



Sand Creek Massacre National Historic Site

2011 Grasslands and Fire Effects Monitoring

Grassland vegetation is the most widespread vegetation type occurring in the Southern Plains. Fire, along with climate, is the biggest determinant of whether grasslands preclude forests, and also is a critical natural process and a primary influence on the plant and wildlife communities of national parks. Monitoring grassland vegetation communities and the effects of fire will help Southern Plains park managers better understand the dynamic nature of these ecosystems and provide an early warning of abnormal conditions. This information can help managers make effective decisions, including planning of prairie restoration efforts.

The overall goal of monitoring Southern Plains grassland communities is to help park managers better understand the dynamic nature of grassland vegetation ecosystems and the processes that influence them. Specific objectives are to: (1) determine status and trends in plant species composition (richness and diversity) and community structure (relative abundance, frequency, distribution, ground cover) of remnant, disturbed, and restored grasslands; (2) document the location, extent, and timing of wildland and prescribed fires and management treatments; and (3) determine status and trends in soil structure (erosion potential, infiltration rate, compaction, texture, stability) and soil chemistry (bulk soil carbon to nitrogen ratios).

Methods

A total of 11 fire and 11 long-term monitoring transects were established at Sand Creek Massacre National Historic Site (NHS; Figure 1). Plant communities monitored include: upland grasslands consisting of blue grama-buffalograss herbaceous vegetation and alkali sacaton-saltgrass herbaceous vegetation; upland sage consisting of sand sage/sideoats grama-blue grama shrubland and sand sage/sand bluestem shrubland, which are considered for type conversion; restoration consisting of reclaimed agricultural land, which is of particular management interest to the park; cottonwood galleries containing cottonwood/western wheatgrass-switchgrass woodland, also of special interest to the park. All long-term transects were monitored and no fire monitoring sites were monitored in 2010 or 2011.

Results

These early-monitoring results provide a baseline to measure future trends and should not be viewed as trends themselves.



Grassland plant community at Sand Creek Massacre NHS.

The extreme rainfall variation between the 2010 and 2011 field season has resulted in noticeable changes in plant response. The grassland communities monitored at Sand Creek Massacre NHS contain native perennial grasses; no exotic grass species were detected in the transects, although cheatgrass (*Bromus tectorum*) is to be found along the county road boundary. These stable grasslands contain a diverse mix of primarily perennial forbs. Roughly two-thirds of the ground strata is litter, which provides shade and moisture retention in this arid environment.

Sand Creek Massacre NHS - 2010 Grassland/Fire Plots

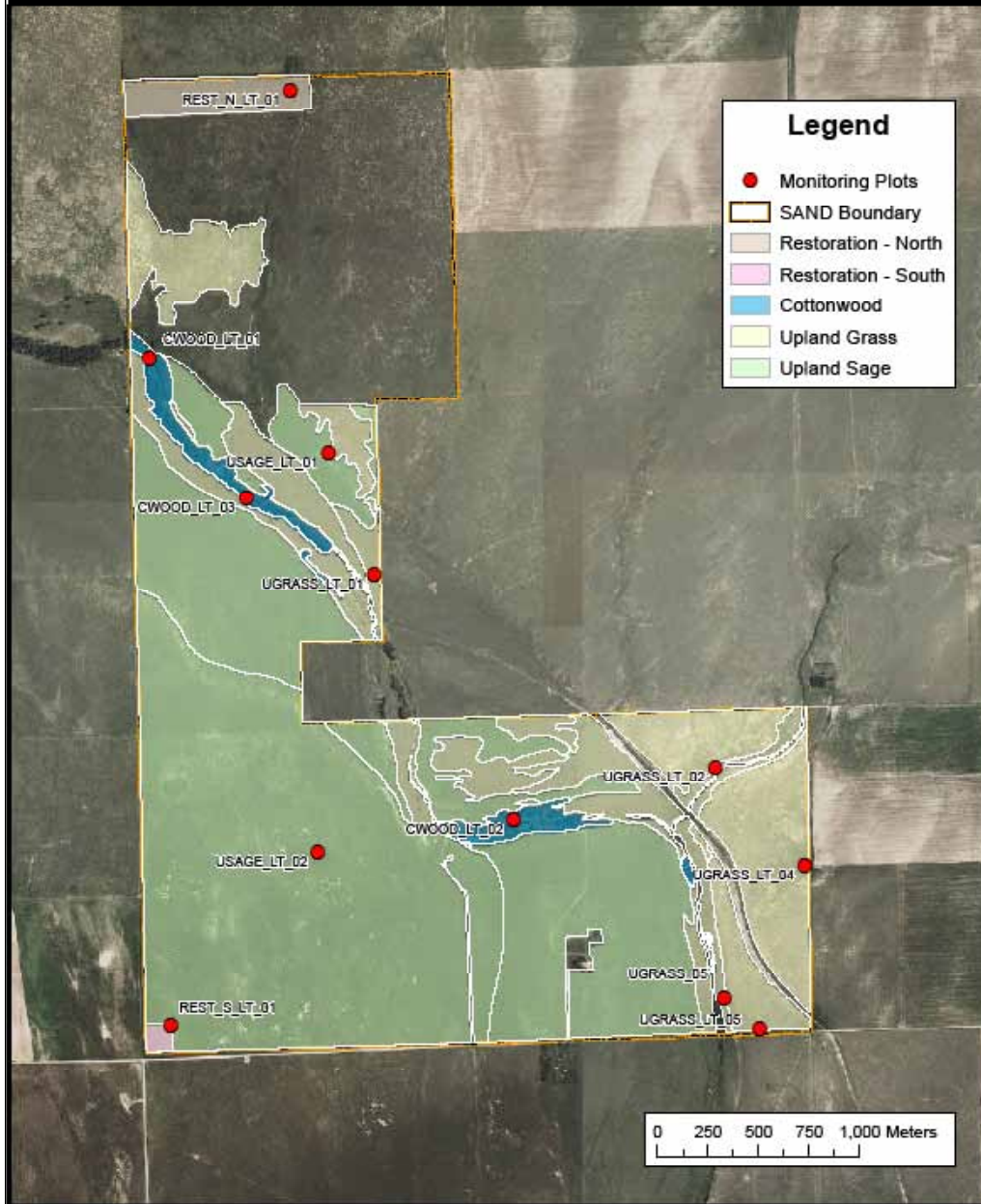


Figure 1. Monitoring transects, Sand Creek Massacre NHS 2010 and 2011.

Restoration efforts on two parcels of grassland show varying results. The older restoration at the north end of the park shows better conversion to native forbs and grasses. The southern restoration area was in ruderal exotics and is just beginning establishment and has been limited by moisture. This area of loose sandy loam is subject to wind erosion and continued efforts at stabilization and exotic control will be needed for success.

In addition to the cheatgrass mentioned above, several annual forbs are found throughout the park. *Kochia* (*Kochia scoparia*) and prickly Russian thistle (*Salsola tragus*) are long-established components of the agricultural suite of exotics and are easily spread throughout the landscape. The perennial field

bindweed (*Convolvulus arvensis*) is present in restoration and upland sites and is of particular concern. The current drought has no effect on its ability to produce copious amounts of seed, giving it a competitive edge over the drought-dormant natives. Exotic species are discussed in greater detail in the Exotic Plant Monitoring Annual Report.

The use of prescribed fire is being considered at Sand Creek Massacre NHS but has not been implemented. To date, mowing and debris removal are being used for fuels reduction. No wildfires have occurred during the last five years.