



Natural Resource Monitoring at Colorado National Monument

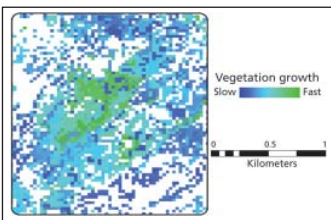


Wedding Canyon (NPS)

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.

Land Use and Land Cover



Vegetation growth rates, 1984–2002.
Oregon State University

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, with newly developed image analysis techniques, 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. In the near term, this project will focus on park-specific issues of management concern related to cheatgrass invasion and changes in pinyon-juniper cover.

Climate



Mist and snow in Monument Valley (NPS)

The NCPN compiles and analyzes climate data from one weather station in Colorado NM. In 2009, average annual maximum temperatures tended to be below average throughout much of the NCPN region. Precipitation in 2009 was noticeably below long-term averages for 20 of 23 stations with valid precipitation totals. Snowfall was somewhat less than long-term averages at many stations. Most stations with long

observation periods show a general increase in average annual minimum temperature over the past 29–49 years. Conversely, there is evidence for a declining trend in snowfall over the past 20–25 years. Colorado NM climate data for the years 1940–2009 are available in an interactive, graphical format on the NCPN web page. A climate report, produced by the NCPN in 2010, is also available on the network’s web site.

Exotic Invasive Plants



Cheatgrass.

Cassandra Skinner@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. In 2009, the NCPN conducted pilot monitoring of invasive exotic plants at Colorado NM. A report on this first field season has been completed and will be published in spring 2010.

Air Quality



Bookcliff View (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 Colorado NM, the report focused on ozone monitoring, which has been

conducted using a portable ozone monitoring station unit there since 2006. Ozone levels at Colorado 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.

Landbirds

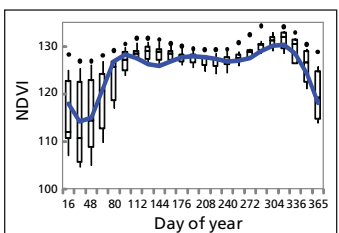


Black-throated sparrow (©Greg Lavaty)

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 two plots in pinyon-juniper habitat at Colorado NM. We currently estimate that we will be able to detect a popula-

tion 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 sage-shrubland. This trend information is preliminary.

Land Condition



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

The NCPN and U.S. Geological Survey have developed remote-sensing methods to study how broad-scale vegetation condition responds to short-term weather patterns, long-term climate trends, land use, and geographic position. Understanding vegetation response enhances knowledge 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 satellite imagery. The timing of green-up in 2009 was approximately the same as the 9-year average. Mid-season productivity then fell well below average before catching up and then again falling below the 9-year average late in the season. Brown-down occurred earlier than in previous years.

For more information

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