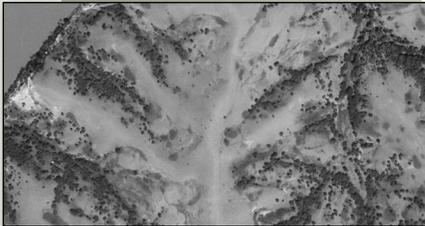




MISSOURI BLUFFS OAK SAVANNA: PAST, PRESENT AND FUTURE

Overview

While the MNRR primarily protects and celebrates the Missouri and Lower Niobrara Rivers and their floodplains, the park also owns and maintains areas of upland oak bluffs adjacent to the river. The oak bluff savanna is a unique and biologically diverse transition zone between the eastern deciduous forest and the tallgrass prairie. It also is a dynamic ecosystem historically maintained by frequent fire. In the region of MNRR, at the extreme western edge of the transition zone, the oak bluff plant community is now imperiled by the absence of fire and by the spread of exotic and invasive plant species.



1950s Oak savanna



2012 Bluff woodland

Above: Woody expansion and succession in an historic savanna along the south shore of the 39-mile reach (photos: NPS archive)

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What caused such frequent fire?

In many instances savanna fires are ignited by lightning; however, Native Americans used controlled fire for many purposes and within the region, some scholars have determined that around 50% of historic savanna fires were ignited by Native Americans. Their reasons are believed to have included the following:

- Encourage desirable understory plants for food and fiber
- Maintain open understory for game production / hunting
- Defense against enemy attacks
- Signal method for communication

When fire is suppressed, the woody understory grows dense and a deeper shade is cast on the ground. This eventually eliminates the herbaceous layer of grasses, sedges and forbs. The resulting cool moist ground then speeds the decay of leaf litter, eliminating the necessary fuel for a ground-level fire. This leads to forest succession favoring shade-tolerant species and impacts the regeneration of oaks and other fire-adapted plants. Other known effects include reduced plant diversity, changes in bird assemblages, reduced insect diversity, reduced forage for herbaceous game species, soil / leaf litter depletion and ultimately, an impoverished ecosystem.

What is an oak savanna?

Oak savanna is characterized by an incomplete canopy cover that allows for a sufficiently dense herbaceous ground cover to support frequent fires. Bur oak (*Quercus macrocarpa*) is especially well-adapted to fire due to its thick, corky bark and slow-decaying leaf litter. Ecologists are able to determine historic fire frequency using tree coring and soil coring methods and most studies in the region determine an average historic fire frequency of 3 – 6 year intervals (more frequent during drought).



WHAT INVASIVE PLANTS IMPACT MNRR SAVANNA BLUFFS?

- **Eastern red cedar** (*Juniperus virginiana*) is a fire intolerant native species that has dramatically spread across the fields, bluffs, and even sandbars throughout the MNRR. Historically, it was scattered and infrequent until fire suppression allowed it to spread.
- **Common buckthorn** (*Rhamnus cathartica*) is an exotic invasive tree that out-competes most native species due to its shade tolerance, vigorous growth, and prolific seed production. The small black fruit are eaten by birds and dispersed in open woodlands.
- **Leafy spurge** (*Euphorbia esula*) is an invasive perennial herb that out-competes native plants in fields, prairies, and open woodlands.



Photo: NPS



Photo: NPS



Photo: blm.gov

HOW IS MNRR WORKING TO RESTORE THE OAK SAVANNA?

Each year, we remove invasive plants using physical and chemical control where necessary. In the long term, our resource management team seeks to apply frequent prescribed fire to oak woodlands and prairies in order to restore the fundamental process that maintains the ecosystem. Prescribed fire is conducted in early spring while snow remains on the ground and this already has begun to increase native flora on park lands. We also conduct long-term vegetation monitoring in order to understand the impacts of management actions on plant communities.



Above: Drilling with native prairie seed on the bluff at Mulberry Bend Overlook (2011)

Right: Prescribed fire in the oak woodland at Upper Bow Creek following cedar removal (2010)



Above: Herbicide treatment of stumps following buckthorn removal at Mulberry Bend Overlook (2013)

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