

## Early Tallgrass Prairie Restoration at Homestead National Historical Park



Prairie monitoring with Heritage Center in background

## Overview

Homestead National Historical Park (formerly Homestead National Monument of America) in southeastern Nebraska was established in 1936 at the site of Daniel Freeman's original homestead from 1863. Encompassing 100 acres of tallgrass prairie that had been converted into agricultural land and 60 acres of woodland fringing a creek, the monument underwent restoration by the National Park Service in 1939 in an attempt to restore the prairie that Freeman would have discovered upon his arrival at the site. Ongoing for more than 75 years, the Homestead restoration is the nation's second oldest tallgrass prairie restoration project. Restoration efforts currently involve periodic burning and removal of invasive plant species. Recent National Park Service monitoring activities documented that the restored Homestead Prairie exhibits the species diversity and distribution characteristic of a functioning native prairie.

### Project Details

#### Lead Entity:

National Park Service

#### Lead entity types:

- Governmental Body

#### Partner Organizations:

Dr. John E. Weaver, University of Nebraska-Lincoln, National Resource Conservation Service (NRCS)

#### Adaptive management

Describe adaptive management processes and mid-course corrections taken to address unforeseen challenges and improve outcomes in each of the following categories:

#### Other:

Since the establishment of Homestead National Historical Park, many different invasive plant species have colonized the site. The species have required different methods of treatment, including changes in herbicides utilized as some toxic chemicals were phased out over time. Managers have also fine tuned the use and timing of fire and mowing on the landscape to achieve restoration goals.

#### State of Progress:

- Post-Implementation Maintenance

**Project Start:**

2023-09-19

**Global Regions:**

- Americas
- Northern America
- World

**Countries:**

- United States of America

**Ecosystem Functional Groups / Biomes:**

- Savannas and grasslands biome

**Extent of project:**

- 20-50 ha

**Extent of restoration:**

- Other

**Degradations:**

- Agriculture & Livestock
- Fragmentation
- Invasive species

**Description:**

When Homestead National Historical Park was established by Congress in 1936, the upland slopes of the site were severely eroded, the lower slopes were covered with heavy depositions of silt, and the woodlands had been logged and heavily grazed. At least 40 acres of the site were under agriculture cultivation until 1939. Current threats to the park are mainly attributed to invasive species, altered fire and grazing regimes, edge effects (from being a small, protected area surrounded by agriculture) and climate change. These disturbances have led to reductions in soil productivity, water quality, and native plant and wildlife habitat and diversity.

**Planning and Review**

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**Goals and Objectives**

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**Was a baseline assessment conducted:**

unsure

**Was a reference model used:**

RM5

**Other reference models used::**

I'm not sure.

**were\_goals\_identified:**

YES

**Goals and objectives:**

- Other

**Goals Description::**

Alter species composition (plant, animal, and undesired species) Increase structural diversity (vegetation, trophic levels, spatial mosaic) Improve

ecosystem function (productivity, habitat, resilience) Remove threats (contamination, invasive species, over-utilization) Improve physical conditions (substrate physical, substrate chemical, water chemo-physical)

## Stakeholder Engagement X

**Were Stakeholders engaged?:**

unsure

**Description of Stakeholder Involvement:**

The stakeholders who were engaged included: the local Indigenous community, the local community or project neighbours, private landowners, citizen scientists from the University of Nebraska-Lincoln, and Government (NRCS). These stakeholders helped prioritize distribution of restoration actions on the landscape, helped set project goals, objectives, targets, or vision, contributed knowledge on methods or implementation, contributed knowledge about ecological conditions or successional patterns, and engaged in participatory monitoring. For more recent restoration activities Tribes have been consulted. Microsoft Word - adhi.docx (npshistory.com):

<http://npshistory.com/publications/home/adhi-2020.pdf>

## Ecosystem Activities and Approaches X

1) eliminate existing threats to the ecosystem: Invasive species: 1943- Weed control was implemented; sunflowers were mowed, and bindweed was treated with sodium chlorate. 1955- Smooth bromegrass infestation was noted. 1963- 2,4-D was used for weed control. 1964- Lowlands were heavily infested with weeds. Dalapon was used for smooth brome control and 2,4-D was applied for broadleaf weed control. 1968- Smooth brome was mowed. 1979- Woody plants were sprayed with ammonium sulfamate; routine 2,4-D spraying program stopped. 1984- Weedy lowland area was mowed. Currently, the park monitors for nonnative species in the prairie and woodland areas of the monument and uses a combination of techniques, including mowing, selective use of herbicides, and prescribed fire, to manage these areas. Agricultural & Livestock: Livestock access to the site has been managed by the park throughout the project. 2) reinstate appropriate physical conditions (e.g. hydrology, substrate): 1942- Additional seeding and sodding occurred, along with the construction of small check dams to slow erosion. 1947- Sodding occurred in upland gullies; seeding and local prairie hay mulch was used in eroding areas 3) achieve a desirable species composition : 1939- Park records indicate that the first seeding took place in 1939 with seed gathered from a prairie located approximately 5 miles to the west. The approximate seed mixture was 45% big bluestem, 50% little bluestem, and 1% each of Kentucky bluegrass, needle and thread grass, indiangrass, prairie dropseed, and sideoats grama. This original restoration also included the installation of native plant plugs and the transplantation of sod from nearby areas of un-ploughed prairie in an attempt to control severe sheet, rill, and gully erosion on the coarse-textured south upland slopes. The source of the sod is unknown. 1942- Additional seeding and sodding occurred, along with the construction of small check dams to slow erosion. 1943- Weed control was implemented; sunflowers were mowed, and bindweed was treated with sodium chlorate. 1948- Additional spot seeding occurred; sod was added to the uplands; selective grazing was suggested as a means of reducing fire hazard. 1949- First use of herbicide other than sodium chlorate (2,4-D). 1951- 40 acres were mowed. 1952- Upland areas were hayed. 1953- Bottomland areas were hayed. 1954- Native seeds were harvested. 1955- Smooth bromegrass infestation was noted. 1963- 2,4-D was used for weed control. 1959- First Vegetation Management Plan was drafted to guide future actions (e.g., mowing, reseeding, planting, burning, weed control) at the park in the ongoing effort to recreate the natural setting of the 1860s. 1964- Lowlands were heavily infested with weeds. Dalapon was used for smooth brome control and 2,4-D was applied for broadleaf weed control. 1965- Thatch buildup leads to complete mowing of the site. 1968- Smooth brome was mowed. 1969- 7-11 acres of lowland were seeded. 1970- First prescribed burn to manage the prairie; 2,4-D was applied. 1976- 4 acres of lowland areas were reseeded. 1979- Woody plants were sprayed with ammonium sulfamate; routine 2,4-D spraying program stopped. 1980- 17-acre wildfire occurred. 1982- Quantitative vegetative sampling began; prescribed burn was implemented in April (8 acres); manual removal of musk thistles and common mullein. 1983- Entire prairie was burned, 4 acres of weedy lowland were mowed. 1984- Weedy lowland area was mowed; fall burn of small overgrown sumac implemented; herbarium was assembled; local native seed and sod was collected. 1986- Lowland area sodded and planted with approximately 3,000 greenhouse grown seedlings from locally collected prairie seed. Prescribed burning began in 1970. The prairie is divided into six management units and burned on a seven-year cycle. Every year, two units are randomly chosen for treatment, with the stipulation that once a unit has been burned twice in the seven-year period, it is removed from consideration for the duration of that period. Seasonality of fires is also randomized. The seventh year is a "rest year". The goals of the fire management program are control of invasive nonnative species such as smooth brome, management of shrub species to no more than 15% of the prairie by area, and removal of plant debris that, if left in place, creates the potential for a large, devastating fire. 4) reinstate structural diversity (e.g. strata, faunal food webs, spatial habitat diversity): This was addressed by reintroducing a prescribed burning cycle. 1968- Smooth brome was mowed. 1979- Woody plants were sprayed with ammonium sulfamate; routine 2,4-D spraying program stopped. 1980- 17-acre wildfire occurred. 1982- Quantitative vegetative sampling began; prescribed burn was implemented in April (8 acres); manual removal of musk thistles and common mullein. 1983- Entire prairie was burned, 4 acres of weedy lowland were mowed. 1984- Weedy lowland area was mowed; fall burn of small overgrown sumac implemented; herbarium was assembled; local native seed and sod was collected. 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that, if left in place, creates the potential for a large, devastating fire. 5) recover ecosystem functionality (e.g. nutrient cycling, plant-animal interactions, normal stressors): This was addressed by reintroducing a prescribed burning cycle. 1968- Smooth brome was mowed. 1979- Woody plants were sprayed with ammonium sulfamate; routine 2,4-D spraying program stopped. 1980- 17-acre wildfire occurred. 1982- Quantitative vegetative sampling began; prescribed burn was implemented in April (8 acres); manual removal of musk thistles and common mullein. 1983- Entire prairie was burned, 4 acres of weedy lowland were mowed. 1984- Weedy lowland area was mowed; fall burn of small overgrown sumac implemented; herbarium was assembled; local native seed and sod was collected. Prescribed burning began in 1970. The prairie is divided into six management units and burned on a seven-year cycle. Every year, two units are randomly chosen for treatment, with the stipulation that once a unit has been burned twice in the seven-year period, it is removed from consideration for the duration of that period. Seasonality of fires is also randomized. The seventh year is a "rest year". The goals of the fire management program are control of invasive nonnative species such as smooth brome, management of shrub species to no more than 15% of the prairie by area, and removal of plant debris that, if left in place, creates the potential for a large, devastating fire.

## Project Outcomes

Achieve a desirable species composition: Today, the species composition of the tallgrass prairie at Homestead resembles that of pre-settlement times. In fact, plant diversity is greater in the oldest sections of the restored prairie than in some native prairie remnants in the area. There are 116 plant species present at the site, and dominant species include big bluestem, little bluestem, Indiangrass, switchgrass, goldenrod, field pussytoes, and leadplant. Interspersed within the prairie are thickets of shrubby species such as sumac, wild plum, and dogwood, which provide habitat for birds and other small animals. A 2007 National Park Service report presented the findings of sampling exercises conducted at monitoring sites between 1998 and 2006. Based on the data collected at these sites, it was concluded that the 100 acres of restored prairie at Homestead National Monument reflect the species richness and diversity of the prairie's historic source and native species augmentation. It is a species-rich plant community with a distribution pattern composed of core and satellite species. Although it is difficult to make a quantitative comparison of the restored prairie with a mid-1860s prairie, the diversity and distribution of species reflects a functioning native prairie. Reinstate structural diversity: Dominant species now include big bluestem, little bluestem, Indiangrass, switchgrass, goldenrod, field pussytoes, and leadplant. Interspersed within the prairie are thickets of shrubby species such as sumac, wild plum, and dogwood.

## Monitoring and Data Sharing

Does the project have a defined monitoring plan?:

YES

Monitoring Details:

Yes, see DataStore - Protocol Narrative - (Code: 573182) (nps.gov): <https://irma.nps.gov/DataStore/Reference/Profile/573182>

Open Access URL:

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## Long Term Management

Long-term resourcing and support:

- Other (please provide details)

Other Long Term Resources:

Monitoring has been done on plant composition/species cover, erosion, and effects of burning, invasive plant removal, and seeding/planting operations. Results from monitoring have been used throughout the many years of restoration activities to adapt and plan for future seeding, planting, sod installation, burning operations, and invasive plant control.

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**STAPER**

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Harbor Brook Daylighting Project, Meriden, Connecticut (<https://app.ser-rrc.org/api/v1/project/10210>)

**Country:** United States of America

**Activities:**

**Biomes:**

**Abstract:** Central Meriden, located in New Haven County, Connecticut, is continuously devastated by flooding. Centuries of urbanization and loss of wetland habitats have led to these ruinous disturbances. Local resident taxes, along with resources provided by the Environmental Protection Agency, furnished the rehabilitation project of the main "Hub" of Meriden. Milone & MacBroom, Inc. were called upon to analyze and develop a plan for reform. Economic development and reduction of flooding hazards were achieved by constructing a program to daylight Harbor Brook, a waterway that had been covered by industrialization. Development of the water budget required an analysis of the characteristics of the large scale watershed, the entire corridor, and the channel itself, segment by segment. Topographical data and models of hydrology were used to develop runoff hydrographs and route them through the watershed. Businesses in the Hub were relocated and 1700 linear feet of concrete culverts over 30 feet wide were demolished, excavated, and removed (Milone & MacBroom, Inc. n.d.). The elimination and reconstruction involved manufacturing a Town Green to be used as a watershed for impending storms, as well as a gathering place for public events.

Learn More (<https://app.ser-rrc.org/api/v1/project/10210>)