



## SECTION 1 The Wolf

### Subjects:

biology, sociology



### Approximate lesson time:

30 minutes



### Materials:

game questions, books or fact sheets about wolves

# Wolf Jeopardy

*Students play a quiz game to check their wolf knowledge.*

### OBJECTIVES:

At the end of the lesson, students will be able to:

1. Assess what they know or do not know about wolves.
2. Extrapolate the important topics related to wolf management.

### VOCABULARY:

body language • vocalization •  
management • bounty •  
stakeholder

### TEACHER BACKGROUND:

This game is a useful pre-test for your students prior to beginning the unit on wolves. It will assist you in assessing students' current knowledge and attitudes toward wolves.

This activity's categories are intended to provide a broad range of topics concerning wolves. You may want to read the following explanations and use them to introduce each category to your students.

#### Category Names:

**Legal Ease:** laws and legal issues dealing with wolf management

**Home on the Range:** wolf range and dispersal

**Life or Death:** life cycle and factors in wolf survival

**Wolf Parts:** the physical adaptations of wolves

**On the Move:** migration and territory

**Myths and Facts:** cultural history and human attitudes toward wolves



## ACTIVITIES:

- Before playing the game, write the categories on the board, with the dollar amounts below each category:

Legal Ease	Wolf Parts	Life & Death (etc.)
\$100	\$100	\$100
\$200	\$200	\$200
\$300	\$300	\$300
\$400	\$400	\$400
\$500	\$500	\$500

Make a scorekeeping table on the board for each of the teams.

- Divide the class into five or six teams of roughly equal numbers of players. Tell each team to choose a (wolf-oriented) name for themselves.
- Choose one team to begin. This team will have the first option of choosing a category. They may select any dollar amount and respond to the question. The higher dollar amounts have more difficult questions.

- If the team cannot answer the question or answers incorrectly, the option to answer goes to the next team. If they cannot answer, the option passes to the next team, and so on. Keep score until the end, declaring a winner.

## Discussion:

- On a scale of 1–10, rate your knowledge of wolves.
- What area do you know the most about? The least?
- How can you learn more about wolves?
- Why does it matter if anyone learns about wolves?

## ASSESSMENT:

By making notes along the way, a teacher may assess what areas students lack knowledge in or depth of knowledge.

## EXTENSION:

Repeat this quiz at the end of the unit to assess learning.



## National Science Education Standards

### *Life Science (5–8)*

*Structure and function in living systems*

*Regulation and behavior*

*Population and ecosystems*

### *Life Science (9–12)*

*Interdependence of organisms*

### *Science in Personal and Social Perspectives (5–8)*

*Populations, resources, and environments*

### *Science in Personal and Social Perspectives (9–12)*

*Population growth*

*Natural resources*

*Environmental quality*

LEGAL EASE	HOME ON RANGE	LIFE AND DEATH
<p><b>\$100</b></p> <p><b>Question:</b> What do we call a person who shoots a wolf illegally?</p> <p><b>Answer:</b> A poacher.</p>	<p><b>\$100</b></p> <p><b>Question:</b> True or false? Wolf range originally spanned a wider area than any other land mammal (other than humans).</p> <p><b>Answer:</b> True.</p>	<p><b>\$100</b></p> <p><b>Question:</b> Name three species wolves might prey on.</p> <p><b>Answer:</b> Deer, elk, moose, bison, hare, beaver, caribou, musk ox, cow, sheep...</p>
<p><b>\$200</b></p> <p><b>Question:</b> What do we call an animal or plant that is in danger of becoming extinct?</p> <p><b>Answer:</b> An endangered species.</p>	<p><b>\$200</b></p> <p><b>Question:</b> Most wolves will disperse from the pack they were born into by what age?</p> <p><b>Answer:</b> Three years of age.</p>	<p><b>\$200</b></p> <p><b>Question:</b> On the average, what percentage of pups die each year?</p> <p><b>Answer:</b> 40–60 percent.</p>
<p><b>\$300</b></p> <p><b>Question:</b> What year was the Endangered Species Act passed by Congress?</p> <p><b>Answer:</b> 1973.</p>	<p><b>\$300</b></p> <p><b>Question:</b> What is the entire geographic area over which wolves are distributed known as?</p> <p><b>Answer:</b> Wolf range.</p>	<p><b>\$300</b></p> <p><b>Question:</b> Who are the main predators of the wolf?</p> <p><b>Answer:</b> Humans.</p>
<p><b>\$400</b></p> <p><b>Question:</b> What is delisting?</p> <p><b>Answer:</b> The process of removing a species from the endangered species list</p>	<p><b>\$400</b></p> <p><b>Question:</b> Wolves may expand their range in two ways: natural recolonization or what human-directed activity?</p> <p><b>Answer:</b> Reintroduction.</p>	<p><b>\$400</b></p> <p><b>Question:</b> What is a leading cause of death for the wolf?</p> <p><b>Answer:</b> Starvation.</p>
<p><b>\$500</b></p> <p><b>Question:</b> What year was the first bounty established in Minnesota?</p> <p><b>Answer:</b> 1849.</p>	<p><b>\$500</b></p> <p><b>Question:</b> The farthest a wolf is known to have dispersed from its home is</p> <ul style="list-style-type: none"> <li>a. 78 miles</li> <li>b. 330 miles</li> <li>c. 660 miles.</li> </ul> <p><b>Answer:</b> c.</p>	<p><b>\$500</b></p> <p><b>Question:</b> How much food does an average wolf need per day to survive?</p> <p><b>Answer:</b> Average of 7 lbs. per wolf per day.</p>



## WOLF PARTS

## ON THE MOVE

## MYTHS VS. FACTS

**\$100**

**Question:** Name three colors that a wolf's fur could be.

**Answer:** Gray, white, brown, black, tan.

**\$200**

**Question:** List three wolf body parts that are important to wolf communication.

**Answer:** The tail, eyes, ears and teeth.

**\$300**

**Question:** What do we call a male and female wolf that mate to produce pups?

**Answer:** The breeding pair.

**\$400**

**Question:** What is the average weight of an adult male wolf?

**Answer:** 70–100 pounds.

**\$500**

**Question:** What does a four-month-old wolf pup eat?

**Answer:** Regurgitated food from an adult pack mate.

**\$100**

**Question:** What is an area that a wolf calls home?

**Answer:** A territory.

**\$200**

**Question:** How far may a wolf travel in search of food?

**Answer:** 10–30 miles a day.

**\$300**

**Question:** What factor most determines the size of a wolf pack territory?

**Answer:** Food availability.

**\$400**

**Question:** What is the name of the area where pups remain when they are 8–20 weeks of age?

**Answer:** The rendezvous site.

**\$500**

**Question:** Name three ways wolves "mark" their territory.

**Answer:** Urination, howling, scat

**\$100**

**Question:** True or false? It is common for wolves to kill people.

**Answer:** False.

**\$200**

**Question:** What does it mean if a person is described as "a wolf in sheep's clothing"?

**Answer:** That person is not as trustworthy as s/he appears.

**\$300**

**Question:** What is the name of the mythological character that is a man who turns into a wolf?

**Answer:** A werewolf.

**\$400**

**Question:** What does a person tell when s/he "cries wolf"?

**Answer:** A lie.

**\$500**

**Question:** What is anthropomorphism?

**Answer:** The act of attributing human actions and motivations to animals.





## SECTION 1 The Wolf

### Subjects:

biology



### Approximate lesson time:

1 hour



### Materials:

animal needs cards,  
animal needs charts  
(See pages 21–22)

# Nature's Stock Market

*Students play a card game to learn the habitat needs of north-woods animals*

### STUDENT OBJECTIVES:

At the end of this lesson, students will be able to:

1. Define the habitat needs of common north-woods mammals.
2. Compare the habitat components among common north-woods mammals.
3. Predict how habitat change affects different species.

### VOCABULARY:

habitat • carrion

### TEACHER BACKGROUND:

All animals need a habitat that provides them with food, water, shelter and space. While all animals have these needs, they satisfy them in different ways.

For example, deer eat twigs, wolves eat deer, beavers build a lodge they create for shelter, and adult wolves sleep out in the open. In this game, each player will try to collect all of their animals' needs by trading habitat cards. This game is similar to a stock market setting. By playing several times, students will gain a sense for the needs of several north-woods animals.

The “north woods” is divided into several distinct habitats. The “evergreen forest” is a forest made up of white and red pines, balsam firs and white spruce, all trees that retain their leaves (needles) during the winter. The “mixed woods” forest contains a mixture of evergreens and northern broadleaf trees (quaking aspen, paper birch and northern red oak). The “shrub woods” is an area dominated by short, brushy tree growth. Shrub woods plant species are generally shorter than 20 feet tall at maturity and may grow so densely that it is difficult to walk through them. Speckled alder and mountain maple are common shrub woods trees. Regrowth forest is one that has been clear-cut but new trees have begun to grow.

### ACTIVITIES:

1. Divide the class into groups of six.
2. Give each group six animal needs charts and a deck of animal needs cards.
3. Direct one student in each group to deal out the animal needs cards to the members of his or her group.



- Students look at their cards and determine if they have any cards that are needed to fill their animal needs charts. If they have a card listed on their chart, they place the card on top of that square in the chart.
- When you say go, students begin trading habitat cards the same way stockbrokers trade commodities on the stock market. If a student has three cards they can't use, they hold them up and yell, "three, three, three" (without revealing the item on the cards). If another player wants to trade three cards, they exchange three cards face down. This fast-moving exchange continues until one player has collected all the necessary cards and calls out, "Habitat!"
- Direct players to rotate animal charts and play again.

### **Discussion Questions:**

- How is this game like reality in the north-woods ecosystem? Answers may include: animals have habitat needs, animals compete to fill their needs, and resources are limited.
- How is this game not like reality in the north-woods ecosystem? Answers may include: animals don't trade resources, animals may be able to share resources, and animals may be able to adapt to new resources.
- Which were the most precious commodities? What does that tell you about the importance of that element of the ecosystem? Answers will vary.
- Which animals had the easiest time making a living? Probably the herbivores and omnivores

because there are a lot of plants in north-woods ecosystems compared to the number of animals available to carnivores.

- Do some animals eat the same things as others? Explain. Yes. Deer, moose, snowshoe hare and beavers all eat aspen. Bear and wolves eat carrion and deer.
- Who would be affected first if the habitat changed (example: if the area was logged, turned into a suburb or flooded)? Herbivores would be affected first because their food source, space and shelter would be immediately impacted. Predators would be second.
- What will animals do if they can't find their habitat needs in a particular area? Migrate to a new area; find a new food, water, or shelter source; adapt; or die out.
- How are wolf needs similar or different from the other animals' needs in this game? All animals need food, water, shelter and space. A bear and wolf may share the same shelter, and both eat deer and carrion, for example.

### **ASSESSMENT:**

Students will take a short quiz.

#### **Quiz**

- Define habitat. An area that supplies enough food, water, shelter and space for one or more organisms, such as plants, animals, fungi and algae.
- Give an example of how one animal finds food, water, shelter and space. See animal needs cards/chart.



William Rideg, Kishenehn Wildlife Works

### **National Science Education Standards**

#### **Unifying Concepts and Processes**

*Systems, order, and organization*

*Change, constancy, and measurement*

*Evolution and equilibrium*

#### **Science as Inquiry**

*Abilities necessary to do scientific inquiry*

*Understanding about scientific inquiry*

#### **Life Science (5–8)**

*Structure and function in living systems*

*Regulation and behavior*

#### **Life Science (9–12)**

*Interdependence of organisms*

#### **Science in Personal and Social Perspectives (5–8)**

*Populations, resources, and environments*

3. Which animals have the easiest time finding enough food, based on this game? Answers will vary based on your observations.
4. Which of these animals is most common near your town? Why? Hint: What kind of habitat is around your town? Which species could live there and be tolerant of the presence of humans?

NOTE: Most species access multiple sources of food, water, shelter and space. For simplicity, only the specified source fulfills the requirement.

#### **EXTENSIONS:**

Play the game again, but add some additional food or space cards. For instance, add meadow cards as the result of forest fires, or add suburb cards. How do these changes affect the animals that survive the game?

## ANIMAL NEEDS CHART

(give one to each player)

ANIMAL 	FOOD berries	WATER stream	SHELTER cave	SPACE evergreen forest
ANIMAL 	FOOD aspen	WATER pond	SHELTER deciduous woods	SPACE regrowth forest
ANIMAL 	FOOD deer	WATER stream	SHELTER log	SPACE deciduous forest
ANIMAL 	FOOD water plants	WATER pond	SHELTER balsam fir tree	SPACE marsh
ANIMAL 	FOOD birch	WATER pond	SHELTER lodge	SPACE deciduous forest
ANIMAL 	FOOD dogwood	WATER stream	SHELTER thicket	SPACE mixed woods

## NATURE'S STOCK MARKET

Animal Needs Cards (cut apart)

mixed woods



water plants



berries



deer



deciduous  
forest



aspen



birch



thicket



dogwood



pond



pond



pond



balsam fir



log



stream



stream



deciduous  
forest



stream



cave



evergreen  
forest



lodge



regrowth  
forest



deciduous  
forest



marsh



flowers



ferns



rock



meadow



# Home Is Where the Food Is

*Students chart wolf travels on a map to glean wolf territorial behavior.*

## **STUDENT OBJECTIVES:**

At the end of this lesson, students will be able to:

1. Describe how researchers determine wolf pack territory size.
2. Use a map to estimate the range of wolf pack territory size in Minnesota.
3. Hypothesize why wolves disperse.

## **VOCABULARY:**

radio telemetry • dispersal •  
territory • radio collar •  
intraspecific strife

## **TEACHER BACKGROUND:**

Researchers study wolves in a number of ways to learn about the wolf's role in the natural system, including its survival, travels, mortality, social behavior and more. Researchers will choose a study methodology based on the data they are trying to collect and the existing environmental conditions. For example, in northern Minnesota, wolves are very elusive, and the vegetation is quite thick in summer. It would be unrealistic to try to count the number of wolves in the summer months because it

would be too difficult to see any wolves. Therefore, researchers take a census of the wolf population by airplane in winter, when the leaves are off the trees and the wolves are easier to spot.

In other areas, such as Yellowstone National Park, the terrain is much more open, so viewing wolves from a distance is more productive. In the Arctic, wolves are less fearful of humans, so scientists can get closer to them.

Wolf research has been conducted in northern Minnesota since the early 1930s. Methods of locating and observing wolves have varied, from the labor-intensive method of looking for wolves by snowshoe to the more reliable radio telemetry approach.

Radio telemetry on wolves involves three main components:

- a radio collar with a radio transmitter and battery placed around a wolf's neck
- an antenna
- a radio receiver

Scientists and field technicians use a collar's unique radio signal to determine a wolf's location approximately once each week throughout the year.



## **SECTION 1 The Wolf**

Chris Darmont

### **Subjects:**

*biology, geography, mathematics*



### **Approximate lesson time:**

*2 hours*



### **Materials:**

*copies of Tracking Map,*

*copies of hypothetical telemetry data for 2004 and 2005,*

*different colored pens*



## National Science Education Standards

### *Unifying Concepts and Processes*

*Evidence, models, and explanation*

*Change, constancy, and measurement*

### *Science as Inquiry*

*Abilities necessary to do scientific inquiry*

*Understanding about scientific inquiry*

### *Life Science (5–8)*

*Populations and ecosystems*

### *Science in Personal and Social Perspectives (5–8)*

*Populations, resources, and environments*



Sample  
wolf radio  
collar

This research has revealed important information about such things as the age at which wolves disperse from their natal packs (usually between age one and three years), causes of wolf mortality (starvation, interspecific strife, disease, humans), average wolf pack territory size (about 10 square miles per wolf in the pack), wolf wanderings (sometimes as much as 660 miles from home!), locations of certain pack territories, the dynamic nature of territory boundaries, hunting and feeding patterns, prey selection, wolf den locations, relations among neighboring packs and more. Researchers know all this from tracking about 20 wolves' locations on a given day each week for several years.

Scientists have paid particular attention to wolf dispersal in recent years. We now know that wolves disperse when they are between the ages of one and three years, especially if they are lower-ranking wolves. Some reasons they might disperse include searching for a mate and starting a new pack (low-ranking wolves almost never

reproduce in their home pack) and finding more food (low-ranking wolves generally get less to eat than higher-ranking wolves).

In this activity, students use hypothetical data to practice this research and analysis process. The extension activity describes how to analyze real wolf research data using information from the International Wolf Center's Web site and an inexpensive map. See [www.wolf.org](http://www.wolf.org) for more information.

## ACTIVITIES:

1. Divide the class into groups of three to four students.
2. Give each group a copy of the map on page 27. Provide one year's worth of telemetry data (Year One).
3. Review how to read and plot this type of data using basic X and Y axes.
4. Instruct groups to plot the data points for each wolf and each date on the Year One chart. It will be helpful to use a different color ink for each wolf.
5. Instruct students to draw a circle around all of the data points for each wolf. If one or two data points are apart from the others, this may indicate the wolf left its main territory. It may be taking a short jaunt or dispersing a great distance.
6. When students are through, discuss:
  - Which wolf had the largest range in its travels?
  - Which wolves belong to the same pack? How do you know?
  - If only one or two wolves in a pack have radio collars on, speculate how researchers estimate the total number of wolves in that pack.



- Why do you suppose the data for wolf 243 stopped after March? *It may have died, dispersed, removed its collar, or the collar battery might be dead.*
  - Based on these data, how large (square miles) are pack territories in your study area?
  - Do pack territories overlap, or are they completely separate? What problems might this cause?
  - Why might a wolf disperse from its native territory?
7. Give students the Year Two wolf territory data, and instruct them to plot it on the same map. Either discuss the following, or provide each group with the worksheet on page 28.
- How do the pack territories in Year Two differ from the Year One data?

- Hypothesize why the territory location and/or size might change in the future.
- How would you prove your hypothesis?
- Which wolves might be part of the same pack?
- Why might a wolf disappear from the study? See #6 above.

### **ASSESSMENT:**

---

Groups may turn in their maps and discussion worksheets.

### **EXTENSIONS:**

---

Now that the students have practiced plotting and analyzing wolf location data, instruct them to use real research data on maps of Minnesota's Superior National Forest. To do this, you will need wolf location data and instructions found by going to [www.wolf.org](http://www.wolf.org) and then search "Track Wild Wolves."

## WOLF TELEMETRY DATA

### YEAR ONE WOLF LOCATION DATA

**Wolf 248   Wolf 101   Wolf 127   Wolf 328   Wolf 975**

1/15	A5	I7	E17	A7	A16
1/30	A7	I7	E14	B10	C16
2/15	B10	I10	H14	A5	E16
2/28	C10	H2	H14	A6	F16
3/15	D11	G4	E12	B6	F13
3/30	D15	G4	E12	B8	F13
4/15	--	K7	H16	A8	E12
4/30	--	I10	I11	A5	D12
5/15	--	I6	G17	B6	C16
5/30	--	J4	I15	B6	F17
6/15	--	K1	G14	A11	H15
6/30	--	K3	G12	B10	F17

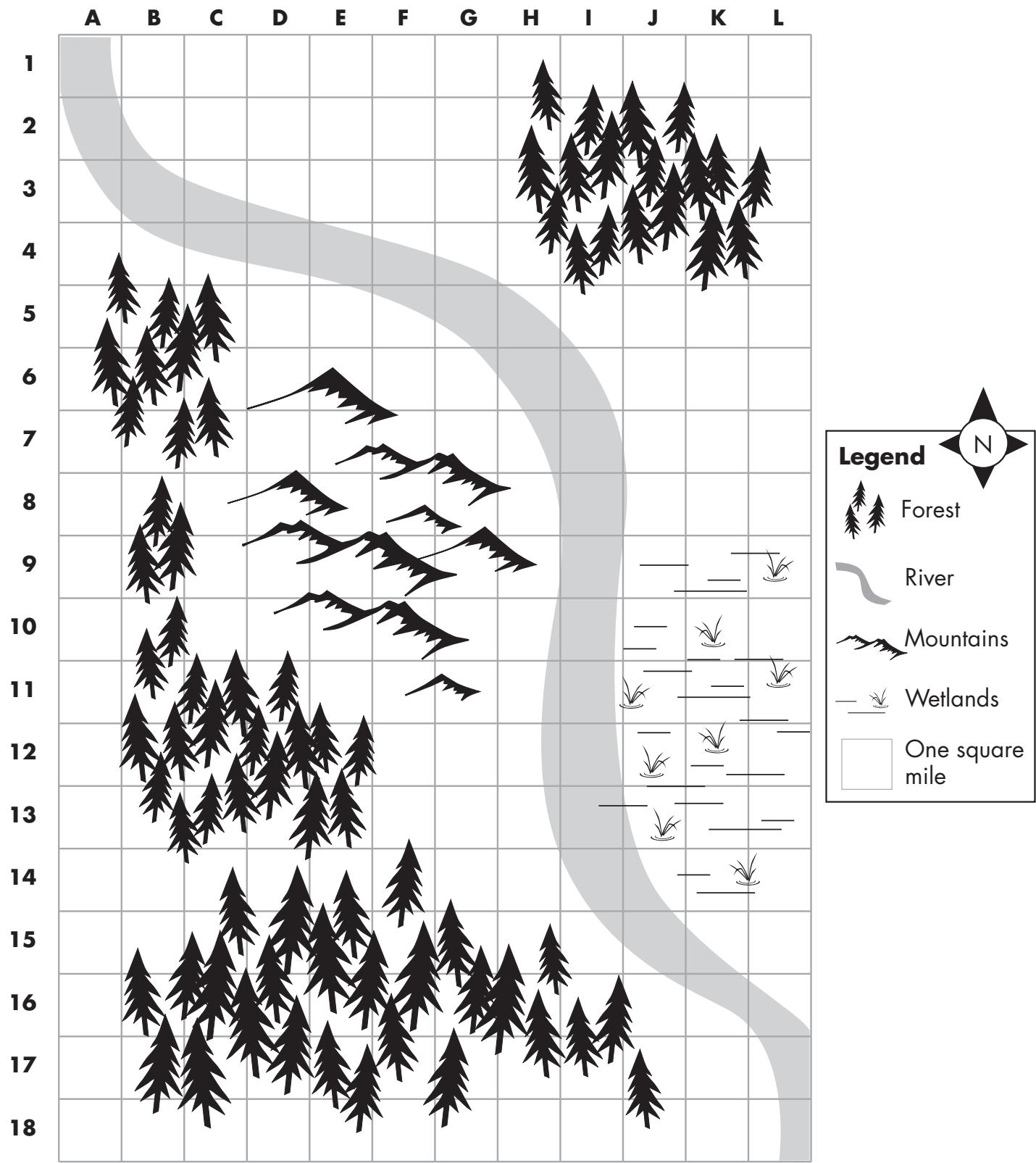
### YEAR TWO WOLF LOCATION DATA

**Wolf 248   Wolf 101   Wolf 127   Wolf 328   Wolf 975**

1/15	--	G4	E12	B6	E12
1/30	--	G1	E14	B7	E14
2/15	--	K6	H17	B8	H17
2/28	--	I9	H14	A8	H15
3/15	--	I5	E12	A7	J16
3/30	--	J3	E12	A5	J17
4/15	--	K2	I13	B3	I13
4/30	--	K1	G16	B2	G16
5/15	--	I6	I14	B7	I14
5/30	--	I8	G18	D8	F17
6/15	--	H1	G15	D10	F16
6/30	--	G3	H17	E8	H17

## MAP FOR RADIO TELEMETRY

(make one copy for each group)



NAME: \_\_\_\_\_



## Home Is Where the Food Is

Answer the following questions. Make sure to cite evidence from the data to defend your answers.

1. How does the location and size of pack territories in Year Two differ from the Year One data?

2. Hypothesize why the territory location and/or size changed.

3. What evidence would you need to prove this hypothesis?

4. Which wolves might be part of the same pack?

5. Why might a wolf disappear from the study?