



# Minnesota Biomes

## In a Nutshell



Students will learn about the study of natural history and discover the threats that invasive species pose to Minnesota's native ecological communities. Students will conduct a plant and animal survey and explore the concept of biodiversity within a native prairie or forest community. Students will also learn about invasive species control methods used on the National Wildlife Refuge.

**Grades** 4 & 5

**Seasons** Fall

**Location** Bloomington Education and Visitor Center & Rapids Lake  
Education and Visitor Center

## Learning Objectives

After participating in this activity, students will be able to:

- Define the term biodiversity.
- Define the term invasive species.
- Give at least one example of how invasive species can harm Minnesota's native plant communities.

## Literature Connections

- *What is a Biome?* by Bobbie Kalman
- *¿Qué son los Biomas?* by Bobie Kalman
- *Mirrors of Minnesota* by Mary Hoff, MN Conservation Volunteer Magazine
- *The Loon's Necklace* by Elizabeth Cleaver
- *The Legend of the Lady Slipper* by Lise Lunge-Larsen and Margi Preus
- *M is for Minnesota* by Dori Butler

## Pre- activity

### Project WILD Minnesota activity, Habitat Rummy (page 49)

Will help students discover how the habitat requirements of animals found in Minnesota are related to the biome where the animals live.

## Who Am I? Cards

Pair students and give each student a card which represents an animal from Minnesota. Because the students cannot see the identity of their animal, it is a mystery. Have the students ask good questions which will help them figure out



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the identity of their mystery animal. Based on the clues provided on each card, ask each pair to determine the biome where their Minnesota animal resides.

### **On-site Activity**

Students will be introduced to the concept of biodiversity, invasive species, and the threats that invasive species pose to Minnesota's native communities. Students will conduct a plant survey either in the prairie or in a deciduous forest to estimate the biodiversity and to determine the threat of invasive species in that natural community. In addition, students will search for signs of animals to determine what wildlife may be found in a particular biome.

### **Classroom Connection**

#### **Conduct other Diversity Surveys**

Ask students to repeat the plant survey in a natural area, such as a park near school or their own school yard. Compare the biodiversity findings of each site. Which area had the most biodiversity? Why? Did students find any invasive species?

#### **Minnesota Natural History Research**

Divide students into four teams. Assign each team to one of Minnesota's four Biomes (Deciduous Forest, Coniferous Forest, Prairie Grassland, and Tallgrass Aspen Parkland). Allow each team one week to research answers to the following questions related to their assigned biome.

- What are the main plant species commonly found in your biome?
- What animal species are commonly found in your biome? Students should provide at least one animal name for each major animal group: *mammal*, *bird*, *reptile*, *amphibian*, and *fish*.
- Are there threats to your biome? Are these threats natural or caused by humans? (i.e. insect pest, non-native plant, land use issues, pollution issues)

#### **Start an Invasive Species Education Campaign**

Ask students to design "Wanted" posters for an invasive plant or animal species found locally. Ask students to include facts that will help others to properly identify the plant, understand the threat this plant or animal poses to native animal and plant communities, and what people should do if they find the invasive species. Hang the posters around the school, the local library, or government center to educate other students and families about invasive species.

#### **State Symbols**

A symbol is often selected based on its unique value to the selecting state (the Agate), historical significance (Norway pine value to the lumber industry), rareness (the lady slipper), or a special human interest or fascination (Monarch butterflies as a migrating insect). Use the Minnesota's State symbols poster to "quiz" your students' knowledge of Minnesota State fish, bird, insect, mushroom,



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and rock. Begin the activity by displaying the illustration of each symbol. As students make a guess for each symbol, reveal the answers one at a time.

Divide students into investigative reporting teams. Each team should work together to uncover the reasons why each symbol was selected to represent our state. To wrap up the activity after students have completed their own investigations, read with students the DNR Volunteer Magazine article ***Mirrors of Minnesota, The Loon's Necklace, The Legend of the Lady Slipper, and M is for Minnesota.***

### Teacher Resources

- ***Mirrors of Minnesota*** by Mary Hoff, Minnesota Conservation Volunteer Magazine
  - Teachers Guide:  
[http://www.dnr.state.mn.us/young\\_naturalists/teachersguides/index.html](http://www.dnr.state.mn.us/young_naturalists/teachersguides/index.html)
- ***Minnesota Invasive Non-Native Terrestrial Plants***, Department of Natural Resources Trails and Waterways



## Minnesota Biomes Pre-Activity

### Materials

- Minnesota Biomes poster (MNDNR)
- *Either*
  - Who Am I? cards, one per student
  - or
  - Habitat Rummy Game (one set per group)
- Biome props, which include:, a deciduous tree leaf, pine needle bough, a pine cone, prairie grass, and an aspen leaf.

### Introduction

(25 min)

Lead students in a discussion of comparing and contrasting the study of human history with the study of natural history.

For example:

- **Human history** is the study of human events over time.
- **Natural history** is the study of the characteristics of living things over time.
  - Human history connects people to the past; whereas Natural history investigates the process of change over time for particular species.
  - Human history often reflects the level of connection and dependence that people have with nature. Natural history more often reflects the effects people have on nature and its natural systems.

Explain to the students that the study of natural history is generally based on the plants and animals that are considered to be native to the area.

- Define the terms native, invasive, and non-native: **Native** plants and animals are species that are known to have been growing and living in Minnesota before the 1800's, when Europeans originally immigrated and settled into the area.
- **Non-native** and **invasive** are terms used to describe plant and animalspecies that were introduced to Minnesota by humans from a different area and outcompete native populations for resources. It is important to note the distinction between the terms non-native and invasive.
  - **Non-native** plant and animal species are new to an area, but do not out-compete or overtake the native populations
  - **Invasive** plant and animal species do out-compete and overtake native populations.

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Use the Minnesota Biomes poster to briefly introduce students to the four major biomes found in Minnesota: Prairie, Coniferous Forest, Deciduous Forest, and Tallgrass Aspen Parkland. The Biomes of Minnesota background information is printed on the back of the poster for teacher reference.

### Explain the difference between a **biome** and a **habitat**:

A **habitat** is a place where a plant or animal lives. There are sixteen different types of habitats in Minnesota. Many habitats can exist within a single biome. For example, it is possible to find prairie, forest, and wetland habitats within the single deciduous forest biome. Another way to think about it is that there can be more than one habitat in a biome, just as there can be multiple neighborhoods within a city.

A **biome** is a term used to describe a community of similar plants and animals and climate conditions that are present over a large area. Of the four biomes in Minnesota, each has a different grouping of climate conditions, plants, and animals.

Lead students in a discussion of the climate conditions that determine where biomes are located. The climate conditions in a biome include the following similar characteristics:

- Average annual temperature
- Average annual precipitation
- Average length of the growing season
- Humidity
- Soil type (dry, clay, acidic, rocky, etc.)
- Terrain or topography

Within each biome, animals survive based on their habitat needs and what that biome provides.

Review the four components of habitat that all plants and animals need to survive- **food**, **water**, **shelter**, and **space**. One last point to mention for habitat needs is that they must be met in the correct arrangement.

### Here is an example of a proper arrangement of habitat needs:

A muskrat living in a wetland needs to have plenty of aquatic plants (water and food) near its hut (shelter) in the middle of the wetland. The water (space) helps to slow or avoid predators.

Too little water, such as a drought, could expose its hut to predator access and increase the distance it must travel to find food which makes the muskrat spend extra energy. This could force the muskrat into building a new hut in a more suitable location.

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Likewise, too much water (flood) could wash away its hut, cover the aquatic plants with debris, and could still result in the muskrat traveling further from its shelter for food or causing it to build a new hut in a more favorable arrangement.

With sixteen habitats and four biomes in Minnesota, would you expect to find similar animals living throughout all four of the different biomes? Explain reasons for why or why not.

- *Animals do not all eat the same types of food. They live in the biome that provides the proper food necessary for their survival.*
  - For example, a lynx primarily hunts and survives on snowshoe hares. Snowshoe hares live primarily in northern coniferous forests. Therefore, lynx are found in northern coniferous forests where their preferred food exists.
- *Animals depend on different types of shelter.*
  - For example, American Goldfinches use the soft, downy hairs found in thistle flowers to build their nests, while a red fox digs an underground den.
- *Animals have different space requirements.*
  - For example, Gray wolves need a much larger territory to meet their four habitat requirements to survive, compared to coyotes which are much more opportunistic with the foods they choose to eat.
- *All animals need water as a habitat requirement, however many also depend on it as a food source.*
  - For example, eagles usually nest near rivers and lakes for their food supply of fish. They may be more likely to be in a deciduous forest due to the size of the trees, however they could be found anywhere there is a large enough water body.
- *Some animals are considered generalists, which means that they can be found across multiple habitats.*
  - For example, raccoons are omnivores and are also nocturnal feeders, eating mainly aquatic insects, frogs, mice, and even raiding nests for eggs at night. They are opportunistic about their dens sites, occupying anything from a fallen log to an attic in a house. Thus, you can expect to find raccoons in multiple habitats across the landscape.

**Animal Connections (Choose One)**

(25 min)

**Habitat Rummy**

Review the Minnesota Project WILD booklet for more in depth instructions.

Divide students into teams of 4. Provide each team with a set of Habitat Rummy cards and 4 playing boards (sets are numbered on the back). Explain the rules of play which are similar to the traditional Rummy card game. The student's objective is to complete one set (food, water, shelter, space, and arrangement card) for as many animals as possible found in their habitat. \* Note - The wetland habitat, referred to in the original Project WILD activity, has been eliminated because a wetland is NOT a biome.

To play Habitat Rummy, with 5-6 players each receives six cards, for 2-4 players each receives five cards from the shuffled deck. Pick the dealer for the first game by who has their birthday closest to today's date. The dealer must shuffle the deck prior to starting each game. The person left of the dealer is the first person to play. The dealer switches from person to person going to the left. Once cards are dealt, the dealer flips one card face up to create the discard pile and the rest of the deck is face down (stock pile) in the middle of the table to begin the game. Each player draws a card from the stock or the discard pile. The player may then meld, which is optional, before discarding one card. Melding is when a player has one complete card set (food, water, shelter, space, and arrangement card) for an animal found in their habitat (called sequence or run), they must be laying these cards, face up, in front of them.

Allow teams to play until at least one person has completed a sequence. If time still remains, continue to play until teams have played through all their cards and no more sequences can be made. The student with the most complete sequence is considered the winner for each team.

If time remains, allow one student from each team to describe the habitat requirements for one of the animals found on their habitat board.

**Who Am I?**

Ask students to find a partner. Place one *Who Am I?* card around the neck of each student. Make sure the card is placed to hang down the student's back to assure that they will be unable to see their mystery plant or animal.

Explain to the class that each pair is trying to accomplish two things. First, they each need to identify what plant or animal they have on their *Who Am I?* card. Give the students 5-10 minutes to ask and answer questions. It is okay for their partner to read and reference the information on the card to give an informed answer to the other student's questions; however, they should not reveal the name of the mystery plant or animal to their partner because each student should be able to make an informed decision about the identity of their mystery plant or

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animal on their own. The pair should switch off who is asking each question. The cardholder may only ask their partner any Yes or No question.

Here are some examples of good questions:

- Do I live in the forest?
- Do I have fur?
- Do I eat other animals?
- Do I lay eggs?

Once the plant or animal's identity has been discovered, the student may move the picture from their back to their front as a signal they are ready to move on.

Second, ask students to determine the most suitable biome for their animal. Clues may be found in the text of the Who Am I? cards. Clarify that although an animal may be found in multiple biomes, it has one biome in which it is most commonly found due to its habitat needs, and thus students should choose one biome their animal belongs to. Ask students to organize all the animals into the appropriate biome. Discuss what characteristics make that biome a good fit for that plant or animal.

Once all of the students have identified their mystery plant or animal, ask the students to raise their hands to indicate if they think their plant or animal lives in the Deciduous Forest biome, Tallgrass Aspen Parkland biome, Coniferous Forest biome, or the Prairie biome.

Each card has a different colored border which represents the biome in which their plant or animal lives:

- Red = Tallgrass Aspen Parkland biome
- Green = Coniferous Forest biome
- Yellow = Deciduous Forest biome
- Blue = Prairie biome

Have each colored border group stand together throughout the room. Ask each student in their group to read the full name of their plant or animal to the rest of the class. If time permits, have each student name something new that they learned about their mystery plant or animal.

### **Wrap-up**

(10 min)

Explain to students that during their field trip to Minnesota Valley National Wildlife Refuge they will conduct a plant survey in either a prairie or forest habitat as a representation of the larger biomes. Students will examine the variety of plants and look for signs of animals that live in the habitat. Students will also learn about other plants and animals that can threaten Minnesota's natural history – invasive species!

## Minnesota Biomes On-site Activities

### Materials

Forest Sampling Kit (per student team)

- 48" length of string
- Plant card (a blank index card with large loop of tape on the front)
- Clipboard
- Pencil
- Data sheet
- Buckthorn/Siberian Elm identification card
- Map of the area around the Visitor Center

Prairie Sampling Kit (per student team)

- One Hula Hoop
- Plant card (a blank index card with large loop of tape on the front)
- Clipboard
- Pencil
- Data sheet
- Leafy Spurge/Thistle identification card
- Map of the area around the Visitor Center

Visual Aids

- Plant Survey Classroom Chart, laminated
- Species Area Curve

### Introduction

(30 minutes)

Briefly review the pre-activity information including the study of natural history, the definition of a biome, the names of the four biomes in Minnesota, and a species or two that lives in each biome.

- Prairie biome plants and animals:
  - Red fox, Eastern Meadowlark, Deer mouse, Bullsnake, Blazing Star, Big Bluestem, Butter and Eggs flower/Toadflax, Prairie Chicken, Upland Sandpiper, Purple Coneflower, Milkweed, 13-lined ground squirrel, badger, Green Darner dragonfly, Harvest mouse, etc.
- Deciduous forest biome plants and animals:
  - Black bear, White-tailed deer, Ruffed grouse, Pileated woodpecker, Red squirrel, Black-capped Chickadee, Gray squirrel, Gray squirrel, Coyote, Eastern Hognose snake, Oak tree, Sugar maple, Opossum, Gray fox, bats, etc.
- Coniferous forest biome plants and animals:
  - Gray wolf, Moose, Red squirrel, Great Gray Owl, Red pine, Black spruce, Bald Eagle, Birch tree, Black-capped chickadee, etc.

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- Tallgrass Aspen Parkland biome plants and animals:
  - Canadian Toad, American bittern, American elk, Sharp-tailed grouse, Aspen tree, Small White Lady Slipper, etc.

Introduce the concept of native species. A **native species** is a plant or animal that lived in an area before the 1600's (when European settlers first settled in Minnesota). Explain that each biome is being invaded and overtaken by invasive plants and animals. **Invasive species** are plants and animals that arrived in the area during the 1600's and after, which take over large areas and lead to a loss of resources that native plant and animals need to survive. Invasive species can be a big problem because there is no natural predator to decrease their population like there would be in the invasive species' original home. Because of this, native species have a difficult time competing for the resources they need to survive.

Introduce the concept of **non-native species**, a plant or animal that did not originally grow or live in a given area, but that does not out-compete native plants for resources.

Discuss any plants they may know that are invasive or non-native.

- More often than not, invasive and non-native plants and animals were brought into new areas by mistake. A gardener imports a plant because the plant appears pretty, will form a nice dense hedge (Buckthorn), or produces an especially pretty purple flower (Purple Loosestrife).
- A pet owner brings House Sparrows from England as caged pets; however, some escape into the wild and are able to survive and reproduce.
- A mussel, native to waters found in Europe, attaches to the bottom of a boat and catches a ride to a new lake or river where it drops off and stays (Zebra Mussels).

The problem isn't necessarily that the species is non-native but that these species often become invasive. Without the natural biological controls found in their original ecosystems, non-native species quickly take over a habitat, crowding out the native plants and animals that are part of the native food web.

Depending on the location where students will complete this activity, highlight one of the two following invasive plants: buckthorn or Siberian elm (forest) as well as leafy spurge or thistle (prairie). Advise students to keep a look out for these invasive plants during the survey, encouraging them to reference the identification card in their sampling kit. If a student finds one of the plants and the rest of their team agrees that the plant found is an invasive, advise him or her to mark it on the group's map. Refuge staff will help verify their identification and remove the invasive plant at a later time.

**Plant Survey** *(incorporated into this lesson with permission from Earth Partnership for Schools, University of Wisconsin – Madison Arboretum)*  
(30 minutes)

The most accurate way to inventory the number of different plant species (diversity) on a site is to count each plant; however this is very impractical due to the size of most natural areas. Scientists have figured out that counting plots in a grid system is a much easier way to determine the number of plants found in an ecosystem while still being accurate. The grid system can produce very reliable data as long as the survey plots (any size or shape) are randomly distributed and sufficient in number.



**A NOTE ABOUT PLANTS WHICH CAUSE IRRITATION:**

Stinging nettle, thistle, and poison ivy may be found close to the trails and in the survey area. Before sending students out to conduct the survey, be sure they are able to identify these plants. To point out identification features, use the poison ivy riker mount located in the Refuge classrooms.

Reassure students during this activity that it is not necessary to know the names of the plants they find, as they are simply conducting a survey to assess plant diversity in the prairie and the forest. Students should collect one leaf from each plant species they find in each of their sample plots and stick it to the tape on their index card.

Remind students that they will not be able to keep the leaves they collect so they should sketch or trace the leaves on their data sheet for a record of their collection. Also remind students should look for and record any signs of animals living in or using the sample plot on their data sheet. Here are some examples: nests, holes in trees, burrows, scat, signs of feeding, feathers, skin or fur.

**Prairie sampling process:**

Ask students to work in teams with at least one adult on each team. Students will be given a hula hoop to define their sample plot. The hula hoop will be lightly tossed into the prairie at random to define their plot. Students may have to gently push their hula hoop down over the tall grass in order to better define the plants within their sample plot. Remind students that it is important to keep track of it at all times. Also emphasize the importance of accurate data collection methods, and direct the students only to collect leaves (no seeds, flowers, or stems).

**Forest sampling process:**

Each team will be given a 48" length of rope that will serve as their line transect. When sampling with a line transect, any part of a plant that touches or crosses over the line is considered to be a part of the sample plot. Have the student team randomly pick a location to sample by selecting two students to hold either

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length of the rope and pull it taut. This line transect should be gently guided down to ground level to better define the plants along it. Once the area is set, have the students use their index card to collect one leaf from each plant of a different species and stick it to their card.

### **Classroom data analysis for both survey areas:**

(30 min)

Back in the classroom, teams will add their leaves to the classroom chart (illustrated below) with the following instructions:

- The first team to complete their survey will add all their leaves to Card #1. The first team should tally the number of new species and cumulative total (both numbers will be the same for the 1<sup>st</sup> team) on the classroom chart.
- The remaining teams will repeat this process one at a time adding ONLY the leaves that are different from the ones already placed on the chart. Remove any leaves that have already appeared on previous cards.

***Note:** As teams “get in line” to add their data there might be some discontent over not being allowed to record everything they found. Explain that their drawings are their record of all the plants they found in their sample plot and this chart is a quick way of calculating diversity. The data from each team is important and valid.*

- Each team also completes the # of New Species and Cumulative Total Species columns. This continues until each team has added their data to the chart.

<b>Prairie Plant Diversity Survey Chart</b>		
<b>Plant Cards</b>	<b>Total # of New Species</b>	<b>Total # Species</b>
Card #1		
Card #2		
Card #3		
Card #4		
Card #5		

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<b>Forest Plant Diversity Survey Chart</b>		
<b>Plant Cards</b>	<b>Total # of New Species</b>	<b>Total # Species</b>
Card #1		
Card #2		
Card #3		
Card #4		
Card #5		

As student volunteers from each team adds their data to the chart, have a student volunteer or chaperone graph the results (see the example below). You may also choose to have your students follow along with the data collected at the front of the class by

graphing the data on their own datasheets while data is being collected by other groups.

How does the graph show us when we have sampled enough plots to accurately assess species diversity? The answer is when the Species Area Curve levels off (as seen in the graph below) or a sufficient number of sample plots have been taken.

In addition to the plant graph, ask students to begin a class record of their wildlife and/or wildlife sign observations on the board. Ask students to guess what animal(s) may have left the sign(s) they observed. This will help students build a whole plant/animal community for the habitats they explored.

**Management Connection- Invasive Species**  
(15 min)

Minnesota Valley National Wildlife Refuge manages habitat for prairie, wetland, deciduous forest, and others such as oak savannah. Invasive species can lead to habitat loss and severe decrease in biodiversity. Refuge staff are challenged to minimize the impacts of invasive species while ensuring that each habitat maintains a healthy and diverse plant/animal community.

Refuge biologists closely monitor habitats through techniques very similar to the plot survey that students conduct in this activity. When biologists find invasive species they develop strategies to minimize the spread, and if possible eliminate them altogether. One method many National Wildlife Refuges use to control invasive plant species is controlled burn, also known as prescribed fire. Storms, which frequently swept across the prairies, often ignited raging wildfires. Over time, prairie plants developed adaptations to survive and even thrive under these

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harsh conditions. Today, biologists sometimes use fire to reduce the growth and survival of non-native invasive species which do not have the adaptations necessary to withstand the harsh conditions of the historical prairie environment. Other management strategies include mowing, pulling, and applying chemicals to non-native invasive species.

## **Minnesota Biomes Rainy Day Alternatives**

### **Biome in a Box**

#### **Materials**

- 8 biome kits 8 mini-hoops
- 8 Tracks and Scat guides
- Journal page
- Invasive species identification cards

Each kit contains a variety of silk plant leaves, seeds, and flowers that represent “plants” in a biome. Some kits may also contain track stickers, scat and other animal signs. To simulate the variable conditions that exist in real biomes, kits are not identical. Some kits may also contain white silk flowers which represent endangered species or small laminated pictures of invasive plants the refuge staff are trying to control.

#### **Introduction**

(30 min)

Follow the directions for the introduction as if you were leading the activity outdoors. Explain how plant plot surveys are conducted outside as described in the field trip introduction. Explain to your students that they will be conducting a simulated diversity study indoors using the biome kits.

#### **Survey:**

(20 min)

Assign students to work in teams of 3. Each team should receive one Biome Box, one mini-hoop, a set of animal prints/scats keys, journal pages for each person, and a set of invasive species identification cards.

Students should empty their box within their plot which is the area inside their hoop. Students should then select different “plants” from their sampling plot as if they were conducting a real survey. Teams should place the leaves on their plant cards in the same manner as described in the original activity. Ask the teams to draw what they find as though they were sampling real plants outside. They should also record any animal signs, invasive or endangered species they find in their “plot.” Advise students to leave their biomes kit and move to another plot. At the new plot each team should repeat this process on a different plant card.

#### **Data Analysis**

(30 min)

Continue as directed in the outside activity, completing the table and drawing the graph. Did the students sample enough “plots?” The graph will continue to climb if the team has not collected enough data.

**Minnesota Biomes Jeopardy**

(30 min)

Play a round of Minnesota Biomes Jeopardy. The questions in this game are based on the information in the pre-activity, the Habitat Rummy game, and what students learned while conducting the plot surveys.

**Minnesota Biomes Jeopardy**

**HOW TO SET UP:**

- Using a dry-erase board, write the categories at the top, with the point amounts listed underneath. Then, as the game is played, you can erase each number that is chosen. Example:

<b>MINNESOTA BIOMES</b>	<b>BIOME PLANTS</b>	<b>BIOME ANIMALS</b>	<b>INVASIVE SPECIES</b>	<b>SURVEY KNOW-HOW</b>
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

- Split the students into two teams.
- Have them choose a team name (preferably a Minnesota plant or animal name).
- Each team needs to choose a captain who will speak for the group.
- Have an adult keep tally of the points for each team.

**HOW TO PLAY:**

- Flip a coin to see who goes first.
- Explain that the points indicate the difficulty of the question.
- There are two questions in each of the following categories, you may choose as the leader which of the two questions you will ask.
- An individual from the first team chooses a category and point value. Take turns asking each student to choose.
- Decide how you want each team to answer: As a group (the team can decide what to answer but ONLY the captain can give the answer, after everyone has agreed) OR individually (with no help from their teammates).
- If they get it right, they get the points.
- If they get it wrong, there is no penalty. However, the other team can now try and answer the question. The other team can discuss the question as a group but then ONLY the captain can give the answer, after everyone has agreed.
- If the other team gives the wrong answer as well, the question is dropped and the answer is given. The team who was next to pick a question is now able to take their turn.
- Clarify wrong answers!

**HOW TO END:** The game ends when either all the clues are chosen, or each student has had a turn to choose a question.

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### 100 points

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Minnesota is divided into how many biomes?

There are 4 biomes in Minnesota.

Name 4 biomes found in Minnesota.

Coniferous forest, deciduous forest, tallgrass aspen parkland, and prairie.

### 200 points

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What is the definition of a biome?

A biological community that occurs over a large area.

What components of habitat are critical to animal survival within a biome?

Food, water, shelter, and space in the right arrangement

### 300 points

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What determines the type of biomes found in Minnesota?

Climate conditions, soil type, and terrain

Give three examples of conditions that influence the location of biome communities.

Rain, snowfall, length of growing season, humidity, winds.

### 400 points

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Which biomes are represented at Minnesota Valley National Wildlife Refuge?

Deciduous forest and prairie

Explain the difference between the terms habitat and biome.

A habitat is an area which includes all the things a plant/animal needs to survive: food, water shelter, and space; whereas a biome represents a large area with similar plant life spread across it.

### 500 points

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How do animals choose the biome they live in?

They live in communities that provide the food, water, shelter, and space they are designed to use.

How many types of key habitats are there in Minnesota?

There are 16 different types of key habitats in Minnesota.

## Biome Plants

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### 100 points

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Name one tree species you might find in a deciduous biome. Oak, Maple, Ash, Elm, etc.

Describe one characteristic that most coniferous trees have in common? They are evergreen, needles instead of broad leaves, carry seeds in their cones, they do not shed their needles all at once

### 200 points

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Why do trees in the deciduous biome drop their leaves in the fall? To conserve water and energy, reduce snow build-up that leads to broken branches

Forb is the term for what type of plant found in the prairie biome? Showy flowers

### 300 points

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Which deciduous tree is part of the Tallgrass Aspen Parkland biome? Aspen

Which Minnesota biome gets the least amount of rainfall and the most wind? Prairie biome

### 400 points

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Which Minnesota biome once dominated the southwestern part of Minnesota? Prairie

Which biome dominated the northeastern part of Minnesota? Coniferous forest

### 500 points

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What biome includes wetlands? All biomes might contain a variety of wetlands

What is the name of the one coniferous tree that does shed all of its needles at one time in the fall? Tamarack

## Biome Animals

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### 100 points

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- |  |  |
|--|--|
| Moose are typically found in which type of biome?                                  | Coniferous forest                                    |
| Which of the following deciduous forest animals eat insects as part of their diet? | Black bear, ruffed grouse, pileated woodpecker, etc. |

### 200 points

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- |   |                |
|---|----------------|
| In which Minnesota biome would you find the following community of animals: Red fox, meadowlark, deer mouse, bullsnake? | Prairie biome  |
| The largest species of owl in Minnesota is a member of the coniferous forest biome.                                     | Great Gray Owl |

### 300 points

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- |   |                                |
|---|--------------------------------|
| Which of these members of the coniferous forest are predators? Wolf, moose, red squirrel, Great Gray Owl. | Wolf and Great Gray Owl        |
| What type of shelter would a bullsnake use?   | A burrow dug by another animal |

### 400 points

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- |  |  |
|--|--|
| Why can't animals live throughout all of Minnesota's biomes?   | Different animals have different food, water, shelter, and space requirements. |
| Give one additional factor that is part of the habitat requirements of food, water, shelter, and space for every animal? | Healthy water, components must be in a suitable arrangement, etc.              |

### 500 points

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- |   |  |
|---|--|
| Name one herbivore found in each of the following biomes: Coniferous forest, prairie, deciduous forest, tallgrass aspen parkland. | Coniferous forest: Moose, red squirrel, etc.<br>Prairie: Insects, American Goldfinch, etc.<br>Deciduous forest: Deer, gray squirrel, etc.<br>Tallgrass Aspen Parkland: Elk |
| Name one carnivore found in each of the following biomes: Coniferous forest, prairie, deciduous forest, tallgrass aspen parkland. | Coniferous forest: Wolf, badger, etc.<br>Prairie: Fox, bullsnake, etc.<br>Deciduous forest: Bear, raccoon, etc.<br>Tallgrass Aspen Parkland: Canadian Toad, etc.           |

## Invasive Species

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### 100 points

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Which invasive species has green deciduous leaves, dark purple berries, thorns, and quickly spreads through forests? Buckthorn

True or false: If none of the plants in your hoop were invasive species, you could pick up and move your survey hoop to a place that did have invasive species. False

### 200 points

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Which of the following is not an invasive species? Big bluestem, buckthorn, Canada thistle, Leafy spurge Big bluestem

Which invasive species has yellow-green flowers and a milky sap? Leafy spurge

### 300 points

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Explain the term “invasive species” Non-native plants or animals that quickly take over a habitat.

Explain the term “native species” A plant or animal historically part of Minnesota’s natural plant and animal communities.

### 400 points

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Why are invasive species such a problem? Without biological controls that are found in their native habitats, invasive species can quickly crowd out native plants or animals part of the community that other plants and animals depend on for survival.

Give an example of an invasive species and how it was introduced to Minnesota. Zebra mussels- boat  
Purple loosestrife- garden plant  
Buckthorn- garden plant  
House sparrow- pet

Minnesota Valley National Wildlife Refuge

**500 points**

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What methods of control does the refuge use to maintain biodiversity and reduce invasive species?

Prescribed burn, chemical application, insect controls, and hand-pulling.

Explain the difference between “non-native” and “invasive”

If a non-native species out-competes the native population, it is considered invasive.

## Survey Know-How

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### 100 points

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True or false: You needed to know the name of each plant in your survey loop. False

True or false: If none of the plants in your hoop looked interesting, you could pick up and move your sample plot somewhere else that had more interesting looking plants. False

### 200 points

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Name one of the invasive species you were looking for in your sample plot Buckthorn, Canada thistle, Leafy spurge, Siberian elm

Which invasive species has spiny stems and leaves? Canada thistle

### 300 points

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Explain how to use the hula hoop to collect a “random” sample plot. Close your eyes and toss the hula hoop in any direction. Then leave it where it lands regardless of the plants found in the hoop.

What information did you collect from the sampling plots? Wildlife signs, invasive species, leaves of different plants

### 400 points

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What is biodiversity? A variety of plants and animals within a community.

Explain the term “native species” A plant or animal that has historically always been a part of Minnesota’s natural plant and animal communities.

### 500 points

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When the species area curve finally leveled off, what did it tell you? That a sufficient number of plots had been sampled

How might refuge biologists use the data collected in your survey? To monitor changes in biodiversity which may influence how they manage certain lands.