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USA: Alabama: Cumberland Sandstone Glade Restoration at the William B. Bankhead National Forest

Overview

Sandstone glades of the Southern Cumberland Plateau are rare and unique plant communities exhibiting some of the richest endemic floras of any habitat type in the eastern United States. As such, they have become a conversation priority and are included in a broad restoration initiative of the US Forest Service at William B. Bankhead National Forest in northern Alabama. In 2007, a pilot project was conducted on a 3-acre glade to test methodology and thus help guide and inform broader restoration goals. Excessive woody biomass was removed from the site to accommodate the open-condition requirements of its endemic and common plant species, and plans were made to reintroduce landscape-level fire influences to the site on a periodic basis. Outcomes from this project will shape the implementation of restoration activities at the 50 other small glades expected to be targeted under the initiative.

Quick Facts

Project Location:

William B. Bankhead National Forest, Alabama, USA, 34.133437, -87.25834609999998

Geographic Region:

North America

Country or Territory:

United States of America

Biome:

Temperate Forest

Ecosystem:

Temperate Forest - Mixed

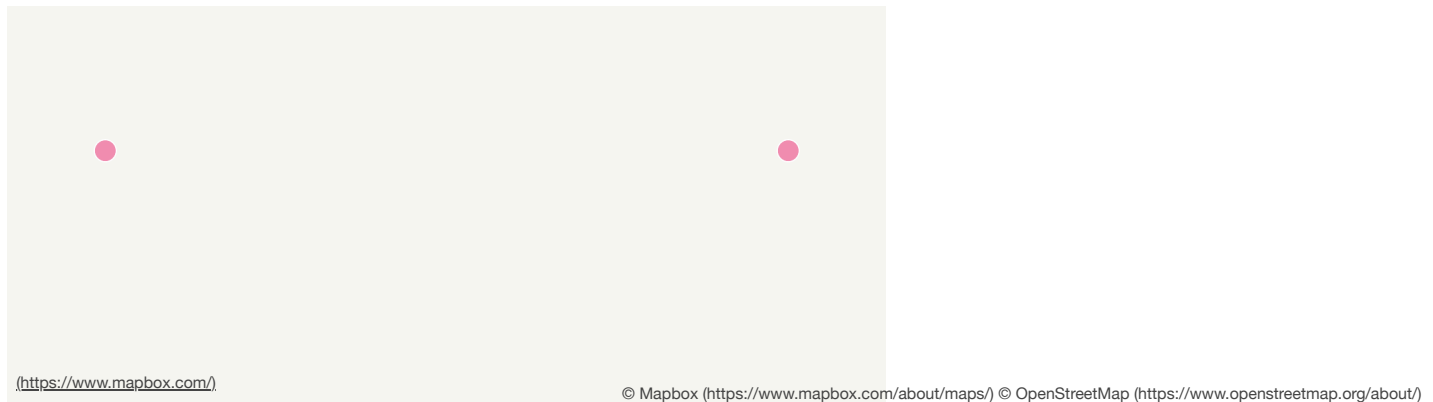
Area being restored:

3 acres

Organization Type:

NGO / Nonprofit Organization

Location



TIMEFRAME

Project Stage:

Completed

Start Date:

2007-01-21

End Date:

2007-03-21

DEFINING THE PROBLEM

Primary Causes of Degradation

Urbanization, Transportation & Industry

Degradation Description

Generally, the current conditional assessment of the glades is poor to fair. The number of woody stems and biomass accumulations within the glade interiors, rock outcrops and the surrounding ecotones is excessive, frequently falling outside desirable levels.

Ecologically, this results from temporally and spatially altered fire regimes which allowed the proliferation of woody vegetation, especially within ecotonal areas. These natural communities need periodic fire to maintain the open-condition requirements of its endemic and common plant species. As a result of active fire exclusion in the surrounding silvicultural uplands, the glades have been excluded from natural disturbance and commonly exhibit encroachment by loblolly and virginia pines, shrubs, vines and woody forbs. Moss and lichens may in some cases be considered overabundant.

Downed woody debris frequently covers the sites. In combination with this pine recruitment and woody encroachment, the Bankhead National Forest has been subjected to tree mortality caused by southern pine beetle infestations, wind events and droughts that have displaced abnormally large amounts of downed trees within and around the glades. Coincided biomass intrusions into the glade interior results in increased soil accumulation that elicit shifts in plant species and composition and allow native and non-native invasive species expansion. In addition, conditions of the glades also suffer from direct human caused habitat modifications from unauthorized vehicle travel, trash deposition and other impacts.

PLANNING AND DESIGN

Reference Ecosystem Description

Glade communities are typically embedded within adjacent forested community types and, without exception, are associated with rock outcrops, edaphically-controlled herbaceous plant and non-vascular taxa communities occurring on exposed bedrock or of very shallow soil accumulation. As such, they illustrate the impact of bedrock geology on plants and often exemplify the development of plant endemism. In fact, sandstone and limestone glades represent some of the richest endemic floras for any habitat type in the eastern United States, with 26 endemic or near-endemic taxa (Baskin and Baskin 1986), four of which are federally listed as Endangered or Threatened (U.S. Fish and Wildlife Service 2006). Each of these discrete communities is found on the Bankhead National Forest.

The species composition and habitat conditions of the sandstone glade observed at the Bankhead National Forest are somewhat similar to that characterized under the natural vegetation classifications developed for the Alabama Cumberland Sandstone Glade (A. Schotz, 1998) and Cumberland Sandstone Flat Rock Glade (M. Pyne, 2005), but exhibit regional and species variations.

Where soils are non-existent or sufficiently shallow to limit the establishment of woody species, a suite of low-growing herbs, bryophytes, and lichens commonly become well developed. Characteristic groundcover vegetation associated with glades of the Bankhead National Forest includes *Cladina* spp., *Cladonia* spp., *Polytrichum* spp., *Grimmia* spp., *Liatris microcephala*, *Packera anonyma*, *Hypericum gentianoides*, *Nuttallanthus canadensis*, *Eurybia hemispherica*, *Opuntia humifusa*, *Croton willdenowii*, *Polygala curtissii*, *Agalinis tenuifolia*, *Danthonia sericea*, *Andropogon virginicus* and *Schizachyrium scoparium*. Small, contorted examples of *Pinus virginiana* occupy areas with an accumulation of soils, such as rock crevices and micro-depressions, as well as dominating some ecotones.

While *Pinus virginiana* often attains the greatest prominence within ecotones and further up slopes, a suite of secondary associates also occur as arborescent species, most notably *Amelanchier arborea*, *Kalmia latifolia*, *Hypericum frondosum*, *Chionanthus virginicus*, *Oxydendrum arboreum*, *Vaccinium arboreum*, and the vines, *Gelsemium sempervirens*, *Bignonia capreolata* and *Vitis rotundifolia*.

As the soil covering becomes heavier, denser woods appear, the succession of principal trees being about as follows (where not manipulated by silviculture): *Quercus alba*, *Quercus falcata*, *Carya alba*, *Pinus echinata*, *Liriodendron tulipifera*, *Quercus stellata*, and *Oxydendrum arboreum*, the last-named being equally at home in both associations.

Project Goals

The conservation goal is to prioritize rehabilitation of multiple large & small glade patches and attempt to connect these, where possible, and integrate all restored glades into the surrounding woodland or forest ecosystem management processes (encouraging the frequent use of prescribed fire as a management tool). This conservation goal would, in theory, mean restoring approximately 50 small glade examples or 0.001% of the total National Forest landscape.

Monitoring

The project does not have a monitoring plan.

PROJECT ACTIVITIES

Description of Project Activities:

A sandstone glade near the Cranal Road was identified and funding secured to initiate a pilot project during the Winter and early Spring 2007. A restoration plan was developed, and objectives included: --Manual removal of excessive accumulation of woody biomass interior to glade and associated rock outcrops with the deposition of this debris relocated beyond a distance of 66 feet (20 meters) from glade ecotones and thoroughly scattered to minimize modifications in subsequent fire behavior --Eradicate any non-native invasive species intrusion and eliminate reproducibility of all surrounding non-native populations --Reintroduce fire influences at the landscape level, where practicable --Strategically integrate discreet communities into broader management --Monitor vegetation responses and site-specific conditions As a general metric, increasing the average size of glade openings to 5 acres (2.02 hectares) over time, as monitored by aerial photography, GIS and permanent photo points, will be considered. The restored range of variation emphasizes parameters of a 0 - 14 basal area (sq. ft. / ac.) for the adjacent woodland; shrubs (including sprouts) should occupy less than 15% total glade cover; and at least 10 native herbaceous species per meter-squared plot will be indicated and monitored by periodic floristic survey and permanent photo points. Surface fire regimes are planned to incorporate return frequency intervals of 2-3 years during the restoration phase and 3-5 during the maintenance phase. These fires should be moderate in severity and intensity. Fire seasonality targets should occur in late spring or early summer during the restoration phase and later, facilitate ample variation in long-term, post-restoration maintenance to be integrated within prescribe fire applications planned for the surrounding landscape.

PROJECT OUTCOMES

Ecological Outcomes Achieved

Eliminate existing threats to the ecosystem:

The initial treatment has produced improvements in the open structural conditions upon which to further evaluate effects of the material impacts of the restoration.

Factors limiting recovery of the ecosystem:

Of note, the region has suffered from late-season freezing temperatures and from an extended drought, both to be considered within the response assessments during early glade monitoring.

Socio-Economic & Community Outcomes Achieved

KEY LESSONS LEARNED

Key Lessons Learned

As the sandstone glade community recovers an ecological integrity and functional conditions resulting from the restoration treatments, this pilot process will provide USFS resource managers important local guidance in addressing additional restoration of similar communities in the National Forest in order to achieve the target goals and broad conservation strategies for sandstone glade restoration. The Bankhead National Forest, in recognizing these unique habitats as important conservation elements, communicates an important public and ecological value to future generations. It exemplifies the development of adaptive approaches to the ecological restoration of discrete plant communities and their importance to regional biodiversity and long-term conservation stewardship.

LONG-TERM MANAGEMENT

Long-Term Management

Debris removal will be continued in the coming months and monitoring of site conditions has begun. Photographic documentations and qualitative monitoring, having already been initiated, will continue annually.

Where possible, the Bankhead National Forest will include glades in prescribed burns planned for their surrounding forest resource compartment. In some instances, because of their location, some glades will be burned on three-year burn rotations, while others will be within ten-year burn plans. In some cases, inclusion of glades in a prescribed burn may not be practicable.

FUNDING

Sources and Amounts of Funding

Funding was secured through the US Forest Service.

LEARN MORE

Other Resources

David Borland
The Nature Conservancy
2100 First Avenue North Suite 500 Birmingham, AL 35203
dborland@tnc.org

Tom Counts
US Forest Service, William B. Bankhead National Forest
PO Box 278 Double Springs, AL 35553
tcounts@fs.fed.us

CONTACTS

Primary Contact

Organizational Contact

