
Introduction

Welcome to the *World of Wolves* EduKit. We hope you and your students will enjoy learning about a variety of topics through its use. Here are some suggestions to help you get the most out of the kit:

Teacher Resource Guide

1. This guide contains information, activities, and study files which cover different aspects of wolves including: wolf biology, social behaviour and needs, and wolves and people. Each activity includes background information, objectives, time required, materials, and instructions. Videos, appropriate to different grade levels, are also provided. As you know your class best pick out the activities which most appropriately fulfil your needs.

Materials

2. The materials in the edukit will be used by the students during their study. Workstations can also be set up to assist students during their exploration of the various study files.
3. The pelts and skulls are meant to be handled and examined, but they are fragile and expensive. Please encourage careful handling and discourage boisterous activities such as clacking the teeth together, etc.
4. Don't worry about answering all the questions students might pose on wolves; wolves are intelligent, sophisticated mammals with individual personalities. Even people who have studied wolves for years are continually surprised by them.
5. Many of the activities can be done without the box. Feel free to copy activities which you could use after the edukit has left your class.
6. Learning about wolves can and should involve many subjects including science, social studies, language arts, art, music, sociology, politics, mathematics, and physical education. While biology is important, our relationship to other species is strongly dictated by our culture and history. To focus only on the biology will give students a very limited understanding of the animal and the emotions it evokes. Wolves are controversial; examine your own viewpoints and your students'.
7. Sharing the box with other classrooms is encouraged. However, you, as the teacher who checks out the box, are responsible for its contents and for returning it on time. Please report missing or broken items so that replacements can be arranged. A fee may be associated with repair or replacement.

Program Summary

World of Wolves is a teacher's activity guide for the Wolf Edukit, developed to assist educators in introducing students from grades seven through ten to wolves and wolf ecology. Although the program has been developed for these grades, it can be modified for use in other grades. A separate program called *Wolves and Me* has been developed for students in grades three to six.

This student-directed program provides the opportunity for students to:

- examine their own attitudes and opinions about wolves
- identify the issues involving wolves
- study wolf biology, behaviour, and ecology
- investigate at least one of these issues
- present their research findings in one of four formats
- complete an action plan and act upon it.

The program is divided into four parts:

Part I: Reader's Theatre, "Voices"

Through a reader's theatre activity, students will be presented with a variety of viewpoints, attitudes, and opinions on wolves. From this activity students will begin to identify the issues surrounding wolves in Alberta.

Part II: Digging In and Finding Out

Students will choose an issue identified in Part I and complete an independent research assignment. The Wolf Edukit contains fourteen Independent Study Files and a Wolf Edukit Library. All students will complete four common Independent Study Files to provide them with an overview of wolves and several other files relevant to their chosen issue / topic.

Part III: Sharing

Students will present their research findings. Four presentation formats have been suggested. Each format asks students to present their findings by answering the following questions:

- *What should the future of wolves be in Alberta?*
- *What can you do to ensure the future you prescribed?*
- *What is your personal goal to achieve your vision?*
- *What actions can you take to achieve your goal?*

Part IV: Actions

Actions is an optional, but highly recommended section offered to those students and teachers who wish to act on a local level to attain the goals set out in *Part III*.

Acknowledgements And Sources Of Materials

This edukit is one which truly reflects the subject matter at hand; it is international in development, the result of work in the United States and Canada, and deals with a subject, wolves, which will only be conserved through cooperative and international effort.

The edukit was originally put together through the coordinating effort of Pat Tucker, a biologist for the National Wildlife Federation, along with the United States Forest Service, the U.S. Fish and Wildlife Service and numerous other generous individuals and groups.

The original information and activities contained in this box have been extensively modified to reflect the Canadian situation, with a focus on Alberta. This revision is a joint effort between Alberta Environmental Protection, Kananaskis Country, Environmental Literacy Program; Banff National Park; and The Friends of Banff National Park.

The song, *Real Wolves*, was written and sung by Mandi Kujawa of Banff, Alberta. The mould for the plaster casts was supplied by Jim Traub of AGT. Funding for this program was provided by the cooperating agencies, and Canada Employment.

Edukit Contents

This edukit has been developed for two teaching levels; elementary and secondary. Not all of these materials may be used at your grade level. Please ensure however that all materials are present when you ship the edukit to its next destination.

Teacher Resource Guides:

- Elementary Guides—*Wolves and Me* and *Wovles and Me—A Discovery Book*
- Secondary Guide—*World of Wolves*

Edukit Library:

Books:

- *Wolf Pack - Tracking Wolves in the Wild*
- *The Wolf Almanac*
- *Animal Tracks of Western Canada.*
- *Little Red Riding Hood*
- *The True Story of the 3 Little Pigs*
- Wolf resource binder, contents listed at the beginning of the binder

Audio Tape:

- Wolf howls and *Real Wolves* song

Videos:

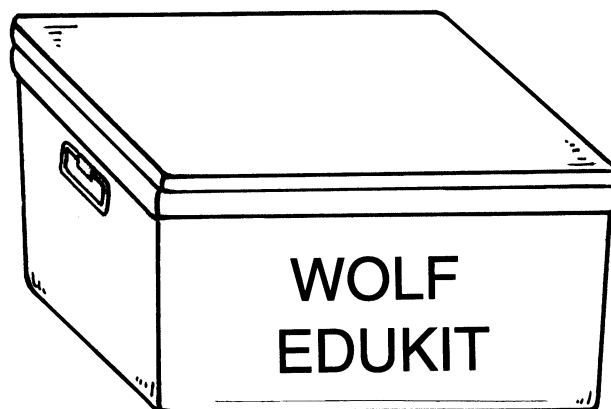
- *White Wolf*. National Geographic
- *Wolves*. Timber Wolf Alliance (for children up to age 8)
- *Let There Be Wolves*. J.N. Alford
- *The Wolf: Real or Imagined?* Bruce Weide & MQTV

Posters:

- Kananaskis Country Wolf (laminated)
- Kananaskis Country Coyote (laminated)
- Wolves (laminated)

Props:

- Rubber paw print
- Rubber track stamp for wolf, coyote, and elk
- Pelts: coyote and wolf
- Swatches of fur from six wolf prey species
- Skulls: wolf, coyote, deer, cougar
- Scat samples: wolf, coyote, dog, deer
- Plaster casts of tracks: wolf, coyote, cougar, deer
- Wooden puppet of wolf
- Set of 18 wooden blocks
- Road runner (measures kilometres of road on a map)
- Felt story board
- magnifying glass
- measuring tape



Care of Edukit

General

The contents of this kit have been checked and shipped to you in good repair. Check the contents on arrival and report any damaged or missing items immediately. **You** are responsible for items lost or damaged while the box is in your possession.

Pelts

The pelts have been professionally tanned and treated to retard soiling. Cleaning must be done by a professional furrier. You can help lengthen the amount of time between cleaning by telling students that it is very important that they not mark on the pelts or drag them on the floor.

Plaster Casts

The casts of the tracks are fragile and can break. Please handle them carefully. The casts may be cleaned by wiping them down with a damp cloth.

Scat

The scat is glued to the bottom of the plastic boxes, and the boxes are glued shut. Vigorous shaking may jar the scat loose and necessitate replacement.

Skulls

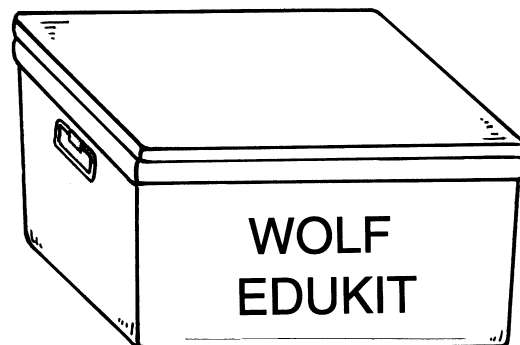
Skulls are very fragile and are both difficult and expensive to replace. Please show the students how to handle the skulls to prevent damage. If a skull should get damaged, let us know immediately. Collect the pieces and made arrangements for its return. We recommend keeping rubber bands around the muzzles so that the lower jaws are attached to the rest of the skull while students are handling them.

Tapes

The video and audio tapes should be kept out of direct sunlight and not subjected to extreme heat or cold. Do not play the tape when it is extremely cold, as this could cause the tape to snap. Keep the tape as clean as possible.

Wooden Wolf Puppet

Loosen sticky joints by gently tapping the piece on a wooden table. The screws have been glued so that they can't be tightened or loosened. If a joint is too loose, you may wrap a thin rubber band between the screw head and the wooden piece. If a screw should break, please make sure to keep all the puppet pieces together.



Part I: Reader's Theatre Voices

Logistics

Time Required: 45 minutes

Group size: one class

Setting: classroom

Objectives

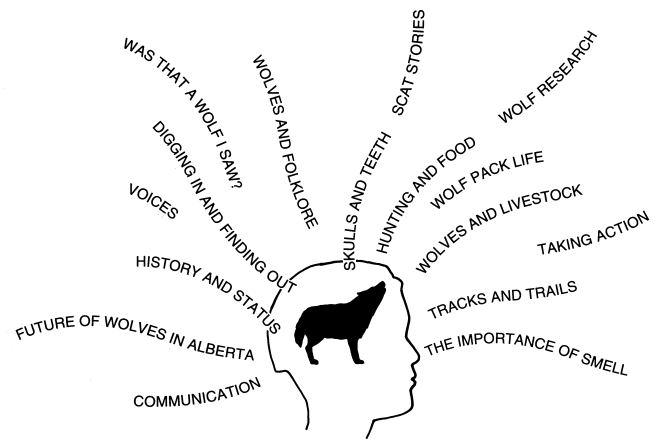
Students will have an opportunity to:

- be exposed to a variety of viewpoints on wolves
- develop a curiosity for the truth about wolves
- participate in creating a mind map of wolf issues.

Materials

- wolf howl cassette
- Voice Scripts (appendix)
- 3 X 5" index cards numbered 1 to 32

A solid square (■) indicates materials are provided in the Wolf Edukit)



Teacher Background

Almost everyone has an opinion on what is happening in the natural environment. Whether it is a new development in a natural area, management of wildlife or changes in land use, many individuals, groups and businesses have concerns and opinions on what should and should not be done to the natural world.

When two opinions differ on an environmental concern or problem, an issue generally arises. *How* the issue is resolved is often as complicated as the problem itself; government hearings, legal decisions, public opinion, and petitions are just a few of the avenues used to deal with issues of major concern.

Whatever method is used, knowledge of all sides of the issue is necessary if informed decisions are to be made. In environmental issues this often involves an understanding of the economic, social, cultural, political, and legal, as well as environmental aspects of the issue. Like the webs of life in a natural system, issues can be very complex, interrelated and difficult to resolve.

In this activity students will be introduced to the multiple opinions about and issues arising from wolves and their role in human and natural systems.

Instructions for the Teacher

- Have the wolf howl tape ready to start in a cassette player.
- Photocopy and cut out each of the scripts.
- Without introduction, hand out one concealed script to each student in the class, indicating that they remain closed until you ask for them to be opened.
- Explain that each script has a number and this number identifies when students are to read aloud their lines. The number will be indicated by the teacher holding up a numbered card, starting at 1 and working through in numerical order to 32. You can also do this without the numbered cards by having each student remember who they follow. If you choose to use the index cards, number them from 1 to 32.

- Seat the students in a circle or randomly throughout the class. Seating arrangements can be choreographed to create a number of different effects. Dramatic techniques such as variation of heights or levels (i.e., students sit on floor, others on chairs), strength of voice and characterizations can also be used.
- Ask the students to open their scripts. Start the wolf howl tape at a very low volume. Begin by immediately holding up the number 1 card or signalling the first student to start. Students may read more than one time so that all 32 scripts are read. Scripts can also be repeated or given to more than one student to emphasize a certain point or opinion.
- The final selection *Think Like A Mountain* by Aldo Leopold should be read by the teacher or a student who has had an opportunity to review the selection. Additional effects such as music, costume, or the wolf howl tape could be used to enhance the passage or entire presentation.
- If cards are used then the teacher becomes the conductor of the performance, holding up the cards as the numbered scripts are to be read. Pacing and selection of order can be varied, depending on students and personal preference.
- After the reader's theatre, ask students to identify the various issues involving wolves. List the issues as you go. Place the suggestions on the chalkboard or large piece of paper, creating a mind map of wolf issues. Issues may include:
 - predation on livestock
 - habitat preservation
 - refuges and corridors
 - research ethics
 - wolves and human safety
 - wolf transplants
 - wolf place in mythology
 - wolf hunting
 - wolf politics
- Challenge students to determine the truth about wolves, to separate fact from fiction; to know the animals as they are, not as they may have come to know them through other people's perceptions and opinions. Sorting out the truth will be the student's journey and challenge as they work through this program.
- Time permitting, repeat the reader's theatre. Enhance the performance using dramatic techniques and student suggestions.



Part II: Digging In and Finding Out

Logistics

Time required: five to ten, 45 minute classroom periods

Group Size: individual or small groups

Setting: classroom

Objectives

Students will have the opportunity to:

- increase their knowledge and understanding of wolf biology and behaviour
- investigate at least one issue involving wolves in Alberta
- explore the future of wolves in Alberta.

Materials

- wolf edukit props
- wolf edukit library
- student independent study files
- current clipping file
- school library resources (if available).

Teacher Background

Issues that involve wolves will have now been explored and identified by the students in Part I. The challenge from this point forward is for each of the students to pick one of the issues and then examine all aspects of the issue to become an expert. The questions *How to study about Wolves?* and *What to study about Wolves?* will be answered as the students work through the independent study files of *World of Wolves*.

The edukit materials and library present opportunities for hands-on exploration, examination of major ecological understandings, (i.e., cycles, interrelationships, change), participation through sharing and doing, and opportunities to use their new knowledge.

Using other resources such as the school library, computer files, resource people, and resource institutions, students will begin to find the information necessary to form educated opinions about wolves. Through *digging in and finding out* students will move from what happens *in books in school* to what is happening *to wolves in the wild*.

Understanding of environmental issues invites a broad range of learning possibilities and emotions. The objective and the subjective is often connected to the emotions which sustain all actions:

- subjective learning: exhibiting or affected by personal bias, emotional background.
- objective learning : tendency to view ideas as external and apart from self consciousness; being detached, impersonal, unprejudiced.
- passion: A state or capacity of being affected by external agents or forces. Passion often implies an emotion that stirs one to the depths; as love or hate, but it may also be used more abstractly; manifesting one's passion for a cause or an end.

Instructions for the Teacher

- Students, having identified issues and topics in *Part I: Voices*, should now choose, as individuals or groups, one of those issues and topics for further investigation.

As a research project, one student or group may choose to do a survey of class attitudes before students conduct their studies and then again after students have completed their final project. These students would need to design an opinion survey form and complete the statistical analysis of the results. The results could then be presented in *Part III: Sharing*.

- Introduce the sharing options available to the students in *Part III*. A discussion will help the students understand that *World of Wolves* proceeds in an organized way to a definite outcome. Through their research and presentation activities, students will become knowledgeable about what actions (*Part IV*) might be taken to address wolf issues in Alberta.
- Student independent study files are included in the edukit. A list of the file names and a brief summary of each follows. Students should determine, in consultation with the teacher, which files are appropriate for their chosen issue.
- Each file is consistent in its organization. On the outside cover is: the file name, a brief summary, the file contents, and a materials list. Inside each file, the student will find all or some of the following: background information, investigations, discussion questions, answer sheet, and resource reading list.
- These files will guide students through their research by giving background information, suggesting activities, posing questions, and listing resource readings.
- A Current Clipping File, containing newspaper or magazine articles, can be found in the edukit library. *Students are asked to contribute to the file while the edukit is in their school.*
- The following files are common to all issues and topics and all students should work through these files. Multiple copies can be made of the files found in the edukit. Completion of these files will give students a basic understanding of wolf biology, behaviour and the politics of wolves:
 - File 1 - The History and Status of Wolves
 - File 3 - Was That a Wolf I Saw
 - File 9 - Wolf Pack Life
 - File 14 - The Future of Wolves in Alberta
- Students will access other independent study files, depending on their chosen topics.
- When students have completed their independent investigations continue to *Part III: Sharing*.

Summary of Student Independent Study Files and Material Lists

1. *The History and Status of Wolves*

Students will have the opportunity to:

- be introduced to the history and populations of wolves throughout Eurasia, North America and Alberta.
- find a correlation between human population increase and wolf population decrease.

Materials:

- rubber paw print

2. *Wolves in Folklore*

Students will have an opportunity to:

- be introduced to the variety of ways wolves are viewed by humans.
- find out how children's literature has affected viewpoints about wolves.
- discover some other factors that have led to peoples' differing viewpoints about wolves.
- be introduced to the fact that decisions about wolf conservation and preservation must accommodate different viewpoints.

Materials:

- *The Wolf, Real or Imagined* video

3. *Was That a Wolf I Saw?*

Students will have an opportunity to investigate external physical differences between wolves, coyotes and dogs.

Materials:

- coyote and wolf pelts
- swatches of fur from prey
- Kananaskis Country posters
- 1 tape measure

4. *Skulls and Teeth*

Students will have an opportunity to examine and compare the structure and function of the skulls and teeth of four different animals.

Materials:

- canine skull diagram
- skulls of coyote, wolf, cougar, and deer
- 1 mirror

5. *The Importance of Smell*

Students will have an opportunity to develop a better understanding of the role scent plays in wolves' lives.

Materials: *(these need to be prepared by the teacher ahead of time)*

- 8 identical small containers
- 4 different scents (*check for allergies*). i.e., mint, lemon, almond, etc.
- cotton balls

6. *Scat Stories*

Students will have an opportunity to:

- identify scat from different animals.
- infer interrelationships in the food chain from the scat.
- discover information that can be obtained from the examination of scat.

Materials:

- Kananaskis Country posters
- 4 scat specimens: dog, coyote, deer, wolf
- magnifying glass

7. *Tracks and Trails*

Students will have an opportunity to:

- identify different animal tracks.
- make their own animal track.
- observe different patterns of tracks and infer what took place.

Materials:

- casts of wolf, coyote, cougar, and deer tracks
- 1 tape measure
- plaster of Paris
- water
- stir stick
- container for mixing plaster
- bucket or pan full of soft dirt or damp sand

8. *Hunting and Energy Needs*

Students will have an opportunity to:

- identify some different wolf prey species.
- understand how wolves hunt their prey.
- understand the relationship between wolves and their prey.
- understand how wolves fit into the web of life and the energy pyramid,
- understand the energy cycle and that interrelationships exist between plants, animals, and their environment.

Materials:

- swatches of fur from wolf prey species
- wooden blocks

9. *Wolf Pack Life*

Students will have an opportunity to:

- understand how wolf packs are formed and how the size of the pack is determined by the prey species available,
- trace the life of a wolf from birth to maturity,
- understand what a territory is and what factors affect territorial size,
- understand how wolves protect their territory.

Materials:

- *White Wolf Video*

10. Communication

Students will have an opportunity to:

- understand the value of body language in people and wolves,
- observe and identify different messages sent by body language,
- study the communication of wolves through howling and explore the

underlying social structure that governs this behaviour.

Materials:

- cassette tape with wolf howls
- wooden wolf puppet
- cassette player

11. Wolf Research

Students will have an opportunity to:

- understand how animals are located using radio telemetry,
- understand how research is conducted on wolves.

Materials:

- *Let There Be Wolves* video

12. Wolves and Livestock

Students will have an opportunity to:

- find out more about wolf predation and compensation programs,
- discuss opinions about wolf - human conflicts.

13. The Future of Wolves in Alberta

Students will have an opportunity to:

- understand the effects human activities have on wolves,
- understand the factors that will ensure the wolves survival.

Materials

- 1 road runner (measures km on a map)

Part III: Sharing

Logistics

Time required: dependent on student presentation formats

Group size: individual or small groups

Setting: classroom

Objectives

Students will have the opportunity to:

- explore the future of wolves in Alberta.
- express their own vision of the future of wolves in Alberta.

Teacher Background

In Parts I and II students spent considerable time discovering and examining the biology of wolves and the issues surrounding them. It is now time to share what they have learned with others. Four options are available: reports, conference, public hearing simulation and a debate. Based on the interest, energy, and time available; one or more of the options could be undertaken.

Reports could be shared with class peers. The conference, mock public hearing or debate could involve peers within the same grade level, division or entire school. The larger formats could only be held if the whole class agreed upon the issue to be addressed and the audience.

Through these presentations students will have a chance to teach others what they have learned, to present their opinions, take risks, and examine possibilities and solutions in an open and interactive format. These presentations would also give students an opportunity to receive feedback, information and ideas which could be used in *Part IV: Actions*.

Instructions for the Teacher

Once students have completed their research, students may present their findings in one of four formats:

- Reports
- Conference
- Public hearing simulation
- Debate

In all four formats, the students should answer the following question:

- *What should the future of wolves be in Alberta?*

There are at least three possibilities for the future of wolves in Alberta:

- sustain viable population numbers
- eliminate wolves
- no plan but rather a laissez faire approach to the future.

The following questions should also be addressed to more fully explore the various possible outcomes:

- *What can you do to ensure the future you prescribed?*
- *What is your personal goal to achieve your vision?*
- *What actions can you take to achieve your goal?*

Reports

Students may create written or oral reports for class presentations. In this way all students will become better informed about the wolf issues identified by the class in *Part I: Voices*.

Conference

Students may wish to organize a conference titled *The Future of Wolves in Alberta*. The conference could set out to answer the questions posed previously:

- *What is the future of wolves in Alberta?*
- *What can you do to ensure the future you prescribed?*
- *What is your personal goal to achieve your vision?*
- *What action can you take to achieve your goal?*

As participants at the conference students would present information from their research projects completed in *Part II: Digging In and Finding Out*. This information could be expressed through oral reports, songs, music, dramatic presentations, or visual arts. Guest speakers such as ranchers, scientists, and politicians could be invited to present various viewpoints and experiences.

For the students who chose the attitude and opinion survey as their project, the conference would be an opportune time to collect their final data from students. Their findings could be presented as the final session of the conference.

Public Hearing Simulation

Students could host a simulated public hearing on the topic *What should the future of wolves be in Alberta?* Students could take on a variety of roles, (presenting the research that they did in *Part II: Digging In and Finding Out*), public hearing panel members, chairperson, or media. Students may choose to have a panel composed of individuals from both inside the school and beyond (i.e., parents, teachers, local and regional politicians, etc.).

Debate

Students could organize a debate around the following question:

- *What should the future of wolves be in Alberta?*

Debates are a wonderful way of exploring both the knowledge about and passion for a particular issue.

Part IV: Actions

Logistics

Time required: varies
Group size: varies
Setting: classroom

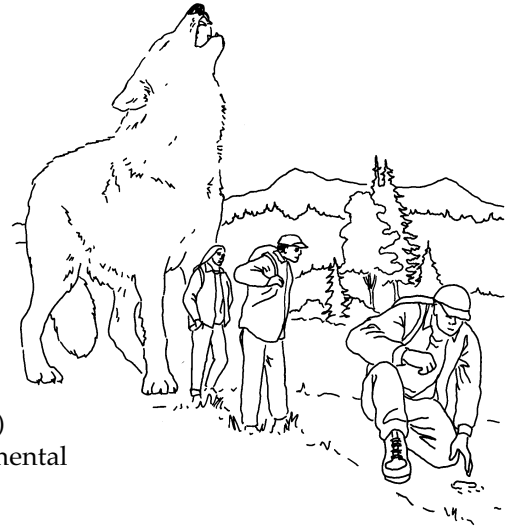
Objectives

Students will have the opportunity to:

- create an action plan for their personal goals.
- act upon their plan.

Materials

- Article: Environmental Issues, Ten Steps to Action (Appendix)
- Article: Action Guidelines and Skills for Addressing Environmental Issues (Appendix)



Teacher Background

Action: the act or process of producing an effect or performing a function; the doing of something; implies a process which takes time and involves more than one step.

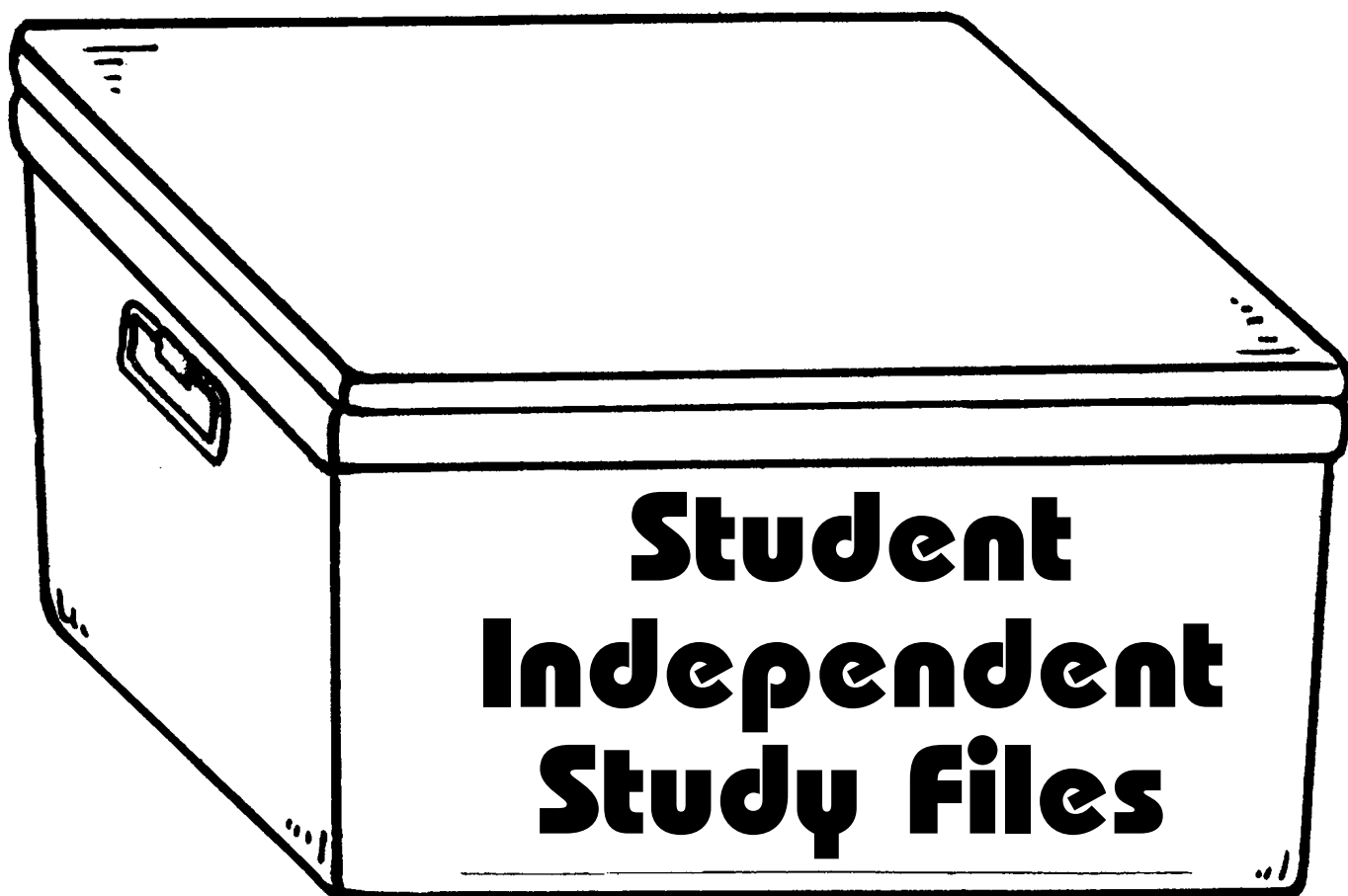
Within Part IV, students are encouraged to take what they have learned and apply it in some way to address their concerns. The teacher can take the student from the classroom to the real world by exploring many pathways:

- political
- economical
- social
- environmental

Students can enrich even further what they have been studying by taking what it is, adding something of themselves to it, and acting upon their concern and opinion. In so doing students will discover that all they have experienced is part of a large pattern of interconnected human involvement, an involvement in which they are an integral and necessary component. It is of little use to comment on the environmental challenges of our time, if we are not also prepared to act in a positive way to address such concerns.

Instructions for the Teacher

- Review, discuss and carry out the steps outlined in the article Environmental Issues - Ten Steps To Action.
- Review and discuss the guidelines given in Action Guidelines and Skills for Addressing Environmental Issues.
- Once actions have been determined and guidelines have been reviewed, begin the process of implementing actions. This is an interactive phase, where students will encounter new challenges. Creativity, commitment and persistence will become the key ingredients to success in addressing environmental issues. Encourage open dialogue, provide support and remind students of the great value and importance of their actions.



File 1: The History and Status of Wolves

File Contents

- Background Information
- Investigations
- Suggested References
- Answer sheet (check with teacher)
- Maps of North America and Alberta.

Materials

- rubber paw print

File Summary

You will have an opportunity to be introduced to the history of wolf populations in North American and Alberta.

Background

Wolves once thrived in most of North America, Europe, and Asia. The only places they did not live were large deserts and tropical forests. Today, their greatly reduced numbers can be found in only a small portion of their original range.

Prior to European exploration and settlement, wolves were found throughout most of North America. Indigenous or native groups respected the wolf for its hunting abilities and strengths.

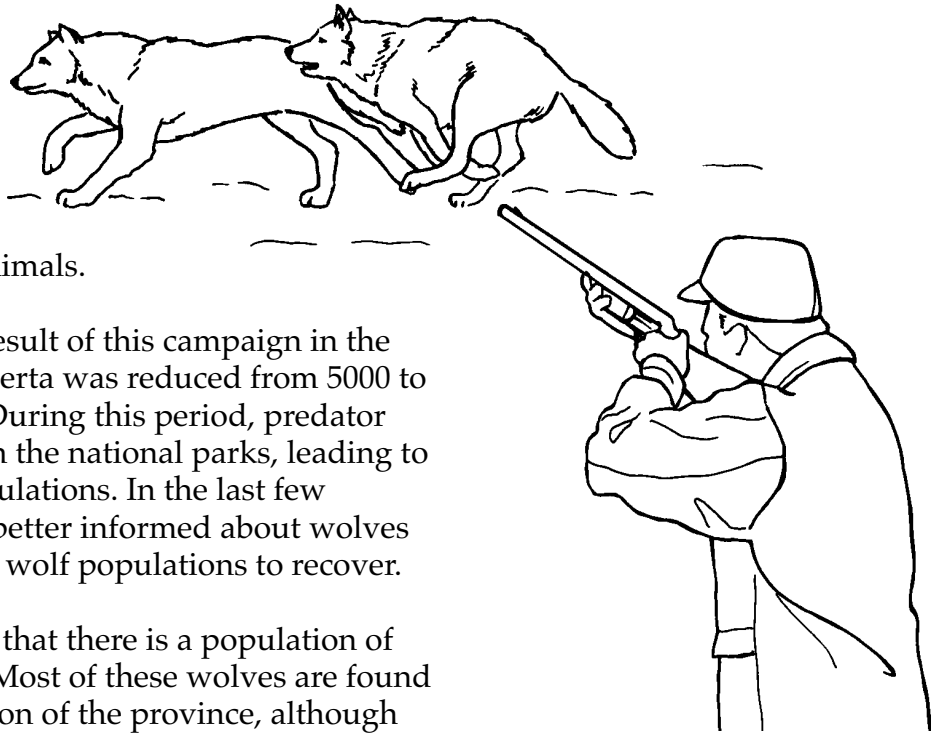
When Europeans arrived, they brought their fear and misunderstandings of wolves with them, just as they brought their mistrust and fear of the wilderness. Immediately upon arrival, settlers began clearing the land and killing wolves. By the late 1800s wolves had been exterminated from the Atlantic provinces and their populations had been pushed northward in Ontario and Quebec. As Europeans moved westward, they killed bison, deer, and other prey of the wolf.

Settlers concerned with the safety of their livestock made an even greater effort to eliminate the wolf. By the 1940s, wolves were essentially exterminated from the lower 48 states of the United States, with the exception of northeastern Minnesota.

Since the arrival of Europeans in Alberta, wolves have experienced two major periods of killing (or extermination). From the late 1800s to the 1920s, wolves were eliminated from most of southern Alberta. This was caused by severe winters, the elimination of the bison herds and other prey species by Europeans, and through persecution of the wolf by both the public and the government. During this period, bounty hunting (a system whereby money is paid to people for killing wolves) took place. Wolves were trapped, shot, snared, and poisoned using strychnine, cyanide, or Compound 1080.

In the 1930s and 1940s, the persecution relaxed, the numbers of prey species improved, and the wolf populations recovered.

Then, in the 1950s there was another predator control campaign in response to the public's fears that wolves were carriers of rabies, were preying on their livestock, and were reducing the number of game animals.



It has been estimated that, as a result of this campaign in the 1950s the wolf population of Alberta was reduced from 5000 to between 500 and 1000 animals. During this period, predator control was also exercised within the national parks, leading to the decimation of their wolf populations. In the last few decades, the public has become better informed about wolves and their attitudes have allowed wolf populations to recover.

In Alberta, it has been estimated that there is a population of between 4500 and 5000 wolves. Most of these wolves are found in the northern boreal forest region of the province, although wolves are also found in other areas except the more heavily cultivated prairie and the aspen parkland regions.

The wolf once lived in the prairies of Alberta, prior to the elimination of the bison. The numbers of wolves found in southern Alberta (south of the Highwood Pass) is estimated by biologists to be less than ten individuals after forty were killed in 94/95.

In Canada, wolves currently occupy 85 percent of their former range. Canada and Alaska still have healthy populations of wolves and some wolves have moved from as far as northeastern British Columbia into Idaho and Montana in the United States. Further, several wolves have moved into southern Alberta from Montana.

In 1979, wolves were once again observed in Banff National Park and in Peter Lougheed Provincial Park in 1980. Since then, wolves have continued to recolonize these areas from the north (Jasper National Park) and from the south (Waterton Lakes National Park and Montana).

Investigations

1. Make a copy of the blank map of North America. Using the map and the historic range maps found in edukit books *Wolf Pack* or *Looking At The Wolf*, use the rubber paw print to indicate on the map where wolves used to live in North America.
2. Use a red marker to “X” out the wolf stamps on the map that are outside the current wolf range. (See the book *Wolf Almanac* for current range).
3. Using a green marker, transfer the statistics on current wolf populations to the map. (See *Wolf Almanac* for statistics.)
4. Make a copy of the blank map of Alberta. Using the map, the wolf stamp, and the information on the present status of wolves found in the pamphlet *Wolves In Alberta*, indicate where wolves are located in Alberta.
5. Using the background information, the edukit library, your school library, and other resources, answer the following discussion questions.
 - a) What happened to the wolves that used to live in most of North America?
 - b) Why did this happen?
 - c) Why weren’t other predators like cougars and bears exterminated?
 - d) Why weren’t wolves exterminated in Canada and Alaska?
 - e) Healthy populations of wolves live in Canada and Alaska right now. If this ever changes, what do you think will be the reasons?



After you have completed the questions and discussed your answers, check with your teacher for the answer sheet.

File2: Wolves in Folklore

File Contents

- Background
- Investigations
- Suggested References

Materials

- wolf photos
- *The Wolf: Real or Imagined?* video and study guide

File Summary

You will have the opportunity to:

- be introduced to how wolves are viewed by humans
- find out how children's literature has affected viewpoints about wolves
- discover some other factors that have led to people's differing viewpoints about wolves
- realize that discussions about wolf preservation must accommodate different viewpoints.

Background

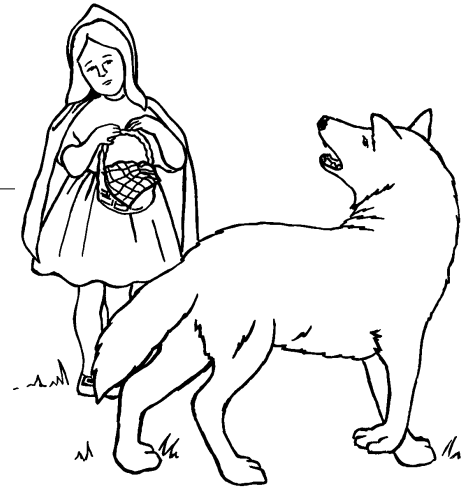
Wolves and humans have lived near each other for many thousands of years. Throughout this time humans have viewed wolves in many different ways. This is natural. We all view things differently. Our viewpoint depends on how we were raised, what stories and movies we have heard and seen, what experiences we have had, and how we live.

Wolves behave very much like humans who live by hunting and gathering. Both live in family units, cooperate to kill animals larger than themselves, defend their hunting grounds from others of their kind and display very complex social behaviours.

Perhaps it is the similarities between wolves and humans that cause us to have so many different feelings about them.

Following are three common viewpoints:

- Many hunter-gatherer societies view the wolf as a teacher who can show them how to hunt animals larger than themselves, live together cooperatively, and yet remain strong
- Many people, especially those in cities who are isolated from natural processes, view the wolf as a *noble, perfect* animal. They believe that the wolf, unlike their own society, lives in harmony with the natural world.



Most of us share some or all three viewpoints. None are wrong or right; they are simply the viewpoints of people living in different environments. While it is natural that we see things differently, it is important that we all become better able to recognize where our own viewpoints and those of others originate.

When we do not understand fully, we are liable to believe false or limited information. For example, people who view wolves as bad are more likely to believe that wolves are dangerous to humans. They may not accept that no documentation exists of anyone being seriously injured by a wild, healthy wolf in North America. In fact, some researchers may interrupt wolves while they are feeding. When this happens, the wolves leave and do not return until the researcher leaves the vicinity. We all know dogs that might behave very aggressively in that situation!

On the other hand, someone who believes that wolves are noble animals may refuse to recognize that some wolves kill livestock and that wolves don't kill sick and weak animals exclusively. Because they believe the wolf is a "perfect" animal, these people may become very upset at the thought of killing wolves under any circumstance. They may believe that management that includes any wolf killing is really a plot to drive wolves to extinction.

Investigations

There are a number of questions to be answered about wolves. The following is a list of activities which you can choose from to continue your exploration of wolves. Discuss your choices with your teacher.

1. List all the similarities you can think of between wolves and humans. Keep the list going for as long as you are studying wolves. Which of these characteristics do we like in ourselves and which ones do we dislike? Draw two large circles in your notebook. Label one circle human and the other wolf. Put the attributes shared by wolves and humans in the overlapping area.
2. Look for a variety of pictures showing how wolves are portrayed by different individuals and groups. Survey books from the edukit library and the school library. Write down some words in your notebooks that express your feelings when you see each photo. Which photos make you like wolves? Dislike wolves? Fear wolves?

3. As a review, to explore where our first impressions about wolves may have originated, read the stories *Little Red Riding Hood*, and *The True Story of the Three Little Pigs*, found in the edukit Library. How are wolves portrayed in each of these stories?

List five words to describe the human attributes the authors gave wolves in each story. Do any of these stories have anything to do with wolves? Are they based on fact?

4. Pick one of the above stories and rewrite it from a different viewpoint or write your own story from two different viewpoints. Try and name other stories, movies, fairy tales, songs, advertisements, or programs in which wolves have played a role. In which ones have wolves been portrayed as good and in which have they been portrayed as bad? Why do we think of these animals as good or bad?
5. Discuss the following question with several of your classmates: Is it fair to give animals human characteristics that we admire or hate? Is a wolf cruel when it kills a deer? Is a sparrow cruel when it picks apart an insect to eat?

To anthropomorphize is to give human characteristics to non-human things. When we give human characteristics to animals, what are we really doing? Can we empathize or relate to an animal without anthropomorphizing?

Science strives to be objective and discourages anthropomorphism. While the perception of an animal provided by science may be factual, is it complete? Do you believe that an animal can be understood by facts alone? Is it possible for a wildlife biologist to be purely objective? Is there a place for anthropomorphic thought in science? If so, at what point does it lose value?

6. Some native cultures see an animal killed by wolves and left uneaten as a gift. What would you think if, on the opening day of hunting season, you found a white-tailed deer killed by wolves but not eaten? Would you eat the deer? Why or why not?

Why do you think wolves sometimes kill more than they eat? (See the book *Wolf Pack - Tracking Wolves in the Wild* for information on why scientists believe wolves sometimes kill more than they can eat)

When wolves kill prey they don't eat, is the animal wasted? Do humans ever do this? Is the natural world efficient? Are humans efficient?

Twenty-nine species of animals have been documented taking advantage of a wolf kill. These include everything from coyotes and ravens to chickadees and flies.

7. Interview your parents and friends about wolves. What are their viewpoints? Are they based on facts? Just a few facts? or mostly stories?

You could ask questions such as:

- What is your viewpoint about wolves?
- What caused you to have that view?
- What might change that view?
- Do you want wolves to be present when you visit a wilderness area?

8. Watch the video *The Wolf: Real or Imagined?* included in the edukit library. Most documentaries that deal with wolves focus on their behaviour and biology; they spend little time on our perceptions of wolves, and the real or imagined wolf that runs in our imagination. This video turns the tables and concentrates on the animal that the human imagination has cast in various roles, ranging from evil to mythical.



Using the study guide for the video, review and select, with your teacher's assistance, the questions most relevant to your study. Using the edukit library, answer these questions, focussing on your area of interest.

9. In what ways are wolves similar to humans (especially cultures which are hunter / gatherers)? Can the wolf provide a vehicle for understanding ourselves? How?
10. List sayings that you have heard that use wolves to make a point, i.e., hungry as a wolf, or wolf down food. Are these sayings true?
11. What are wolves good for? Would the world be better or worse off without wolves, or does it even matter? How about in Alberta?

STUDY GUIDE FOR THE VIDEO: *THE WOLF: REAL OR IMAGINED?*

Background

Most documentaries that deal with wolves focus on their behavior and biology; they pay little attention to our perceptions of wolves, to the real or imagined wolf that stalks through our minds. This video turns the tables and concentrates on the animal that the human imagination has cast in various roles, ranging from evil to mythical.

The *Wolf: Real or Imagined?* can be divided into three major sections:

- perceptions of the wolf by hunter / gatherers
- perceptions of the wolf by agriculturalists
- current perceptions of the wolf

Instructions

The Wolf: Real or Imagined can be tied into many different subject areas including wildlife biology, anthropology, literature, myth and folklore, philosophy, ethics, social studies, and history. Read through the following questions, select the ones that suit your issue or area of interest and answer them, in discussion with others.

- List stories, fairy tales, movies, songs, or programs in which animals are given human characteristics.
- Name stories, movies, fairy tales, songs, or programs in which the wolf plays a role.
- Keep a list for a week or two of how the wolf (or other animals) are used in newspaper and magazine articles and television shows.
- Find out how the wolf is used in advertising, by special interest groups and organizations.
- On a sheet of paper, draw two large circles that overlap. Label one circle *human* and the other *wolf*. Place characteristics of each category in the separate circles. Put attributes shared by wolves and humans in the overlapping area.
- Make a list of sayings you have heard that use animals to make a point. (Hungry as a wolf, lazy as a sloth, slow as a turtle, eats like a bird.) Are these sayings true?

- Think of other animals that have been stereotyped in stories; snakes, bears, lions, ravens, etc. Name three animals that have been portrayed as *good* and three animals that have been portrayed as *bad*. Why do we think of these animals as good or bad?

To *anthropomorphize* is to give human characteristics to non human things. When we give human characteristics to animals, what are we really doing? Can we empathize or relate to an animal without anthropomorphizing?

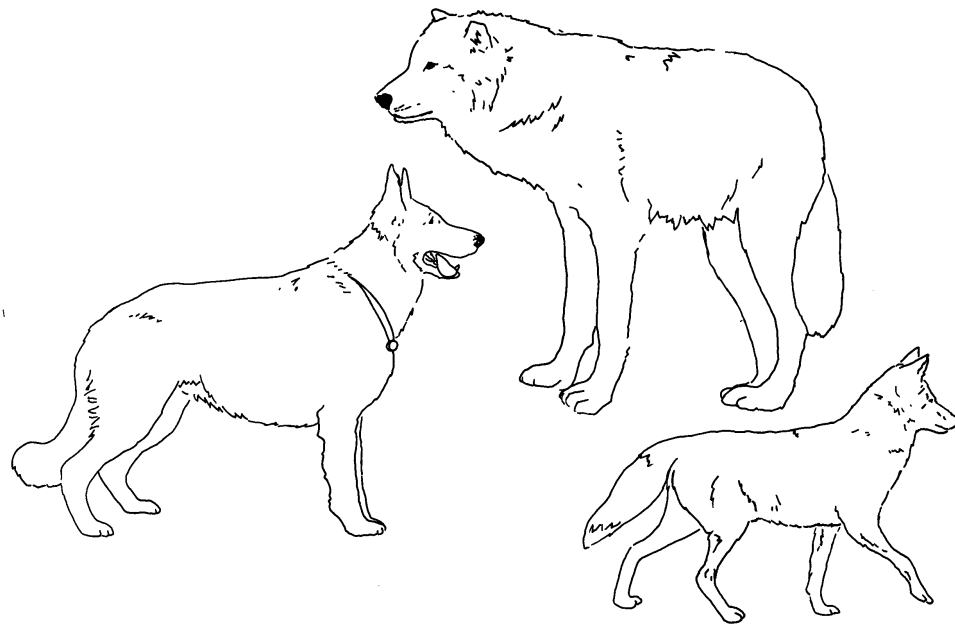
Science strives to be objective and frowns on anthropomorphism. While the perception of an animal provided by science may be factual, is it complete? Do you believe that an animal can be understood by facts alone? Is it possible for a wildlife biologist to be purely objective? Is there a place for anthropomorphic thought in science? If so, at what point does it lose value?

- Imagine you are a wildlife biologist. What animal(s) would you want to study? Why? What animal(s) would you not want to study? Why?
- Why do you think we create stories (such as fables) with animals? What animals do we give positive human characteristics? What animals do we give negative human characteristics? How has the wolf been portrayed? Is that a *fair* or true picture of the animal?
- Given that the human imagination requires villains and monsters, should we cast animals (such as the wolf in *Little Red Riding Hood* and the Great White Shark in *Jaws*) for those roles?
- Discuss the difference between *Goldilocks and the Three Bears* and *Little Red Riding Hood*. Did the bears ever present an actual threat to Goldilocks?

Discuss how the ending of *Little Red Riding Hood* has changed through the years. Why has this happened?

- Are humans part of the natural cycle? Are we animals? Are humans predators? Where is our place in the food chain? What is the wolf's place in the food chain?

- When wolves kill prey they don't eat, is the animal wasted? Why might wolves kill prey and not eat it? Is nature efficient? Do humans ever do this?
- Dogs are direct descendants of the wolf. Why is the dog *man's best friend* and the wolf often characterized as an enemy?
- In what ways are wolves similar to humans (especially hunter/gatherers)? Can the wolf provide a vehicle for understanding ourselves? How?
- Pretend you are making up a story in which the main characters are represented by a wolf and a deer (and any other animals you might want to include). What kind of car does the wolf drive? What kind of food, entertainment, and clothes does the wolf like? How about the deer?
- What are wolves good for?
- Would the world be better or worse off without wolves, or does it even matter? How about in Alberta?



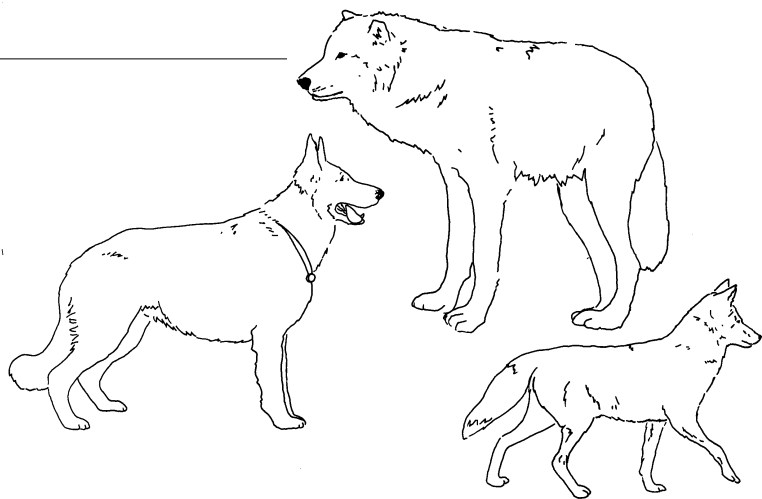
File3: Was That a Wolf I Saw?

File Contents

- Background
- Investigations
- Answer sheet (check with teacher)
- Suggested References

Materials

- coyote and wolf pelts
- swatches of fur from wolf prey
- Kananaskis Country posters
- 1 tape measure



File Summary

You will have the opportunity to investigate external physical differences between wolves, coyotes and dogs.

Background

Wolves, coyotes, and some breeds of dogs look similar from a distance. Often people report that they've seen a wolf even when they can't identify specific characteristics. In case you ever see a large, doglike animal, make sure you know how to tell these three members of the dog family apart.

There are many similarities between dogs, wolves, and coyotes. They all belong to the Canidae or dog family. They all have carnassial teeth used for shearing. Their behaviour is similar. They all display dominant, submissive, and aggressive postures. Their play is similar.

Dogs, wolves, and coyotes can communicate well with each other. It has been found that ninety-seven percent of a dog's behaviour is the same as a wolf's. Compare this to cat and dog behaviour that is very different. When dogs want to play they put their ears back and wag their tail. To a cat, ears back and a wagging tail is communicating aggression. No wonder cats and dogs seldom get along!

Many people wonder how many types (subspecies) of wolves there are. Wolves were divided into 24 subspecies in North America in the early 1900s. However, many biologists now feel that wolves are so similar that at most there should be only two or three subspecies.

All subspecies of wolves belong to the species *Canis lupus*. In the Rocky Mountains, for example, two recognized subspecies originally existed: *Canis lupus irremotus* and *Canis lupus columbianus*. After two periods of extirpation and recolonization in the central Rockies however, the two subspecies are less distinct. The red wolf, (*Canis rufus*) which used to live in the southeastern United States, is a smaller wolf and is considered a separate species by many scientists.

Investigations

Collect the materials needed from the Wolf Edukit. By looking at the pelts and using the measuring tape, reading the background information and resource books make a copy and fill in the comparison chart found on the next page. After you have completed the chart answer the following questions.

1. If you see a doglike animal, what are four things you could look for to decide if it's a coyote or wolf?
2. Name one thing that would indicate that you're seeing a malamute dog and not a wolf?
3. Where are the longest hairs on the coyote and wolf located?
4. What is the function of this long hair?
5. What is the short, soft hair next to the skin for?
6. An adaptation is a change in plant or animal structure or behaviour that helps it better survive in its particular environment. List some ways in which the wolf and coyote's fur is adapted to help these animals survive.
7. Look at the swatches of fur in the wolf prey species bag. Describe how your own human hair is different from the hair of the other animals.
8. How is the hair of the wolf's prey different from the hair of the coyote and wolf?
9. Deer and elk hair has hollow shafts. What benefit might this provide?

After you have filled in the chart and completed the questions check with your teacher for the answer sheets.

Wolves, Coyotes, and Dogs - A Comparison

<i>Feature</i>	<i>Wolf (Canis lupus)</i>	<i>Coyote (Canis latrans)</i>	<i>Dog (Canis lupus familiaris)</i>
<i>Colour</i>			
<i>Size</i>			
<i>Tail</i>			
<i>Ears</i>			
<i>Muzzle</i>			
<i>Feet</i>			
<i>General</i>			

File4: Skulls and Teeth

File Contents

- Background
- Investigations
- Answer sheet (check with teacher)
- Suggested References

Materials

- canine skull diagram
- skulls of coyote, wolf, cougar, and deer
- 1 mirror

File Summary

You will have an opportunity to examine and compare the structure and function of the skulls and teeth of five different animals.

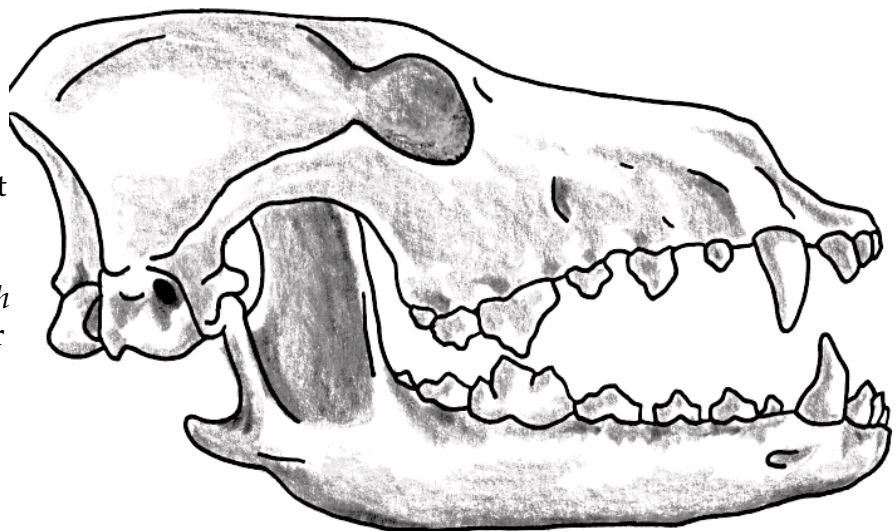
Background

Animals' teeth tell much about them. There are 4 main types of teeth:

Incisors are used for nibbling. Animals that eat plants (herbivores) use these teeth to nip food from plants. Animals that eat meat (predators and scavengers) use these teeth to clean meat scraps from bones.

Canine teeth are used for grabbing. A herbivore does not need large canine teeth because plants don't try to escape. The larger and stronger a predator's prey is, the larger and thicker the canine teeth are; slender canine teeth could break while the prey struggles.

Premolars and **molars** are for crushing, tearing, and grinding. A herbivore uses these teeth to grind and crush plants. A predator uses these teeth to tear off chunks of meat and to crush bones for the marrow inside. Specialized premolars called *carnassial teeth* act like scissors to shear or tear off chunks of meat.



The rest of the skull also tells us interesting information about an animal:

Eye sockets on the side of the head indicate an animal preyed upon by other animals. It can see danger coming from behind. Sockets toward the front of the head are important for animals that need to perceive depth and are not as worried about things sneaking up on them.

The *sagittal crest* (the bony ridge on top of the skull) is where the lower jaw muscles attach to the skull. A large sagittal crest means an animal has large, powerful jaws.

Note: Skulls are prepared for exhibit in several ways. The skulls in this kit were preserved by first cutting off most of the meat and then putting them in a colony of special beetles to clean off the rest of the meat. Skulls are then soaked in ammonia and hot water to remove fat from the bone. Teeth often chip, crack and loosen as the skulls dry. **Please handle them carefully.**

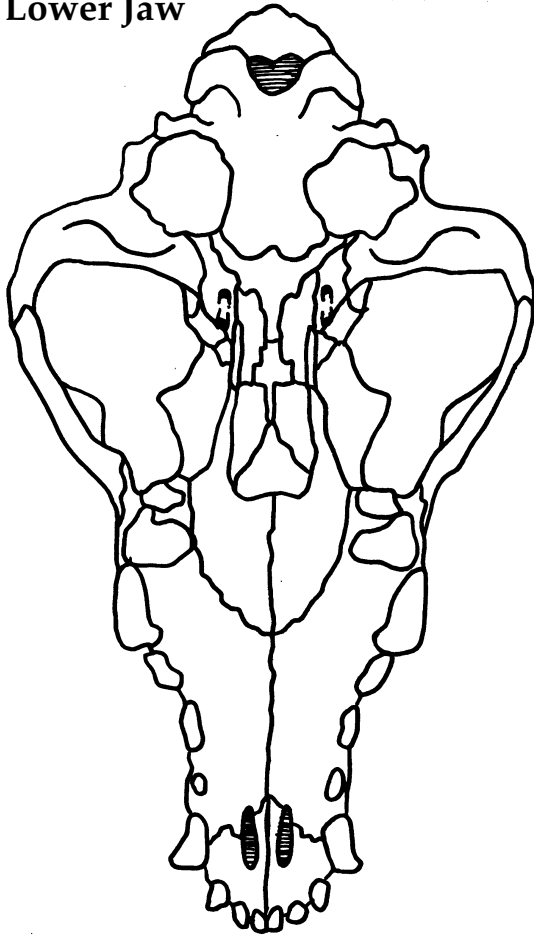
Investigations

Collect the listed materials. Using the canine skull diagram, find the incisors, canines, premolars and molars on all four skulls and on yourself or a friend.

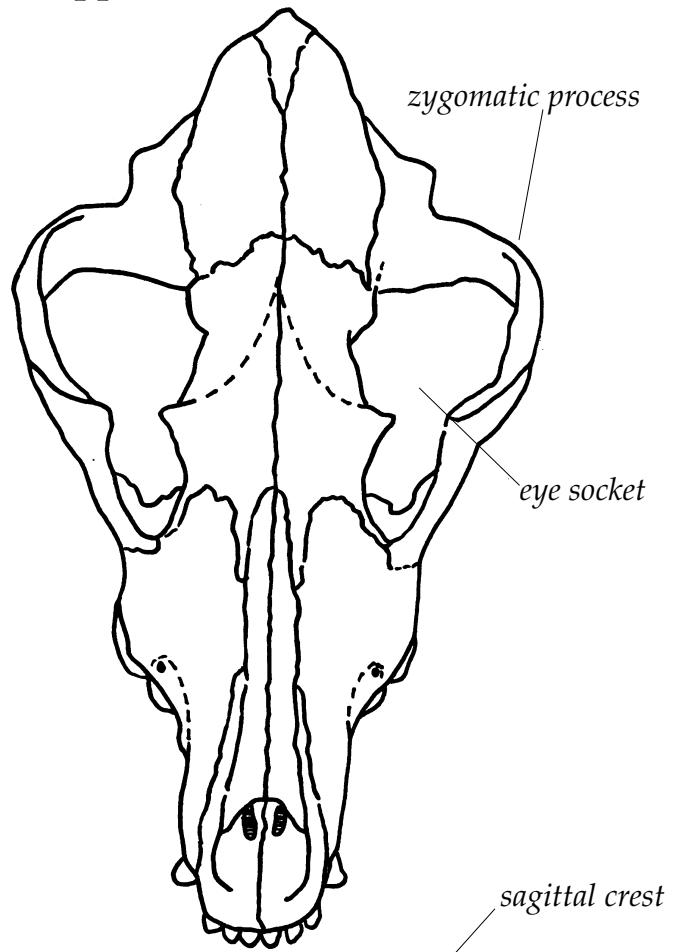
1. How many incisors, canines, premolars, and molars do each of the animals have?
2. Each of the different types of teeth are adapted for a different function. What do the animals use their incisors for?
3. What do the animals use their canine teeth for?
4. What do humans use in place of large canine teeth to *grab* food?
5. What do the animals use their premolars and molars for?
6. Look at the deer's teeth. Which are the incisors?
7. Look at the molars of the predatory animals (coyote, wolf, and cougar). The biggest molars are called *carnassial teeth*. What are the carnassial teeth used for?
8. What do people use in place of carnassial teeth to tear off pieces of meat?
9. The sagittal crest is the bony ridge on top of the skull. Find the sagittal crest on each of the skulls. What do you think this crest is for?

10. Which animals have the largest sagittal crest and why?
11. If someone has a large gentle dog, measure the length of its canine tooth. How does it compare with the wolf's?
12. Name three characteristics that distinguish dog skulls from wolf skulls.
13. Name three characteristics that distinguish the cougar skull from the wolf skull.

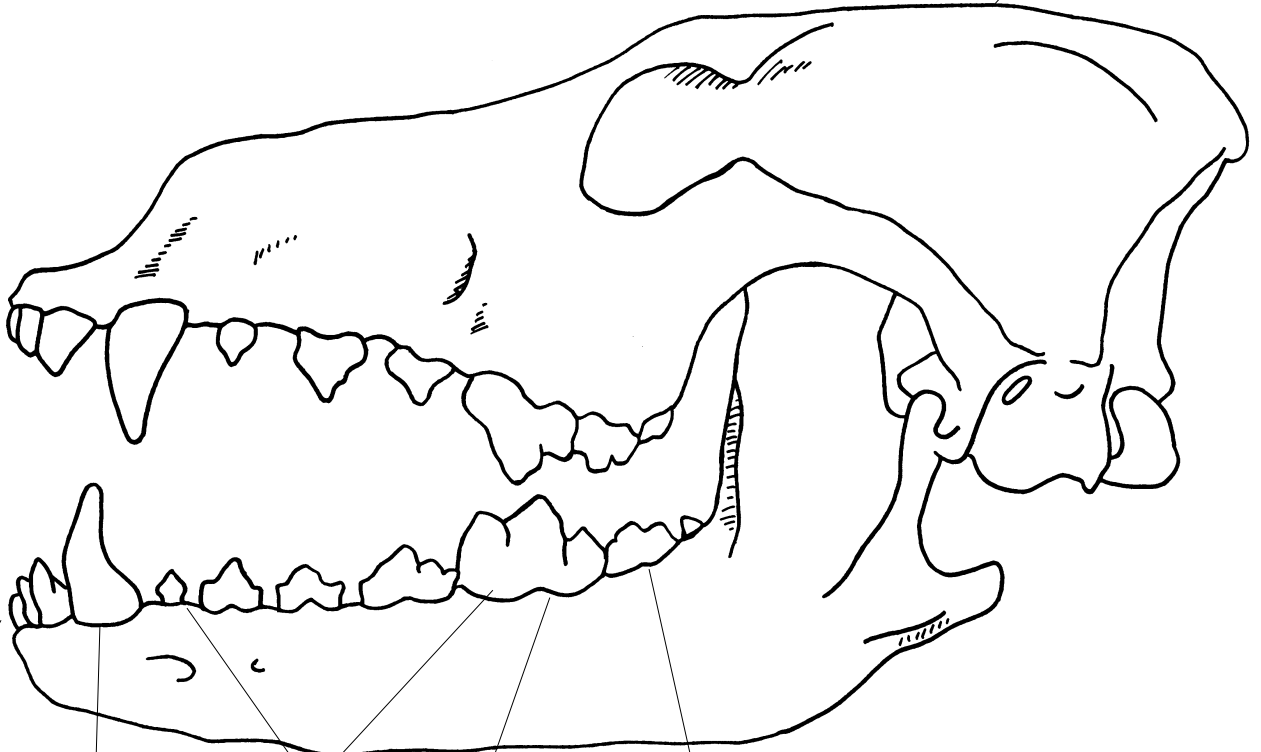
Lower Jaw



Upper Jaw



sagittal crest



Incisors

Canine

Premolars (Carnassial)

Molars

File5: The Importance of Smell

File Contents

- Background
- Investigations
- Suggested References

Materials

- ☐ 8 identical containers (e.g., empty film canisters)
- ☐ 4 different scents (**check for allergies!**) i.e., peppermint, lemon, clove, almond, etc.
- ☐ cotton balls: Dip two cotton balls in the same scent and put each in a separate container. Mark one container with the name of the scent, leave the other one unmarked. Do the same for the three other scents.
- ☐ tissues
- ☐ September 1986 and October 1987 National Geographic articles on sense of smell from the Wolf Edukit Library

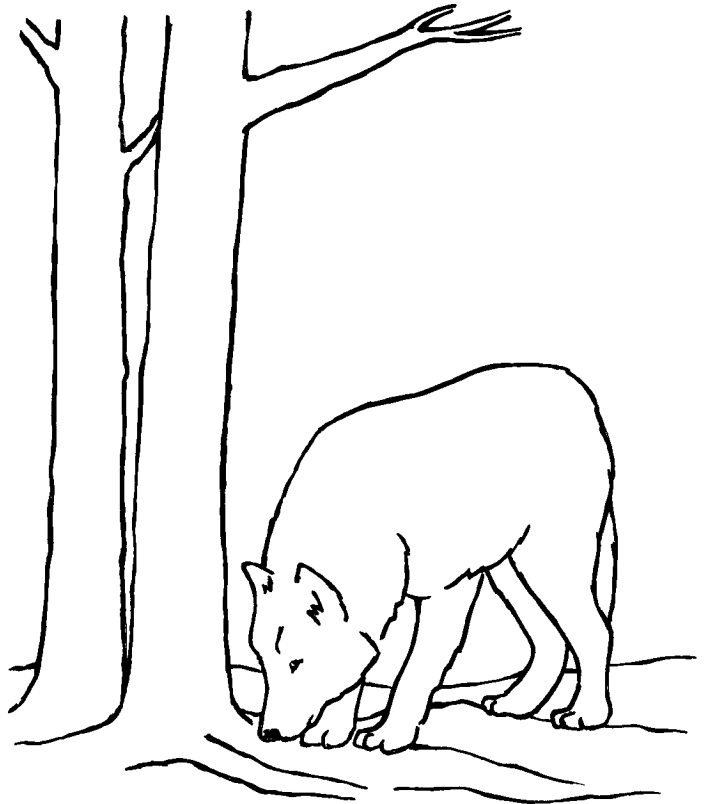
File Summary

You will have an opportunity to develop a better understanding of the role scent plays in wolves' lives.

Background

The sense of smell may be as important to a wolf as the sense of sight is to us. Some researchers estimate that wolves can smell one hundred times better than we can! It is difficult for us to conceive how useful that could be because our own sense of smell is so poorly developed in comparison to wolves.

Wolves use odours to find their way around their territories in much the same way we use road signs. They do this by scent marking (urinating and defecating) on prominent objects such as stumps. These scent marking posts are *freshened up* regularly. They are especially common at intersections of travel routes and around the borders of their territories.



Wolves produce odours that tell the other wolves their rank in the pack and whether they are ready to breed. Wolves in a pack rub up against each other so that they all smell alike and can easily tell members of their pack from those of a strange pack. Rubbing may also be a form of bonding. Individual wolves may smell different from each other and can be distinguished by members of their own pack.

When a wolf rolls in something that smells foul to us, it may be a way of bringing messages back to other pack members about a food source. Of course, it may be that the smell of a dead animal to a wolf is like the smell of a fine perfume to us!

Through their noses, wolves can *read* the news of the last few days. They can tell where and when a deer crossed the trail and where a raven spent the night. They may even be able to tell the physical condition of a prey animal by the odour it produces.

Investigations

1. Collect the listed materials.
2. Test your own sense of smell by trying the following activity. ***Check for Allergies!***

Open the lid on one of the marked scent containers (i.e., lemon, mint, etc.) and smell inside it. Close the lid.



Now use your nose to check the four unmarked containers for the same smell. One unmarked container will hold the same smell.

Continue until you have matched the smells of the four marked containers with the four unmarked containers.

3. Try the same experiment with a tissue over your nose. This may simulate the sensitivity of human smell as compared to wolves.
4. Observe your dog or a friend's dog when it's out for a walk. Find out the answers to the following questions:

During a ten minute walk, how many times does the dog spend investigating things with its:

nose _____
eyes _____
ears _____

What might this observation tell us about a dog's use of its senses?

File 6: Scat Stories

File Contents

- Background
- Investigations
- Suggested References
- Scat Identification Key
- Answer sheet (check with teacher)

Materials

- 4 scat specimens; wolf, coyote, dog, deer
- magnifying glass
- Kananaskis Country posters

File Summary

You will have the opportunity to:

- identify scat from different animals
- infer interrelationships in the food chain from the scat
- discover some information that can be obtained from the examination of scat.

Background

Scientists learn many things about animals by studying their droppings or scat. Scat studies can help us determine:

- what the animal eats
- how many animals live in an area. The amount of scat found in an area can be compared to the amount of scat found there at a later date. If less scat is found in the same area at a later time, it may mean there are fewer animals than in previous surveys
- whether the animal has parasites.

For a short time after wolves feed on fresh meat, their scat is very runny and black because blood turns black when it goes through the digestive tract. After the wolves have eaten the organ tissue of the prey animal, they begin to feed on muscle tissue that may have hair attached to it. After eating this tissue, the scat becomes firmer, with more and more hair and bone in it.



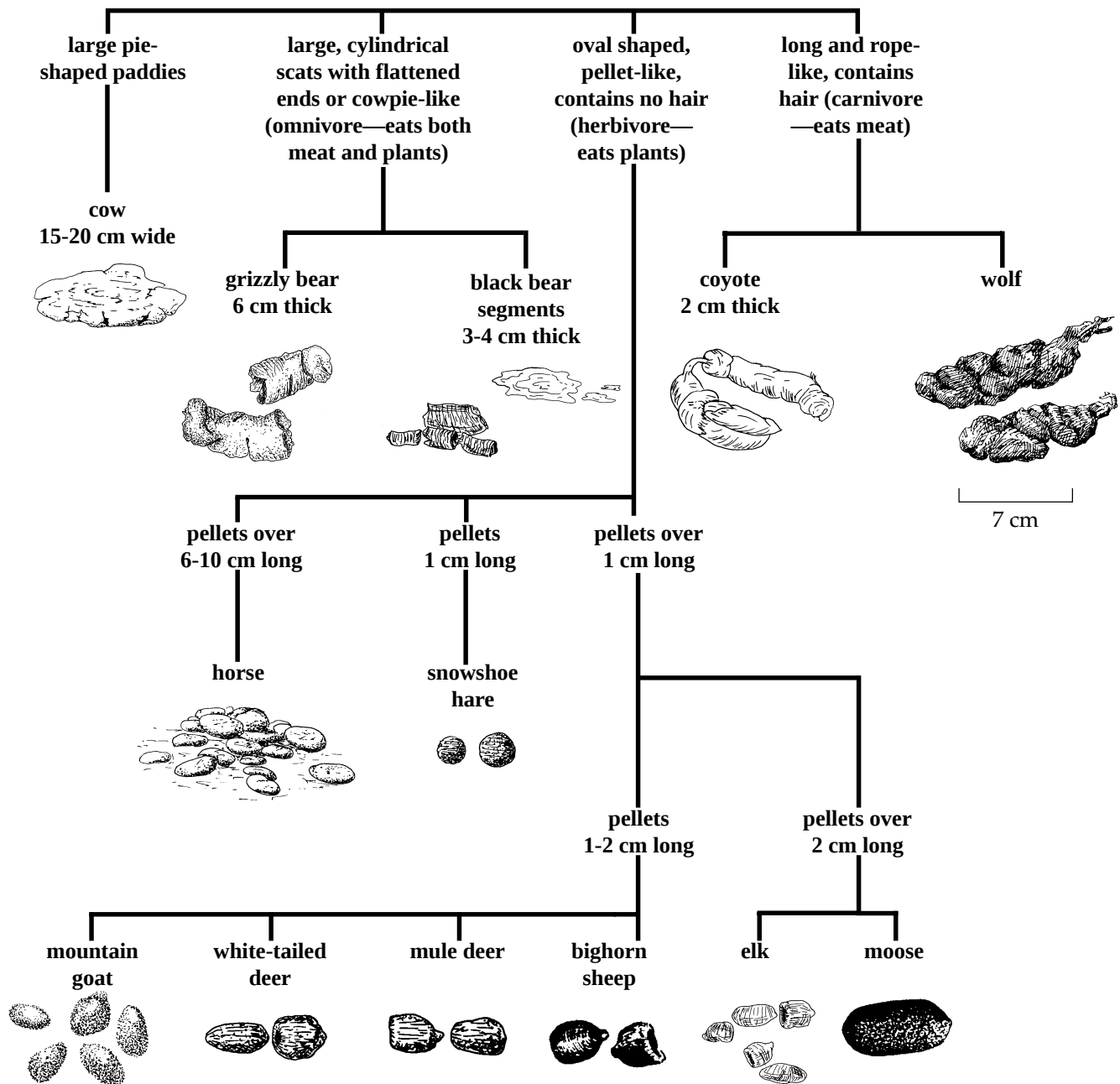
IMPORTANT: *Scat of any animal may contain parasites that are dangerous to humans. Never handle scat with bare hands, and do not breathe dust from the scat. It is highly recommended that researchers wear masks over their nose and mouth when handling scat in the field and laboratory.*

Investigations

1. Collect the listed materials.
2. Examine the four scat specimens in the box and determine which comes from the wolf, coyote, dog, and deer.
3. Two of the scat specimens have hair in them. What animals do you think this hair is from? Why?
4. Work out the following population problem:
 - a) You want to know whether deer populations are increasing or decreasing, so you decide to count the number of deer scats on their winter range. You are going to sample the area by counting scat in 25 study squares which are 25 square metres each. Draw a chart five squares by five squares.
 - b) Map the following data onto your chart. The first year you find the following numbers of scat on the 25 study squares (1 deer scat may contain up to 30 or more pellets): 2, 1, 0, 0, 1, 5, 0, 1, 1, 0, 0, 3, 1, 0, 0, 2, 0, 1, 2, 0, 2, 1, 1, 2, 0 (from left to right).
 - c) Draw a second chart, five squares by five squares. Map the following data onto the chart. The second year you find the following numbers of scat on the 25 plots: 0, 1, 1, 4, 2, 0, 1, 0, 2, 1, 1, 3, 0, 2, 2, 1, 3, 2, 1, 0, 3, 1, 0, 2, 2 (from left to right).
 - d) Is the average number of scat more or less for the second year?
 - e) What factors, besides changes in population, could cause the difference?
5. Research will help you find the answer to the following question: *How can we monitor numbers of individuals in species such as wolves, bears, and cougars?* The number of individuals within each of these species is naturally low in comparison to their prey species numbers and they are extremely difficult to find.

For information on predator monitoring, students may wish to call their local Fish and Wildlife office, college, university, private wildlife consultants, provincial or national park wildlife biologists. They can also read the booklet entitled *Wolves: Identification, Documentation, Population Monitoring, and Conservation Considerations* included in the three ring binder.

A KEY TO THE MOST COMMON SCATS



File 7: Tracks and Trails

File Contents

- Background
- Investigations
- Suggested References
- Track Mystery Sheets
- Track Mysteries Answer sheet (check with teacher)
- Capturing The Tracks worksheet

Materials

- plaster casts of wolf, coyote, cougar and deer tracks
- field guide to animal tracks
- 1 tape measure
- plaster of Paris
- water
- stir stick
- container for mixing plaster
- bucket or pan full of soft dirt or damp sand

File Summary

You will have the opportunity to:

- identify different animal tracks
- make your own animal track
- observe different patterns of tracks and infer what took place.

Background

Like detectives, biologists often use tracks to tell them who or what came by, when they came by, how fast they were going, and even whether they were injured or not. Good trackers will spend a great deal of time in the woods studying tracks and keeping detailed notes on measurements and other information about the tracks they find. They often go back day after day to see how tracks age in different weather conditions and different kinds of substrate (the material the track is made in—for example, snow, sand or dirt). After an extensive study period, often years, tracks come to mean much more than just imprints in the ground or snow, they come to tell an amazing story of an animal and the life it leads.

When you find a set of tracks, you can often discover what animal made them by following these steps. A field guide to animal tracks will also help you.



1. Look at the shape of the track. Does it have toes? Does it have hooves? The track's shape tells you the general type of animal.
2. Look at the pattern of the tracks. Is the animal hopping? Trotting? Walking?
3. Measure the intergroup distance or stride length. That's the distance from where the toes of one foot hit the ground to where the heel of the next foot hits the ground.
4. Measure the size of the track. The length is the longest part of the track, including the claws. The width is the widest part of the track.

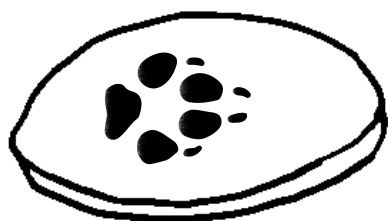
Investigations

1. Measure the length and width of your own footprint or track.
2. Measure the intergroup distance of your footprints.
3. Measure the intergroup distance of a dog, a cat, and any other available animals.
4. Compare your various measurements with others in your class. Is there a correlation between the length or width of a person's track and their intergroup distance?
5. Make your own cast of one of the animal tracks in the box by following the steps outlined in the instruction sheet, *Capturing The Tracks*.
6. After completing steps 1 to 5, study the Track Mysteries included in the study file. Each mystery shows a series of tracks. Determine what happened by studying the tracks and the signs left behind.

After you have worked through your answers, check with your teacher for the answer sheets.



CAPTURING THE TRACKS



Using one of the plaster molds provided in the Wolf EduKit, make a positive image of the track.

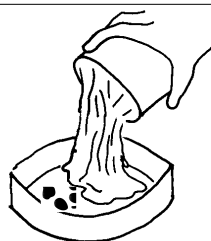
Place the cast from the edukit on a flat surface. Cover the surface of the track with a thin coating of spray cooking oil.



Fit a plastic collar around the track so that it sticks up 3 cm above the cast.



Mix up some plaster of Paris according to the instructions on the box (plaster of Paris can be purchased at most hardware stores).



Pour the plaster over the track.



Let it set and then carefully separate it from the original mold.



You will now have a positive impression of the track.

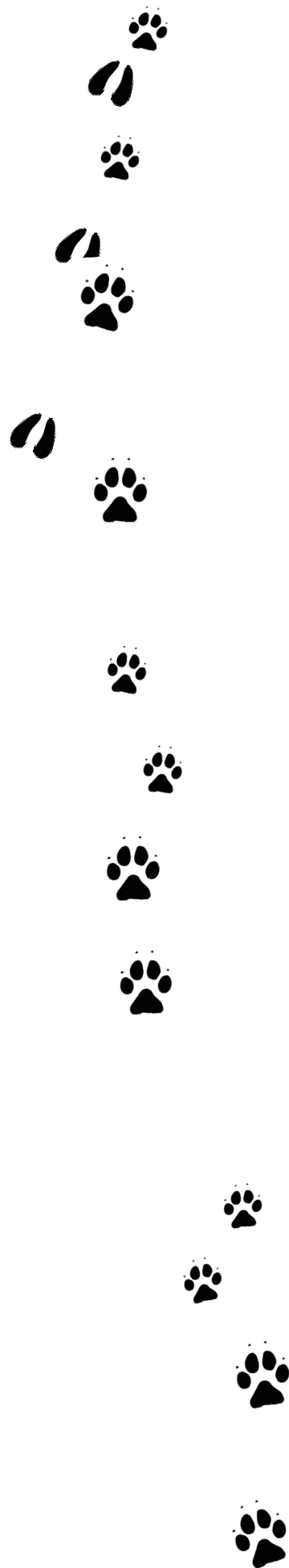
Track Mystery I

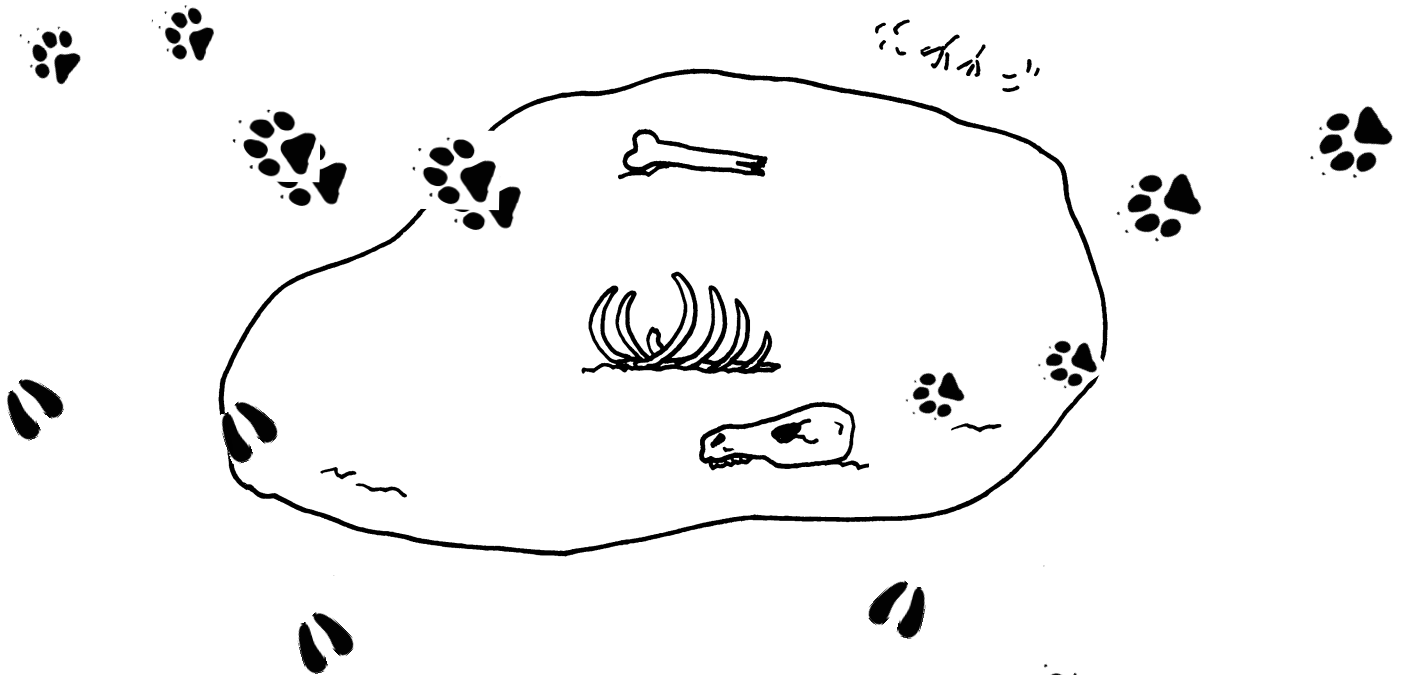
Key

Wolf



Deer





Key

Wolf



Deer



**Trampled
Area**



Track Mystery II

Track Mystery III



Key

Wolf



Moose



**Dead
Wolf**



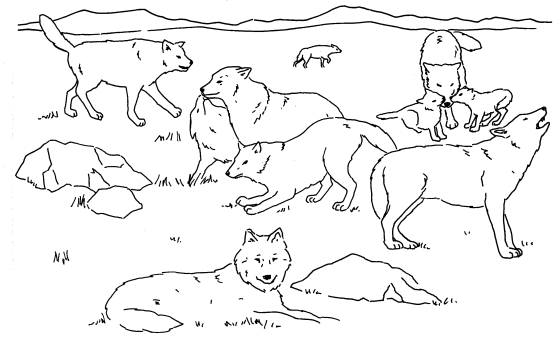
File8: Hunting and Energy Needs

File Contents

- Background
- Investigations
- Answer sheet (check with teacher)
- Suggested References

Materials

- swatches of fur from the wolf prey species
- *The Wonder of Wolves* book
- the essay *Thinking Like a Mountain* by Aldo Leopold
- wooden blocks



File Summary

You will have the opportunity to:

- identify some different wolf prey species
- understand how wolves hunt their prey
- understand the relationship between wolves and their prey
- understand how wolves fit into the *web of life*
- understand the energy pyramid,
- understand that interrelationships exist between plants, animals, and their environment.

Background

Wolves are predators, surviving by killing and eating other animals. Wolves eat primarily ungulates, which are cloven hoofed animals that eat plants. Many of the wolf's prey are considerably larger than the wolf itself. Common prey species and average weights include: deer (45 kg), caribou (136 kg), deer (270 kg), moose (400 kg), bison (690 kg), and musk ox (362 kg). In contrast, an average wolf weighs 36 to 45 kg. A large wolf weighs 55 kg.

Wolves also eat beaver and less commonly, mountain sheep and mountain goats. Mice and ground squirrels are not usually a major portion of their diet.

Wolves hunt together in packs. Their prey are often the young, the old, or the sick animals of the population. They will kill healthy prey if it is vulnerable (e.g., crust on snow that prey falls through but wolves are able to stay up on).

When wolves find a likely prey, they may challenge it to see if it is worth the effort of trying to bring it down. If it proves to be too difficult, they will leave it alone and move on to another individual. Often wolves are unable to kill a large animal immediately because it is too dangerous.

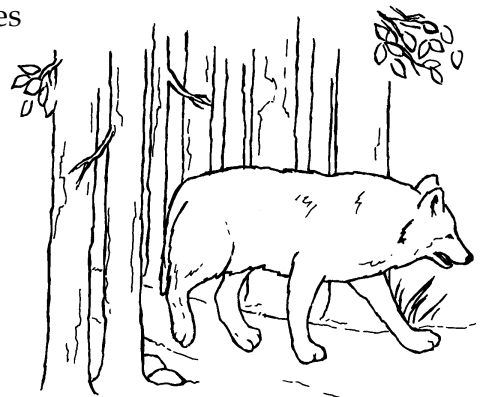
When predators such as wolves attack a large prey animal, they are vulnerable to being hurt or killed by the prey's hooves, horns or antlers. To avoid being injured, wolves sometimes dash in, wound an animal and then wait until it weakens before they kill it. When attacking their prey, they usually aim for the rump or underbelly and then move to the head. Prey is often difficult and dangerous for wolves to kill, so when an animal is taken all parts of the prey are usually eaten. Often all that is left is some hair, blood, and bones on the ground. Occasionally, if conditions are difficult for their prey and easy for wolves, they may kill more than they can eat, and they may kill healthy animals.

Digestive systems in wolves are built for fasting and feasting. They often go for a week or two without eating. When they finally make a kill, wolves may eat nine kg or more of the fresh meat. It takes considerable energy to hunt and kill large animals, and wolves need a lot of food to keep going. To stay in good condition they need an average of 2.5 to 5.5 kg of meat every day.

It is natural to have ups and downs in the numbers of predators and prey. These cycles may take place over a couple of years or over many years. Wolves are sometimes responsible for declines in prey populations, but prey populations also decline when their habitat deteriorates, when winters are severe, or when there are too many human hunters. When this happens, wolf populations decline as well. These predator/prey interactions are very complex and not well understood. We do know that ungulates, like deer and elk, have the biological potential to increase their numbers rapidly, unlike large predators such as the wolf.

Most predators select the most vulnerable members of prey populations; the individuals that are genetically most adapted to escape predation survive longer and reproduce more than less able individuals. The result is that many prey animals, through change over time, come to look and behave the way they do because of their predators.

Wolves and other large predators fill an important role in the natural world. Wolves kill and eat animals that would otherwise compete with healthier animals for food. This helps keep prey populations strong and viable. Wolves may also help to keep prey animals bunched and moving so that they do not overgraze or overbrowse their range.



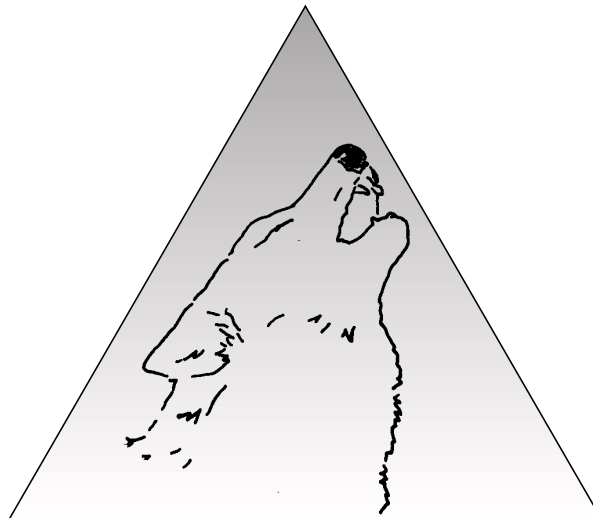
Energy Needs

In the natural environment, all living things are linked to each other. All energy comes from the sun. Energy from the sun is collected in plants. Energy from plants is passed onto herbivores (animals that eat plants). The energy from plant-eating animals like deer, moose, and rabbits is passed onto carnivores (animals that eat other animals, like wolves, eagles, and hawks). As an example, the sun's energy is collected by a willow plant, a deer eats the buds of this plant and a wolf kills and eats the deer. Eventually, when the wolf, deer, and plant dies, their remains then become energy for decomposers such as bacteria, worms and beetles.

Energy is used by living organisms to fuel their life processes. Only a small part of the energy taken in by an animal over its life span is stored; the majority is used by the animal to help it keep warm and perform bodily functions such as breathing, eating and moving. For this reason, the energy available to organisms at each successive stage of a food chain is always less than the energy taken in by the preceding organisms. Energy, unlike most components in an ecosystem, does not recycle - it simply diminishes with each step in the food chain. Fortunately, with the sun as the ultimate source of energy, there is a considerable amount of energy remaining to fuel the food chains of today and tomorrow.

Investigations

In this activity you have the opportunity to build an energy pyramid. In an energy pyramid, the plants which capture energy from the sun are at the bottom. The energy is passed onto herbivores which eat the plants and then again when the herbivores are eaten by carnivores. The pyramid shape shows that more plants are needed at the bottom to support the energy needs of animals at the top. *Why would this be the case?*



Hunting

1. Do humans and wolves seek the same qualities in the prey they hunt?
2. Call your local provincial wildlife agency and ask what sexes and ages of animals are killed most frequently by human hunters.
3. Are there good things wolves might do for prey populations?
4. What times of year are easiest for wolves? Most difficult? Why?
5. Name some circumstances where wolves might kill more than they can eat. Why?
6. Do humans ever kill more than they can eat? Why do humans do this?
7. Are wolves being cruel when they wound an animal and wait for it to weaken before killing it?
8. Where did the saying *to wolf down food* come from?
9. What are some defences prey animals have against wolves?
10. How do prey species defend themselves from wolves?
11. Name factors other than wolves that cause prey populations to decrease.
12. Some wild ungulate females do not let their young get more than a few feet from them during their first few months of life. Observe the distances between domestic cows or sheep and their young. Other wild ungulate young survive by hiding and staying still. If they don't they are at greater risk.
13. If deer were decreasing in an area what factors might be causing the decrease?
14. Read *Thinking Like a Mountain* by Aldo Leopold.

Energy

In this investigation you will have the opportunity to build and see how energy flows in an *energy pyramid*. Energy pyramids include plants, herbivores and carnivores. The pyramid, when completed, should show the position and abundance of the plants and assorted animals. *Where would the plants be found, the herbivores, the carnivores?. Why would this be the case?*

Read the events below, and use the blocks to construct a pyramid, and answer the questions. As you read through the events, think how they would cause a problem. As the events happen, remove blocks in the pyramid. At what point will your pyramid fall apart? See how long you can keep the pyramid together removing only the blocks you are told to move. **Note:** Do not use the purple blocks. You will use those later.

- Humans put out forest fires, aspen trees become scarce as the forest matures. Remove one of the plant blocks.
- Logging removes more trees. Remove another plant block.
- Wetlands are drained. Remove a herbivore block.
- A development project for a new airport changes the habitat. Remove a herbivore and plant block.
- Bad berry crop this year. Remove an omnivore block.
- Severe drought, little growth of grasses and shrubs. Remove two plant blocks.

Try again! By building the pyramid in different ways, see how long you can make it last.

- a) *What happened to the plant eaters (herbivores) and meat eaters (carnivores) as the habitat was changed?*
- b) *Are any parts of the pyramid unimportant?*

Rebuild the pyramid. Remove the blocks as follows:

- Humans kill the wolves. Remove the large carnivore block.
- Disease kills all the snowshoe hares and the bobcats starve. Remove the herbivore and small carnivore blocks.
- Wetland habitat for moose dries up. Remove a herbivore block.
- Since all the wolves were killed, the deer numbers have grown. Add all the purple blocks.

Important: Purple blocks can only go on top of green plant blocks.

- c) *Is there enough food for all the new deer to eat? Is there room on the plant level to hold all the purple blocks?*
- d) *What happens when there are too many animals and not enough plants for them to eat?*
- e) *Where do humans fit into the energy pyramid? Where would you place the blue block?*

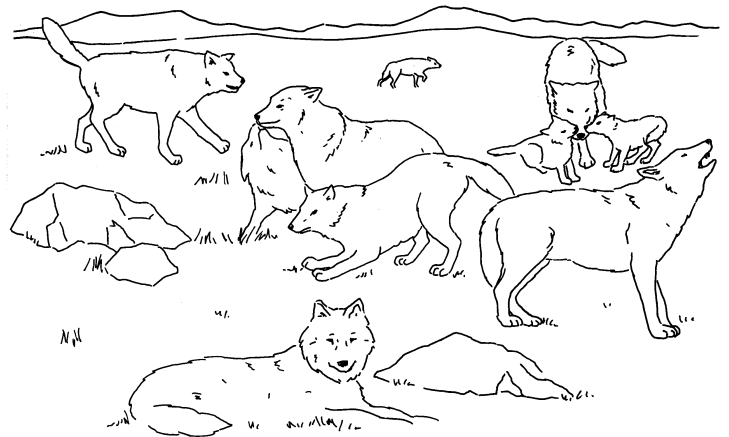
File 9: Wolf Pack Life

File Contents

- Background
- Investigations
- Suggested References
- Answer sheet (check with teacher)

Materials

- White Wolf video
- Wolf Almanac
- VCR



File Summary

You will have the opportunity to:

- understand how wolf packs are formed and how the size of the pack is determined by the prey species available
- trace the life of a wolf from birth to maturity
- understand the various roles of different pack members in raising the wolf pups.
- understand what a territory is and what factors affect the size of that territory
- understand how wolves protect their territory.

Background – Wolf Packs

Most wolves live together in groups called packs. A pack of wolves is not just a bunch of wolves that have somehow found each other. Rather, a pack is much like a human family or tribe.

A pack is formed when a male and female wolf leave the pack they were born in (disperse), find each other and breed. During the first year, the pack consists of the male and the female and their pups. When the parents breed the next year, the pack consists of the male and female, that year's pups, and the pups from the previous year, which are now young adults.

A pack of wolves usually has only one breeding pair, though there may be several adults. The breeding wolves are usually the most dominant members of the pack and are called the *alpha female* and *alpha male*. The alpha female is dominant over the rest of the females in the pack and the alpha male dominates the other males. A female, however, can also be dominant over a male in the pack and vice versa.

The alpha female and male are often the oldest members of the pack and have the greatest experience in hunting, defending territory, and directing pack movement. The grownup offspring of the alpha pair occupy the next level of the hierarchy. They are called young subordinates and have special roles under the leadership of their parents. Some may be more dominant than others due to superiority of size or an assertive personality. The juveniles and pups are under two years of age and do not occupy permanent positions in the pack. They take orders from older brothers and sisters and parents. During play and activities, they are constantly testing one another to determine dominance.

When wolves are one to two years old and older, they may disperse and search for a new territory and a mate. These wolves often range over large areas and may travel as far as 800 km from where they were born, though less than 50 km is more common. This movement of wolves maintains the genetic diversity of the population.

When an alpha animal is deposed or replaced by a younger, stronger or more intelligent pack member (often one of its offspring), it might remain in the pack as a low-ranking wolf, or it may be forced out of the pack. If it is forced out it becomes a lone, or *trailing* wolf. Sometimes a dethroned alpha retains a special status in the pack, akin to a retired king or queen.

The number of wolves in a pack depends on the number of prey in the pack's territory, the size of the main prey species, and other factors such as the temperaments of pack members. Packs hunting large prey, such as moose and bison, generally number between 8 and 15, while those hunting primarily deer number between two and five. An obvious reason for this is that it is easier for a large pack to kill the larger animals. Another reason is that dominant animals initiate hunting trips and eat first when an animal is killed. If the pack is large and the prey animal is small, some low-ranking wolves may not get enough to eat. Low-ranking wolves that are not eating well are likely to leave the group.

Birth and Early Life

Having young is a big event in all animals' lives; wolves are no exception. Generally, only the mating pair breed. They usually breed in mid to late February. Around mid-April the pregnant female begins to hunt for a place to have the pups. She may hollow out a rotten log, enlarge a den that was already dug by a coyote or badger, dig a new den, or find a cave. In places like the Arctic where good dens are scarce, a wolf pack may use the same den for many generations!

If the female wolf digs her den, she will make the entrance tunnel one to five metres long and just big enough for a wolf to move through comfortably. At the end of the tunnel is a chamber about 1.2 m by 1.2 m by 0.5 m high. The female does not line the chamber with nest material. The opening to the den is usually south facing. It is dug in sandy soil and near a source of water.

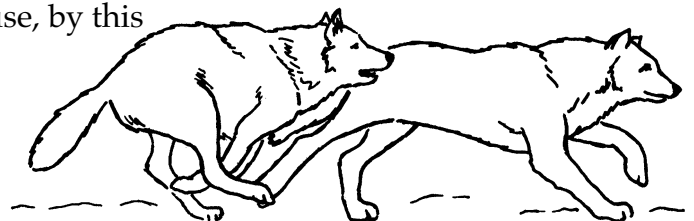
In the Rockies, pups (usually 5 - 6) are born between the third week of April and the middle of May. They are blind and almost hairless at birth and weigh about half a kilogram each. For the first few weeks they are totally dependent on their mother for warmth and food. If the mother leaves for more than an hour the pups may die from cold. Other members of the pack feed the mother during this time but they are not allowed into the den. When the pups are about three weeks old the mother leads them out to meet the rest of the pack. The other members are very interested in the new arrivals and examine them thoroughly.

In general, the whole pack helps raise the pups - they pup-sit when the mother wants to go on a hunt, they put up with endless games of having their tail chased or playing ambush, and they all help feed the growing pups. Sometimes, certain individuals from a pack spend very little time caring for the pups.

When the adults kill an animal they have to get it back to the pups somehow. Since they don't have backpacks, they carry the food back in their stomachs. When they return, the pups run out and begin jumping and licking around the adult's face. The adult then regurgitates the meat and the pups have a fine hot meal!

As the summer progresses the pups may be moved to a series of rendezvous sites. These sites are close to prey and water and usually have a meadow for the pups to play in. During this time, the pups begin to howl. At first, their howls are high-pitched with a lot of yapping mixed in. Adult wolves often stop and howl when they get near the rendezvous site, with the pups responding to the verbal communication.

By August the pups weigh 18 to 27 kilograms. The adults have to work hard to find enough for them to eat because, by this



time, young prey animals are able to get away and prey populations are at their healthiest.

By October the pups begin to go out on their first hunts with the adults. They learn how to attack large animals and stay out of the way of the deadly hooves. By winter they are ready to take their place as real pack members, and by spring will be ready to help raise the next generation of pups.

Wolf Pack Territory

Wolves are territorial animals. This means that they live in a specific area and defend that area from other wolves. The boundaries of a wolf pack's territory may change over time, but generally, a wolf pack occupies the same home area for generations. Actual boundaries of a territory may consist of rivers or mountain ranges. The boundaries of two wolf pack territories may overlap, and occasionally a wolf from one pack may be allowed to join another pack and live in its territory. Many other animals, such as deer, have home ranges. This means that while they live in a definite area, they do not keep other deer out of it.

The size of a wolf pack's territory depends on the size of the pack and the density of the prey. A pack of five wolves may have a 40 square kilometre territory where prey is dense or a 3200 square kilometre territory where prey is scarce, as in the Arctic. Mountains also cause territories to be large. Wolves do not use steep, rough terrain. In the Rockies, territories can be up to 4000 square kilometres. Aside from wolf packs, there are also transient wolves that move between packs. This movement between packs maintains the genetic viability of the packs. In the Rockies, for example, individual wolves have been known to live with two different packs.

Packs tell other wolves where the boundaries of their territories are by scent marking (urinating and defecating) around the boundaries and by howling. Scent marking is also used to mark travel paths within the pack's territory. Scent marking is especially heavy at the junctions of paths and along travel ways.

Strange wolves that are caught by the pack inside the pack's territory may be harassed and even killed. On the contrary, research has shown that several individual wolves have visited other packs for extended periods of time without aggression from the host pack. Aggressive confrontations are not common in the Rockies. This may be due to the fact that the wolves living here are recolonizing the area and their boundaries are more flexible.



Investigations

1. Using the Background Information, the edukit library, your school library, and other resources, answer the following discussion questions.
 - a) Do you think a pack of 100 wolves exists? Why or why not?
 - b) What are the advantages of wolves living together in groups? Disadvantages?
 - c) Do humans disperse when they reach adulthood or do they stay in the same family and home range?
 - d) List people you know who have dispersed (moved away from the place where they were raised) and those who have not. What reasons might there be for some people to disperse and others to choose to stay close to home?
2. What similarities and differences do you see between how humans raise their young and how wolves raise their pups?
3. Compare the relationship between people and their dogs and dominant wolves and pups by exploring the following questions:
 - a) How does a dog greet its owner (alpha) when the owner comes home from school or work?
 - b) Is it similar to how a wolf pup greets its parents or other adults?
 - c) What is the dog asking for?
4. Wolf populations are self regulating. If the numbers of prey species goes down, the wolves produce fewer young. What advantage is this adaptation?
5. What is the difference between a home range and a territory? What are some advantages of having a territory instead of a home range? What are some of the disadvantages?
6. Do humans have territories or home ranges or both?

Using a copy of a map of your local area, mark your home territory (where you live) with an X on the map. Then draw a line around your home range and colour it in. Your home range is the area where you spend the majority of your time.

When you have completed your map, put them up on a wall for display. Compare the different sizes of students' home ranges and where they overlap.

- a) What influences the size of your home range?
 - b) Do we share our home range with others?
 - c) How do humans tell other humans where their territorial boundaries are?
7. Watch the video *White Wolf*. The film looks at the natural history of a wolf pack on Ellesmere Island (in the Arctic). The first thirty-six minutes deal primarily with pup rearing and social behaviour such as howling and close interaction with researchers. The last fourteen minutes consist of graphic footage of the pack killing and eating a musk-ox calf. After viewing the video, answer the following questions:
- a) The film shows close interactions between human researchers and their subjects. At one point a researcher feeds his sandwich to a wolf. The photographer crawls into the den and takes pictures of the pups. The wolves are given names. How involved should researchers be with the animals they are studying? What are the advantages and disadvantages of close interaction?
 - b) Why and when do wolves howl?
 - c) What did you learn about the care and rearing of the pups?
 - d) What did you learn about the behaviour of the different ranking individuals within the pack?
 - e) What defence did musk-oxen have against wolves and what strategies do wolves use to break through the defence? Would the calf have been killed if the musk-oxen had kept up their defence? Would there be strong pressure for musk-oxen to maintain their defence instead of breaking down as shown in the film? Explain.
 - f) What feelings did you have while watching the musk-ox calf being killed? Why are the young taken, and not the adults?
 - g) The behaviour of the wolves to each other after the kill is very ritualistic. What are the reasons for this behaviour? Did any of the wolves actually hurt another?

After you have completed the questions, check with your teacher for the answer.

File 10: Communication

File Contents

- Background
- Investigations
- Suggested References
- Wolf Body Language Chart
- Answer sheet (check with teacher)

Materials

- cassette tape with wolf howls
- wooden wolf puppet
- cassette player
- a student partner

File Summary

You will have the opportunity to...

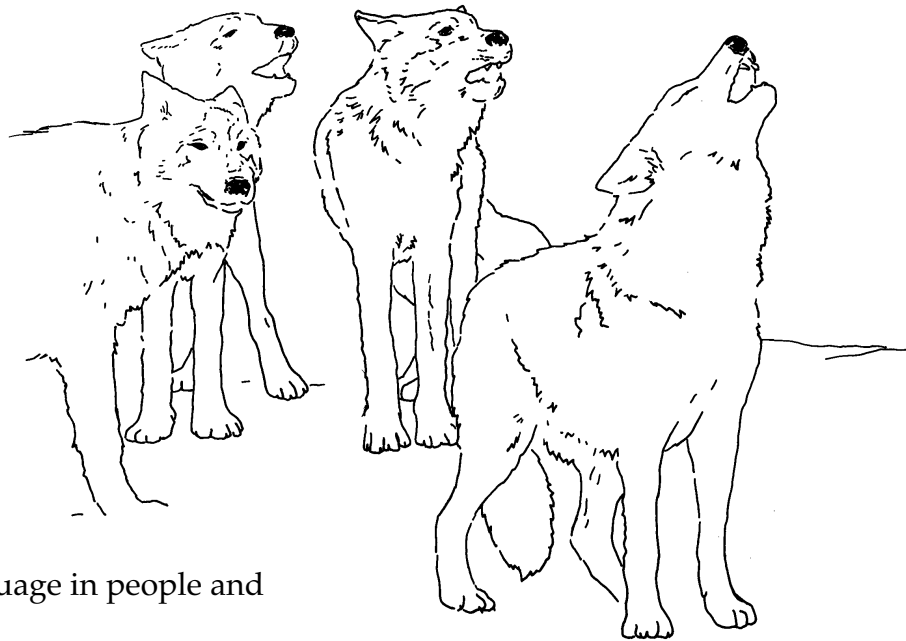
- understand the value of body language in people and wolves.
- observe and identify different messages sent by body language.
- study the communication of wolves through howling and explore the underlying social structure that governs their behaviour.

Background

Social animals such as wolves and people need to have ways to communicate feelings and rules. If social animals had no way to communicate with each other, cooperation would be impossible, disagreements would result, and social structure would break down.

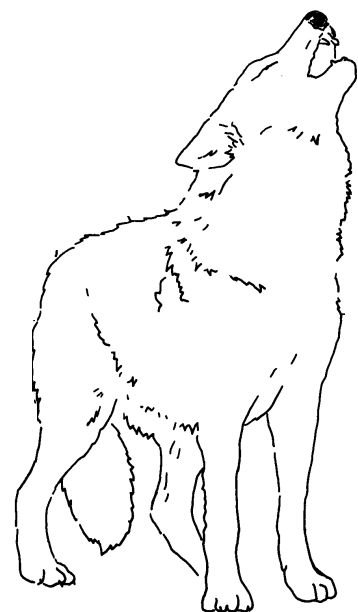
Wolves communicate over long distances by howling and over time through scent marking. Most day-to-day communication is through body language. Positions of tails, ears, mouths, eyes, and legs all combine to create a language that is readily understood by pack members. Many gestures that wolves use to invite other wolves to play are similar to a dog's. These include *bowing*, cocking its head from side to side, *smiling*, and wagging its tail.

Fights that lead to serious injury are rare in a wolf pack because of the wolves' ability to tell one another how they are feeling. For example, dominant wolves hold their tails higher than subordinate animals. All the wolves in the pack know the status of every other wolf, and the alpha wolf seldom needs to prove its dominance by fighting.



Many stories have been told about why and when wolves howl. Only recently have we had any idea whether these stories were true or not. We still know very little about the purposes howling serves, but we do know a few things.

- “Group or chorus howling is a means by which the members of a wolf pack reaffirm their ties with each other and their closeness as a group. One wolf, often the alpha male, will point its nose at the sky, open its mouth, and start to howl. Immediately the other members of the pack rush to stand beside him, shoulder to shoulder, and join their voices to his. The whole group seems to be excited and happy, tails wagging and bodies wiggling. Each wolf howls on its own note so that a grand chorus of slightly different sounds is produced.” (excerpt from *Wolf Pack*)
- Wolves often howl together before a hunt; this may serve as a sort of rallying ceremony, rather like a rally before a sports event.
- Wolves howl to warn other packs to stay away. They are also likely to howl when they have killed a prey animal.
- Wolves howl to locate other pack members if they become separated.
- Wolves howl most often in February (during the breeding season) and in August and September (when the pups are out of the den and learning how to howl).
- Wolves never harmonize when howling; this disharmony makes it sound like there are more of them than there are and may intimidate other packs.
- Wolves howl as often when there *isn't* a full moon as when there is.
- Wolves howl more often at night than during the day. This may be because sound travels farther at night than during the day, due to lower humidity and cooler temperatures.
- In still weather, on flat open ground, wolves can hear each other several miles away.
- Wolves respond more readily to human imitations of their howls than to tape recordings of their own howls.
- It might just be that howling is fun for wolves.



Investigations

Using the Background Information, the edukit library, and school resources investigate the following activities and discussion questions. After completing the questions, check with the teacher for the answer sheet.

Body language

1. Brainstorm a list of facial expressions and body positions that people use to tell each other what they are thinking or feeling.
Frowns, smiles, hunched shoulders, crossed arms, etc.
2. Do we *listen* more to body language or to spoken language?
3. If someone smiles nicely and calls you stupid, which do you believe, the smile or the words?
4. What if someone looks at you scornfully and says you're the most wonderful person in the whole world, which do you believe, the smile or the words?
5. Pair up and try giving each other a mixed message, a message in which you say one thing but show another. Discuss the exercise.
6. What advantages might there be for an animal to have a silent language?
7. By demonstrating different human body language expressions in front of your group, have the rest of the group guess what you're *saying*.
8. With a partner, use the wooden wolf puppet and the wolf body language chart to complete the following activity.
 - a) **Student 1:** Pretend you are the lead wolf (alpha). Use the posture chart to help you put the wolf puppet in a position that tells your partner that you are the dominant wolf. Do this without talking to your partner. See if your partner can understand the wolf body signals you are sending. Describe the posture of the wolf in your notebook.

Student 2: Take the wolf puppet and pretend you are a second wolf, a year-old pup, and send the right signal back to the leader (alpha) wolf. Describe in your notebook the answer you sent back:

How did the alpha wolf react to your message?

Discuss what you were doing with the puppet. Did you understand the messages you sent each other?



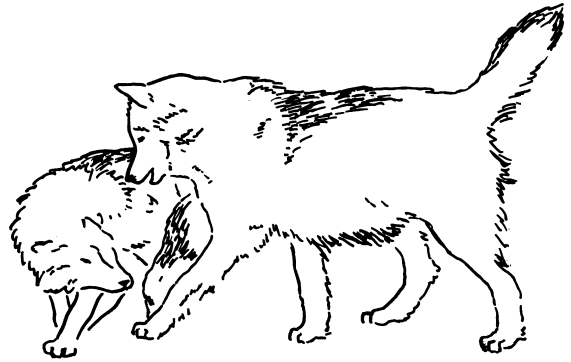
- b) **Student 1:** Your wolf wants to play. Using the puppet, ask the other wolf (your partner) to play.

What did you do to suggest that you wanted to play?

Student 2: Your wolf does not want to play, he is old and wants to get the playful wolf to leave him alone. Using the puppet, tell the other wolf to leave you alone.

What did your wolf do to suggest it wanted to be left alone?

Student 1: What was your wolf's first reaction to the message you received back?



- c) **Student 1:** This time make up your own story. What message did you send the other wolf?

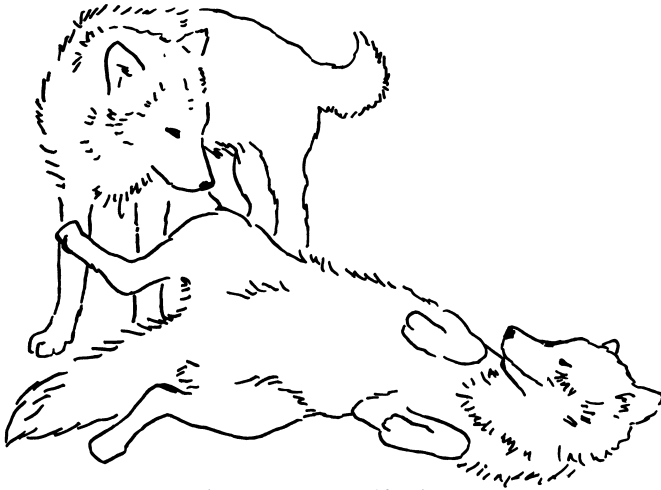
What did the second wolf do when it received your message?

Student 2: Send an appropriate message back to the first wolf. What did your wolf say?

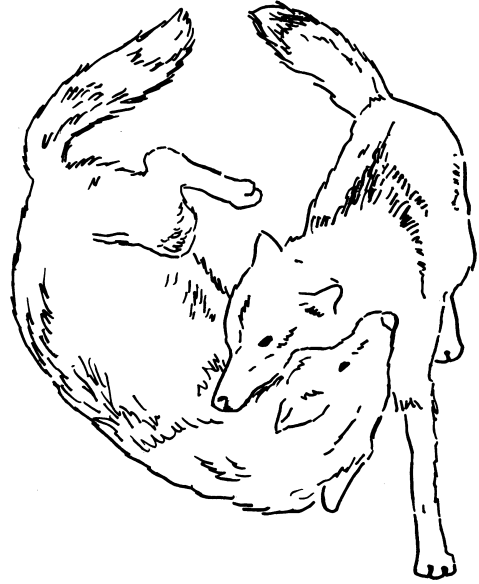
How did the first wolf react to your message?

9. Play the wolf howl tape. The first part of the recording consists of a segment of wolf howling played twice. Play the howling segment once. Listen for the howls of the pups.
- Why do you think these wolves were howling?
 - How many wolves can they hear howling?
 - How many times does the lead wolf call before the others answer?
 - Can you imitate any of the sounds?
10. Listen to the opening section of the tape and pick out the pack leader (probably the alpha male), the young subordinates, and the pups. How do their sounds differ?
11. The last part of the tape has ten minutes of wolf vocalizations. Use your imagination to picture what the wolves look like as they are howling. Draw a picture of what you *see*.
12. How is the social structure of a wolf pack similar to our social structure?
13. How is howling used to maintain the wolf's social structure?

Wolf Body Language Chart



passive submission - a wolf submits to leader by lying down still

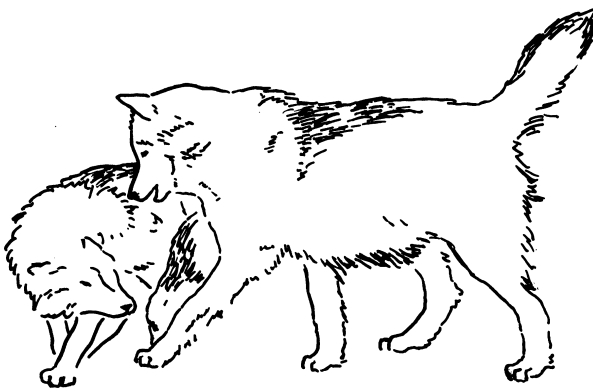


fighting - pin down

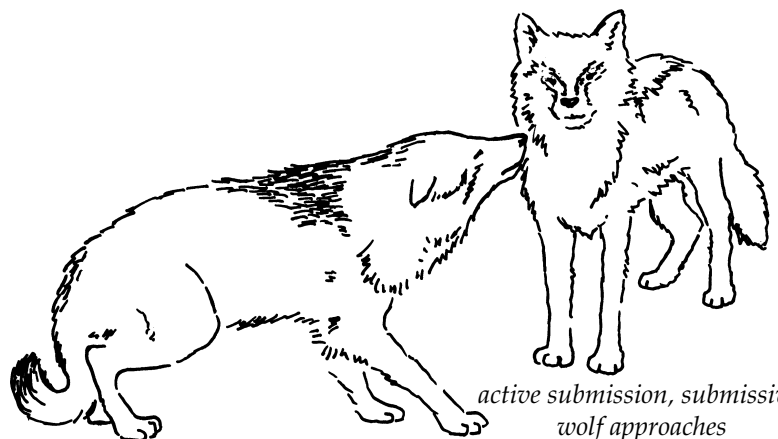


snapping attack

defensive threat, afraid but threatens back to defend itself



dominant display or parade, young wolf submits



active submission, submissive wolf approaches

Wolf Body Language Chart continued



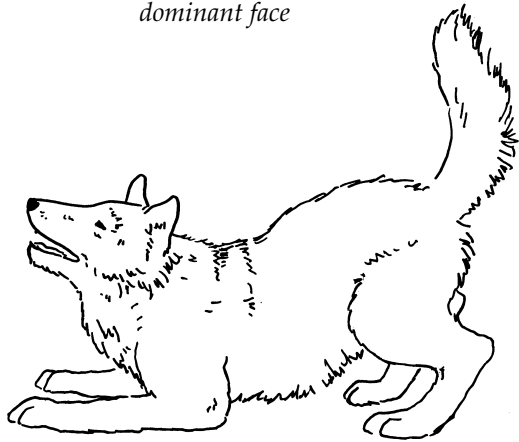
dominant face



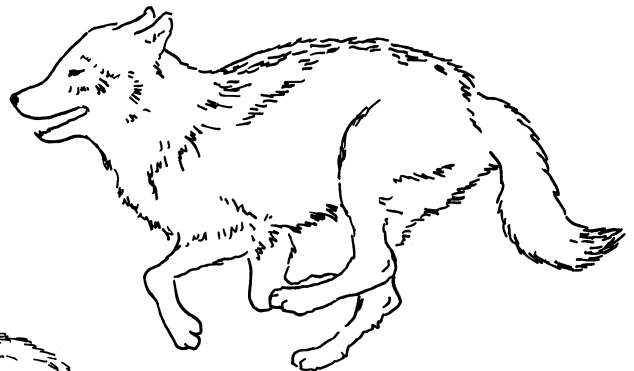
submissive face



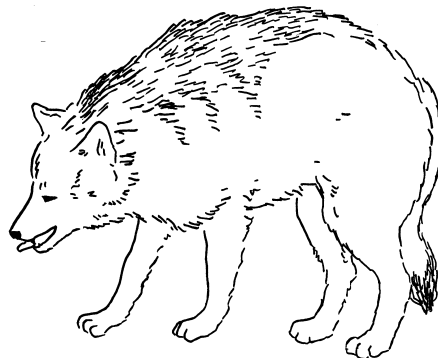
aggressive face



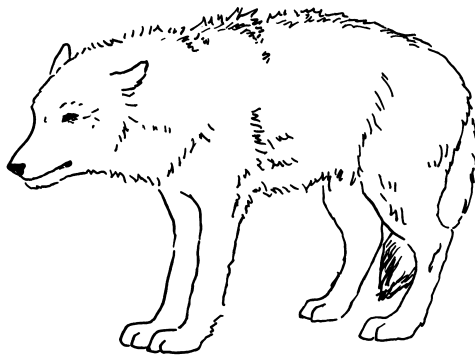
play bow



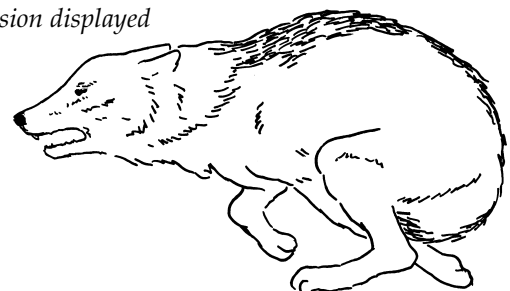
play running



ambivalent - both fear and aggression displayed



submissive



running in fear



*tail wagging
aggressive
arousal*



humility



*normal
-relaxed*



*normal
-interested*



fear



*intimidation
-dominant
position*



*attack
arousal*

Tail Talk

File 11: Wolf Research

File Contents

- Background
- Further Activities
- Suggested References

Materials

- *Let There Be Wolves* video and study guide
- VCR

File Summary

You will have an opportunity to...

- understand how animals are located using radio telemetry
- understand how research is conducted on wolves.

Background

There are many ways that people study wolves.

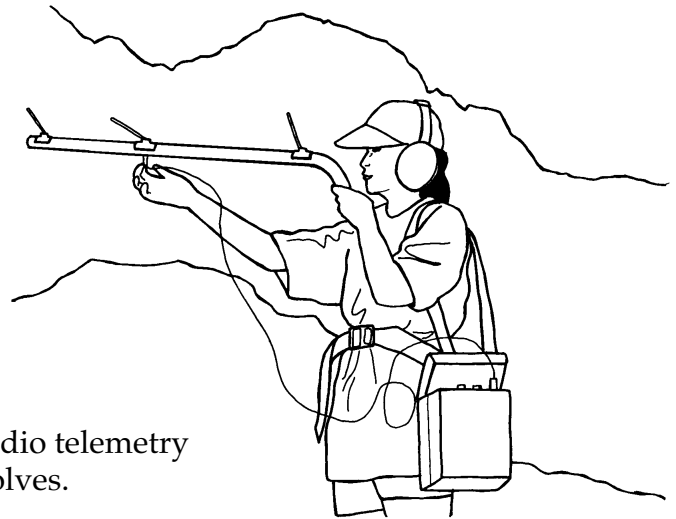
Field research

This is the work that most people think of when they think about studying wolves. Most field work with wolves involves animals with *radio-collars* (collars with a transmitter attached that emits a signal; this signal can be picked up on a receiver held by the researcher). The signals from radio collars can be received up to 15 kilometres from the wolf.

Radio collars enable researchers to track the movement of wolves they are studying, determine the size of their territories, and count pack numbers using monitoring equipment and aerial reconnaissance.

Wolves must be captured before they can be radio collared. Researchers catch wolves with a modified version of the leghold trap that fur trappers use, checking the traps at least once a day. When researchers find a wolf in one of their traps they give it a drug to anaesthetize it. They then weigh and measure the wolf, check for injuries, put a radio collar around the neck of the animal, and release the wolf to rejoin its pack.

Very little of the field researcher's time is spent capturing wolves. Most of a researcher's time is spent listening to signals from the radio collar, tracking wolves to see what they have done, collecting scat to determine what they are eating, and writing field notes. Much to most people's amazement, field researcher rarely see or have any direct contact with the elusive wolves they are studying.



Research on captive wolves

Since wolves are rarely seen in the wild, captive animals are often observed to help us better understand their social behaviour. A person who is studying captive wolves observes them from outside their enclosure or study area and notes the behaviour of individual wolves as they interact with each other.

Public information and education

Some people get closer to wolves by writing about them, holding public meetings to discuss them, or making movies about them. These people may visit field researchers, observe captive wolves, and interview other people who are involved with wolves.

Further Activities

- Write letters to people or agencies conducting field research on wolves. Ask them to describe what they might do on a typical field research day and what skills and equipment are helpful to them on their jobs.
- View the video *Let There Be Wolves* for information on wolf research and radio telemetry in Banff National Park.

File 12: Wolves and Livestock

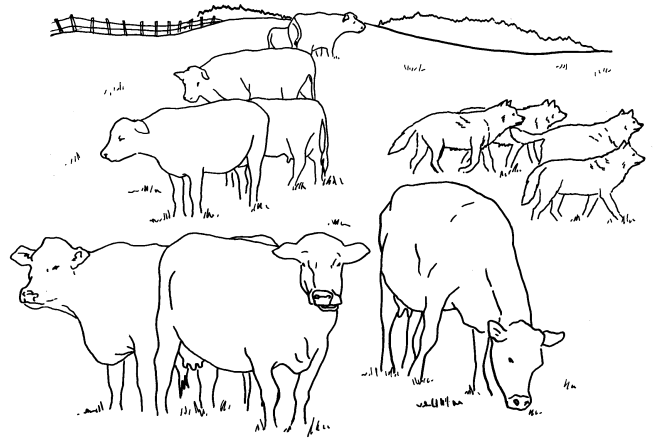
File Contents

- Background
- Investigations
- Suggested References
- Answer sheet (check with teacher)

Materials

The following pamphlets are found in the three ringed binder:

- *Let's Tell the Truth about Predation*
- *Introducing Livestock Guard Dogs*
- *Of Wolves and Livestock*



File Summary

You will have the opportunity to:

- find out more about the livestock predation by wolves
- find out about compensation programs
- discuss opinions about wolf - human conflicts.

Background

The danger that wolves pose to livestock is overrated by some and underrated by others. The following is a list of some things that are known:

- Not all wolves prey on livestock even when they live near them.
- Some wolves do prey on livestock. Once a wolf begins to prey on livestock, it often continues and may teach its pups to kill livestock also. When this occurs the only sure methods of preventing wolves from continuing are: to kill the wolf, put the wolf in captivity, or move the wolf to an area where cattle do not exist.

Moving is certainly not always the answer. After relocation, wolves may simply return to the original location or relocate to another livestock area. Moreover, moving wolves to locations where there are no cattle is complicated by the fact that most good wolf habitat in the southern portion of Canada and the northern United States is already being used for raising livestock.

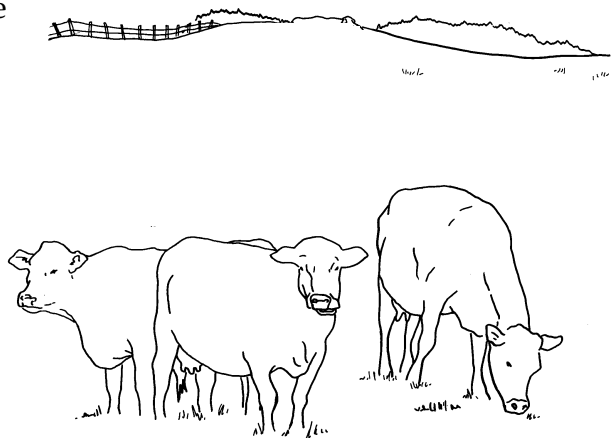
- The overall ratio of livestock taken by wolves in wolf range in Alberta is less than 2 out of 1000 annually. More cattle die of injuries or are taken by rustlers each year. Most

ranchers can tolerate a few of their cattle being taken by wolves, but cannot allow the problem to become an epidemic and significantly affect their livelihood.

- While a low percentage of ranches in wolf range have livestock killed by wolves, those ranches that do have problems may suffer significant losses.
- The Alberta Government cancelled their livestock compensation program (paying the rancher for livestock losses due to wildlife predation) in the spring of 1993. It was found that compensation can help but it is not the complete solution because:
 - a) it is sometimes difficult to tell if an animal was killed by a predator or what kind of predator it was
 - b) wolves may cause problems that are not compensated for, such as requiring a rancher to hire extra help or causing livestock to lose weight due to harassment
 - c) many ranchers feel that losing a few cattle to wolves is the cost of grazing cattle on public lands
 - d) some ranchers worry that, if compensation is available, people will expect them to let wolves continue killing livestock

Although the Alberta Government currently does not offer compensation to ranchers, compensation continues via privately funded organizations such as the Waterton Natural History Association in Waterton, Alberta and the Canadian Parks and Wilderness Society in Calgary.

- Wolves sometimes engage in surplus killing (killing more than they can eat) of livestock.
- Some practices that ranchers can employ to reduce, but not eliminate, the chances of having trouble with wolves include:
 - a) properly fence and protect livestock,
 - b) ensure that calving and lambing takes place close to the ranch headquarters,
 - c) use livestock guard dogs in some situations.
 - d) keep sick or wounded animals close to ranch headquarters,
 - e) bury or remove livestock that have died,
 - f) tolerate and even protect wolf packs that have shown themselves not to be livestock killers. This will help to keep other wolves from moving into the area and possibly becoming problems themselves.

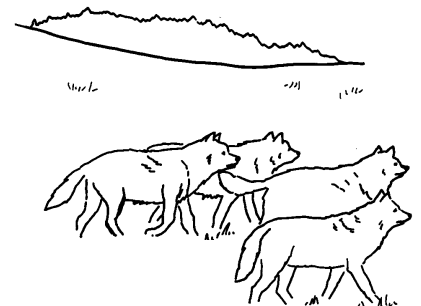


- In 1994, sixteen of 450,000 head of cattle were killed by wolves in Southern Alberta. That is 0.00004% of the cattle population. Yet cattle outnumber any other prey species by approximately seventy-five percent.

Investigations

Using the background information, pamphlets included in this file, the edukit library and school resources, investigate the following discussion questions.

1. If wolves are killing livestock, what do you think should be done if there aren't many wolves in the area? If there are many wolves in the area? Should we kill them, capture them or give them another chance. Why?
2. Should a rancher be compensated (paid) if a wolf kills a cow or sheep? If so, who should pay them: organizations who are advocating the protection of wolves, the federal government through taxes, the provincial government through taxes, the provincial government through hunting fees, livestock organizations, or some combination of these?
3. What are the pros and cons of grazing cattle on public lands where wolves are present?
4. Should ranchers who graze their cattle on public land have to change the way they operate to accommodate wolves?
5. What can ranchers do to reduce the chance of wolves preying on their livestock?
6. What might happen if a wolf that attacks livestock is allowed to continue preying on livestock?
7. If a rancher is compensated, what should happen to the wolf/wolves that killed the livestock? Why? What consequences could result?
8. Can you come up with any other innovative approaches to the problems and conflicts of wolf predation?



File 13: The future of Wolves in Alberta

File Contents

- Background
- Investigations
- Suggested References
- Answer sheet (check with teacher)
- map of Alberta

Materials

- 1 road runner (measures distance on a map)

File Summary

You will have the opportunity to:

- understand the effects human activities have on the wolf
- understand the factors that will ensure the wolf's survival.

Background

Like all animals, wolves need air, water, food, shelter, and space to survive. Wolves are generalists, which means they can readily adapt to a variety of living situations.

Two limiting factors for wolves are living space (habitat) and an adequate supply of food such as large herbivores. Factors that may affect the supply of large herbivores include severe weather, food supplies, hunting by predators and humans, and loss of habitat.

Wolf habitat may be limited by human development. It has been found that wolves do not survive when there are more than 1.6 kilometres of road for every 1.6 square kilometres of land (one mile of road for every one square mile of land).

Wolves use roads and trails—but not roads that are heavily used by humans. Roads bring human predators, wolf road deaths, and habitat fragmentation (i.e., breaking a large habitat area into smaller pieces). Roads and trails bring vehicles and people that can disrupt the dynamic ecology of wolf populations to the point of complete displacement or loss.

In some areas, wolves compete with people for domestic and wild meat supplies. This has led people to fear and dislike wolves to the point where they have tried to control or eliminate wolf populations. In some locations, wolf numbers have significantly decreased as more wolves have been killed than can be replaced through reproduction.

Wolves normally have a high reproductive rate and can replace themselves if less than fifteen to thirty percent of the population is eliminated every year. However, if more than thirty wolves out of a population of one hundred are eliminated in a year, the population begins to decline and will be lost if the high rate of mortality continues.

It is not enough to have a place for just one wolf pack. Biologists estimate that at least ten wolf packs in an area are necessary for the survival of a population. Wolves in one area need to be able to travel to other areas where at least ten other packs live, to be confident that wolf populations will survive. Seven wolf packs exist in the national parks of Banff, Yoho, and Kootenay and Peter Lougheed Provincial Park in Kananaskis Country .

In the Rocky Mountain parks, many wolves are killed as they cross highways and railways. Their habitat is being reduced as a result of development in areas such as valley bottoms where the wolves prefer to live and travel. This human development is also causing wilderness areas to become fragmented or broken up and separated by different forms of development. This fragmentation results in the isolation of wolf packs and the reduction of genetic interchange and diversity.

In the foothills of Alberta, wolves are also being killed legally by hunters and trappers. Some ranchers kill wolves to ensure the safety of their herds or in retaliation for an animal already killed by predators.

There are many initiatives that need to be studied and implemented if we are to protect the wolves in Alberta and the rest of Canada. These could include:

- ensure that large wilderness areas are set aside for wolves, and also corridors of wilderness connect these areas. Wolves use these wildlife corridors to move between patches of habitat within their territory, as well as to move greater distances when recolonizing an area or dispersing to a new territory. Unfortunately, the corridors wolves prefer to use are the same corridors humans prefer to use for highways and development. An example is the Bow Valley of southern Alberta, where human development infringes on the corridors used by wolves and other wildlife.
- look at wolf populations from a global perspective. It is our responsibility to conserve one of the last significant populations of wolves in the world
- educate people about wolves, their biology, and their significance in natural systems so that people can adjust their choices to reduce conflict with wolves

- ensure that the regulations concerning wolves are compatible throughout the different jurisdictions travelled by wolves. For example, there are wolves that move between national and provincial parks in Alberta to crown land in British Columbia and then into the United States. The status of wolf protection in these areas varies from protected to hunted to endangered
- limit human access into wilderness areas, particularly where human activity has been shown to be a problem for sensitive wildlife
- examine and review the hunting regulations in Alberta. At present, these regulations state that a land owner or occupant of privately owned land or a person with a grazing lease on public land may hunt (but not trap) wolves on these lands and on any lands within eight kilometres of those lands any time of the year without a license. The regulations also state that any resident of Alberta and also non-resident with a wolf/coyote license may hunt (but not trap) wolves from the opening of big game season (usually in September) to the end of May

Currently in Alberta, hunters and landowners are not required to report any wolves killed to the provincial wildlife authorities. To manage wolf populations effectively, a system of registering wolf kills would be useful in keeping track of changes in the population, particularly in southern Alberta. A change in the wolf hunting season would allow the wolves to breed and raise their pups while protected from human predators

- learn all we can about wolves and their role in the ecosystem
- develop a system of community-driven, regional wolf management plans for southern, central, and northern Alberta. These plans could take all the above factors into consideration as they pertain to each region's individual situation.

Investigations

Using the background information, edukit library and your school's resources investigate the following questions.

1. a) Are wolves capable of living in close proximity to people?
b) Why don't wolves live long when they live close to people?
c) What things could we do to increase the possibility of wolf survival? If these things were done, what human activities might be impacted? Is that okay?
2. Use the road runner to determine the number of kilometres of road in the ten square kilometres outlined on the regional map. This is done by running the road runner over each road and recording the reading made by the road runner.
a) How many kilometres of road are there per square kilometre of area?
b) Could wolves survive here? (see background information)
c) What other factors need to be considered?
3. a) Look at the regional map. Is there anywhere within eighty km of you where one pack might be able to survive? Where ten packs might be able to survive?
b) How many wolves make up ten packs?
4. What do you think is the greatest threat to wolf survival in North America over the long term (at least 100 years)?
5. Wolves in Alberta and the rest of Canada are not considered an endangered species according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Although the Canadian wolf population is healthy, there are many areas of the country where this species has been eliminated. Discuss whether you think any steps should be taken to ensure the wolf population of Canada remains healthy. Should any steps be taken to encourage wolves back into some of their old habitat areas? Would these steps be reasonable or even feasible?

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APPENDIX

"Large and living mostly in packs, the wolf must rely on trying to kill prey that are larger than itself: moose, bison, elk, caribou, sheep, deer, goats, and musk-oxen. Most of the prey animals present formidable defence."

David Mech

1

"This great enemy of man and his dependants, the creature against the ravages of which almost all the early races of Europe had to combine either in tribes, villages, or principalities to protect their children."

1901-02

The Standard Library of Natural History

2

"In Ojibwa tales, the wolf is revered for its positive influence and high family values."

**Mike Link
Kate Crowley**

3

"Grey Wolf Walking

**Pacing the silent forest
Searching out Earth wisdom
Grey Wolf looks up
And sings to the night**

**Echoes of such singing
Brush against treetops
Touch distant stars
And the night remembers."**

Paula Underwood

4

"Packs vary in number from 5 - 30, the smaller group being by far the most common. Wolves sometimes kill big game while hunting alone, but most of the actual killing is done either by the members of the last season's family, or in case of a large pack, by several packs which have banded together. Ordinarily they have a beat which they cover every two or three weeks. The course the pack travels is in the shape of a great, uneven circle, the diameter of which is often thirty to fifty miles. The extent of the run depends on the supply of game. The fact that hunting is always easier in the region which has been undisturbed for weeks may account, at least partly, for the great range of some hunting trails."

Sigurd Olson - Scientific Monthly January, 1938

5

"It looked like a big friendly dog. It was easy to believe that I could have reached out and petted it. It certainly helped inspire me to learn all I could about the animal that had such a calm and gently look, yet earned its living by killing."

David Mech

6

"A pack of wolves slowly and silently walked down the lake in a single file, their heads like gray beads on a leather thong. The lead wolf passed in front of me. He looked briefly in my direction, but paid no attention to me or my campsite on shore. It seemed almost unreal. Now the pack had passed and was travelling swiftly down the far shore. They grouped momentarily near the point and then dispersed into the snow covered spruce. They had come and gone in complete silence, leaving only a neat trail which was already filling up with new snow."

Milt Stenlund 1943 **7**

"I have seen wolves attack prey animals, and there is nothing hesitant about the attack. No one could ever grab a wolf by the neck or throat if it lunged the way it does at prey. Wolves can crack open the heavy upper leg bones of musk-oxen and sever a cow's tail at the base in a single bite."

David Mech

8

"No documentation exists of anyone being seriously injured by a wild, healthy wolf in North America."

Wolf Almanac

9

"The difficult task is separating the wolf of legend from the wolf of fact, and the difficulty lies not just with those who hate the wolf, but also with those who have created a romantic image of the animal and support it with such fervour that they refuse to acknowledge its natural role in ecology."

Mike Link
Kate Crowley

10

"Wolves are made for other wolves and vast expanses of wilderness"

David Mech

11

"There's a fairly strong tradition that has a very bad name - anthropomorphism, a large sin in early biology. You're missing a good chunk of these animals if you can't accommodate that. The Eskimos never had any problem with it. They saw wolves as thinking animals, smart animals, that learn, and an unavoidable by-product is that they have a personality with no two exactly alike."

Bob Stephenson

12

"As the musk-ox ran and swerved around, the wolves grew increasingly excited. The scene grew surrealistic; big dark whirling beasts; long white streaks; clouds of dust; swerving, streaking, twisting, charging; black masses, white streaks, dust - the Stone Age!"

David Mech

13

"There's a big distinction that people like to make about wolves taking the sick, the old, and the weak. I prefer to say that they take the vulnerable."

Diane Boyd

14

"There has to be some place in the world where wolves can just be wolves."

Candy Peterson

15

"Anyone entering the woods of Finnskogen should carry a gun to fight the threatening howling wolf packs. There will be no tourists anymore and we will not be able to enter the woods looking for berries and no more hiking in the woods."

Norwegian Newspaper 1990

16

"The number of wolves in Norway and Sweden has been estimated at ten animals."

**Mike Link
Kate Crowley**

17

"The gray wolf was classified as *Canis lupus* by the Swedish scientist Carolus Linnaeus in 1758."

18

"Wolves jaws have a crushing pressure of perhaps 1,500 lbs/in² as compared to 750 lbs/in² for a German Shepherd."

Barry Lopez

19

"The brains of a wolf do decrease and increase with the moon."

Edward Topsell

A Historie of Fourefooted Beastes, sixteenth century

20

"If you see wolves there, the wilderness is intact."

Paul Paquet

21

"The heaviest wolf on record was shot in Jasper National Park in 1945. It weighted 172 pounds."

Wolf Almanac

22

"Researchers estimate that the wolf's ability to smell is 100 times more sensitive than that of man."

David Mech

23

"Dianne Boyd and Paul Paquet found that from 1984 to 1991, ninety one percent of wolf mortality in Banff and Glacier National Parks was caused by humans."

24

"The Average 1992 Price Of A Wolf Pelt in Canada was \$157.54, in 1991 it was \$177.42.

Wolf Almanac

25

"The Strength of the Pack is the Wolf, and the strength of the Wolf is the Pack."

**Rudyard Kipling
The Jungle Book, 1894**

26

"In 1992 there were 53 claims of wolf predation on Livestock in Alberta. A total of \$28,150 was paid in compensation."

Wolf Almanac

27

"In 1993 there were 100 trophy wolves killed by hunters in Alberta."

28

"The only good wolf is a dead wolf."

29

"A wolf is kept fed by his feet."

Russian Proverb

30

**"Tell me now my brothers
Tell me now my sisters
Who speaks for wolf?"**

Paula Underwood

31

Other

Other

***Thinking Like A Mountain* by Aldo Leopold.** This selection, which follows on the next two pages, could be shared between several students, with students reading together for emphasis and alone for effect and change of delivery.

32

Other

Other

Thinking Like A Mountain

by Aldo Leopold

A deep chesty bawl echoes from rimrock to rimrock, rolls down the mountain and fades into the far blackness of the night. It is an outburst of wild, defiant sorrow, and of contempt for all the adversities of the world.

Every living thing (and perhaps many a dead one as well) pays heed to that call. To the deer it is a reminder of the way of all flesh, to the pine a forecast of midnight scuffles and of blood upon the snow, to the coyote a promise of gleanings to come, to the cowman a threat of red ink at the bank, to the hunter a challenge of fang against bullet. Yet behind these obvious and immediate hopes and fears there lies a deeper meaning, known only to the mountain itself. Only the mountain has lived long enough to listen objectively to the howl of a wolf.

Those unable to decipher the hidden meaning know nevertheless that it is there, for it is felt in all wolf country, and distinguishes that country from all other land. It tingles in the spine of all who hear wolves by night, or who scan their tracks by day. Even without sight or sound of wolf, it is implicit in a hundred small events: the whinny of a pack horse, the rattle of rolling rocks, the bound of a fleeing deer, the way shadows lie under the spruces. Only the ineducable tyro can fail to sense the presence or absence of wolves, or the fact that mountains have a secret opinion about them.

My own conviction on this score dates from the day I saw a wolf die. We were eating lunch on a high rimrock, at the foot of which a turbulent river肘ed its way. We saw what we thought was a doe fording the torrent, her breast awash in white water. When she climbed the bank toward us and shook out her tail, we realized our error: it was a wolf. A half-dozen others, evidently grown pups, sprang from the willows and all joined in a welcoming melee of wagging tails and playful maulings. What was literally a pile of wolves writhed and tumbled in the centre of an open flat at the foot of our rimrock.

In those days we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack, but with more excitement than accuracy: how to aim a steep downhill shot is always confusing. When our rifles were empty, the old wolf was down, and a pup was dragging a leg into impassable slide-rocks.

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. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view.

Since then I have lived to see state after state extirpate its wolves. I have watched the face of many a newly wolfless mountain, and seen the south-facing slopes wrinkle with a maze of new deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death. I have seen every edible tree defoliated to the height of a saddlehorn. Such a mountain looks as if someone had given God a new pruning shears, and forbidden Him all other exercise. In the end the starved bones of the hoped-for deer herd, dead of its own too-much, bleach with the bones of the dead sage, or molder under the high-lined junipers.

I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades.

So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea.

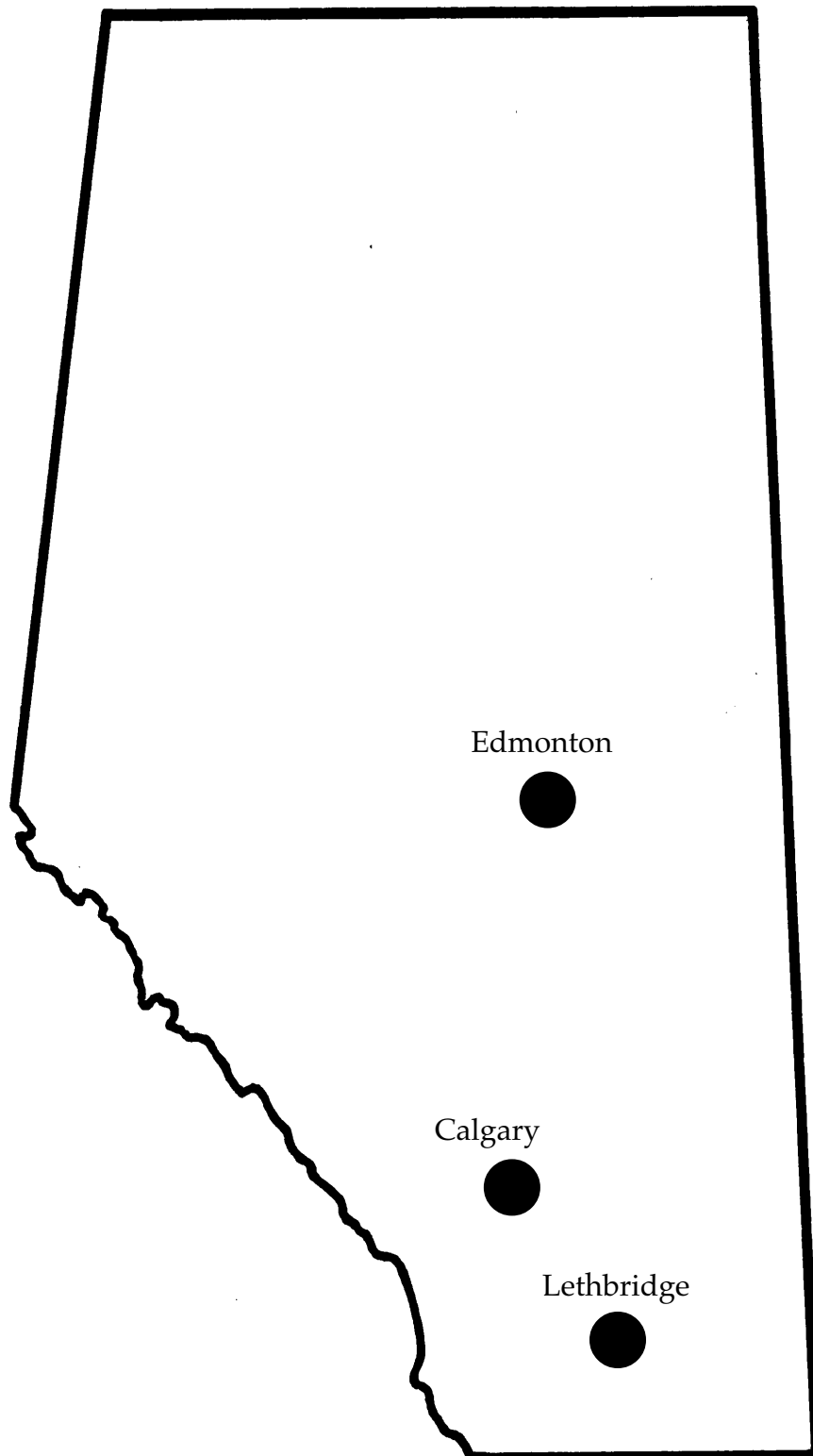
We all strive for safety, prosperity, comfort, long life, and dullness. The deer strives with his supple legs, the cowman with trap and poison, the statesman with pen, the most of us with machines, votes, and dollars, but it all comes to the same thing: peace in our time. A measure of success in this is all well enough, and perhaps is a requisite to objective thinking, but too much safety seems to yield only danger in the long run. Perhaps this is behind Thoreau's dictum: In wildness is the salvation of the world. Perhaps this is the hidden meaning in the howl of the wolf, long known among mountains, but seldom perceived among men.

Thinking Like A Mountain: From A Sand County Almanac by Aldo Leopold, 1949.

Map Of North America



Map Of Alberta



Wolves, Coyotes, and Dogs - A Comparison

<i>Feature</i>	<i>Wolf</i> (<i>Canis lupus</i>)	<i>Coyote</i> (<i>Canis latrans</i>)	<i>Dog</i> (<i>Canis lupus familiaris</i>)
<i>Colour</i>	black, white, all shades of gray, cream, and brown, never spotted	all shades of tan and gray, rarely black, never spotted	variable, may be spotted
<i>Size</i>	36 - 45 kg, females are slightly smaller, 67-82 cm tall at the shoulder	9 - 16 kg, 40 - 50 cm at shoulder	variable
<i>Tail</i>	hangs straight down or straight out, never curls hangs to the end of the foot holds tail out when running	hangs straight down or straight out, never curls hangs nearly to the ground, very bushy holds tail down when running	variable, may be curled
<i>Ears</i>	rounded, small, upright	pointed, large, upright	variable, may hang down
<i>Muzzle</i>	large and blocky	long, pointed	variable
<i>Feet</i>	very large to body size	proportional to body size	varies
<i>General</i>	massive, long-legged, first impression is often of a deer or calf	delicate, medium size, fox-like face	variable

Answer Sheet for Student Independent Study File 1: The History and Status of Wolves

a) What happened to the wolves that used to live in most of North America?

They were exterminated, primarily through the widespread use of poison and hunting.

b) Why did this happen?

This happened because of fear, superstition, and perceived conflicts with livestock and game animals.

c) Why weren't other predators like cougars and bears exterminated?

Several reasons can be given; 1) other predators were not as intensely hunted 2) bears and cougars are generally solitary hunters. With wolves, one poisoned carcass would eliminate a whole pack or family of wolves.

d) Why weren't wolves exterminated in Canada and Alaska?

Fewer people lived there and the extermination campaign was not as extensive as in the United States.

e) Healthy populations of wolves live in Canada and Alaska right now. If this ever changes, what do you think will be the biggest reason?

Wolf population numbers will most probably decline as a result of habitat loss or a reduction in the availability of prey.

Answer Sheet for Student

Independent Study File3: Was That a Wolf I Saw?

1. If you see a doglike animal, what are four things you could look for to decide if it's a coyote or wolf?
You could look for the shape of the nose, size of the ears, general shape, and size. If the animal is running, what is it doing with its tail?
2. Name one thing that would indicate that you're seeing a malamute dog and not a wolf?
A malamute dog has a curled tail, a wolf's tail is straight.
3. Where are the longest hairs on the coyote and wolf located?
The longest hairs are on the back.
4. What is the function of this long hair?
This hair is called guard hair and it serves to shed the rain.
5. What is the short, soft hair next to the skin for?
This hair is called underfur and it serves as a layer of insulation.
6. An adaptation is a change in plant or animal structure or behaviour that helps it better survive in its particular environment. List some ways in which the wolf and coyote's fur is adapted to help these animals survive.
The colour of the fur helps camouflage the animal. The layers of fur keep the animal warm and dry.
7. Look at swatches of fur from the wolf prey species bag. Describe how your own human hair is different from the hair of the other animals.
Human hair continues to grow longer and longer while other animals' hair stops growing at a certain length. The different animals have different lengths of hair depending on its use (insulation, shedding water).
8. How is the hair of the wolf's prey different from the hair of the coyote and wolf?
The hair is shorter and coarser. The hairs on the coyote and wolf may be variable in colour while the hair on their prey species is of a solid colour.
9. Deer and elk hair have hollow shafts. What benefit might this provide?
The hollow shafts will provide the animal with insulation and flotation.

Answer Sheet for Student

Independent Study File: Skulls and Teeth

1. Find the incisors, canines, and pre-molars and molars on the skulls and on yourself or a friend. How many incisors, canines, premolars, and molars do each of the animals have?

	Wolf	Coyote	Deer	Cougar	Humans
incisors	12	12	6	12	8
canines	4	4	2	4	4
premolars	16	16	12	10	12
molars	10	10	12	4	8

2. Each of the different types of teeth is adapted for a different function. What do the animals use their incisors for?
Incisors are used for nibbling. Animals that eat plants (herbivores such as elk and deer) use these teeth to nip branches off plants. Animals that eat meat, (predators and scavengers such as coyotes, cougars, and wolves) use these teeth to clean meat scraps from bones.
3. What do the animals use their canine teeth for?
Canine teeth are used for grabbing. Herbivores such as deer do not need large canine teeth because plants don't try to escape. The larger and stronger a predator's prey is, the larger and thicker the canine teeth are; slender canine teeth could break while the prey struggles.
4. What do humans use in place of large canine teeth to *grab* prey?
We use spears, rifles, and arrows.
5. What do the animals use their premolars and molars for?
Premolars and molars are for crushing, tearing, and grinding. A herbivore uses these teeth to grind and crush plants. A predator uses these teeth to tear off chunks of meat and to crush bones for the marrow inside.
6. Look at the deer's teeth. Which are the incisors?
The deer has a tough bony pad in place of top incisors, and its lower canines look like another incisor.
7. Look at the molars of the predatory animals in the box (coyote, wolf, and cougar). The biggest molars in the back are called *carnassial* teeth. What are the carnassial teeth used for?
Carnassial teeth act like scissors to shear or tear off chunks of meat.

continued...

8. What do people use in place of carnassial teeth to tear off pieces of meat?
We use knives.
9. The sagittal crest is the bony ridge on top of the skull. Find the sagittal crest on each of the skulls. What do you think this crest is for?
The sagittal crest is where the lower jaw muscles attach to the skull. The sagittal crest of the male is larger than that of the female.
10. Which animals have the largest sagittal crest and why?
The largest sagittal crest is found on animals such as the wolf, cougar, and coyote, that need strong jaw muscles for eating their food.
11. If someone has a large gentle dog, measure the length of its canine tooth. How does it compare with the wolf's?
Even dogs that are larger than a wolf have smaller canine and carnassial teeth.
12. Name three characteristics that distinguish dog skulls from wolf skulls.
Dog skulls have less sloping brows, are narrower, and have smaller carnassial and canine teeth.
13. Name three characteristics that distinguish the cougar skull from the wolf skull.
The cougar skull is shorter and rounder, has fewer premolars and molars, and has a smaller sagittal crest than the wolf skull. Both cougar and wolf skulls have carnassial teeth and long canines.

Answer Sheet for Student Independent Study File 6: Scat Stories

3. Two of the scat specimens have hair in them. What animals do you think this scat is from? Why?
The specimens with the hair are from the wolf and the coyote. These animals eat all of their prey including the hair. The hair passes right through their digestive system.
4. Work out the following problem:
- a) You want to know whether deer populations are increasing or decreasing, so you decide to count the number of deer scat on their winter range. You are going to sample the area by counting scat in 25 study squares which are 25 square metres each.
- b) The first year you find the following numbers of scat on the 25 study squares (1 deer scat may contain up to 30 or more pellets): 2, 1, 0, 0, 1, 5, 0, 1, 1, 0, 0, 3, 1, 0, 0, 2, 0, 1, 2, 0, 2, 1, 1, 2, 0 (**26 scats in 25 plots = 26/25**).
- c) The second year you find the following numbers of scat on the 25 plots: 0, 1, 1, 4, 2, 0, 1, 0, 2, 1, 1, 3, 0, 2, 2, 1, 3, 2, 1, 0, 3, 1, 0, 2, 2 (**35 scat in 25 plots = 35/25**).
- d) Is the average number of scat more or less for the second year?
The average number of scat is more for the second year (1.44) than for the first year (1.04).
- e) What factors, besides changes in population, could cause the difference?
If the second winter was more severe than the first, the deer may stay on the winter range for a longer period of time, so you would find more scat. However, this data is highly variable - the sample size is not really large enough to determine if there is a real difference in number of scat found or if the difference is due to random variation. More research over a larger area and longer period of time would have to be conducted to ensure the results were scientifically valid.

Answer Sheet for Student

Independent Study File 7: Tracks and Trails - Track Mysteries

Track Mystery One

1. A deer was walking along when it encountered a wolf. The deer began to run with the wolf chasing after it. There is no way to determine whether or not the wolf captured the deer. Alternatively, the deer may have begun to run for any number of reasons and at a later time a wolf was loping along and followed the tracks.
2. Story endings will vary.

Track Mystery Two

1. Two deer enter the picture, walking in each other's footsteps. Many animals do this in snow because it takes less energy. Do humans? Two wolves run toward the deer and both deer begin to run. One deer escapes. The other deer is killed. The wolves feed and then walk away in each other's footsteps. The track in the upper right corner is a bird's - probably a raven or eagle. When a bird takes off, it leaves *brush* marks in the snow with its wings.
2. The raven or eagle were scavenging off the carcass.
3. Other animals that scavenge on the carcasses include chickadees, foxes, magpies, wolverines, and bears.

Track Mystery Three

1. **There are two possible scenarios:** A moose was walking along when it saw three wolves approaching. It backed up against the trees and brush to protect its back, and when the wolves attacked, the moose managed to kill one, probably by striking it with its front feet or antlers. The other two wolves decided to leave and search for a prey that was easier to get. After they left, the moose walked away. *Alternatively* two wolves from the same pack caught a trespassing wolf in their territory. They killed it and walked away. The moose then walked through the area either before or after the wolf died and had nothing to do with the story.
2. Wolves might kill strange wolves that are in their territory to protect their food resource. At other times single wolves may join or visit other packs.

Answer Sheet for Student

Independent Study File8: Hunting and Energy Needs

Hunting

1. Do humans and wolves seek the same qualities in the prey they hunt?
Wolves catch and eat whatever vulnerable prey they can. This usually means that they kill old, young, weak, or diseased animals. Hunters generally kill animals that are in prime condition to ensure the food is suitable for human consumption.
3. Are there good things wolves might do for prey populations?
Wolves eliminate diseased animals before the disease can spread to others. They also kill weak animals that are competing with healthier animals for food. Prey species can produce more offspring each year than the habitat may be able to support. Thus, when wolves kill their prey, they can relieve pressure on the land and help to ensure adequate food for the remaining prey species.
4. What times of year are easiest for wolves? Most difficult? Why?
Late winter to early summer are the easiest because prey animals are weakened from a long winter, and in early summer there are many vulnerable young animals. Late summer and fall are the most difficult because the prey animals are usually healthy, and are big enough to be able to escape. Also, during this time the wolf pups are growing rapidly, requiring a constant supply of food, but are still unable to help in the hunt.
5. Name some circumstances where wolves might kill more than they can eat. Why?
If environmental conditions are difficult for their prey and easy for wolves, they may kill more than they can eat, and they may kill healthy animals. The remains of the prey are never wasted as they will be eaten by other wildlife species such as coyotes, ravens, and wolverines.
6. Do humans ever kill more than they can eat?
Yes, the near extinction of buffalo by hunters on the prairies in the 1800s is just one example. Today, a minority of hunters choose not to eat what they kill, but hunt animals only for special parts of the body; i.e., head, hide, organs, etc. The fact is many species that hunt for food have leftovers after their initial meal. As to whether the remainder is eaten by the same animal or not depends on how well it is protected or stored from other predators.

Why do humans do this?
In historic times people sometimes killed animals for sport, out of fear, as part of a tradition or if they believed that the animals were a threat to crops. Today most hunters do eat what they kill, or store it for later consumption.
7. Are wolves being cruel when they wound an animal and wait for it to weaken before killing it?
No, they're just trying to eat without expending more energy or putting themselves at more risk than necessary.
8. Where did the saying to wolf down food come from?
*Digestive systems in wolves are built for fasting and feasting. They often go for a week or two without eating. When they finally make a kill, wolves may eat nine kilograms or more of the fresh meat. Needless to say, when a meal is available, they eat it quickly or **wolf it down**. Wolves digestive processes begin in their stomachs, unlike humans where the digestive process begins in the mouth. Therefore, with wolves, there is no need for the food to linger in the mouth.*

9. What are some defences prey animals have against wolves?

Prey animals use a variety of defences including; hiding and camouflage, running, swimming (most prey animals are faster swimmers than wolves), kicking, stomping, and gouging with their antlers or horns.

10. How do prey species defend themselves from wolves?

Moose and bison stand and fight; beavers swim; deer hide or run; caribou and deer run or stand and fight; bighorn sheep and mountain goats escape to rocky, cliff areas.

11. Name factors other than wolves that cause prey populations to decrease.

Prey populations may decrease due to other large predators such as cougars, bears, and humans, and due to environmental factors such as hard winters, droughts, overfeeding on their range, habitat loss caused by human or natural phenomenon, and disease.

12. Many wild ungulate females do not let their young get more than a few feet from them during their first few months of life. Observe the distances between domestic cows or sheep and their young.

Often these animals allow their young to range quite far away from them, or the young do not know how to hide and stay still.

13. If deer were decreasing in an area what factors might be causing the decrease?

A decrease in deer populations may be the result of disease, weather conditions, predators, food supply, human hunting, or habitat loss. It is important to take these factors into consideration before placing the cause on any one factor.

Energy Pyramid

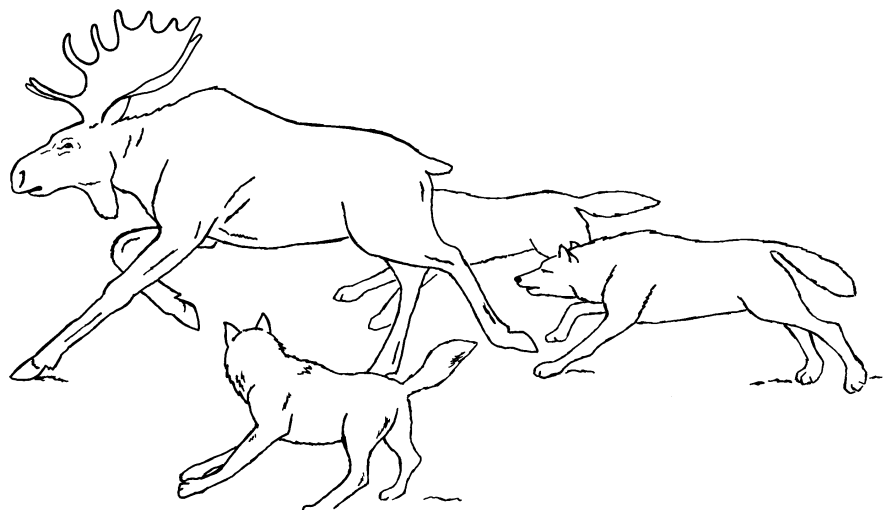
a) *The herbivores and carnivores could not survive as the habitat was changed.*

b) *All parts of the pyramid are important.*

c) *There is not enough food for all the new deer to eat. There is not enough room on the plant level to hold all the purple blocks.*

d) *The animals will not survive if there are too many of them and not enough plants for them to eat.*

e) *You are an omnivore who is sometimes at the lower level of the pyramid as a plant eater, and sometimes at the top as a high level carnivore.*



Answer Sheet for Student Independent Study File 9: Wolf Pack Life

1. a) Do you think a pack of 100 wolves exist? Why or why not?
No, because no prey animal is large enough to satisfy the appetites of 100 wolves. The pack would have to be preying on whales!

b) What are the advantages of wolves living together in groups? Disadvantages?
*Advantages: a pack of wolves can cooperate to hunt and raise pups, can share learned information.
Disadvantages: the members of the pack have to share food with other wolves in the group.*

c) Do humans disperse when they reach adulthood or do they stay in the same family and home range? *Both.*
2. What similarities and differences do you see between how humans raise their young and how wolves raise their pups?
Raising wolf pups and human babies have some similarities: they are both cared for, taught important survival lessons, and made to feel part of the group. A major difference is how the time frame is compressed for wolves; less than a year for wolves in comparison to fifteen to twenty years with humans. Many societies in the world still have extended families who help look after the children in a similar manner as wolves.
3. Compare the relationship between people and their dogs and dominant wolves and pups by exploring the following questions:

a) How does a dog greet its owner (alpha) when the owner comes home from school or work?
The dog generally greets its owner with a submissive posture and a wagging tail.

b) Is it similar to how a wolf pup greets its parents or other adults? *Yes.*

c) What is the dog asking for?
The dog is asking its owner for recognition.
4. Wolf populations are self regulating. If the numbers of prey species go down, the wolves produce fewer young. What advantage might this be to wolves?
If there is less food available to wolves, fewer pups will be born or the survival rate of pups is reduced. The survival rate of pups in the Rockies is 50%, in the Arctic 30%. In severe years no pups will be born. In this way, the wolves don't overtax the system and take too many prey. When there are lots of prey available, the wolves may produce a litter of five pups.
5. What is the difference between a home range and a territory? What are some advantages of having a territory instead of a home range? What are some of the disadvantages?
*Territories are areas we actively protect from others of our own species. Home ranges are areas we use but do not protect from others of our own species.
Advantages: the food resource is not shared with other packs.
Disadvantages: it takes significant amounts of energy to defend territories.*

6. Do humans have territories or home ranges or both?

Humans have both home ranges and territories. Most of us have a territory we call our home and yard that other humans are allowed to enter only by invitation. We also have an area around us called our personal space, which can also only be crossed by those we care for and trust. We also have home ranges - the area between our homes and school, office, store, etc. Humans also maintain territories that are known as nations. We, if necessary, will defend the resources and residents within these territories from others.

a) What influences the size of your home range?

Some students may have friends, relatives, or activities they go to on the other side of their community. This would influence the size of their home range.

b) Do we share our home range with others?

Yes, we all use common areas such as parks, stores, schools, and churches.

c) How do humans tell other humans where their territorial boundaries are?

The boundaries of our home territories are delineated by fences, signs, walls, etc. Personal space, the distance between ourselves and others, is conveyed by the amount of space we maintain with others. This space varies considerably depending on our comfort with others.

7. a) The film shows close interactions between human researchers and their subjects. At one point a researcher feeds his sandwich to a wolf. The photographer crawls into the den and takes pictures of the pups. The wolves are given names. How involved should researchers be with the animals they are studying? What are the advantages and disadvantages of close interaction?

The advantage of such a relationship is that it allows the researcher to get very close to the animals to clearly observe behaviour. The disadvantages are that the animals may become familiar with or habituated to humans which could pose problems in other encounters. Another disadvantage is that the mere presence of the investigator could change the natural behaviour of the wolf pack.

b) Why and when do the wolves howl?

The researchers felt that the wolves howled when they wanted to communicate the "community spirit". They also howled when they woke up and when they wanted to tell other wolves to stay away. They found that the wolves started a chorus of howls just before they set off for a hunt.

c) What did you learn about the care and rearing of the pups?

The pups are born to the alpha male and female. Pups are born in a den where they remain for about two or three weeks. While in the den they are kept warm and fed by the mother wolf. When they come out of the den, they play together. This allows them to get some exercise while also learning the behaviours they will need as adults. They will start to eat meat that is either brought in by the adults or regurgitated by them.

All the animals in the pack take turns looking after the pups. Sometimes the subordinate animals will stay behind to care for the pups while the other wolves go off on a hunt. During such times and throughout their first summer, the pups practice the skills and behaviours they will need to become active members of the pack.

- d) What did you learn about the behaviour of the different ranking individuals within the pack?

The alpha male and female are the dominant members of the pack. They initiate activities ranging from howling to hunting and feeding. They are also the breeding pair of the pack. Within the hierarchy are also the subordinate males and females who assist with the hunt, beg to the alpha animals for food, and help look after the pups.

- e) What defence do musk-oxen have against wolves and what strategies do wolves use to break through those defence? Would the calf have been killed if the musk-oxen had kept up their defence? Would there be strong pressure for musk-oxen to maintain their defence instead of breaking down as shown in the film? Explain.

When approached by a predator, the musk-oxen form a circle with the calves in the middle. The wolves will try to provoke an animal to attack or will wait for the animals to panic. If panic occurs, this may allow the wolves to get close enough to attack a calf. In the film the circle broke quickly and the female musk-ox abandoned her calf in favour of remaining in the safety of the herd. The calf may well have survived if the herd had kept up their defence. It may be that the safety of the herd takes precedence over the safety of the individual.

- f) What feelings did you have while watching the musk-ox calf being killed? Why are the young taken, and not the adults?

Answers will vary. Young are taken because they are easier to capture and injury to the wolves is less likely. Wolves do not kill out of cruelty, but rather as an act of survival.

- g) The behaviour of the wolves to each other after the kill is very ritualistic. What are the reasons for this behaviour? Did any of the wolves actually hurt another?

The behaviour is ritualistic as it allows the alpha male and female to feed first and maintain their dominance over the pack. None of the wolves were hurt.

Independent Study File 10: Communication

2. Do we *listen* more to body language or to spoken language?
We communicate 58% of our message through body language, 35% of our message through our tone of voice, and 7% of our message through our words.
3. If someone smiles nicely and calls you stupid, which do you believe, the smile or the words?
We believe the smile if it is genuine.
4. What if someone looks at you scornfully and says you're the most wonderful person in the whole world, which do you believe, the smile or the words?
We believe the scornful look and ignore the compliment.
6. What advantages might there be for an animal to have a silent language?
Silent language can help animals communicate without alarming their prey.

8 a) Student 1

The first message sent was that he was the dominant wolf. The posture would include tail up, standing tall and big and puffed out, ears up, and in full dominant display or *parade*.

Student 2

The answer the year-old pup sent back was: The pup laid down, rolled over, put his ears back, smiled but did not show any teeth, and put his tail between his legs in *passive submission*.

If the leader received the wrong signal, it would have pinned down the yearling until he submitted. The leader will get more fierce if the yearling does not submit.

b) Student 1

The wolf that wanted to play put his ears down, *smiled*, did a play bow, and wagged his tail.

Student 2

The wolf that did not want to play put his tail out straight, put his ears up, showed his teeth, and did a snapping attack.

- c) The answers will depend on your story.

9 a) Why do you think these wolves were howling?

It sounds as if one wolf was separated from the pack and was trying to locate the others.

b) How many wolves can they hear howling?

It is difficult to determine the number of wolves from their howls. In the tape, there are 4 adults and several pups. Pup howls can be distinguished from those of the adults by their length, not their pitch. Pup howls last only a few seconds as they have small lungs.

c) How many times does the lead wolf call before the others answer?

Three times.

10. Listen to the opening section of the tape and pick out the pack leader (probably the alpha male), the young subordinates, and the pups. How do their sounds differ?

The alpha male starts with long howls. The other wolves join in with shorter howls, some whining or barking howls, while the pups yip in the background.

12. How is the social structure of a wolf pack similar to our social structure?

Wolf and human social structures are very similar with the older and more experienced adults directing and teaching the younger and less experienced members of the family.

13. How is howling used to maintain the wolf's social structure?

Howling keeps the pack together by reaffirming their ties with each other and maintaining their closeness as a group. It also helps wolves locate other pack members if they have become separated. The wolf howls are usually initiated by the alpha male who is joined by the other members of the pack.

Answer Sheet For StudentIndependent Study File 12: Wolves and Livestock

1. If wolves are killing livestock, what do you think should be done if there aren't many wolves in the area? If there are many wolves in the area? Should we kill, them, capture them, or allow them another chance?
Answers will vary. The rancher should ensure that they have taken all the precautions mentioned in the background information section. Guard dogs have proven to be a valuable deterrent for wolves. Canada and Russia are the home of the last significant population of wolves in the world, their future is dependent on the actions we will take today. The wolves causing the problems are usually killed but conservation groups hope that ranchers will leave other wolves alone.
2. Should a rancher be compensated (paid) if a wolf kills a cow or sheep? If so, who should pay them: organizations who are advocating the protection of wolves, the federal government through taxes, the provincial government through taxes, the provincial government through hunting fees, livestock organizations, or some combination of these?
The province of Alberta compensated ranchers for the loss of their stock until the spring of 1993. It was found that this system didn't work well as there were too many factors that had to be considered before a rancher could be compensated. There is currently no compensation program. Some privately funded organizations such as the Waterton Natural History Association (based out of Waterton, Alberta) and the Canadian Parks and Wilderness Society from Calgary will compensate ranchers for the loss of livestock if the loss is the result of a confirmed wolf kill. The amount of the compensation is equal to the current market value for that animal. The impetus behind the program is to give members of the public a chance to compensate ranchers for their losses to wolves, as a way to increase the rancher's tolerance of wolves.
3. What are the pros and cons of grazing cattle on public lands where wolves are present?
Some ranchers graze cattle on public land at a cost subsidized by the public. If the ranchers do not tolerate predators taking some of their cattle from public land each year, some of the public may not tolerate ranchers grazing on crown owned land. On the other hand, large lease holdings provide wildlife with large tracts of land unpopulated and generally undisturbed by humans. These large blocks of safe space are becoming fewer and fewer. In the end it is trying to attain a balance between our need for resources and the needs of other species.
4. Should ranchers have to change the way they operate to accommodate wolves?
Answers will vary depending on your viewpoint. Ranchers already adjust to accommodate other natural situations such as late-maturing native grasses and unreliable weather. Some individuals may feel that ranchers grazing on "public" land should accommodate wolves. Others may feel that, since wildlife belongs to all the people (wildlife is a public resource), ranchers operating on "private" land should also accommodate wolves. Still others may feel that ranchers should not have to adjust at all for predators, not even if they are compensated for losses, as ranching is their livelihood and a vital economy. This question is value-laden.

5. What can ranchers do to reduce the chance of wolves preying on their livestock?
There are a number of actions ranchers can and have undertaken to reduce wolf predation, such as:
- a) properly fence and protect livestock*
 - b) ensure that calving and lambing takes place close to the ranch headquarters*
 - c) use livestock guard dogs in some situations*
 - d) keep sick or wounded animals close to ranch headquarters*
 - e) bury or remove livestock that have died*
 - f) tolerate and even protect wolf packs that have shown themselves not to be livestock killers, so as to keep other wolves from moving into the area and possibly becoming problems.*
6. What might happen if a wolf that preys on livestock is allowed to continue preying on livestock?
They might teach their pups to prey on livestock and those pups might teach their pups, and so on.
7. If a rancher is compensated, what should happen to the wolf/ wolves that killed the livestock? Why? What consequences could result?
Answers will vary, from total elimination of wolves to giving them a second chance and accommodating their presence. Consequences can range from continuation of a sustainable wolf population to the elimination of wolves or continued predation.
8. Can you come up with any other innovative approaches to the problems and conflicts of wolf predation?
Answers will vary with background and experience.

Answer Sheet for Student

Independent Study File 13: The Future of Wolves in Alberta

1. a) Are wolves capable of living in close proximity to people?
Yes, but it depends on the number of people. For example, wolves tend to avoid towns.
- b) Why don't wolves live long when they live in close proximity to people?
As mentioned above, wolves are capable of living near people, but if they do, they often get killed, either because people are afraid to have wolves around, they are accidentally run over on roadways and railways, or they begin to kill livestock.
- c) What things could we do to increase the possibility of wolf survival? If these things were done, what human activities might be impacted? Is that okay?
Roads could be closed, developments in wild areas could be restricted or prohibited, and prey populations could be encouraged. People can learn new ways to protect livestock.
2. b) Could wolves survive here? (see background information)
- c) What other factors need to be considered?
The number of prey animals, the topography, the amount of available water, and the attitudes of the local people towards wolves all need to be considered.
3. a) Look at the regional map. Is there anywhere within 80 km of you where one pack might be able to survive? Where 10 packs might be able to survive?
Wolves can survive in all the mountain parks, in Kananaskis Country, and in all areas where there is either a low ratio of roads to land (less than 1.6 km road to every 1.6 square km of land) or where there are few human visitors.
- b) How many wolves make up 10 packs?
Approximately 70 to 100 wolves.
4. What do you think is the greatest threat to wolf survival in North America over the long term (at least 100 years?)
The biggest threat to the survival of wolves over the next hundred years is the loss of suitable habitat. Suitable habitat is characterized by large tracts of unfragmented land, few people and little development; a combination which is becoming almost as rare as the wolf in some areas of Alberta.

Environmental Issues: Steps to Action

Environmental issues are as timeless as humans themselves. Some issues can be dealt with in a very quick manner, and others may require a lifetime to resolve. Whether the time frame is short or long, the process to address environmental issues remains basically the same. This process is outlined below. As with all outlines you will need to fill in the details and change it to suit your needs and goals. The key words to remember *and be*, when addressing issues of concern, are the four C's: caring, committed, cooperative, and creative.

Before working on an issue such as the preservation of wolves in Alberta review the process outlined below and ask yourselves the following question:

Do you and your classmates have the time to address the issue and carry through on the various steps of the action process.

If your answer is yes, then you may have what it takes to deal with some of the most important issues of our time. Read on!

1. Select an issue, one that is attainable, focused and initially local in scope.
2. Find out what you know and do not know about the issue. Become an expert. Also examine how you feel about the issue, how you might be connected to the issue and what actions you might already be taking to address the issue.
3. Determine what you wish to accomplish, and state them as your goals. As with the issue ensure goal(s) are attainable, focused and initially local in scope. The goal should be a statement that everyone agrees with or at least will try. Goals address the *What do I want to do?*, not the how, actions address the how.
4. Determine *how* you can address your goal(s). Brainstorm to come up with actions to achieve the goal(s). Group the actions under the following *Categories for Change*:
 - organizational -actions which address how the group will be set up
 - research/information gathering - how to get information you will need
 - education/media - how to communicate your concern,
 - direct action - actions you can take as an individual or part of a group,
 - political action - how to address politicians, decision makers, and
 - legal and quasi-legal action - how to address the issue in the legal system.

The following are examples of some actions that students could take to protect or reduce wolf numbers in Alberta.

- adopt a wolf (direct action)
- make presentations to local and regional (political action)
- take part in public hearings on wolf populations and habitat (legal and quasi-legal action)
- be involved in a further education project for their school and /or community (education/media).

5. Do an analysis on each action, viewing the social, economic, political and environmental implications of each. If the implications are too negative, the action may not be feasible.
6. Inventory yourselves as to skills, abilities and interests related to the Categories for Change. Find others who may be able to fill areas of perceived weakness. Based upon skills, abilities or interest assign people to various actions, each action category should have a spokesperson or chairperson. Each action should be addressed by determining not only who will do it but also when, where, why and how.
7. From the action plan, determine the structure of the group, i.e., executive, rotating chair, coordinating committee, etc.
8. Refer to the handout *Action Guidelines*, for reassurance and consideration when the road gets long and rough and *for when at first you don't succeed* (which always occurs!).

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Action Guidelines and Skills for Addressing Environmental Issues

Developing action skills is similar to the development of any other skill, it requires time spent in practice and reflection. Because of the complexities and nuances associated with learning these skills, a long term apprenticeship should be expected! Guidelines for engaging in issue resolution include:

Know where you want to go, how long it will take, and how much it will cost.

- Establish your mission and goal / objective(s). Reach group consensus or agreement on the stated goal / objective.
- Develop a timeline, a budget: What do you want to change? Is it realistic? Is it achievable? What and who will it require to get it done? (resources; i.e. people, financial, physical)

Positive Viewpoints

- Be for something you propose, rather than against something someone else proposes.
- Maintain an open mind, listen actively to what others have to say, without compromising your values and goal(s).

Deal with the Issue, not the Individual

- Treat every person you encounter as you would wish to be treated, with respect and consideration.
- Environmental issues often make for unusual alliances and partnerships, Maintaining your own integrity, leave as many doors open to future alliances and partnerships as possible.

No stereotyping

- It is easy to lump individuals into a category or group. When you do so, you tend to minimize their contributions as a person, as you become concerned with the general attributes of the stereotyping. While stereotyping is sometimes convenient and expedient, this type of thinking is very limiting and tends to close rather than open possibilities and contributions.

Persistence and Commitment

- Environmental problems are some of the most complex issues of our time. Long term commitment, sometimes full-time, and the will to succeed is necessary for the ongoing resolution of many. Pace against burnout.

Homework

- Study the issue and all its facets, dimensions, and viewpoints - become an expert on the issue.

Ability to work with numbers

- Numbers are equated with facts. An understanding of what they mean in everyday terms is necessary, to make the issue relevant to others.

Do not procrastinate

- Once a preliminary proposal for change has been made, do studies to see if it is supported. Initiate actions to address the issue before a large commitment in time, money and allegiance has been made. "Get going before the tracks have been lain and the train is leaving the station."

Be Proactive

- Submit proposals, which address an environmental concern, that adhere to your own vision or mission. Seek commitment to your proposals from decision-making bodies or individuals.

Diversify

- Do not rely on one approach or strategy. Petition to all sectors of the public and political arena.

Watch established procedures

- Be cautious of planning procedures and processes, they can consume a considerable amount of time with very little to show for it.
- Try to deal with decision makers directly.

Cultivate relationships

- Keep in focus the public-political relationship. Politicians and public decision makers need to be encouraged in addressing environmental issues. In fact, they often look to the public for issues of importance.
- Media can have considerable influence in determining what issues will be addressed.

Have fun!

- Maintain or develop a sense of humour. Over the hills and valleys, humour and perspective are essential to any long-term issue involvement.

World of



Wolves

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