







UNIVERSITY OF MINNESOTA EXTENSION

MAKING A DIFFERENCE IN MINNESOTA: ENVIRONMENT + FOOD & AGRICULTURE + COMMUNITIES + FAMILIES + YOUTH

# Big Woods, Big Rivers

## MINNESOTA MASTER NATURALIST PROGRAM



# LESSON TWO:

# THE FOREST FOR THE TREES

## Plant communities in the Big Woods

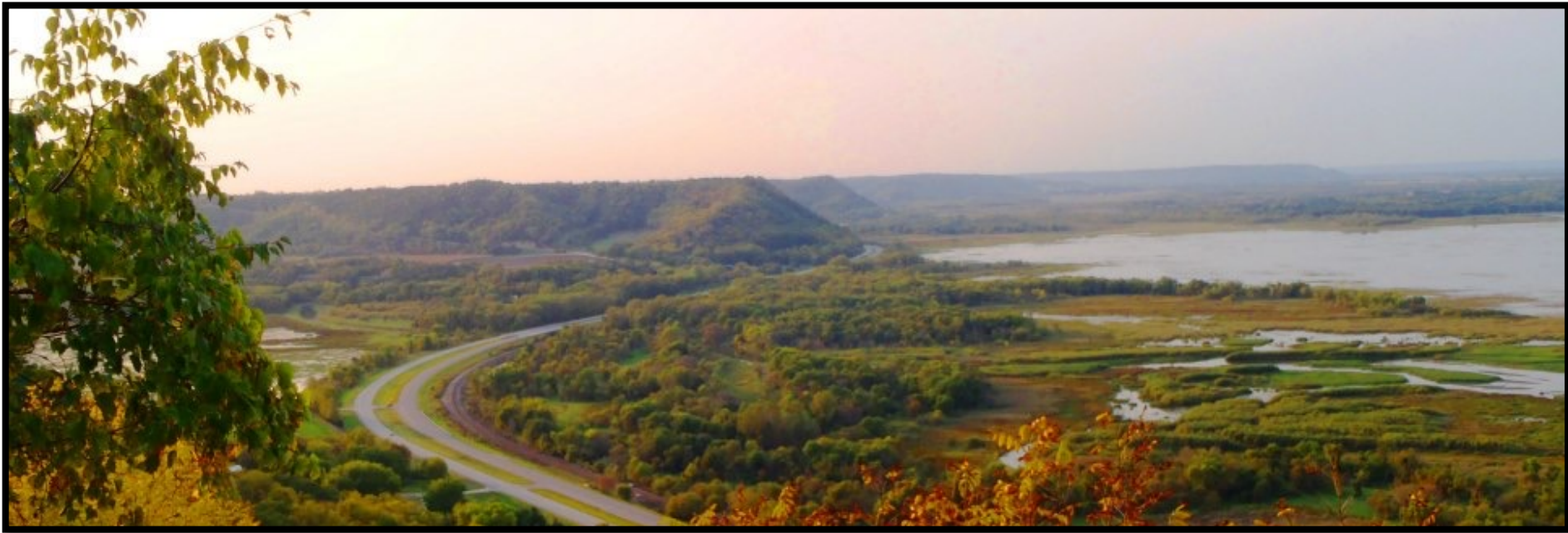


IMAGE: By Danielle Quist, U of M Extension

Objective: Understand that local geography, disturbance patterns, and management shape and create the plant communities in the Big Woods, Big Rivers region.



past history  
ecological process  
available moisture  
unpredictability  
+ bit of management

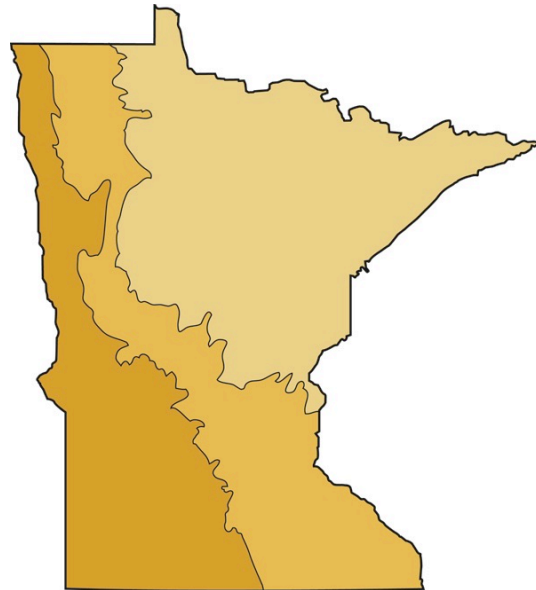
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# Your Favorite Woods





# WHY DOES THE DECIDUOUS FOREST BIOME RUN LIKE A SASH ACROSS MINNESOTA?





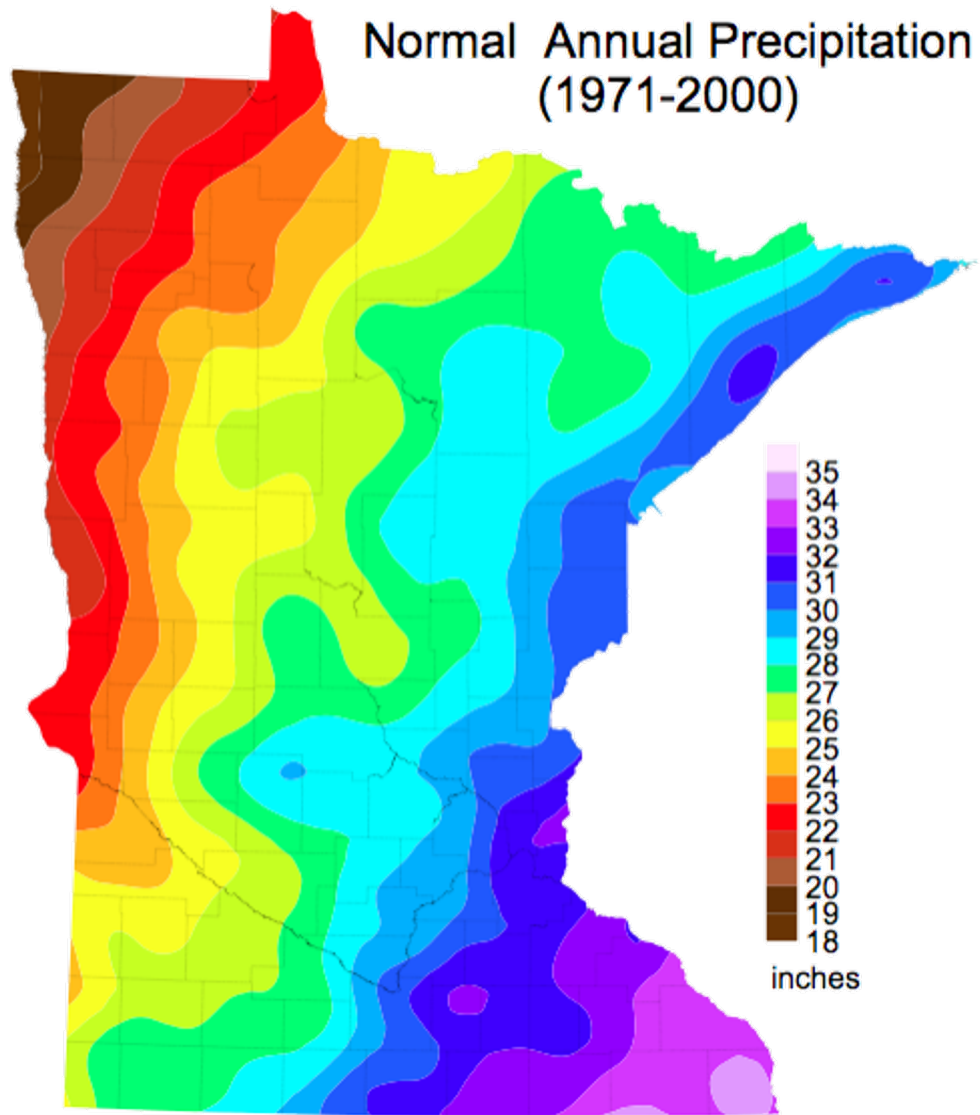


Image courtesy of State Climatology Office – DNR Waters



# Normal Annual Temperature (1971-2000)

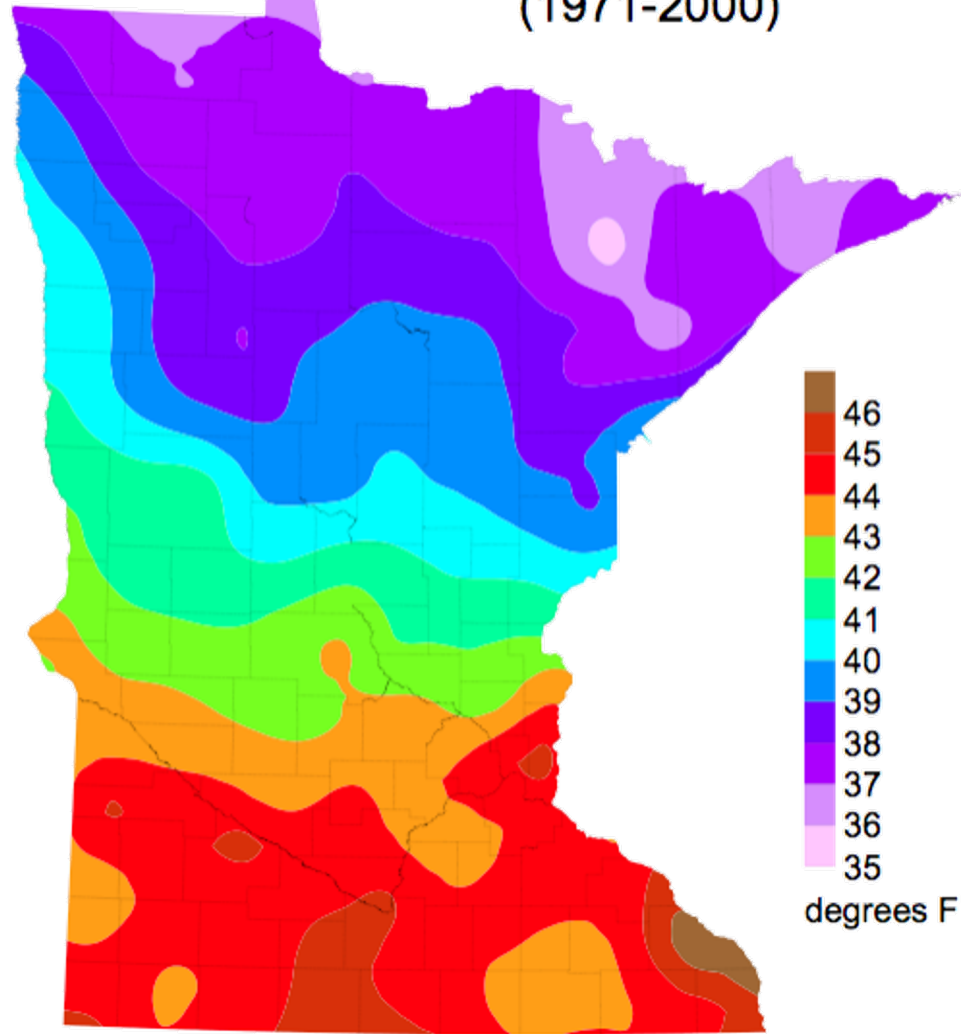


Image courtesy of State Climatology Office – DNR Waters



# MN BIOMES

Annual Precipitation minus  
Evapotranspiration

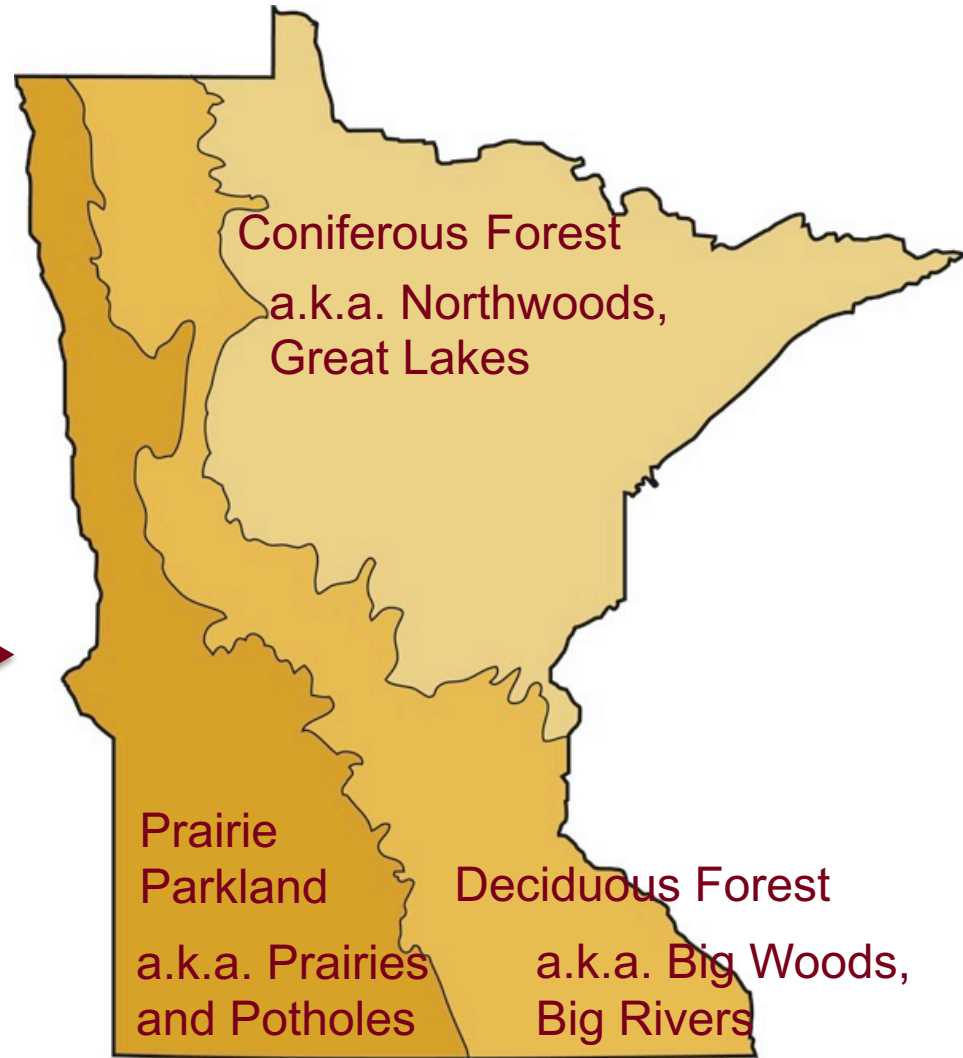
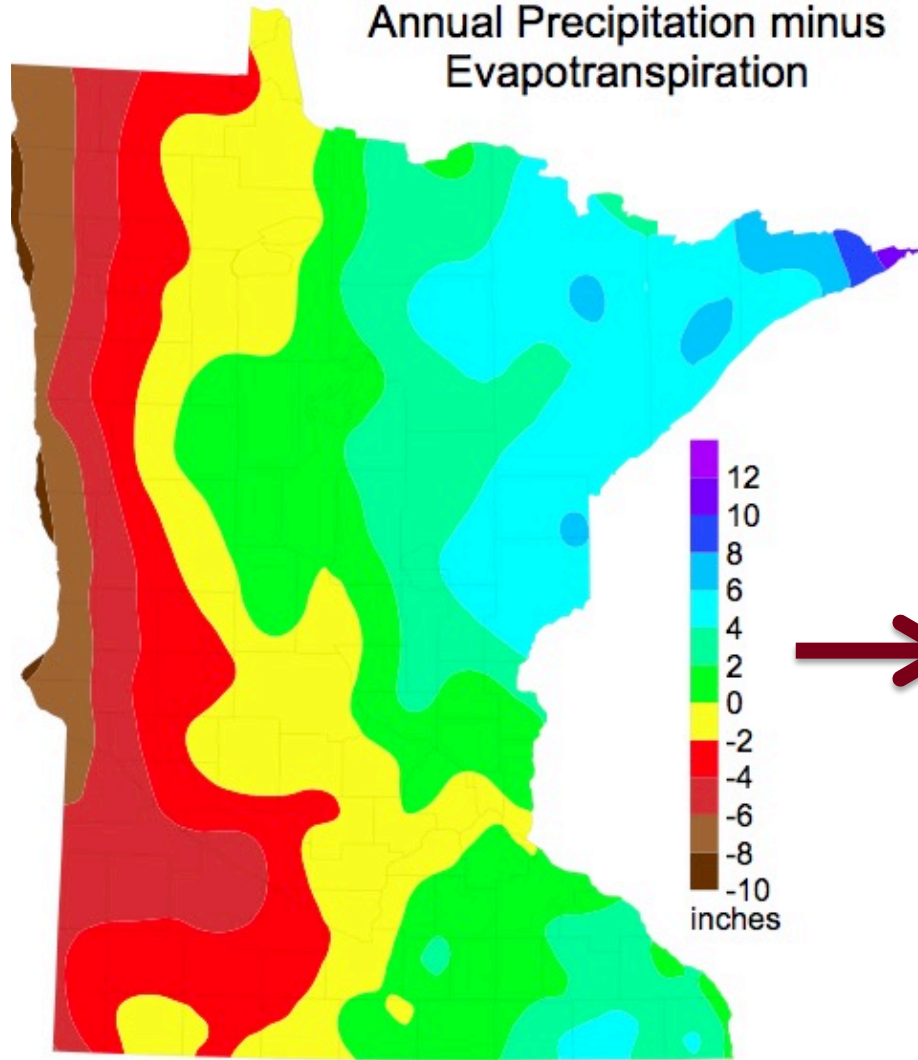


Image courtesy of State Climatology Office – DNR Waters





By Doug Wallick (CC BY-SA)



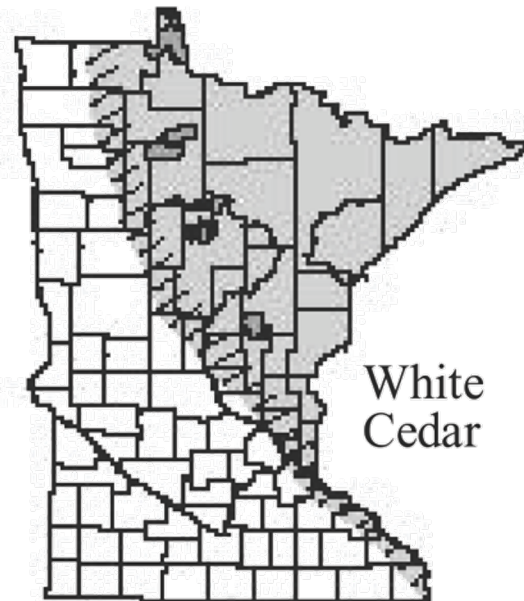
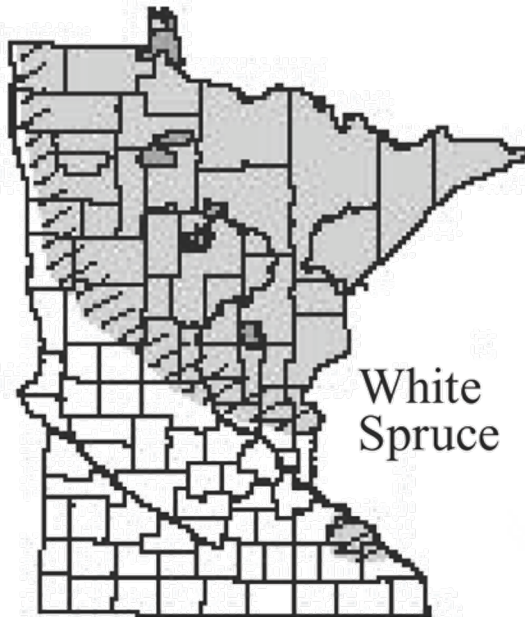
By Anthony Auston (CC BY)



# WHAT VARIETY EXISTS IN THE BIG WOODS BIOME IN MINNESOTA?



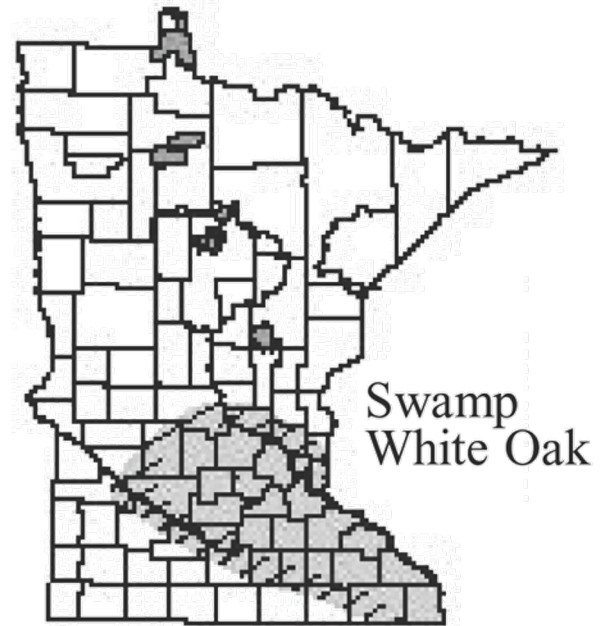
# NORTHERN SPECIES



Images courtesy of Minnesota Forest Resources Council



# SOUTHERN SPECIES



Images courtesy of Minnesota Forest Resources Council

# THE TRANSITIONAL ZONES

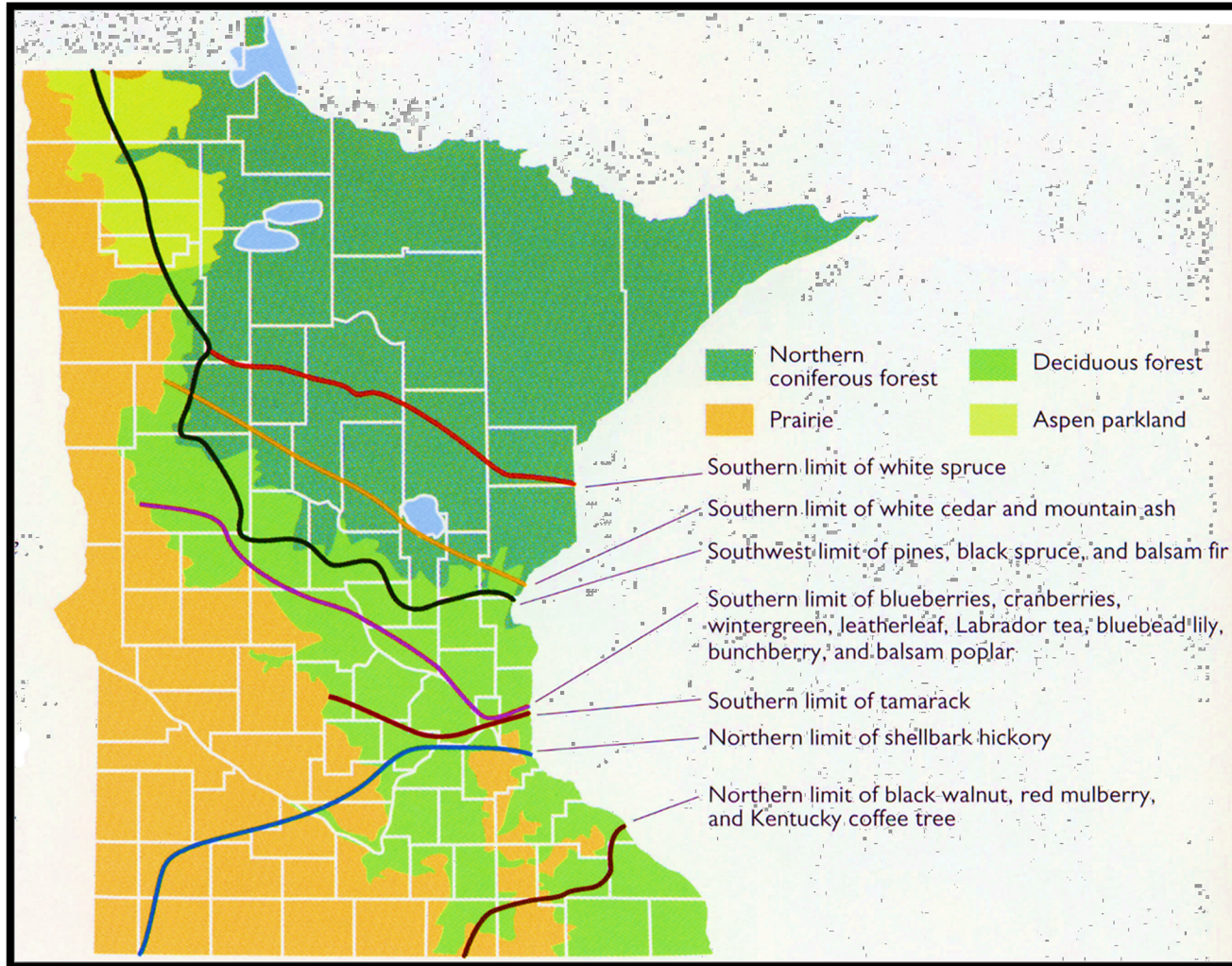


Image courtesy of John Tester, from "Minnesota's Natural Heritage" (1995)





# WHAT PROCESSES MAINTAIN THIS VARIETY IN THE BIG WOODS?

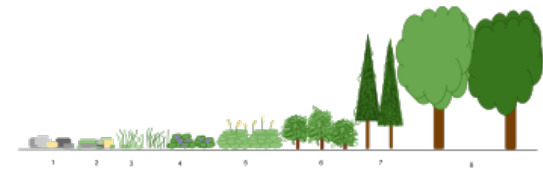


Inspiration Peak Alexandria, Minnesota By Amanda Su (CC BY-SA)

# SUCCESSION

The process in which communities of plant and animal species in a particular area are replaced over time by a series of different and usually more complex communities.

*-- Hubbard Brook Ecosystem Study LTER*





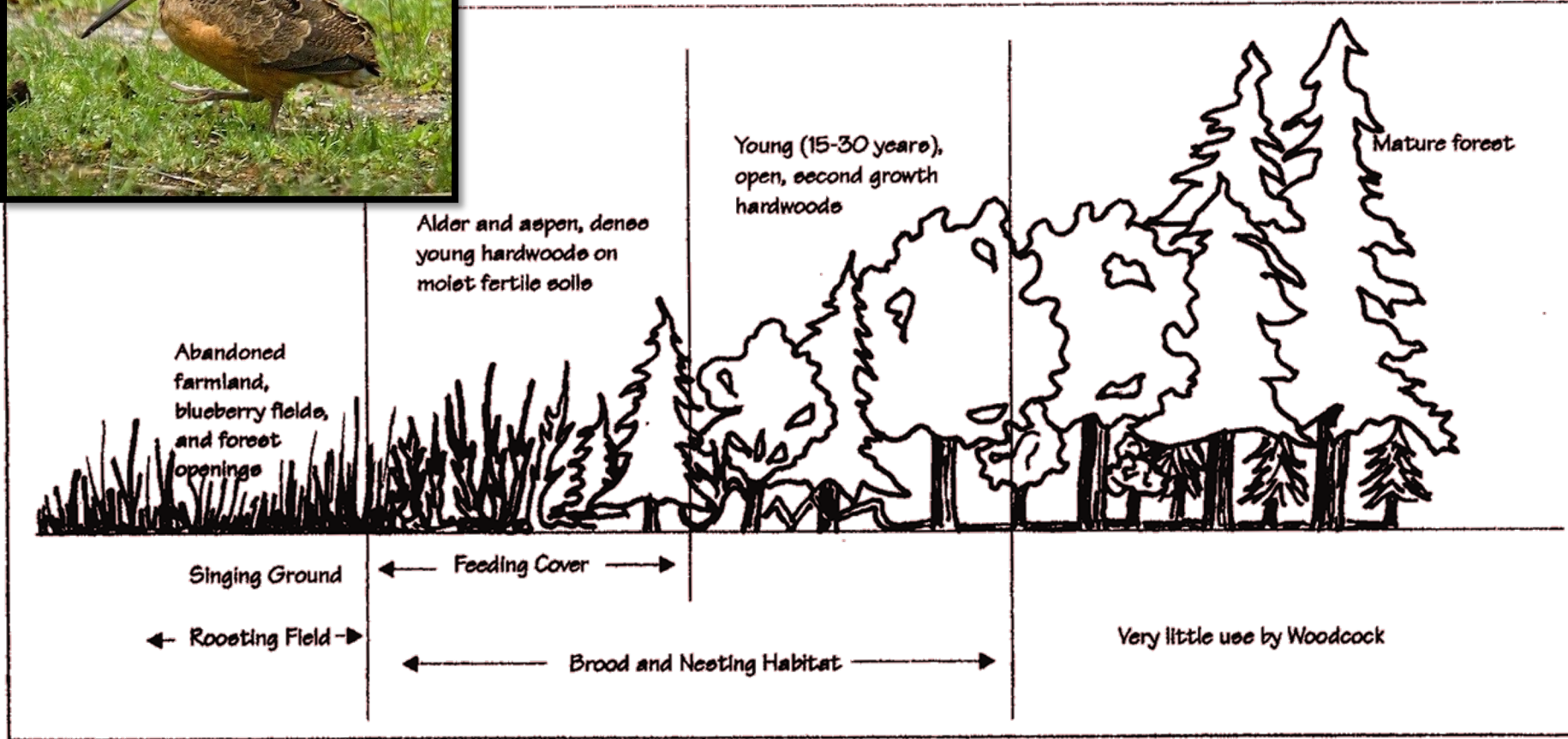


Image from Sargent, M.S and Carter, K.S., ed. 1999. Managing Michigan Wildlife: A Landowners Guide. Michigan United Conservation Clubs, East Lansing, MI. 297pp

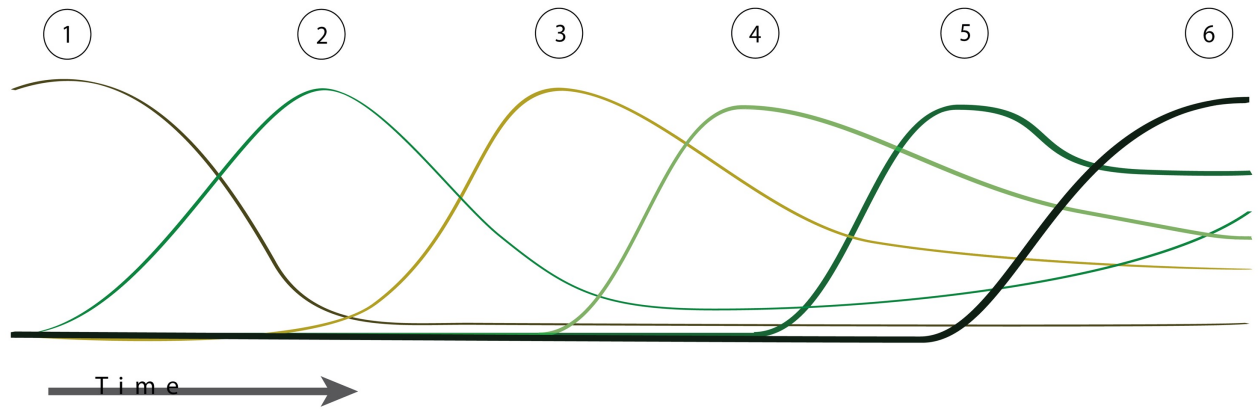
# OPTIONAL VIDEOS ON SUCCESSION

- Bozeman Science (6 mins)

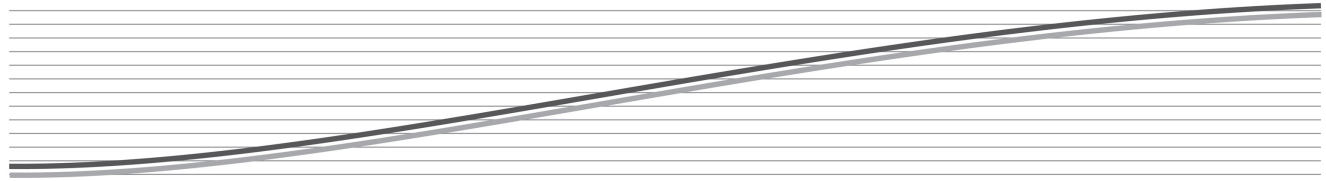
<https://www.youtube.com/watch?v=V49lovRSJDs>

# Forest Succession Over Time In Six Stages

- 1 Bare Rock
- 2 Mosses Grasses
- 3 Grasses Perennials
- 4 Woody Pioneers
- 5 Fast Growing Trees
- 6 Climax Forest



**Increase over Time**  
 Biodiversity  
 Biomass  
 Soil Layer



By Lucas Martin Fey, Louisiana State University (CC BY-SA)



# DISTURBANCE

A natural or human-induced disruption or alteration of an ecosystem.

*-- Hubbard Brook Ecosystem Study LTER*



# FIRE



Image Courtesy of MN DNR, BY Boyd Barrott from A Citizen's Guide to DNA Forestry

# OPTIONAL VIDEOS ON DISTURBANCE

- Response of a Forest to a Fire (50 secs)
  - Ground View: <https://youtu.be/SoQA6gGEyLg>
  - Tree View: [https://www.youtube.com/watch?v=cMUnFyz\\_8mM](https://www.youtube.com/watch?v=cMUnFyz_8mM)





By Walters, Harold D., U.S. Forest Service

# WINDTHROW



Image courtesy of MN DNR July 4<sup>th</sup>, 1999 Storms





Image courtesy of MN DNR



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Image courtesy of MN DNR



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# FLOODING AND FLOODPLAIN FOREST SUCCESSION



Willows and Cottonwood → Mature Cottonwoods and Willows+ Silver Maple → Mature Silver Maple + Green Ash, Elms, River Birch



# LOGGING



Public Domain, <https://commons.wikimedia.org/w/index.php?curid=1977287>



By Daniels, Gene, photographer, Photographer (NARA record: 8463941) – U.S. National Archives and Records Administration, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=16916734>







Image courtesy of USDA Forest Service



BY Hustvedt (CC BY-SA)

# SILVICULTURE

Natural resource managers can modify or direct succession by controlling species vigor and composition and the types and frequencies of disturbances. This is the basic premise of silviculture.



# SILVICULTURE

- **Stall succession**
  - partial cuts or disturbances that affect over 30 percent of the stand are used.
- **Keep pioneer species**
  - major disturbances such as clear-cuts are needed to create a new stand of young trees (even-aged management).
- **Keep specific species**
  - minor disturbances such as partial cuts and shelterwoods are used to remove groups of trees.

# WHAT ARE THESE FOREST COMMUNITIES?



Inspiration Peak Alexandria, Minnesota By Amanda Su (CC BY-SA)



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*Field Guide  
to the*

NATIVE PLANT  
COMMUNITIES  
*of* MINNESOTA



The Eastern  
Broadleaf Forest  
Province





# HOW ARE VEGETATIVE COMMUNITIES DETERMINED?

- Field Surveys
- Canopy Trees
- Understory Vegetation
- Soil Surveys
- Indicator Species



Image courtesy of US EPA

# SURVEYING FOREST COMMUNITIES

Hemispherical Photo



By Martin Wegmann (CC BY-SA)

DBH

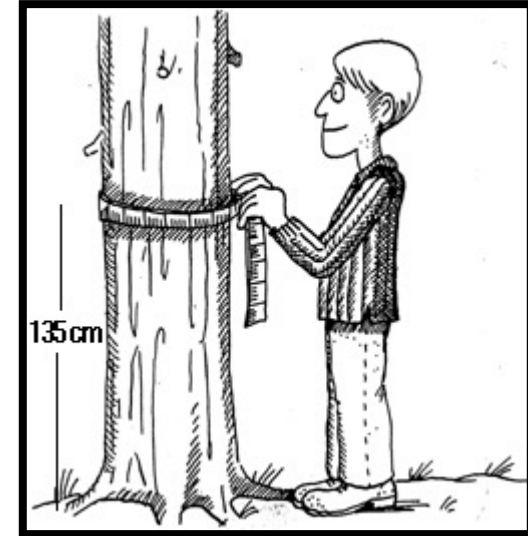


Image courtesy of US EPA

Soil Profile

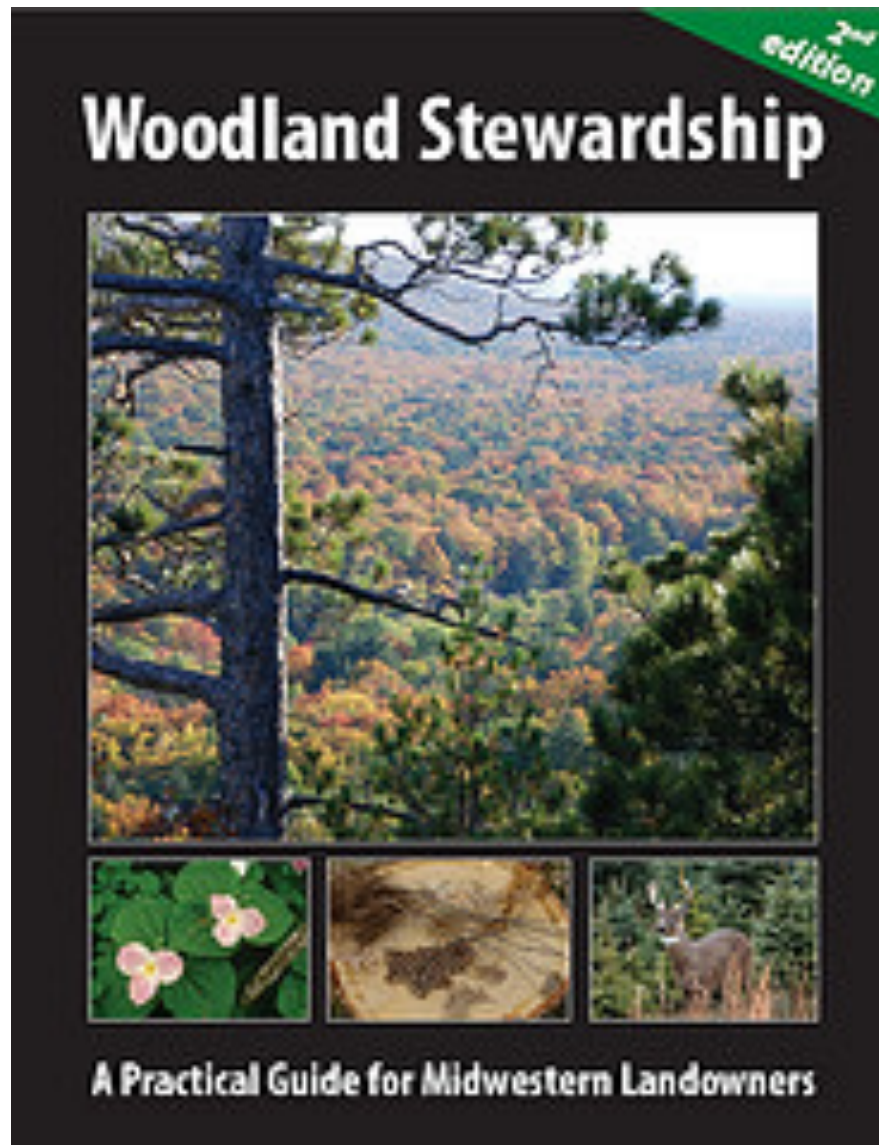


Image courtesy of USDA

Quadrats



Image courtesy of USDA



[HTTP://WOODLANDSTEWARDSHIP.ORG/](http://WOODLANDSTEWARDSHIP.ORG/)

Image courtesy of University of Minnesota Extension

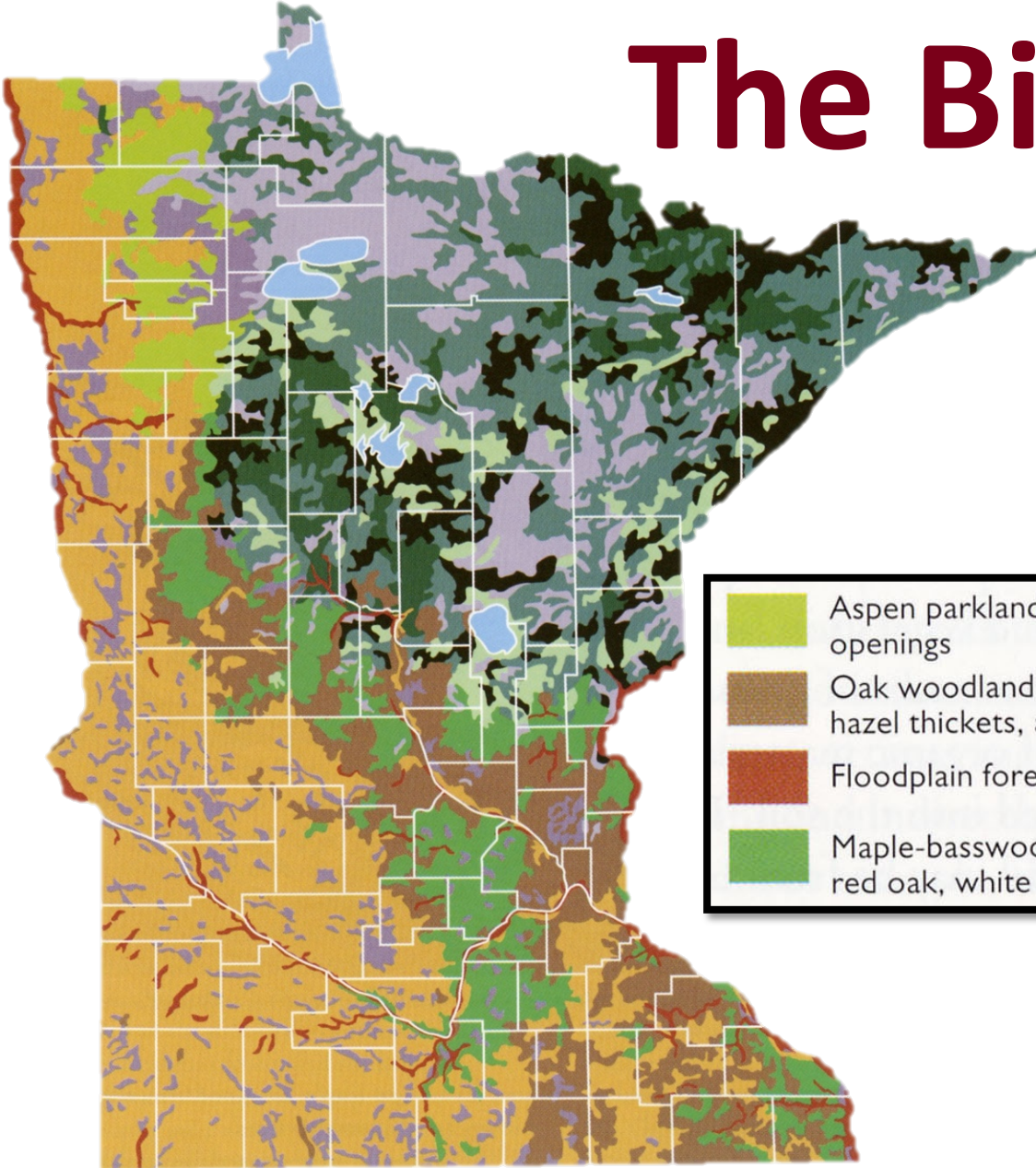


# INDICATOR SPECIES

An organism whose presence or state of health is used to identify a specific type of biotic community or as a measure of ecological conditions or changes occurring in the environment..

*-- USGS Status and Trends of the Nation's Biological Resources*

# The Big Woods







-  Aspen parkland—aspens groves with prairie and sedge meadow openings
-  Oak woodland and brushland—bur oak and pin oak, aspen and hazel thickets, and prairie openings
-  Floodplain forest—silver maple, elm, cottonwood, willow
-  Maple-basswood forest—elm, basswood, sugar maple, red oak, white oak

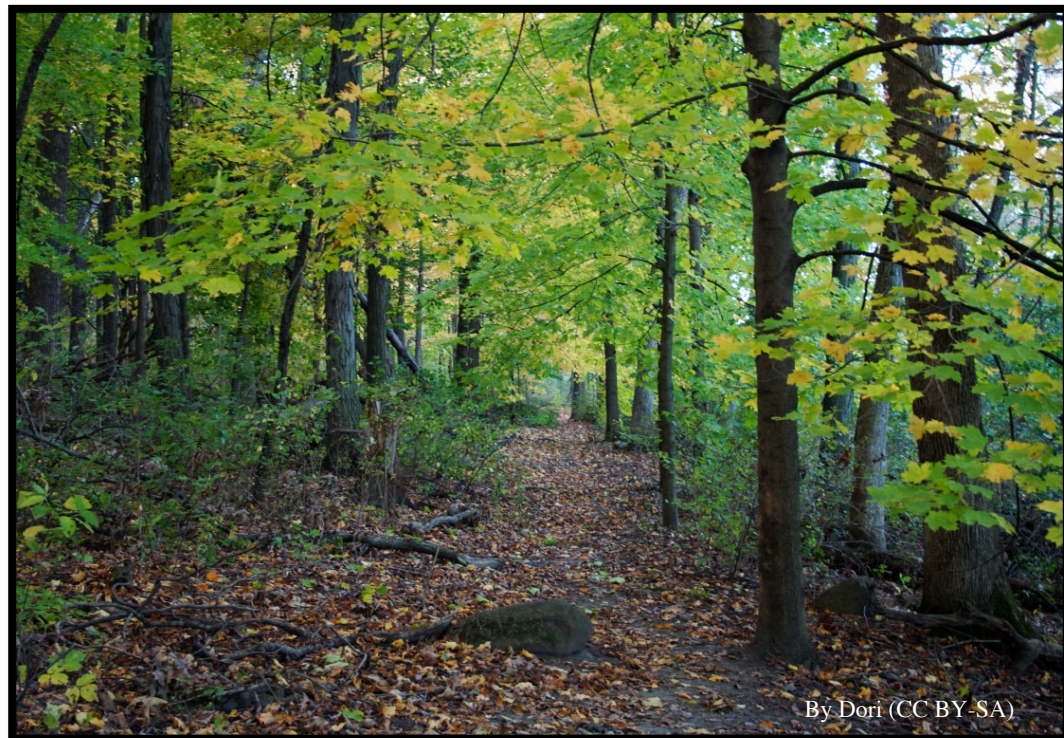
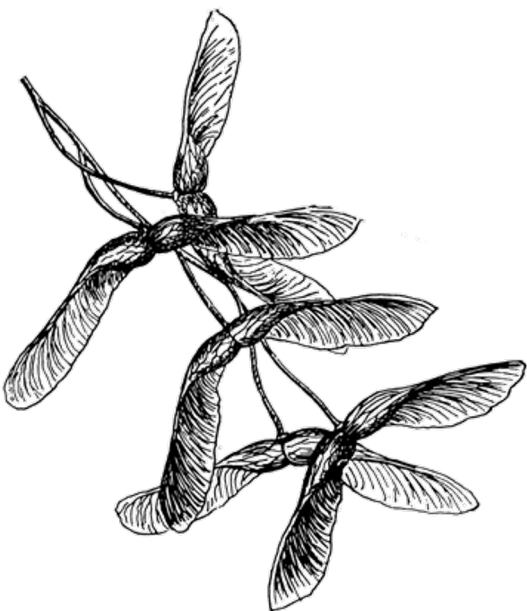
Image courtesy of John Tester, University of Minnesota





# MAPLE-BASSWOOD

- Mesic
- Mature
- Not fire tolerant



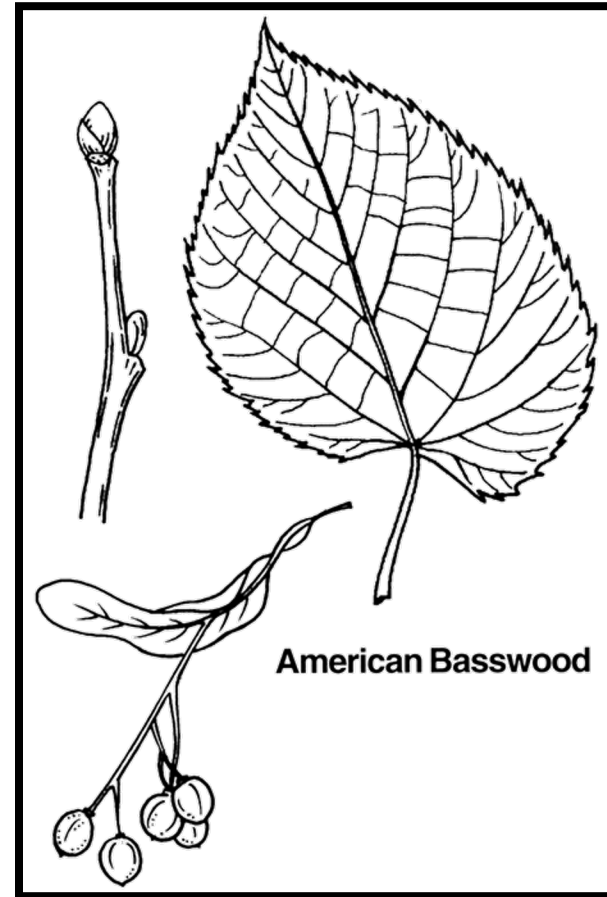
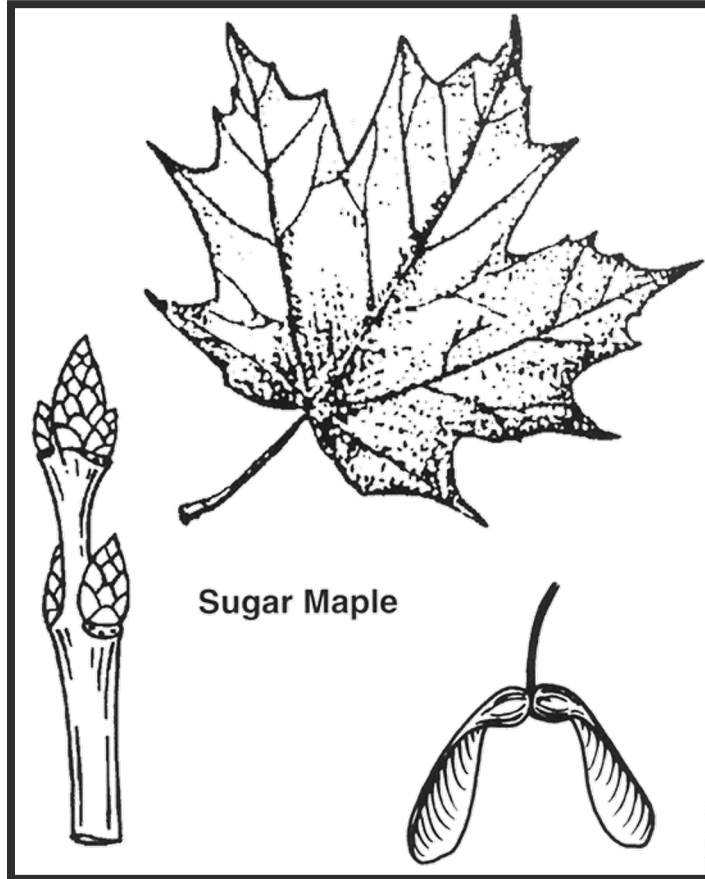
By Dori (CC BY-SA)

Grasses and nonwoody plants → bushes (raspberries) → Sun-loving tree/shrub species (boxelder, ash, cherry) → Shade loving trees (maple and basswood)





# MAPLE-BASSWOOD TREES



Images courtesy of [Minnesota Trees](#), University of Minnesota Extension. Illustrations by Bruce L. Fuller, John Molstad, Michael W. Rathke, A.E. Hoyle, and Leta Hughey.

# MAPLE-BASSWOOD UNDERSTORY



Leatherwood



Ironwood

Photos courtesy of the Wisconsin State Herbarium By Kenneth J. Sytsma and Joanne Kline

# MAPLE-BASSWOOD HERBS



Virginia Water-leaf



Zig-zag Goldenrod

Photos courtesy of the Wisconsin State Herbarium By Kenneth J. Sytsma and John M. Schoeneker

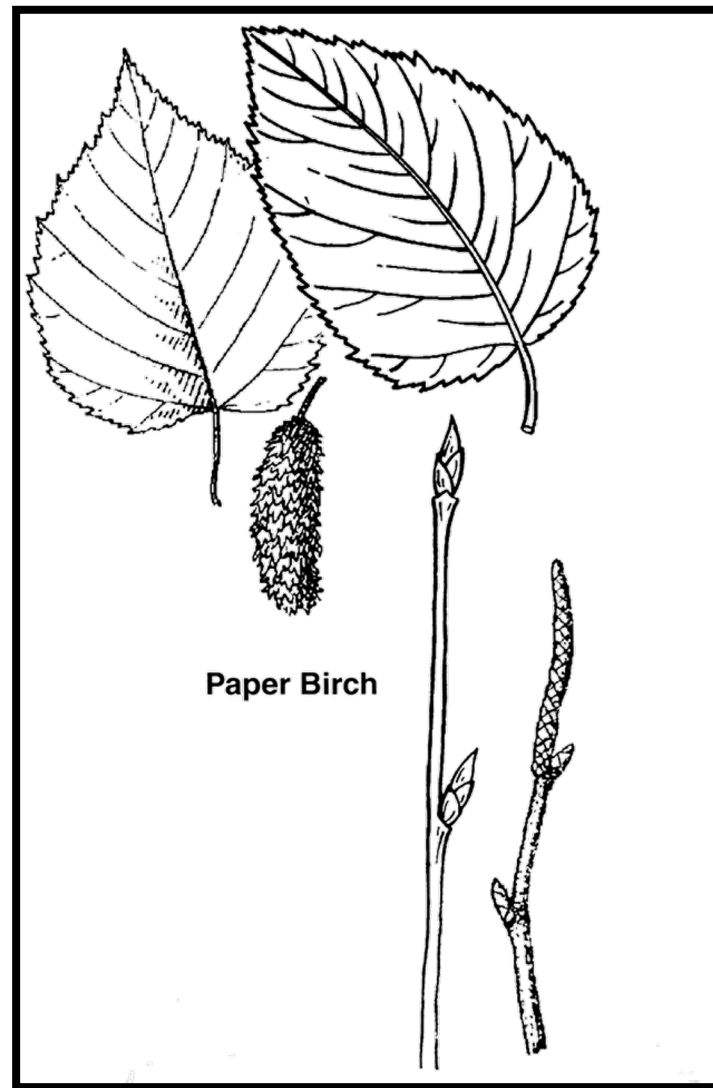
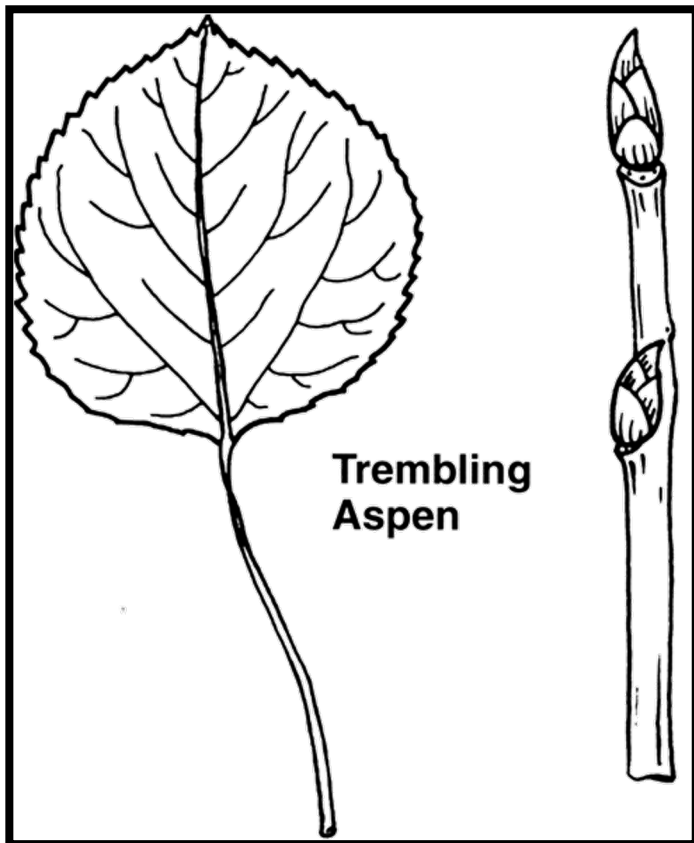


# ASPEN BIRCH

- Mesic to Dry
- Immature to Mature
- Fire tolerant



# ASPEN BIRCH TREES



Images courtesy of [Minnesota Trees](#), University of Minnesota Extension. Illustrations by Bruce L. Fuller, John Molstad, Michael W. Rathke, A.E. Hoyle, and Leta Hughey.



CANOE BUILDING  
ON SANDY POINT,  
ELY, MINN.





# ASPEN BIRCH UNDERSTORY



Redosier Dogwood



Beaked Hazelnut

[http://plants.usda.gov/plantguide/pdf/cs\\_cose16.pdf](http://plants.usda.gov/plantguide/pdf/cs_cose16.pdf)

# ASPEN BIRCH HERBS



Fireweed



Yarrow  
(*Achillea* sp.)

Photos courtesy of the Wisconsin State Herbarium By Dennis W. Woodland and Kenneth J. Sytsma







# OAK/OAK SAVANNAH

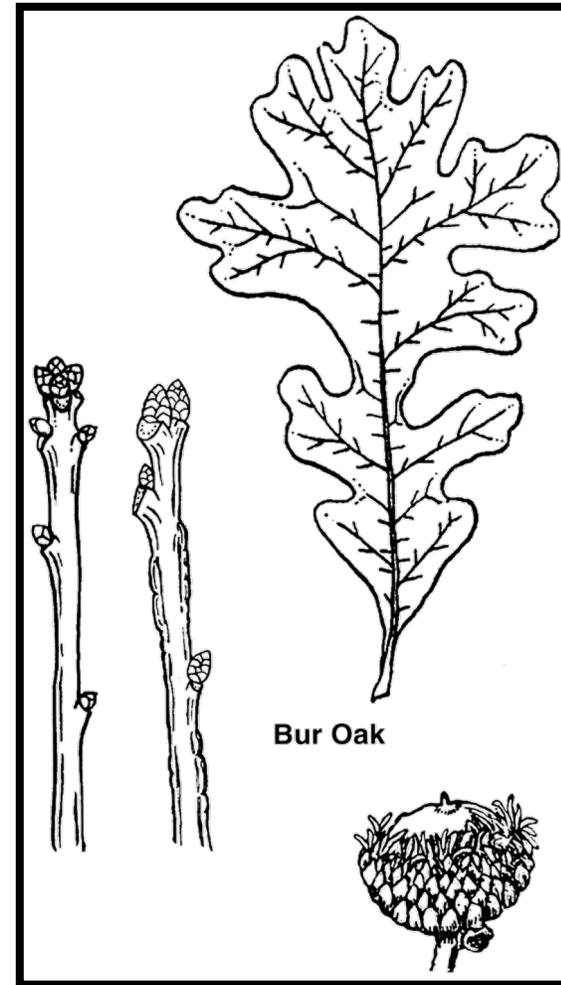
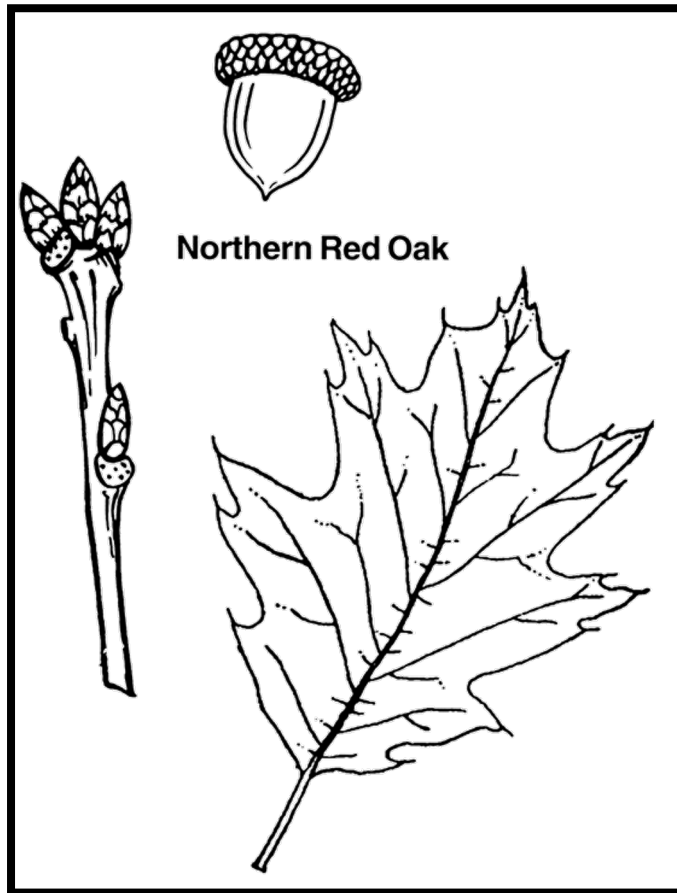
- Xeric (very dry)
- Mature
- Fire-maintained



Photos courtesy of the Wisconsin State Herbarium By V. Kline



# OAK/OAK SAVANNAH TREES



Images courtesy of [Minnesota Trees](#), University of Minnesota Extension. Illustrations by Bruce L. Fuller, John Molstad, Michael W. Rathke, A.E. Hoyle, and Leta Hughey.

# OAK/OAK SAVANNAH UNDERSTORY



Gray Dogwood



American Hazelnut

Photos courtesy of the Wisconsin State Herbarium By Kenneth J. Sytsma



# OAK/OAK SAVANNAH

## HERBS



Wolfberry



Golden Alexanders

Photos courtesy of the Wisconsin State Herbarium By Kitty Kohout and Robert W. Freckmann

# Wet/Floodplain Forests

- Hydric
- Mature
- Subject to annual disturbance



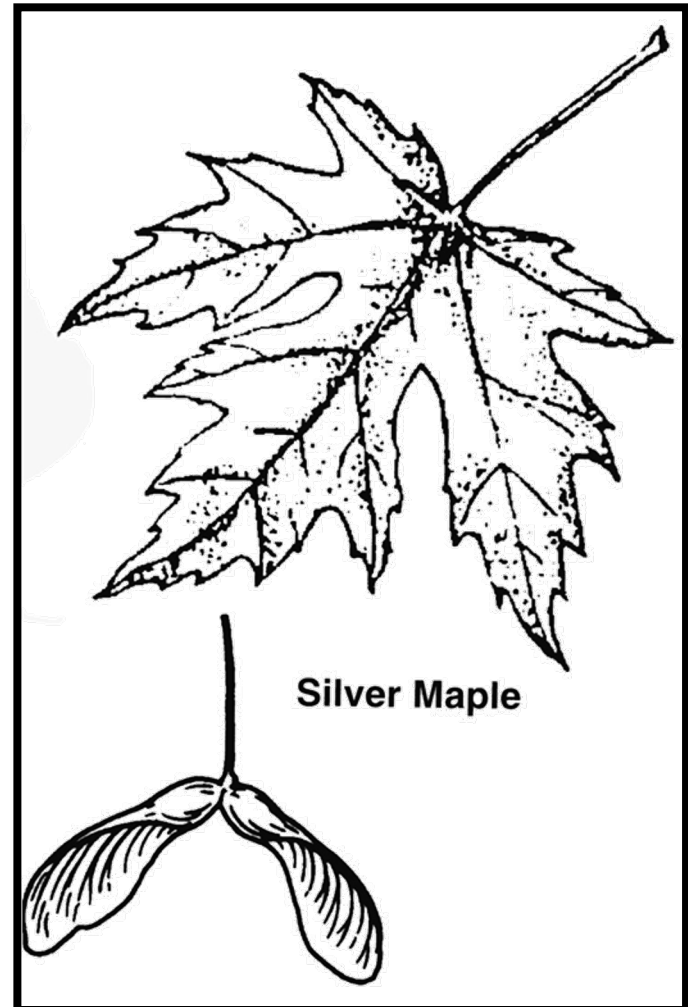
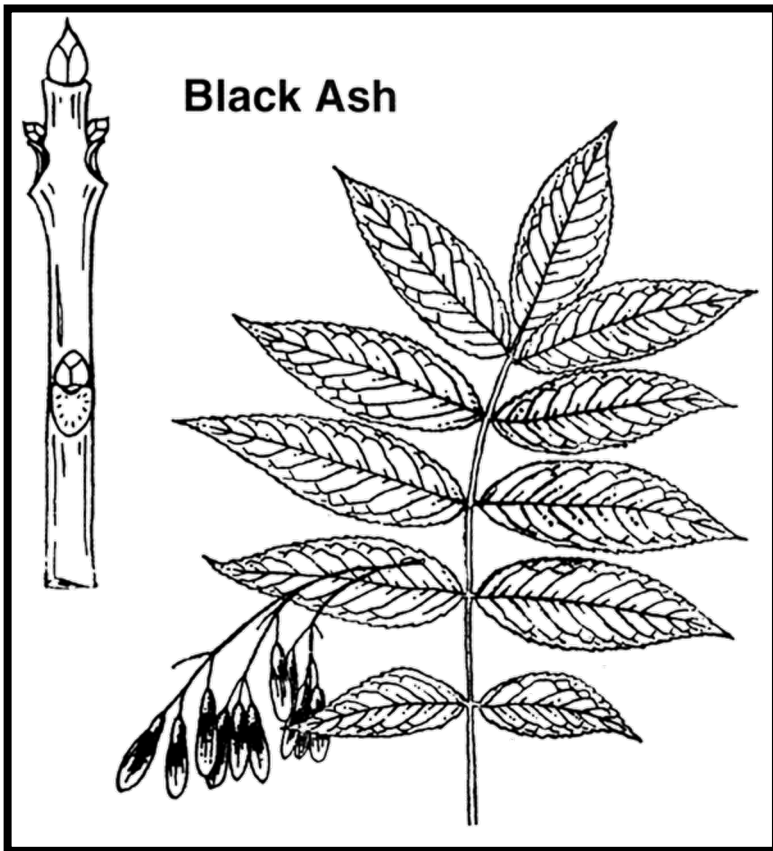
Willows and Cottonwood → Mature Cottonwoods and Willows+ Silver Maple → Mature Silver Maple + G/B Ash, Elms, River Birch

Photos courtesy of Danielle Quist, U of MN Extension



# Wet/Floodplain Forests

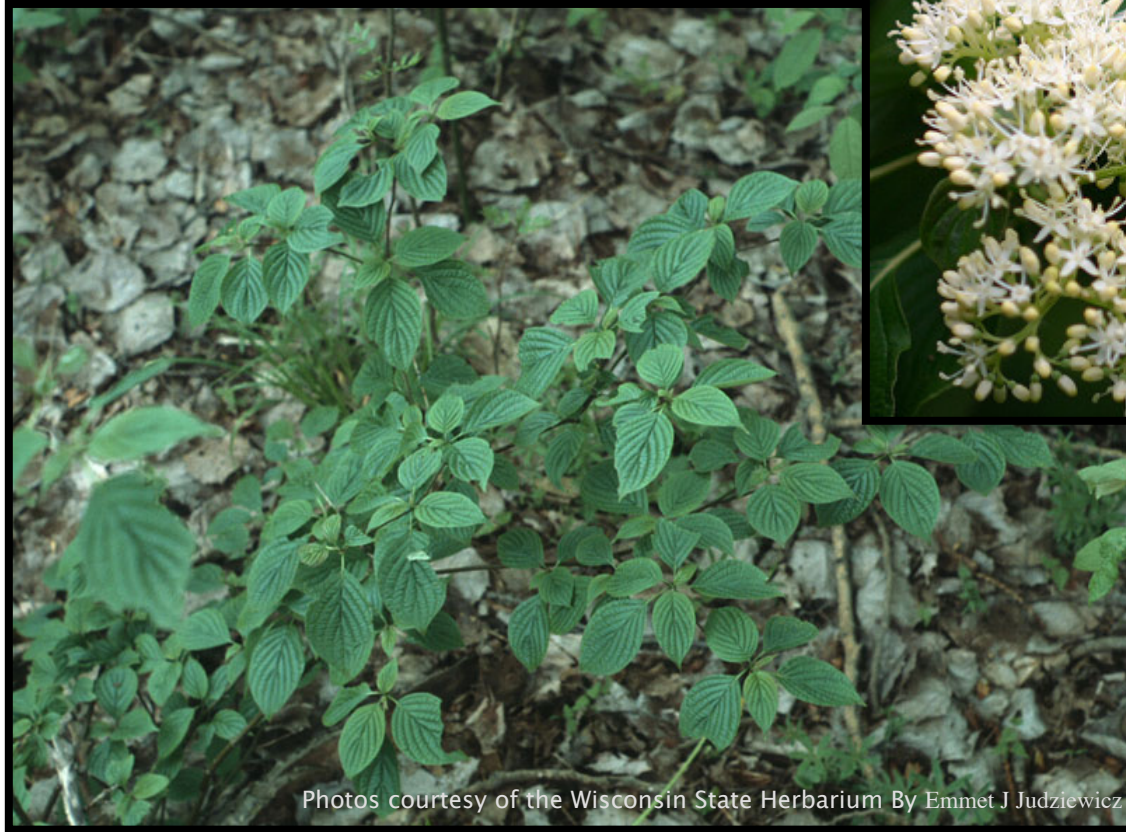
## TREES



Images courtesy of [Minnesota Trees](#), University of Minnesota Extension. Illustrations by Bruce L. Fuller, John Molstad, Michael W. Rathke, A.E. Hoyle, and Leta Hughey.

# Wet/Floodplain Forests

## UNDERSTORY



Photos courtesy of the Wisconsin State Herbarium By Emmet J Judzewicz

### Pagoda Dogwood



# Wet/Floodplain Forests

## HERBS



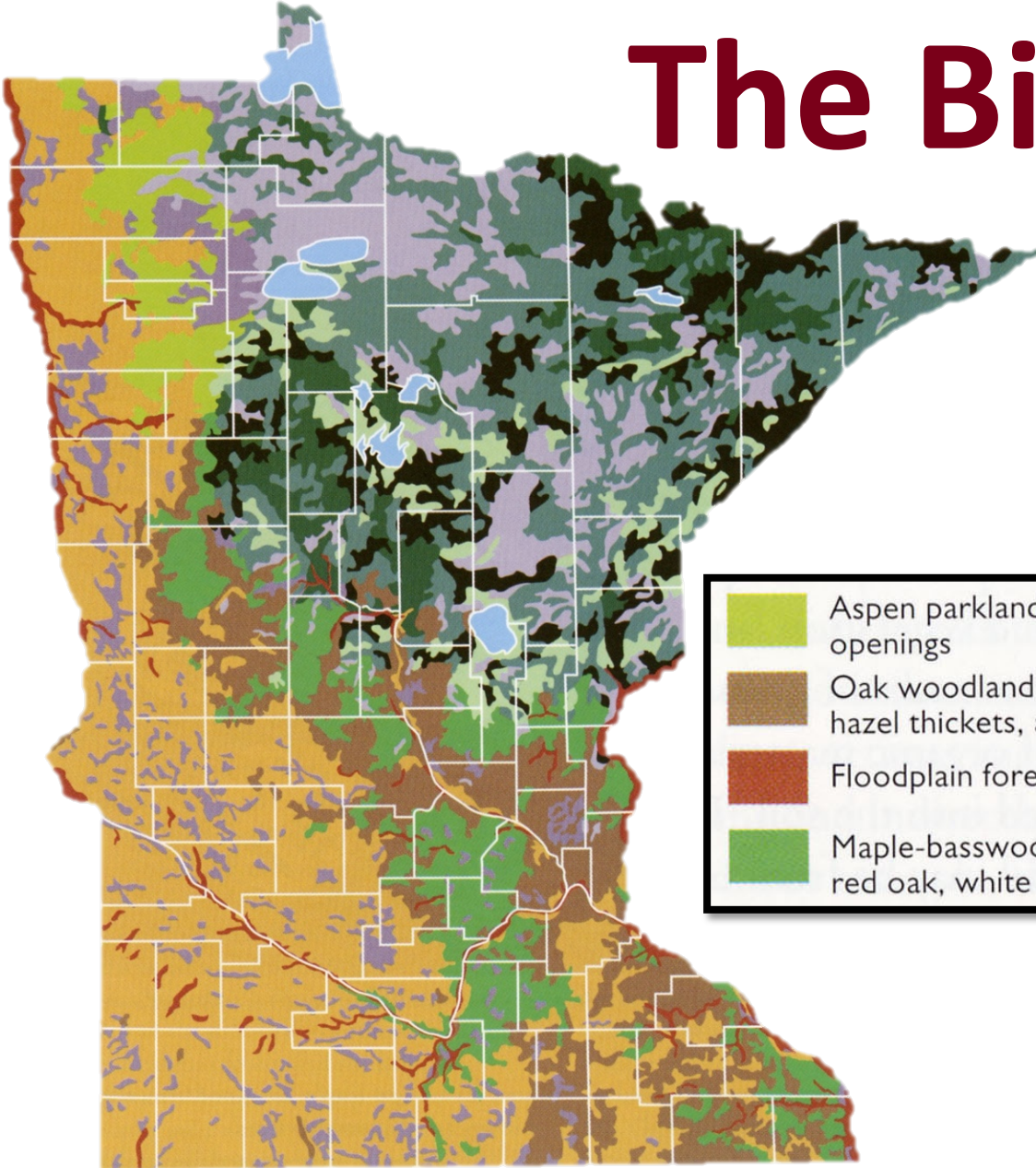
Wood-Nettle



Common Marsh-marigold

Photos courtesy of the Wisconsin State Herbarium By Michael Clayton and Paul Drobot

# The Big Woods







-  Aspen parkland—aspens groves with prairie and sedge meadow openings
-  Oak woodland and brushland—bur oak and pin oak, aspen and hazel thickets, and prairie openings
-  Floodplain forest—silver maple, elm, cottonwood, willow
-  Maple-basswood forest—elm, basswood, sugar maple, red oak, white oak

Image courtesy of John Tester, University of Minnesota





# MN DNR DIVISION OF FORESTRY: MANAGING THE BIG WOODS

- Provides a long-term, sustainable yield of forest resources from state forest lands
- Improves the health and productivity of forest lands
- Promotes the conservation, enjoyment, and use of Minnesota's forests.

# INVADERS IN OUR WOODS



Image courtesy of US NPS



By Tony Atkin (CC BY-SA)



Image courtesy of USDA - APHIS

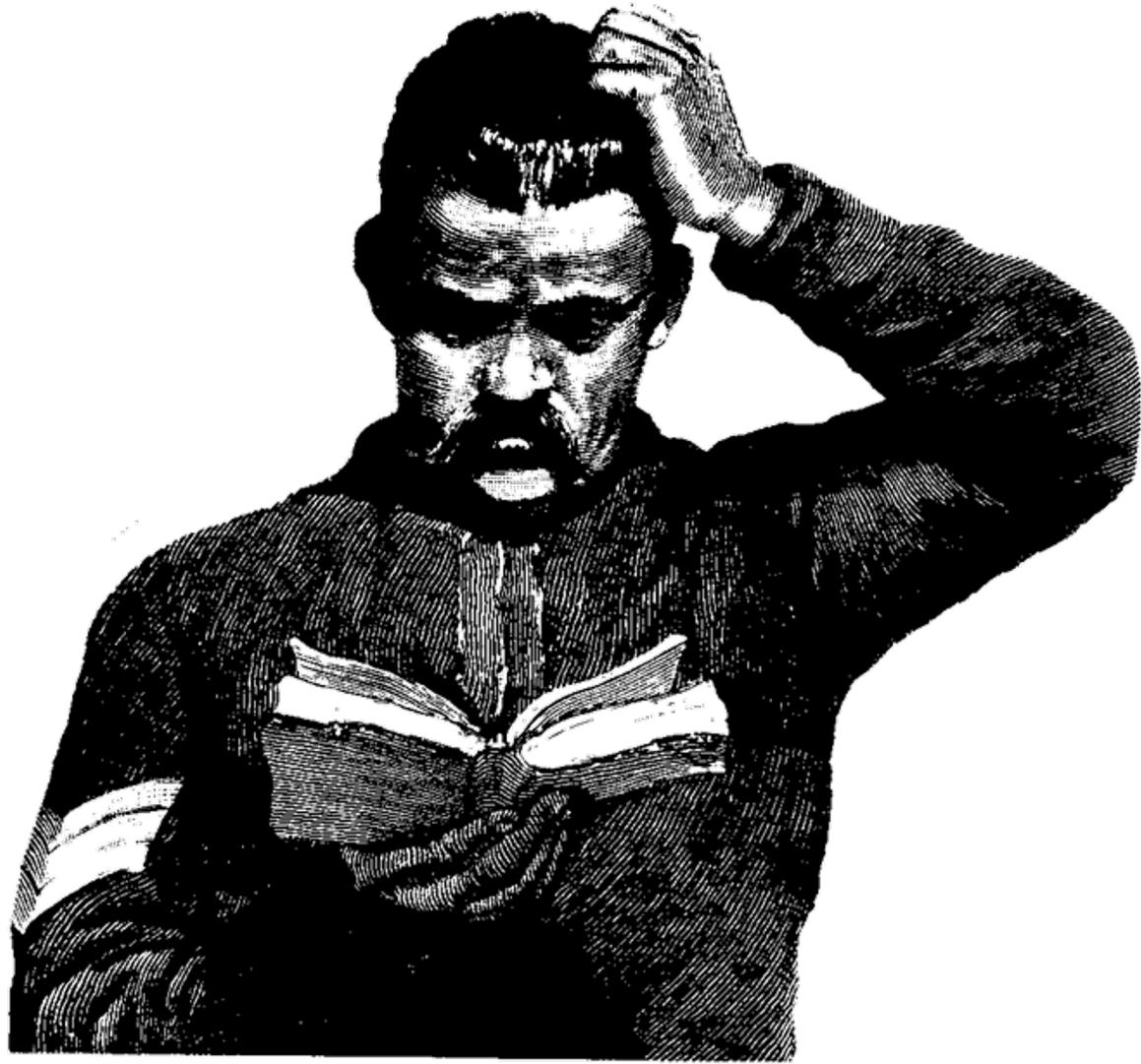
[www.dnr.state.mn.us/invasives](http://www.dnr.state.mn.us/invasives)



# YOU CAN HELP

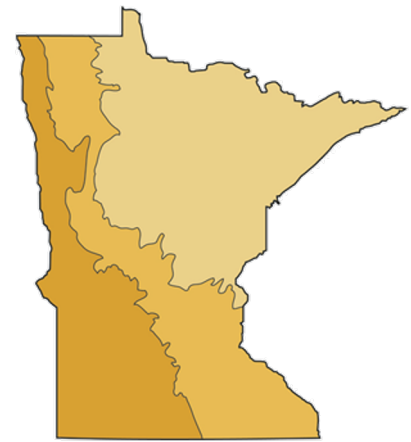
- Be aware and keep an eye out
- Inspect and clean everything (even your boots/shoes)
- Manage invasive species on your land
- Plant native species
- Help with local restoration efforts
- Learn how to identify invasives







The forest communities in the Big Woods, Big Rivers region are the result of many influences including past history, ecological process, available moisture, a dash of unpredictability, and little help with management.



past history  
ecological process  
available moisture  
+ unpredictability  
bit of management

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# Your Favorite Woods







200 ft

Imagery ©2015 Google, TerraMetrics, DigitalGlobe, Cnes/Spot Image, Map data ©2015 Google



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# GOALS FOR MANAGEMENT PLANS

1. Balance growth with resource protection.
2. Improve water quality.
3. Coordination of efforts for management and enforcement.
4. Enhance wildlife habitat and wildlife populations.
5. Increase landowner assistance.
6. Promote forest stand improvement and health.
7. Improve forest productivity and regeneration.
8. Encourage diversities of forests, plants and ecosystems.

[http://www.dnr.state.mn.us/input/mgmtplans/parks\\_trails/parks.html#completed](http://www.dnr.state.mn.us/input/mgmtplans/parks_trails/parks.html#completed)





# ACKNOWLEDGMENTS

Images used in this presentation were taken from multiple sources and we thank all of the people who gave us permission to use them.

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**EXTENSION**  

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**MINNESOTA MASTER NATURALIST**





UNIVERSITY OF MINNESOTA EXTENSION  
Driven to Discover<sup>SM</sup>

## Minnesota Master Naturalist Program

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