



Integrated Uplands Monitoring

Importance

Uplands represent the vast majority of land area in the Northern Colorado Plateau Network (NCPN), and include rock outcrops, badlands, shrublands, grasslands, woodlands, and forests. Upland vegetation provides energy to other trophic levels, habitat structure for various organisms, and is a significant component of species diversity. The ability of uplands to retain soil and nutrients, absorb and release water, and buffer high-runoff precipitation events is a major influence on riparian condition. Upland ecosystems are easily disturbed and slow to recover, yet several NCPN units contain relatively undisturbed examples of grasslands and shrublands. 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.

Long-term Monitoring

Integrated uplands monitoring includes measuring soil stability, hydrologic function, biological soil crusts, and plant community characteristics. The NCPN uses a complex survey design to select randomized sampling plots that are 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 and is a cost-effective way to estimate the health of upland ecosystems across a large area. NCPN uplands monitoring is intended to strike a balance between increasing fundamental understanding of these systems and providing managers with early warning of undesirable change.

Status and Trends

The NCPN initiated uplands monitoring in 2006. By the end of the 2012 field season, the network had implemented long-term monitoring designs for all 10 park units where uplands are monitored. From fall 2012 through winter 2013, data from the 2011 field season were summarized in annual reports for those 10 park units. This will be the last set of yearly summary reports produced for uplands monitoring, as the focus of reporting will now shift to more detailed analyses to identify trends. A trends report for Canyonlands NP is expected later in 2013.

Due to cuts resulting from the federal budget sequester, uplands monitoring was reduced in 2013. After soliciting and receiving feedback from park staff, the network decided to cancel sampling of grasslands and pinyon-juniper systems at Arches NP and pinyon-juniper systems at Dinosaur NM.

Contact

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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

Horses on a grazing allotment, Dinosaur National Monument. NPS photo.

Invasive Exotic Plant Species in NCPN Uplands

Though the NCPN has a protocol specifically dedicated to detecting invasive plants along common pathways, invasive-plant tracking is an important part of the uplands protocol, as well. Here, the goal is to document trends in already-established exotics (and those that expand after fires) through ecosystems over time and estimate the status of exotic plant species throughout NCPN uplands. Some of our findings to date are presented below.

What is the most common non-native species in NCPN uplands?

Cheatgrass (*Bromus tectorum*) is, by far, the exotic species most likely to be encountered in NCPN uplands monitoring, and the species with some of the highest cover. This invasive is especially problematic in sagebrush shrublands and pinyon-juniper woodlands, where it can expand dramatically after fires, increase the potential for future fires, and outcompete native perennial vegetation.

Although cheatgrass is not as widespread in NCPN uplands as it is in the Great Basin, there are some areas where this invasive is especially prevalent. At Dinosaur NM, sagebrush shrublands and pinyon-juniper woodlands seem to be particularly susceptible to cheatgrass dominance after fire, especially at lower elevations. Zion NP has struggled with a large expansion of cheatgrass in pinyon-juniper woodlands burned by the Kolob Fire in 2006. Cheatgrass has heavily invaded the understory of pinyon-juniper woodlands in the Red Rock Canyon area of Black Canyon NP, despite healthy, intact tree canopies. Cheatgrass has been detected with less frequency and cover at nearly every other lower-elevation ecosystem that the NCPN monitors, including grasslands, blackbrush shrublands, and Gambel oak shrublands.

Which NCPN uplands have the fewest exotic species?

Pinyon-juniper (PJ) woodlands and mixed-conifer forests at Bryce Canyon NP consistently have the lowest cover and frequency of exotic species of any of the upland areas that the NCPN monitors. Our monitoring indicates that the park's PJ woodlands are currently free of cheatgrass—and we hope that it stays that way, because pinyon-juniper woodlands are one of the ecosystems where cheatgrass is especially problematic. While exotic plant species are present in the park, their frequency and cover is likely lower than in surrounding lands with higher use impacts (e.g., grazing, off-highway vehicle use).

Which other species are often detected in NCPN uplands?

Russian thistle (*Salsola tragus*) is a common invader of low-elevation grasslands at Arches, Canyonlands, and Capitol Reef national parks. Kentucky bluegrass (*Poa pratensis*) is often found in aspen (Curecanti NRA), Gambel oak (Black Canyon of the Gunnison and Zion NPs), spruce-fir (Cedar Breaks NM), and subalpine meadow plots (Cedar Breaks and Timpanogos NMs). Dandelions (*Taraxacum officinale*) are common invaders of these higher-elevation systems, as well. Desert madwort (*Alyssum desertorum*) has high cover in some sagebrush plots at Dinosaur NM, and is often found with cheatgrass. Prickly lettuce (*Lactuca serriola*) sometimes invades after fire; we have recorded it at sagebrush shrublands in Dinosaur NM and pinyon-juniper woodlands at Zion NP.



Cheatgrass dominates a pinyon-juniper woodland after the 2006 Kolob Fire, Zion National Park.