



Natural Resource Monitoring at Colorado National Monument



Colorado 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 Colorado National Monument.

Landbirds



Dark-eyed junco (pink-sided).
©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 two plots in pinyon-juniper habitat at Colorado NM. 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 habi-

tat, appeared to be experiencing significant declines. The trend was not significant for Bewick’s wren in low-elevation riparian habitat, but the 2010 density estimate 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. One new species (dark-eyed junco, pink-sided) that had previously been noted as probably present was recorded at Colorado NM.

Paleontological Review



Fossilized turtle tracks.
NPS/S. Bellacqua

In 2011, the NCPN worked with contractor Justin Tweet to complete a literature review of the monument’s paleontological resources. Fossil deposits in and near the park are rich and have been known since 1885. The report covers geologic strata from the Chinle Formation, in the Upper Triassic, to Quaternary rocks and

sediments from the Pleistocene and Holocene. Close to 100 localities and over 400 collections are known within the monument. The bulk of the collections are from Quaternary sediments. Fossils range from monocotyledonous (flowering) plants and conifers to insects, sharks, dinosaurs, and mammals.

Exotic Invasive Plants



Russian olive.
D.E. Herman et al. @USDA-NRCS PLANTS Database

Invasive exotic plants represent one of the most significant threats to natural resources in national parks. Exotic plants are able to reproduce prolifically, rapidly colonize new areas, displace native species, and alter ecosystem processes across multiple scales. However, if these invaders are discovered in their early stages, control efforts are likely to cost less and achieve higher success rates than after a species has become more widespread. The NCPN plans to meet with park staff to review the invasive plant routes that were previously moni-

tored in 2009. NCPN crews will then complete the second year of monitoring in summer 2011. In 2009, there were 150 infestations of high-priority invasive plants, most found in riparian areas. Very few infestations were detected along park trails. Tamarisk had decreased, and Russian olive increased, since the last surveys were completed by Utah State University in 2003. Invasive plants found in 2009 were generally in small, localized areas that had promising chances for control.

Air Quality



Park 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 qual-

ity report was produced in 2010. For Colorado NM, the report focused on ozone monitoring. While ozone levels were estimated to be in moderate condition at the park, there were not enough data to determine trend; as such, it is not known if the park is currently meeting its 2009 GPRA goal for ozone.

Climate

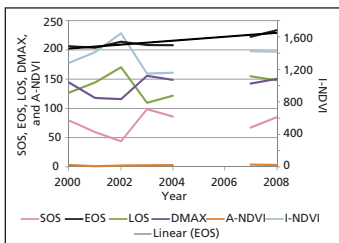


Clouds over Colorado NM (NPS)

The NCPN compiles and analyzes climate data from one weather station in Colorado NM. In 2010, mean annual maximum temperature tended to be below average throughout much of the NCPN region, while mean annual minimum temperature, precipitation, and snowfall were above long-term averages. Most stations with long observation periods show a general

increase in average annual minimum temperature over the past 30–50 years. There is evidence for a declining trend in snowfall from the 1980s to the mid-2000s; however, snowfall in 2010 and during the previous couple of years was higher than the long-term average. A climate report was produced by the NCPN and posted on the network's web site in 2011.

Land Condition



Annual spring phenology metrics,
Colorado NM, 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 report on remote sensing of vegetation phenol-

ogy and snow-cover extent in NCPN parks, covering the years 2000–2009. For those years, the analysis showed one statistically significant trend for Colorado NM, where the end of senescence (EOS) for the spring growing season was occurring earlier in the year (black lines in chart). This trend should be considered with caution because it is based on a short (10-year) record with two years (2005 and 2006) of missing data. The full report is posted on the network's web site.

For more information

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