



Natural Resource Monitoring at Fossil Butte National Monument



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Wasatch Saddle.

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.

Vegetation Mapping



Vegetation mapping plot (NPS)

The NCPN has completed a multi-year, multi-partner effort to map vegetation at Fossil Butte NM. 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 158 vegetation classifica-

tion plots, 97 observation points, and 622 accuracy assessment points. A total of 1,709 map polygons representing 39 natural and semi-natural vegetation map classes were developed for the project, which achieved an overall mapping accuracy of 89%. These maps will be a valuable resource for use in park management, resource monitoring, interpretive programs, planning, prescribed fire, and as a baseline for designing ecological studies. All final products were delivered to park staff in August 2010.

Rare Plants



Tufted twinpod.

©Walt Fertig

Three plant species present in Fossil Butte NM are listed as species of concern by the Wyoming Natural Diversity Database: *Physaria condensata* (tufted twinpod), *Lepidium integrifolium* (thick-leaf pepperwort), and *Astragalus lentiginosus* var. *salinus* (salty loco milkvetch). Through a cooperative agreement with the University of Wyoming, funded by the Rocky Mountains CESU, the NCPN hired Walt Fertig

to conduct a rare plant inventory in the park. In 2010, tufted twinpod habitat was mapped along Fossil Butte and other outcrops of the Green Formation within the monument. New habitat was found and tufted twinpod presence was confirmed at several sites. In addition, thick-leaf pepperwort was mapped and several new locations were found for salty loco milkvetch. Field work will continue in 2011.

Landbirds



Black-billed magpie.
©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 sagebrush-shrubland at Fossil Butte 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 habitat, 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.

Invasive Exotic Plants

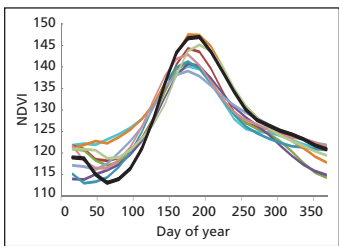


Cheatgrass.
Cassandra Skinner@USDA-NRCS PLANTS Database

Invasive exotic plants (IEPs) 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 2010, NCPN staff detected 21 IEP species (11 Priority 1 IEPs)

on monitoring routes and quadrats at Fossil Butte NM. Although some IEPs that were targeted for control along the Main Park Road and Chicken Creek were found in reduced numbers when compared to previous years, Priority 1 IEPs have increased in number and size of infestations in most other areas. Efforts should be made to ensure that the area around Fossil Butte, which is largely free of Priority 1 IEPs, is maintained. NCPN staff will return to re-visit all monitoring routes in 2012.

Land Condition



Annual NDVI curves stacked for inter-annual comparison, Fossil Butte 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 phenology and snow-cover extent in NCPN parks, covering the years 2000–2009. The maximum NDVI greenness at Fossil Butte NM in 2009 (black line) was 10.5% above the nine-year average.

Climate



Clouds above Fossil Butte NM.
USGS/P. Stoffer

The overarching goal of NCPN climate monitoring is to compile and present climate data in a form that helps explain the trends seen in other network vital signs. The NCPN compiles and analyzes climate data from one weather station in Fossil Butte 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.

For more information

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