

Northern Colorado Plateau Network

Monitoring Brief

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program



2015

Integrated Uplands Monitoring

Importance

The vast majority of lands in Northern Colorado Plateau Network (NCPN) units are uplands, which include rock outcrops, badlands, shrublands, grasslands, woodlands, and forests. Upland vegetation provides energy and habitat for countless other organisms, and is a key component of species diversity. Uplands also retain soils and nutrients, absorb and release water, and buffer high-runoff precipitation events. These factors all strongly influence riparian condition in the watershed. Upland ecosystems are slow to recover from disturbance. However, several network parks contain relatively undisturbed examples of grasslands and shrublands (e.g., areas that have been rested from grazing for 15–30 years). Historic land uses include livestock and timber production. More recently, recreational use has increased. To effectively manage uplands, the National Park Service needs to know the impacts of these uses.

Process and Use

Integrated uplands monitoring includes several components. Field crews measure soil stability, hydrologic function, biological soil crusts, and characteristics of plant communities. The network's survey design selects randomized, spatially balanced sampling plots. Each plot is visited in two consecutive years, followed by a relatively long interval between revisits (3–6 years). This design minimizes the chances that sensitive, arid-ecosystem plots will be damaged by repeated visits in successive years. It is also a cost-effective way to estimate the health of upland ecosystems across large areas. NCPN uplands monitoring is intended to increase fundamental understanding of these systems and provide managers with early warning of undesirable change.

Status and Trends

The NCPN initiated uplands monitoring in 2006, and now monitors these systems in 10 park units. After some reductions in field work in 2013 (due to the federal budget sequester), we were able to return to monitoring all scheduled upland plots in 2014. By the end of the 2014 field season, all monitoring plots were established in Bryce Canyon, Capitol Reef, and Zion national parks and Timpanogos Cave National Monument. Going forward, we plan to focus on in-depth analysis of data from a couple of parks each year, beginning with Capitol Reef and Canyonlands national parks. Data from grasslands at Capitol Reef NP are currently being analyzed. These data will help inform the park's upcoming environmental impact statement on grazing.

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Network park units where uplands are monitored

Arches NP	Cedar Breaks NM
Black Canyon of the Gunnison NP	Curecanti NRA
Bryce Canyon NP	Dinosaur NM
Canyonlands NP	Timpanogos Cave NM
Capitol Reef NP	Zion NP

NP = National Park; NM = National Monument; NRA = National Recreation Area

Canyonlands NP. NPS photo.

Variation in Pinyon-juniper Woodlands

Pinyon-juniper (PJ) woodlands are monitored in more NCPN park units than any other vegetation type, accounting for about one quarter (27%) of our uplands monitoring effort. PJ woodlands are a characteristic plant community of the Colorado Plateau, where they occur on a wide variety of soils and landforms at elevations of 5,500–8,200 feet. In most NCPN park units, these woodlands are dominated by Utah juniper (*Juniperus osteosperma*) and two-needle pinyon (*Pinus edulis*). The understory of PJ woodlands varies widely, but often consists of sparse shrubs and perennial bunchgrasses.

Not all PJ is created equal, however. At lower elevations of Zion NP, two-needle pinyon is replaced by singleleaf pinyon (*Pinus monophylla*), more common to the Great Basin. Extensive research on the historic distribution and fire ecology of PJ woodlands in the western U.S. has revealed three main types of PJ, based on soils, landforms, and types of disturbance: persistent woodlands, savannas, and wooded shrublands (Romme et al. 2009).

Most PJ woodlands on the Colorado Plateau are persistent woodlands. They occur on shallow soils and tend to have long intervals between fires (200–600 years), with no evidence of fire in some places. A much smaller area of the Colorado Plateau, including some parts of Dinosaur NM and Zion NP, consists of the wooded shrubland type. This type tends to experience more active expansion and contraction across the landscape over time (Romme et al. 2009). However, fires were still found to be small and rare in wooded shrubland systems. The savanna type is not known to occur in NCPN sampling areas to any great extent.

Recent research found strong evidence of long intervals between fires in PJ communities at Colorado and Dinosaur national monuments (Floyd-Hanna et al. 2014; Kennard and Moore 2013). Preliminary assessments of Zion NP suggest long intervals between fires there, too, but more data are needed (Brown et al. 2014).

Implications for Fire Management

Some recent research has suggested eliminating or greatly reducing prescribed fire as a management tool in systems with long intervals between fires—such as most of the PJ woodlands at NCPN park units (Arendt and Baker 2013; Baker and Arendt 2014; Kennard and Moore 2013). This is a change from past fire management practice, in which PJ woodlands were commonly burned to limit encroachment of trees into grasslands and shrublands. Research at Dinosaur NM has actually shown a net loss of PJ woodlands over the last 90 years (Arendt and Baker 2013).

Researchers caution against using prescribed fire in PJ woodlands where exotic annual grass is present, due to the risk of conversion to exotic annual grassland (Arendt and Baker 2013; Baker and Arendt 2014; Kennard and Moore 2013). Parts of Dinosaur NM and Zion NP have already been converted from PJ woodlands to exotic annual grasslands after fires, and cheatgrass (*Bromus tectorum*) has invaded many areas of many park units (Brown et al. 2014; Sherrill and Romme 2012). Although prescribed burning is still a valid management tool in PJ woodlands, it is important to understand an area's historic fire regimes and risk of conversion to exotic annual grassland when determining where and when prescribed fire is appropriate.

References

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