GETTING TO KNOW THE WOLF

A Teacher's Guide to the "Wolf-Pac" Materials

A School Outreach Project of the National Park Service

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United States Department of the Interior

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APR - 6 1989

Dear Educator:

This educational package, Wolf Pac!, is an attempt to put basic factual information about wolves, wolf behavior, and wolf ecology into the hands of educators, like yourself, so that young people can learn that the wolf of legend bears little resemblance to the wolf in the wild.

Perhaps no animal in recent memory has generated as much controversy as the wolf. Long feared and maligned by people, wolves have only recently been appreciated on a more positive level. Since 1973, wolves have been listed as "endangered" under the provisions of the Endangered Species Act in the lower 48 states (except in Minnesota where they have been classified as "threatened" since March 9, 1978).

As required by the Endangered Species Act, the U.S. Fish & Wildlife Service has prepared a recovery plan for the northern Rocky Mountains that calls for returning the wolf to two national parks, Glacier and Yellowstone. On their own, wolves have crossed the U.S.-Canadian border and have raised pups inside the boundaries of Glacier National Park. However, most experts agree that for the wolf to return to Yellowstone, it will require human intervention.

The National Park Service supports the objectives of the Wolf Recovery Plan that call for restoring the wolf to Yellowstone. We support that plan, not only because the law requires us to do so, but because the wolf has a rightful place as part of the Yellowstone ecosystem; it is not there today only because people hunted them to extinction.

Inevitably, talk of bringing the wolf back to areas where it has been eradicated leads to controversy and emotion-laden arguments, often without factual basis. The wolf suffers much more from its reputation than it does from its actual behavior.

The materials contained in Wolf Pac! include both background information as well as lesson plans and activities suitable for both the classroom and the home. We hope that as teachers, educators, and conservationists, you will find these materials informative and helpful. We welcome your comments.

For more information on wolves and wolf resources, we suggest you contact the:

National Parks and Conservation Association
1015 Thirty-First Street, NW
Washington, DC 20007

Good luck with Wolf Pac!.

Sincerely,

William Penn Mott, Jr.
Director, National Park Service

International Standard Book Number 0-911797-69-6

Printed in the United States of America

Publishing Consultant: Roberts Rinehart, Inc. Publishers

ACKNOWLEDGEMENTS

Any endeavor of this magnitude is by its nature a team effort. Many different people were involved with the creation of *Wolf Pac!*, and they need to be recognized. Foremost among these is former National Park Service Director William Penn Mott who convened the NPS Task Force for Education on Wolves from which *Wolf Pac!* had its genesis. Director Mott's vision and his willingness to promote an educational effort of this magnitude aren't often seen in government.

All the members of the Task Force for Education on Wolves contributed to *Wolf Pac!* particularly Larry Wiese, Lorraine Mintzmyer, and Bill Sontag who kept the program moving when it seemed, at times, that it might never happen.

Others who contributed to the project include Yellowstone National Park staff members Bob Barbee, George Robinson, John Varley, Norm Bishop, Sue Mills, Jack de Golia, Ginny Cowan, Linda Young, and Pat Chansley; Ellen Meloy whose talent as an illustrator includes the ability to guess just what I really wanted as opposed to what I told her; Sandi Robinson, for advice and moral support; Valerie Gates Harbaugh, Texize Corporation, the Denver Museum of Natural History, the Zion Natural History Association, the Great Smokies Natural History Association, the Cabrillo Historical Association, the Southwest Parks & Monuments Association, and the Jefferson National Expansion Historical Association for their financial support; Rick Rinehart of Roberts Rinehart Publishers, Inc. for his advice and patience; Dr. Cheryl Charles and the Project Wild people for their inspiration and cooperation; Kevin Montano of Wildlife Education, Inc. and Jim Magee of Parker Printing; Ruth Norris, Ida Connor, and Chris Wille of the National Audubon Society; Whitney Tilt of the United States Fish & Wildlife Foundation; the teachers and school children – those who helped test the materials and those who will use them.

HOW TO GET MORE

The National Park Service has produced other educational materials in connection with *Wolf Pac!*

A 34-page color booklet on the wolf is available from the Zion Natural History Association (Springdale, UT 84767) for $4.95. This booklet has been condensed from the book Twilight Hunters published by Northland Press. A 25-minute video, "A Howling in Our National Parks," has been produced and is available from the Zion Natural History Association and the Yellowstone Association (P.O. Box 117, Yellowstone National Park, WY 82190) for $24.95. Narrated by Robert Redford, the video looks at the natural history of the wolf, its place in human culture, and the current controversy over plans to restore the wolf to areas where it has been eliminated.

Additional copies of Wolves by Wexo, Looking at the Wolf by Bruce Thompson of the Teton Science School, and Wolf Recovery in the Northern Rocky Mountains by Tilt, et. al., may be ordered from the Yellowstone Association. A four-color poster of the wolf is also available from the Zion Natural History Association.

The Wonder of Wolves by Sandi Robinson can be purchased from the Museum Shop, Denver Museum of Natural History (2001 Colorado Boulevard, Denver, CO 80205).

WELCOME TO WOLF PAC!

Wolves were once common across much of North America, Europe, and Asia. As predators of large mammals and having a highly complex social behavior, wolves share many similarities with humans. These similarities may have led to early competition with people; first with humans as hunters where wolves competed directly for food, and later with agricultural humans where the competition was for space. This conflict continues even today.

Competition led to fear, misunderstanding, and persecution of the wolf. As our technology has enabled us to hunt wolves efficiently, *Canis lupus* has disappeared from much of its original range.

The wolf has become so rare that it survives mostly in areas where people are few– Canada, Alaska, and the wilder regions of the United States, Europe, and the Soviet Union. Today, few people have ever seen wolves in the wild, and so our misunderstanding of the wolf and its nature continues.

Wolf Pac! is an attempt to provide teachers and other science educators with information, activities, and resources they can use to help students (and themselves) learn about the ecology, life history, and the folklore of wolves.

HOW TO USE THIS TEACHER'S GUIDE TO WOLF ACTIVITIES

The enclosed materials are comprised of three major components. The first is a series of reprinted booklets about the wolf, each targeted at a different age group. *Wolves* (Wexo) is aimed at the younger audience of children in the K-4 grade levels. *Looking at the Wolf* (Teton Science School) is geared toward students in grades 5-8, while *Wolf Recovery in the Northern Rocky Mountains* (Tilt & Eno) is a discussion of current issues surrounding the wolf and is suitable primarily for grades 9-12. Besides providing much valuable background information, these booklets list many references for additional study.

The second component of the package is a teacher's guide titled *Getting to Know the Wolf.* The activities in this guide are broken down into the same three age groups. In one or two instances, you'll notice that an activity is recommended for a broader age range than those given above. The activities are further subdivided into four major concept or theme groups: Wolf/Canid Recognition, Wolf Behavior, Wolf Ecology, and Wolves and Humans. While it is not necessary to use the activities in any particular order, the concept groups listed here do follow a rather natural progression.

These activities are designed primarily for classroom teachers and were planned with the idea that they would be used in a classroom setting. This does not preclude their use by professional naturalists, interpreters, nature center employees, scout leaders, or anyone who works with children.

The final component of *Wolf Pac!* is a combination storybook/activity guide, *The Wonder of Wolves—Story and Activities.* Sponsored by the Denver Museum of Natural History and written by noted children's author Sandra Chisholm Robinson, this illustrated wolf booklet is designed as a family activity for children and their parents to do together.

It is important that educators who use these activities do <u>their</u> homework. References are cited frequently in the activities, and it is hoped that teachers will take time to familiarize themselves with this material before actually conducting the activities with their students. A tremendous amount has been written about wolves, and the teacher should be prepared to, at least briefly, introduce themselves to some of this material.

Words listed under *Key Vocabulary* are mostly technical terms used by biologists and scientists. Students should look up these words as part of their research.

The appendices provided in the back of *Getting to Know the Wolf* include materials to be copied for use with the activities, additional background information, and a list of other resources on wolves.

Getting to Know the Wolf was also designed to be used as part of an existing environmental education curriculum about Yellowstone National Park. Called *Expedition: Yellowstone!*, this 260-page workbook of activities is targeted to school children in grades 4-6. Teachers wanting more information about *Expedition: Yellowstone!* can obtain it by writing to the address listed below.

Almost everyone who talks about wolves has strong opinions about them. If wolves are anything at all, they are controversial. It is hoped that, as an educator, you are aware of possible biases that you might have toward wolves and take these into consideration as you prepare your lessons and teaching units for your classes. Wolves are fascinating animals, and they have a lot they can teach us, not only about their lives, but also about ourselves.

Preparing these activities has been a learning experience for me as well, one that I hope does not end with this publication. If you have ideas for wolf activities that could be added to those assembled here, I would sure like to hear from you. If you have comments or suggestions on improving the existing activities, don't hesitate to contact me.

Good luck, and happy howling!

Joseph W. Zarki
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P.O. Box 168
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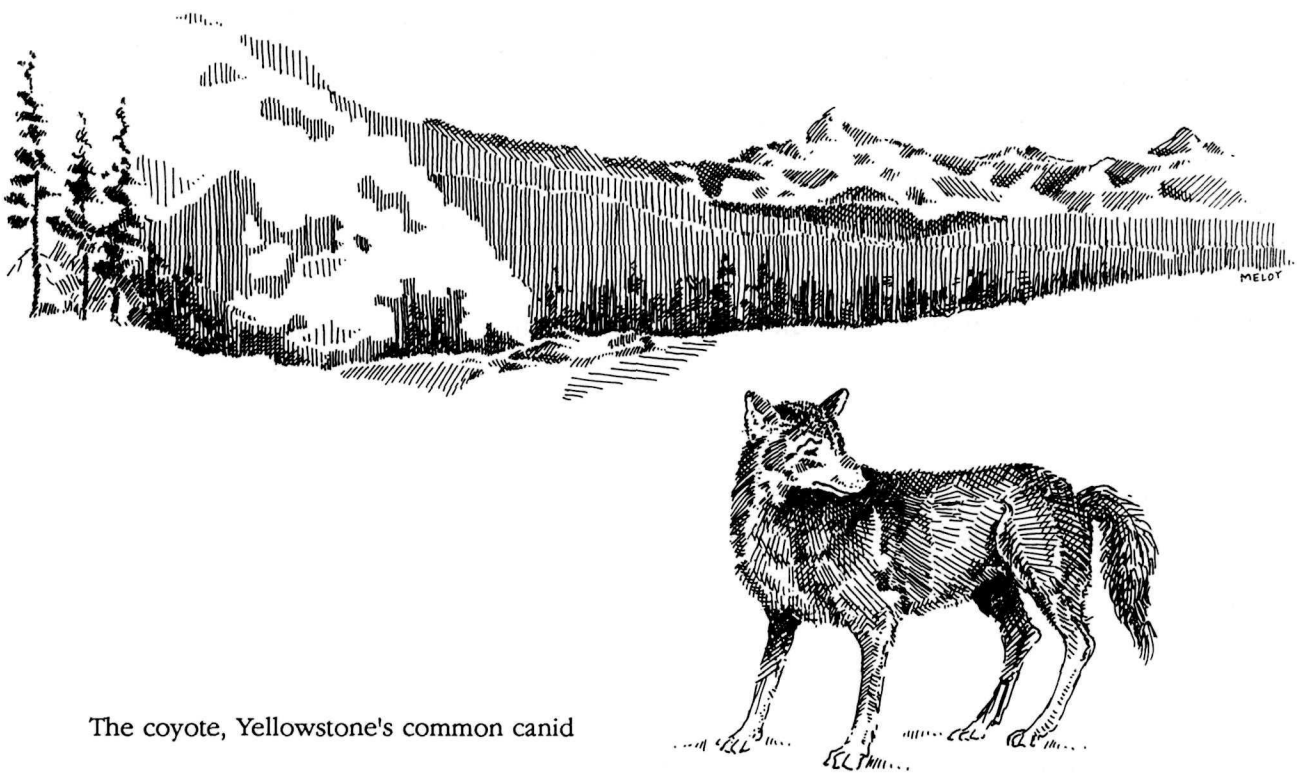
WY 82190



The coyote, Yellowstone's common canid

ACTIVITY: I-1

THEME GROUP: Wolf/Canid Recognition

TITLE: Calling All Canids!

MAIN SUBJECT: Science

OBJECTIVE: Students identify and categorize different members of the dog family.

METHOD: Using a supplied chart, students learn to identify members of the canid, or dog, family according to size, color, and general shape and appearance.

BACKGROUND: People are often very confused when they try to distinguish among wolves, coyotes, and dogs. In Yellowstone, park naturalists take many "wolf" sightings from park visitors each year. Nearly always they turn out to be sightings of coyotes as Yellowstone is not known to have a resident wolf population. Wolves and coyotes are often blamed for the depredations of feral dogs that roam in packs and kill livestock. While most members of the dog family are similar in shape, there are differences in size, color, and behavior that make separating them a fairly easy task...with a little patience.

MATERIALS: Canid chart in back of curriculum, field guide to mammals, other books on dogs available in your library, films such as *Song Dog* or *Wolf Pack;* a copy of Burt and Grossen-heider's *Field Guide to the Mammals* is also needed.

PROCEDURE: Use the chart of the dog family found in the appendix. Have your students study the chart in class and look up information about size, weight, shape, and appearance of each species. Read the material with them if necessary. Have the children search for pictures and articles about wolves, coyotes, foxes, and other wild canids in magazines. Make a collage or exhibit on your classroom bulletin board. Divide the students into groups and have them learn about a particular member of the canid family.

EXTENSION: Invite other classes into your classroom to view the exhibit and have the various groups make a presentation about their particular wild dog.

EVALUATION: Use the canid chart in the appendix to test the students about their knowledge in recognizing the different members of the dog family. You could divide the class into teams and make a game of it.

Grades: K-4
Subjects: Science
Duration: 2-3 class periods, 3-5 days out of class preparation
Group Size: any
Setting: classroom
Key Vocabulary: canid

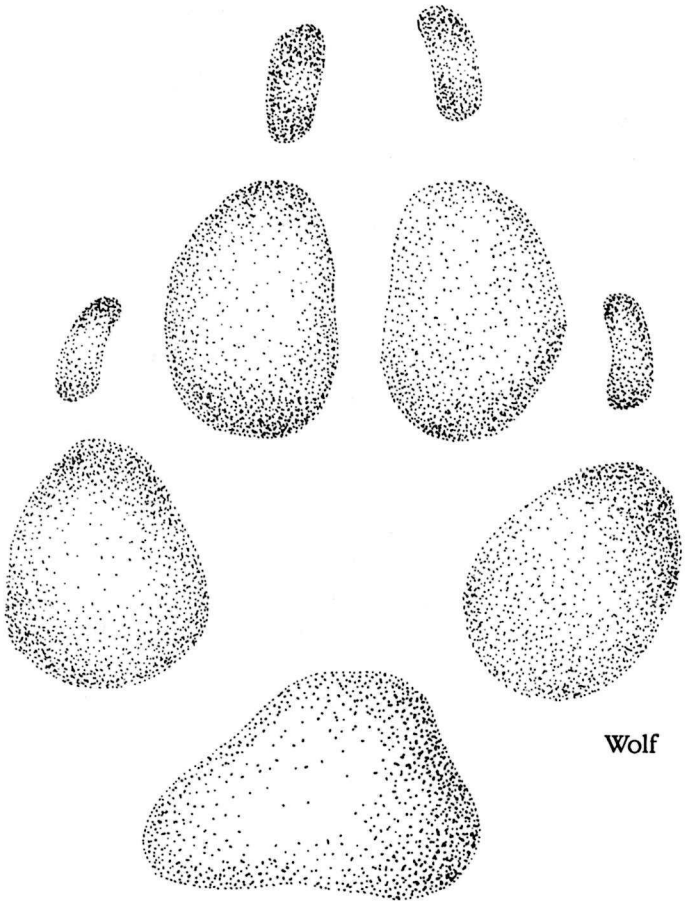
ACTIVITY: I-2

THEME GROUP: Wolf/Canid Recognition

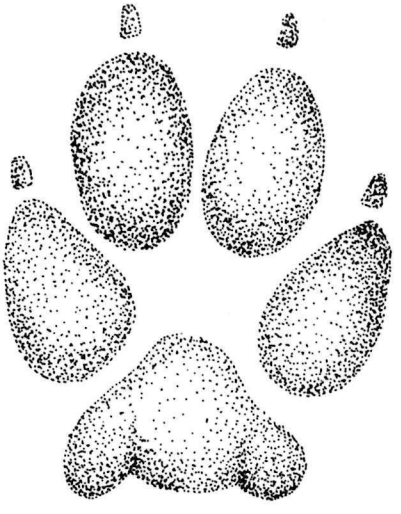
TITLE: Keeping Track of Wolves

MAIN SUBJECT: Science

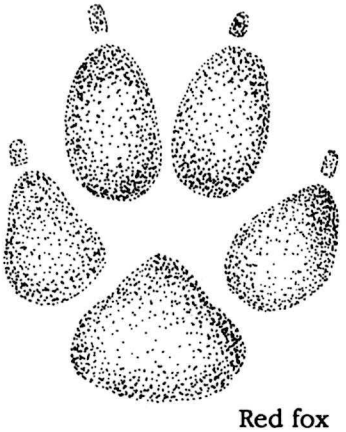
OBJECTIVE: Students demonstrate the ability to distinguish between wolves, coyotes, and domestic dogs.



Wolf



Coyote



Red fox

METHOD: Students use tracings, silhouettes, and plaster casts to compare and identify tracks of wolves, coyotes, and various breeds of domestic dogs.

BACKGROUND: People are often very confused when they try to distinguish among wolves, coyotes, and dogs. In Yellowstone, park naturalists take many "wolf" sightings from park visitors each year. Nearly always they turn out to be sightings of coyotes as Yellowstone is not known to have a resident wolf population. Wolves and coyotes are sometimes blamed for the depredations of feral dogs that roam in packs and kill livestock. Often the identification of these animals is based on their tracks– a tricky business at best. This activity gives the students a chance to identify and compare wolves, coyotes, and dogs based on the size and shape of their tracks.

MATERIALS: Wolf, coyote, and dog tracks in the form of silhouettes or plaster casts. A good field guide to mammals (Burt & Grossenheider, *A Field Guide to Mammals* is widely available in book stores and libraries) or animal tracks is also necessary. Wolf and coyote tracks are provided in the appendix of this curriculum. A supply of construction paper.

PROCEDURE: Take a survey of your students to determine how many have dogs as pets and how many different breeds are represented. Have your students take measurements of their dogs' tracks. They should get tracings or plaster casts of both front and hind feet of their dogs. Tell them to be sure that their tracks include all the pads and claw marks. Have them measure the length and width of the tracks with a ruler and record this information on the side. Students who do not have dogs could either work with other students or measure a neighbor's dog (make sure they get permission from the owners before they do this!). While they should make note of the breed of the dog they measure, this information should not be recorded on the tracks themselves. Post all the tracks somewhere in the classroom as an exhibit and have the students compare the wolf and coyote tracks with those of the various domestic dogs.

EXTENSION: Have your students also measure the weight and stride length of their pet dogs and compare those with the same measurements for wolves and coyotes. See Jim Halfpenny's *Mammal Tracking in Western America* for details on measuring stride length.

EVALUATION: Break the class up into two teams and have each team try to guess which animals the different tracks belong to. A team could be awarded one point for each right answer.

Grades: 4-8
Subjects: Science
Duration: 1-2 classroom periods, perhaps 3-5 days of outside class preparation
Group Size: any
Setting: classroom
Key Vocabulary: domestic, feral

ACTIVITY: I-3

THEME GROUP: Wolf/Canid Recognition

TITLE: Key to the Canids

MAIN SUBJECT: Biology

OBJECTIVE: Students will correctly identify members of the canid family and also be able to separate wolves from coyotes and domestic dogs.

METHOD: Students create a dichotomous key of the canid family based on teacher supplied information.

BACKGROUND: Dichotomous keys have long been used by biologists and naturalists as a way of

correctly identifying plants and animals. Quite simply, a dichotomous key is a list of characteristics for the particular plant or animal you are trying to identify. At each level of the key you have two choices that are based on physical characteristics. They start with very general characteristics and get more specific as you delve further into the different levels of the key. As you make a choice between characteristics, you are given instructions as to which level of the key you are to look at next. Many keys use technical scientific nomenclature which limits their use to people who are familiar with these terms. Simple dichotomous keys can be used by practically anyone.

MATERIALS: A sample canid key is supplied in Appendix B for reference; a copy of Burt & Grossenheider's *Field Guide to the Mammals* is also needed. This can be obtained at almost any library or bookstore.

PROCEDURE: Take some time to explain to the students what a dichotomous key is and how it is put together and used. It might be helpful to have an example of a key to your local flora. These can usually be found in libraries although they are sometimes rather technical. Break the students into small work groups and tell them that their assignment is to design a key for the canid family. You may want to take a few moments at this point to talk about canids (dog-like animals) and how they are distinguished from other animals such as cats and bears. This is not likely to be something that the students will be able to complete in one class period so you should decide beforehand whether this will be an in-class assignment or one that will be done as homework.

EXTENSION: 1) Have students research and design an evolutionary tree for the canid family showing the dog family's close relations as well as where in the past the dogs diverged from their relatives to become modern canids. 2) Have students research and report on the ancestry of the domestic dog *Canis familiaris.*

EVALUATION: Students could be evaluated on the completeness of their work as well as their ability to use a dichotomous key correctly.

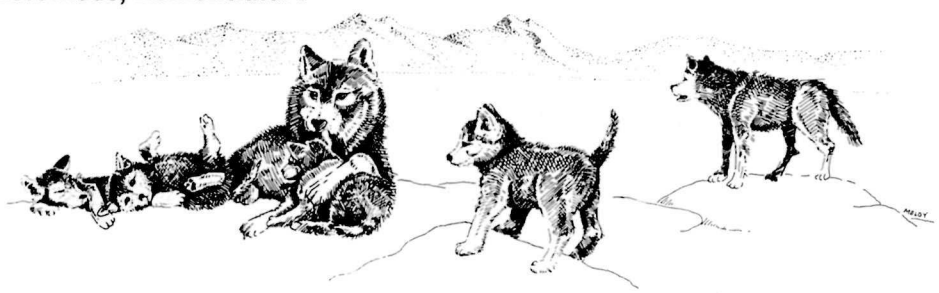
Grades: 9-12
Subjects: Biology
Duration: 1-2 class periods for discussion, 3-5 hours of preparation
Group Size: any
Setting: classroom, outdoor school or environmental education center
Key Vocabulary: canid family, dichotomous, nomenclature

ACTIVITY: II-1

THEME GROUP: Wolf Behavior

TITLE: Pack It Up

MAIN SUBJECT: Science/Biology



OBJECTIVE: Students will be able to explain and discuss the concept of the wolf pack and its underlying social structure.

METHOD: Students will form their own "wolf packs" complete with a dominance hierarchy based on teacher provided criteria.

BACKGROUND: Wolves are social animals that associate in family units called packs. The wolf pack generally consists of a mated pair and their offspring. While packs range in size from two or three to as many as 20 animals, most wolf packs number from 5-8 animals in size. Pack members are arranged in a *dominance hierarchy* with the dominant, or alpha, male and female at the top and other pack members arranged in order below them. Each sex has its own hierarchy. The

bonds between individual pack members are very strong. The strong bonding and the pack hierarchy promote harmony within the pack and lead to a high degree of cooperation among pack members.

MATERIALS: Badges or nametags showing each student's position or role within their pack.

PROCEDURE: Begin by discussing with your class the concept of a wolf pack. Pose questions to the class such as "What is a wolf pack? How are they organized? Why do wolves have them?" Introduce the concept of dominance hierarchy, or pecking order. Ask the students if they have seen any examples of this among their pets or farm animals. Divide your students into groups which will be their "packs." Possible ways packs could be organized might include age, size, grades, alphabetical order by last, first, or middle names, or any other way you can think of. At a given signal from you, the students will mill around among themselves sorting each other out according to the given criteria. Once the pack structure has been determined, have the students record or otherwise remember their position within the pack for each of the criteria you have specified. As you do other wolf activities in this unit, keep switching the pack pecking orders so that different students will get opportunity to be dominant or submissive.

EXTENSION: Ask the students for ideas as to how they would organize their own packs. Ask them if they notice any parallels in human behavior. Do they belong to a pack of their own (clique, club, team, or other social group)? How do wolves change their position within their pack? How do people change their status?

EVALUATION: None really needed.

Grades: K-6
Subjects: Science/Social Science
Duration: 20-30 minutes
Group Size: Any
Setting: Classroom, camp, park or outdoor center, scout group, etc.
Key Vocabulary: alpha male and female, dominance hierarchy, pecking order, social bond.

ACTIVITY: II-2

THEME GROUP: Wolf Behavior

TITLE: What's In a Face?

MAIN SUBJECT: Science/Biology

OBJECTIVE: Students will be able to identify different wolf postures and discuss their significance in terms of how wolves communicate with each other.

METHOD: Students use flash cards of wolf faces and postures to understand how wolves communicate with each other.

BACKGROUND: Wolves are masters at the subtle art of non-verbal communication. Nearly every part of a wolf's body– face, ears, tail, back neck, eyes, etc.– is used to communicate with other members of a wolf pack. This communication through body language is used to establish and maintain the social structure of the pack. Each member thus knows their place in the pack, whether it's as a dominant male or female or one of the pack's subordinate members.

MATERIALS: A set of flash cards depicting the full range of wolf expressions and postures (see material following Appendix B). The face of each card shows a drawing of a wolf while the back of the card explains the significance of the posture/expression shown on the reverse side. Possibly,

use of the film *Wolf Pack.* Lopez (1978) and Mech (1970) would be helpful as background information.

PROCEDURE: As preparation for the activity, students should view the film "Wolf Pack" or read their copy of Zoobook's *Wolves* by Wexo. Students break into groups, or "packs", for the duration of the activity. Cards are distributed among members of the pack– one for each. Students hold up each card one at a time to the other members of the group. The group members try to guess the message that each card conveys. Those who are able to guess correctly then check to see if they have a card that would be an appropriate response (example: someone holds up a card showing a submissive posture; the pack member having the card showing dominance holds up their card in response).

EXTENSION: As students get skilled with the cards, the teacher can then introduce specific situations to the group such as asking for the card showing the expression of the dominant female toward a juvenile male.

EVALUATION: Students are shown a photo or drawing of a wolf pack interacting (pages 6-7 of *Looking at the Wolf* for example) and are asked to identify the various postures.
Grades: 3-6
Subjects: Science
Duration: 30 minutes
Group Size: 5-8 per pack of flash cards, otherwise any size
Setting: classroom, camp, environmental education center, park
Key Vocabulary: body language, dominance, posture, submissive

ACTIVITY: II-3

THEME GROUP: Wolf Behavior

TITLE: What Did You Say?

MAIN SUBJECT: Science

OBJECTIVE: Students will demonstrate an effective means of non-verbal communication.

METHOD: Students create their own wolf language and then use it to communicate with each other.

BACKGROUND: Wolves howl for various reasons including locating each other in unfamiliar territory, assembling the pack, communicating alarm or danger, announcing or defending a fresh kill, marking their territory, sending messages over great distances, and promoting pack unity. Contrary to popular belief, wolves do <u>not</u> howl at the moon. This activity will help your students learn how another species is able to communicate occasionally complex messages among its members.

MATERIALS: None

PROCEDURE: Once again organize your class into wolf packs (see the activity "Pack It Up"). Tell the students that they are going to learn an entirely new language that they themselves will make up! Discuss with them how wolves communicate with each other by howling, the reasons why they howl, and what advantages howling has for wolves. Tell them that working within their own packs, they are to come up with their own wolf language (real words are not allowed!) of sounds to communicate the meanings or messages you give them (see those listed under Background for this activity). Allow them to make up and practice their wolf language. WARNING! This may get a little noisy, so you might want to consider taking the class outside.

Once they have had time to practice their "language," take the class outside and separate them. Have the different pack members send messages to each other over different distances to determine the effectiveness of their communications. Try this when they are able to see each other and also when they cannot see each other. See if pack members are able to correctly identify other members of their pack when blindfolded or when otherwise unable to see them. Which pack was able to communicate most effectively? Which pack could communicate over the longest distance? Who was the loudest howler? Regardless of how this works out, you and your students will have a "howling" good time!

EXTENSION: Have each pack choose a den site. Have them howl at each other in order to determine their pack's territorial boundaries. Then have each pack draw a map of the different packs' boundaries as near as they can determine from their howling. Compare the maps of each pack. How closely do they resemble each other? Ask the students what other ways might wolves use to settle territorial boundary disputes (see the activity "The Nose Knows").

EVALUATION: Each pack could be evaluated on how clearly they are able to communicate with each other and how well each pack member knows his/her pack's calls.

ACTIVITY: II-4

THEME GROUP: Wolf Behavior

ACTIVITY: Group Grok

MAIN SUBJECT: Science/Biology/Sociology

OBJECTIVE: Students will define and discuss the concepts of social organization and group dynamics as applied to both wolf and human societies.

METHOD: Students will compare and contrast the make-up and social dynamics of groups within their school with that of a wolf population.

BACKGROUND: Within any given wilderness or ecosystem a wolf population is broken down into various packs of different sizes depending on such factors as an area's habitat, how habitat is arranged, the prey base available, suitable den sites, climate and inter- and intra-pack dynamics. Human populations are similarly divided but according to very different factors. Within a class or school there are any number of social groups or cliques formed for various reasons. These groups have different degrees of permanence. Your immediate family is a long-term social group while most school friendships last for a much shorter time. Within each human social group there is usually some structure akin to the dominance hierarchy present among wolves. These human pecking orders may function quite differently, but they provide some form of group organization.

MATERIALS: A class or school roster, flip charts or butcher paper for diagramming.

PROCEDURE: Students will work individually or in small randomly selected groups on this activity. Introduce the idea of pack structure and behavior to your students. Talk about how packs are organized within a large geographic area, how different packs establish and defend territories, and how new packs and territories are formed (see Mech, 1970). Ask students if they are aware of any divisions within their school or class. Discuss with them the reasons why these different groups exist, how they are organized, how new groups are formed, how members change their status within a group, or how they move from one group to another. Compare human social organization to that of a wolf society. Tell the students they are going to study "pack" structure and dynamics within their own society. Arrange with another school to have students from your class study group social dynamics among younger children. Tell them that **without using names** of individuals (they should invent a number scheme), they are to arrange the individual children they study into groups based on their friendships with other students.

They are to arrange each group according to its number of members, its hierarchy (if it can be determined), observable intra-group relationships, and relationships with other groups. If some people are members of more than one group, students should note this and determine that person's status within each group. Loners who seem to belong to no group should also be noted. Stress to your students the importance of not using names as the identification of individuals could be very damaging to those people in certain circumstances. Allow students about a week or 10 days to work on this. Set aside 1-2 hours of class time someday to have the students present and discuss their results.

EXTENSION: Once this is done initially, students could keep track of their class structure over the entire school year. Two charts could then be compared to see what changes had taken place over time. This could then be compared to an actual study of wolves in an area like Isle Royale where pack histories have been documented over a number of years.

EVALUATION: Students could be graded on the completeness of their work and their understanding of the terms and concepts associated with wolf social behavior.

Grades: 9-12
Subjects: Biological Science/Sociology/Animal Behavior
Duration: 10-14 days preparation (homework), 1-2 hours class time
Group Size: any
Setting: classroom or homework assignment
Key Vocabulary: dominance hierarchy, ecosystem, habitat, prey base

ACTIVITY: III-1

THEME GROUP: Wolf Ecology

TITLE: The Nose Knows

MAIN SUBJECT: Science

OBJECTIVE: Students demonstrate their knowledge of how wolves rely on their sense of smell.

METHOD: Students test their sense of smell and compare it to that of wolves.

BACKGROUND: According to some authorities wolves and other dogs have a sense of smell that may be as much as **one million times** as sensitive as a human being. This gives wolves an ability to detect and track prey at long distances as well as locate possible enemies. Since humans are mostly visually oriented, it is hard for us to appreciate fully the extent that wolves and other dogs depend on their sense of smell for their perception of the world.

MATERIALS: A variety of smelly objects from soaps, perfumes, household cleansers, vinegar, various food items, to whatever you can think of. A number of blindfolds, paper, pencils, and clipboards. **Warning!** It is possible that some children will be allergic to the objects you select. Determine beforehand any allergies your students might have.

PROCEDURE: Students are broken into packs according to whatever criteria you choose (see "Pack It Up" elsewhere in this curriculum). Explain to them that they are going to do an experiment testing their sense of smell (see *National Geographic* articles on the sense of smell in the September 1986 and October 1987 issues). Let them see and smell the objects you are going to use in the experiment so they can become slightly familiar with their smells. This activity may be done either indoors or outdoors as you prefer. One student from each pack is blindfolded at a time. A particular odorous object from those you have gathered is then exposed to the blindfolded students, first from far away and then gradually closer. At the point where each student is able to first detect the smell and then again when they can identify it, have the others in their group measure and

record the distance. Do this until each pack member has been tested. When all the results have been recorded, post them on the blackboard to determine the best 'smeller' in each pack. This person may become the pack leader during another activity if you wish. Compare your results with the information you have on the wolf's olfactory powers. Discuss how and why wolves smell so well.

EXTENSION: Try the same experiment using someone's pet dog and some hamburger.

EVALUATION: None

Grades: 1-6
Subjects: Science
Duration: 1-2 class periods
Group Size: any
Setting: classroom, schoolyard, nature center, park, just about anywhere
Key Vocabulary: olfactory

ACTIVITY: III-2

THEME GROUP: Wolf Ecology

TITLE: It's a Wolf's Life

MAIN SUBJECT: Science

OBJECTIVE: Students will demonstrate an understanding of the ecological principles of carrying capacity and population dynamics.

METHOD: Students play a game that teaches them about how wolves survive in the wild as well as how many wolves can live in a given area.

BACKGROUND: Since wolves subsist primarily on large ungulates for their prey, their overall numbers are closely tied to the populations of ungulates within their territory as well as the effects of other predators on their own numbers.

MATERIALS: A flip chart and a magic marker. You may want to use colored arm bands to designate the different kinds of animals.

PROCEDURE: This is an outdoor activity. You will probably need about 25-30 students for this to work optimally. Students will assume the role of various animals present in the wolf's world and simulate the rise and fall of a wolf population over a number of years. The animals, or players, in this game include Wolves (**two** packs of **four** members each), Deer, Elk, or some other prey species (**15-18** total), Bear (**1**), Mountain Lion (**1**), Eagle (**1**), and a Human (**1**). The wolves each choose a den site on opposites sides of the playing area. The other predators arrange themselves on the edges of the game site. As the teacher, you establish an imaginary boundary between the two wolf packs. You also designate two "safety zones" for the prey at each end of the playing area. The prey arrange themselves in a safety zone at one end of the pack boundary. The pack boundary then serves as their migration route, or travel corridor, through the wolf country from one safety zone to the other.

At a signal from you, the prey try to make their way across the playing area along the travel corridor without being touched by a wolf. Wolves, in turn, leave their dens and try to capture (by tagging) prey. Any captured prey return to the den and become wolf pups and members of that pack. Only alpha male and female members of each pack may hunt so these wolves should be designated at the start of the game. Other pack members have very important roles. They are

subordinate pack members whose job is to protect the den site and any wolf pups from other predators. As each new wolf pup is added to the pack, the oldest surviving wolf pup assumes subordinate adult status.

The non-wolf predators operate in the following manner. At the start of each turn, they attack the prey species as well, capturing prey in the same manner as wolves. Captured prey become other predators of the same species. The non-wolf predators also have the option of preying on wolf pups. To do this, they simply have to tag them as they do any prey species. Captured wolf pups also become predators of the species that tagged them. Non-wolf predators may not attack adult wolves. Wolf pups must stay at their den sites; they cannot run away.

All predators, wolf and non-wolf alike, can take only **one** animal per turn.

Humans may take any animal at any time– prey, wolves, or other predators. Any animal tagged by a human becomes a member of the prey group on the next turn. If a human takes an alpha wolf, a subordinate member of that pack may replace them and thus hunt the prey species on the next turn. Subordinate wolves try to protect wolf pups by blocking other predators from tagging the pups. If a human tags them, they become a prey group member. If another predator tags them, nothing happens, and the game continues. Adult wolves may take another predator when at least two wolves tag a predator simultaneously. The captured predator then becomes a wolf pup.

Each turn consists of the movement of the prey along their travel corridor, or migration route. A turn begins with a signal from you and ends when all prey are safely in their safety zone. You will need to watch and give a signal when the prey have all reached their safety zones. At the end of every turn (representing one year), the teacher takes a count of each population and records this on the flip chart. It is possible that one of the predator populations may be eliminated through starvation or predation. If one of the wolf packs is eliminated entirely, then two subordinate wolves from the other pack may move over and establish their own pack. In any given turn that a wolf pack or predator does not capture any prey, one member (always the youngest or most recent) of that group *dies* and becomes part of the prey group.

PREDATION TABLE

Species	Prey	Number taken (per turn)
Wolf	Deer, moose, elk	1 per animal
	Other predators (2 wolves must tag simultaneously)	1
Other predators	Deer, moose, elk	1 per animal
	Wolf pups	1
Humans	Any non-human animal	1

Continue playing the game for about ten rounds making sure to record population numbers after each round. As several rounds are played, the prey group will likely shrink in numbers and the wolves and other predators will expand. Eventually, the predators and wolves will not be able to capture prey, and they will begin to starve, thus replenishing the prey base. A basic population equilibrium will then be established. The most volatile part of this equation will be the human being and how he or she influences the game. At your discretion, you may add one additional player to the human population from the deceased prey, but only one.

You may notice that some students will make value judgements as to which player they want to be or whether or not they choose to die (this will be especially true among the predator groups).

Don't worry about this. Not playing by the rules usually means that the prey group will shrink even faster, thus precipitating a larger, more severe population crash later in the game. It all tends to even out over time. Also you may want to explain to the kids that while this is an active game involving running and playing tag, that pushing is not allowed. The basic rule for everyone is play fair, play hard, and no one gets hurt.

EXTENSION: You may want to, at your discretion, remove half of the prey group from the game during any one turn. Prey populations may experience occasional crashes that are related to disease, absence of their food, severe weather, or other factors unrelated to the effects of predators. This may add a random, unexpected element to the game, but one that is based on realism and which should not affect your final results.

EVALUATION: After playing at least ten rounds and recording the results, gather the students together and look at what happened. What happened to the wolf populations? Did they go up, or down? When did this occur? Why did they change the way they did? How about the prey? What happened to them? How about the other predators? Did the predators affect each other? How so? What was the effect of the human(s) on the game? Did this mirror real life? If so, in what way? If not, why not? How would your students change the game based on what they have learned about wolves?

Grades: 4-8
Subjects: Science, Animal Ecology
Duration: 1 hour or class period
Group Size: 20-40, 25-35 would be optimal
Setting: outside
Key Vocabulary: carrying capacity, equilibrium, migration, population dynamics, predator, prey, ungulate

ACTIVITY: IV-1

THEME GROUP: Wolves and Humans

TITLE: "Who's Afraid of the Big, Bad Wolf?"

MAIN SUBJECT: Reading/Science

OBJECTIVE: Students will be able to distinguish wolf facts from fables.

METHOD: Students will read and examine a number of fictional stories and accounts about wolves.

BACKGROUND: Wolves have played an important part in many folk tales and fables, often to the detriment of the wolf's public image. Many of our perceptions of wolves as vicious, bloodthirsty creatures comes from tales that have been handed down over hundreds of years. Though often short on fact, these stories continue to enforce the perception of the wolf as a creature to be feared and loathed. The book *Of Wolves and Men* by Barry Lopez is a good starting point for the subject of the wolf in myth and fable.

MATERIALS: A variety of children's stories on wolves including *Little Red Riding Hood, Peter and the Wolf, The Three Little Pigs, Jungle Stories* (Kipling) and *Julie of the Wolves* (by Karen Craighead).

PROCEDURE: Have the children read one or all of the stories listed under Materials. If it is not practical to have them read the stories themselves, then read them aloud in class. Have the students examine how the wolf is portrayed in each of the stories. Ask them if they like the wolf in the stories they read. If not, ask them why not. Ask them if the wolf they read about in the stories seemed like the same wolf they had learned about in class. (Make sure that this is not the first wolf

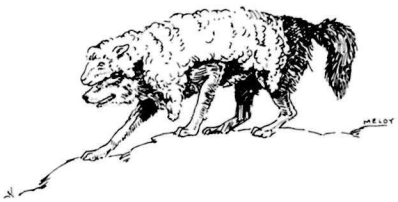
activity that you do with the class). Ask them if people are afraid of wolves. Should people be afraid of wolves? Ask them if they would like to meet a wolf. Would they be afraid? If so, ask them why. Ask your students if they know any stories that tell about good wolves. If so, have the students tell his/her story to the other children.

EXTENSION: Have the students create their own fable in the form of a play based on what they know about wolves and what they have learned. Once the play has been created, have them act it out in front of other classes.

EVALUATION: Evaluate your students on their class participation and their knowledge of the assigned reading material (if applicable).

Grades: K-4
Subjects: Reading/Science
Duration: 1-5 class periods depending upon whether the Extension is done.
Group Size: any
Setting: classroom
Key Vocabulary: fable, myth

ACTIVITY: IV-2



THEME GROUP: Wolves and Humans

TITLE: Speaking of Wolves

MAIN SUBJECT: Language Arts/Science

OBJECTIVE: Students will be able to describe the origins of common sayings and expressions using the wolf as their inspiration.

METHOD: Students will research common colloquial or archaic expressions using the wolf and report on their origins, meanings, and usages.

BACKGROUND: We often unconsciously use common expressions in everyday language that are derived from the animal world. We say that a person has *eagle eyes,* or we give someone a *bear hug*. Some expressions have originated from observations on wolves. Men sometimes use *wolf whistles* when directing their attention to members of the opposite sex. People are sometimes said to *wolf down their food.* A person is described as a *wolf in sheep's clothing.* The study of these expressions, their origins, and their usages can tell us a lot about how man has perceived the wolf over time.

MATERIALS: Access to a library would be helpful.

PROCEDURE: Students are given the assignment to find and research any and all expressions using the wolf that they can find. They are to look for information on the origins of these expressions, their meanings, how these expressions were used, and when they were used.

EXTENSION: Have students try to make up their own wolf expressions. Have them research other animal-related sayings and show how these are used in our language.

EVALUATION: Students are graded on their knowledge of the assigned topic and the completeness of their work.

Grades: 7-12
Subjects: Language Arts/Biological Science

Duration: one class period, or this activity can be done as a research assignment
Group Size: any
Setting: classroom or homework assignment
Key Vocabulary: archaic, colloquial

ACTIVITY: IV-3

THEME GROUP: Wolves and Humans

TITLE: Of Wolves and Biopolitics

MAIN SUBJECT: Government/Biological Science

OBJECTIVE: By participating in a mock public meeting, students will gain insight into the complex issues and controversies surrounding the management of the wolf under the provisions of the Endangered Species Act. They will be able to describe the workings of a public meeting– an integral part of the democratic process on a local level.

METHOD: Students play roles in a simulated public meeting.

BACKGROUND: The management of an animal under the Endangered Species Act is a complex process often involving emotion-laden politics as much as simple biological knowledge. With the advent of the National Environmental Policy Act and the Endangered Species Act, the public has been given an expanded role in helping make resource decisions on public lands. Much of the public input received by federal land management agencies is generated at public meetings where anyone has the opportunity to speak out on the merits of a proposal.

Simulation games are models of real life problems and issues. In the process of playing, both the instructor and the students are exposed to the basic facts of an issue and allowed to assume the roles and attitudes of various interest groups. They gain the experience of examining a problem, weighing facts, alternative solutions, consequences and effects, and arriving at a decision. They also can experience the sweep of emotions that often do much to influence decisions.

This simulation game deals with the proposed reintroduction of wolves into Yellowstone National Park. While the situation presented here is fictitious, it's based on a real proposal to bring the wolf back to Yellowstone as set forth in the U.S. Fish & Wildlife Service's *Northern Rocky Mountain Wolf Recovery Plan.*

You need not have extensive knowledge of the wolf recovery issue to play this game. We do recommend that this game be played after some study of Yellowstone and the natural history of the wolf (see Reading List for suggestions).

The game can take just one 50-minute class period, or you may want to divide it into two shorter periods. For best results, we recommend you divide the class into role groups, allow each group to review its assignment and briefing material, and conduct the simulated public meeting on another day. You may want to assign students to research their interest groups, even interviewing members of similar groups in your community.

MATERIALS: Tilt, et. al., *Wolf Recovery in the Northern Rocky Mountains (1987)* or U.S. Fish & Wildlife Service, *Northern Rocky Mountain Wolf Recovery Plan (1987).* Flip charts and pads, marking pens, copies of role assignments.

PROCEDURE: (See Appendix A for details on the Procedure, the Issue Statement, Briefing Materials, and Role Assignments).
EXTENSION: Does your school have a Debate Club? If so, have the issue of wolf reintroduction

debated in front of the student body.

EVALUATION: Grade the students on their level of participation as well the preparation they do and the completeness of their work.

Grades: 9-12
Subjects: Government/Biological Science
Duration: 2-3 class periods plus additional time outside of class for research and preparation.
Group Size: at least 15, as many as 40
Setting: classroom, school debating club
Key Vocabulary: biopolitics

APPENDIX A THE WOLF RECOVERY SIMULATION GAME

PROCEDURE:
1) Divide the class into a maximum of seven groups. Assign Group #1 to choose a spokesman who will be the Northern Rocky Mountain Wolf Recovery Team Leader. Other groups should also choose a spokesperson to present the groups' cases to the Leader and the Team staff.

2) Pass out the Briefing Material to each group. Each group should also get a copy of its Role Assignment, but be sure no group sees the Role Assignment of any other group.

3) After some time to review the handouts, ask the Team Leader to read the Issue Statement to the class, to open the public meeting.

4) Give the groups 20 minutes to develop their positions, recommendations, and presentations for the public meeting. Pass out marking pens, and flip charts pads so the groups can write their major position points for all to see. Groups may, if they wish, lobby other groups to form coalitions.

5) Allow each group five minutes to present its recommendations to the Recovery Team. There should be NO interruptions during this period. (If you have more than one 50-minute class period for this game, allow three minutes for questions from the Team staff and three minutes for questions from members of other groups.)

6) After all the presentations, allow a five to 10 minute recess when the Team can confer and make its decision.

7) After the recess, the Team Leader announces the decision. If more time is available, you might allow a few minutes for the groups to raise questions about the decision or make rebuttal speeches. The Team may decide to make a decision that is ambiguous, like, "We've decided to study the issue further." While you shouldn't encourage a "no-decision" decision, the Team may have valid reasons for choosing this course of "inaction." Ask the Team Leader to justify a decision that's ambiguous.

8) Follow the game with a discussion about it. Some questions you might ask include:

a. What are some things we discovered in this game?
b. What did we find out about wolves?
c. Do some people feel differently about wolves than others? Why?
d. Were some groups able to form coalitions? Why?
e. Were you able to get a feeling for the attitudes and values of the groups you represented? Did it help you understand other people's strong feelings on issues?
f. What can we say, in summary, about the wolf recovery program?
g. Why should or shouldn't we protect endangered species like the wolf?
h. What recommendations would you make personally if you attended a real public meeting about wolf recovery in Yellowstone?

ISSUE STATEMENT: WOLF RECOVERY IN THE GREATER YELLOWSTONE AREA

This statement is to be read to everyone by the Northern Rocky Mountain Wolf Recovery Team Leader.

I'd like to welcome you and thank you for attending this public meeting. I am the head of the Northern Rocky Mountain Wolf Recovery Team. Our job is to implement the recommendations of the Northern Rocky Mountain Wolf Recovery Plan and to ensure that the wolf does not become extinct in the northern Rockies. We are here today to hear your views on one very important aspect of the Recovery Plan– the reintroduction of wolves into Yellowstone National Park.

Wolves occurred naturally in Yellowstone prior to the arrival of white Americans to the area in the 1800's. After Yellowstone became a national park, park managers, the U.S. Army, and park rangers participated in national programs to control predators, including wolves. Along with mountain lions and coyotes, wolves were shot, trapped, and poisoned in Yellowstone for many years. The predator control programs were stopped in national parks in the 1940's, but by that time the wolf had been exterminated in the park and surrounding area.

With the passing of the Endangered Species Act in 1973, wolves were listed as an "endangered" species in the lower 48 states (except in Minnesota where 1,200 wolves exist), and the U.S. Fish & Wildlife Service was directed to prepare a plan to recover and manage wolves in the northern Rocky Mountains. One aspect of that plan calls for wolves to be brought back to Yellowstone National Park where they would be managed by the U.S. National Park Service in cooperation with the Fish & Wildlife Service.

The Wolf Recovery Plan calls for ten experimental packs of wolves to be introduced to Yellowstone. These animals would be brought to Yellowstone from western Canada where there are wolves that prey primarily on elk. Yellowstone has the largest herds of elk in North America, so many biologists believe that wolves would find plenty to eat in the park and would add stability to the ecological balance in the area.

Critics of the Wolf Recovery Plan state that wolves would deplete elk numbers and other wild game and eventually wander out of the park where they would prey on cattle, sheep, and other livestock. They raise questions such as who will bear the economic burden if wolves do start to prey on livestock, and will a rancher be able to kill a wolf that is preying on his or her cattle or sheep? Many biologists dispute the contention that wolves will become significant predators of animals and claim that is unlikely wolves would leave Yellowstone. They point to Minnesota where over 1,000 wolves live in an area containing thousands thousands of farms, but they rarely kill domestic animals.

Recently, wolves have migrated from Canada into Glacier National Park, Montana, where they have set up dens and raised several litters of young. Biologists are watching this situation closely, but for the moment, wolves in Glacier seem to have taken the matter of their recovery into their own hands (or paws). Some people contend that we should simply wait for wolves to migrate down the mountain ranges to Yellowstone where they would re-establish themselves. Others feel that the distances are too great for this to happen, and wolves are unlikely to return to Yellowstone without the intervention of people.

The task of managing the wolf is complicated by human emotions toward an animal that has been the subject of myth and legend for hundreds of years. Our culture and folklore are filled with images of the wolf– nearly all negative– that tend to cloud our judgement when we need to examine the animal in a clear and dispassionate manner.

We recognize that the subject of wolf recovery is a sensitive issue. But, we are here today to try to make a decision free of emotion, based on the facts as we know them. Because we are charged

under federal law with the task of recovering wolf populations in the northern Rockies, we have prepared four alternatives for your consideration (these are presented with your briefing material). You may choose to recommend one or several of these alternatives, or you may wish to recommend an entirely different alternative than those that are listed here. All ideas are welcome. Our final decision may actually be a combination of actions listed in several alternatives or new ideas you bring up today. In any case, this public meeting has been called to hear your views on the subject of the reintroduction of the wolf into Yellowstone National Park.

The briefing material you have been given contains more information on wolf behavior as well as details on the Wolf Recovery Plan. You will also find a summary of the Endangered Species Act that will explain what is meant by the terms *endangered* and *threatened.*

BRIEFING MATERIALS

Summary of the Endangered Species Act of 1973

This law, passed by the U.S. Congress, gives federal protection to animals and plants that face extinction. It establishes national policy for preventing further extinctions as well. This law provides two classifications for animals and plants it protects:

ENDANGERED: Animals and plants with this classification will likely become extinct over most or all of their range. The Secretary of the Interior can declare a species *endangered* if, after consultation with the affected state governments and with interested persons and organizations, the Secretary finds extinction likely. A *recovery team* is organized and must submit a recovery plan for the species. The plan lists the steps to be taken to protect the species and to bring it back from the brink of extinction. In addition, the law prohibits hunting, harming, shooting, capturing, possessing, selling, receiving, and importing or exporting an *endangered* species or products made from it.

THREATENED: Animals and plants with this classification are likely to become endangered over most or all of their range. Under this classification, there is more flexibility in managing the animal or plant. For example, while an *endangered* species may not be hunted, a *threatened* species can be if the hunting doesn't harm its population. A recovery team is also organized for a *threatened* species. The team can order hunting, selling, and other activities prohibited, but such prohibitions are not mandated for a threatened species.

Summary of Information About Wolves

It is important that all participants read the background publication about wolves (Tilt & Eno) supplied with this packet of learning materials. Other books and resource materials may be acquired from local libraries. A bibliography is attached that lists suggested books, articles, and other materials about wolves. Reading or viewing any of these materials would make this activity more stimulating.

Alternative Actions Proposed by the Northern Rockies Wolf Recovery Team

Alternative #1

No Action

Do not reintroduce the wolf into Yellowstone National Park. Continue managing park wildlife according to existing policies.

Alternative #2

Proceed with the recommendations presented in the Northern Rocky Mountain Wolf Recovery Plan.

1. Introduce three pairs of alpha males and females into separate areas of Yellowstone National Park where biologists have determined their chances of survival are good.

2. Manage the restored population according to the same laws and guidelines that have been established for other endangered species. This would prohibit killing of wolves under all but the most unusual circumstances.

3. Manage the introduced wolves as an endangered species until such time as there are ten established packs in the identified recovery area.

4. Once ten wolf packs have established themselves and have existed for a period of three years, the U.S. Fish & Wildlife Service would propose de-listing the wolf from the Endangered Species Act. At this time, the wolf would be managed the same as any other animal within the boundaries of Yellowstone National Park. Wolves wandering outside the boundaries would be managed under existing state wildlife laws which may permit hunting and trapping.

5. Livestock losses by stockmen which can be definitely attributed to wolves will be reimbursed.

Alternative #3

Proceed with a modified version of the Wolf Recovery Plan.

1. Introduce three pairs of wolves as described under Alternative #2.

2. Manage this introduced population as an experimental population. This would allow for the taking of marauding wolves that are causing livestock losses. Problem wolves could be killed by U.S. Fish & Wildlife Service agents, state game and fish personnel, National Park Service wildlife managers, or other designated government wildlife agents.

3. In accordance with the terms of the Endangered Species Act, limited hunting may be authorized on state, federal, and private lands outside the jurisdiction of the National Park Service.

4. Trafficking in wolf hides and other animal parts would still be prohibited under this alternative.

5. An indemnity program for wolf depredation of livestock similar to that described under Alternative #2 would be initiated.

Alternative #4

Remove the wolf's classification as *endangered* thus denying the wolf federal protection under the Endangered Species Act.

1. Wolves would be "de-listed" from the Endangered Species Act.

2. States would be given full authority to manage wolf populations in accordance with state game regulations. Presumably this would allow hunting and trapping of wolves, as well as trafficking in wolf hides and other wolf parts.

Role Assignment #1: Northern Rocky Mountain Wolf Recovery Team

First, choose a member of your group to be the Team Leader. The Leader should then read the Issue Statement to the other groups assembled for this public meeting. Listen carefully to the presentations made by the other groups. After all groups have made their presentations, review them. Look for the following:

1. Similar recommendations. You aren't counting votes, but general agreement on a reasonable course of action is important. The greater and more diverse the support for your recommendation, the more likely it is to be carried out by the Secretary of the Interior and the Congress.

2. Recommendations that are illegal. You won't be able to approve these.

3. Recommendations that would require substantial money from Congress or from state legislatures. You can accept these recommendations, but realize that you may not get the money!

You can pick and choose parts of recommendations to make your final decision, or you can come up with your own decision if none of the recommendations make sense to you. Just be ready to defend your decision.

Once you have made your decision, the Team Leader should present it to the public meeting.

Role Assignment #2: WHOS— Wolves Have Our Support

You are members of a non-profit organization of 15,000 members, mainly from the East Coast. Most of your members also belong to the U.S. Humane Club, a group that advocates the health and protection of animals. You advocate saving the wolf from extinction and favor bringing the wolf back into Yellowstone. You oppose killing wolves for any reason.

You believe strongly that wildlife, like wolves, come first, and that people and their economic interests come second. You believe that if we can't save the wolf from extinction, we certainly can't save ourselves either.

Role Assignment #3: Zaxxon Oil and Gas Company

You work for a large oil and gas exploration company that holds leases to drill for oil, gas, and geothermal power on national forest land near Yellowstone National Park. You are very concerned with your company's poor public image. Many people think your company's work will destroy Yellowstone's geysers and harm wildlife. You want very much to develop good public relations with the local townspeople, and at the same time, go ahead with your exploration and development work. You oppose any further restrictions on your activities.

Role Assignment #4: Coalition of Responsible Hunters

You are a member of a coalition of hunting clubs and hunting outfitters who oppose restrictions on hunting in the national forests around Yellowstone National Park. While you are not opposed to wolf reintroduction itself, you don't think it should be done at the expense of hunting outside the park. You are very concerned that wolves will cause a depletion of elk, deer, bighorn sheep, and other big game animals in Yellowstone as well as on national forest lands. You are worried about possible restrictions on hunting activities to protect wolf denning sites and wolf travel routes. Your group supports the continued use of roads in national forests. You believe that if elk numbers need to be controlled then hunters would do the job better than wolves. You publicly deplore poaching because of the damage it does to the reputations of responsible hunters.

Role Assignment #5: Greater Yellowstone Chamber of Commerce

You represent the businesses around Yellowstone National Park as well as the businesses inside the park. These include hotels, motels, campgrounds, garages and service stations, outdoor equipment stores, float trip operators, restaurants, grocery stores, curio shops, and other small businesses that serve the tourists who come to the Yellowstone area. While you generally favor wildlife because it

brings tourists to the area, you are very concerned about any publicity that would keep people from coming to the park, like the kind accompanying the fires of 1988. You support keeping Yellowstone's wonders in a natural state, but you oppose any further restrictions on use of the park and are concerned about how the public will feel about safety in Yellowstone if another large predator like the wolf is brought into the area.

Role Assignment #6: Yellowstone Valley Livestock Association

You are an organization of cattle and sheep ranchers many of whom depend on public national forest lands as well as your own ranch lands for grazing your livestock. You are very concerned about losing livestock to predators and feel that you already have enough problems with predatory bears, coyotes, mountain lions, and eagles. You adamantly oppose bringing wolves into the Yellowstone area and want the right to kill any wolf that you find on your lands or that you believe is harming your livestock. You oppose any effort to limit or further control your use and access to national forest lands currently used for grazing. You fear such limits or controls would increase your cost of doing business, which you believe is already too high.

Role Assignment #7: Friends of the Environment

You represent local chapters of a national environmental group. Your members are mostly professional, college-educated people. You are concerned with protecting native wildlife and maintaining wildlife habitat. You are in favor of bringing the wolf back to Yellowstone because you believe that the parks should be managed first for wildlife, then for people. You are concerned that Yellowstone is being managed too much for local interests and that the voices of your members, from all over the United States, are not being heard. Your group has recently been successful in forging coalitions of different groups to solve wildlife management problems, by finding things the groups all agree on to solve the problem.

Your group was instrumental in persuading Congress to establish the National Park Service in 1916. Since then your group has supported the Park Service when it tried to protect wildlife in the parks, and opposed it when it encouraged development of tourist facilities in the parks. You feel that too many tourists will harm the environment of Yellowstone and its wildlife.

GLOSSARY

Agent – a representative of a government, often charged with enforcing the law.

Alternative – one of a number of courses of action.

Backcountry – as used in national parks and national forests, land located away from settlements and other human developments, often having a wilderness character.

Biopolitics – the conduct and contest of governmental affairs as they relate to public lands, wildlife, and wilderness issues.

Coalition – an alliance, especially a temporary one of different groups.

Ecosystem – a naturally self-regulating community of living things together with its physical environment, considered as a unit.

Extinct – no longer living; dead; used especially to refer to entire groups or species of plants and animals.

Habitat – the arrangement of food, water, and shelter (cover) that is suitable for an animal's needs.

Mandatory – required.

National Forest – a tract of land designated and managed by the national government in a way that assures a continuing supply of particular natural resources. In the United States, national forests are managed to ensure a continuing supply of timber, water resources, grazing land, recreational, scenic, and wilderness values. U.S. national forests are also managed to allow mineral extraction in ways that do not generally impair the other resources and values.

National Park – a tract of land designated and protected by the national government. In the United States, these lands are, by acts of Congress, to be preserved in their natural state and capable of being visited by the people in such a way as to leave these lands unimpaired for the enjoyment of future generations.

National Park Service – an agency of the U.S. Department of Interior. Responsible for managing over 350 national parks, national monuments, historic sites, and recreation areas. Employees include maintenance workers, interpretive naturalists, and park rangers, among others.

Poaching – taking game illegally.

Predator – an animal that lives by feeding primarily on other animals.

Range – an area where a species of animal lives, including the extreme limits of this area.

Secretary of the Interior – an official of the United States government, appointed by the President, and confirmed by the U.S. Senate, who is responsible for administering agencies in the U.S. Department of the Interior.

Species – a group of like organisms capable of interbreeding, represented in taxonomic nomenclature by two Latin names, the first for its genus followed by its species name, as in *Homo sapiens.*

State game and fish department – an agency of state governments. Known by various names in different states (e.g., Department of Fish & Game, Game & Fish Department, Department of Fish, Wildlife, & Parks). Responsible for managing game (hunted wildlife) in a particular state. Sets hunting and fishing areas and seasons, and often gets most of its revenue from the sale of hunting and fishing licenses.

U.S. Fish & Wildlife Service – an agency of the U.S. Department of Interior. Responsible for managing national wildlife refuges and game ranges, and protecting endangered and threatened species all over the United States. It also enforces international wildlife laws and treaties within the U.S.

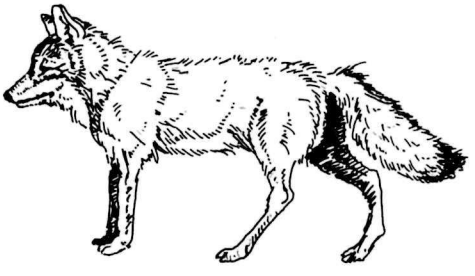
U.S. Forest Service – an agency of the U.S. Department of Agriculture. Responsible for managing national forests and national grasslands. It also engages in forestry research. Employees specialize in managing timber, grazing, recreation, mining, water, wilderness, and other resources. Forest rangers are the officials in charge of districts of particular national forests.

APPENDIX 'B'

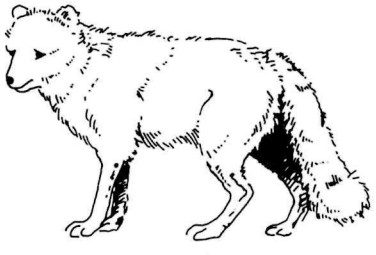
KEY TO THE CANIDS
A Sample

1. All members are dog-like in appearance, having a scent gland at the base of the tail.
   Go to 2.

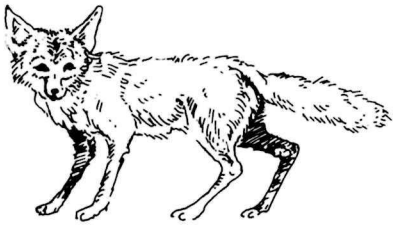
Red fox



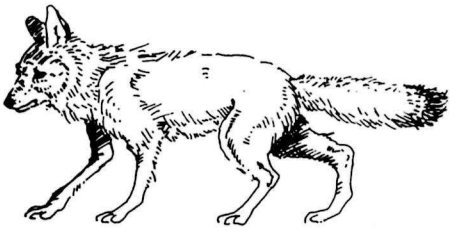
Gray fox



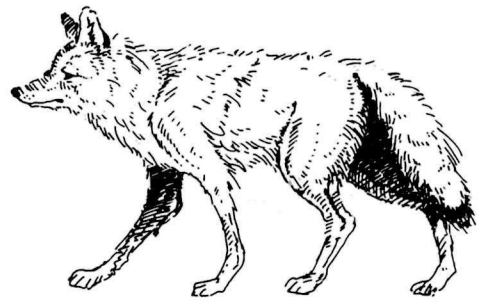
Arctic fox



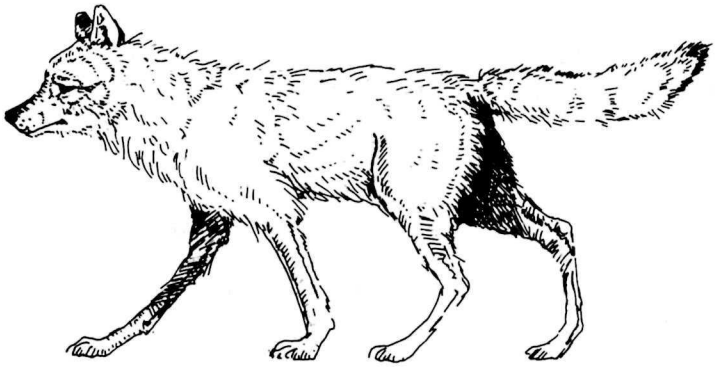
Kit fox



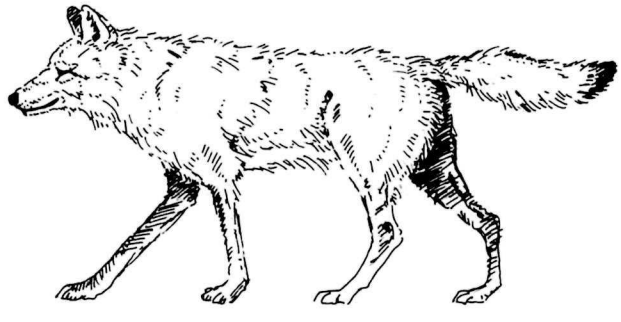
Swift fox



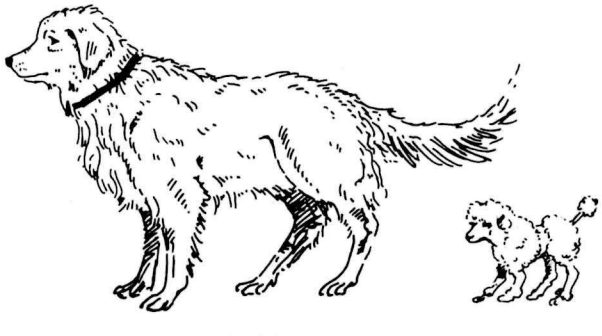
Coyote



Gray wolf



Red wolf



Dog (golden retriever, toy poodle)

2. a. Has five toes on each front foot (inside toe is high) and four toes on each back foot. **Go to 3.**
   b. Has *five* toes on each back foot. **Go to 12.**

3. a. Head and body length larger than 30 inches. **Go to 4.**
   b. Head and body length smaller than 30 inches. **Go to 7.**

4. a. Holds tail high when running. **Go to 5.**
   b. Holds tail down between legs when running. **Go to 6.**

5. a. Adult weight 70-120 lbs., eyeshine *greenish orange*, body color usually gray but may be black or nearly white. Has *10 mammae.* Occurs only in northern U.S. and Canada south to the northern parts of Minnesota, Wisconsin, and Michigan and northern Montana and Idaho.
   Gray Wolf *Canis lupus.*
   b. Adult body weight 40-70 lbs., eyeshine *gold to bluish green*, body color reddish gray to nearly black. Has eight mammae. Occurs only in the southeastern United States from east Texas to North Carolina. Nearly extinct.
   Red Wolf *Canis niger.*

6. Adult body weight 20-50 lbs., nose pad less than one inch, nose fairly pointed with tail bushier than domestic dogs, eyeshine *greenish gold.* Normally the only wild member of the genus *Canis* in the western U.S. south of Montana and Idaho. Voice is *high-pitched* yaps and howls.
   Coyote *Canis latrans.*

7. a. Body color entirely white. **Go to 8.**
   b. Body color not white. **Go to 9.**

8. Short, rounded ears, heavily furred feet. May also show bluish-gray color phase. Found in Alaskan and Canadian tundra. Adult body weight 7-15 lbs.
   Arctic Fox *Alopex lagopus.*

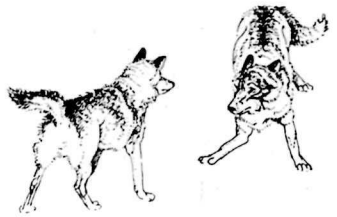
9. a. Head and body length are greater than 20 inches. **Go to 10.**
   b. Head and body length are less than 20 inches. **Go to 11.**

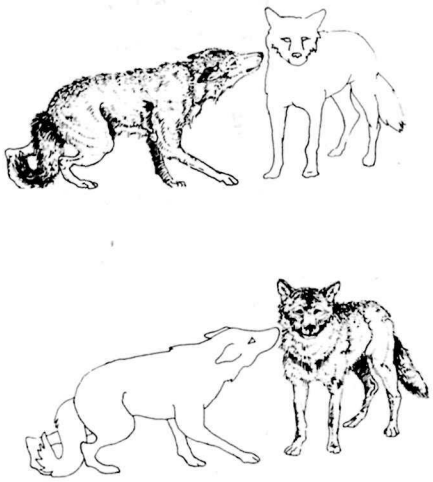
10. a. Body color *reddish yellow*, belly white, long bushy tail, *tipped with white.* Adult body weight 10-15 lbs. Has eight mammae.
   Red Fox *Vulpes fulva.*
   A black phase (the silver fox) also exists and all color gradations between the red and black phases can occur.
   b. Body color *salt-and pepper* in color, buffy underfur, long bushy tail with a *black stripe* running the length of the tail on top. Tail is *tipped with black.* Has 6 mammae.
   Gray Fox *Urocyon cinereoargenteus.*

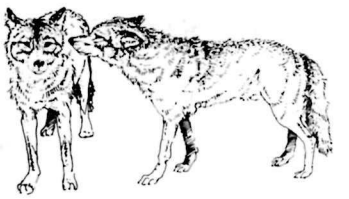
11. a. Body color *buffy-yellow*, bushy tail is tipped with black. Body weight 4-6 lbs. Occurs mainly in Great Plains area although may be found in western Colorado, western Wyoming, and northeast Utah. Very rare.
   Swift Fox *Vulpes velox.*
   b. Body color *pale gray,* washed with rusty, belly whitish, ears *very large.* Body weight 3-6 lbs. Found in low, sandy deserts of the southwest U.S.
   Kit Fox *Vulpes macrotis.*

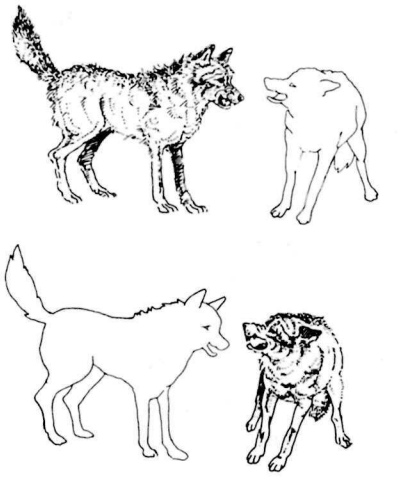
12. Domestic Dog *Canis familiaris.* WARNING: Not all domestic dogs have five toes on their hind feet. Also the many breeds of domestic dog are extremely variable in their size,

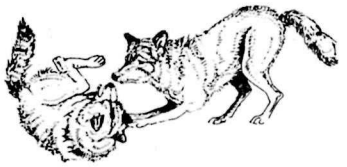
THREAT (Aggressive behavior) Dominant wolf snarls with raised lips; tail raised, ears forward. Often done in combination with many other aggressive behaviors. Purpose: An expression of tension, usually occurs when two wolves are close to one another, such as when feeding on a kill.	**FUR SNIFFING** (Neutral behavior) One wolf walks up to another wolf; pushes its nose into the other's fur and then walks on. Purpose: Helps to strengthen bonds among pack members.	**FACE LICKING** (Passive submission) A low ranking wolf approaches a higher ranking wolf with a crouched posture, tail tucked down between the legs, and licks the other animal on the muzzle. Purpose: To show submission, helps to promote harmony in the pack and reduce aggression.	**PLAY BOW** (Social behavior) One wolf approaches another in a non-threatening manner, bows down with front legs spread wide, runs away in a playful manner. (Many dogs show this behavior.) Purpose: An invitation to play. Play helps to strengthen muscles and coordination in young animals and also helps to reduce tension within the pack.
IMPOSING (Aggressive behavior) Stiff-legged walk toward another wolf; tail held up and rigid; dominant wolf "stares" at opponent and may growl. Dominant wolf may push or shove the other animal. Purpose: To show dominance; helps establish pack social order.	**NOSE TOUCHING** (Neutral behavior) Two wolves stand side-by-side and briefly touch noses. Purpose: Helps to strengthen bonds among pack members.	**LYING ON BACK** (Active submission) A low ranking wolf falls or lies on its back with one slightly raised hind leg in front of a dominant wolf. Purpose: To show submission; helps to reduce immediate threat of aggression from another more dominant pack member.	**PLAY WRESTLING** (Social behavior) Lots of physical contact, play wrestling, play biting, play growling, play running... all in good fun. Purpose: Play helps to strengthen muscles and coordination in young animals and also helps to reduce tension within the pack.

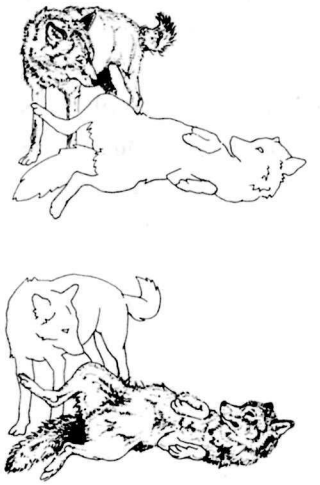


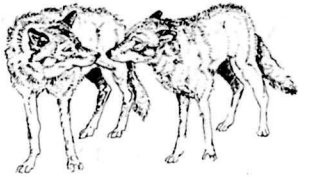


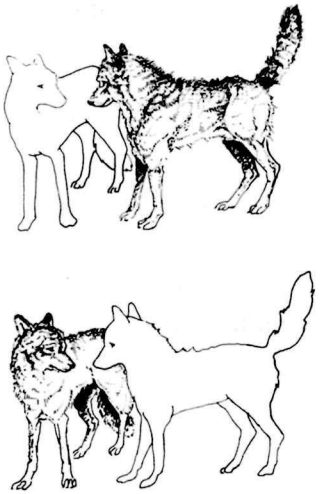












appearance, color, and other physical characteristics. Since they are commonly kept as pets, many have collars. They are most frequently found in association with human dwellings and settlements.

WOLF EDUCATIONAL MATERIALS FOR TEACHERS AND READING FOR YOUNG PEOPLE

A 150 page packet of educational materials is available that includes suggested activities and information. Send $13.45 and your school tax number. Request *The Wolves and Humans Teacher's Packet* from: The Science Museum of Minnesota, 30 E. 10th, St. Paul, MN 55101.

A cassette tape, "Wolf and Humans:Wolf Vocalizations," is available from the Science Museum of Minnesota for $12.98, plus $3 postage/handling.

Summer adult education classes on wolves are offered by the Yellowstone Institute (P.O. Box 117 Yellowstone National Park, WY 82190) and the Teton Science School (P.O. Box 68, Kelly, WY 83011). These classes can often be taken for college and teacher recertification credit.

An audiocassette, "The Language and Music of the Wolves," narrated by Robert Redford, is available from the American Museum of Natural History, Dep't. L89, Central Park West at 79th St., New York, NY 10024. Cost is $10 plus postage/handling.

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