



Natural Resource Monitoring at Golden Spike National Historic Site



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Golden Spike National Historic Site.

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 Golden Spike National Historic Site.

Water Quality



Blue Creek.

NCPN water-quality monitoring is made possible through partnerships between the I&M Program, individual park units, the U.S. Geological Survey, and the State of Utah’s Division of Water Quality. In 2010, the network published its second biennial report on water quality in NCPN parks, covering the period from January 1, 2006 to December 31, 2009. The news was good: of the 25,462 total water-quality evaluations completed on 1,267 site visits to 76 different locations during those years, 24,878

(97.7%) did not exceed state water quality standards. Many of the recorded exceedances were due to naturally occurring conditions characteristic of the geographic setting. Of 13 comparisons of results against beneficial use standards conducted at one site in Golden Spike NHS, one (7.7%) exceeded water quality standards, in the category of total dissolved solids. Natural weathering of mineral-rich deposits left behind from Prehistoric Lake Bonneville is likely contributing dissolved solids to Blue Creek.

Vegetation Mapping



Bureau of Land Management's Haywood

Woods' rose.

The NCPN is nearing completion on a multi-year, multi-partner effort to map vegetation at Golden Spike NHS. This project has included gathering aerial photography, collecting initial vegetation plot data, using that data to classify vegetation types and write vegetation descriptions, writing a dichotomous vegetation-type key, performing photo interpretation, collecting accuracy assessment data, creating a geo-

database, and writing the final report. These maps will be a valuable resource for use in park management, natural resource monitoring, interpretive programs, park planning, and prescribed fire, and as a baseline for designing ecological studies. The map, report, and all final products are currently planned for completion in fall 2011.

Invasive Exotic Plants



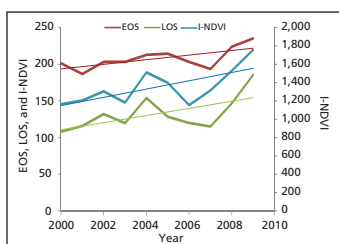
Cheatgrass.

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, twenty-five IEP species were detected on monitoring routes and plots that covered all major roads, trails, and riparian areas. IEPs are widespread at

the park, with at least one IEP present on every monitoring route and monitoring transect. Four IEP taxa are widespread and may be beyond management control: crested wheatgrass (*Agropyron cristatum*), cheatgrass (*Bromus tectorum*), field bindweed (*Convolvulus arvensis*), and redstem storksbill (*Erodium cicutarium*). Several other species are present in small, localized invasions that have a greater chance of being successfully controlled through management actions. Infestation rates in 2010 were similar to rates estimated in 2008. The network will return for a third year of monitoring in 2012.

Land Condition

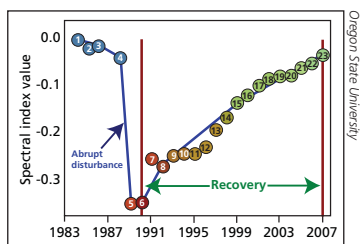


Annual spring phenology metrics with trends, Golden Spike NHS, 2000–2009.

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, cov-

ering the years 2000–2009. For those years, the analysis showed four patterns for Golden Spike NHS: during the spring growing season, the end of senescence (EOS) was occurring later in the year and the length of season (LOS) and I-NDVI (the metric most often used as a measure of overall productivity) were increasing. In addition, snowmelt (i.e., the day of the year when snow cover falls below 5.5%) was occurring later in the year. These patterns should be considered and evaluated with caution because they are based on a short, 10-year record. The full report is posted on the network's web site.

Land Cover and Land Use



Spectral index showing landscape disturbance and recovery over time.

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 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. Cooperators at Oregon State University have analyzed 25 years of Landsat imagery and developed new analysis techniques for arid ecosystems. Pinyon-juniper dynamics at Dinosaur NM are currently being examined; after this work is complete, we will determine the utility of applying these techniques at other NCPN parks. We are also evaluating this technology for application to riparian ecosystems and grazed versus ungrazed environments.

For more information

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