



GRAY WOLVES



GRAY MATTER

Exploring the Social and Biological Issues of Wolf Survival

SECOND EDITION

Jacquelyn Fallon



A PUBLICATION OF THE INTERNATIONAL WOLF CENTER

International Wolf Center
Teaching the World about Wolves

**GRAY
WOLVES**



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MATTER**



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The International Wolf Center advances the survival of wolf populations by teaching about wolves, their relationship to wild lands and the human role in their future.

PDF versions of this curriculum may be downloaded for free from www.wolf.org.
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Lynn and Donna Rogers /www.bearstudy.org



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Foreword

*A wild wolf trots out of the woods into a clearing.
It doesn't see you as it crosses...*

a prairie meadow

your cattle pasture

a wilderness trail

the playground at the edge of town

a logging road in the forest

or your back yard

How do you react?

The wolf evokes feelings of excitement and fear, wonder, anger and allure. Looking into the eyes of a wild animal blows open the doors of a student's imagination and sparks the mind with curiosity. As this curriculum fuels the fire with biological, cultural and political perspectives, it takes students beyond emotion and challenges their thinking about the wolf and its complex relationship with humans.

The world's top wolf researchers have gathered the information you will present in these exercises. With that expertise in hand, your students are about to enter a real-world debate taking place in the wolf-populated and wolf-barren areas of Yellowstone National Park, New Mexico, France, Finland, Russia and elsewhere around the world.

Will the controversial wolf lope across our future landscape? Your students will gather facts, write, talk and listen, explore outcomes, resolve conflict and then decide.



Robert Schultz
Executive Director
International Wolf Center

September 1, 2018

How to use this curriculum

The International Wolf Center is proud to provide educators with a resource that goes beyond biology to analyze the human aspects of the wolf's survival. This curriculum helps educators of all types address a true environmental controversy in a holistic, objective manner. Wolves are a complex subject to study, encompassing multiple disciplines and issues. The materials provided will help you and your students make sense of this multifaceted subject.

Even the name of this curriculum, *Gray Wolves, Gray Matter*, reflects the complexity of wolf issues. The phrase *gray matter* has dual meaning. First, it refers to the gray areas between fact and fiction, right and wrong. Second, gray matter is a metaphor for the brain, meaning that intensive thinking will be required to find compromise on these complicated issues.

Within these pages you will find a wealth of resources for teaching about the wolf and the current controversies surrounding their survival, including background information for teachers, interdisciplinary activities, assessment recommendations and student worksheets and game pieces. This activity guide is composed of a series of lessons that may be used together in sequence as one unit or used piecemeal to supplement an existing unit of study. The project is geared to students in grades 6–12, but no specific grade level is recommended for any of the lessons because they can all be adapted for learners of any age.

The activities are grouped into five themes:

The Wolf: The natural history of wolves, including pack life and survival needs

Natural Systems: The wolf's relationship with its ecosystem, including predation and territorial behavior

Social Systems: The cultural and economic interactions between wolves and humans

Wildlife Management: Understanding the mechanisms humans use to influence wildlife populations

Finding Solutions: Personal and civic skills necessary to find peaceful coexistence with wolves.

Not only has this curriculum been classroom tested, but it has also been reviewed by a variety of stakeholders in the wolf management controversy. These people, who fall on different sides of the wolf issue, made suggestions that were incorporated to ensure the greatest objectivity possible. In addition, all material was approved by world authorities on wolves, wolf ecology and wolf management. The International Wolf Center's goal is to provide the most current, scientific, unbiased information available so that people can formulate their own opinions about wolves and wolf management.

The International Wolf Center is committed to supporting wolf educators. Visit our extensive Web site, www.wolf.org, where you'll find a host of information and opportunities!

LEARN: Accurate information and activities including volumes of wolf facts, curricula, loan boxes, Just for Kids section, outreach program information, Educator section (with our teacher workshop schedule) and more!

EXPERIENCE: Join us for the adventure program of a lifetime. Monitor our Wolf Watch Web Cam, or track wild wolves like the researchers do.

SHOP: An educator's dream site for purchasing books, audiovisual materials, wolf adoption kits, track packs, wolf curricula and more.

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SECTION 4
Wildlife
Management

Lynn and Donna Rogers/www.bearstudy.org



Management Plan Analysis

Students compare existing wildlife management plans.

STUDENT OBJECTIVES:

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

1. Define wildlife management.
2. Identify at least two components of a management plan.
3. Outline some reasons a management plan might succeed or fail.

VOCABULARY:

limiting factor • endangered species • carrying capacity • management

TEACHER BACKGROUND:

Many wildlife species are “managed” by humans. Various measures, from hunting and trapping to feeding and breeding programs, control the numbers and range of all sorts of wildlife species. Even a habitat improvement project can be considered a wildlife management strategy, since wildlife populations will benefit from better habitat.

In the United States, each state typically has jurisdiction over the plants and animals in its state. States usually have an agency such as a Department of Natural Resources or a Department of Fish

and Game that is charged with the task of overseeing the wildlife populations in their state. Often, these agencies prepare a plan for what they want to see happen to certain key species. Elk, bear and pheasants often have well-established management plans, while woodchucks, red squirrels, mice and porcupines are often not closely managed. Occasionally, the federal government will supersede state authority and develop comprehensive management plans for endangered or threatened species.

At its most basic level, managers must establish a basic framework of goals to develop a management plan.

Management Plan Framework:

1. Identify the basic habitat needs of the animal in question (food, water, shelter, space).
2. Determine the density or sometimes the number of animals that will be considered an optimal population level.
3. Identify any limiting factors that are keeping the species from maintaining the desired population level, and how human activity could bring about increases (or in some cases, decreases) in the species population.



SECTION 4 Wildlife Management

Subjects:

biology, sociology, reading skills, geography



Approximate lesson time:

4 hours



Materials:

copies of wildlife management plans, pictures of animals, paper, pencils



4. Create a plan that is designed to bring the target species to the desired population level. Keep in mind that actions that benefit one species may have the opposite effect on another.

Often, state natural resource agencies will solicit input from the public when preparing a management plan. Individual citizens may favor a certain species and want to see more done to protect it; others may dislike that species and want the agency to reduce its numbers.

ACTIVITIES:

1. Divide students into “management teams” of four students. Assign each team a wildlife management plan (on pages 130–133).
2. Review as a class the components of a wildlife management framework (above).
3. Tell students to review their assigned plan and identify how managers addressed the framework in their plans.
4. Instruct each team to select a new animal native to their area. Students should research their chosen animal, determine its habitat needs, and create a management plan that will increase (or decrease) this animal’s population in its home territory, using the steps outlined in the framework. The worksheet on page 134 may be helpful to organize information the students gather.
5. Each group should present its plan to the class.

Discussion:

Ask students: If you were going to build a house, would you ask the people walking past the property to design the structure, or would you ask an architect to design it? If we are going to design a wildlife management plan, who should be asked to design it?

ASSESSMENT:

1. Each group will hand in a three-page wildlife management plan describing their management recommendations.
2. Students will be given an essay quiz.
 - a. What steps do wildlife managers follow to create a management plan?
 - b. How did your group manage your animal’s population?
 - c. What biological, economic, political or cultural barriers may prevent your plan from working?

EXTENSIONS:

1. Contact a local wildlife specialist (e.g., ecologist or Department of Natural Resources staff) and ask what endangered species (plant or animal) live in the region. Instruct students to develop management plans for some of these species, using topographic maps of the region, and proposing how managers could recover the endangered animal or plant.
2. Invite a wildlife manager to your classroom to talk about his or her experiences managing wildlife populations.



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National Science Education Standards

Unifying Concepts and Processes

Systems, order, and organization

Life Science (9–12)

Interdependence of organisms

Behavior of organisms

Science in Personal and Social Perspectives (5–8)

Populations, resources, and environments

Risks and benefits

Science in Personal and Social Perspectives (9–12)

Population Growth

Natural Resources

Environmental Quality

WILDLIFE MANAGEMENT CASE STUDY

Pacific Salmon

The five species of Pacific salmon—chinook, coho, sockeye, chum and pink—have been an invaluable resource to people living on the Pacific Coast for thousands of years. Today, the livelihoods of both commercial and recreational fisherman, tribal groups and coastal communities are still very much dependent on healthy populations of these fish.

Dams and Hydropower

Pacific salmon are anadromous fish, which means they spend most of their adult lives in the ocean but migrate up rivers to spawn (or breed) in fresh water. In the past 40 years, thousands of hydropower dams have been built on important salmon rivers, making it difficult for them to reach prime breeding locations. The proliferation of dams in the West has also altered the natural environment of many key salmon rivers by reducing the velocity of the water and changing water temperatures. Slowing down the rate at which the water flows increases the chances for predators to prey on juvenile salmon, and increasing the water temperatures causes salmon to behave abnormally. Scientists believe that partially removing the dams on the Lower Snake River in southeastern Washington has an 80 to 99 percent chance of restoring healthy salmon runs by reversing the habitat damage caused by the dams.

Recent management efforts have addressed the negative impacts of dams on Pacific salmon species. Government agencies have joined forces with concerned citizens and interest groups to improve salmon habitat by removing unproductive hydropower dams. The removal of dams has reestablished many miles of free-flowing rivers and improved overall habitat.

Sustainable Harvesting

The five species of Pacific salmon are highly coveted by commercial and recreational

fisherman. The sockeye, chinook and coho salmon are extremely popular for food, which causes them to be harvested in larger quantities. The low number of Pacific salmon today is very much a result of intense harvesting in the past.

Recent management strategies have changed the way these fish are harvested in hopes of reducing the impact of harvesting on the overall population. Some management plans have regulations that cut the number of commercial salmon fishing permits by half, which allows more salmon to remain in the water to spawn and increase populations.

Habitat

The most critical issue addressed in salmon management plans is the protection and restoration of habitat. Pacific salmon are sensitive to water quality and have very specific habitat requirements. These fish require cool, free-flowing rivers with gravel or cobbled riverbeds for successful reproduction. Certain land-use practices like clear-cutting, mining, and removal of riverbank vegetation cause soil to be washed away by rains and carried into the rivers, which jeopardizes the habitat of many important salmon rivers.

Large-scale irrigation efforts in the West have also contributed to the loss of Pacific salmon habitat. As more water is diverted from the rivers, the water level drops, and water temperature consequently increases. The Klamath River in Washington is a prime example of salmon habitat affected by irrigation. The Klamath, which was once the third most productive salmon river system in the United States, now has less than 10 percent of its historic population because upstream irrigation has caused water levels to drop and water temperatures to increase.

For more information:

<http://www.pcffa.org/klamath.htm>

<http://www.wildsalmon.org/about/index.htm>

<http://www.whylwild.org/threats.html>

<https://www.nwd.usace.army.mil/ps/factors.htm>

WILDLIFE MANAGEMENT CASE STUDY

Elk

As a grazing animal, elk play an important role in the ecosystem and have important cultural value as well. In many western states, elk hunting is a special tradition that brings a substantial amount of income into the economy.

National Elk Refuge

In the early 1900s, elk in the west-central part of Wyoming had trouble finding enough food in the winter because of human settlements and cattle. Many elk died during the especially severe winters between 1909 and 1911. In 1910, rather than hurt the local residents and interests groups that relied on the elk by restricting elk hunting, local citizens and government officials began to provide extra food for the elk during wintertime. In 1912, after assessing the importance of the Jackson elk herd to the state of Wyoming, the federal government established the National Elk Refuge (NER), which protected the elk and their food supply. Today, the NER includes almost 25,000 acres of wintering habitat for the Jackson elk herd.

To help maintain the elk during the winter, the grasslands at the NER are managed to produce as much natural forage as possible. However, when large snowfalls make it harder for the elk to find food, or the natural forage is no longer available, supplemental feeding is provided in the form of alfalfa pellets.

As a result of the winter feeding program, the Jackson elk herd is one of the largest in the world. This has enabled Jackson Hole to support a large hunting, outfitting and wildlife viewing industry, which has contributed to the local economy and culture of the surrounding area.

Even so, with such a large number of elk grazing inside the National Elk Refuge, there has been much concern about the impact they are having on the land. Not surprisingly, concentrating a large number of elk on the same area for close to 100 years has decreased the amount of woody vegetation available, like aspen and willow.

Therefore, to decrease the possibility of overgrazing, the NER tries to limit the number of elk that winter on the land. The NER and Wyoming Game and Fish Department have determined the optimum number of elk for the range to be 7,500. They work to maintain this number by allowing people to hunt elk during the fall on the NER and surrounding public lands.

For more information:

<http://nationalelkrefuge.fws.gov/index.htm>

WILDLIFE MANAGEMENT CASE STUDY

Black-Footed Ferrets and Prairie Dogs

One of only three species of ferrets in the world, the black-footed ferret has been on the brink of extinction since the 1940s. Biologists discovered that the main reason for the species' decline involves factors influencing their primary food source: prairie dogs.

History

As early settlers populated the west, prairie dog populations began to decline due to losses in habitat. People converted grasslands into farms, ranches, towns and grazing areas for livestock, which left prairie dogs with very few places to live. At one point, prairie dogs reportedly occupied more than 100 million acres of grassland and prairie; however, by 1960 that area was reduced to only an estimated 1.5 million acres.

In addition to losses in habitat, many landowners established pest control programs because they viewed prairie dogs as pests. In the late 1980s, \$6.2 million was spent on poisoning prairie dog colonies in just one area of South Dakota. Another factor influencing the species was outbreaks of disease in many prairie dog colonies. Deadly diseases, like the sylvatic plague, resulted in the eradication of entire prairie dog populations. All of these factors, losses in habitat, pest control programs and outbreaks of disease, helped contribute to the dramatic decline of the prairie dog. Moreover, since prairie dogs make up 91 percent of the black-footed ferret's diet, the decline in prairie dogs caused the ferrets to decline as well. By the 1960s, the black-footed ferret was on the verge of extinction.

Conservation and Status

To help the black-footed ferret, biologists and government officials listed them as endangered in 1967 under a law that preceded the Endangered Species Act of 1973. However, even under this protection black-footed ferrets were thought to be extinct in the wild by 1978.

In 1981 a small population of black-footed ferrets was accidentally discovered by a rancher's dog in Meeteetse, Wyoming. This gave biologists a second chance to try to save the species. They began to study this elusive species, gaining important new information about their life history and behavior.

Nevertheless, sylvatic plague and canine distemper, which are lethal to ferrets, broke out in the population and almost destroyed it entirely. In another effort to save the black-footed ferret, biologists captured the 18 remaining individuals and began a captive breeding program. Today, there are six main captive facilities in the United States and Canada that breed black-footed ferrets. The national recovery goal for the United States is to have 1,500 breeding adult ferrets in at least 10 populations by the year 2010. As of June 2003, black-footed ferrets had been reintroduced into parts of Wyoming, Montana, South Dakota, Arizona, Colorado, Utah and even northern Mexico.

To improve the survival of black-footed ferrets, prairie dog habitat must be conserved and protected. Setting aside land for prairie dogs would provide them with a place to breed and increase in numbers, which is beneficial to black-footed ferrets because it means more prey would be available. If this is not done, the future of both prairie dogs and black-footed ferrets will remain in jeopardy.

For more information:

www.blackfootedferret.org

www.wildlife.utah.gov/publications/pdf/newferrt.pdf

<http://biology.usgs.gov/s+t/noframe/c040.htm>

<http://mountain-prairie.fws.gov/species/mammals/blackfootedferret/>

WILDLIFE MANAGEMENT CASE STUDY

Whooping Crane

The survival of the whooping crane is considered one of the most successful cases of animal conservation in North America. After 60 years of conservation work, the whooping crane is finally making a comeback.

Twice each year, at speeds of up to 35 to 40 miles per hour, members of the only remaining wild flock of whooping cranes fly an estimated 2,500 miles between their wintering habitat in southern Texas and breeding habitat in northern Canada. During this migration, the cranes stop at particular sites along the way to get much needed rest and find food, such as insects, frogs and crayfish.

History

Before 1870, the total population of whooping cranes was estimated at around 500 to 1,400 birds. As European settlers continued to move throughout North America, much of the whooping crane's habitat of wetlands and marshes was drained and converted for use by agriculture. Not only did this conversion affect the areas where whooping cranes bred or stayed for the winter, it also affected the availability of certain stopping points along their migration route. In addition, collisions with power lines, uncontrolled hunting and human disturbance of nest sites caused the species to suffer. As time progressed, whooping crane populations experienced a steady downward decline, which resulted in just 15 known individuals in 1941.

Restoration Efforts

To help save the whooping crane from extinction, the U.S. and Canadian governments took a variety of conservation actions. In 1922, Canada established Wood Buffalo National Park, and in 1937, the United States established Aransas National Wildlife Refuge.

These actions protected both the breeding and wintering habitats for the last remaining flock of whooping cranes. Then, in 1967, the whooping crane was designated an endangered species under a law that preceded the Endangered Species Act of 1973.

According to the whooping crane recovery plan, which was created by crane specialists from both Canada and the United States, two additional flocks of 25 breeding pairs each would be needed to improve the health of the species. Therefore, in 1990 and 2001, two additional flocks were added by incubating wild eggs. A nonmigratory flock was added to central Florida, and a migratory flock that breeds in Wisconsin and winters in Florida was established by training chicks to follow an ultralight airplane. It only took one flight for them to remember how to get back to Wisconsin!

As of September 2004, an estimated 318 whooping cranes existed in the wild. So far, the only flock that has not reached the goal of 25 breeding pairs (or 50 adults) is the Wisconsin-Florida migratory flock with an estimated total of 35 adults.

Even though the whooping crane has made a substantial comeback, their habitat is still at risk of being reduced or destroyed. In many areas in the United States, growth in the human population has increased the demand for water, which has resulted in more water being diverted or taken from freshwater sources. If not monitored carefully, the change in water flow could affect a variety of different factors in wetlands, including the amount of food available for whooping cranes.

For more information:

www.npwrc.usgs.gov/resource/distr/birds/cranes/grusamer.htm#dist

<http://training.fws.gov/library/Pubs/crane.pdf>

www.whoopingcrane.com

www.bringbackthecranes.org

Name _____



Management Plan Analysis:
Writing a Management Plan

Species: _____

Current population: _____ Target population: _____

Related species (prey species, predators):

Description of preferred habitat:

Food needs:

Water needs:

Special considerations (low reproduction rate, susceptibility to human disturbance etc.):

Limiting factors (threats such as diseases, weather, change of food or habitat, human activity, predation etc.):

What actions will you take to increase (or decrease) the population?



Wolf Time Line

Students act out key points in the gray wolf's political and social history.

STUDENT OBJECTIVES:

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

1. Summarize how wolf management has changed from 1492 to today.
2. Draw conclusions about the changing relationship between wolves and humans.

VOCABULARY:

bounty • Endangered Species Act • endangered species list • delisting

TEACHER BACKGROUND:

For students to understand the issues surrounding wolves and wolf recovery, they need to have a sense for the history of these issues. This activity, based on a hands-on time line, will help students understand some of the historical issues surrounding wolf management.

Because inflation has affected the value of money over the past 200 years, we have translated historical bounties into 2005 dollars for you. Assuming a compound inflation rate of 3.22 percent (which is the average from 1926 until 2005), a \$5 bounty in Wisconsin in 1965 would be worth about \$372.26 in 2005. A \$3 bounty in Minnesota in 1938 would be worth about \$525.57 in 2005.

But wolf bounties didn't keep pace with inflation. In 1965, when the Minnesota bounty program ended payments, the bounty was \$35 per wolf. If payments had kept pace with inflation, they would have been \$118.95 in 1965 (these estimates might be understated because the inflation rate may have been higher between 1838 and 1926).



SECTION 4 Wildlife Management

Subjects:

*sociology, reading skills,
public speaking*



Approximate lesson time:

1 hour



Materials:

*Wolf Time Line cards,
costume props (see cards)*



ACTIVITIES:

1. Ask students what they know about the history of wolves in the United States. Make a list of their ideas on the board.
2. Ask for volunteers to create a “gray wolf time line.” Give students time line cards. Tell the student with card one to stand in front of the class and read his or her card, and move to the left side of the room.
3. The second student should read the second card, then stand next to the first student. Eventually students with cards will form a line.
4. When each student has read his or her card, let members of the class ask questions of these historical figures. Students should try to answer the question on behalf of the character. The teacher may help answer questions if the historical figures get stuck on a question.

DISCUSSION:

- Which event was the most important in the wolf’s history?
- What surprised you about this time line?
- How will wolf management look in the year 2100?

ASSESSMENT:

Give the students a written quiz:

1. Describe wolf management in the 1600s and 1700s.
2. How did wolf management change in the 1970s? Why did it change?
3. If you could choose how to manage wolves in the 21st century, what would you do?

EXTENSIONS:

Instruct students to research newspaper articles from 1974 to today. What do these articles tell you about the changing attitudes of people toward wolves and other wildlife?

Invite students to prepare costumes for the time line characters.

Add key events to the time line specific to the red wolf or Mexican gray wolf.



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National Science Education Standards

Unifying Concepts and Processes

*Change, constancy,
and measurement*

Life Science (9–12)

Interdependence of organisms

Science in Personal and Social Perspectives (5–8)


Risks and benefits

Science in Personal and Social Perspectives (9–12)

Environmental Quality


WOLF TIME LINE CARDS

1492 Christopher Columbus (flag of Spain)

 *"I claim this land in the name of Spain. We own it now is my claim."*


The arrival of Christopher Columbus in the Western Hemisphere brings news of the "new world" back to Europe. Other European explorers and settlers follow and eventually colonize the Americas. Many Europeans bring with them to the new country negative views of wolves and a mission to "tame" the wilderness.

1630 Bounty Hunter (bandanna around neck)

 *"Wolf fur is just like gold, \$3 a pelt is what I'm told."*

The first wolf bounty law in America is passed in Massachusetts Bay Colony in 1630. Most colonies—and eventually the states—pass laws that pay people a bounty, or reward, for trapping or shooting wolves and other fur-bearing animals. In 1838 Michigan bounty hunters are paid \$3 per wolf pelt. Adjusting for annual 3.22 percent inflation, \$3 in 1838 would be worth about \$525 today. In a good winter, a bounty hunter can catch up to a thousand wolves.

1805 Meriwether Lewis (paddle and/or compass)

 *"I see wolves there and there and there, they'll steal our food if we don't take care."*

Explorers Lewis and Clark lead the Corps of Discovery up the Missouri River and through Montana. Lewis and Clark keep journals of their observations along the journey, and throughout the Dakotas and Montana they make frequent references to the abundance of wolves. Lewis describes wolves as "shepherds of the buffalo" because the two species are frequently observed together. When the explorers catch extra game animals beyond what is immediately eaten by the men, they leave an overnight watchman to guard the meat from scavenging wolves.



1949 Aldo Leopold (notebook and pen or a copy of A Sand County Almanac)

🐾 *"I have made a big mistake, I fear. Wolves are as important as trees and deer."*

Aldo Leopold becomes famous for writing essays about nature. In 1944 he publishes an essay titled "Thinking Like a Mountain" about an experience he had in his younger years seeing a pack of wolves. "In those days we had never heard of passing up a chance to kill a wolf," he writes. He and his companions shoot the wolves they see, then approach one. "We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain."

Leopold's essays challenge people to think more broadly about the environment and to develop what he calls a Land Ethic.

1960s Landowner (picture of wolf with big "X" over it)

🐾 *"Wolves are dangerous, and so I plan to shoot any wolf I can."*

By the early 1960s most official policies for removing wolves are eliminated, but by this time wolves are already gone from most areas of the lower 48 states. Only about 600 wolves remain, in the far northeastern corner of Minnesota. Some people take wolf management into their own hands with the "3 Ss" of wolf control: "Shoot, Shovel, and Shut Up." These people illegally shoot a wolf, bury it, and don't tell anyone about it.


1973 U.S. Legislator ("Endangered Species Act" written in decorative type on a scroll)

🐾 *"We're losing species, that's a fact, so I propose the Endangered Species Act."*

Although initial protections for wolves were installed by the federal government in 1967, when the 1973 Endangered Species Act (ESA) is enacted into law, it gives a higher level of protection for many species that are disappearing from the United States. The ESA is characterized as the most important piece of species protection legislation in the history of the world. Wolves are protected by the ESA starting in August 1974. Being listed as "endangered" means that even problem wolves (that kill livestock) cannot be killed; they can only be moved to a new location.


In 1978, the U.S. Fish and Wildlife Service (USFWS) publishes plans to recover the wolf in the lower 48 states, starting with the Eastern Timber Wolf Recovery Plan. They develop separate plans for wolves in the Midwest, the Northern Rockies, and the southwestern United States. Because wolf numbers in Minnesota are already high enough to be considered "recovered," the wolf in Minnesota is reclassified from "endangered" to "threatened." This change allows government trappers to kill problem wolves rather than move them.

1989 Livestock Owner (cowboy hat)

 *"I'm losing cows and that's not funny. Either shoot the wolves or give me money."*

If a wolf kills a cow or other livestock animal, the farmer can apply for reimbursement for that loss, but only if they can prove to a government agent that it was a wolf that caused the damage. In 1989, farmers in the state of Minnesota lose at least 1,733 animals such as cows, calves, sheep, turkeys and dogs to wolves.

1995 U.S. Fish and Wildlife Service Agent (binoculars)


 *"Returning wolves here might seem strange, but it's important to help expand their range."*

In 1995 and 1996 wolves are reintroduced to Yellowstone National Park and central Idaho in order to speed up wolf recovery in the Northern Rocky Mountains. The wolves are captured in Canada, fitted with radio collars, then released into their new homes. The wolves are classified as "experimental nonessential," allowing wolves that kill livestock to be removed, which helps livestock owners who oppose the introduction.

The Wyoming Farm Bureau and the Sierra Club both file lawsuits against the government reintroduction plans in U.S. District Court. The Farm Bureau opposes the return of wolves; the Sierra Club wants more protections for the reintroduced wolves. A federal judge joins the two cases and declares the reintroduction illegal in December 1997. The ruling is overturned by a higher court, allowing the wolves to stay.



2001 Wolf Research Technician (flannel shirt)

 *"The wolf packs are growing as we can see, so it's time to change the management in our country."*

By 2001 there are 3,580 wolves in the lower 48 states, nearly 600 percent growth in population! Yellowstone National Park's hillsides and valleys are wide-open for viewing wolves from a distance. Now, more people can see wolves over longer periods of time in the wild. This way scientists can study wolf behavior and ecological impacts, vastly improving our understanding of the wolf's role in the ecosystem.


Because wolf numbers have grown, the U.S. Fish and Wildlife Service reorganizes wolf management in the lower 48 states. In 2003 they divide the country into three "Distinct Population Segments" (DPSs) and reclassify wolves from endangered to threatened in many areas of the United States. Wolves in the Southwestern DPS retain their endangered status.

2004 State Legislator (official-looking paper with "Wolf Bill" on it)

 *"We need a plan to deal with wolves right now. The question is what, when, where and how."*

In order for the U.S. Fish and Wildlife Service to return management of wolves to the states, each state that has wolves must prove it's ready. The states must develop a wolf management plan that specifies how many wolves are enough, where they will be allowed to live, what they will do with the wolves if they leave the designated areas, and how they will handle wolf depredation.

Future All of Us (paper with big question marks)

 *"To live and prosper wolves need wild lands, how much is left for them is in our hands."*

Eventually the U.S. Fish and Wildlife Service will remove federal protections from wolves, and the wolf's future will be determined by the states where wolves live. Humans will continue to build homes and "suburbanize" large tracts of undeveloped wild lands, and wolves will continue to expand their range and population. How will the states manage wolves to build peaceful coexistence with humans? What choices can individual citizens make that will help make coexistence possible?

Fact and Opinion

Students identify fact and opinion statements in editorial articles.

STUDENT OBJECTIVE:

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

1. Differentiate between facts and opinions.
2. Assess the impact of facts and opinions in news articles.
3. Evaluate the validity of some sources of facts and opinions.

VOCABULARY:

fact • opinion • scientific evidence • critical thinking • validate • objective • subjective

TEACHER BACKGROUND:

We have all heard that we shouldn't believe everything that we read, but how often do we really evaluate what we are reading? Knowing the difference between a fact and an opinion is essential to understanding any issue, especially one that has strong social advocacy around it. This activity challenges students to evaluate what they are reading and to separate facts from opinions.

While it seems like facts are clearly different from opinions, sometimes distinctions are blurred. Sometimes people will take scientific facts (research) and from that data, apply their opinion to what those

data mean or what might happen in the future. Other times, people only tell the facts that support their opinions and ignore facts that don't agree.

ACTIVITIES:

1. Distribute a copy of the "Fact or Opinion?" worksheet to each student without providing a definition of fact or opinion. Have students complete the worksheet.
2. Come up with a class definition of *fact* and *opinion*. If necessary, refer to the definitions provided in the glossary. Instruct students to review their answers on the worksheet and make any necessary changes. If desired, tell the students to discuss their answers and changes in small groups.
3. Read the following statement to students:

"There are 400 wolves in Michigan."

Ask if students think this statement is a fact or an opinion. Discuss why they answered as they did. Read a few more statements to continue the discussion:

"There are too many wolves in Idaho."



SECTION 4 Wildlife Management

Subjects:

reading skills, sociology



Approximate lesson time:

2 hours



Materials:

paper and pencil,

newspaper editorial articles
about wolves,

Fact and Opinion Worksheet



“One of the most misunderstood animals on this earth is the gray wolf.”

“The only efficient way to kill wolves is by hunting.”

“The wolf is an endangered species.”

4. Divide the class into groups of four students. Hand each group several newspaper or magazine articles about wolves (samples provided on pages 209–213).
5. Instruct students to make a list of as many statements of fact as they can find in their articles, and another list of opinions.

Discuss:

- Who can dispense “facts”?
- Do authors of articles cite where they find their facts?
- How can you confirm their information?
- What are the advantages of using facts in articles?
- What are the advantages of using opinions?
- Why might people use both facts and opinions in the same article?
- How do people formulate opinions?
- What are some things people do to make their opinions seem like facts?
- Are opinions untruths? Give examples.
- Which are more persuasive, facts or opinions?
- What other persuasion techniques can you find in the articles?

6. Discuss with the students the relationship between beliefs (what you hold to be true), values (deeply held beliefs that guide behavior), attitudes (feeling toward a thing), and action (behavior).

ASSESSMENT:

Have students give a presentation to the class that includes:

- a. summary of the group’s article(s)
- b. evaluation of the facts in the article
- c. evaluation of how effective the article was in convincing readers that its view is correct.

EXTENSION:

Direct students to research supporting data for some of the fact statements they find in their articles.

Worksheet Answer Key:

1. Fact
2. Opinion
3. Fact
4. Opinion
5. Fact
6. Opinion
7. Opinion
8. Fact
9. Opinion
10. Fact
11. Opinion
12. Fact
13. Fact
14. Fact
15. Opinion



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National Science Education Standards

Unifying Concepts and Processes

*Evidence, models, and
explanation*

Science as Inquiry

*Abilities necessary to do
scientific inquiry*

*Understanding about
scientific inquiry*

Name _____



Fact and Opinion Worksheet

Directions:

Read each statement. Write the word *fact* on the line if the statement is something that can be proved or disproved using concrete evidence (e.g., the sky is blue). Write the word *opinion* on the line if you think that the statement is a belief or position statement (e.g., the sky is beautiful).

1. _____ Gray wolves are carnivores who prey on deer, moose and other animals.
2. _____ Gray wolves should be allowed to spread all across Minnesota so they can control our deer population.
3. _____ Gray wolf pups are born blind in the spring and are raised by the entire pack (family).
4. _____ Wolf hunting should be legal in places where scientists tell us there are plenty of wolves.
5. _____ Adult gray wolves are generally larger than red wolves and coyotes.
6. _____ Gray wolves in the United States are a threat to small children.
7. _____ Wolves are ferocious and mean.
8. _____ Wolves are social hunters with a pack structure based on a dominance hierarchy.
9. _____ Minnesota has plenty of gray wolves right now.
10. _____ Leading wolf biologists say that Minnesota has enough wolves to maintain a wolf population even if they are taken off the endangered species list.
11. _____ People should be allowed to shoot a wolf if it enters their property.
12. _____ Wolves often kill sick, old, young or injured prey animals.
13. _____ Gray wolves are generally shy around humans and will usually run away when they see, hear or smell a human.
14. _____ A wolf could kill a human.
15. _____ Farmers should be reimbursed if a wolf kills their livestock.



Wolf Management Scenarios

Students assemble social and biological factors to predict and address management issues.

LESSON OBJECTIVES:

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

1. Explain the role that politics and economics play in wildlife management decision-making.
2. Deduce problems that may arise in management planning.

VOCABULARY:

management • endangered species
• habitat • population

TEACHER BACKGROUND:

The United States has had a series of decisions to make about wolves and their management over the past two centuries. These decisions range from bounty hunting and depredation issues to protection and reintroduction issues. Complex as all of those decisions have been, they have all been within the context of a nation that has a relatively stable economy, a strong government and sufficient natural resources to support a wolf population.

Other countries in the world are making decisions about protection or eradication of wolves within very different contexts. Every country has unique economic and political circumstances that influence

policies toward wildlife. For example, in Poland, the government and economic stability have wavered in the past several decades. Their policies toward wolves have literally flip-flopped several times between eradication and restoration. The purpose of this activity is to help students realize that a wide variety of national-level factors influence the social and political climate for wolves.

ACTIVITIES:

1. Prepare one full set of scenario cards (it may be helpful to copy each category onto a different color paper). Divide the class into groups of four to five students. Randomly distribute one card from each category to each group of students. Distribute one National Map to each group of students.
2. Put the following instructions up on the chalkboard or overhead projector:
 - Name your country.
 - Make sense of your scenario; what's the situation?
 - List 10 problems you see occurring or you think will soon occur.
 - How will you, as the country's government, solve these problems?



SECTION 4 Wildlife Management

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Subjects:

*geography, government,
biology, sociology, economics*



Approximate lesson time:

1 hour



Materials:

*scenario cards,
copies of "National Maps"*





National Science Education Standards

Unifying Concepts and Processes

Evidence, models, and explanation

Change, constancy, and measurement

Evolution and equilibrium

Science as Inquiry

Abilities necessary to do scientific inquiry

Understanding about scientific inquiry

Life Science (5–8)

Regulation and behavior

Population and ecosystems

Life Science (9–12)

Interdependence of organisms

Behavior of organisms

Science in Personal and Social Perspectives (5–8)

Populations, resources, and environments

Risks and benefits

For more correlations, please see Appendix IV.

- What plans do you recommend for managing wolves in your country?
3. Instruct the students to survey their scenario cards, discuss their country's situation, and come up with a wolf management plan for their nation. Remind them to write down their list of problems and ideas for solutions to turn in later.

Example: Let's say a group gets cards that describe a desertlike country where there used to be 100 wolves and today there are about 1,000 wolves. The wolves are eating mainly rodents, wild pigs and rabbits. There are about 10 humans per square mile, and the people have always had a close cultural bond with wolves. The group could interpret that there is a huge influx of wolves possibly due to an overabundance of prey.

If that country also depends on small-animal farming for its main industry, the wolves might also try to catch the domestic animals. The group could recommend an investigation into the prey population size to learn whether they should anticipate depredation. If the group also got the card "very high unemployment," they should think about the main industry (small-animal farming) and make extrapolations about the society and economy based on that. What would a stable, desert, farming society be like? How great can the farming be in a desert? And so on.

4. Each group should appoint a spokesperson to report their situation and decisions to the class.

Discussion Questions:

1. What role do economy and government play in decisions about wildlife management?
2. In what ways did your group insert your own values into your decisions and plans? Could this also happen on a national level?
3. How would your group's interpretations and decisions be different if just one of your parameters had been different? Which parameters matter the most?
4. What would happen if all of these countries were located next door to each other? Would the management plans have clashed in any way?
5. How would this activity have been different if the countries were larger with more diverse habitats and natural resources?
6. What does this activity tell you about the wolf's situation around the world?

ASSESSMENT:

The small-group presentations will reflect student comprehension of the complexity of wolf management. Groups should turn in their list of 10 anticipated problems as well as their ideas for solving the problems.

EXTENSIONS:

Check the International Wolf Center's Web site for updates on wolf populations around the world. Are there any countries whose situation parallels any group's scenario? How are these other countries handling their needs and problems associated with wolves?



MASTER TABLE OF ALL SCENARIO CARDS

Habitat	Historical Wolf Population	Present Wolf Population	Primary Wolf Food Source	History with Wolves	Human Density	Pressing Political Issues	Major Industry
desert	0 wolves	~ 1,000 wolves	rodents, wild pigs, rabbits	close cultural bond with wolves	average of 10,000 humans per square mile	widespread political corruption	small-animal farming
northern boreal forest	~ 750 wolves	5–10 wolves	human garbage	centuries of competition between wolves and humans	average of 100 humans per square mile	extreme housing shortage	technology
savanna/ scrub woods	~ 2,000 wolves	10,000 wolves	large, wild ungulates	ambivalence toward wolves	average of 1 human per square mile	very high unemployment	manufacturing (e.g., textiles)
mixed hardwood forest	10,000 wolves	0 wolves	livestock	historical reverence for wolves	average of 1,000 humans per square mile	developing country, unstable government	crop farming
northern mountains	~ 100 wolves	~ 100 wolves	small deer	cultural demonization of wolves	average of 10 humans per square mile	extreme environmental degradation	large-animal ranching

HABITAT

HABITAT



Your country's main wildlife habitat is desert. You have few trees, sandy soil, hot daytime temperatures, cool nighttime temperatures, minimal standing water.

HABITAT



Your country's main wildlife habitat is northern boreal forest. You have thick spruce/fir forests, short growing season, cool temperatures, low plant diversity.

HABITAT



Your country's main wildlife habitat is savannah/scrub woods. You have wide open spaces with grasses and some short trees or shrubs.

HABITAT

Your country's main wildlife habitat is mixed hardwood forest. You have deciduous trees such as oaks and maples.



HABITAT

Your country's main wildlife habitat is northern mountains. You have high

altitudes, short evergreen trees or aspen meadows, snow year-round at higher elevations.



HISTORICAL WOLF POPULATION

HISTORICAL WOLF POPULATION



Historically, your country never had wolves.

HISTORICAL WOLF POPULATION



Historically, your country had about 750 wolves total.

HISTORICAL WOLF POPULATION



Historically, your country had about 2,000 wolves total.

HISTORICAL WOLF POPULATION



Historically, your country had about 100 wolves total.

HISTORICAL WOLF POPULATION



Historically, your country had about 10,000 wolves total.

PRESENT WOLF POPULATION

PRESENT WOLF POPULATION



Today, your country has no wolves.

PRESENT WOLF POPULATION



Today, your country has a total of about 1,000 wolves.

PRESENT WOLF POPULATION



Today, your country has a total of about 5–10 wolves.

PRESENT WOLF POPULATION



Today, your country has a total of about 10,000 wolves.

PRESENT WOLF POPULATION



Today, your country has a total of about 100 wolves.



PRIMARY FOOD SOURCE FOR WOLVES

PRIMARY FOOD SOURCE FOR WOLVES



In your country, wolves generally eat rodents, wild pigs and rabbits.

PRIMARY FOOD SOURCE FOR WOLVES



In your country, wolves generally eat human garbage.

PRIMARY FOOD SOURCE FOR WOLVES



In your country, wolves generally eat deer, elk and moose.

PRIMARY FOOD SOURCE FOR WOLVES



In your country, wolves generally eat livestock.

PRIMARY FOOD SOURCE FOR WOLVES



In your country, wolves generally eat small deer.

HISTORY WITH WOLVES

HISTORY WITH WOLVES



Historically, people in your country have felt a close cultural bond with wolves.

HISTORY WITH WOLVES



Historically, there have been centuries of competition between wolves and humans in your country.

HISTORY WITH WOLVES



The people of your country are ambivalent toward wolves.

HISTORY WITH WOLVES



Historically, people in your country have had a strong reverence for wolves.

HISTORY WITH WOLVES



Historically, the people of your country have felt a strong cultural demonization of wolves.

HUMAN DENSITY

HUMAN DENSITY

In your country, you have an average of 10,000 humans per square mile.



HUMAN DENSITY

In your country, you have an average of 100 humans per square mile.



HUMAN DENSITY

In your country, you have an average of 1 human per square mile.



HUMAN DENSITY

In your country, you have an average of 1,000 humans per square mile.



HUMAN DENSITY

In your country, you have an average of 10 humans per square mile.



PRESSING POLITICAL ISSUES

PRESSING POLITICAL ISSUES

Your country has widespread political corruption.



PRESSING POLITICAL ISSUES

You have a developing country with an unstable government.



PRESSING POLITICAL ISSUES

Your country is experiencing an extreme housing shortage.



PRESSING POLITICAL ISSUES

Your country has very high rates of unemployment.



PRESSING POLITICAL ISSUES

Your country has extreme environmental degradation.



MAJOR INDUSTRY

MAJOR INDUSTRY



The major industry in your country is small-animal farming.

MAJOR INDUSTRY



The major industry in your country is technology.

MAJOR INDUSTRY



The major industry in your country is manufacturing (e.g., textiles).

MAJOR INDUSTRY



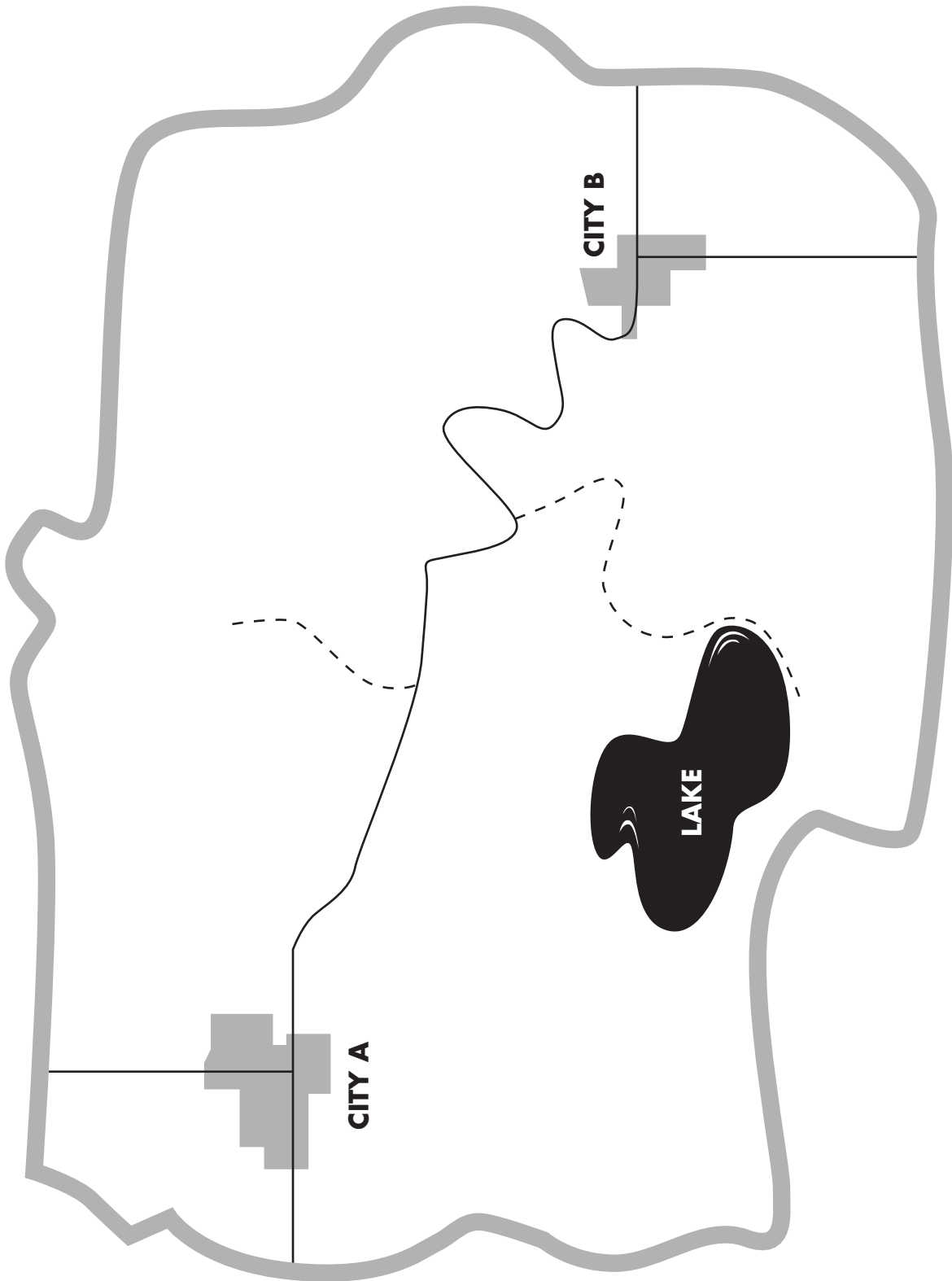
The major industry in your country is crop farming.

MAJOR INDUSTRY



The major industry in your country is large-animal ranching.

NATIONAL MAP



Imaginary Wolf Recovery

Students plan wolf recovery in a hypothetical nation.

STUDENT OBJECTIVES:

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

1. Explain the advantages and disadvantages of wolf reintroduction and recolonization.
2. Identify successful strategies for wolf restoration.
3. Predict the long-term impact of wolf restoration in a hypothetical situation.

VOCABULARY:

restoration • reintroduction • recolonization • Endangered Species Act • recovery • viable wolf population • livestock • translocate

TEACHER BACKGROUND:

When wolves were placed on the endangered species list, the U.S. Fish and Wildlife Service outlined specific objectives and strategies that would improve the wolf's situation so it could be taken off the list. The document they prepared is known as a "Recovery Plan." The wolf recovery planning team identified specific population goals that they believed would constitute viable wolf populations. Once the planning team knew what

outcomes they would pursue, they had to decide what they would do to achieve the goals. There are two options for recovering wolves: recolonization and reintroduction.

Recolonization is essentially allowing nature to take its course through an existing core population of wolves. Since wolves have a high reproductive potential and are naturally highly mobile, wolves allowed to produce offspring and wander into new territory on their own can repopulate an area without human intervention. This recovery strategy was used in the western Great Lakes region, where wolves in northern Minnesota and Ontario expanded their range into central Minnesota, Wisconsin and Upper Michigan.

Reintroduction involves intense human effort to translocate wolves into a new, suitable habitat. The wolves may come from an existing healthy population or from captive breeding stock. It involves complex governmental processes and often receives a great deal of scrutiny from politicians, the public and the media. The reintroduction of wolves to Yellowstone National Park and central Idaho is a useful example of this strategy.



SECTION 4 Wildlife Management

Subjects:

biology, geography, sociology



Approximate lesson time:

2 hours



Materials:

*Imaginary Wolf
Recovery Group Worksheet,*

*Imaginary Wolf
Recovery Map*



Biology tells us that wolves can live anywhere they have enough food and human tolerance. Both methods of arriving at wolf “recovery” can be controversial and complicated, and both are expensive to prepare for and monitor. Public education and support are key to the success of wolf recovery, and there is usually a wide variety of opinion holders wanting to influence the process.

This activity challenges students to analyze a recovery situation and make strategic decisions.

On the Imaginary Wolf Recovery Map, you can assume that deer, moose and other wolf prey are found all across the map. Wild food sources decrease near urban areas. The land around Ranch City is western range land much like the Dakotas, Nebraska and Colorado. The land around Farm City supports crop and animal farming similar to Iowa. The parks and forests are heavily wooded and have abundant wildlife species. The mountains west of Central State are much like the Rocky Mountains. The Triton Ocean is much like Lake Superior. Students may assume that the closest viable wolf population is 1,000 miles to the north.

ACTIVITIES:

1. Divide the class into groups of three to four and give each group an Imaginary Wolf Recovery Map. Each group should look over their map. Since the wolf recovery plan requires that wolves be recovered in some way in this

region, the students’ job is to determine where and how to restore this wolf population to 300 wolves.

2. Each group should answer the following questions (see Imaginary Wolf Recovery Group Worksheet):
 - Will you choose reintroduction or recolonization to recover wolves?
 - If you choose reintroduction, how many wolves will be introduced? Where will the wolves come from (captive breeding or from other regions)?
 - If you choose recolonization, how long will you wait for wolves to come? What will you do to prepare for their arrival?
 - Where can the wolf population spread from the recovery area?
 - Do you anticipate problems with livestock? How will these be handled?
 - Will wolves be protected? How?
 - How will the rules of wolf management change once the population has reached the recovery goal?
 - Who will be allowed to shoot wolves? When and where can wolves be shot?
 - Where should wolves not be allowed to live? How will you keep them away?
 - How will we keep wolves out of conflicts with humans?
 - How will the presence of wolves affect the rest of the plants and animals here?



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National Science Education Standards

Unifying Concepts and Processes

Systems, order, and organization

Evidence, models, and explanation

Change, constancy, and measurement

Evolution and equilibrium

Science as Inquiry

Abilities necessary to do scientific inquiry

Understanding about scientific inquiry

Life Science (5–8)

Regulation and behavior

Population and ecosystems

Diversity and adaptations of organisms

For more correlations, please see Appendix IV.

3. Once each group has developed a plan for recovering wolves, a spokesperson from each group will present their plan to the class. They will explain why they made the choices they made, and answer questions from the class.

Optional: Tell each group to meet with another group to see if they can combine plans. Then have those groups meet with other groups, until the whole class agrees on one plan.

Discussion:

- Which questions were hardest to answer?
- What additional information did your group need?
- What are the benefits of reintroduction? Of recolonization?
- Was it hard to come up with a plan that everyone can agree with?
- How did you resolve conflict?

ASSESSMENT:

Ask students to write answers to the following questions:

1. What are three problems with recovering wolves in an area in which they are not currently living?
2. How can recovery plans address these problems?
3. Would you like wolves living in the woods around your house? Why or why not?

EXTENSIONS:

Instruct students to research the wolf reintroduction programs in the Northern Rocky Mountains and in Arizona and New Mexico. How are these programs similar to or different from the plans the class developed?

Nancy Gibson



Name _____



Imaginary Wolf Recovery Group Worksheet

Each group should answer the following questions:

1. Will you choose reintroduction or recolonization to recover wolves?
2. If you choose reintroduction, how many wolves will be introduced? Where will the wolves come from (captive breeding or from other regions)?
3. If you choose recolonization, how long will you wait for wolves to come? What will you do to prepare for their arrival?
4. Where can the wolf population spread from the recovery area?
5. Do you anticipate problems with livestock? How will these be handled?
6. Will wolves be protected? How?
7. How will the rules of wolf management change once the population has reached the recovery goal?
8. Who will be allowed to shoot wolves? When and where can wolves be shot?
9. Where should wolves not be allowed to live? How will you keep them away?
10. How will you keep wolves out of conflicts with humans?
11. How will the presence of wolves affect the rest of the plants and animals here?

WOLF RECOVERY AREA

