Enbridge Natural Resource Damage Assessment −
Fort Custer State Recreation Area Oak Savanna Enhancement

Final Project Report
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Widely scattered oaks, tolerant of frequent ground fires amid a landscape dominated by grasses and wildflowers, meets benchmark conditions made possible by the Fort Custer Recreation Area Oak Savanna enhancement.

Project Overview

This project was to provide compensatory restoration for damages to upland habitats from the Enbridge Line 6B oil discharges and subsequent spill response operations. The restoration was conducted within an area of 175 acres of former oak barrens that had turned to brush and closed-canopy forest at Fort Custer State Recreation Area (FCRA) managed by the Michigan Department of Natural Resources, Parks and Recreation Division (DNR; Figure 1). The final restoration resulted in an increase in 67 fully restored acres. The 67-acres of intensive restoration required land clearing and other mechanical shrub and tree removal around existing canopy oaks, as well as invasive species removal. The DNR is continuing shrub and tree control and expanding the restoration throughout the 175 acres so that the site reaches desired conditions and contributes to listed species recoveries.

Background

Only approximately 15 extant oak savanna sites totaling 650 acres are known in Michigan despite an estimate of 719,042 acres in the mid-19th century, resulting in its designation as "critically imperiled" in Michigan by the Michigan Natural Features Inventory. Furthermore, only a few of the 15 sites are surrounded by enough undeveloped land to increase size and continuity – an opportunity uniquely possible at FCRA. There is also a disproportionately high number of state- and federally listed species in oak savanna, including within the project area. These barrens and oak "openings" landscapes were a result of thousands of years of frequent fires managed by Indigenous peoples. The loss of these landscapes closely tracks the history of Indigenous peoples in the region.

Most oak savannas were replaced with individual settler farmsteads where cultivation and grazing transformed the landscape during the 19th-century. The frequent fires set by Indigenous peoples to maintain the open areas between large oak trees ceased, while settlers effectively suppressed those started by lightning strikes. The lack of fires no longer controlled shrubs and trees in remaining savannas so that any uncultivated or lightly grazed savanna eventually became forest. Prior to this Natural Resource Damage Assessment, FCRA and surroundings were known to have abundant evidence of historic oak savanna despite what appeared as closed-canopy forest. This evidence included notes from the General Land Office surveys (November of 1826), extant savanna-indicator species, small relics of savanna plant communities, and appropriate landforms and soils. The following state-listed species have been documented within the project area or nearby on remnant oak savanna that will benefit from restoration:

black and gold bumblebee (*Bombus auricomus*; special concern)
downy sunflower (*Helianthus mollis*; threatened)
false boneset (*Brickellia eupatorioides*; special concern)
lead-plant (*Amorpha canescens*; special concern)
red-headed woodpecker (*Melanerpes erythrocephalus*; special concern)
regal fritillary (*Speyeria idalia*; endangered)
upland boneset (*Eupatorium sessilifolium*; threatened)
white false indigo (*Baptisia lactea*; special concern)
wild sweet-potato (*Ipomoea pandurata*; threatened)

The target acreage of 67 acres was 10% of the extant acreage known in Michigan and was to be focused within Management Unit 11 and 18, both of which contained relic features of oak savanna and were included in contemporary prescribed fires conducted by the DNR. However, the areas required major investment via land clearing and invasive species control. The Trustees funded this project at $25,000 per year for three years, for a total amount of $75,000 between October 1, 2016 and October 15, 2018.

Results

Restoration ultimately occurred on 67 acres by initial removal of all shrubs and most sub-canopy trees by heavy equipment with specialty forestry attachments, exposing the land surface to open conditions. After a century or more of closed canopy, farming, grazing, and fire suppression, the simple action of clearing

shrubs and trees restored some major aspects required of savanna: increased light, temperature, moisture, and reset carbon and nutrient cycling regimes, pollinators, and soil biota. Foundational savanna grasses, wildflowers, and animals are expected to be promoted and increase over time.

The tree and shrub removal occurred in two phases. First, initial land clearing by heavy equipment removed black locust, black and choke cherry, aspen, hazelnut, dogwood, sumac, and sassafras. Rather than clearing in one area and working out, land clearing connected existing smaller openings, thus promoting connectivity between patches of remnant savanna, and accelerated the size of the openings. The second phase required hand work with chain saws within the treatment zones and immediate surrounding areas. The stumps of non-native, invasive shrubs and trees were treated with herbicide to reduce resprouts to the greatest extent possible. Small shrubs and those regenerating after cutting were foliar-treated with herbicide.

DNR staff within the Stewardship Unit of the Parks and Recreation Division continues shrub and tree control and is expanding the restoration in the surrounding area to reach the 175-acre target. Staff and contractors continue to use a combination of mechanical cutting followed by herbicide application to the stumps of invasive species, foliar spraying of some regenerating smaller shrubs, and prescribed fire. Over time, prescribed fire will once again be the dominate disturbance maintaining the oak savanna.

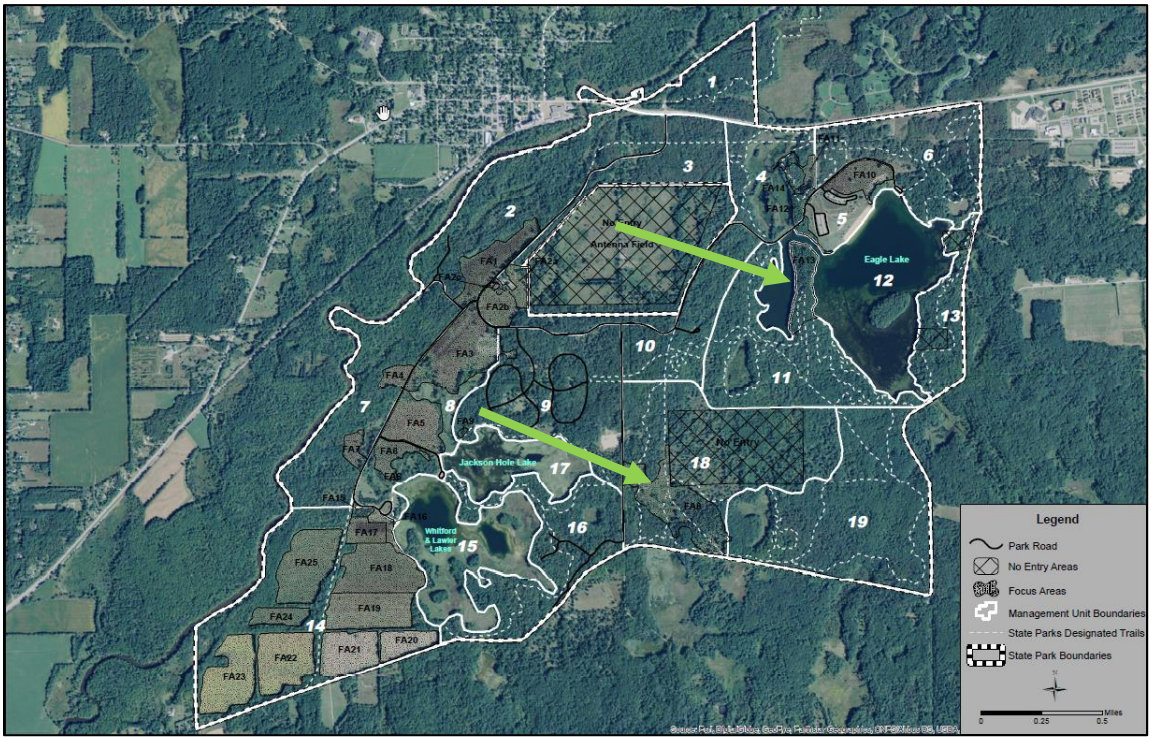

Figure 1. Fort Custer Recreation Area. The land clearing of both native and non-native shrubs occurred in priority areas of Management Units 18 and 11. Intensive work occurred within Focus Areas 8 and 13 (green arrows) within those two management units totaling 67 acres of restoration.

The 67 acres included the following actions.

- 67 acres of invasive species control work.
- 25.4 acres land clearing (machine work)
- 41.6 acres of invasive tree and shrub herbicide treatments (hand work)

An additional 32.5 acres of work was conducted by another funding source (3.2 acres of land clearing and 29.3 mechanical tree and shrub removal) within the same period. When considering the broader impacts of the work funded by this project nearly 200 acres of barrens were enhanced.

For monitoring, project managers took photographs from multiple long-term monitoring points as recently as 2020 (Figures 2A−5B).

Figure 2A. 2009 Fort Custer photopoint 18A prior to clearing. Locust is abundant and lacks oak "grubs" and characteristic wildflowers.

Figure 2B. 2020 Fort Custer photopoint 18A after clearing. Locust is negligible with abundant oak "grubs" and characteristic wildflowers.

Figure 3A. 2009 Fort Custer photopoint 18C prior to clearing. The area is a forest.

Figure 3B. 2020 Fort Custer photopoint 18C after clearing. The area is open and developing characteristic structure and oak savanna species.

Figure 4A. 2009 Fort Custer photopoint 18D prior to clearing. The area is a stand of locust.

Figure 4A. 2020 Fort Custer photopoint 18D after clearing. The area has been cleared and is regenerating characteristic structure and species. The image shows a large American hazelnut surrounding by grasses and wildflowers.

Figure 5A. 2009 Fort Custer photopoint 18E prior to clearing. The area is a stand of locust.

Figure 5B. 2020 Fort Custer photopoint 18E after clearing. The area will continue to be kept open and is fully expected to regain characteristic species over time.

Conclusion

The project provided the funding to reclaim lost historic oak savanna from forest – an expensive endeavor to be absorbed by a state agency operating budget. The DNR continues to maintain the clearing from this project by employing fire and some mechanical control of shrubs, both native and non-native in these and surrounding Management Units at FCRA. The successful restoration of oak savanna structure and characteristic species in the 67 acres was attributed to accurate identification of the location of historic barrens using existing landforms, soils, and historical evidence. The site is also uniquely conducive to the continuation of prescribed fire and mechanical shrub control well into the future.

Various challenges emerged during the initial clearing. First, controlling black locust required herbicide use, including other invasive species such as autumn olive. Locust is notably difficult to control because it can have prolific re-sprouts after cutting due to extensive suckering from the root systems.

Prescribed fire across the management units is a continued priority. We anticipate use of herbicide when and where appropriate to set back locust and other non-native shrubs that we desire to remain out of the restoration areas. Over time, it may be appropriate to reintroduce populations of oak savanna species which fail to emerge despite the increasingly suitable conditions. In these cases, we may consider reintroduction of seed collected from nearby sites to preserve the genetic diversity within the local wild populations.

Lastly, oak savanna restoration is not only intended to bring back rare species and habitat for declining wildlife. Michigan savanna is also a nearly extinguished cultural landscape that was a result of fire management by Indigenous peoples. The act of acknowledging this important aspect is a humble first step to a more viable future for this landscape that is so imbedded in the history and heritage of Michigan. Visitors of FCRA are now able to experience this landscape and the processes required to maintain it.