Sand Dunes State Forest

Managing for multiple values

Sand Dunes State Forest

Managing for multiple values

- Values
- Natural Heritage
- Globally Imperiled
- Unique
- Connectivity
- Climate Change
- Migration corridors
- Biodiversity
- Ecologically appropriate
- Aesthetics
- Sand dunes
- Bare dunes
- Mosaic of habitats
- Prescribed Fire
- Herbicide
- Native Plant Community
- Native Plant Community Management

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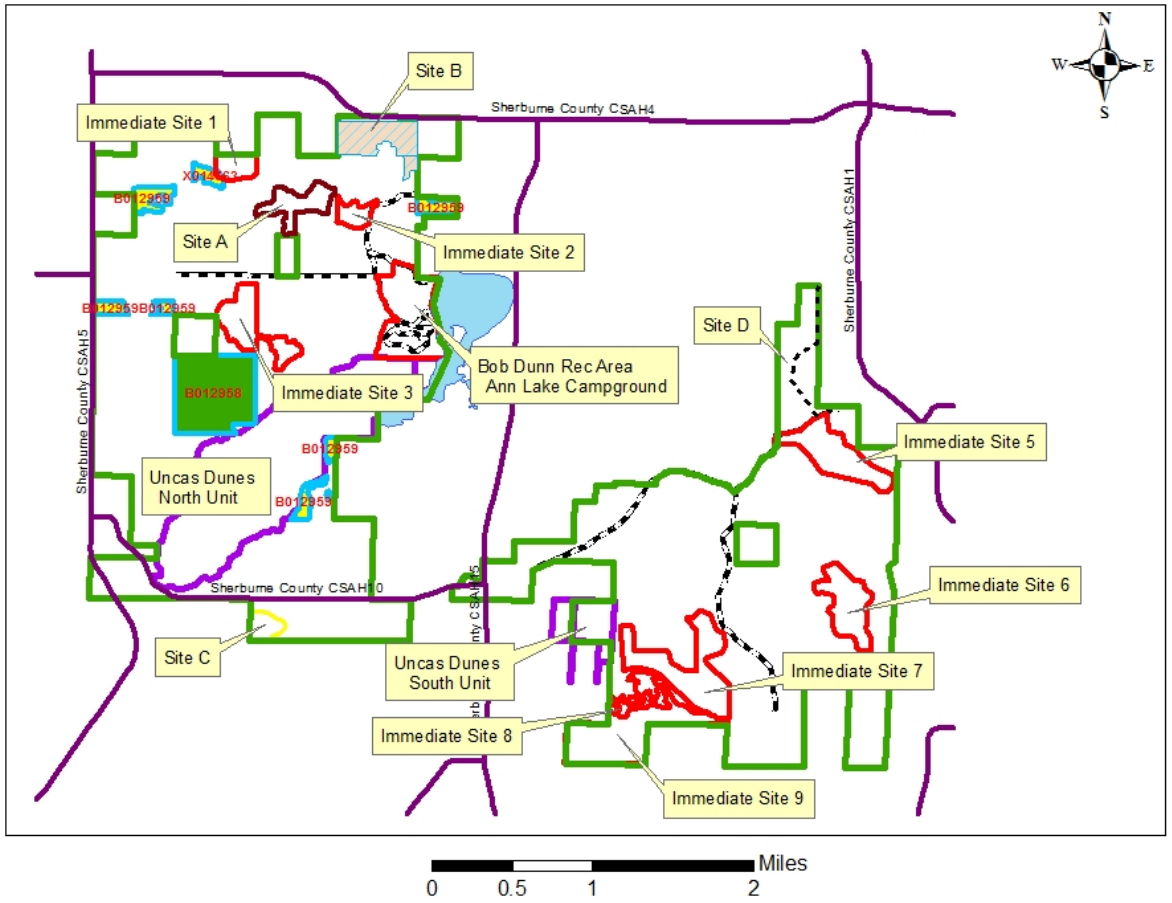
Planned Management Map



Planned Management at Sand Dunes State Forest 2016-2017 8/26/2016

In Progress:				
Location	**Map Reference**	**Activity**	**Approx Acres**	**Purpose**
Uncas Dunes SNA south unit	SNA South Unit	Prescribed fire	17	promote native vegetation
Uncas Dunes SNA south unit	SNA South Unit	Cow vetch control - herbicide	2	remove invasive species
Uncas Dunes SNA north unit	SNA North Unit	Cow vetch control - herbicide	2	remove invasive species
Uncas Dunes SNA north unit	SNA North Unit	Pine removal	less than 1	remove pines that seeded in
North unit	X014763	Sold timber sale	10	final harvest and regenerate
North unit	B01258	Sold timber sale	159	thinning to improve health and growth
North unit	B01259	Sold timber sale	68	final harvest and regenerate
North unit	Site A	Thin RP plantation on Trust land	43	thinning to improve health and growth
North unit	Site B	Harvest and replant trees	25-35	final harvest and replant pines
South Unit	Site D	Improve existing road		enable mgmt and avoid township roads
Legislatively Funded, More Discussion Needed:				
North unit	Immediate site 3	Prescribed fire	17	promote native vegetation
North unit	Immediate site 1	Install mineral firebreaks		fire barrier
North unit	Immediate site 2	Install mineral firebreaks		fire barrier
South Unit	Immediate site 5	Install mineral firebreaks		fire barrier
North Unit	Ann Lake Campground	Buckthorn surveys		survey for invasive control needs
North unit	Ann Lake Campground	Buckthorn treatment - herbicide		remove invasive species
North unit	Bob Dunn Rec area	Invasive species survey		survey for invasive control needs
South Unit	Immediate areas 6, 7, 9	Invasive species control	98	remove invasive species
Uncas Dunes SNA	Uncas Dunes	Invasive species control	12	remove invasive species
Unfunded, More Discussion Needed:				
North unit	Immediate site 2	Vegetation restoration	19	restore to oak savanna
South Unit	Immediate site 5	Vegetation restoration	82	restore to oak savanna
South Unit	Immediate site 5	Install mineral firebreaks		fire barrier
South Unit	Immediate site 5	Invasive species control		remove invasive species
South Unit	Immediate site 6	Vegetation restoration	68	restore to mix of oak woodland and savanna
South Unit	Immediate site 8	Vegetation restoration	4	restore to mix of oak woodland and savanna
South Unit	Immediate site 9	Vegetation restoration	137	restore to mix of oak woodland and savanna
North unit	Site C	Site prep and replant trees	18	reforest a previously harvested site

Sand Dunes State Forest: Managing Native Plant Communities for Plants, Animals and People

Liz Harper Assistant Regional Manager EWR
with help from many DNR staff

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Managing Native Plant Communities for Plants, Animals and People

Natural heritage refers to the sum total of the elements of biodiversity, including flora and fauna and ecosystem types, together with associated geological structures and formations (geodiversity).

Heritage is that which is inherited from past generations, maintained in the present, and bestowed to future generations.

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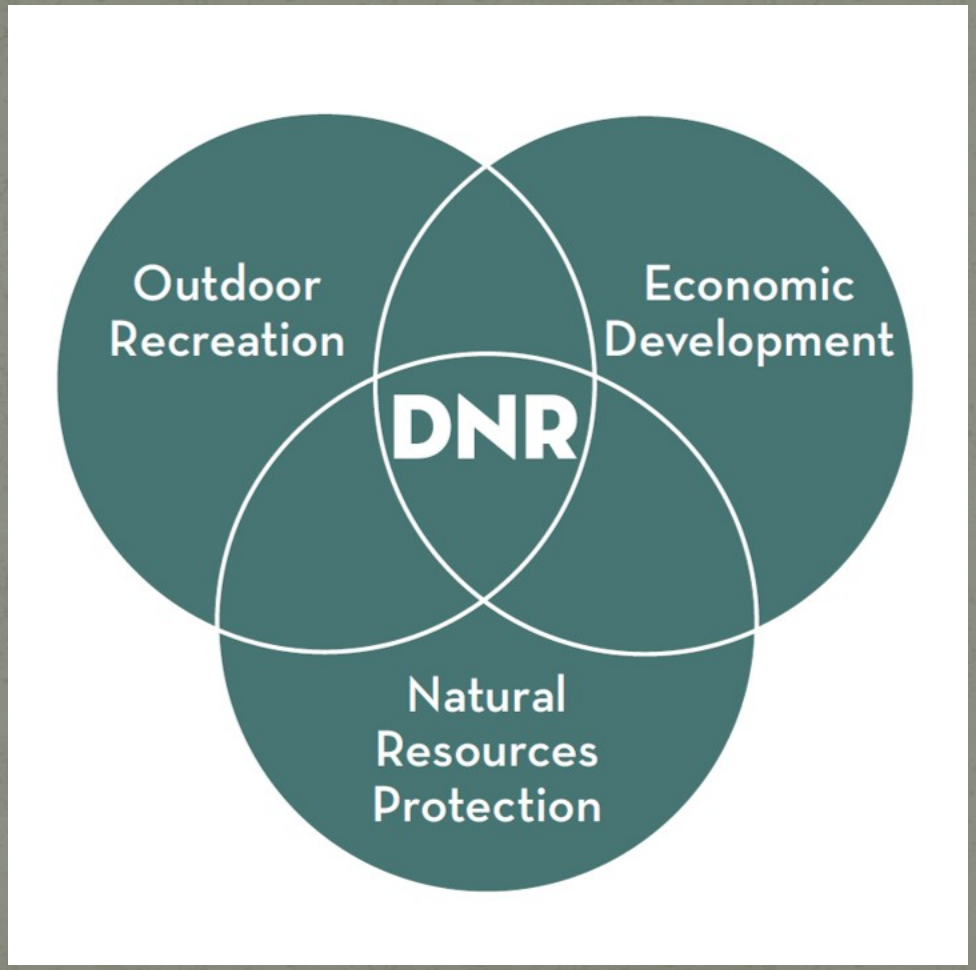
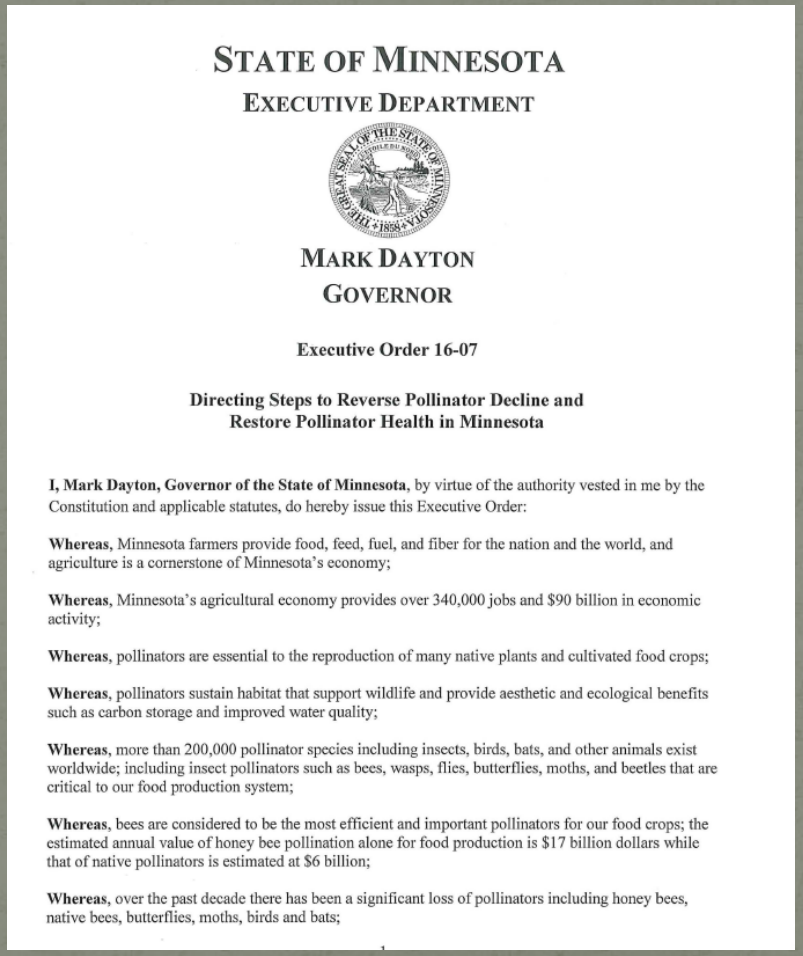
Managing Native Plant Communities for Plants, Animals and People



Managing Native Plant Communities for Plants, Animals and People



STATE OF MINNESOTA

EXECUTIVE DEPARTMENT

MARK DAYTON
GOVERNOR

Executive Order 16-07

Directing Steps to Reverse Pollinator Decline and Restore Pollinator Health in Minnesota

I, Mark Dayton, Governor of the State of Minnesota, by virtue of the authority vested in me by the Constitution and applicable statutes, do hereby issue this Executive Order:

Whereas, Minnesota farmers provide food, feed, fuel, and fiber for the nation and the world, and agriculture is a cornerstone of Minnesota's economy;

Whereas, Minnesota's agricultural economy provides over 340,000 jobs and $90 billion in economic activity;

Whereas, pollinators are essential to the reproduction of many native plants and cultivated food crops;

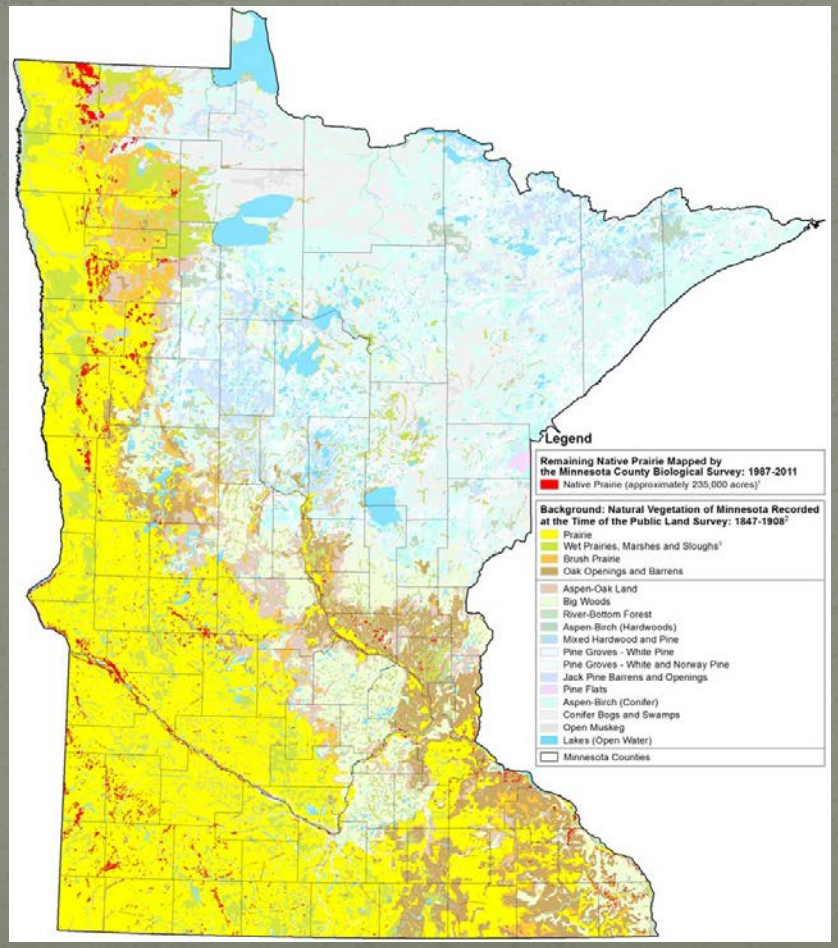
Whereas, pollinators sustain habitat that support wildlife and provide aesthetic and ecological benefits such as carbon storage and improved water quality;

Whereas, more than 200,000 pollinator species including insects, birds, bats, and other animals exist worldwide; including insect pollinators such as bees, wasps, flies, butterflies, moths, and beetles that are critical to our food production system;

Whereas, bees are considered to be the most efficient and important pollinators for our food crops; the estimated annual value of honey bee pollination alone for food production is $17 billion dollars while that of native pollinators is estimated at $6 billion;

Whereas, over the past decade there has been a significant loss of pollinators including honey bees, native bees, butterflies, moths, birds and bats;

Managing Native Plant Communities for Plants, Animals and People: Why here why now?



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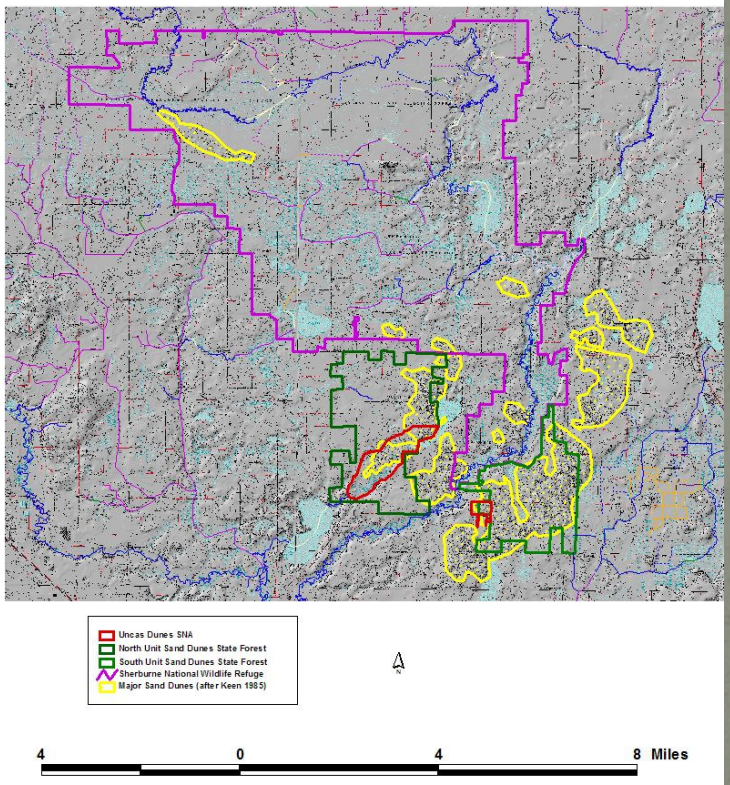
Managing Native Plant Communities for Plants, Animals and People AND geology

Figure 1. Sand Dune Formations In the Vicinity of Sand Dunes State Forest and Sherburne National Wildlife Refuge (redrawn from Keen 1985)



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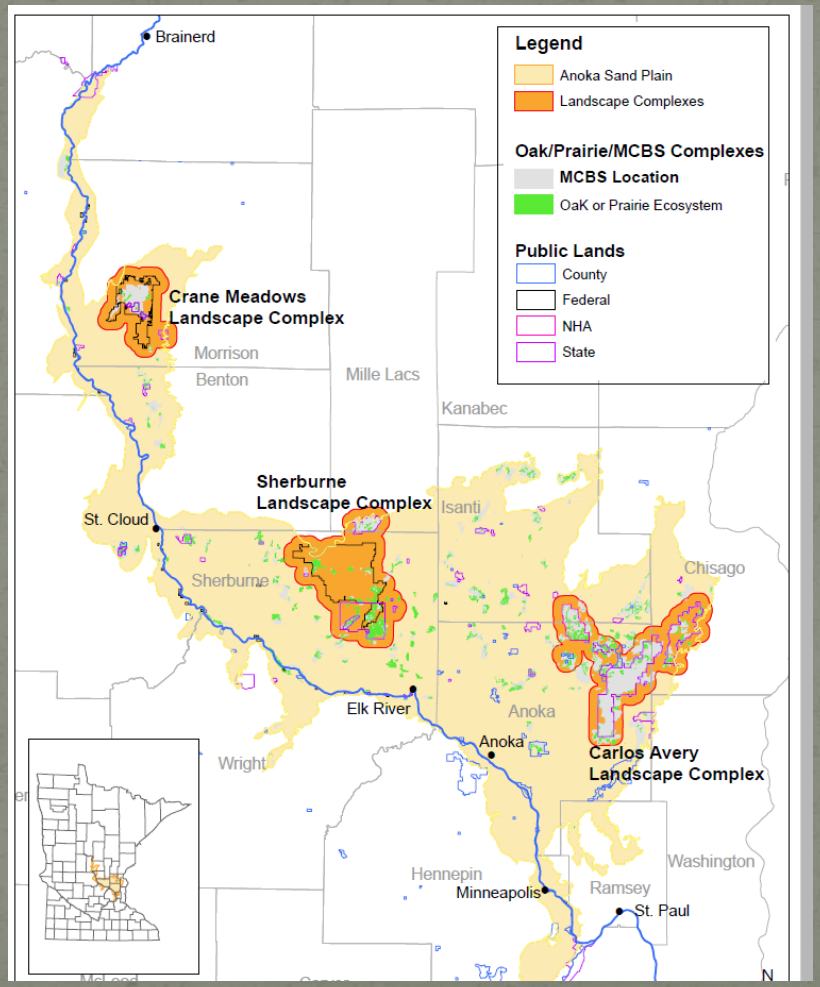
Managing Native Plant Communities for Plants, Animals and People: Why here why now?



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Managing Native Plant Communities for Plants, Animals and People: Why here why now?

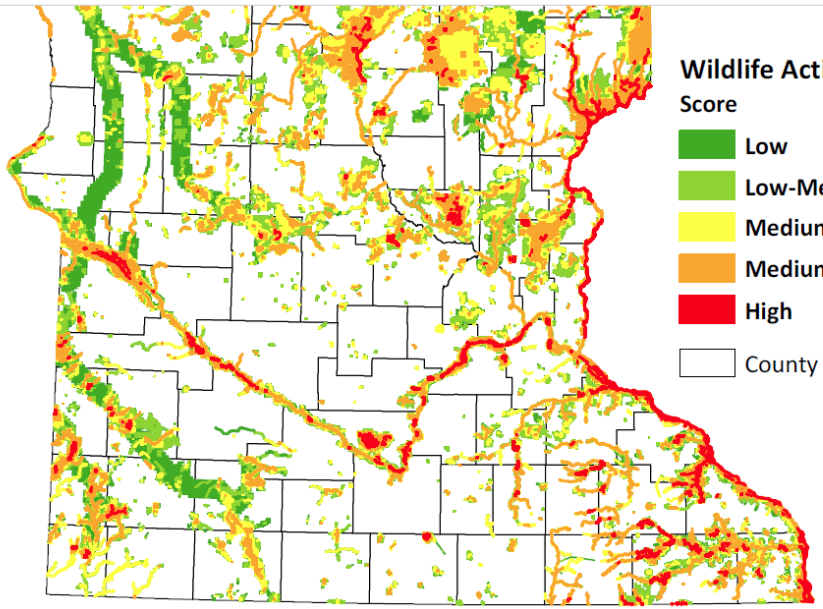

Figure 1.4. The Wildlife Action Network scored. Scores are based on five scalable metrics: SGCN population viability scores, SGCN richness, spatially prioritized Sites of Biodiversity Significance, ranks of Lakes of Biological Significance, and Stream Indices of Biological Integrity (IBI). Lower scores (green) in a given area indicate the metric scores for any of these five components were either relatively low or zero, while high scores (red) indicate that multiple metrics of high scores overlap. For example, a red area could indicate several good or outstanding SGCN populations and/or high SGCN richness (including species that did not have population maps available) along with a high score from another prioritization layer. See Appendix E for more details. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.

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Managing Native Plant Communities for Plants, Animals and People

Cool Green Science *Smarter By Nature*

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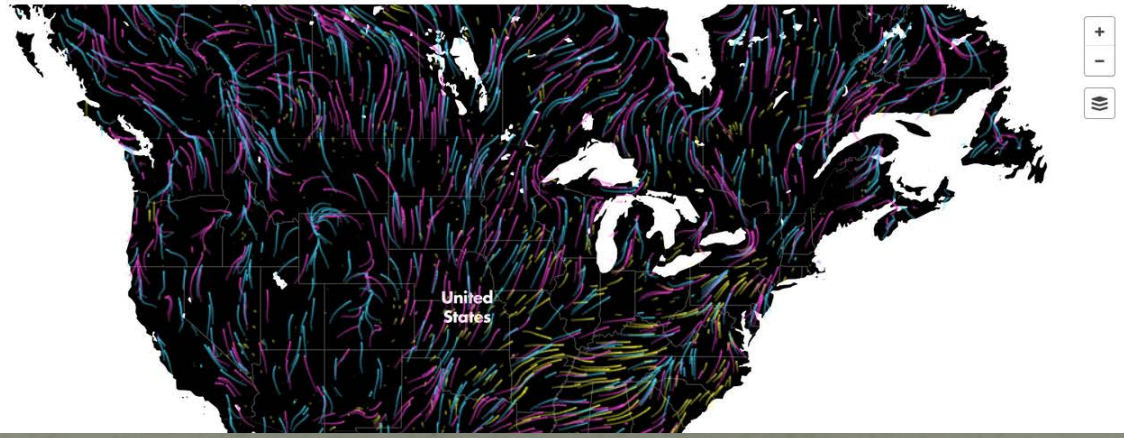
Migration in Motion: Visualizing Species Movements Due to Climate Change

BY JUSTINE E. HAUSHEER

AUGUST 19, 2016 | Follow Justine



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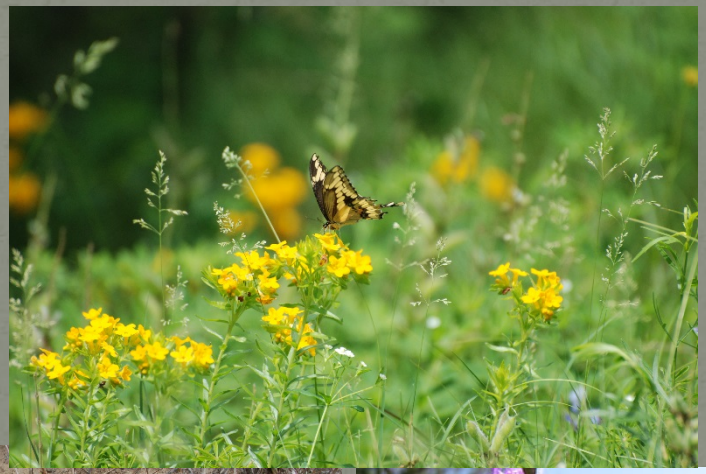
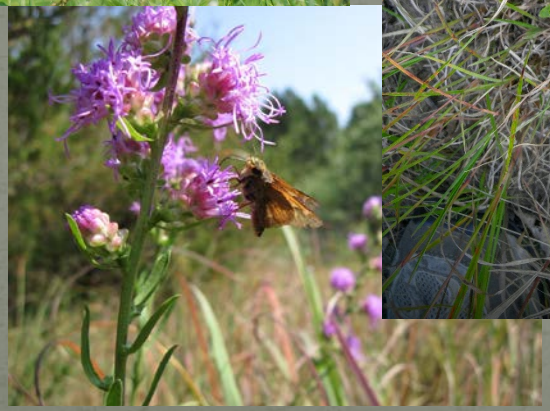
Managing Native Plant Communities for Plants, Animals and People





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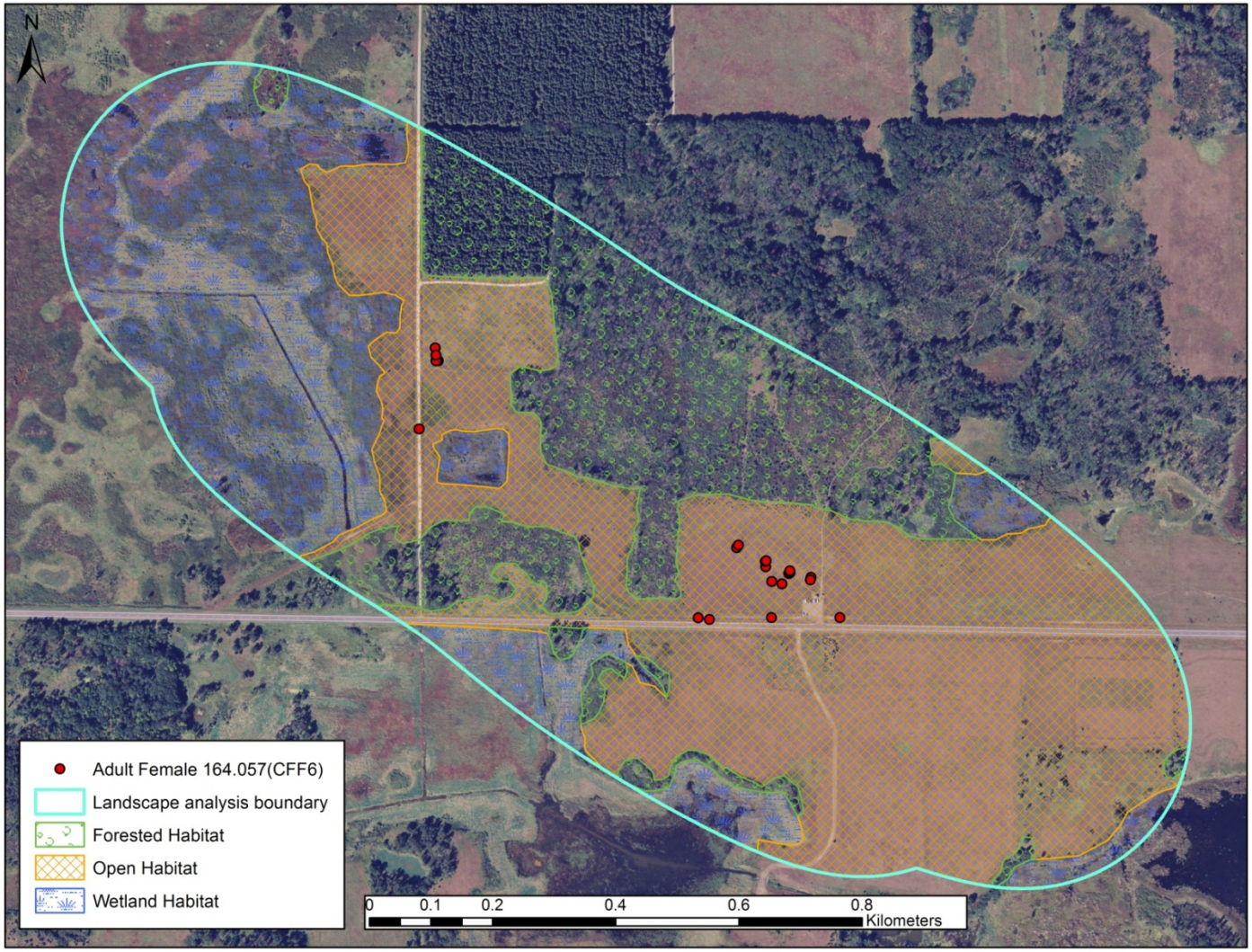
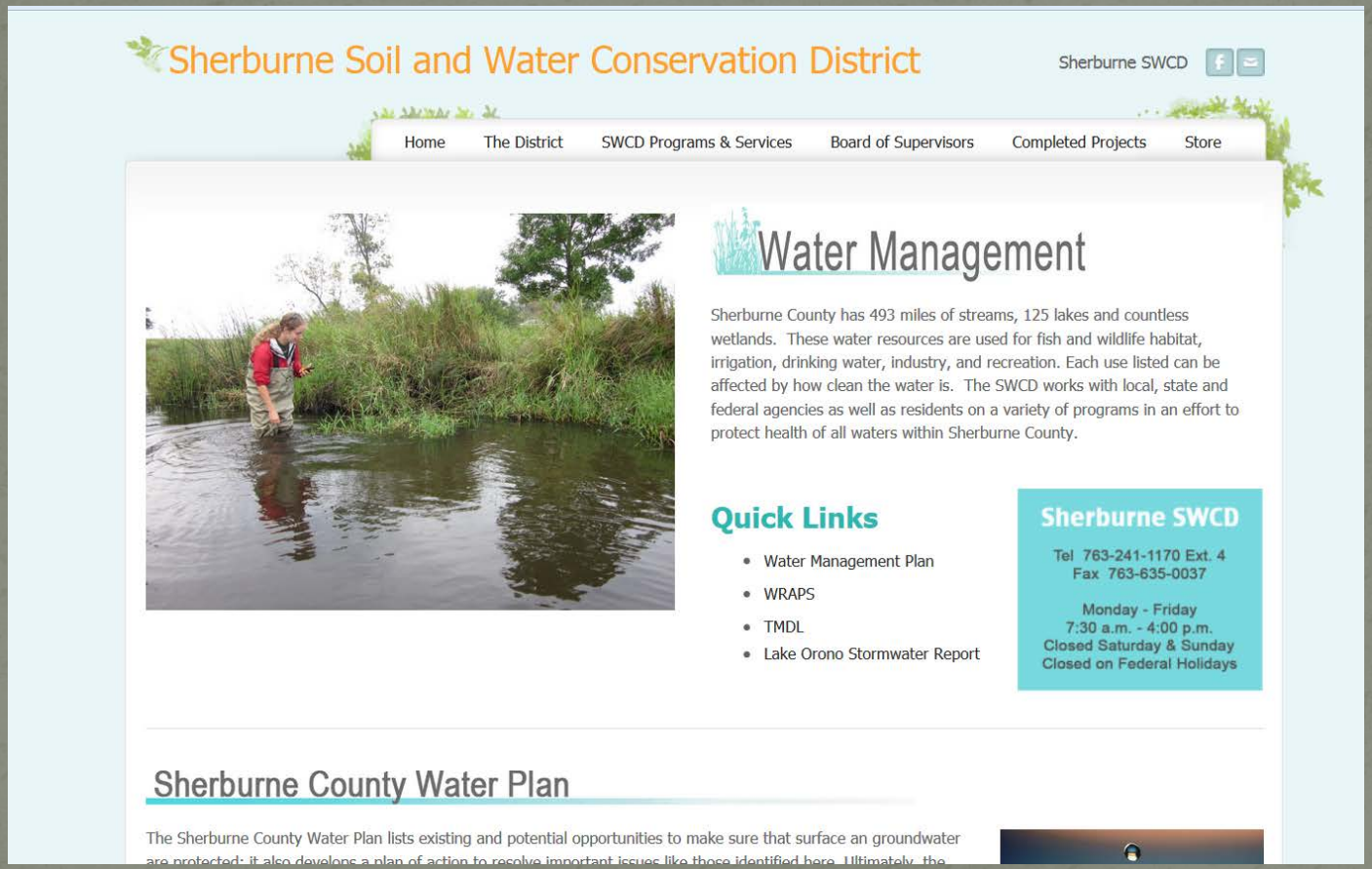


- Open Habitat: 46%
- Forested Habitat: 24%
- Wetland Habitat:
- 30%
- 100% locations in Open

Managing Native Plant Communities for Plants, Animals and People



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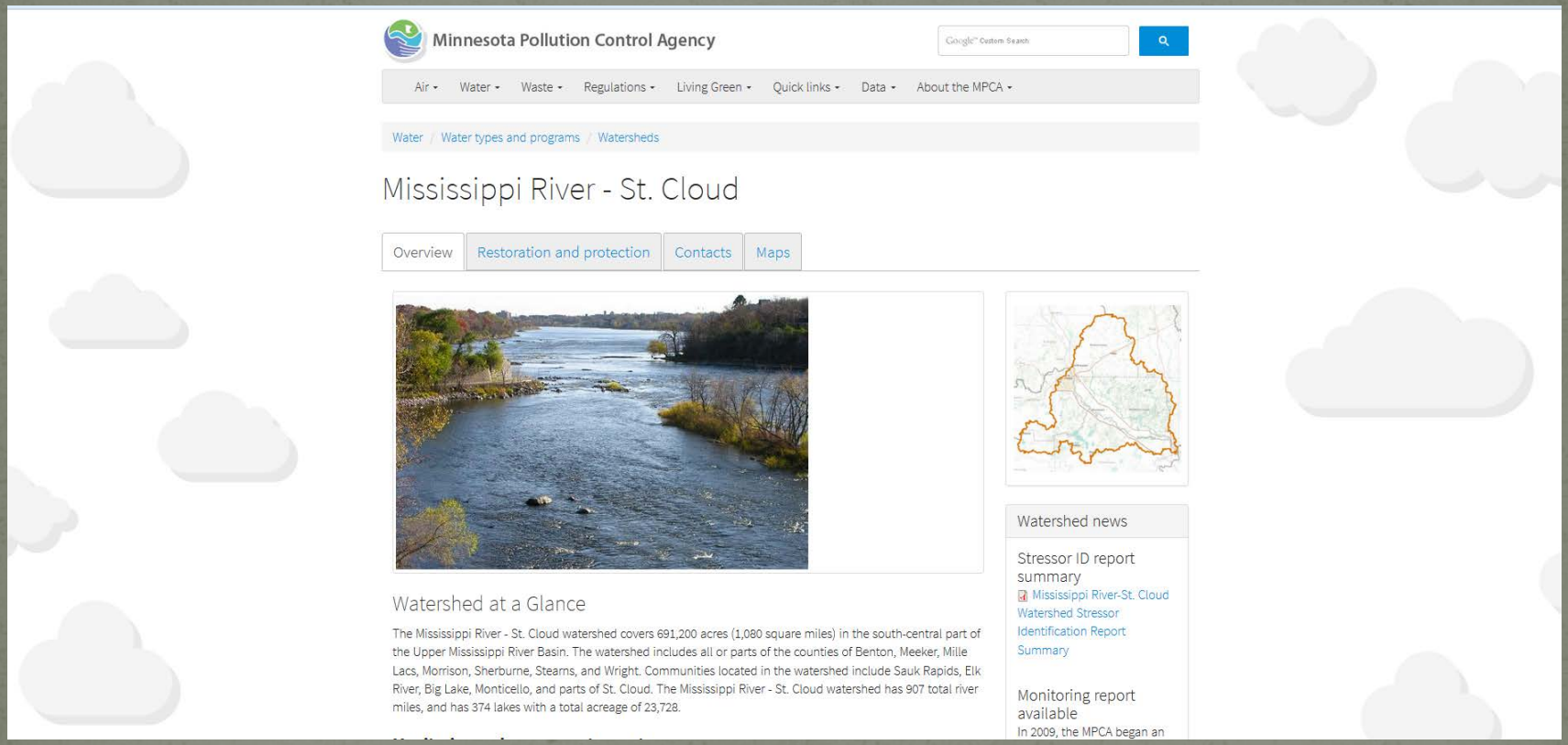
Managing Native Plant Communities for Plants, Animals and People



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Managing Native Plant Communities for Plants, Animals and People

Minnesota Department of Agriculture

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Conservation Practices
Minnesota Conservation Funding Guide

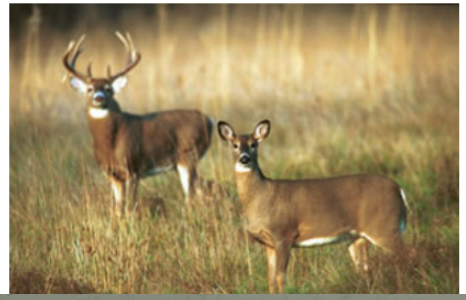
Habitat Restoration & Management

Financial & Technical Assistance | Similar Practices | All Practices

Habitat restoration and management preserves natural upland or wetland ecosystems and the plants and animals that thrive there. It typically involves permanent, perennial grass/shrub/tree plantings suitable for desired wildlife. Long-term management is needed to maintain the desired habitat and keep out invasive species.

Common elements of habitat restoration in Minnesota include wildlife travel corridors, wildlife habitat buffers, wildlife food plots, wildlife brush piles, bird nesting structures and forest openings.

Wildlife habitat corridors connect isolated patches of habitat. They can be man-made ribbons of habitat or formed around natural features such as streams. Trees/shrubs with a high density of stems are ideal for wildlife corridors. Corridors must be wide enough to provide cover for larger wildlife and allow them to move freely. Riparian buffers and filter strips being established for water quality purposes can be designed to double as wildlife corridors.



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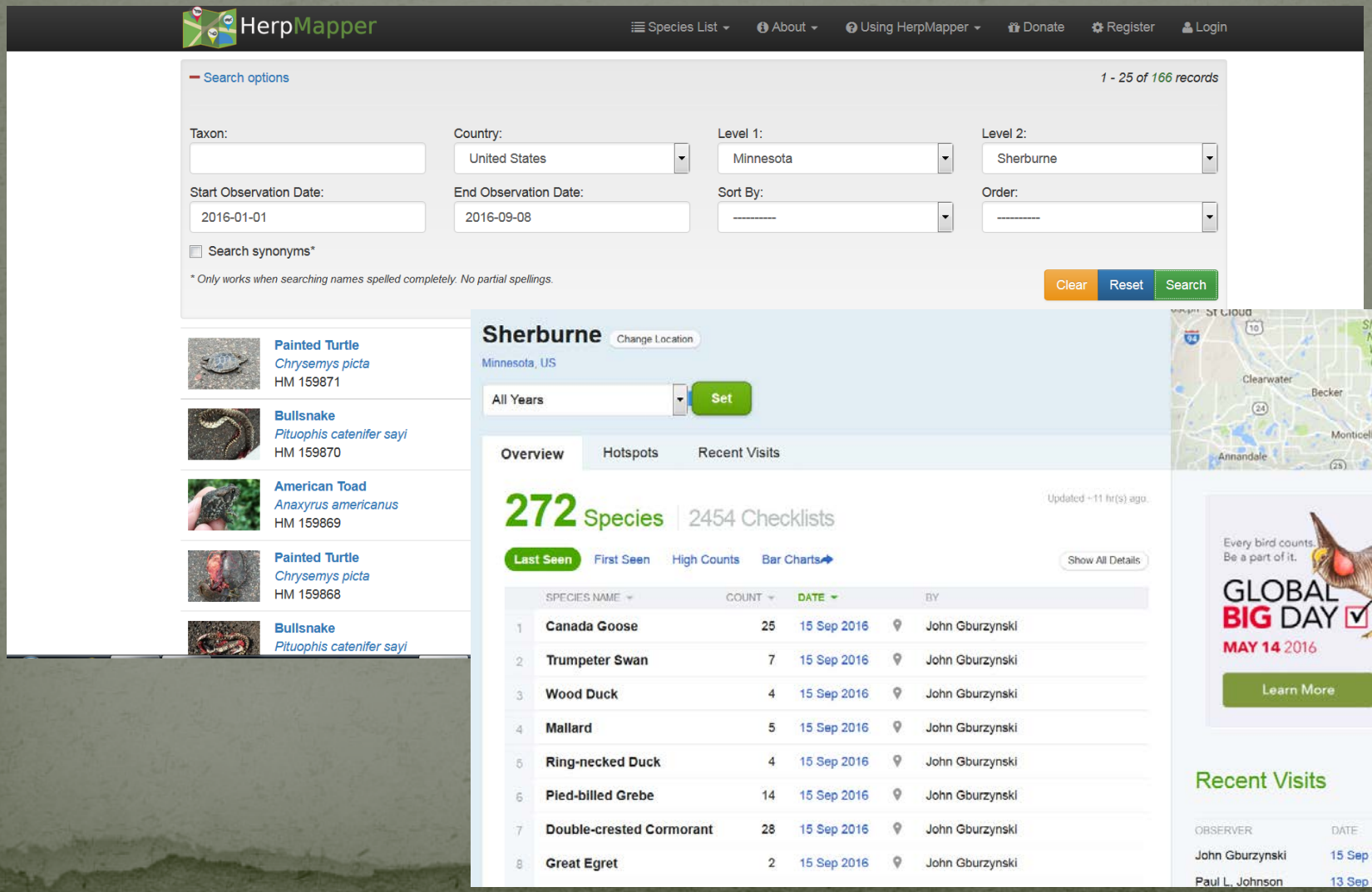
Managing Native Plant Communities for Plants, Animals and People



Managing Native Plant Communities for Plants, Animals and People: Biodiversity

- *Biodiversity is a compound word derived from 'biological diversity' and therefore is considered to have the same meaning.*

- 'Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
- Convention on Biological Diversity (1992) Convention on Biological Diversity. Secretariat of the Convention on Biological Diversity, Montreal, Canada

- The CBD definition is the internationally accepted definition of biodiversity.

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Managing Native Plant Communities for Plants, Animals and People: Biodiversity

- The variety of life at every hierarchical level and spatial scale of biological organizations: genes within populations, populations within species, species within communities, communities within landscapes, landscapes within biomes, and biomes within the biosphere.

  E. O. Wilson (1988), Biodiversity [2]

- Functionally these two definitions are similar. The CBD definition explicitly incorporates the term ecosystem which is used in a comparable context to the word biome within the Wilson definition. Both definitions include genetic, species, habitat and geographic scales thereby encompassing all living things and associated systems.

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Managing Native Plant Communities for Plants, Animals and People: Biodiversity

- **biological diversity**: The variety of living organisms that are recognized and analyzed by biologists at three levels of organization: ecosystems; the species that comprise those ecosystems; and the genetic variability within those species (Wilson 2001). Species present in an ecosystem include animals, plants, fungi, protists, and bacteria and range enormously in size and ecological functions. **Functional diversity** (see definition) is an aspect of biological diversity that some scientists believe may be of particular importance to ecosystem resilience. Biological diversity can be measured at different spatial scales (Whittaker 1960):
  - alpha-diversity: the number of species found in a small homogeneous area.
  - beta-diversity: extent of change in species composition among habitats or communities.
  - gamma-diversity: total species diversity in a landscape.

MNWAP 2016

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Managing Native Plant Communities for Plants, Animals and People: Biodiversity

- **Simplified: Biodiversity is the variety of life and its processes**

Managing Native Plant Communities for Plants, Animals and People: Biodiversity

Why is Biodiversity important?

- **Biodiversity forms the foundation of the vast array of ecosystem services that critically contribute to human well-being.**
- **Biodiversity is important in human-managed as well as natural ecosystems.**
- **Decisions humans make that influence biodiversity affect the well-being of themselves and others.**

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Managing Native Plant Communities for Plants, Animals and People: Biodiversity

The value of biodiversity (the variety of life and its processes)

Minnesota's biodiversity has evolved over millennia into complex ecosystems. A myriad of species interact with each other and environmental factors such as soils, topography, hydrology and climate within these ecosystems.

Preserving biodiversity has many benefits, often called ecosystem services:

Maintaining ecosystems and recovery from catastrophic events

Maintaining healthy, stable plant and animal populations

Protecting genetic diversity

Providing sources for food, medicine and other products

Protecting water and soil resources

Filtering pollution and nutrient recycling

Contributing to climate stability and carbon sequestration

Research, education and monitoring

Recreation, tourism and inspiration

In areas where biodiversity is threatened, losing species can affect the ecosystem's ability to function properly and provide these services.

Maintaining biodiversity reduces voids and the entire ecosystem maintains a higher degree of resilience.

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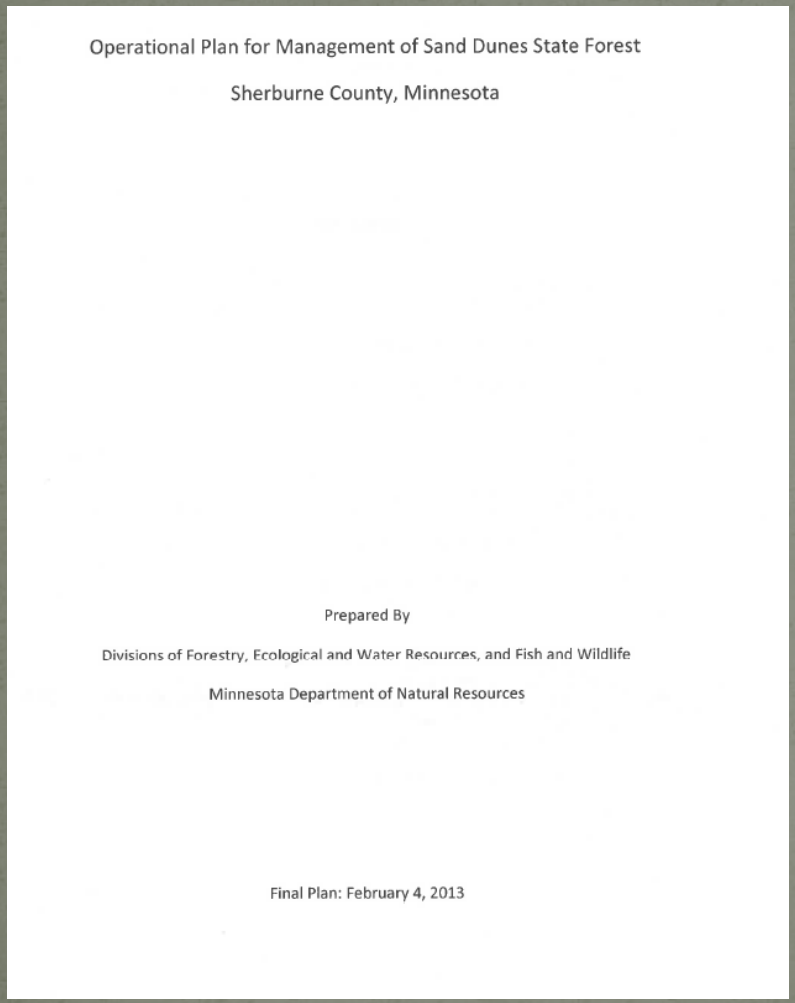
Sand Dunes State Forest: Native Plant Communities



Operational Plan for Management of Sand Dunes State Forest

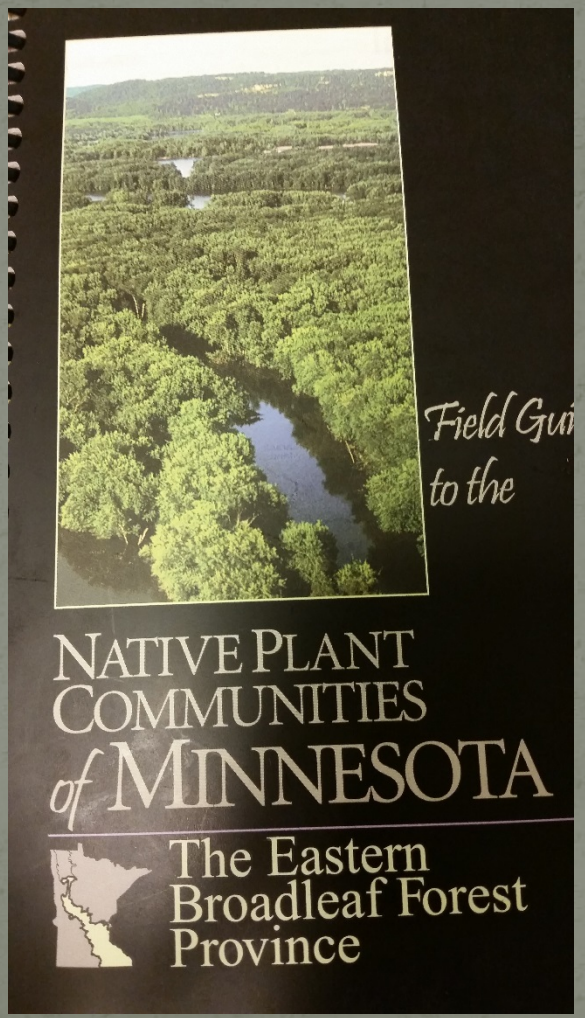
Sherburne County, Minnesota

Prepared By

Divisions of Forestry, Ecological and Water Resources, and Fish and Wildlife

Minnesota Department of Natural Resources

Final Plan: February 4, 2013



Biodiversity: Oak Savannas

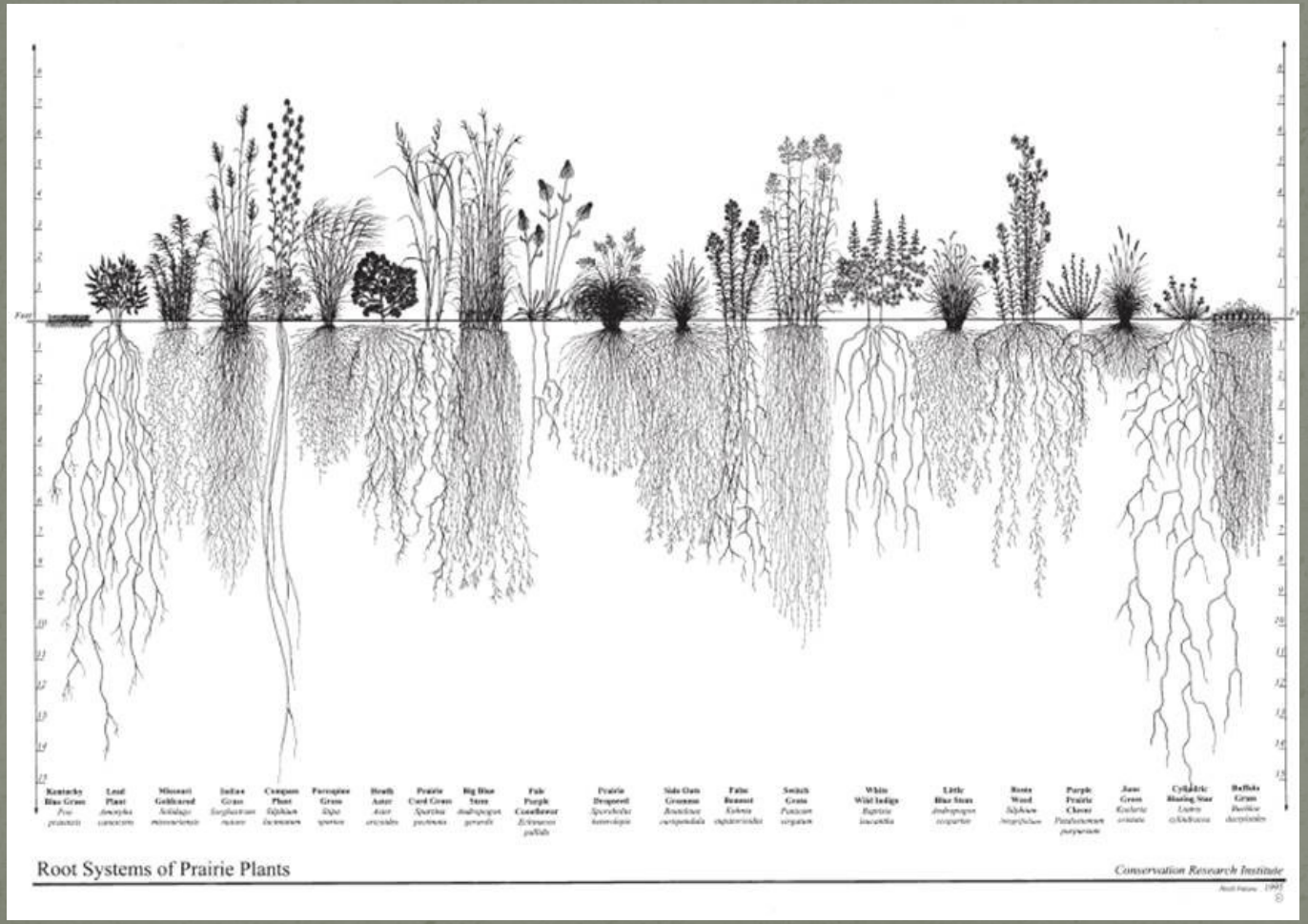
Biodiversity: Oak Savannas

Native Plant Communities: Oak woodland/oak savanna

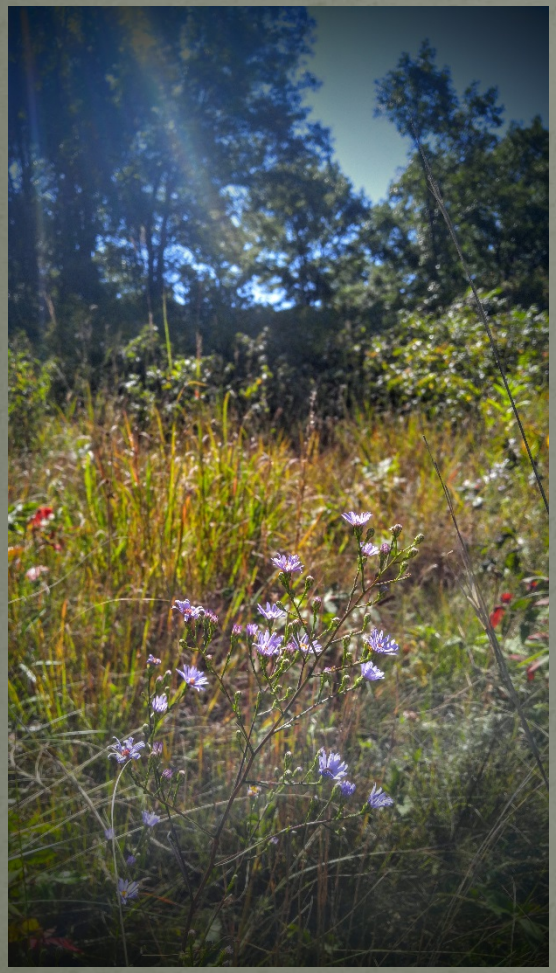
Native Plant Communities: Oak woodland/oak savanna

Native Plant Communities: Oak Savanna/prairie

Native Plant Communities: Oak Savanna/prairie



Native Plant Communities: Oak Savanna/prairie



Native Plant Communities: Wet Communities

Biodiversity: Mature Pine Plantation

Biodiversity: Pine understory

Native Plant Communities: Dunes and "Bare Dunes"

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Native Plant Communities: Mosaic

Managing Native Plant Communities for Plants, Animals and People: HOW?

Next Steps for Implementation/Further Consideration
Page 23 of Operational Plan

Some steps include:

Continuing site visits / ground truthing/revising the model
Writing site level management plans that will guide work on the ground
Assessing timber stands during annual stand exam process – determining management at stand level
Removing invasive species and other trees - selective harvest, herbicide, prescribed fire
Post treatment monitoring/adaptive management: high level info on techniques is described on page 20 of Op Plan and methods section of ASP project located on SDSF stakeholder website

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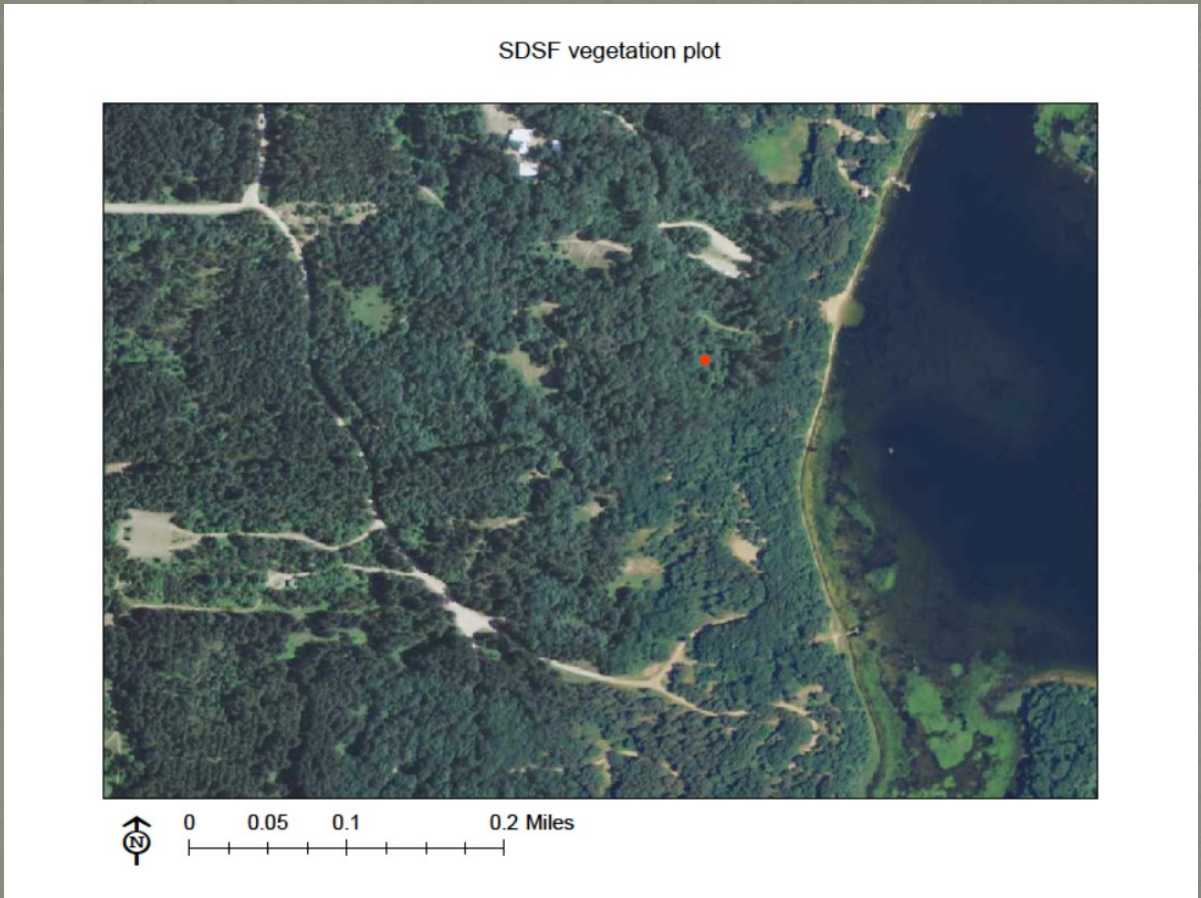
Managing Native Plant Communities for Plants, Animals and People: HOW?



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Managing Native Plant Communities for Plants, Animals and People: HOW?

Managing Native Plant Communities for Plants, Animals and People: HOW?

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Managing Native Plant Communities for Plants, Animals and People: HOW?

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Managing Native Plant Communities for Plants, Animals and People: HOW?

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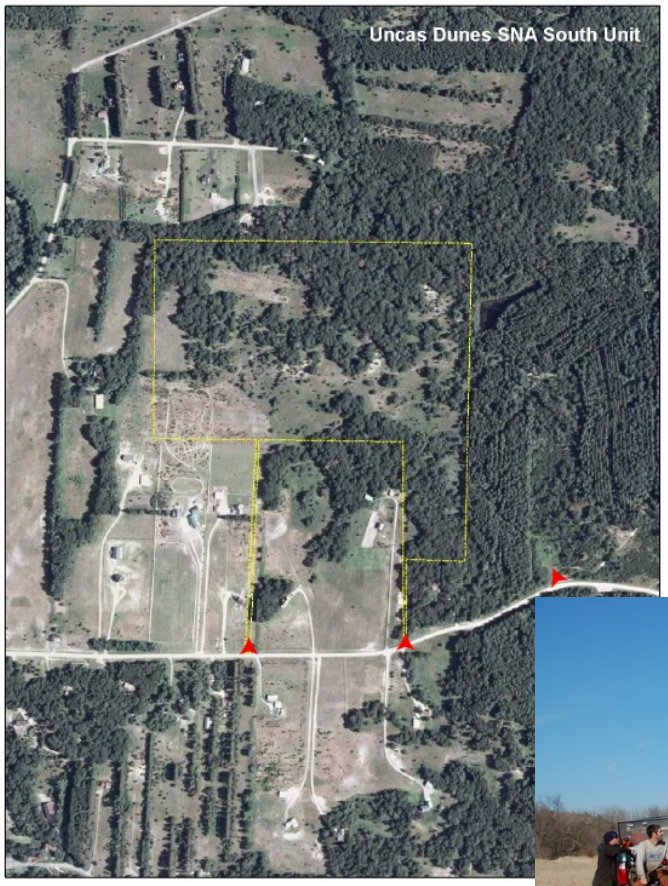
Managing Native Plant Communities for Plants, Animals and People: Have we done it before? YES



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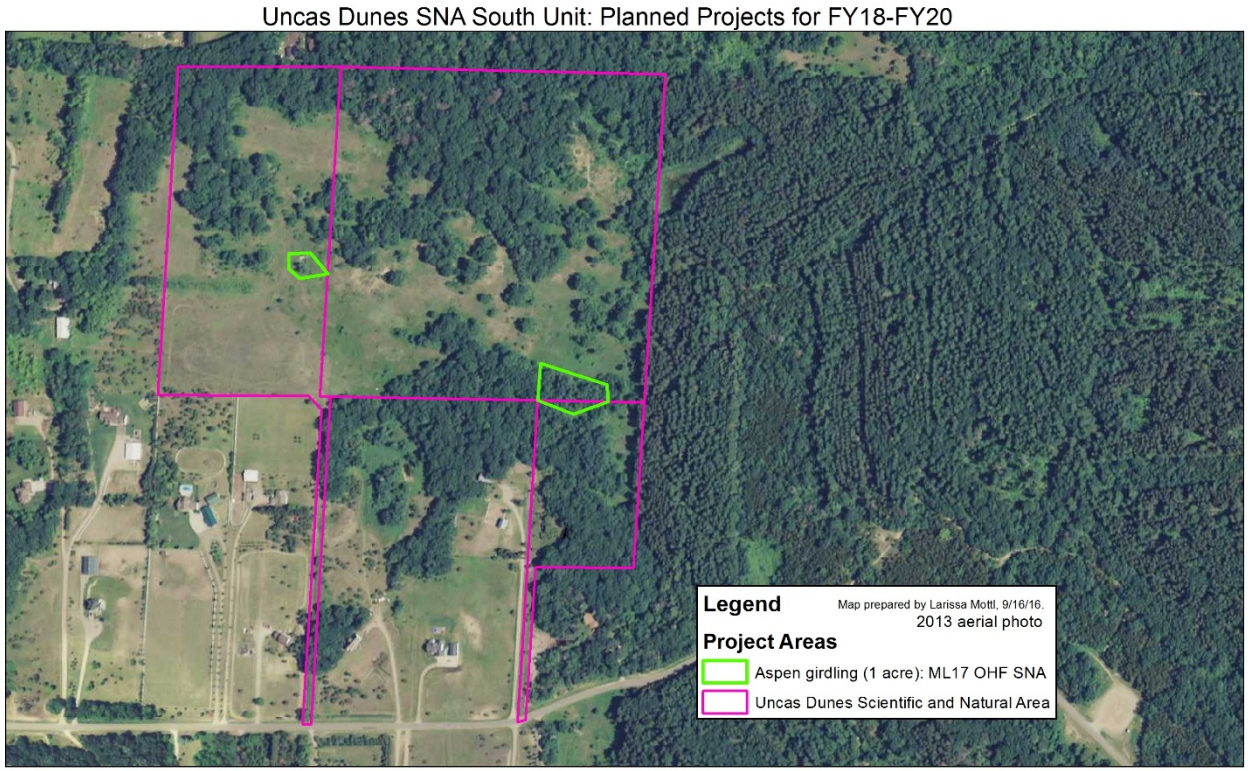
Managing Native Plant Communities for Plants, Animals and People

Managing Native Plant Communities for Plants, Animals and People

Uncas Dunes SNA-South Unit, MN DNR - 47 acres of mixed hardwoods, conifers and shrubs restored to oak savanna 44 loads, 880 tons of biofuel

Managing Native Plant Communities: Monitoring and follow-up work



Sand Dunes State Forest
Wildlife & Habitat Management Techniques

Nicholas Snavely
Assistant Area Wildlife Manager

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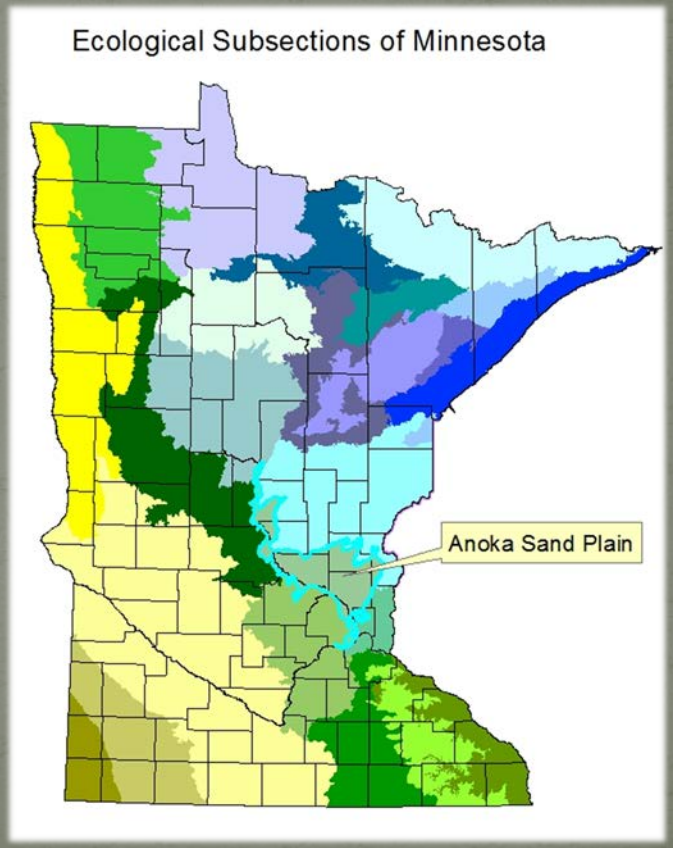
Minnesota State Forest Management Principles:

- Produce timber and other forest products
- Provide outdoor recreation
- Protect watersheds
- Perpetuate rare and distinctive species of native flora and fauna.

Sand Dunes State Forest Operational Plan

- ❑ Anoka Sand Plains Subsection Plan
- ❑ Guide vegetation management as part of broader ASP
- ❑ Provide direction to local managers



Sand Dunes State Forest Wildlife Habitat Management

- What we'll cover today:
  - Why we manage habitat?
  - Habitat management techniques and challenges in the Sand Dunes State Forest

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Wildlife Habitat Management

- Hunting seasons and regulations are the primary means of managing wildlife game populations.
- However, wildlife populations exist in areas based on how suitable the habitat is available to them and what stages of succession is being managed.
- In a fire dependent community such as Sand Dunes State Forest, change is constant and necessary to maintain various life stages of vegetation for wildlife to thrive and sustain their populations.

Wildlife Habitat

- Cover near food resources
- Nesting habitat
- Wildlife species are a product of the available habitat.
- Various stages of habitat succession provide a greater number of wildlife species niches to thrive.

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Wildlife Habitat

- Many wildlife require a mix of succession forest, woodland, open grassland and brushland habitat. In other words, a variety successional habitat stages.

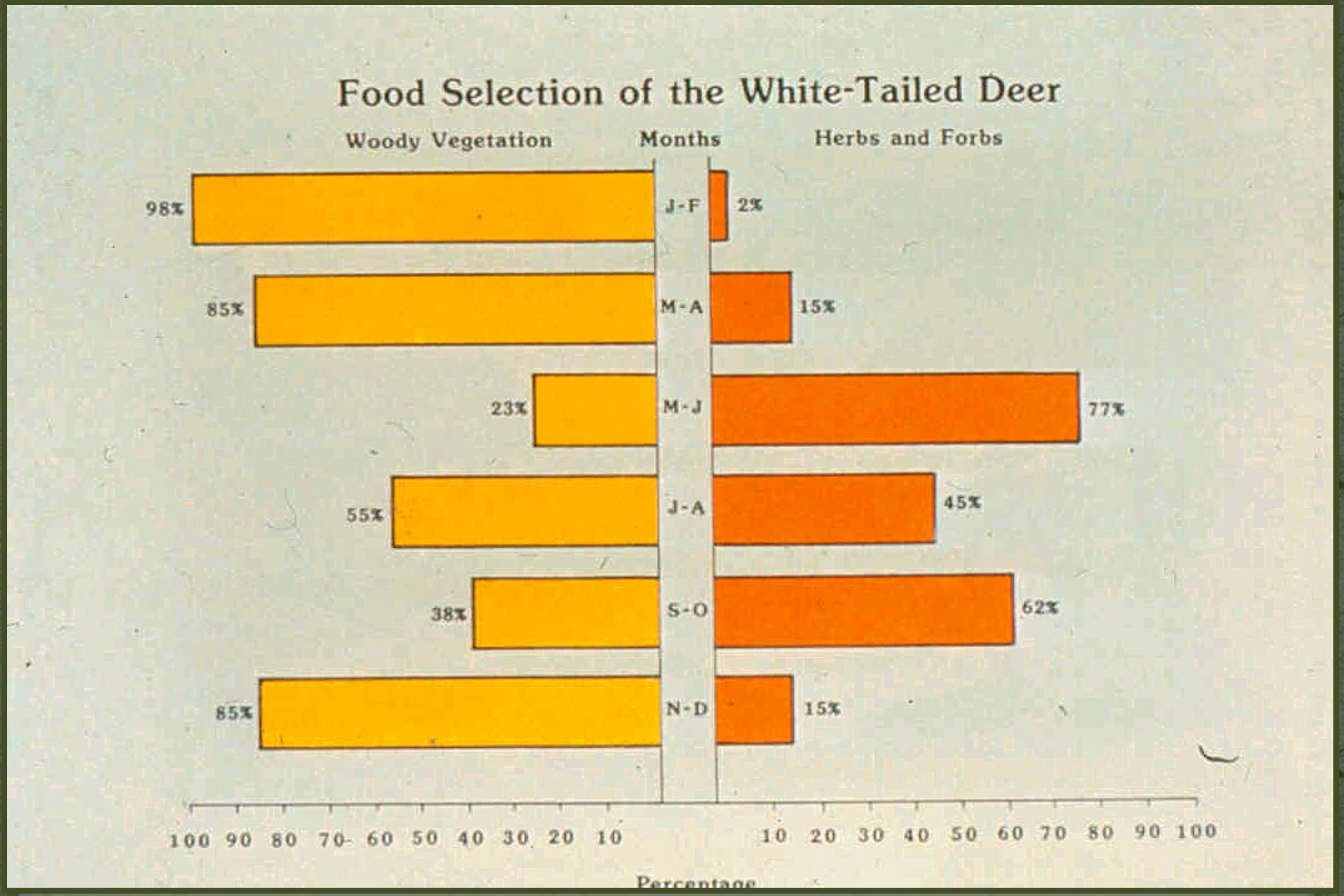
- Whereas, other animals only need one of two of these habitat stages through their life, but often within close proximity or with corridors connecting them.

Wildlife Habitat

- "Edge" habitat and diverse landscapes found in Sand Dunes State Forest provide:
  - Cover
  - Water
  - Space
  - Food

- Most important spring/summer food sources include grasses, buds and blossoms from a variety of herbs, shrubs and trees.

- Acorns also provide important nutrition in the fall and winter.


Food Selection of the White-Tailed Deer
Woody Vegetation
Months
Herbs and Forbs
98%
J-F
2%
85%
M-A
15%
23%
M-J
77%
55%
J-A
45%
38%
S-O
62%
85%
N-D
15%
100 90 80 70 60 50 40 30 20 10
10 20 30 40 50 60 70 80 90 100
Percentage

Wildlife Populations and Habitat Management

- Fire, wind, age and humans are drivers of change.
- Insect and Disease Considerations
- Rare Feature Considerations

Sand Dunes State Forest Habitat

Habitat Management Challenges

- Invasive Species Control
- What are invasive species?
  - Invasive species are plants, animals, and microorganisms that are often not native to a particular area.
  - They are capable of causing severe damage in areas outside their normal range, harming the economy, the environment or human health once they become established.
- A few common invasive species in Sand Dunes State Forest include:
  - Common buckthorn
  - Spotted knapweed
  - Two fungal species that cause:
    - Dutch elm disease
    - Oak wilt

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Invasive Species Control

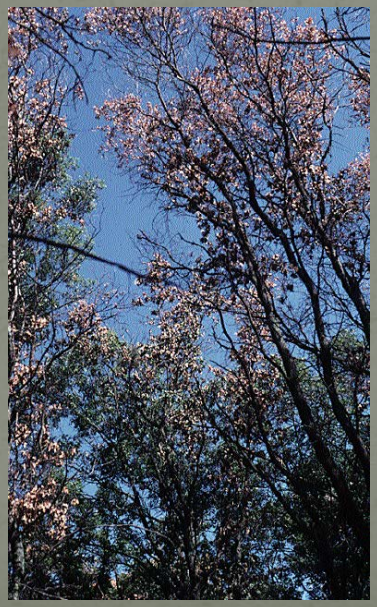
- Historically, invasive species were not as prevalent in these habitat communities.
- What's changed?
  - Introductions of invasive species thrive when conditions are suitable for their growth often without the natural predators present from their place of origin or the absence of historical disturbances.
- Successful invasive species control requires an integrated pest management approach.

Invasive Species Control

Based on Integrated Pest Management approach:

- First, property identify invasive species or disease.

.



Invasive Species Control

Based on Integrated Pest Management approach:

- Then, implement one or a combination of the following:
  - Mechanical Treatments
  - Herbicide Treatments
  - Cultural Treatments
  - Biological Control

.

Integrated Pest Management

- Mechanical Treatments
  - Mowing

  - Vibratory plow

  - Timber harvest

  - Cut stump
    - Used <u>alone</u> could require multiple entries depending on the species
      - Eastern red cedar = one treatment
      - Common & glossy buckthorn = multiple treatments
  - Prescribed burn

Habitat Management Enhancement & Restoration

- Based on SDSF Operational Plan desired future conditions.
- Techniques and specific site level management including prescribed fire, mechanical and herbicide treatments.
- Natural history of Sand Dunes State Forest fire dependent community:
  - Frequency (10 year average vs. 110 years)
  - Fire intensity (mild surface vs. stand replacement)

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Prescribed Burning

- Prescription based on ecological objectives
- Vegetation response and wildlife benefits
- Fire adapted/dependent ecosystems

Prescribed Burning

- Burn plans and permits
- Season and timing
- Firebreaks
- Smoke management
- Contingency plans
- Small burn units (7-30 acres on average)
- Fire qualifications and experienced staff
- Specialized equipment
- Post burn monitoring


CAUTION
SMOKE
AHEAD


04/18/2008


04/18/2008


RANGER
04/18/2008

Integrated Pest Management

- Why use herbicides treatments?
  - Important for habitat restoration and maintenance.
  - DNR has a responsibility to manage invasive species on state lands.
  - Deferring or ignoring simple herbicide work can lead to much more expensive treatments and loss of initial restoration investment.
  - Herbicide application is often a cost-effective means to control undesirable species in restoration (i.e. woody plants in a prairie)

Integrated Pest Management

- Herbicide Treatments
  - Common label names and best applications
  - Licensed applicators conducting or directing work with herbicides
  - Application methods
    - Backpack sprayer
    - ATV tank with wand applicator

Invasive Species Control
Herbicide Treatment

- Used when:
  - Biological controls are not an option.
  - Mechanical control alone does not kill the targeted plant.
  - Note the multiple stems spouting from this buckthorn cut stem without the follow-up targeted spot spray of the stump.

MNDNR

Integrated Pest Management

- Herbicide Treatments
  - Spot spraying (i.e. basal bark & cut stump treatments)
    - Used following mechanical treatments (cut stump) reduces or eliminates need for additional reentry into managed areas.

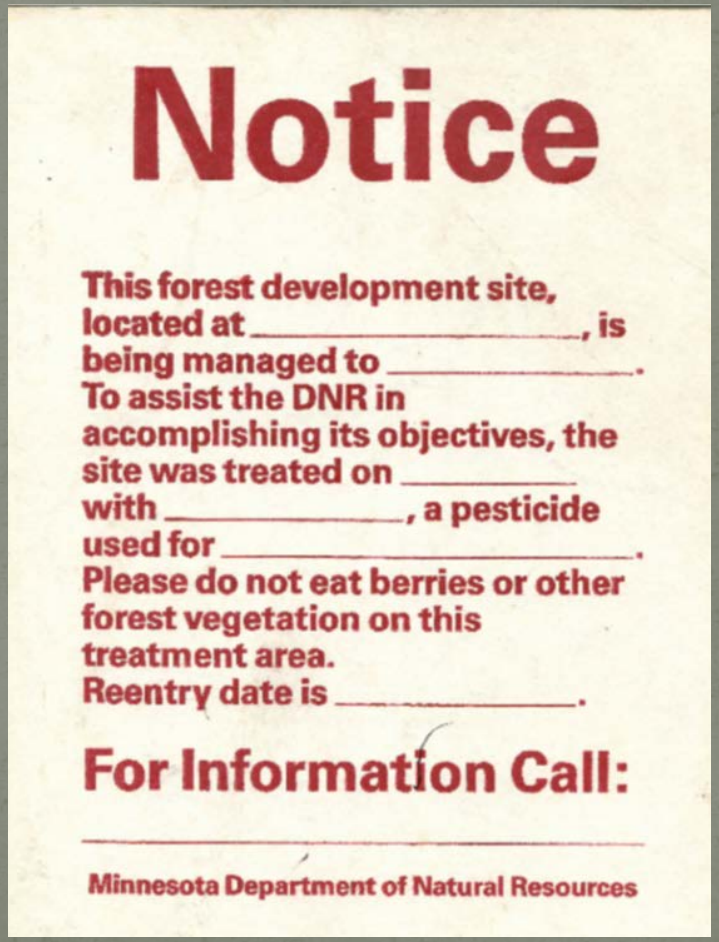
Integrated Pest Management

- Pesticide Treatments
  - Broadcast spraying
    - Btk (*Bacillus thuringiensis subspecies kurstaki),* a bacterial insecticide, was aerial sprayed by helicopter in 2007 for a severe outbreak of jack pine budworm in Sand Dunes State Forest.

    - Red and white pines were defoliated along with Jack pine.
    - Two salvage sales of red and white pine were done shortly after the outbreak. Btk is used for forest tent caterpillar and Gypsy moth outbreaks in the Lake states and beyond.

Integrated Pest Management

- Herbicide Treatments
  - Signage
    - Located at entrances to treated sites for the growing season.
    - Describes:
      - Pesticide used
      - Purpose
      - Treatment date
      - Reentry period



Integrated Pest Management

- Cultural Treatments

Play Clean Go

STOP INVASIVE SPECIES IN YOUR TRACKS.

PlayCleanGo.org

MNDNR

Integrated Pest Management

- Biological Control
  - **The use of natural enemies to control non-native pests, can be an effective tool in managing invasive plants.**

  - **Non-native plants can become invasive because they lack the insects and diseases that control them in their native environments.**

Integrated Pest Management

- Biological Control

  - **Biological control reunites natural enemies, such as herbivores and pathogens, with their host (invasive plant) to reduce impacts caused by the pest.**

  - **The goal of biological control is to reduce the target pest population and its corresponding impact to an acceptable level.**

Integrated Pest Management

- Biological Control
  - **The following successful biological control programs have been implemented statewide:**
    - **Leafy spurge**
    - **Spotted knapweed**
    - **Purple loosestrife**
  - **Development of new biological control efforts for buckthorn, and others are underway.**
  - **Biological control agents are specialized insects that were tested extensively to ensure they specifically target a specific non-native invasive plant and produce the desire reduction result without harming native species.**