



Natural Resource Monitoring at Fossil Butte National Monument



Fossil Butte 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 Fossil Butte National Monument.

Inventory Needs



Pallid bat (USGS/T. Mollhagen)

Except for vegetation mapping, the NCPN no longer receives funding for natural resource inventories. However, networks and parks may have opportunities to compete for funds to support additional inventories in the future, or there may be year-end funds available for those inventories. In 2009, NCPN park managers were asked to compile a list of inventories they would like to see completed if funding becomes

available, and to rank those inventories as high, medium, or low priority. In rank order relative to the overall network, the inventories identified as high-priority for Fossil Butte NM were bats, unique insects, and rare plants. Having this “wish list” ready will provide the NCPN with direction when seeking external funding and potential partnership opportunities that often require quick action.

Invasive Exotic Plants



Field bindweed (*Convolvulus arvensis*)
R.A. Howard © USDA-NRCS PLANTS Database

In 2008, the NCPN implemented a pilot field season of invasive exotic plant (IEP) monitoring at Fossil Butte NM. The three-pronged methodology included (1) surveys of established monitoring routes by experienced field staff, (2) one-time inventories of areas of high concern to park managers, and (3) “monitoring lite,” a method used by park staff or volunteers with less knowledge of invasive species. In 2009, the NCPN produced the first IEP report for the

park. A total of 23 IEP species were detected. They were found to be widespread along the main park road, but less prevalent elsewhere. Generally, the further a route was from areas of high visitation, the less IEPs detected. Many IEPs were present in small, localized invasions that have a promising chance of successful management control and eradication. A report on this field season is now available at the network’s web site.

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 sagebrush-shrubland at Fossil Butte 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.

Climate

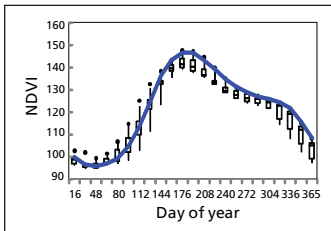


Early snowstorm (NPS)

The overarching goal of NCPN climate monitoring is to compile and present climate data in a form that helps us to understand the reasons for trends seen in other network vital signs. The NCPN compiles and analyzes climate data from one weather station in Fossil Butte 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. Fossil Butte NM climate data for the years 1990–2009 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.

Land Condition

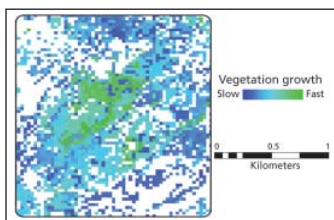


Normalized Difference Vegetation Index values for Fossil Butte NM in 2009, plotted with historical ranges.

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. Green-up occurred at the same time and rate as the 9-year average in 2009, which was one of the most productive in the last 10 years, based on peak season greenness and sustained greenness. During most of the growing season, the 2009 curve was generally at or above the 9-year average. End of season brown-down occurred later than in previous years.

Land Cover and Land Use



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.

For more information

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