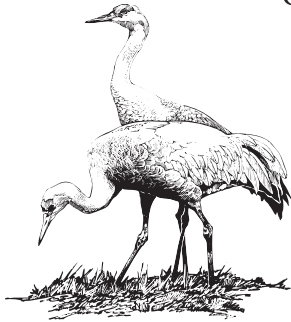


# MINNESOTA'S TALLGRASS ASPEN PARKLAND BIOME



Groves of deciduous trees nestled among fields of prairie grasses and flowers create an intricate quilt of prairie and woodland known as the tallgrass aspen parkland. This northwestern Minnesota biome, home to a rich diversity of animal and plant life, exists in a natural transition between the dry, windy prairies to the west and the moist, cold coniferous forests to the east. Although the smallest biome on the Minnesota map, the tallgrass aspen parkland expands across three provinces in Canada. Ten thousand years ago Glacial Lake Agassiz receded, leaving behind large, flat plains. In the early 19th century, farmers' high hopes for this area were dashed as rocky, wet, and poorly drained soil produced small yields and crop farming gave way to cattle grazing. Today, this open landscape provides a great opportunity to view sandhill cranes, elk, bear, and a horizon dotted with farms, aspen groves, and fields of big bluestem.

## WHAT IS A TALLGRASS ASPEN PARKLAND?

The tallgrass aspen parkland is a mosaic of prairie and sedge fens (wetlands fed by ground water) accented by groves of aspens or scattered bur oaks. It is a place where plants and animals well adjusted to harsh winds, extreme temperatures, and dry conditions thrive. This appropriately named “parkland” seems designed to please the human eye—as if nature has placed trees and prairie patches to enhance their individual beauty and the overall grandeur of the landscape.

## FOUNDATIONS OF TODAY'S TALLGRASS ASPEN PARKLAND

Glacial Lake Agassiz once stretched across this biome. It left behind a rocky, flat plain open to nature's elements. Storms, strong winds, and fire molded the land into a mix of deciduous trees, prairie grasses, and wildflowers that thrive under the challenging climate and soil conditions of the area.

## CLIMATE IS KEY

Life is tough in the tallgrass aspen parkland. Uninterrupted by hills, strong dry winds blow from the western prairie and yield very little precipitation. Cold winters and hot summers are typical.

## TREES VERSUS PRAIRIE

As tranquil as the tallgrass aspen parkland appears, it is a battleground between trees and grass. Aspen seek to advance across grasslands and convert the entire land into forest. Fires beat the aspen back and open up spaces for prairie grasses to flourish. Centuries ago, wildfire worked the landscape alone. Today, natural resource managers set prescribed burns to maintain this biome's unique plant composition.

## FUN FACT

*Evapotranspiration is greater than precipitation across this biome in Minnesota. That means more water evaporates from the ground and transpires from plants than falls from annual rain and snow!*



# MINNESOTA'S CONIFEROUS FOREST BIOME

Wind whispers in the fragrant needles, the heavy branches create a cathedral effect— this is the coniferous forest; the north country loved by many Minnesotans. It is a place where the vast deciduous forest of the North American continent gives way to needled trees. The coniferous forest in Minnesota is found in the northern half of the state, but grades into the deciduous forest then tallgrass aspen parkland in the northwestern part of the state. Logging, fire, and development have altered the coniferous forest biome in the past 200 years, yet there are still some untouched conifers existing today.

## WHAT IS A CONIFEROUS FOREST?

A coniferous forest contains evergreen trees that bear cones. Elegant pines grow in this biome, along with spruce, fir, and tamarack. In much of the northern forest, the conifers mingle with deciduous trees, particularly aspen, birch, sugar maple, and basswood.

## STORMS AND FIRE

Two major forces of natural change in the coniferous biome are catastrophic storms and fire. Typically they happen in sequence. A tornado or fierce windstorm can knock down trees over a large area. The logs, snags, and branches dry out over time as sunlight now penetrates to the forest floor. In the right conditions a fire can ignite and consume the downed forest. From these ashes a new forest will eventually emerge.



## FOUNDATIONS OF TODAY'S CONIFEROUS FOREST

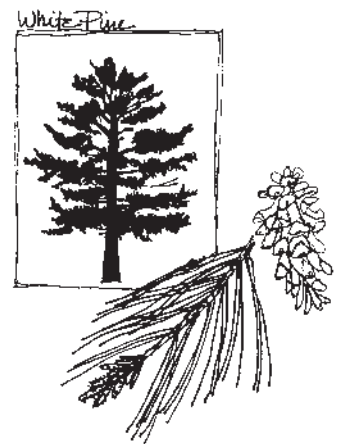
Glaciers sculpted the coniferous biome, leaving only thin glacial deposits blanketing the bedrock in the northeast. Deeper deposits formed in the southern and western parts of this biome. Peatlands occur in huge areas as a result of large glacial lakes that developed at the end of the glacial period.

## CLIMATE IS KEY

The coniferous forest biome is often considered to be cool and moist. Cold winters and cool summers caused by arctic air masses are typical of the coniferous forest. Moisture levels are maintained by summer rains and heavy winter snows.

## FUN FACT

*Conifers are well adapted to living in the cold. Because needles are retained two to 15 years, they can begin photosynthesis as soon as temperatures are warm enough.*



# MINNESOTA'S DECIDUOUS FOREST BIOME

There is a magic in the deciduous forest. Perhaps it is due to the green quality of light beneath the dense canopy of leaves. Perhaps it is in the silence that wraps itself around the sturdy trunks. Or perhaps it arises from the crumbling logs of fallen trees as they melt back into soil. A vast deciduous forest once covered the eastern half of North America. In Minnesota, it extended in a diagonal line from the southeastern part of the state to the northwest. Most of these forests were cleared and converted to farmland during Minnesota's first 50 years of statehood. European settlers often spared patches for wood lots or to tap maple trees for their sweet sap. These are the forests that have survived to our times.

## WHAT IS A DECIDUOUS FOREST?

The deciduous forest is characterized by trees that lose their leaves at the end of each growing season. In Minnesota these woodlands include sugar maples in areas where lakes, rivers, and rugged terrain protect them from fire. At the prairie's edge, where fires are common, oaks dominate. Forests of silver maple and cottonwood grow along moist river flood plains. In northwestern Minnesota, scrubby bur oaks and aspen groves mingle with prairie.

## FOUNDATIONS OF TODAY'S DECIDUOUS FOREST

In the last period of glaciation, ice sheets sculpted portions of the deciduous forest biome, but missed the southeastern corner known as the driftless area. The rest of this biome's glacial history left behind glacial ridges, sand plains, kames (hills), and kettle lakes.

## CLIMATE IS KEY

Air masses from the Gulf of Mexico bring warm summer temperatures and humid, sunny days that provide an ample growing season for the deciduous forest biome. The optimal moisture and sunlight of this biome promote deciduous tree growth.

## FALLING LEAVES

A large amount of energy is required to produce new leaves every year. So why do trees drop their leaves? The broad leaves of deciduous trees evaporate a lot of water and use a lot of sap. So to prepare for winter, deciduous trees shut down and drop their leaves. As an added benefit, dropped leaves decompose and add nutrients to the soil.

## FUN FACT

*In the spring, before the trees leaf out in many deciduous forests, spring wildflowers grow. Most of these flowers wither soon after the trees leaf out; they must wait until sunlight next spring stirs them into life again.*



Red Columbine

# MINNESOTA'S PRAIRIE GRASSLAND BIOME

On a prairie the lines of the landscape are clean. No trees clutter the horizon. Nothing blocks the view extending forever. Ripples run through the grasses so they seem to advance in front of the wind. These are the waves that early settlers saw as an ocean, a sea of grass and unbroken soil stretching as far as the eye could see. Minnesota once had 18 million acres of prairie that stretched across the state from southeast to northwest. Fertile prairie soil grew good agricultural crops, however, and most of the prairie was plowed. The patches of prairie remaining are mostly the remnants that could not be plowed.

## WHAT IS A PRAIRIE?

Prairies are defined as extensive areas of flat or rolling grasslands. In Minnesota these grasslands range from sparsely vegetated sand dunes to vast fields of big bluestem up to 8 feet tall, from wet meadows to shortgrass prairies high on the bluffs of the Minnesota River.

## FOUNDATIONS OF TODAY'S PRAIRIE GRASSLAND

The last glacial episodes in Minnesota advanced across the state leaving behind the soils that the prairie formed upon. The northern parts of the prairie biome were primarily influenced by Glacial Lake Agassiz. The south and southwestern parts feature a high plateau of quartz bedrock topped with glacial debris.

## CLIMATE IS KEY

Rainfall and temperature play a major role in where prairies form. Prairies develop where rainfall is generally lower and summer temperatures are higher compared to Minnesota's other biomes.

## FIRE, BISON, DROUGHT



Three major factors have influenced the prairie grasslands. Fire eliminates trees and shrubs while improving the growth of prairie wildflowers and grasses. Prairie plants have adapted to grazing by bison and other large herbivores (plant eaters) by having underground growing points that quickly sprout after being eaten. Many prairie plants can go dormant during a drought then begin growing again after the drought ends.

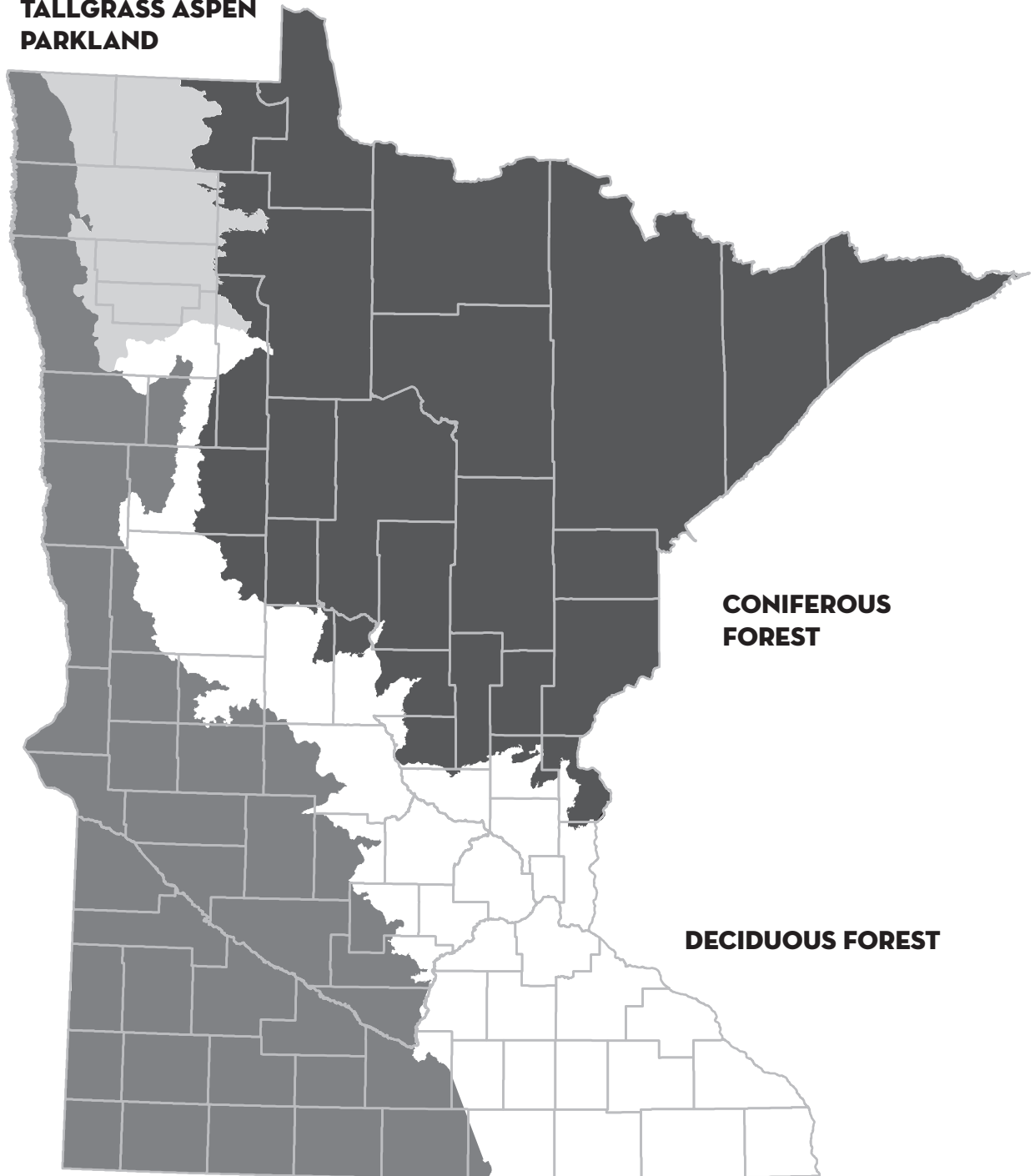
## FUN FACT



*Much of a prairie is found underground! Prairie plants have deep, massive roots that absorb nearly all available water. Some roots can be three times longer than the plant above them!*

# MINNESOTA BIOME MAP

**TALLGRASS ASPEN  
PARKLAND**



**CONIFEROUS  
FOREST**

**DECIDUOUS FOREST**

**PRAIRIE GRASSLAND**

**What biome does your community belong to?** Create a list of plants and animals in your community. Would you expect to find similar animals and plants throughout your entire biome? Why or why not?

# MINNESOTA BIOMES TABLE

*“Biome” is a term used to describe a biological community.* Usually, biomes occur over large areas and include many similar plant communities and the animals that live in them. The table below shows samples of conditions within Minnesota’s biomes.

	AVERAGE ANNUAL PRECIPITATION	AVERAGE ANNUAL TEMPERATURE	VEGETATION EXAMPLES	ANIMAL EXAMPLES	AVERAGE GROWING SEASON LENGTH
<b>TALLGRASS ASPEN PARKLAND BIOME</b>	20" - 22"	35° - 44° F	<ul style="list-style-type: none"> <li>• Aspen</li> <li>• Heart-Leaved Willow</li> <li>• Wiregrass Sedge</li> <li>• Small White Lady's Slipper</li> <li>• Little Bluestem</li> </ul>	<ul style="list-style-type: none"> <li>• Sharp-Tailed Grouse</li> <li>• Sandhill Crane</li> <li>• American Bittern</li> <li>• Canadian Toad</li> <li>• American Elk</li> </ul>	
<b>CONIFEROUS FOREST BIOME</b>	21" - 32"	36° - 41° F	<ul style="list-style-type: none"> <li>• Black Spruce</li> <li>• Northern White Cedar</li> <li>• Balsam Fir</li> <li>• Red Pine</li> <li>• Fly Honeysuckle</li> </ul>	<ul style="list-style-type: none"> <li>• Wood Frog</li> <li>• Boreal Chickadee</li> <li>• Compton's Tortoise Shell Butterfly</li> <li>• Gray Wolf</li> <li>• Moose</li> </ul>	90 - 100 days
<b>DECIDUOUS FOREST BIOME</b>	24" - 35"	39° - 45° F	<ul style="list-style-type: none"> <li>• Northern Red Oak</li> <li>• American Basswood</li> <li>• Sugar Maple</li> <li>• Prickly Gooseberry</li> <li>• Rue Anemone</li> </ul>	<ul style="list-style-type: none"> <li>• Eastern Hognose Snake</li> <li>• Cerulean Warbler</li> <li>• Eastern Pipistrelle Bat</li> <li>• Gray Fox</li> <li>• Eastern Spotted Skunk</li> </ul>	100 - 130 days
<b>PRAIRIE GRASSLAND BIOME</b>	18" - 33"	37° - 45° F	<ul style="list-style-type: none"> <li>• Big Bluestem</li> <li>• Blazing Star</li> <li>• Purple Prairie Clover</li> <li>• Prairie Dropseed</li> <li>• Leadplant</li> </ul>	<ul style="list-style-type: none"> <li>• Great Plains Toad</li> <li>• Greater Prairie Chicken</li> <li>• Upland Sandpiper</li> <li>• Pocket Gopher</li> <li>• Badger</li> </ul>	130 - 180 days

*For a fun way to learn about Minnesota’s biomes, plants, and animals,* check out the **Junior Park Naturalist Program** at a state park near you or call the DNR’s Information Center at (651) 296-6157 (Metro Area) or 1-888-646-6367 (Toll Free).



# WHAT IS SUCCESSION?

Plant communities flourish or perish depending on their environmental conditions. As these conditions change, the types of plants that make up the community may also change. This process is called succession. In a stable community, the plants are well suited to the amount of water, nutrients, and sunlight available to them. As the availability of these resources change, the conditions may favor a different set of plants, and these plants will become more abundant. This causes a shift in the makeup of the plant community. In effect, the new plants succeed the old, creating a slightly different community. Events can cause change in a plant community. Such disturbances can include windstorms, wildfires, insect infestations, and widespread disease.

In a mature deciduous forest dominated by maple and basswood trees, fire can provide a dramatic example of succession. Following a fire disturbance, the charred land is friendly terrain for some species, and hostile to others. Grasses and other nonwoody plants are first to pioneer the newly disturbed area. These are soon followed by bushes such as raspberry. Species that do well in full sun such as boxelder, ash, and cherry are the first trees to recolonize the area. As these trees mature, they shade the forest floor, making it difficult for their own young to grow. Shade-loving species such as maple and basswood find themselves at a competitive advantage, and the species composition of the forest slowly shifts. Over time, the older sun-loving trees die out and the shade-tolerant species take over. The process may take hundreds of years, but left undisturbed, this forest will evolve into a plant community dominated once again by maple and basswood.

## SUCCESSION IN A DECIDUOUS FOREST

In an undisturbed setting, succession progresses from pioneer grasses and shrubs to mature trees that return to pioneer grasses. However, disturbance, such as a wildfire, windstorm, or insect infestation, can happen at anytime and interrupt the cycle. This returns the forest to an earlier stage of success and the process begins again.



# WHAT IS A NATIVE PLANT?

Native plants are plant species that were growing in Minnesota's biomes when European immigrants first arrived in this state. These plant species, along with the existing mammals, birds, fish, insects, and other living things, help to make each biome unique.

European settlement brought changes to the landscape including farming, logging, and building communities. Settlers also brought plants from their homeland to grow in Minnesota. Some of the new plants introduced to Minnesota were very competitive and quickly crowded out existing native plants. In some places these invaders have spread out of control—such as European buckthorn in deciduous forests, purple loosestrife in wetlands, and leafy spurge in prairies.

Along with the new plants, diseases and insects came in to the state. Native plants were often defenseless against these new pests. For example, the American elm, once a dominant tree in Minnesota's deciduous forests, had its numbers decimated due to the invasion of Dutch elm disease.

Since European settlement, many changes have occurred across all of Minnesota's biomes. It is important to note that as native plant communities are altered, so, too, are the animal species that live within them.

## WHAT CAN WE DO TO HELP?

In our own yards we can make a difference by planting native plants and avoiding exotic plants that may spread into wild areas. We may not be able to return to the landscape of 200 years ago, but we can preserve what is left and restore some of the native plant communities that support so many other species.

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