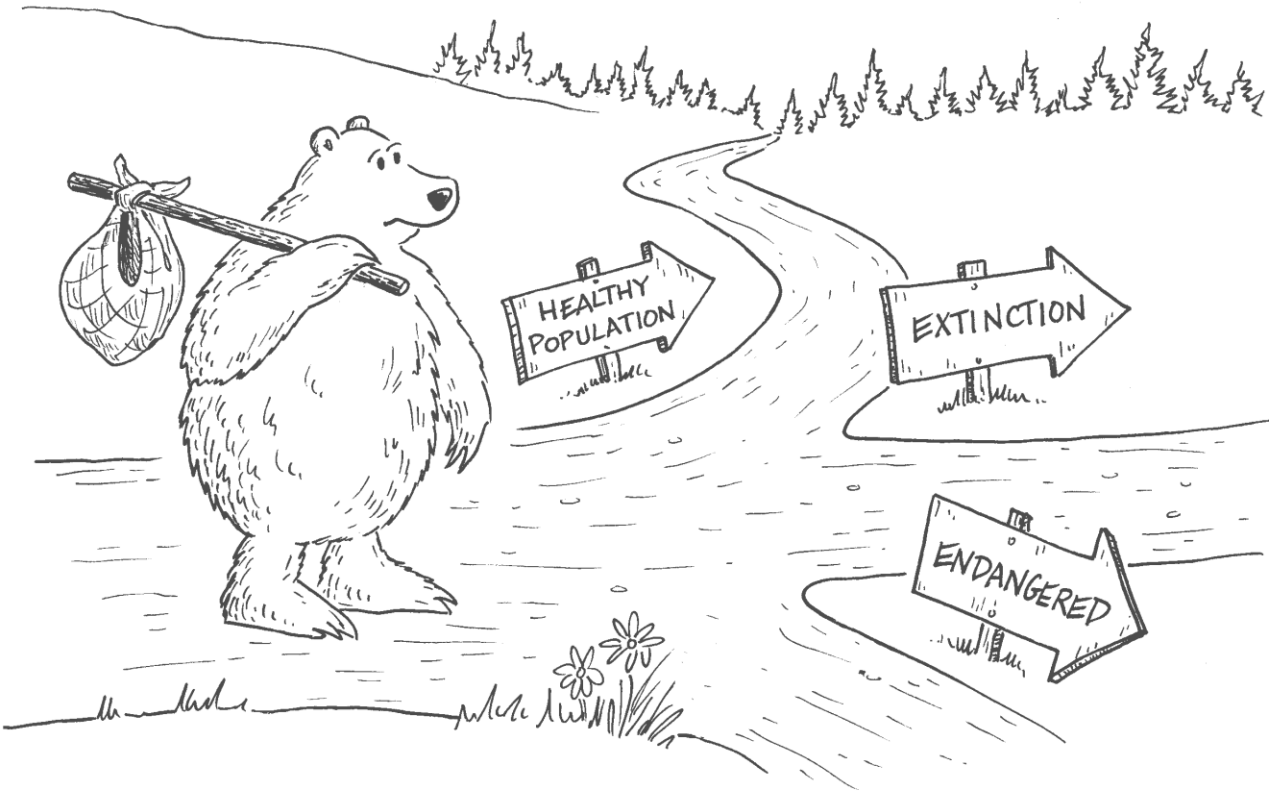
Grizzly Bears Forever!



a teacher activity guide for Science 7, 8 and 9

CPAWS
CANADIAN PARKS AND WILDERNESS SOCIETY

Welcome!

This guidebook is a living document and is one of the vital components of the Canadian Parks and Wilderness Society's education program, *Grizzly Bears Forever!* We welcome all feedback and will incorporate suggested changes. Please email us at education@cpaws.org using the form on the following page. For comments, questions and inquiries, please contact us at 403-232-6686 or education@cpaws.org.

With *Grizzly Bears Forever!*, we have tried to create a relevant, exciting, and informative resource that carefully examines the present day challenges we face in the field of large mammal conservation. We have collaborated with the *Eastern Slopes Grizzly Bear Project* (ESGBP) to provide factual, science-based activities that meet current curriculum needs. CPAWS wishes to thank the ESGBP, without which many aspects of *Grizzly Bears Forever!* could not have been created. The mandate of the ESGBP is restricted to research and education, and suggestions within *Grizzly Bears Forever!* on how to help grizzly bears are offered by CPAWS alone.

Written and Researched by Gareth Thomson, Jennifer Grant and Kim Kiel. Illustrations by Ed Carswell. Thanks to Colleen Campbell, Elizabeth Surridge, Derek Ebner and Rob Osiowy for providing their comments, feedback and thought on this guide.

About the Canadian Parks and Wilderness Society (CPAWS)

CPAWS
CANADIAN PARKS AND WILDERNESS SOCIETY

The Canadian Parks and Wilderness Society was founded in 1963 and is Canada's true grassroots voice for wilderness. Our mission is to establish new parks and make sure nature comes first in their management. CPAWS has played a key role in saving almost 500,000 km^2 of Canada's spectacular wildlands. Built from the ground up, we have thirteen chapters across the country, where people passionate about nature can get actively involved.

The Southern Alberta Chapter is the only CPAWS chapter to have a full-time education office. Our education program delivers in-class programs and interpretive hikes about species at risk, watersheds, biodiversity, ecosystem management, parks and protected areas and other concepts relevant to the CPAWS mission. For more information about CPAWS visit our website, www.cpaws-southernalberta.org

For more information about our teacher resources, in-class programs and hikes, visit:

www.cpaws-southernalberta.org/campaigns/education

EVALUATION FORM
TO: CPAWS EDUCATION
Email: education@cpaws.org

Your feedback is important to us! The Canadian Parks and Wilderness Society has tried to create a relevant, bias-balanced and curriculum-tied resource. This guidebook is a living document and we welcome all comments and suggestions for change.

The goals of this guidebook are to inform students about conservation biology and the issues surrounding grizzly bears living in the central Rockies of Alberta. By presenting the facts through current and authentic scientific data, and providing ideas for action, we hope that we've empowered students to make changes.

Do you feel that this guidebook has attained its goals? Please state why.

_____
_____
_____

Which section of *Grizzly Bears Forever!* did you find most useful?

_____
_____

Least useful?

_____
_____

Is there anything you would add or change?

_____
_____
_____

Additional comments:

_____
_____

Name (optional): _____School: _____

Thank you! Please return this form to the below address, either via fax, mail or email. We look forward to hearing from you.

Canadian Parks and Wilderness Society
Southern Alberta Chapter
Email: education@cpaws.org
Fax: 403-232-6988
88 Canada Olympic Road S.W.
Calgary, AB T3B 5R5

Grizzly Bears Forever!

Annotated Table of Contents

Please note that activities in this guide are placed in an order that allows for concept building; working through the guide from beginning to end is recommended.

Table of Contents continued

Be sure to check out additional activities available free from:

cpaws-southernalberta.org/campaigns/resources-for-environmental-education

Supplementary Activities	Description of activity
Disperse or Decease!	In the role of their favorite animal, students try to disperse (migrate) into new habitat areas - or deal with the horrible consequences!
Park Puzzle	How well do you know Alberta's parks? Play this matching game to test your students and yourself on our provincial parks system!
Take a Stand	Faced with a controversial statement, students physically "take a stand" on an issue, while learning to appreciate others' points of view.

The Canadian Parks and Wilderness Society would like to thank the following organizations for their support during the initial development of this program guide.

The J.W. McConnell Family Foundation

TD Friends of the Environment Foundation

ChevronTexaco

green street www.green-street.ca

bp

ecoACTION

Why Study the Grizzly Bear?

People are interested in grizzly bears. The grizzly bear (*Ursus arctos*) is one of the most loved, feared, and misunderstood of Canada's wild animals. As a result, the grizzly bear serves as an excellent entry point into learning about larger issues such as ecosystems, interactions and biological diversity.

As well, the long-term persistence of the grizzly bear in our province is uncertain. Ever-expanding development, recreational, and resource extraction pressures continue to increase while wildlife populations dwindle and habitat quality decreases. Since European settlement, Alberta's grizzly bear population has fallen from 6000 bears to an estimation of less than 700 (2015). If this trend continues, a local or even a global extinction of the grizzly bear may occur.

Should we care? Will the loss of the grizzly bear affect us? Biologists and wildlife managers consider the grizzly bear to be:

- an indicator species used to assess ecosystem health
- a surrogate for land-use planning
- a habitat effectiveness indicator

We need the grizzly bear not only for ecological reasons but also for ethical reasons; all living things have intrinsic value and the right to exist.

CPAWS Educational Principles

- **Science-Based**
  Our education is based on sciences such as conservation biology; it is grounded in fact.
- **Student-Centered**
  All activities are learner-centered and experiential in nature.
- **Bias-Balanced**
  Our education programs are bias-balanced. Although the CPAWS point of view is clearly expressed, other points of view are discussed and respectfully considered.
- **Curriculum-Tied**
  Programs for students are closely tied to Alberta curriculum content areas such as science and social studies.
- **Empowering**
  Educational programs lead participants through the process of awareness and understanding, and allow them to take action through personal lifestyle changes or through democratic, citizenship-building processes such as letter-writing.

Based on our five educational principles, *Grizzly Bears Forever!* has:

- Well defined learning outcomes that are linked to current curriculum
- Variety of learning approaches; lessons for teacher-led material and ideas for independent study
- Activities that appear in a sequence that reflects students' learning styles
- Interesting, interactive activities
- Local (Alberta) content
- Evocative yet simple lessons

Curriculum Connections

All of the activities in *Grizzly Bears Forever!* were designed to address the latest **junior high science** curriculum. For example, over 80% of the grade 7 science unit, *Interactions and Ecosystems*, and the grade 9 unit, *Biological Diversity*, can be taught using this guide.

Grade 7: *Interactions and Ecosystems* – STS Outcome 1: Investigate and describe relationships between humans and their environments. Outcome 2: Interpret flow of energy and materials within ecosystems (a/biotic factors, producers and consumers). Outcome 3: Monitor a local environment, assess impacts and reproduction of organisms. Outcome 4: Describe relationships in maintaining environments (human impacts, decision making, analyze local issue).

Grade 8: *Freshwater and Saltwater Systems* – STS Outcome 3: Analyze productivity and species distribution. Outcome 4: Analyze human impacts on aquatic systems, and identify the roles of science and technology in addressing related issues.

Grade 9: *Biological Diversity* – STS Outcome 1: Investigate diversity among and within species (niches, variation, dependencies). Outcome 2: Nature of reproductive processes (sexual reproduction, genetic variation). Outcome 4: Identify impacts of human action on species and variation, and analyze issues for personal and public decision making.

In addition to achieving knowledge outcomes as defined by Alberta Learning, the activities in *Grizzly Bears Forever!* meet the **skills outcomes.** The activities allow students to identify questions and data, conduct research, analyze and communicate data, and work collaboratively. As well, *GBF* encourages development of the **attitude outcomes**: interest in science, mutual respect, scientific inquiry, collaboration, safety and stewardship.

Social Studies, Mathematics and Language Arts knowledge outcomes are also acknowledged within this guide. It is an excellent fit with Environmental and Outdoor Education programs. ***Please share this resource with teachers of other subjects*.**

The following page provides detailed information on the activities and their cross-curricular potential. Curriculum links are also noted at the beginning of each activity.

Junior High Alberta curriculum connections for *Grizzly Bears Forever!*

	GRADE 7	SCIENCE 7	SOCIAL STUDIES 7	LANGUAGE ARTS 7	MATH 7	**GRADE 8**	SCIENCE 8	SOCIAL STUDIES 8	LANGUAGE ARTS 8	MATH 8	**GRADE 9**	SCIENCE 9	SOCIAL STUDIES 9	LANGUAGE ARTS 9	MATH 9
The Grizzly Bear and You				●					●					●	
Who am I?		●					●	●				●			
Weird Webs		●					●	●				●			
An Uncertain Future		●	●				●	●				●	●		
Bio-What?		●	●				●	●				●	●		
Bears of Banff			●					●				●	●		
Habitat Effectiveness		●			●		●	●		●		●		●	●
Births and Deaths		●			●			●		●		●			●
Secure Area Analysis			●					●	●			●		●	
Where is Bear Sophie?		●					●	●				●			
Room to Roam			●	●			●	●	●			●	●	●	
The Great Bear Debate			●	●				●	●			●	●	●	
Helping the Great Bear			●	●				●	●			●	●	●	

(This table was drawn from the following Junior High curriculum: Science 1999/2002, Math 1996, Language Arts 1998, and Social Studies 1989.)

The Grizzly Bear and You

This introductory and diagnostic activity prompts students to brainstorm their unbiased feelings and knowledge of grizzly bears and allows you, the teacher, to establish students' background knowledge. This activity will allow you to answer three basic questions: What do my students know? What are my students able to do? What else do I want them to know and be able to do?

Did you Know???

The Latin name for grizzly bear is *Ursus arctos* meaning bear of the north.

Materials

- Picture of a grizzly bear

Time Required

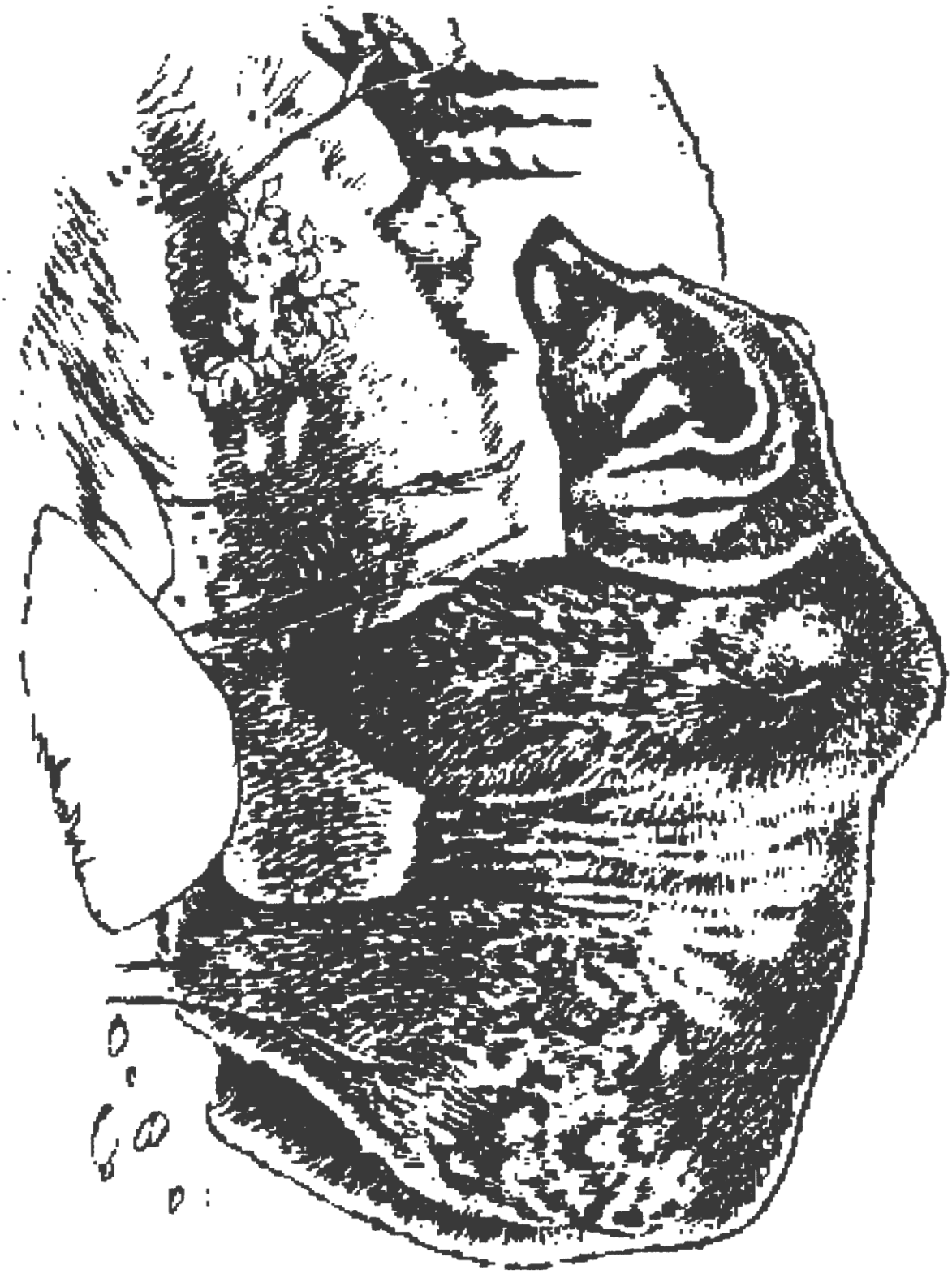
- 30 minutes

Instructions for the Teacher

1. Show students the following picture of the grizzly bear. Ask the students, in silence, to think of the first word that pops into their head when they see the picture. Alternatively use a photo of a grizzly bear.

2. Next, ask the students to write a "one-minute paper" that states: what their word is, why they thought it, and what, if any, experience they've had with grizzly bears. Students may write about a personal encounter in the backcountry, a movie about grizzly bears, or even a bear joke. The sky is the limit! Have some students read out their papers aloud to the class.

3. **OPTIONAL:** Use the students' "one-minute papers" as part of the evaluation of this guide. After completing several or all of the *Grizzly Bears Forever!* lessons, repeat this activity to compare the papers and see if students' perceptions or feelings have changed. CPAWS asks that you complete the feedback form at the beginning of this guide, and would be very happy to learn of the results of this exercise.



Who am I?

In this activity, students are introduced to a number of different classification schemes for animals and plants that are all found in grizzly bear habitat. Each student is given a picture of a common ecosystem element (e.g. grass, hare, coyote, etc.) that is either affixed to his/her forehead or hung around his/her neck. Students must mingle with other students to determine what plant or animal they are. *(Illustrations provided courtesy of the Canadian Museum of Nature).*

Curriculum Connections

Science 7A: *Interactions and Ecosystems* Outcomes 1,2

Science 8E: *Fresh and Saltwater Systems* Outcome 3

Science 9A: *Biological Diversity* Outcome 1

Materials

- *Who am I?* signs (these are best laminated before using, and could be mounted on 4 x 6" index cards)
- String to hang signs around students' necks

Time Required

- 30 minutes

Instructions for the Teacher

1. Review the key words and their definitions on the following page with students, as used in the Junior High Science Program of Studies. As you go over these words and their definitions, record them on the board so that students will be able to see them throughout the activity.

Key Words

- ***carnivore:*** an animal that eats meat (e.g. a cougar)
- ***herbivore:*** an animal that eats plants (e.g. deer)
- ***omnivore:*** an animal that eats both animal and vegetable matter (e.g. grizzly bear)
- ***scavenger:*** an animal that feeds on dead matter (e.g. weasel)
- ***predator:*** an animal that hunts, captures and kills another animal (the prey) for food
- ***prey:*** an animal that is a source of food for a predator
- ***producer:*** an organism that makes its own food (e.g. green plant)
- ***consumer:*** an organism that feeds upon those below it in a food chain (e.g. herbivores that eat grass are consumers)
- ***first order consumer:*** herbivores which feed upon green plants or producers
- ***second order consumer:*** carnivores that feed upon herbivores
- ***third order consumer:*** carnivore that feeds on other carnivores

2. Students should be given one of the common ecosystem elements included in the ***Who am I*** signs (e.g. grass, hare, coyote, etc.). Students are not to show this card to any one.

3. Students will then hang their card ***on the back of*** one of their fellow students so that their fellow students don't know what sign they have.

The object of this game is for students to determine what ecosystem element they are. Students do this by asking questions of the other students that use the key words on the board such as, "Am I a carnivore?" – All questions can only be answered by a yes or a no! Students get only ONE chance to guess what ecosystem element they are. Students are encouraged to mingle with each other and think of as many relevant questions as possible.

4. While the activity is underway, monitor all questions and answers. If students find they need more information, stop the game briefly, tell students that they are allowed to ask more general yes/no questions ("Do I have fur"? "Am I bigger than a breadbox?") to find out more. When most students know what they are, allow them to move beyond yes/no answers and give hints to the remaining students.

Extension

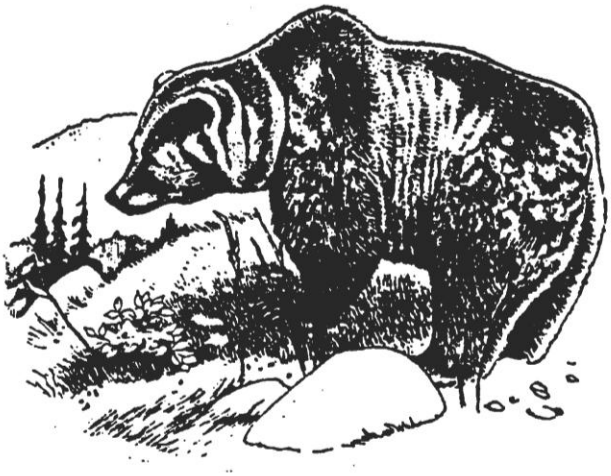
1. Once students have discovered their identities, challenge them to do the following group work:

When I say 'go' I want everyone to get into a group of either...

- **producer, consumer and decomposer**
- **first order, second, order, third order consumer**
- **predator and prey**
- **carnivore, omnivore, and herbivore.**

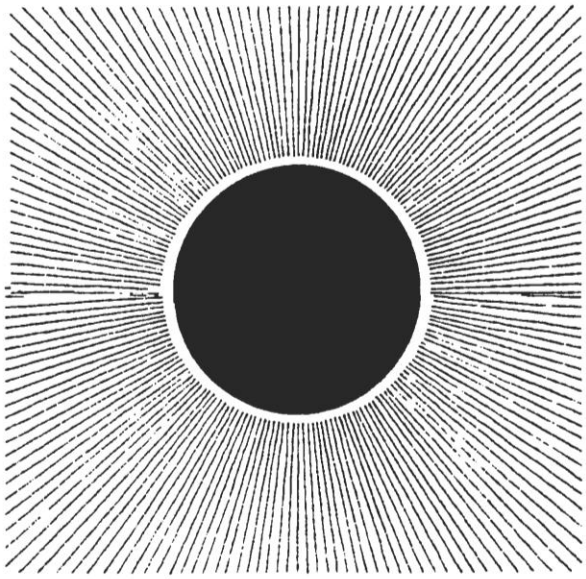
2. Another variation of the above activity is to divide the class into two groups and challenge each group to come up with a "Frozen Drama" in which each member of the ecosystem demonstrates their interactions with others (e.g.. the tree might be standing with its arms outstretched, the cougar is preparing to pounce on a browsing deer, etc.). One of the members of the group will be the only one who can talk; their job is to narrate the frozen drama to the 'audience.'

The next activity is an excellent complement to ***Who Am I?*** and is most relevant immediately following it. In ***Weird Webs,*** the characters from this activity create a food web using string. The activity includes some key discussion questions about the grizzly bear!



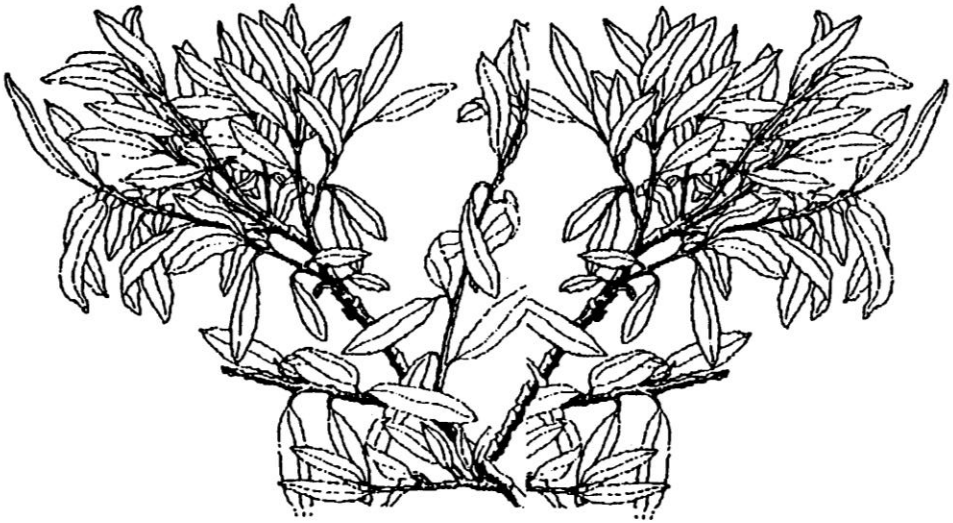
Grizzly bear

Wolf



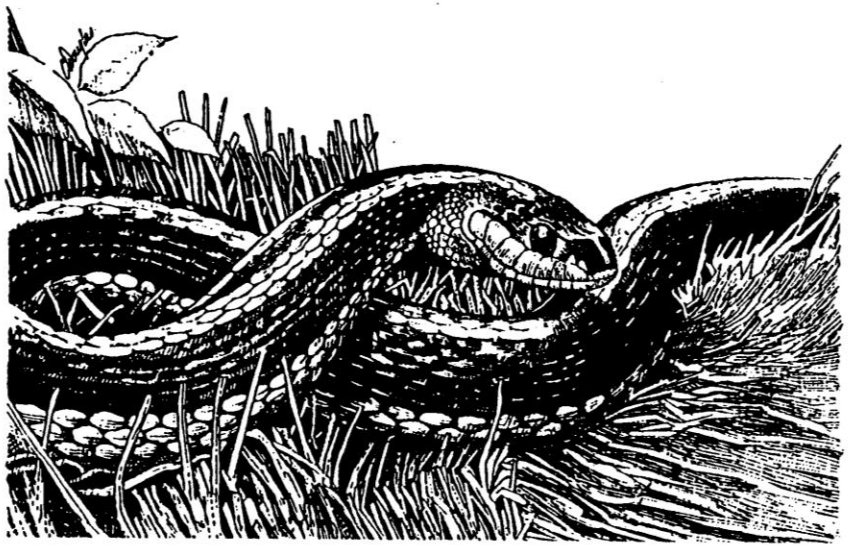
Sun

Squirrel

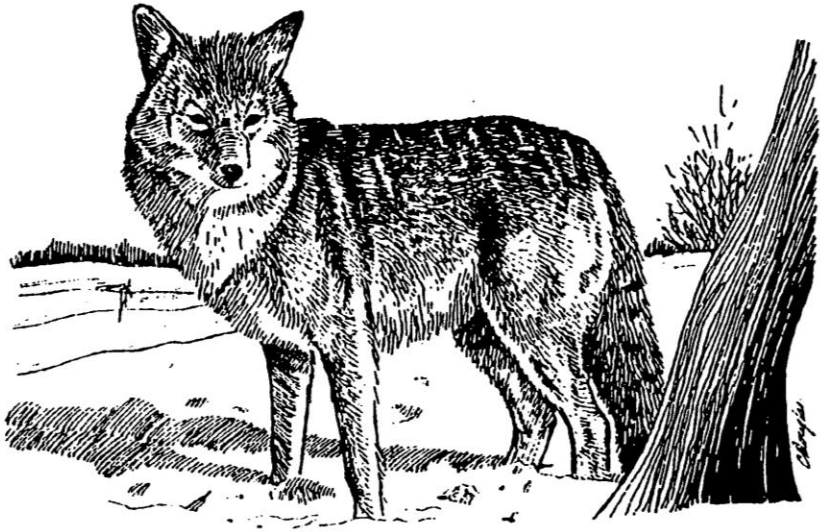


Bush

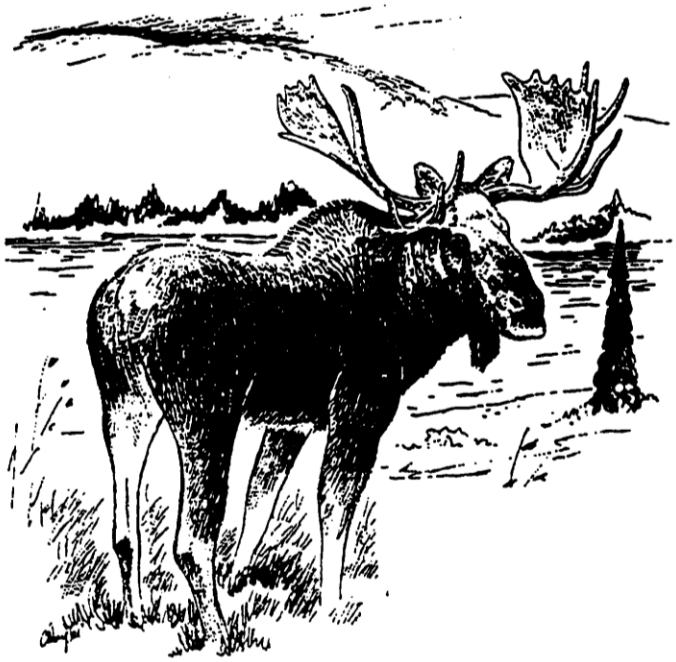
Flower



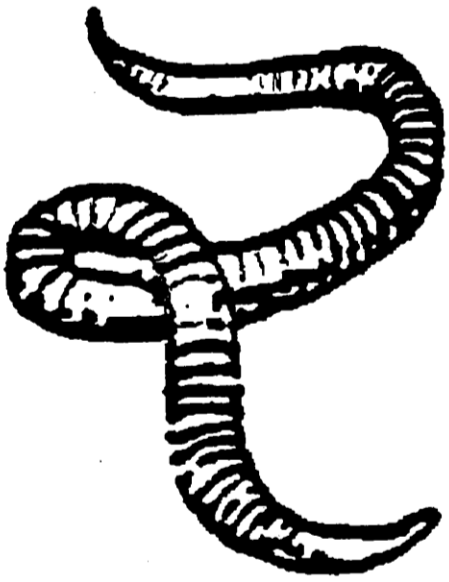
snake



Coyote



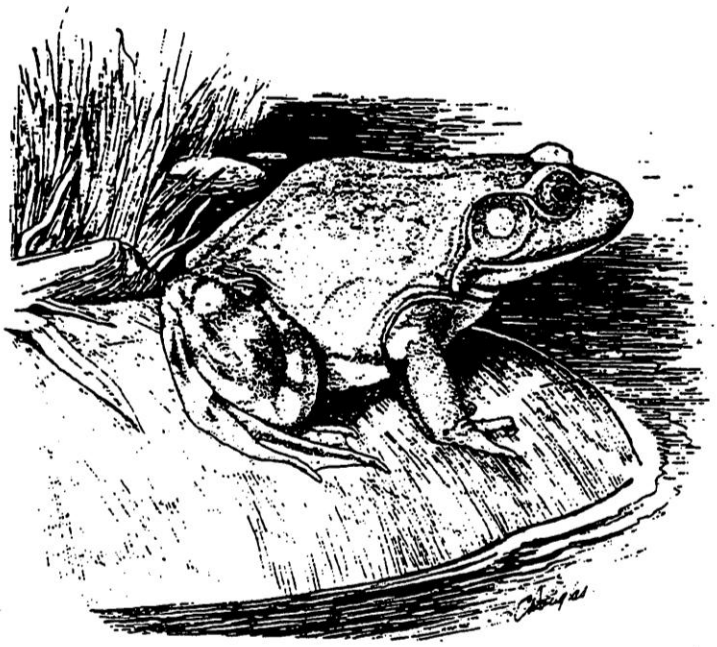
Moose



Worm

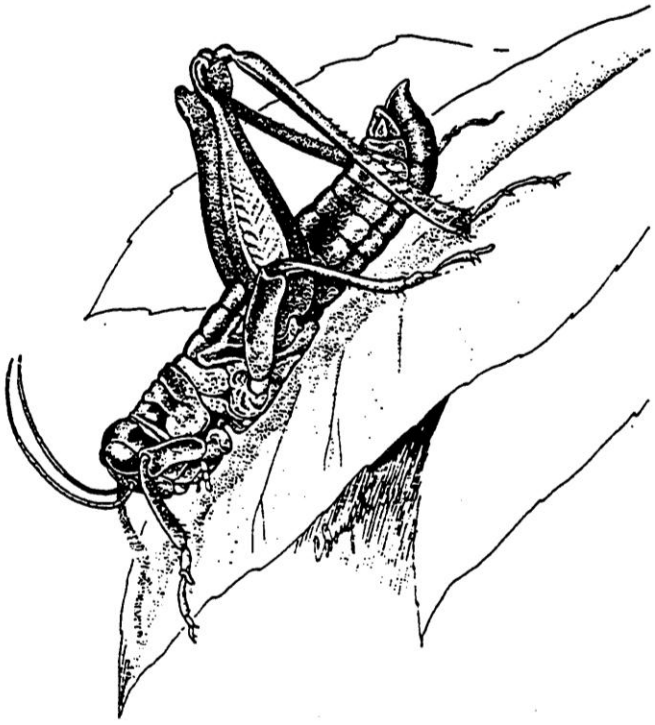
Peregrine falcon

Beaver

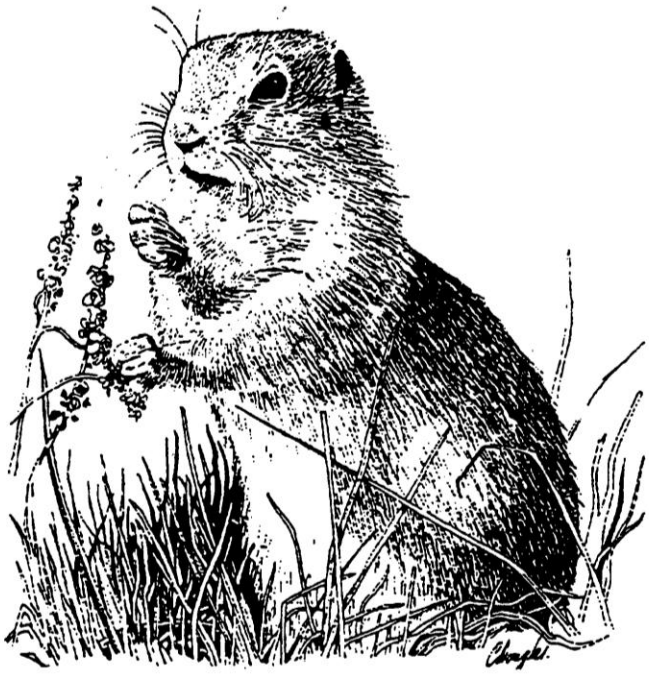


Frog

Grass



Grasshopper



Ground squirrel

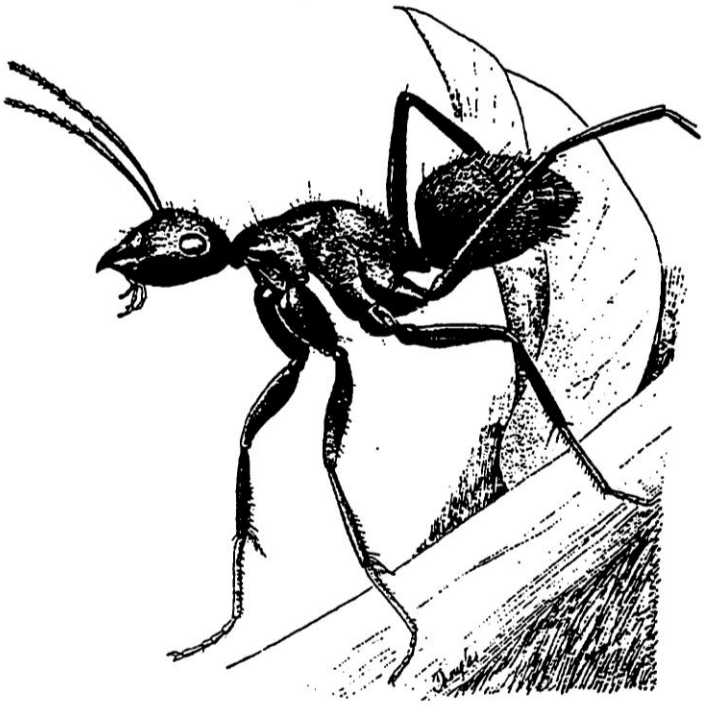
Human

Crow

Poplar tree

Elk

Cougar

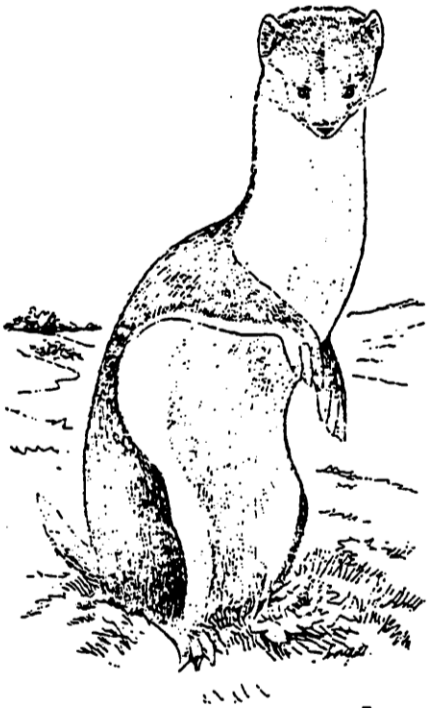


Ant

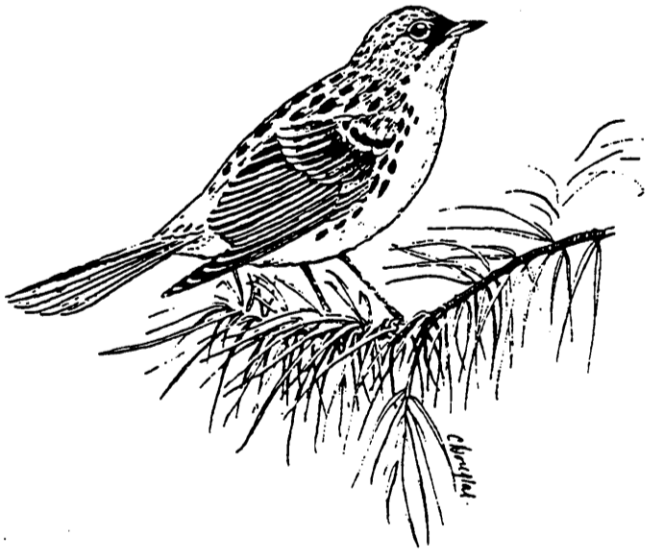
Pine tree

Bee

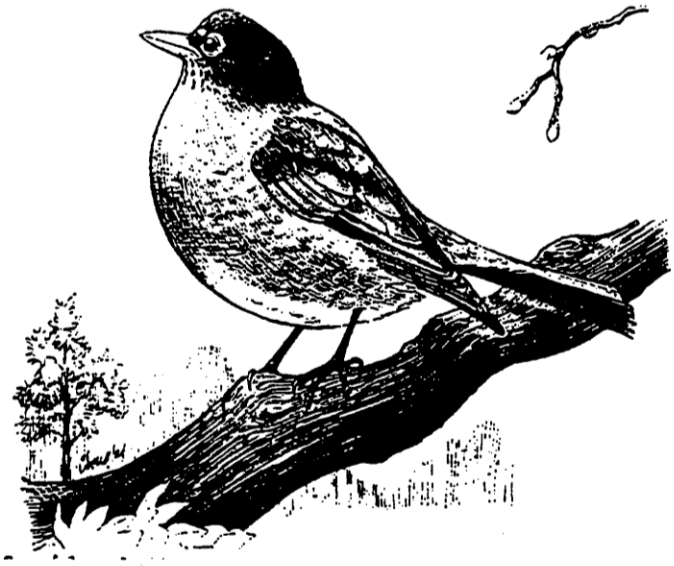
Porcupine



Weasel



Warbler



Robin

Weird Webs

Who cares about the grizzly bear? In this activity, students learn that grizzly bears are interconnected with many other different species making them a vital and key component of a healthy ecosystem. Again in the character of the ecosystem elements they received in ***Who Am I***, students use a ball of twine to create a 'food web' that shows the interactions among the members of the ecosystem. Teachers are provided with key discussion questions that help students appreciate the interconnections within the natural community and identify food chain relationships and energy flows within the "web of life." The ecosystem services given to us - for free! - are also discussed.

Curriculum Connections

Science 7A: *Interactions and Ecosystems* Outcomes 1,2

Science 8E: *Fresh and Saltwater Systems* Outcome 3

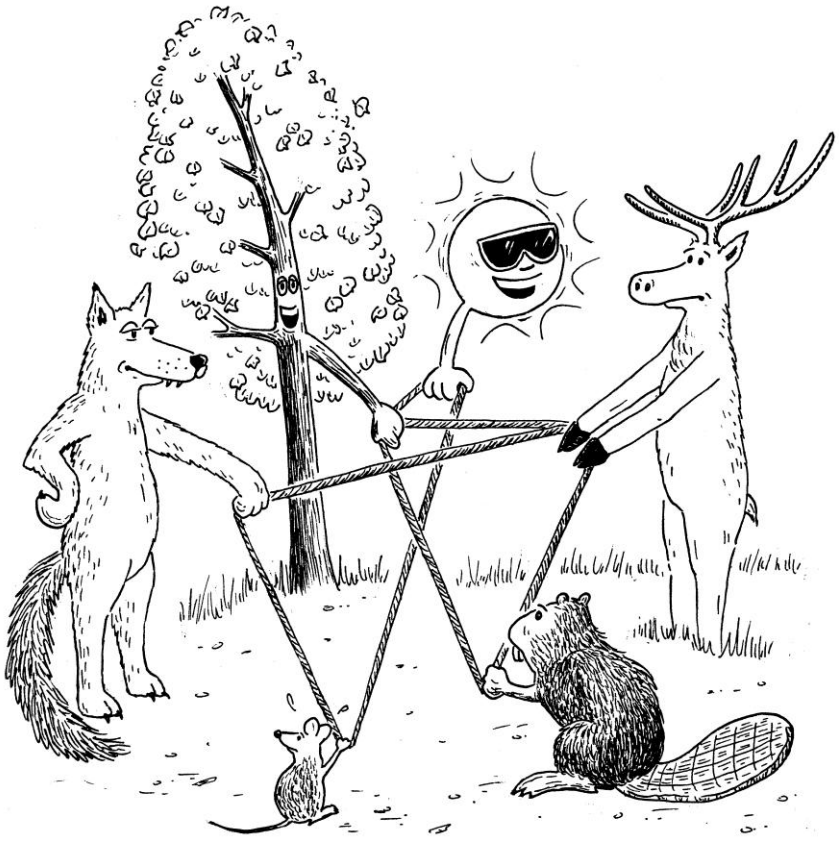
Science 9A: *Biological Diversity* Outcomes 1,4

Materials

- signs from ***Who am I?*** activity
- ball of at least 100 m of string, wool or very thin rope

Time Required

- 20-30 minutes



Instructions for the Teacher

1. Instruct students to stand or sit in a circle, showing the signs they received in the ***Who am I?*** activity. You should also be part of the circle.

Tell students that you will be playing the role of the sun, the ultimate source of life for all things (as befits your role as teacher!). Pass the ball of string to the tree, and say "I am passing the ball to the tree, because it needs me to survive. I give energy to the tree."

2. Tell students that they can pass the ball of string to another ecosystem element in the circle ***only if it needs you in order to survive, or if you need it in order to survive.*** For example, the squirrel could pass the ball to the tree (which it needs to survive) or to the owl (which needs it to survive).

3. Make sure that each exchange is justified by each student as they pass the ball, and that the whole group understands and agrees with the rationale that is given. Challenge students to try to establish connections with everyone in the circle, so that no organisms are left out. Ensure the grizzly bear is connected at least two or three times.

4. When every organism is connected, have students pull gently to make the string taut. Ask students to examine the pattern they have created. Tell them that this pattern represents the very complex pattern of interconnections between organisms that occurs in a natural ecosystem. For this reason, interrelationships within an ecosystem are sometimes referred to as ***the web of life.***

Ask students if this web is more complex or more simple than the web of life which exists in a nearby natural area or park (your classroom web is ***much*** more simple).

5. **Consider Grizzly Bears**

Have students consider the grizzly bear, and ask them to nod their heads if they could imagine their own ecosystem element being connected to the grizzly bear by the string (most students should nod their heads). Ask the students to imagine what would happen if the grizzly bear was removed from the ecosystem because of, for example, the development of a new ski resort. Without the presence of grizzly bears, many other species may not survive.

Consider Large Carnivores

Next, tell students that something has just happened to change this ecosystem: a large development has been created, and suddenly there are too many humans in the area for the grizzly bear, wolf, and cougar to tolerate. Keeping the string taut, ask these carnivore students to suddenly

release the string when you count to three. After the string is released, immediately ask if anyone felt the tension in the string change when the three large mammals dropped out (many prey species should say yes). Ask those affected by the loss of the carnivores to state how they are affected.

Emphasize two points to students:

a) Studies have shown that carnivores are far more important than previously thought - their presence or absence will actually dictate how healthy an entire ecosystem is. This is known as the 'top down' or regulatory effect.

b) Humans usually understand only a small amount of what actually goes on in an ecosystem: the relationships and interdependencies are normally too complex. This often makes our attempts to 'manage ecosystems' almost comical! The following true story of 'Cats in Parachutes' by Bart Robinson elaborates on this.

6. Try affecting the web using other species: the poplar and pine trees. Tell students that something has just happened to change this ecosystem: a timber company has just received the right to log this forest ecosystem. Keeping the string taut, ask the "tree" student(s) to suddenly release the string when you count to three. After the string is released, immediately ask if anyone felt the tension in the string change when the tree dropped out (several, including the squirrel, should say yes). Ask those affected by the loss of the tree to say how they are affected. *(For Grade 8 extensions, alter water ecosystems and see the effect)*

Count to three again, and ask these "affected" students to in turn drop the string. Keep going until everyone has dropped the string. Have students drop the string in front of them so they can pick it up again for the next round. Students should realize that any change to an ecosystem - whether slight or profound - is felt throughout the system. Tell students the golden rule of ecology: ***In an ecosystem, you can never just do one thing.***

7. Ask students to repeat this activity using the following changes to the ecosystem:

- The municipality has decided to build a dam that will alter upstream and downstream landscapes
- A developer drains a wetland complex to build a new community
- The municipality sprays to remove pesky mosquitoes from the area
- Decreasing ozone levels allows more ultraviolet radiation, which kills cells and slows the growth of the trees
- A species of worm goes extinct. This worm specialized in breaking down deer and elk poop and releasing the nutrients back into the

soil

- The forest is in a park - but the park is too small to preserve large carnivores, causing them to be extirpated from the area

8. Brainstorm with the class to suggest things that humans do to harm and to help ecosystems.

9. As an entertaining finale for this activity, take a few minutes to read "Cats in Parachutes."

Cats in Parachutes

In the early 1950's, the Dyak people of Borneo were suffering from Malaria. The World Health Organization was called, and they had a ready-made solution, which was to spray copious amounts of DDT, a chemical made to kill mosquitoes, all over the place. As a result, the mosquitoes died off and the malaria diminished. So far, so good.

There were some side effects, however. One was that the roofs of the houses began to fall in on their owners' heads because the DDT had not only killed mosquitoes, it had killed a species of parasitic wasp that up to that point had controlled a population of thatch-eating caterpillars. Furthermore, the DDT affected a great many species of small bugs that were eaten by lizardy-type creatures called geckoes, which were in turn eaten by the many resident cats.

In time, the DDT worked its way up the food chain and the cats begin to die, and when the cats died, the rats began to multiply and flourish, and soon the Dyak people were suffering from typhus ***and*** sylvanic plague, which was much worse than the original malaria. The World Health Organization was called again, except this time they didn't have a ready made solution and had to invent one, which was, believe it or not, to parachute live cats into Borneo.

Operation Cat Drop, courtesy of the Royal Airforce.

All of which is to say simply that... If you don't understand the interrelatedness of things, the cause of problems is often solutions... And that simple questions often require complex and reflective thinking if good solutions are to be found.... And that, as the Father of Ecology Aldo Leopold once said:

"The first law of intelligent tinkering is to keep all the pieces."

- by Bart Robinson, reprinted with permission (based on a story originally told by Amory Lovins).

An Uncertain Future

Large mammals and carnivores are indicators of ecosystem health. Using a number of maps, students compare the historical and present distribution in North America of several large carnivores, and try to deduce from this information what changes have occurred within the ecosystems in which the carnivores lived.

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

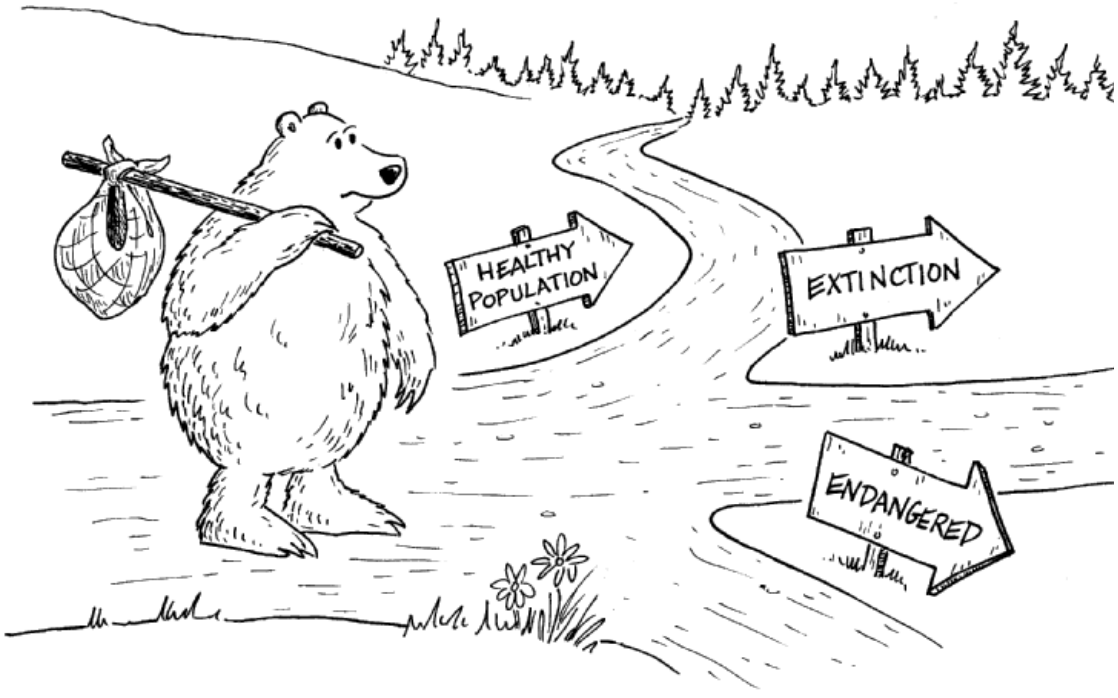
Science 9A:
Biological Diversity
Outcomes 1,4

Materials

- copy of all illustrations, including distribution maps for wolverine, cougar, wolf, and grizzly bear
- copy of the Present Distribution of Grizzly Bears map for each group of students

Time Required

- 60 minutes



Instructions for the Teacher

1. Tell students that you will be reviewing together a number of maps that show changes in the distribution of various large carnivores.

Ecological Indicator

A component of an ecosystem whose status measures the health and integrity of that ecosystem.

Species that are sensitive to changes in their environment (e.g. amphibians or bears) are often used as indicators, as they can illustrate an environmental change.

The presence or absence of carnivores or large mammals in an area can usually be used as an ***indicator of ecosystem health*** for three main reasons:

- carnivores greatly influence the entire food web
- carnivores require large areas for their habitat
- carnivores are shy of human activities

For these reasons, carnivores disappear when their habitat is fragmented by human activities and made into smaller areas. If large predators can survive in an ecosystem, it usually means the system is healthy enough to support the other animal species, like aspen, elk and hares!

2. Review the maps of cougar, wolverine, and wolf with the class. Ask students:

Have these animals disappeared from much of their original range? Why did this happen?

There have been many changes to the land, turning the habitat of these large carnivores into a place they could no longer live in. Examples of change or disturbance include agriculture, mining, forestry, cities, roads, and other kinds of human developments.

Examine the "last refuge" areas for these animals. What do you think they look like - mountains, forests, or prairies?

Most of the carnivores' last refuges are the mountainous areas where humans have not yet settled in large numbers. Some large untouched forests may also be home to these animals. Humans have dramatically altered the prairies because native grasslands have been ploughed up and are no longer habitat for these animals.

3. With your students, review the map showing the historical distribution of the grizzly. Ask them:

Was the grizzly once found in Mexico, throughout the mid-west states, or Saskatchewan?

The answer is to all three questions is yes! In fact, the grizzly is believed to have evolved in the grasslands, developing its long claws and hump of muscle on its back to help dig up plants and ground squirrels.

4. Show the 1922 Distribution of Grizzly Bears. This map shows where the grizzly could be found over 90 years ago. Ask students:

Why do you think the range of the bear has shrunk?

Extirpation

When a species goes extinct in one area, but still exists elsewhere; also known as local extinction

The answer is generally the same as for the other animals. The West experienced massive immigration of pioneering families over the last century. As the land was ploughed up and cities, railways, roads and industrial plants were built, the natural habitat that bears need to survive was fragmented or destroyed. This habitat loss, along with intense hunting pressure, eventually caused grizzly bears to disappear from settled areas.

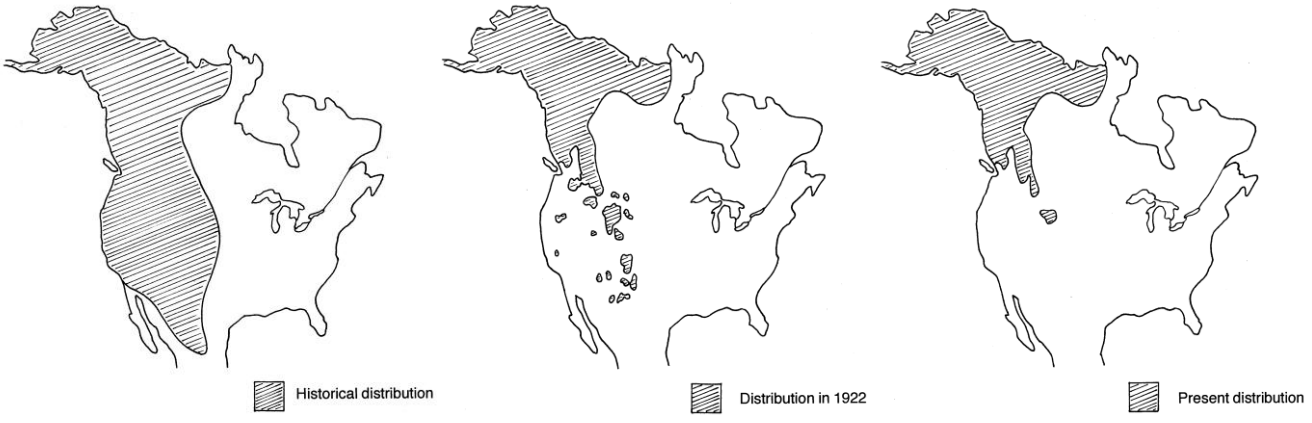
In 1922, the scattered remaining 'grizzly bear areas' in the U.S. became surrounded by human development, and might as well be considered as islands of habitat floating in a sea of developed land.

For further discussion, please see the activity, *Room to Roam* about habitat fragmentation.

Ask the students:

What if you were a bear in one of these smaller "islands" of habitat (point to one of the smaller enclaves in California). Would you predict that grizzly bears still live there today? Why or why not?

Grizzly bears no longer live here. The "islandization" of bear populations means they are isolated from other populations. They cannot connect with each other for breeding purposes. As a result, inbreeding and weakening of the population occurs, usually resulting in extirpation (local extinction) of bears from the area. Once a population dies out, whether from disease or over-hunting, no new bears can access or re-populate the area because the islands of habitat are no longer connected to each other. This is what happened to the habitat islands of 1922.



5. Show students the Present Distribution of Grizzly Bears map. Ask them:

What is the name of the remaining U.S. "island?"

This is Yellowstone National Park. It supports a population of approximately 1300 grizzly bears, which are believed to be isolated from grizzly bears to the north by ranches, highways, and other development.

Do you think the bear will become extinct in Yellowstone?

Nobody knows. Much uncertainty still exists about "how low you can go" in population numbers and still be sustainable. The U.S. government spends millions of dollars annually to keep the Yellowstone population alive.

Wildlife Corridors

Segments or pathways of land that connect critical wildlife habitat; used by animals to migrate and disperse. In the Rockies, valley bottoms are important corridors for large carnivores.

6. Brainstorm with the class possible answers to the following question:

If you were the park superintendent in the year 2020, and your bear population was becoming inbred, what could you do to save this population?

Scientific evidence suggests that the best solution to this problem is to create sufficient **wildlife corridors** and **core refugia** to allow the bears to reconnect with populations to the north.

Core Refugia

Protected areas that provide critical habitat and areas to rest.

Other, less effective measures could include the capture and release of grizzlies from Canada into Yellowstone. The probability of survival for relocated bears is low because some grizzly bears try to return to their home, and encounter roads, hunters or other threats on their way. Other grizzly bears are released into areas that are already occupied by a more powerful, dominant grizzly. This approach also requires a healthy Canadian bear population, political will on both sides of the border, and must be continued forever.

7. On the Present Distribution of Grizzly Bears map, locate the "pinch point," the slimmest point at the base of the long peninsula that reaches down into the northern U.S. Tell students that the Banff Bow Valley is located here, and ask them:

What human activities would cause this point to pinch off completely, forming a second island of habitat?

Increased development in the Bow Valley would cause this, particularly if it cuts off the wildlife corridors that connect the peninsula with habitat north of the valley. Development includes railways, highways, urban expansion, resort development, and increased human use.

Futures

Probable Future: *the one that is most likely*

Possible Future: *our actions today can have the effect of creating a whole range of possibilities*

Preferred Future: *the future we would most like to have happen*

8. On the board, write the following terms:
    - Probable future
    - Possible future
    - Preferred future

Ask the students:

What is the difference between these three terms?

Once students understand the three terms, ask:

Given the trends of the past century, what is the probable future of the grizzly bear range in North America?

Use the Present Distribution of Grizzly Bears map to illustrate/brainstorm what the probable future of the grizzly bear might be. Some groups might predict extirpation of bears from North America. Some groups might predict a more hopeful scenario. The following questions can be done with the entire class or by students in small groups.

Keeping in mind that the grizzly bear is an important indicator of wilderness and ecosystem health, what is your preferred future for the distribution of the grizzly bear?

Try to get the class to agree on an answer to this question, and use the Present Distribution map to show the class's preferred future.

What actions need to occur now in order to achieve this "preferred future?"

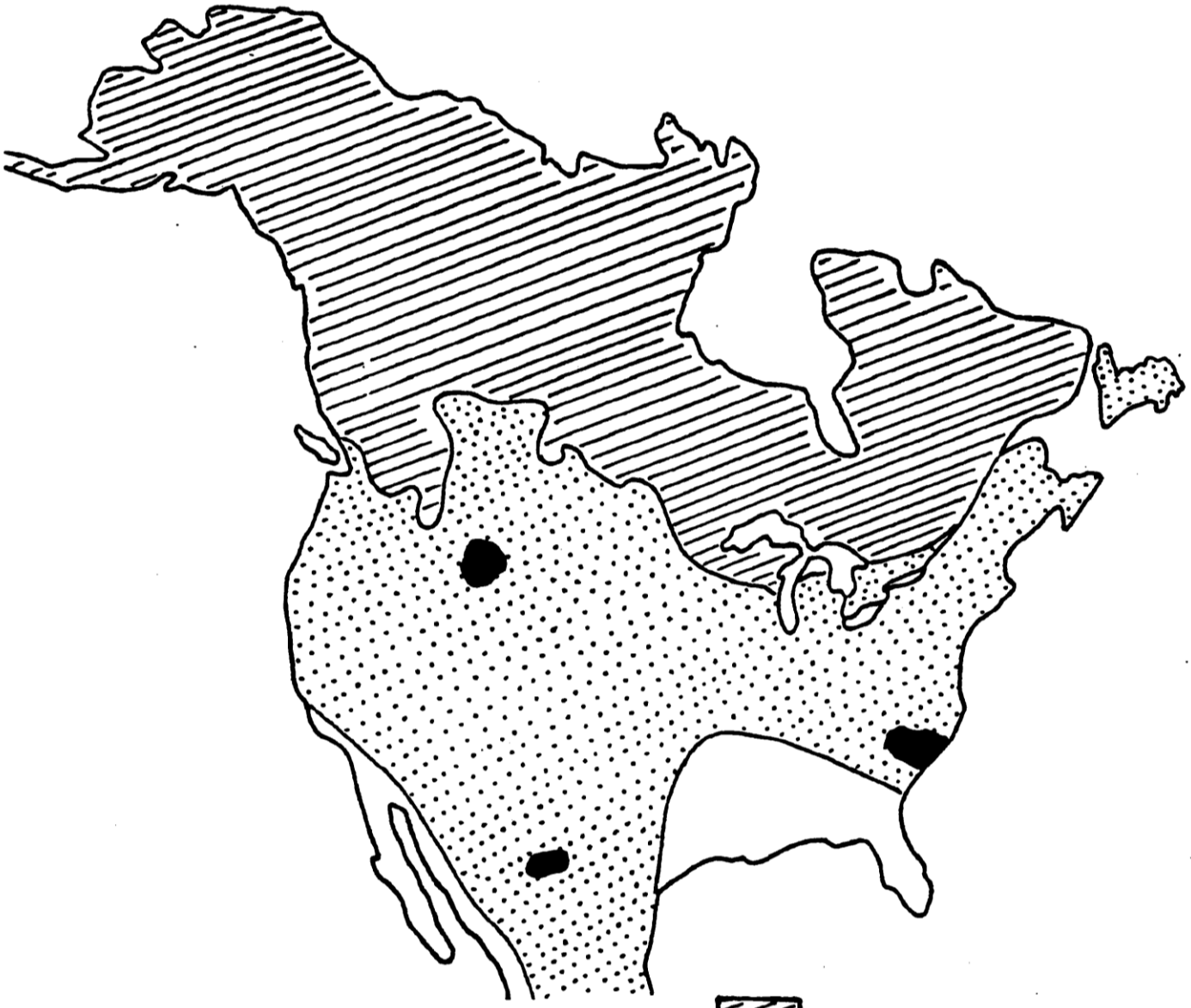
Some action-oriented ideas include:

- Stopping human developments in protected areas
- Preserve (or reopen) wildlife corridors that bears use to move from one area to another
- Important unprotected land should be given protected status
- Unprotected land used by bears should not be fragmented by roads and other developments into smaller chunks of habitat
- Unprotected land that has been degraded should be restored to more natural conditions (e.g. close old roads)

As citizens, how can we ensure that these actions stated above will actually occur?

The action-oriented sections at the end of this booklet will assist you and your students to take meaningful action on this topic.

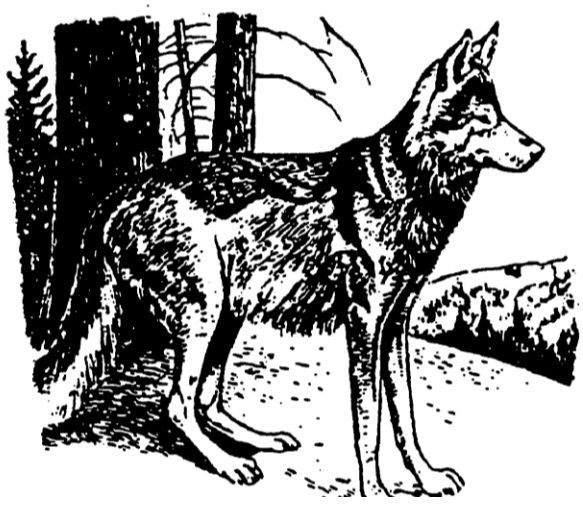
Wolf Distribution Map



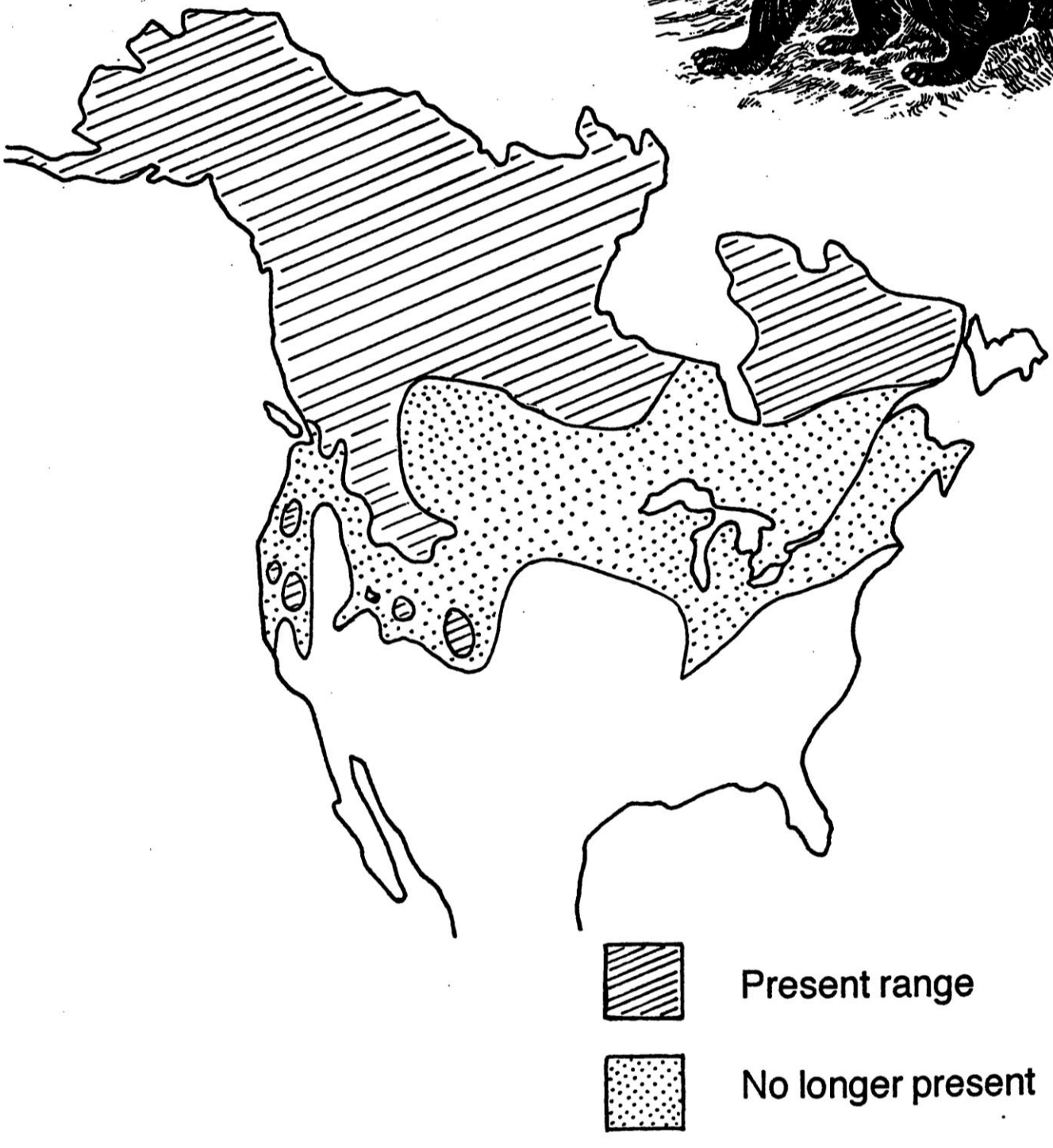
Present range

No longer present

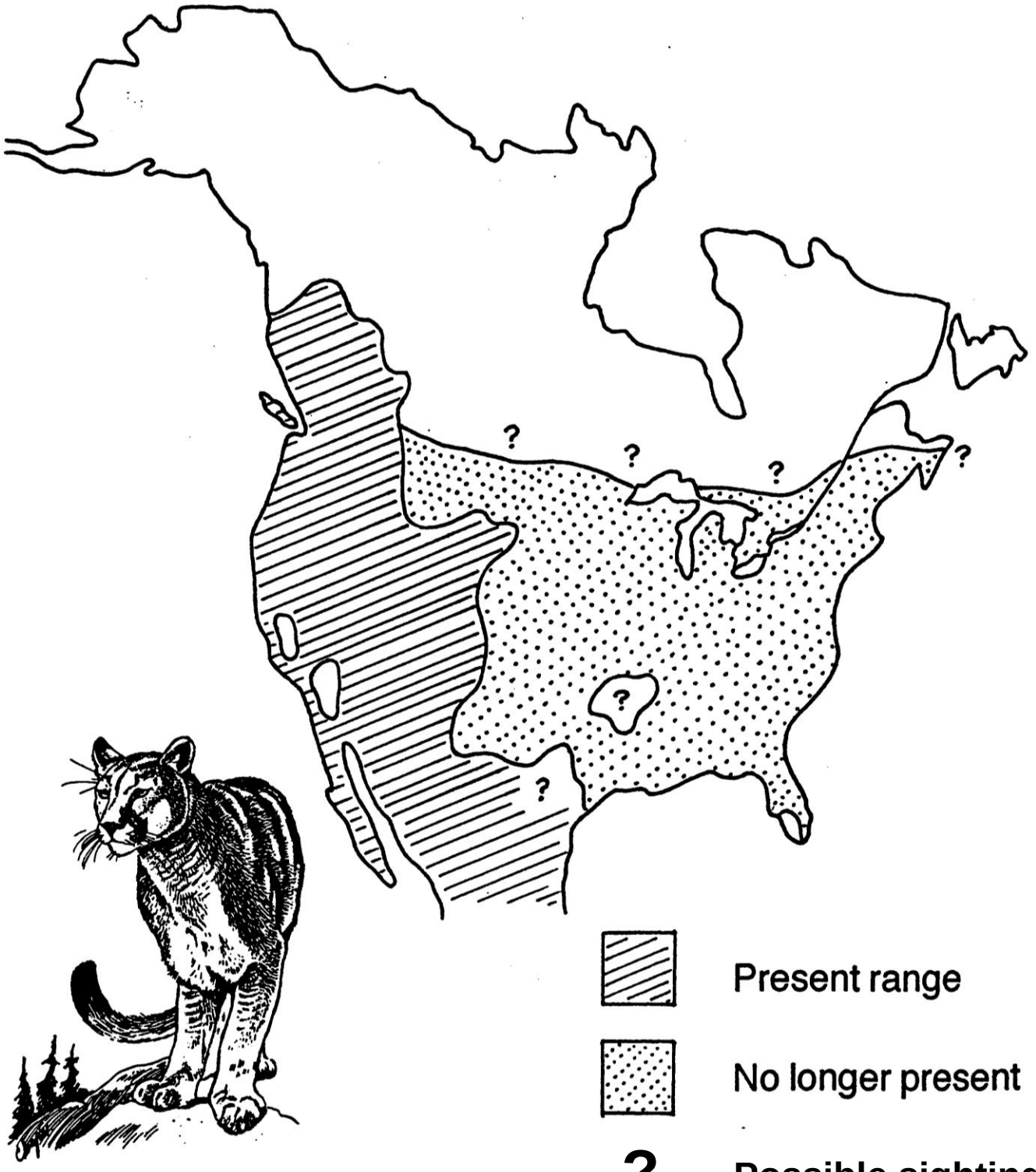
wolf restoration project



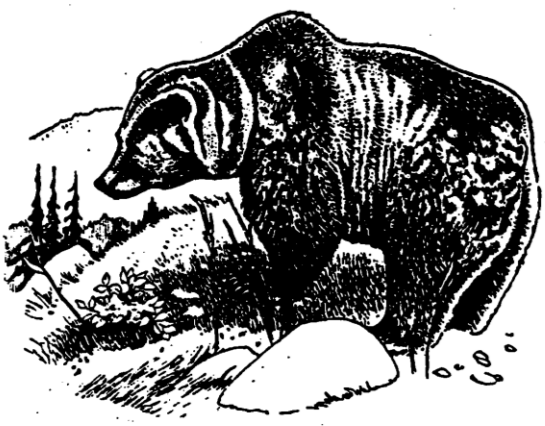
Wolverine Distribution Map



Cougar Distribution Map



Historical Distribution of Grizzly Bears (1800s)



Historical distribution

1922 Distribution of Grizzly Bears

Present Distribution of Grizzly Bears

Bio-What?!

Bio-What?! What the heck is a "Biodiversity"!? A lot of people may ask this question or may not have heard about "the loss of biological diversity." Yet the accelerating loss of biodiversity is probably the most serious environmental threat facing the planet right now. In this activity students learn about biodiversity and find out that our very survival as a species depends upon its preservation.

Curriculum Connections

Science 7A: *Interactions and Ecosystems* Outcomes 1,3,4

Science 8E: *Fresh and Salt Water Systems* Outcomes 3,4

Science 9A: *Biological Diversity* Outcomes 1,4

Materials

- Biodiversity hand-outs

Time Required

- 30-40 minutes

Instructions for the Teacher

1. Ask students:

What does the word "biodiversity" mean?

Break this word into two parts for the students:
"bio" means life and "diversity" is a synonym for variety.

2. Ask your students:

How many species of plants and animals do you think there are in the world?

Diversity

Biological Diversity: *The variety of different species found within a particular ecosystem or community.*

Genetic Diversity: *The genetic variation among the members of a single population of species.*

Actually, nobody knows: when it comes to biodiversity, scientists have far more questions than they have answers! Over 200 years ago the biologist Linnaeus told us that there were exactly 4,236 species. Since then, biologists and other scientists have named and described approximately 1.75 million species; we know very little about the behaviour of most of these species, ***or*** the role they play in the ecosystem. Estimates of the total number of species of plants and animals range from 10 to 80 million. Over three-quarters of this number is probably made up of members of the insect family.

3. The following open-ended statement will give students an opportunity to examine their own values, and to realize that not all their peers share those values! Read the following sentence aloud to your students:

> ***"If humans don't have any use for a plant or an animal, then it might as well not exist."***

Ask your students if they **agree** or **disagree** with this statement, and to say why.

4. Ask your students:

Though it may have no direct value to people, why might it be important to protect a species?

Answers might include the following: to learn about it, it may play a role in keeping other "more important" species alive, it may be beautiful to look at, or it may be the right thing to do. One important point that your students should understand is that an endangered or extinct species is an important ***indicator*** that biodiversity is being lost. A threatened species like the grizzly bear means that something is wrong in the ecosystem in which the species lives - and that the "something" might well be capable of affecting humans as well as wild species.

5. Brainstorm with your class *why biodiversity is valuable*. Write the class responses on the board.

6. Using the following pages, ask students to take notes as you go through the six main reasons why biodiversity should be preserved. The following descriptions elaborate on each of these reasons.

Seven Reasons to Protect Biodiversity

**Use these detailed explanations to help students understand the seven reasons to protect biological diversity.*

Biodiversity belongs.	Biodiversity can be beautiful and can give us aesthetic pleasure: we like seeing wild animals, strange plants, or pretty flowers. *All* humans have a right to exist; shouldn't *all* animals and plants have the same right? We are all products of a complex, miraculous system that created life on earth. Humans should respect other forms of life and make sure our actions don't destroy them.
Biodiversity helps us heal ourselves	Many animals and plants may hold the key to some marvelous new invention or medicine. For example, willow trees gave us Acetylsalicylic acid, or ASA, the active ingredient in Aspirin. How many people use Echinacea to stop colds?
Biodiversity keeps natural areas together.	The loss of animals or plants from an ecosystem affects other species in the food chain – breaking up the natural functions of the ecosystem. This may eventually lead to negative impacts on surrounding natural areas and to the human population.
Biodiversity attracts tourists.	Ecotourism, when done sustainably, may well be the best hope for the survival of protected areas, as it offers a positive economic argument for the preservation of nature.
Biodiversity helps life to continue on earth.	The more species there are, the more adaptability there will be to changing conditions like global climate change. There were little warm-blooded rat-like mammals scurrying around at the time of the dinosaurs; this diversity may have contributed to their survival while all the dinosaurs became extinct. Evolutionary expansion or 'radiant evolution' into the vacant niches left by the dinosaurs allowed mammal biodiversity to soar.
Biodiversity gives us food.	Since humans need a variety of different plants and animals to breed crops and animals suitable for use on farms, a decrease in biodiversity means that scientists have fewer species to choose from when they try to develop new food sources. For example, when a fungus wiped out 15% of the American corn crop in 1970, biologists bred resistant hybrids from a species of Mexican wild corn. The loss of animals or plants from an ecosystem will affect other species in the food chain, which may in turn affect humans.
Biodiversity helps us preserve OUR diversity.	The large number of human cultures that exist, complete with their own languages and customs, add to the diversity of the human experience and enrich us as a species. The loss of biodiversity threatens these cultures, particularly those that live close to nature such as Canadian First Nations bands or tribes living in the forests of the Amazon.

Biodiversity belongs.

The plants and animals with which we share this planet have a right to exist - whether or not they are useful to humans. Do you think it is fair for humans to make another species become extinct?

Biodiversity helps us heal ourselves.

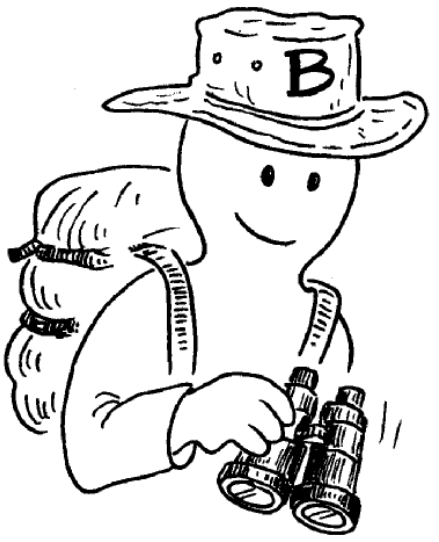
Over a hundred different species of plants are known to provide medicine for humans. 40% of the medicines found in pharmacies are derived from plants. Without the Rosy Periwinkle, many more children would die from Childhood Leukemia. Does the cure for cancer or the common cold lie in a local plant? Perhaps – that's why it's important to preserve plant biodiversity.

Biodiversity keeps natural areas together...

....and natural areas (ecosystems) provide us with essential services like clean air and fresh water. Every time we lose a species from an ecosystem, we change the way the whole system works. If this goes on for too long, the area loses its ability to provide us with ecosystem services.

Biodiversity attracts tourists.

Tourism is the most rapidly growing industry in the world; ecotourism (which helps people enjoy nature and ecosystems) is the most rapidly growing kind of tourism! All kinds of places - from Canmore to Costa Rica - need to preserve biodiversity to keep their economy strong.



Biodiversity helps life to continue on earth.

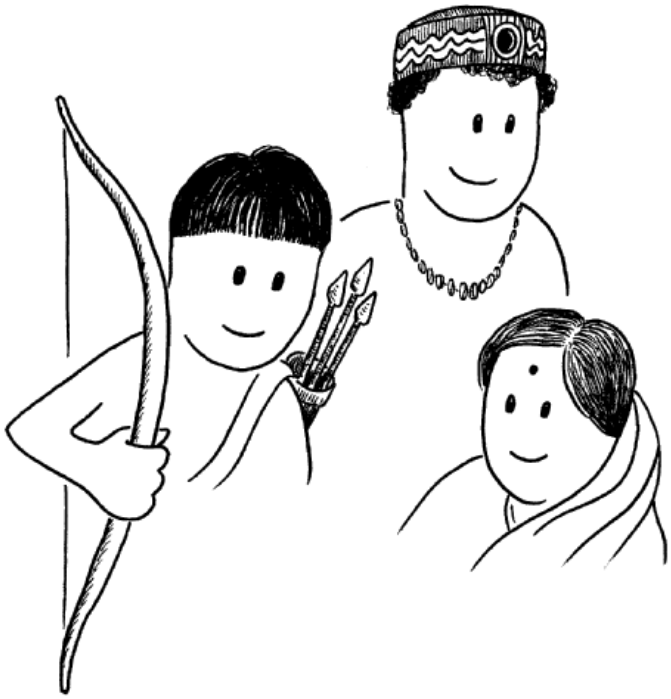
Biodiversity is life's insurance policy and helps evolution to take place. For example, biodiversity helped usher in the Age of Mammals 65 million years ago, when the dinosaurs became extinct!

Biodiversity gives us food.

Twenty species of plants (wheat, rice, corn, potatoes, barley, cassava, sorghum, etc.) give us 80% of the food we eat. If disease or insect pests attack these crops, we'll need the more resistant varieties of these plants that are currently growing wild.

Biodiversity helps preserve cultural diversity

The large number of human cultures that exist, complete with their own languages and customs, add to the diversity of the human experience and enrich us as a species. The loss of biodiversity also threatens these cultures, particularly those that live close to the land.



Bears of Banff

In this simulation activity, students assume the role of grizzly bears as they try to survive and pass on their genes in Banff, Canada's 'flagship' national park. Students will discover how human activities can sometimes "get in the way" of a bear's procreation opportunities...
(This activity was adapted from the Calgary Zoo).

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

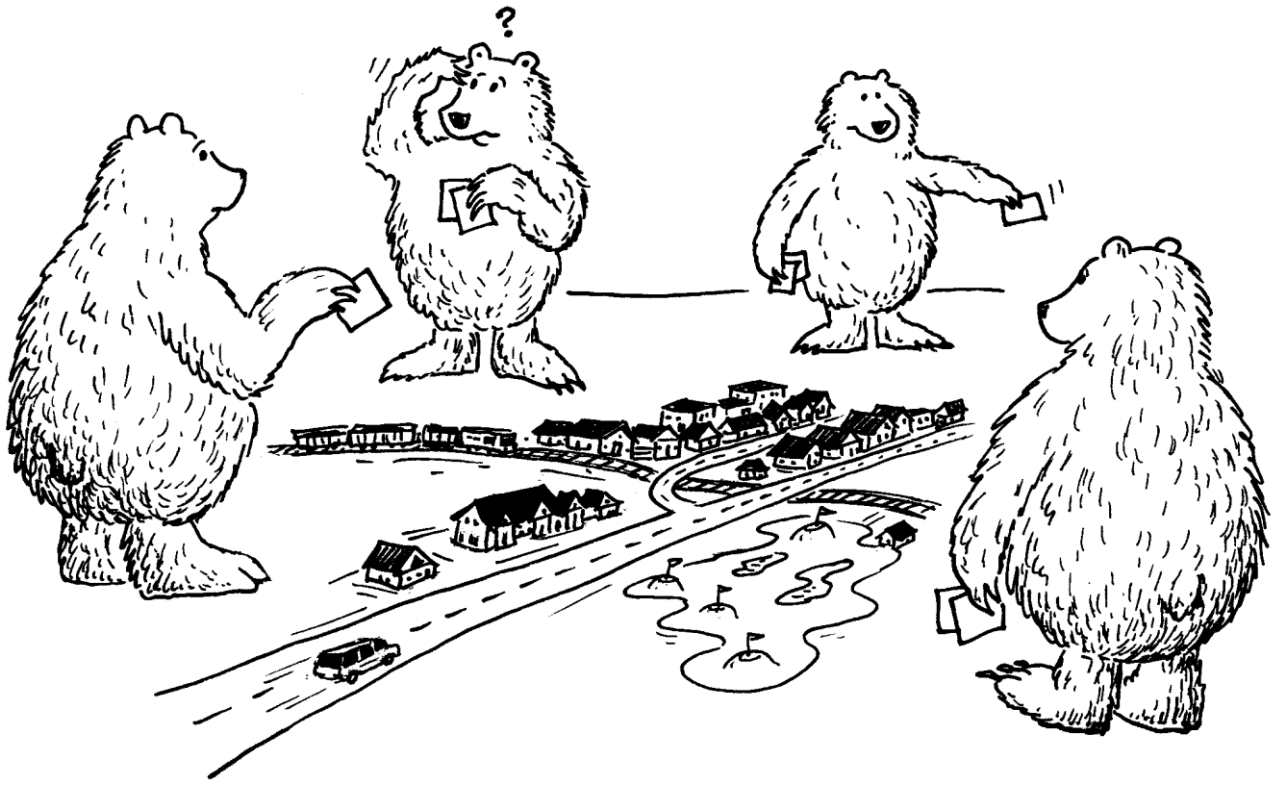
Science 9A:
Biological Diversity
Outcomes 1,2,4

Materials

- Two or three large sheets of fabric or paper
- two 5 metre lengths of coloured twine or rope
- two short (30 cm) boards or two pieces of construction paper
- enough coloured cards so that each student has a set of five cards (i.e. in a class of 30 students you'll need 30 blue, 30 green, 30 red, 30 yellow, and 30 black cards)
- an open space of at least 3 x 5 metres

Time

- 30-40 minutes



Instructions for the Teacher

1. This activity is all about breeding! If needed, review the key words below and then begin this activity by inviting students into a large area that can comfortably hold the entire group. This could be as simple as the classroom with desks moved aside.

Key Words

- ***Genes:*** a unit of heredity composed of deoxyribonucleic acid (DNA)
- ***DNA:*** deoxyribonucleic acid, the genetic material of living organisms
- ***Genetic diversity****:* differences in the genetic make up of an animal population; these differences are passed from the parents to the young. Genetic diversity improves the ability of a species to survive in a changing environment.
- ***Inbreeding:*** mating between closely related individuals
- ***Inbreeding depression*****:** when continued inbreeding results in harmful characteristics in a population because of poor genetic diversity
- ***Dispersing:*** when an animal travels long distances from their birthplace to mate with individuals from other families

2. Tell students that they have just entered a national park, and show them the boundaries of the park. Tell them that the park borders are all impassable mountains, that all activities must occur within the park area you have defined and that, in this activity, they will play the role of grizzly bears!

3. Ask the students to name three very basic things that every animal needs to survive. They should answer 'food, water, and shelter.' Tell students that in this game, it is assumed that they can meet these basic needs - what they will be tested on is their ability to *mate*!

4. Once the excited chatter has died down, distribute the cards so that every student has five differently coloured cards. Tell the students that the long-term *sustainability* of animal populations requires the mixing of *genes* to keep the population healthy, and that normally individuals ensure proper genetic mixing by *dispersing*.

Teaching Tip

Handing out all those cards can really take up time…

Save time by asking 5 students to stand in a circle while each holds a stack of cards (one student has all blue, one has all red, etc.)

Get the remaining students to walk around these students in a circle and take one card from each.

5. Tell students that the cards they are holding represent their genes, and that when you give the word to "Disperse" their task is to trade cards with other bears from across the room until they have five identical cards.

6. Say "Disperse!" It should only take a minute until all trading ceases. Ask students to put up their hands if they were able to achieve the task; you should see all or the vast majority of students put up their hands. Congratulate them on their ability to disperse and their good genetic prospects.

7. Next, find out how many students were unable to fill their hand with five identical cards. Tell these unfortunate individuals that they are the victims of ***inbreeding***, a genetic phenomenon in which mating with related animals results in not enough genetic mixing. Tell students that any bears who suffer from inbreeding in three successive rounds will be diagnosed as suffering from ***inbreeding depression***. These bears will be forced to leave the game.

Remind students that inbreeding depression is one of the more obvious reasons our human society has *taboos* against incest and inbreeding.

Inbreeding Depression

Occurs when individuals in a population are harmed by generations of inbreeding (not enough genetic mixing).

These individuals may not be able to reproduce as well as healthy individuals, may suffer from mutations and may have a lowered resistance to disease.

8. Tell students:
"Great news! Humans have finally come to live in the valley, and will be located in a modest townsite in the centre of the park, with a simple road crossing through the park to supply essential services to the town." (place a large sheet of paper or fabric in the centre of the space, and a rope through the sheet that bisects the park area). "Sorry, bears, but as you know towns and roads are dangerous for bears; bears are asked not to step onto the sheet, and any bear seen stepping across the road will be killed by myself, who today will also playing the role of a truck."

9. Tell students that when you say "Disperse" this time, their task is to fill their hand with five differently coloured cards (i.e. it will look like the hand they started off with). Say "Disperse" and let the next round proceed.

10. Play nine or ten more rounds with the students: after each "Disperse!" their task is to fill their cards either with five identical cards or five differently coloured cards. Have students give a show of hands so that you can all monitor the onset of inbreeding depression!

Add any of the following changes to the park after each round:

Round 3: Add a railway track at right angles to the road (divides the game area into quarters).

Round 4: Double the size of the town by adding commercial shopping area "to give people something to do when they come to the national park."

Round 5: Build a large oil refinery just outside the park boundary - the "halo" around this development creates a large area inside the park where bears will not go (put a sheet here).

Round 6: Build an affordable housing unit and an airfield in two different places, reaching from the townsite to the boundary, causing yet more habitat fragmentation.

Round 7: Pause here and tell the bears that there has been a proposal by an environmental group to build a wildlife overpass that would allow animals to cross the highway (place the board over the highway to show them what it would look like). Ask the 'bears' if they are in favour of this proposal - but then tell them, "Who ever asks bears for their opinion?!" Tell the bears that the proposal has been turned down, and say "Disperse!"

Round 8: Pause again and tell students that the government has twinned the highway, but to make up for it has built two wildlife overpasses over the highway (put these two boards in place). Also, the Banff-Bow Valley Study spent two years (and two million dollars) and to come up with a set of recommendations that included closing the airfield. Ask the bears again if they are in favour of these changes; there may be some dangerously inbred populations that are very happy about this restoration! Take out the airfield, put overpasses on the highway in two places, and find out if these changes help cure any bad cases of inbreeding depression.

Discussion

11. The main intent of this game is to demonstrate how incremental development in this park makes genetic mixing more difficult. Scientists have noticed the first signs of inbreeding depression in the park's grizzly populations, which might eventually lead to the extirpation of the species within and south of Banff.

Ask students:

In future rounds of this game, do you think it would get easier or more difficult for the bears?

Things could go either way, but one thing is for sure: even in a national park, humans have a hard time saying, "That's enough." Incremental development, in which human structures advance in tiny increments year after year, is a major threat to our remaining natural areas.

12. Banff National Park is the site of discussion between those who believe that "Parks are for People," and those who believe that the first job of a national park is to protect the animals that live in it. Ask your students to discuss what they believe parks are for. As a follow-up, remind students that our National Parks Act holds protection of plants and animals to be of primary importance.

13. **Marvelous Metaphor**:

Place an empty box on the end of your desk so that all the students can see it. Tell the students that this box represents an intact ecosystem, but that your hand represents the hand of the human, who manages and impacts on the natural ecosystem. With your hand, push the container closer to the edge of the desk; each time you do this, give an example of an incremental impact on ecosystems (from twinning highways to air pollution).

Continue until the box is partially overhanging the desk edge. Point out that the box is still intact - but that it is at risk. Ask students if the ecosystem will survive unchanged if incremental development continues indefinitely within the ecosystem. Could it be that human activities should have their limits?

14. As a follow-up activity you may wish to play the CPAWS activity, "Take a Stand" with your students available from:

www.cpaws-southernalberta.org/campaigns/resources-for-environmental-education

Births and Deaths: Natality and Mortality of Grizzly Bears

If the number of bear deaths exceeds the bear births in a bear population, then that population will decline. In this activity, students will be able to use real data from the *Eastern Slopes Grizzly Bear Project* to discover the ups and downs of the grizzly bear population in Banff.

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

Science 9A:
Biological Diversity
Outcomes 1,4

Materials

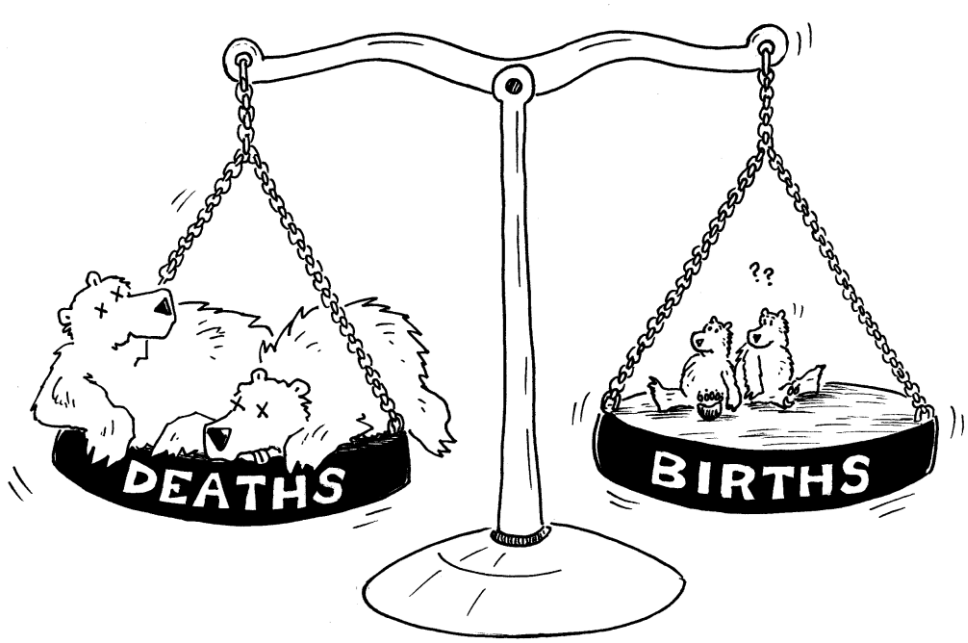
- Copies of worksheets for each student
- Coloured pencil crayons for each student
- Calculators for each student

Time Required

- 60-90 minutes

Background

Introduce the concept of population dynamics. Over a long period of time, the number of bears in a population is affected not only by the number of births during that period, but also by the number of deaths. To maintain a stable population of bears over time in an ecosystem, wildlife managers must ensure that the birth rate equals or exceeds the death rate!



Tell the students that they will be using real data from the Eastern Slopes Grizzly Bear Project:

Gibeau, M., S. Herrero, J. L. Kansas, B. Benn. 1996. Grizzly bear population and habitat status in Banff National Park: A report to the Banff Bow Valley Task Force. University of Calgary, AB. 62pp.

Copies of this report and updates may be downloaded from: *http://www.canadianrockies.net/Grizzly/rspub.html.*

For future updates and data on the biology and status of Grizzly Bears in Alberta, see the Foothills Model Forest, Grizzly Research site at: *http://www.fmf.ca/pa_GB.html*

Habituation

When a bear becomes used to and loses its natural wariness of humans and human things (highways, cars, photographers)

Positive reinforcement and rewards play a role (feeding bears, careless storage of food/garbage).

Instructions for the Teacher

1. Define the words mortality (death rate) and natality (birth rate) for the class. Grizzly bears have a very low birth rate and are among the least reproductive large mammals in North America. The mortality rate is a very important factor for determining bear populations!

2. Ask the students to brainstorm possible causes for grizzly bear mortalities in Banff National Park. Have them rank these in order of most significant to the least significant. Compare the students' list with the statistics on the following page. In Banff National Park, habituated bears die more then any other cause. Habituated bears are bears who have lost their natural fear of humans. These bears may have been fed by humans, or have encountered garbage or food left behind by careless campers. Habituated bears often are shot by conservation officers or wardens if they pose a threat to human safety.

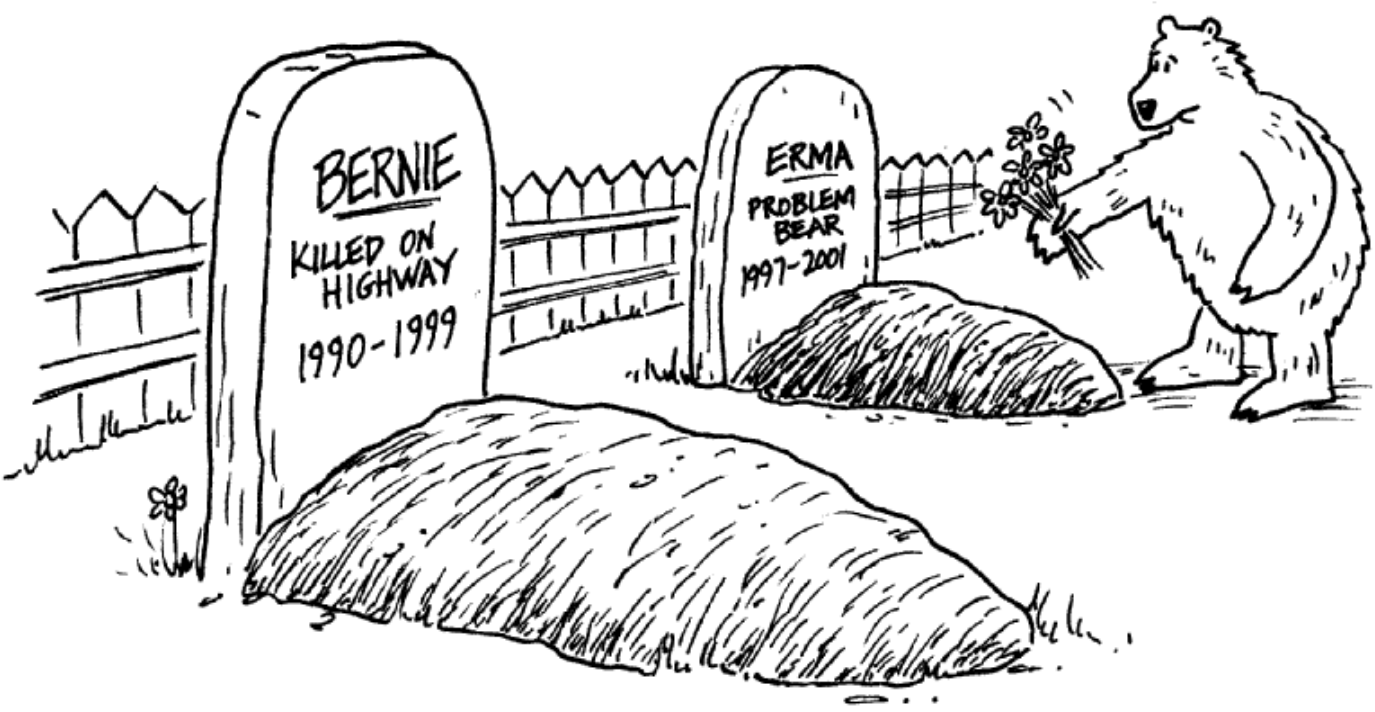
3. Distribute worksheets to the class and have students fill in the table titled, *Grizzly Bear Mortalities in Banff National Park.* A teacher solution is also provided. Have students fill in the blanks by calculating:

- the totals for each type of mortality
- the average number of mortalities per 5 year period for each type
- the combined total average number of mortalities

4. Have the students complete a histogram (plotting the number of deaths per year versus the five year periods) to represent the mortalities for each five-year period. Have them divide each bar into portions to represent the causes of mortality.

5 Main Causes of Grizzly Bear Mortality in Alberta

1. Poaching
2. Highway/Railroad Kills
3. Habituation
4. Unknown
5. Natural Causes



Student Worksheet: Grizzly Bear Births and Deaths
Natality (birth rate) and Mortality (death rate)

Name:_____

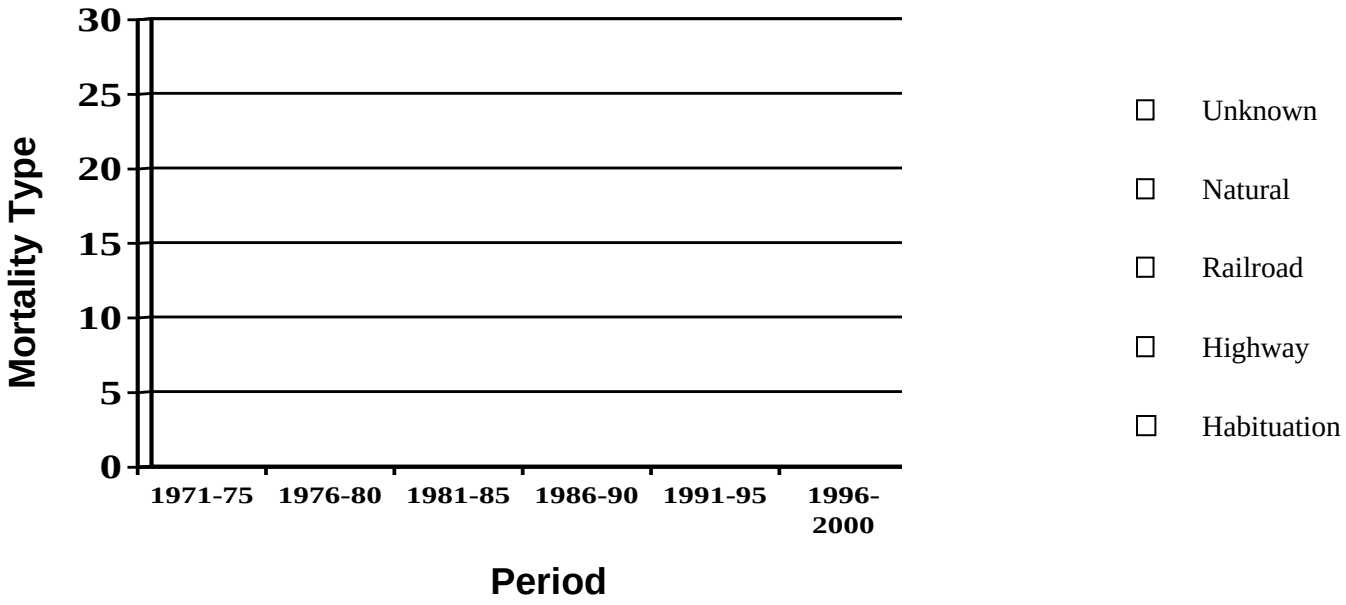
1) Fill in the blanks on the following table:

Type of Grizzly Bear Mortalities in Banff National Park, in 5-year periods 1971-2000

Period	Mortality Type					Totals	Average # of Mortalities/ year
	Habituation	Highway	Railroad	Natural	Unknown		
1971-75	6	0	1	0	1		
1976-80	17	8	2	2	0		
1981-85	14	0	0	0	4		
1986-90	10	1	0	0	1		
1991-95	5	1	0	0	0		
1996-00	0	0	1	3	0		
Totals							

2) Using the numbers from the table above, create a histogram with coloured pencils in the provided space below plotting the number of deaths per year versus each five-year period.

Type of Grizzly Bear Mortalities in Banff National Park (BNP)



3) Based on the data, what is the greatest cause of grizzly bear mortalities?

4) What reasons might have contributed to the peak in mortalities in the late 1970's?

QUESTIONS: STUDENT WORKSHEET Page 2

5) What factors may have caused the decrease in mortalities in the late 1980's and early 1990's?

6) Within Banff National Park the grizzly bear death rate for the most recent period we have data for (1996-2000) is 0.8 deaths/year. In your opinion, is this mortality rate too high for a bear population to remain in Banff Park for the years to come? What else do you have to know in order to answer such a question?

Use the following data to answer questions # 7, 8 and 9.
Between 1994 and 1999, 17 female bears in Banff National Park had the following cubs:

Bear #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
# of cubs	3	4	2	1	3	4	5	5	1	2	1	0	2	0	0	0	0

7) What is the average number of cubs born per year during this period?

8) What is the average number of cubs born per bear per year?

9) Many cubs will not survive to adolescence. Only about 70% will survive to adulthood. Take the total number of cubs per year from question 7 and multiply it by .70 to get the number of cubs who survive to become adults. This is the *natality rate*.

Comparing Mortality (death) and Natality (birth) Rates
10) Based on the mortality and natality rates in BNP, should the bear population increase or decrease over time? **(m>n = [redacted]op; m<n = p[redacted]pp)**

11) Biologists feel that the grizzly population in BNP is decreasing, not increasing. This is because the mortality rate (2.56 bears/year) does not represent the *actual* number of mortalities. Many deaths are undocumented or occur outside the park boundaries. Based on an increased mortality rate of 5.0 bears/year and a natality rate of 4.6 bears/year, what will happen to the grizzly bear population over time?

12) Biologists estimate that within Banff National Park, the current population of grizzly bears is 70. Use the numbers in the question above to find out how many bears there will be 25 years from now.

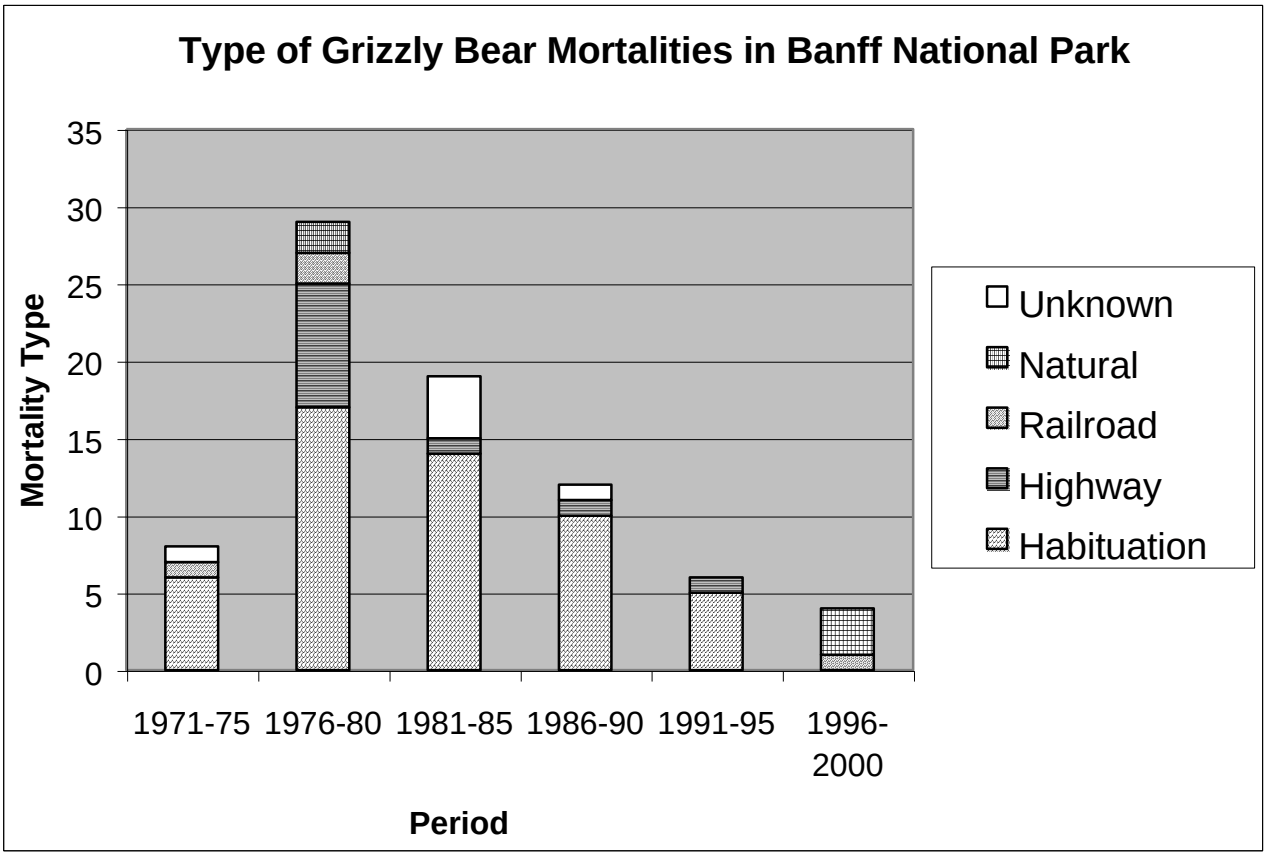
13) You have just done an extrapolation, where you take a certain rate and project it forward in time in order to make a prediction. Can you think of any problems in making such a prediction?

TEACHER'S SOLUTION
Type of Grizzly Bear Mortalities in Banff National Park

1)

Period	Mortality Type					Totals	Average # of Mortalities/ year
	Habituation	Highway	Railroad	Natural	Unknown		
1971-75	6	0	1	0	1	8	1.6
1976-80	17	8	2	2	0	29	5.8
1981-85	14	0	0	0	4	18	3.6
1986-90	10	1	0	0	1	12	2.4
1991-95	5	1	0	0	0	6	1.2
1996-00	0	0	1	3	0	4	0.8
Totals	52	10	4	5	6	77	2.56

2)



Teacher Key to Written Questions:

3) Based on the data, what is the greatest cause of grizzly bear mortalities?

Habituation: when a bear becomes conditioned by humans through positive reinforcement (feeding bears, stopping to take photographs of bears, attracting bears by being careless with garbage or food etc. are all examples of positive reinforcement)

4) What reasons might have contributed to the peak in mortalities in the late 1970's?

Banff National Park was managed differently in the late 1970s than it is today. People used to allow bears to approach cars for photos. There were no fences on the highway. Garbage wasn't properly stored in bear-proof garbage bins; in fact, bears used to feed at the Banff Dump. When the dump closed in the late 70s, the habituated bears may have had more human encounters while searching for food. Park managers also killed several bears after a mauling that involved only one bear (they couldn't find the "culprit").

5) What factors may have caused the decrease in mortalities in the late 1980's and early 1990's?

Factors such as the fencing along the side of the Trans-Canada Highway, better education of park visitors and campers, and the use of bear-proof garbage bins.

6) Within Banff National Park the grizzly bear death rate for the most recent period we have data for (1996-2000) is 0.8 deaths/year. In your opinion, is this mortality rate too high for a bear population to remain in Banff Park for the years to come? What else do you have to know in order to answer such a question?

To answer this question, we need to know the birth rate (see the next section).

Use the following data to answer questions # 7, 8 and 9.
Between 1994 and 1999, 17 female bears in Banff National Park had the following cubs:

Bear #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
# of cubs	3	4	2	1	3	4	5	5	1	2	1	0	2	0	0	0	0

7) What is the average number of cubs born per year during this period?

There were 33 known grizzly bear cubs in the park: 33/5 = 6.6cubs/year.

8) What is the average number of cubs born per bear per year?

6.6 cubs/year divided by 17 females = .039 cubs/bear

9) Many cubs will not survive to adolescence. Only about 70% will survive to adulthood.

Take the total number of cubs per year from question 7 and multiply it by .70 to get the number of cubs who survive to become adults. This is the *natality rate*.

6.6 cubs/year x 0.70 = 4.60 cubs/year will survive to adulthood

Comparing Mortality (death) and Natality (birth) Rates
10) Based on the mortality and natality rates in BNP, should the bear population increase or decrease over time?

(m>n = ⬇ pop; m<n = ⬆ pop)

m (2.56) < n (4.56) = population should increase over time.

11) Biologists feel that the grizzly population in BNP is decreasing, not increasing. This is because the mortality rate (2.56 bears/year) does not represent the *actual* number of mortalities. Many deaths are undocumented or occur outside the park boundaries. Based on an increased mortality rate of 5.0 bears/year and a natality rate of 4.6 bears/year, what will happen to the grizzly bear population over time?

The bear population will decrease. If this trend continues, bears will become extirpated (locally extinct) in Banff National Park.

12) Biologists estimate that the current population of grizzly bears in Banff National Park is 70. Use the numbers in the question above to find out how many bears there will be 25 years from now.

Growth rate*(# of years) + current population = future population (*Growth rate = BR – MR)

{(4.6 – 5) X 25} + 70 = 60 bears

13) You have just done an extrapolation, where you take a certain rate and project it forward in time in order to make a prediction. Can you think of any problems in making such a prediction?

Yes. Problems exist when making extrapolations because they presume that factors such as habitat effectiveness remain constant. In the unlikely event that developed land becomes restored, the population may actually increase despite the prediction made. On the other hand, if wild areas become developed and visitor use increases, the population prediction of the Banff Park grizzlies could be much smaller than 60. Also, a smaller population of bears in 25 years might have trouble finding each other! Similarly, the population might start to suffer from inbreeding as it grows smaller. Both of these would hasten the decrease in population over time. This positive feedback loop is known as the "Extinction Vortex."

Discussion

Which part of the histogram surprises your class the most? Why?

The following might be useful in answering students' questions:

- **Railroad:** Bears are often attracted to the railroad due to spilled grain along the tracks and are hit by trains.
- **Highway:** Vegetation is often cleared along roadsides, creating false bear habitat: fresh shoots and buffaloberries grow in these cleared areas. As well, bears come into contact with roads that pass through their habitat (Trans-Canada Highway).
- **Habituation**: Many bears are attracted to areas near development because of the great smelling garbage that humans create. As a result, these bears become less wary of humans. Unfortunately, a close encounter with humans usually means death or imprisonment in zoos.

Are the mortality numbers completely accurate? What are the 'sources of error' that are possible?

Fifty percent of all grizzly bear deaths are unknown! This is because:

- Bears who die of natural causes may never be found; bears included in the population may die outside of the park, or move out of the park to live elsewhere
- Though, there has been a temporary ban on hunting grizzly bears, some are still illegally hunted outside of the park.

The researchers for the Eastern Slopes Grizzly Bear Project found that the majority of the bears dying in Banff National Park are females. Ask students why this might be a problem for grizzly bear populations.

Biologists believe that females are far more important than males. Females are the reproductive "engines" of the bear populations and are key to maintaining stable populations - so long as there are some males around to help out!

Some environmentalists and Parks managers claim that, "What we have here is not a bear problem - it is a human problem." Ask students if they agree. Ask students what they think a "problem bear" is.

This question is one that challenges our assumptions and perceptions regarding bears. A problem bear is one that, through its aggressive or non-conforming behaviour, breaks some of the rules we've set out for how 'good bears' ought to behave. Today, we refer to problem bears as habituated bears. Most conflicts between humans and bears can be ascribed to some error made by people in the Park.

Biologists feel that large, well-protected areas should serve as a source of grizzly bears by creating an excess of bears every year. These excess bears would disperse to less protected areas. Is Banff National Park a 'source' or a 'sink' for grizzlies?

Problem Bears or Problem Humans?

Not long ago, bears who had become habituated by garbage, careless storage of camping food, etc., were called, "problem bears."

Today, we realize that humans are the problem when it comes to unwary bears threatening human safety. Problem bears are now called 'victimized' or habituated bears.

Given the known natality and mortality rates for Banff, it should be a source of grizzly bears. However, if the *actual* mortality rate is higher than the natality rate, then Banff would be a sink.

What are suggestions for reaching a stable, or better yet, a growing number of grizzlies?

Slower speed limits on the highways, restrictions on human access to some areas, travelling responsibly in bear country, importing bears from other areas (costly and long-term).

Habitat Effectiveness

When is habitat not effective habitat? When it can't be used by grizzly bears and other wildlife. Discover the problems that can arise when we fill up protected areas with 'human stuff.' This activity uses real data and techniques used by researchers in Banff National Park. Habitat Effectiveness uses a mathematical approach to assess how human use in grizzly country impacts potential bear habitat. (See also Secure Area Analysis for another method of determining bear habitat).

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

Science 9A:
Biological Diversity
Outcomes 1,4

Materials

- Pencil and eraser for students
- 4 different colored pens or markers for students
- Calculator
- Copy of cartoon (Potential x Habitat Effectiveness = Realized) and map labeled, *Significant human features in Banff, Yoho and Kootenay National Parks*
- Photocopies of table and two numbered maps

Time Required

- 90 minutes

Instructions for Teacher

1. Have students brainstorm and write down on a separate sheet of paper what desirable grizzly bear habitat would look like and explain why. Have them also consider what would constitute an undesirable area. Grizzly bears choose habitat that has the following attributes:

- **Food!** A large, mainly vegetarian animal such as a grizzly is always hungry and chooses habitat with lots of foodstuffs
- **Low-elevation, open valley bottoms.** This is where food is more abundant. Higher elevation areas, such as the alpine ecoregion above the treeline, offer only a short growing season and are commonly cold, rocky, snowy or icy – not the place to find a lot of food (except for a short period in midsummer).

Show students the cartoon that illustrates the relationship between potential habitat, habitat effectiveness and realized habitat. Human use can affect habitat, and reduce its 'potential value' to 'realized value.' Ensure that students understand that great bear habitat may become unusable for bears if human activities are intense enough in the area.

Thinking Question

Q: What kind of habitat do humans prefer in Banff? Why is this a problem for bears?

A: Humans and bears prefer the same habitat: the valley bottoms. Wild, wary bears avoid humans and development, thereby reducing the size of their habitat.

2. Hand out both maps and the *Grizzly Bear Habitat in BNP* table to students. To conserve paper and encourage teamwork you may wish to have them work in small groups.

3. Refer students to the table entitled *Grizzly Bear Habitat in Banff National Park*. The column labeled 'Potential Habitat' gives a value for a particular BMU (Bear Management Unit) that was calculated by researchers based on the quality of that habitat for bears – NOT CONSIDERING the effects of humans (e.g. people, roads, etc) in that area.

On the map labeled *Grizzly bear habitats for BMU's…* have the students use pencils to create their own symbol in the legend and to shade in the regions according to the values on the supplied chart. For example, if the potential habitat value on the chart is 1.5, it is considered low potential. All regions that are less than 2.9 on the chart should be filled in with the same pattern.

4. This map now shows potential habitat. Have them add the word, "Potential" to the title resulting in, *Potential Grizzly Bear Habitat for BMU's…*

Ask the students:

Why are there different values for potential habitat in the three mountain parks?

Grizzly bears prefer to live at elevations under 8000 feet (valley bottoms) where there is a large amount of high quality berries. These regions have a high potential habitat value. Regions above 8000 feet, or that have poor quality vegetation (lakes, dense forest) have a low potential habitat value.

5. Direct students to examine the values in the next column: 'Realized Habitat.' Ask students if these numbers are higher or lower than the potential habitat column. Ask them what they think 'Realized Habitat' refers to. Realized habitat is simply a percentage of the potential habitat after taking into account disturbance factors from human use: people, buildings, roads, traffic, etc. It is a measure of the amount of the potential habitat that the bear is actually using.

6. Ask students to scrutinize the maps they just made, and if necessary use eraser and pencil to 'downgrade' the habitat from potential to realized habitat – reflecting the fact that there are many human disturbances to this natural ecosystem. Have students add the word, "Realized" to the title of the map. Discuss possible factors influencing the realized habitat values. These would include the Trans-Canada Highway and human settlements like the town of Banff and Lake Louise Village.

7. Ask students to study the chart once more, and have them calculate and fill in the 'Habitat Effectiveness' in the blank column on the chart.

Habitat Effectiveness =
Realized habitat ÷ Potential habitat
e.g.) BMU #1 has a potential value of 1.5 and a realized value of 1.0. *so* 1.0/1.5= .67 *or* 67%.

8. On the second map labeled *Habitat effectiveness for Bear Management Units*... have students colour (use different colours for each of the four categories) in the areas of different habitat effectiveness values using the values from the table, following the legend provided on the map. This final map reveals the 1996 effective habitat for grizzly bears in Banff National Park.

9. Ask students:
Why does habitat effectiveness vary in the 40 Bear Management Units?

What human features would you expect to find in those BMUs with values less than, say, 70%?

Human features like towns, buildings, roads, railways and ski hills are often found in Bear Management Units that are less than 70%.

10. Ask students:

BMU 22 has a higher potential habitat value but a lower realized habitat value than BMU 21. Why is there such a difference between the two neighboring BMUs?

Show students the map labeled, *Significant human features in Banff, Yoho and Kootenay National Parks* to help answer this question.

BMU 22 has a higher potential habitat value than BMU 21 because it is a flat, valley bottom that is unimpeded by large lakes. Almost all of BMU 22 could potentially be used by grizzly bears. BMU 21 has a lower potential habitat value because of a large lake called Lake Minnewanka. This lake is of little use to a grizzly bear.

Definitions

Potential Habitat
Areas that can potentially provide bears with ideal habitat (excellent food and shelter). Areas are rated: 0 is of no value to bears; 10 provides best possible habitat.

Realized Habitat
The amount of potential habitat the bear is actually using. It accounts for human disturbances in bear habitat. A value of 0 is of no value; 10 provides best remaining habitat.

Habitat Effectiveness
Is the comparison between the habitat and disturbance and reflects an area's actual ability to support bears.

BMU 22 has a lower realized habitat value than BMU 21 because of the presence of the town of Banff. The town of Banff, located in BMU 22 is densely populated by humans and is situated very close to the Trans-Canada highway.

Similarly, Lake Louise village is located at the junction of BMUs 8, 10, 11, 9, and 17. Grizzlies are very sensitive to human disturbance, and can't successfully forage or live near human dwellings and activities.

11. Ask students:

What if anything should Parks Canada do to increase habitat effectiveness values in these three national parks?

Researchers' recommendations to increase habitat effectiveness values in our National Parks include the following:

- Particular attention should be given to preventing further loss of habitat effectiveness especially in high quality habitats (valley bottoms) where highly suitable seasonal grizzly bear habitat exists. This may mean limiting human developments.
- Steps should be considered to increase habitat quality for grizzlies. Limiting human access in grizzly habitat, the use of fire, and the creation of selective clearings can potentially enhance grizzly bear habitat.
- Human impacts on movement areas that grizzly bears use should be managed at levels that will encourage movement by grizzly bears.

To see what Parks Canada is doing to protect grizzlies in Banff National Park, review the new management plans at:
http://www.pc.gc.ca/eng/pn-np/mtn/ours-bears/gestion-management.aspx

12. Ask students:

What, if anything, can we/visitors to Banff National Park do to influence habitat effectiveness?

- Drive less through BNP
- Drive the speed limit
- Avoid causing "Bear Jams" – do not stop to take pictures of bears near roads
- Avoid trails/campgrounds with "Bear in Area" signs


GREAT BEAR HABITAT
X
=
UNUSABLE HABITAT
POTENTIAL
HABITAT EFFECTIVENESS
REALIZED HABITAT

Grizzly Bear Habitat in Banff National Park

Bear Management Unit	Potential Habitat	Realized Habitat	Habitat Effectiveness (%)
1	1.5	1.0	
2	3.1	2.7	
3	3.4	2.9	
4	2.4	2.3	
5	3.0	2.2	
6	2.3	2.2	
7	2.6	2.5	
8	3.5	2.6	
9	4.5	2.1	
10	3.5	3.1	
11	3.2	2.5	
12	2.6	2.5	
13	4.0	3.8	
14	4.1	3.8	
15	4.4	3.8	
16	5.5	3.8	
17	5.2	3.9	
18	5.3	4.0	
19	5.6	4.4	
20	4.8	4.7	
21	5.3	4.8	
22	7.4	3.6	
23	3.5	2.9	
24	4.0	3.5	
25	5.1	4.7	
26	3.5	2.9	
27	3.9	3.5	
28	4.7	4.1	
29	4.4	4.1	
30	3.0	2.0	
31	4.8	3.9	
32	3.6	2.8	
33	4.3	4.2	
34	4.3	3.6	
35	4.8	3.9	
36	5.6	5.0	
37	6.9	6.1	
38	7.8	6.7	
39	6.9	5.6	
40	8.1	6.9	

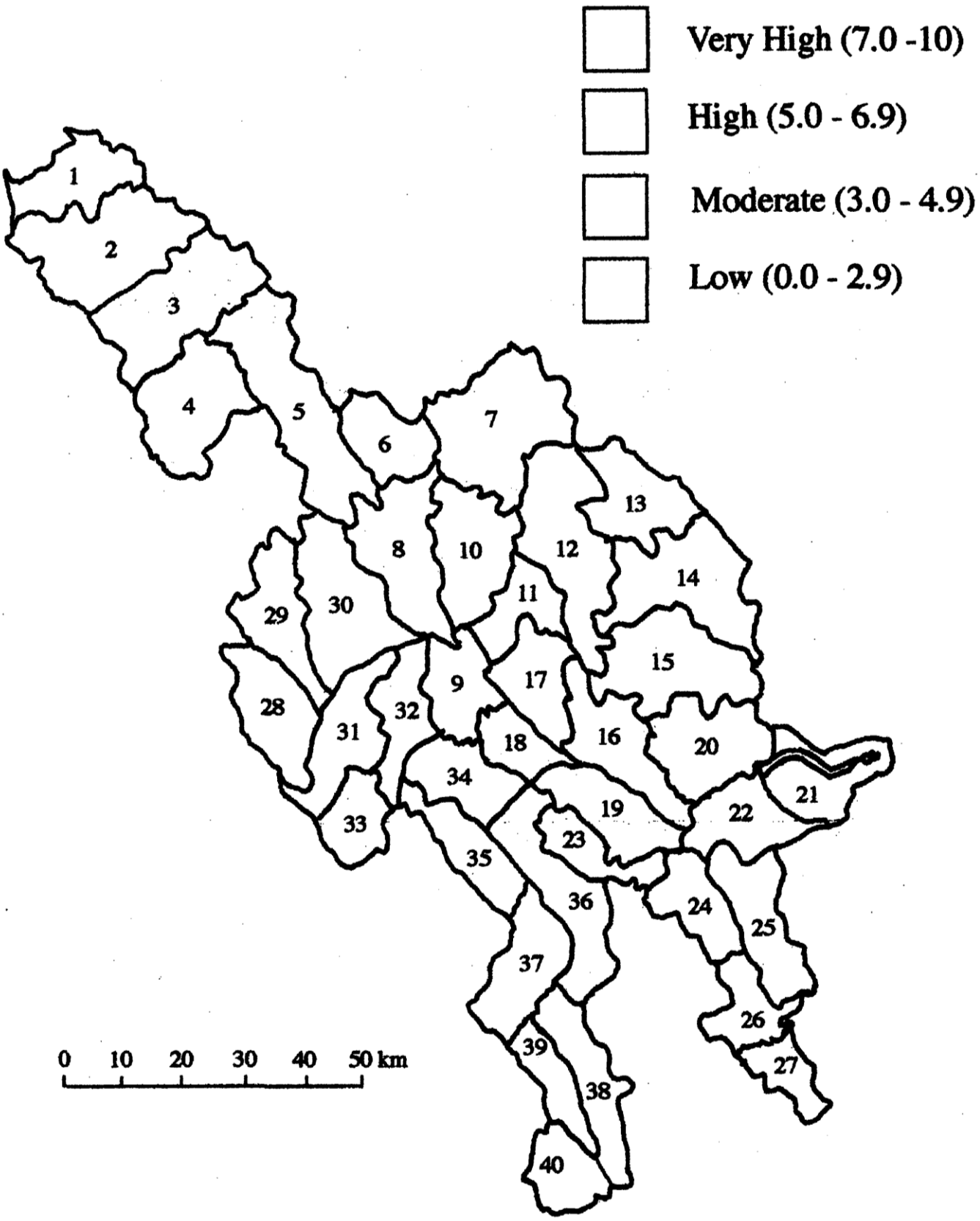
Note: this table uses data from Table 2: Summer Values for Canadian National Parks Habitat Effectiveness Model. Found in *Grizzly Bear Population and Habitat Status in Banff National Park: a report to the Banff Bow Valley Task Force*, 1996.

Teacher Solution
Grizzly Bear Habitat in Banff National Park

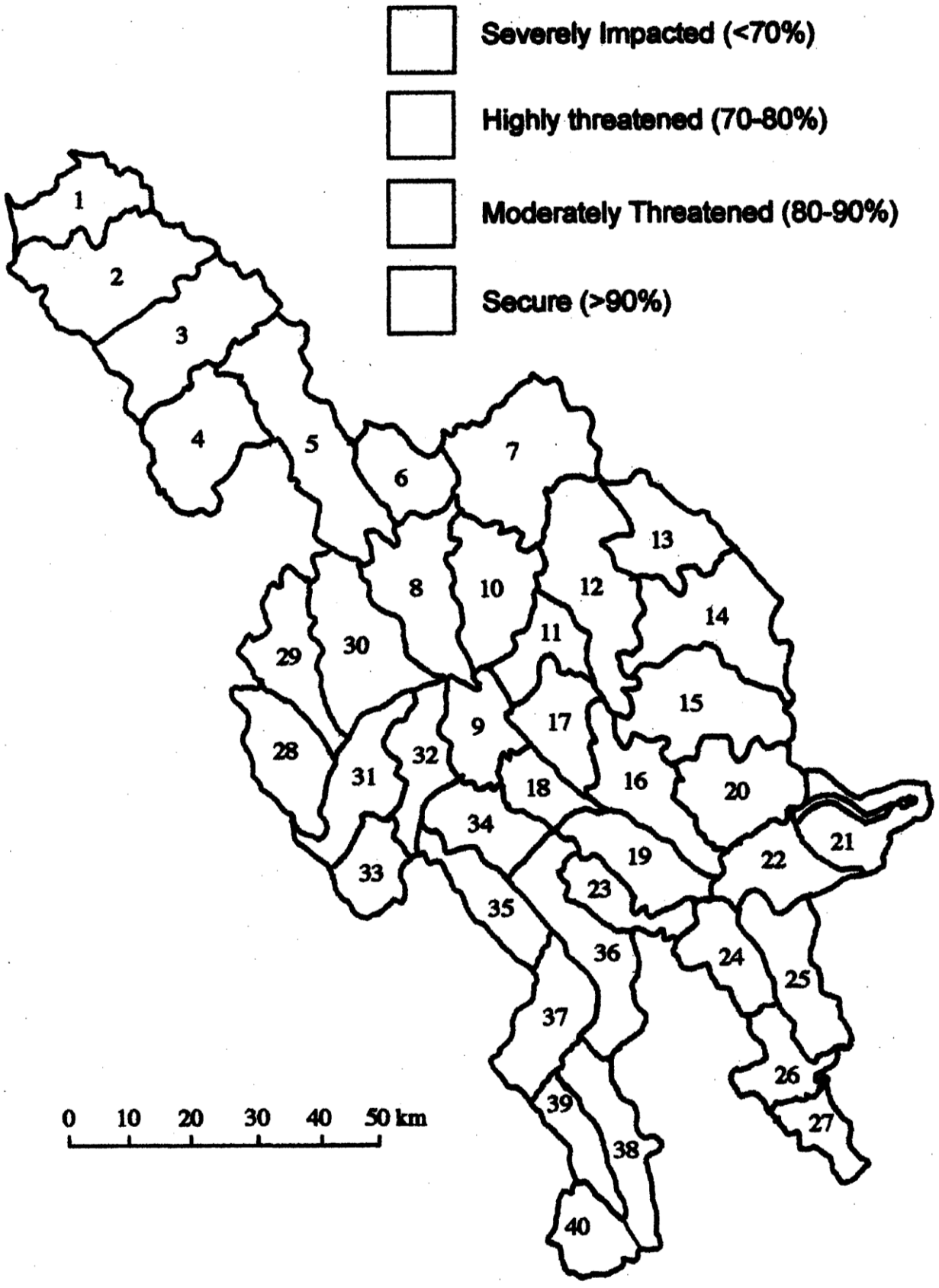
Bear Management Unit	Potential Habitat	Realized Habitat	Habitat Effectiveness (%)
1	1.5	1.0	67
2	3.1	2.7	87
3	3.4	2.9	85
4	2.4	2.3	96
5	3.0	2.2	73
6	2.3	2.2	96
7	2.6	2.5	96
8	3.5	2.6	74
9	4.5	2.1	47
10	3.5	3.1	89
11	3.2	2.5	78
12	2.6	2.5	96
13	4.0	3.8	95
14	4.1	3.8	93
15	4.4	3.8	86
16	5.5	3.8	69
17	5.2	3.9	75
18	5.3	4.0	76
19	5.6	4.4	79
20	4.8	4.7	68
21	5.3	4.8	91
22	7.4	3.6	49
23	3.5	2.9	83
24	4.0	3.5	88
25	5.1	4.7	92
26	3.5	2.9	83
27	3.9	3.5	90
28	4.7	4.1	87
29	4.4	4.1	93
30	3.0	2.0	67
31	4.8	3.9	81
32	3.6	2.8	78
33	4.3	4.2	98
34	4.3	3.6	84
35	4.8	3.9	81
36	5.6	5.0	89
37	6.9	6.1	88
38	7.8	6.7	86
39	6.9	5.6	81
40	8.1	6.9	85

Note: this table uses data from Table 2: Summer Values for Canadian National Parks Habitat Effectiveness Model. Found in Grizzly Bear Population and Habitat Status in Banff National Park: a report to the Banff Bow Valley Task Force*, 1996.*

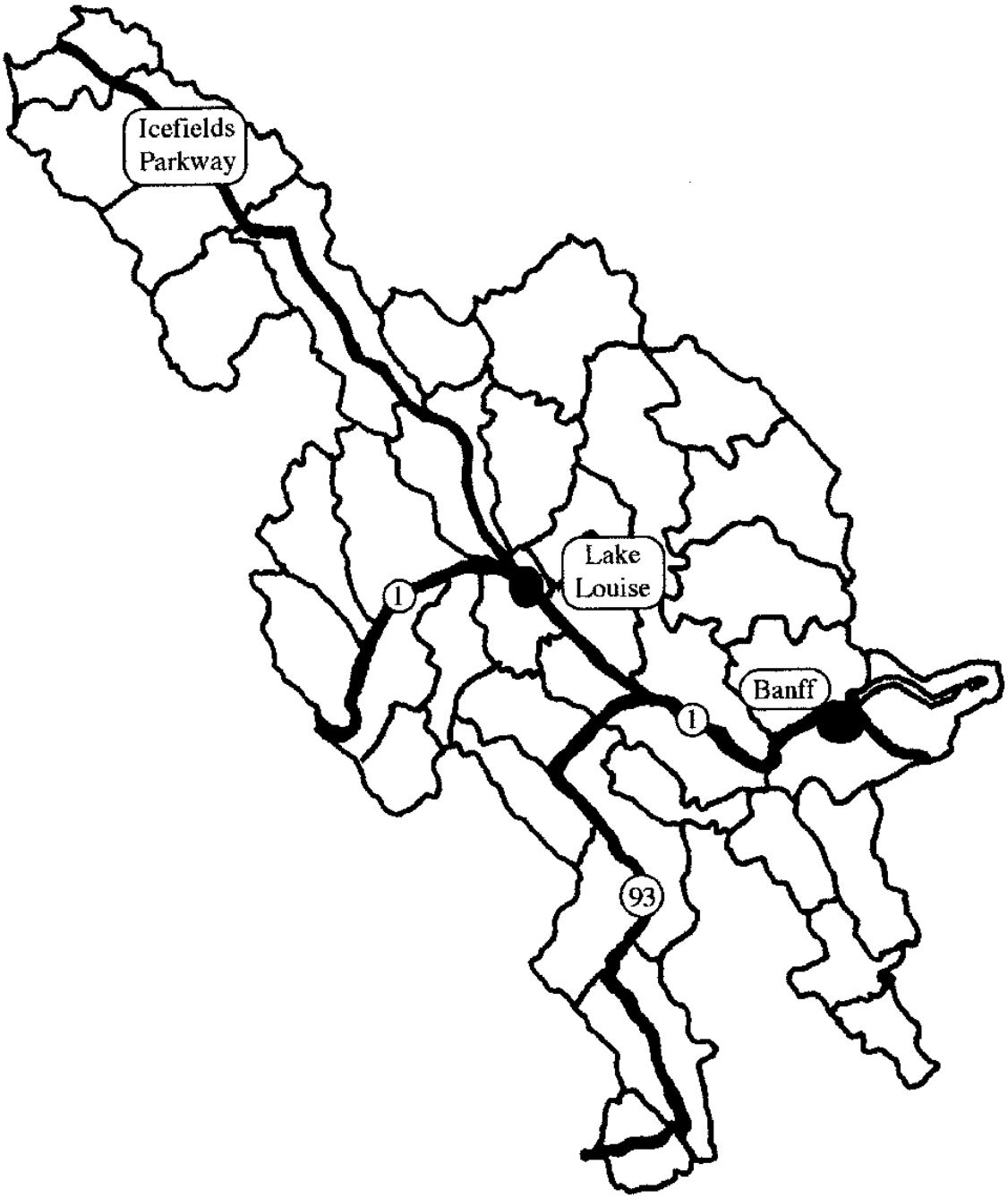
Grizzly bear habitat for Bear Management Units (BMUs) in Banff, Kootenay, and Yoho National Parks



Habitat Effectiveness for Bear Management Units (BMUs) in Banff, Kootenay, and Yoho National Parks



Significant human features in Banff, Yoho, and Kootenay National Parks



Secure Area Analysis

In our society, we have homeless people who lack places where they can feel safe and secure. These unfortunate people commonly have health problems, seldom raise children, and have a shorter life expectancy. Some bears go through life like our society's homeless: they have few places where they feel safe and secure. In this activity, find out if Kananaskis Country's Evan Thomas Valley, with Highway 40, Nakiska ski resort, and the Kananaskis Village, is a good place for grizzly bears to live. Whereas Habitat Effectiveness uses mathematics to assess human impacts on bear habitat, Secure Area Analysis identifies suitable habitat based on food requirements for female grizzlies.

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

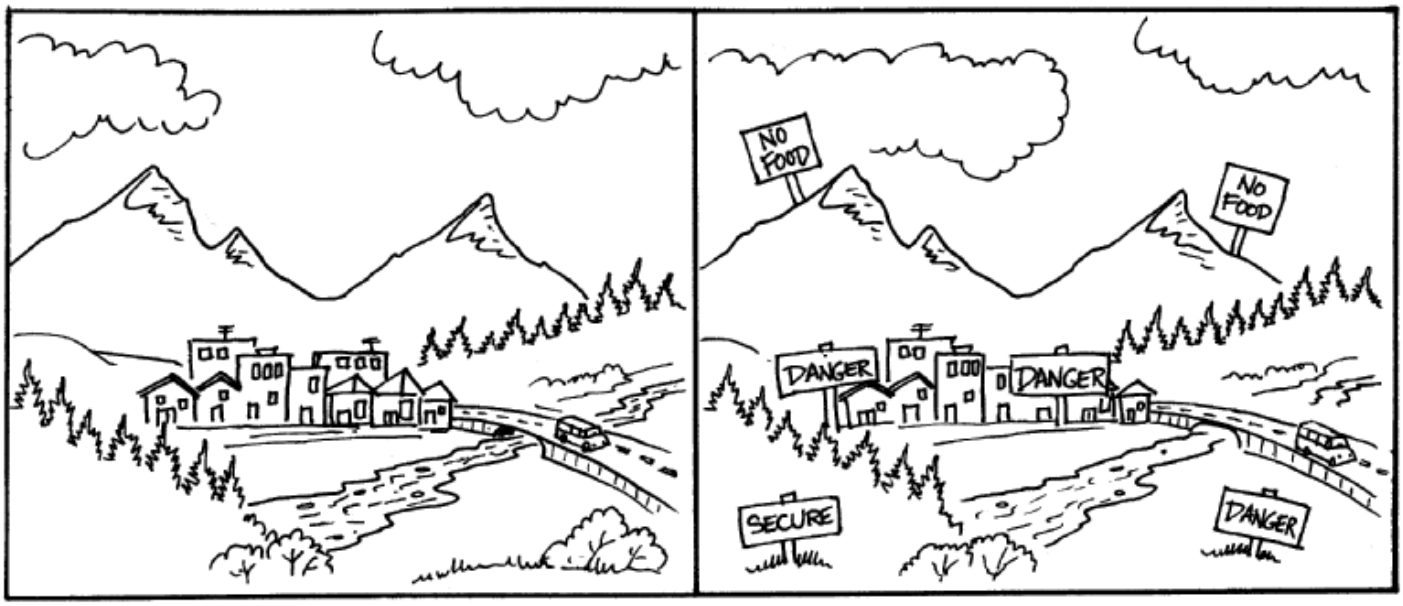
Science 9A:
Biological Diversity
Outcomes 1,4

Materials

- Photocopies of the map titled *Topographical map of the Evan Thomas Valley and surrounding regions: Kananaskis Country* for each student
- Pencil crayons

Time Required

- 60 – 70 minutes



BEFORE
SECURE AREA ANALYSIS

AFTER
SECURE AREA ANALYSIS

Background Information

Grizzly bears are as shy and wary of humans as humans are of grizzly bears. Scientific studies show that human access greatly influences grizzly bear security. The more that humans access an area, the less likely it is that bears will use it because they feel less secure. Human activity must sometimes be modified or controlled to maintain viable grizzly bear habitat.

There are probably less than 50 grizzly bears living in Kananaskis Country, which sees almost 2 million visitors per year. There is a strong need to protect habitat where grizzly bears will be secure from encounters with humans *and* where grizzly bears can meet their energetic requirements. Grizzly bears that have access to secure habitat will have a low probability of becoming habituated to human presence and are more likely to reproduce successfully. In the **Births and Deaths** activity, students learn that habituation is the number one cause of death for grizzly bears in our mountain landscape.

Secure Area Analysis is one way biologists can determine how much secure habitat is available. This process identifies secure and insecure areas for grizzly bears based on the average daily food requirements of a female grizzly. Habitat effectiveness, alternatively, uses a more mathematical approach to assess how human use in grizzly country impacts potential grizzly bear habitat. Both of these techniques are used by researchers to help us understand what grizzly bears need to successfully live and reproduce in our mountain parks.

Instructions for the Teacher

1. Set the stage: Tell your class they are a group of bear biologists and they have been given the job of determining whether or not the Evan Thomas Valley is a good place for grizzly bears by performing Secure Area Analysis (SAA). Write the following key words on the board.

Key Words

- ***Secure habitat*:** an area where an adult female grizzly can meet her daily needs with a low probability of disturbance by people. Only female bears are considered when assessing secure habitat, because females are the 'reproductive engines' of the population. A grizzly bear with access to secure habitat has a low probability of becoming habituated and a longer life expectancy.
- ***Habituation:*** a habituated bear is one that has become so accustomed to something in its environment that it no longer has a natural response to it. A bear that is used to humans no longer flees from them; a bear that is used to cars will feel comfortable browsing on the side of a highway. Obviously, neither of these reactions is good for the bear,

and habituation is a leading cause of grizzly bear mortality. Cubs can also learn these bad habits from their mothers.

- ***Secure Area Analysis:*** a technique used to understand the relationship between human development and activity and grizzly bear habitat.

Did You Know?

Female grizzlies must forage over an area of **9 square kilometers** of secure habitat per day to get enough food!

2. Ask the class:

What kinds of things would make a bear's habitat secure?
Secure bear habitat includes ample food, minimal human activity, and good connectivity between core areas of habitat.

The *Eastern Slopes Grizzly Bear Project* biologists use three characteristics to assess secure habitat. Write down and discuss these three characteristics:

- ***Elevation****:* Bears prefer habitat below 8000 feet (2400m) because that is where the most of their food is located. Berries do not grow in the rocky, snowy alpine zone!
- ***Landscape Characteristics****:* Unusable parts of the landscape like lakes, snow-covered regions or bare, unvegetated areas do not offer bears any security.
- ***Human Activities or Features****:* Busy hiking trails, roads, and buildings can frighten bears, rendering their secure habitat insecure. Not only do these human use features make habitat unusable for bears, but the 500 meters surrounding each feature is also considered insecure. This 500 metre area is called the ***zone of influence.*** According to research, Kananaskis Country, which is dedicated to recreation and resource development, has the largest percent of land in the zone of influence in the Central Canadian Rocky Mountains.

When all of the criteria have been accounted for and subtracted from a region, the remaining habitat is considered secure if it is large enough. This is the process of Secure Area Analysis.

Ask your class:

***Why is the zone of influence an important component of Secure Area Analysis*?**
Grizzly bears are still at risk of becoming habituated in the zone of influence. For example, if a bear is feeding beside a busy highway (within the zone of influence) it may be exposed repeatedly to vehicles, cyclists, and cameras. Over time, this bear may become accustomed to human activity and presence and become habituated.

3. Hand out copies of the map titled, *Topographical map of the Evan Thomas Valley and surrounding regions: Kananaskis Country.* If your class has never studied maps before, tell them that the curvy,

topographical lines represent points of equal elevation. The closer the lines are together, the steeper the slope of the mountain. Using the topographic map, ask students to identify mountaintops, valley bottoms, and areas of steep and gentle slopes. Also have them identify trails, roadways and streams in the area. Please note that only the busy, popular trails are shown on this map.

4. **Performing SAA**
Follow these steps with the class.

STEP 1. Remove areas from maps (by shading them in with pencil crayon) that are unsuitable for foraging for bears. Most land above 8000 feet (2400m) is considered useless for bears.

STEP 2. Remove, by shading, areas with human use features (roads, trails, buildings/hotels, golf courses, etc). Remember to include the buffering zone of influence (500m or 0.5 km) that surrounds the human use features, including trails.

STEP 3. Remove any other remaining parts of the landscape that would not offer bears food or other habitat needs (e.g. lakes).

STEP 4. Congratulations! You have just completed Secure Area Analysis. The uncoloured or unshaded regions on the map indicate secure habitat for grizzly bears.

Discussion

5. Discuss the following questions with your class.

Apart from highways and trails, what else is found in this area?
The Evan Thomas Valley includes human features such as parking lots, Ribbon Creek Youth Hostel, a ski hill, three hotels in Kananaskis Village and two golf courses.

Are you surprised by the size of remaining habitat that you have selected?
Most students will be surprised. It is interesting to note that biologists who completed SAA in Kananaskis Country discovered that these grizzly bears persist in one of the most human-dominated landscapes.

If you were a grizzly bear, would you like to live in the Evan Thomas Valley knowing that you need to explore 9km^2 per day to get enough food? Why or why not?
Most students will say NO! The current development and use of the area already makes the majority of the region inhospitable for bears. Small increments of future development may chase bears out of the Evan Thomas Valley permanently.

Sophie, a young female grizzly which once lived in the Evan Thomas Valley is now a habituated bear. Does this surprise you?
Sophie was seen foraging near residential areas in Canmore and was subsequently re-located to the southern Kananaskis Country. Learn more about Sophie in the following activity.

Is the Evan Thomas Valley in a national park? A provincial park? If not, should it be?
The Evan Thomas Valley is not designated as a Provincial or a National Park. It is currently managed for human recreation and NOT for the protection of wildlife. This leaves the Evan Thomas Valley vulnerable to increased human use, the expansion of existing developments, and the creation of new, small-scale developments.

How can we help the bears and other wildlife that call the Evan Thomas Valley their home?
Brainstorm with the class some ways to help grizzly bears in the Evan Thomas Valley.

- Respect bear closures and avoid areas that bears frequent (areas with lots of buffaloberries)
- Close popular trails when bears are using the area
- Be a responsible hiker/biker/camper to prevent human-bear encounters

Research Tells Us…

Kananaskis Country has the largest percent of land in the zone of influence within the Central Canadian Rocky Mountains.

Bears #47 and #24, part of the Eastern Slopes Grizzly Bear Project, have the least secure areas and the highest degree of human influence. They make their homes in Kananaskis Country and the Evan Thomas Valley.

- Letter writing is one effective way to be heard. Write the Ministers below and tell them what you think about grizzly bears. Make sure you send a copy of your letter to CPAWS. Here are some ideas to share with the Government:
    - the road density in the Eastern Slopes needs to be decreased to restore grizzly bear habitat.
    - grizzly bear recovery needs to be included in the frameworks that will come out of the South Saskatchewan Regional Plan
    - you support bear research, and hope that managers use current science when making land-use decisions.
    - you support trail or campground closures.
    - you care about Alberta's grizzlies.
- For up-to-date details on grizzly bear management and CPAWS recommendations see:
  www. cpaws-southernalberta.org/campaigns/grizzly-bears
- For more ideas on how to help Grizzly Bears, see *Helping the Great Bear* below

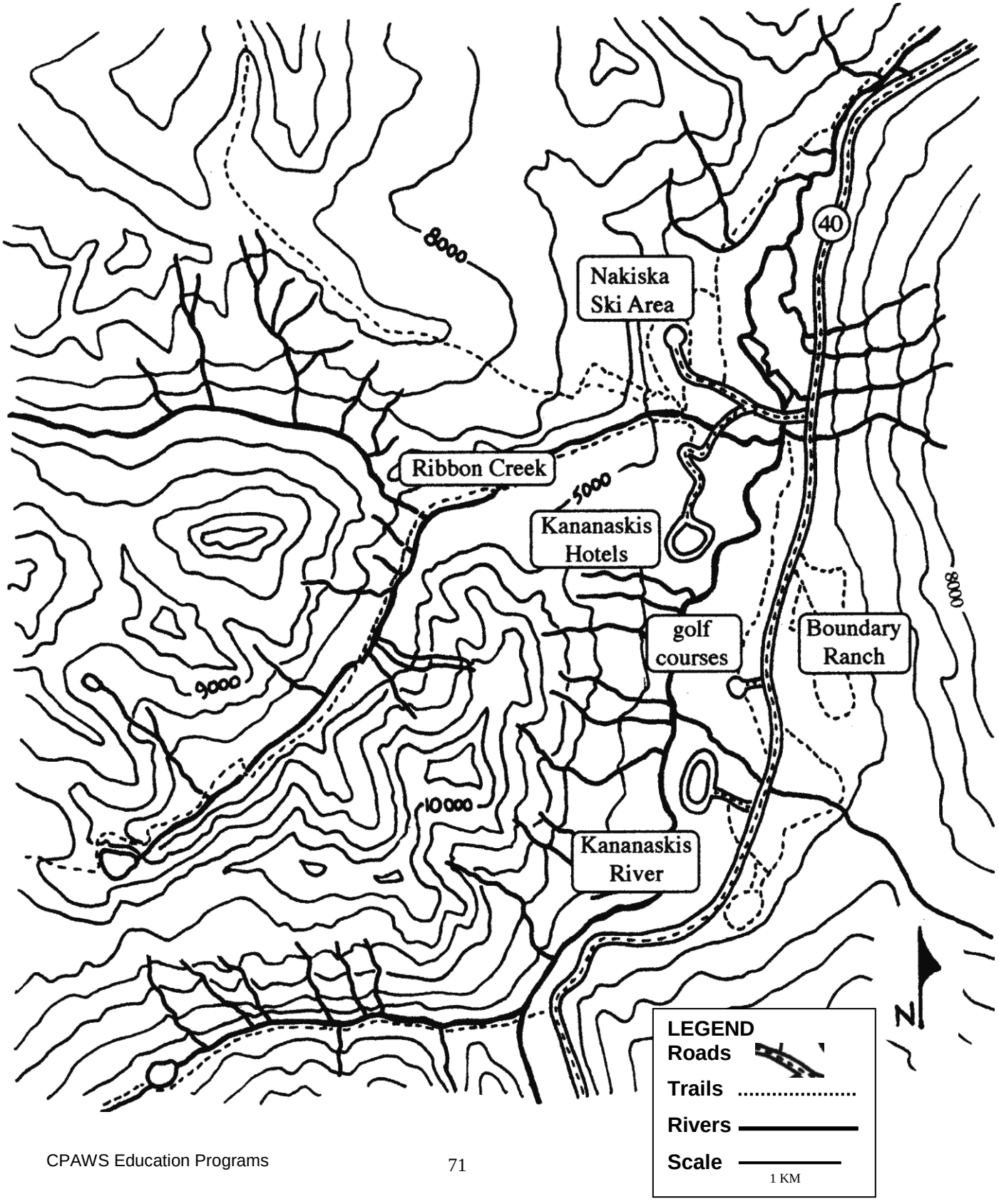
The Honourable Shannon Phillips
Minister of Environment and Parks
208 Legislature Building, 10800 - 97th Avenue Edmonton, Alberta T5K 2B6
Phone: (780) 427-2391 / Fax: (780) 422-6259
E-mail: aep.minister@gov.ab.ca

The Honorable Rachel Notley
Premier of Alberta
307 Legislation Building, 10800 - 97th Avenue Edmonton, Alberta T5K 2B6
Phone: (780) 427-2251
E-mail: premier@gov.ab.ca

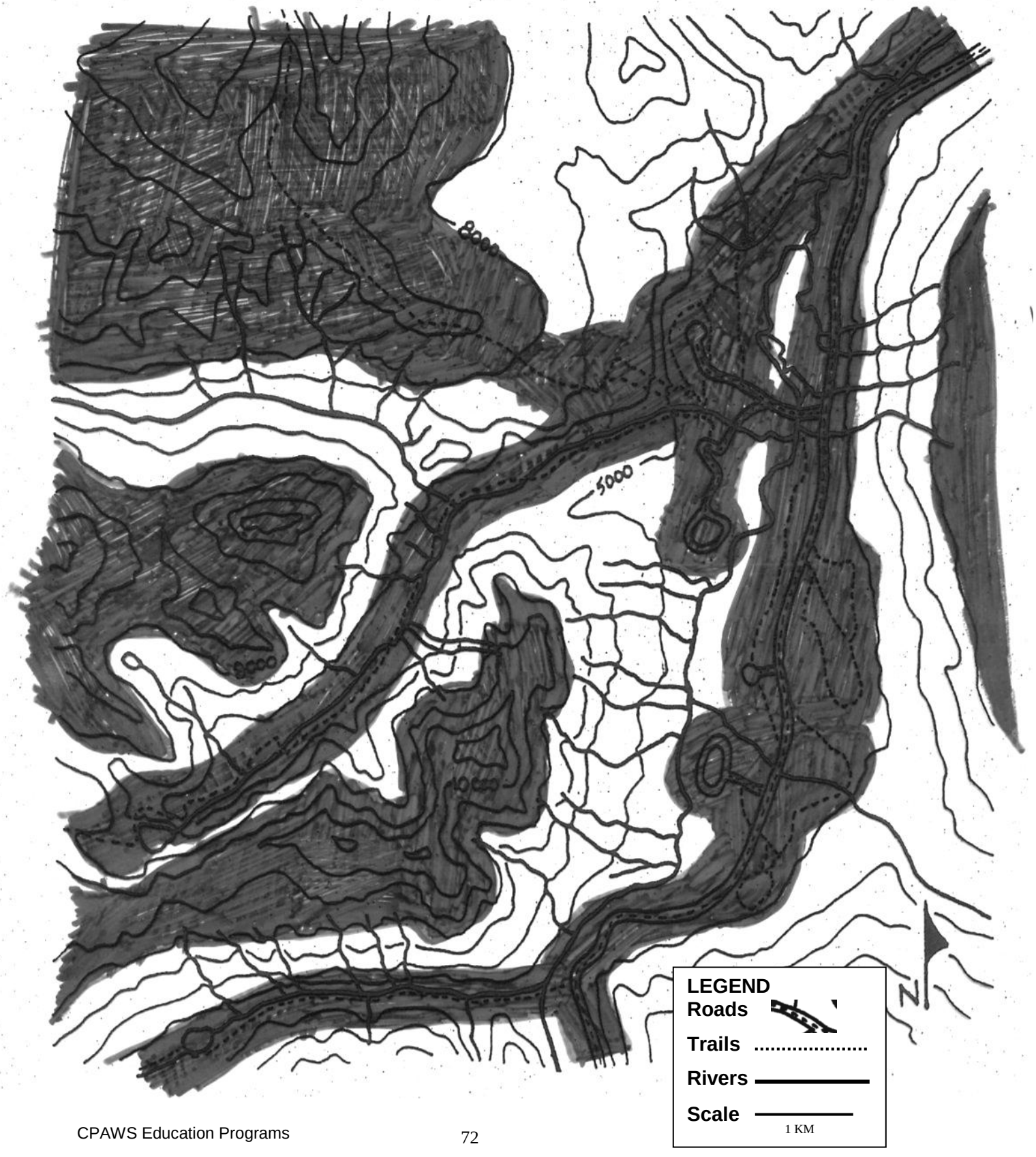
The Honourable Catherine McKenna
Minister of the Environment and Climate Change
107 Catherine Street (Main Office), Ottawa, Ontario K2P 0P4
Phone: (613) 996-5322 / Fax: (613) 996-5323
E-mail: Catherine.McKenna@parl.gc.ca

*** Encourage your students to find their Member of the Legislative Assembly at *www.electionsalberta.ab.ca***

Topographical Map of the Evan Thomas Valley and Surrounding Regions: Kananaskis Country



Topographical Map of the Evan Thomas Valley and Surrounding Regions: Kananaskis Country



Where is Sophie?

This activity complements *Secure Area Analysis*, and asks students to determine whether or not the behaviour of a local Kananaskis bear is healthy and normal. Building on their knowledge of what constitutes secure grizzly habitat, students will examine the location points of Sophie in an attempt to deduce her history through her actions today.

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

Science 9A:
Biological Diversity
Outcomes 1,4

Materials

- Knowledge and completion of *Secure Area Analysis*
- Copies of "Where is Sophie?" for students

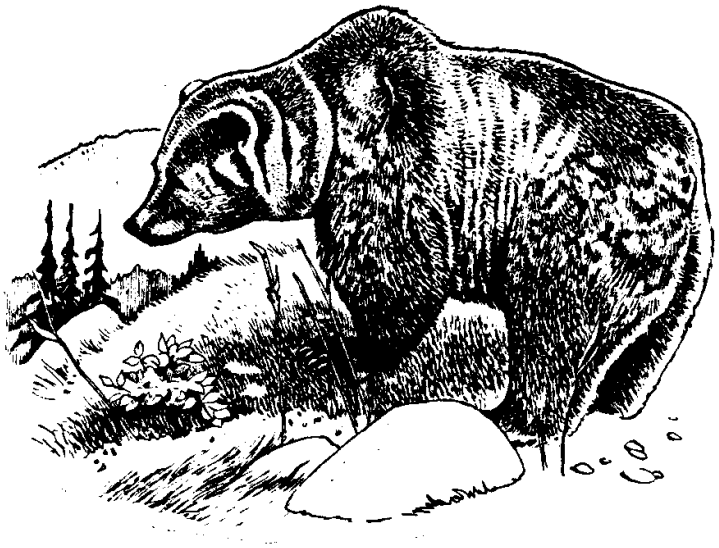
Time Required

- 30-40 minutes

Instructions for the Teacher

1. If necessary, review the key words from *Secure Area Analysis* with the class.

2. Discuss the characteristics of habituated bears with the class. Habituated bears seem to be fearless of humans and show a tendency to wander into campgrounds, travel on roads and act oblivious to human activity. It is important to note that bears become habituated through what they consider to be positive experiences with humans. For example, if people leave food on their picnic table unattended, a hungry bear may be drawn to the food to feast. Bears exposed to human food or garbage will learn to associate food with humans. As a result, they may even seek humans out in order to get their "reward." Most habituated bears are relocated or killed. The expression, *"A fed bear is a dead bear"* holds true.



3. Distribute the map titled, *Where is Sophie?* to students and ask them to scrutinize her movements. Tell the students that the map represents the same region (different scale) that was examined in Secure Area Analysis. The location points were collected using GPS (Global Positioning Systems) technology. In the early fall of 2000, Sophie was captured and fitted with a GPS collar, providing researchers information about where Sophie lives. The location points illustrate her movements over a period of 44 days.

4. Ask the students:

Where does Sophie like to forage?
In the fall of 2000, Sophie frequented the Mt. Kidd alpine meadow, the Kananaskis River, Kananaskis Village, Kananaskis golf course, Mt. Kidd R.V. Park and the Ribbon Creek Day Use area. She also spent some time on the Nakiska ski hill.

Are these areas 'secure' habitat for grizzly bears?
To help answer this question, have the students compare the "Where is Sophie" map with the map students created from Secure Area Analysis. The areas Sophie calls home are not secure because they have a high risk of disturbance from people.

Does Sophie spend time in the 'zone of influence,' - the 500 m area that surrounds human features like roads, trails and buildings? What implications does this have for Sophie and people who enjoy Kananaskis Country?
Yes, Sophie spends a lot of time in the zone of influence, which indicates an unwariness of people. Sophie appears to be habituated and could potentially be a threat to humans, in which case she would probably be relocated or destroyed.

What are some possible reasons why Sophie spends so much time near human populated areas?
Some possible reasons include:
- Sophie may have been fed by humans and has learned that careless campers leave food rewards.
- Sophie may have had an inadequate and disruptive upbringing as a cub, and may have learned some bad habits from her mother.

5. Read aloud or independently *The Story of Sophie, a collared bear in Kananaskis Country.*

After reading the story, ask the students:

How did the story make you feel? Did you feel sorry for the mountain biker, Sophie, the hikers, or for all subjects in the story?

Do you feel that the mother should have been captured?
Students should realize that before capturing a bear and relocating it in the wild or to a zoo, alternative measures can be taken to 'teach' a bear proper behaviour. These measures, referred to as ***aversive conditioning***, can re-train bears to fear and avoid people. Aversive conditioning can involve firing rubber bullets and using bear bangers. A highly effective and somewhat new way to deal with problem behaviour in bears is the use of Karelian Bear Dogs. These dogs have been bred and used by grizzly bear hunters and farmers in Finland and western Russia for centuries. Today they are used as bear shepherds, to help prevent bears from being habituated to human areas.

Aversive Conditioning

A method of teaching habituated bears to avoid human features.

Techniques:
-bear dog shepherding
-bear bangers
-yelling
-"spanking" with rubber bullets.

Do you think Sophie should have been relocated?
Often, relocated bears are killed – either by other bears, or by legal and illegal hunting outside park boundaries. Sophie's sister, bear #70 is undergoing aversive conditioning in the Canmore area to teach her to be a wary bear.

CPAWS believes that the Alberta Government should provide more resources to its staff, enabling them to practice aversive conditioning with habituated bears, rather than just removing them to other areas, where they will likely get into more trouble or be killed by other bears.

6. **What you can do to help bears like Sophie**
Brainstorm with your class different ways they can help bears like Sophie. For ideas, review *Secure Area Analysis* and *Helping the Great Bear*.

The Story of Sophie, a collared bear in Kananaskis Country

Sophie and her sister were born in a den in the winter of 1996 under a heavy, deep blanket of snow. Their mother, Nakiska, was a large grizzly with a thick, cozy chestnut-brown coat. Emerging from their den in the last week of April and seeing the lit world for the first time must have alarmed the cubs. The den was the only life they had ever experienced, and their mother was now leading them into a world full of wind, puddles of melting snow, and a great diversity of flora and fauna. Cubs are especially vulnerable to predation in their first year of life, so Sophie and her sister didn't stray far from their mother.

Being a mischievous cub, Sophie would often wrestle and play with her sister. When they weren't playing, they were busy learning about what types of plants were safe to eat and where they could find them.

Sophie and her family were careful to avoid noisy, invasive humans. Their sensitive noses could smell things over a kilometre away. From time to time, groups of hikers would unknowingly pass by the family, sending Sophie and her sibling scampering to find their mother. Towards the end of the summer, the grizzly family began looking for a den, one that was located up in the subalpine where the snow fell steadily to keep the family insulated and warm.

The next spring, the family poked their heads out of their den and upon smelling the wet spring air, groggily emerged to begin their search for food. Finding food in the Rockies can be especially difficult for large mammals because so little of the land is comprised of montane and subalpine - areas where grizzly bears' favourite foods grow. To find enough food, Sophie and her family would have to pass by the edge of the sprawling town of Canmore. On one occasion, the family of grizzly bears passed through the Canmore Nordic Centre and encountered a couple of fast approaching mountain bikers. The cubs rushed for cover, and Nakiska, in defense of her cubs, knocked one biker down and bit him. The biker suffered from minor injuries, and Nakiska became even more wary of humans in her home range.

A few weeks later, Sophie and her family encountered humans again while traveling near Skogan Pass. This time, Sophie's mother bluff charged two hikers, successfully frightening them away. The grizzly family stumbled upon more and more people each year as they were forced to share their home range with 1.4 million people who came to the Evan Thomas Valley to golf, ski, hike, bike and climb.

Soon after these two events, the family came across a strange looking culvert with an irresistible odor. Nakiska entered the strange cylindrical object to investigate, and *SLAM!, a* door locked shut, and she was trapped inside. Abandoned and left to fend for

themselves, Sophie and her sister spent the night near the metal trap. The next day the cubs were tranquillized and collared by researchers. When they awoke, Sophie and her sister could not find their mother anywhere. The cubs separated, going their own ways and trying hard to remember all that their mother taught them.

On her own, Sophie tried to avoid people but often found herself pushed into poor habitat by bigger, wiser grizzly bears. This poor habitat included the Kananaskis Country golf course and the Mt. Kidd R.V. Park. She also frequented the power line near a popular swimming spot called Quarry Lake located on the edge of Canmore. The power line runs adjacent to a hotel, a subdivision, and a recreational area where people regularly walk their dogs. Needless to say, Canmore residents were repeatedly bumping into Sophie.

One August afternoon in 2001, Sophie made an appearance in a busy subdivision, where she crossed three streets sending surprised locals running for their homes and vehicles. To prevent future human encounters and further habituation, Sophie was tranquillized, captured and relocated to a region hundreds of kilometers south of the Evan Thomas Valley in Kananaskis Country. When captured, she weighed 250lbs and was estimated to be 5 years of age.

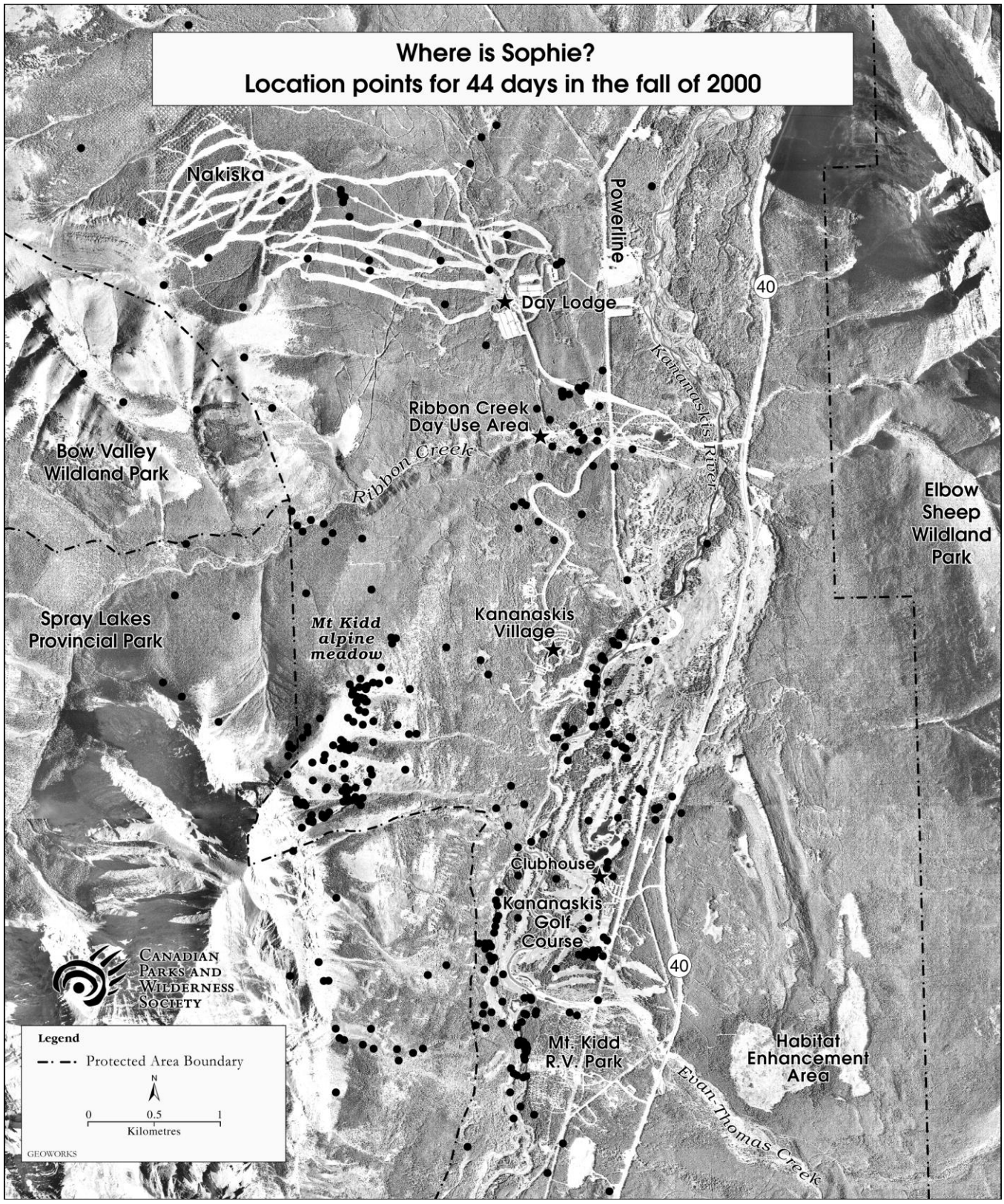
The rest of the story…

- After the two encounters with humans, Sophie's mother, Nakiska, was moved to the Calgary Zoo. She was initially considered to be a very 'wild' bear and showed little signs of being habituated. Nakiska was a living reminder that we must practice better bear management and try harder to prevent bears from becoming habituated.

- On September 25, 2001, Nakiska died of infected wounds after fighting with another grizzly bear in the zoo. Clio Smeeton, president of the Cochrane Ecological Institute, stated that integrating animals in a foreign enclosure isn't without its dangers. "I wouldn't say it was bound to happen . . . but you're keeping some very large animals in a very small space."

- During the summer of 2002, Conservation Officers received a report that Sophie had been legally shot on the Eden Valley Indian Reserve, south of Kananaskis Country. She is the seventh grizzly bear known to have been killed on an Indian Reservation in the Central Rockies Ecosystem since 1993.

- Up until 2003 Sophie's sister, bear #70 was undergoing aversive conditioning around Canmore – however, in 2003 Bear #70 was judged to be too habituated to remain in her home, and was relocated to elsewhere in Alberta. Her radio collar was found. It appeared to have been cut. Bear #70's remains have never been found.


Where is Sophie?
Location points for 44 days in the fall of 2000
Nakiska
Powerline
Day Lodge
40
Kananaskis River
Ribbon Creek
Day Use Area
Ribbon Creek
Bow Valley
Wildland Park
Elbow
Sheep
Wildland
Park
Spray Lakes
Provincial Park
Mt Kidd
alpine
meadow
Kananaskis
Village
Clubhouse
Kananaskis
Golf
Course
40
Canadian
Parks and
Wilderness
Society
Legend
Protected Area Boundary
N
0
0.5
1
Kilometres
GEOWORKS
Mt. Kidd
R.V. Park
Habitat
Enhancement
Area
Evan-Thomas Creek

Room to Roam

This activity takes many of the concepts discussed in this teaching guide and shows how they can be applied in a real-life scenario. In this simulation, students take on the role of town planners as they try to preserve wildlife corridors for animals in the face of rapid urban growth.

Curriculum Connections

Science 7A:
Interactions and Ecosystems
Outcomes 1,3,4

Science 9A:
Biological Diversity
Outcome 4

Materials

- 4 overheads

Time Required

- 60 – 80 minutes

Instructions for the Teacher

1. Tell the students that wildlife biologists are learning that many animals - particularly large mammals - need more space than anyone had previously thought, and that many protected areas are simply too small to sustain permanent populations of these animals. Define the following terms for the students:

Key Terms

- ***Core refugia:*** a large area that forms an important part of an animal's habitat where it can meet some of its needs throughout the seasons. It is important that roads or other developments not break up these large areas of habitat.
- ***Wildlife corridor:*** a passage or ribbon of land that is used by animals to travel from one core refugia to another.

Biologists and some town planners use these concepts as criteria as they seek to minimize the effects of humans and human development on various animal species and the ecosystem in which they live.

The following questions accompany the four overheads and are designed to promote discussion and to lead students through the simulation activity. Use an overhead projector and a water-soluble pen to illustrate the points made by the students.

Overhead #1: 100 years ago

This overhead shows the natural situation 100 years ago before any human development. Tell the students that the mountains in this area are very steep, are mainly rock and ice, contain no food, and cannot be used by grizzly bears. Their only habitat is in the valley bottoms where they can find the berries, roots, and other vegetation that comprises the majority of their diet.

2. Ask the students:

Where is the grizzly bear habitat?

Students should correctly identify the valley bottom (areas A, B, and C) as bear habitat. Although bears have very large territories, they overlap with each other. Tell the students that many bears use this area.

Where are the core refugia and wildlife corridors on this map?

All of areas A, B, and C are called ***core refugia***; all those valleys that join the refugia are ***wildlife corridors***. Illustrate how a grizzly bear might wander from Refugia A to B using a wildlife corridor.

Overhead #2: The Present

This overhead shows what has changed now that humans have entered the valley.

3. Ask the students:

What has changed in this valley?

Students should note changes to the valley: the road, the town, and the creation of a National Park that now protects Refugia A.

How would these changes affect the grizzly bear?

Although grizzly bears would not be aware of the park boundary, there are definitely some things they would notice:

- **The road.** A major cause of grizzly bear deaths in the mountains is from vehicles traveling on highways and roads.
- **Less habitat.** The creation of the town and the road has used up bear habitat.
- **The town.** Under normal conditions grizzlies will not come close to humans or human settlement; hunting and other persecution by humans has taught them to avoid us and our development.
- **More people.** Bears may become habituated when humans live in grizzly bear habitat. People often don't manage their garbage to make sure bears don't get into it. In such cases, bears end up either getting killed or being moved to another area where they have to compete with other bears or other people to survive. The majority of bears who die are habituated.

Can bears still access Refugia B?
We don't really know. Biologists are not sure what the ideal width of a corridor is. If it is too narrow, shy animals like grizzlies may stop using it.

If you were a biologist, how would you find out if bears were using Refugia B?
Scientists could use a variety of techniques. They could radio-collar the animals in the area to monitor where the animals travel; they could look for bear signs, or use cameras in the wildlife corridor in the hopes of photographing a bear actually using the area. (For a dose of reality, ask students to calculate a budget for this research! Where might all this money come from?)

4. Define the term ***islandization*** for your students. If the town were to completely cut off Refugia B from A and C, we would say that this part of the habitat has been "islandized." This phenomenon is also known as ***habitat fragmentation.***

Recent research in Banff National Park and Kananaskis Country indicates that the grizzly bear population may be in danger, partly because of these factors.

Habitat Fragmentation/ Islandization

When natural features (mountains, lakes) or human features(roads, cities, railways) disrupt and cut away at landscapes, habitat becomes fragmented.

Islandization occurs when a piece of habitat is cut off from other areas and is effectively isolated. Often, an "ocean" of development surrounds habitat fragments ("islands").

Overhead #3: A Possible Future

5. Have the students examine the map, and ask them:

What further changes have occurred in the valley?
Students should notice that things have changed - and not for the better as far as grizzlies are concerned! The town has completely blocked off Refugia B, and is also threatening to block the wildlife corridor connecting Refugia A and C. The twinned highway takes up more habitat and makes highway crossings more hazardous for bears and all other animals.

Tell students that under the conditions outlined here bears are likely to become extirpated (locally extinct) in this area. Point out that this picture represents only one of a number of ***possible*** futures for the valley. A ***Preferred Future*** is one where human action that occurs today creates a more desirable future (i.e. grizzlies are not extirpated).

6. Tell the students to imagine that they are today's town politicians and planners, and are responsible for planning what the valley will look like in their *Preferred Future*. Ask them:

Is it practical to just say that the town cannot grow any more?
This is possible - but Canadian towns or cities rarely decide to *not* grow (Okotoks, AB is one of the rare exceptions). Not only are all municipal bylaws written to encourage growth, but capping the growth of towns like

Canmore or Banff have proven to be very unpopular with residents who fear the law of supply and demand will increase the value of their property - and the property taxes that they will have to pay. Even the town site of Banff, which lies within a national park, continues to increase its commercial growth at a rapid rate.

Our tendency to opt for continued growth in a finite area is similar to a much larger concern: the increasing human population on the planet.

Other questions for discussion:

Will our quality of life remain the same in this future?

Is it possible for the town to restore land that is developed (a golf course, for example) back to its natural state? Why or why not?

If you said 'no", do you think that this will always be the case, or might public attitudes change in the future?

Ask the students to assume that some growth is necessary.

Using Overhead #2 (The Present), show how you would make the town grow to allow the population to triple - but without ruining the valley for the wildlife. We will call this your "Preferred Future."

What about the highway: could you decreases its size, or even close it?
Remind students that highway mortality is the #1 cause of death for Banff's Bow Valley wolf pack, and the #2 cause of death for grizzly bears. Some might say that highways are essential for humans: we need them for their own travel, the flow of goods from the prairies to the Pacific Ocean, and that they are here to stay. Ask students if they agree with this statement.

What changes can be made to mitigate the effects of the highway on the ecosystem? What recommendations would you make to future park managers in order to help manage the impact of additional people who all want to access the remaining wild areas for recreation?

Overhead #4: A Preferred Future

7. Have students present their preferred futures to the class. The overhead provided is just one example of a Preferred Future and shows how the impact of additional humans, although considerable, can be reduced by responsible planning. Ask the students:

What new features are shown on this map?

Although the population has tripled, the town has grown to less than three times its previous size because buildings are now higher and population density in town is greater. It has expanded parallel to the valley wall, allowing a corridor to stay open. Through a land swap negotiated by the town, part of a developed golf course area has been restored to its natural state in order to improve access to Refugia B, while the developer has been allowed to build elsewhere in town. The southern part of town is connected to the main town by a narrow road that is posted with low speed limits, speed bumps, and educational signage to reduce wildlife mortality. Although the highway has been twinned in response to increased use, it has been fenced in, forcing animals to use the new overpasses that have been built to allow animals to cross above the highway in safety.

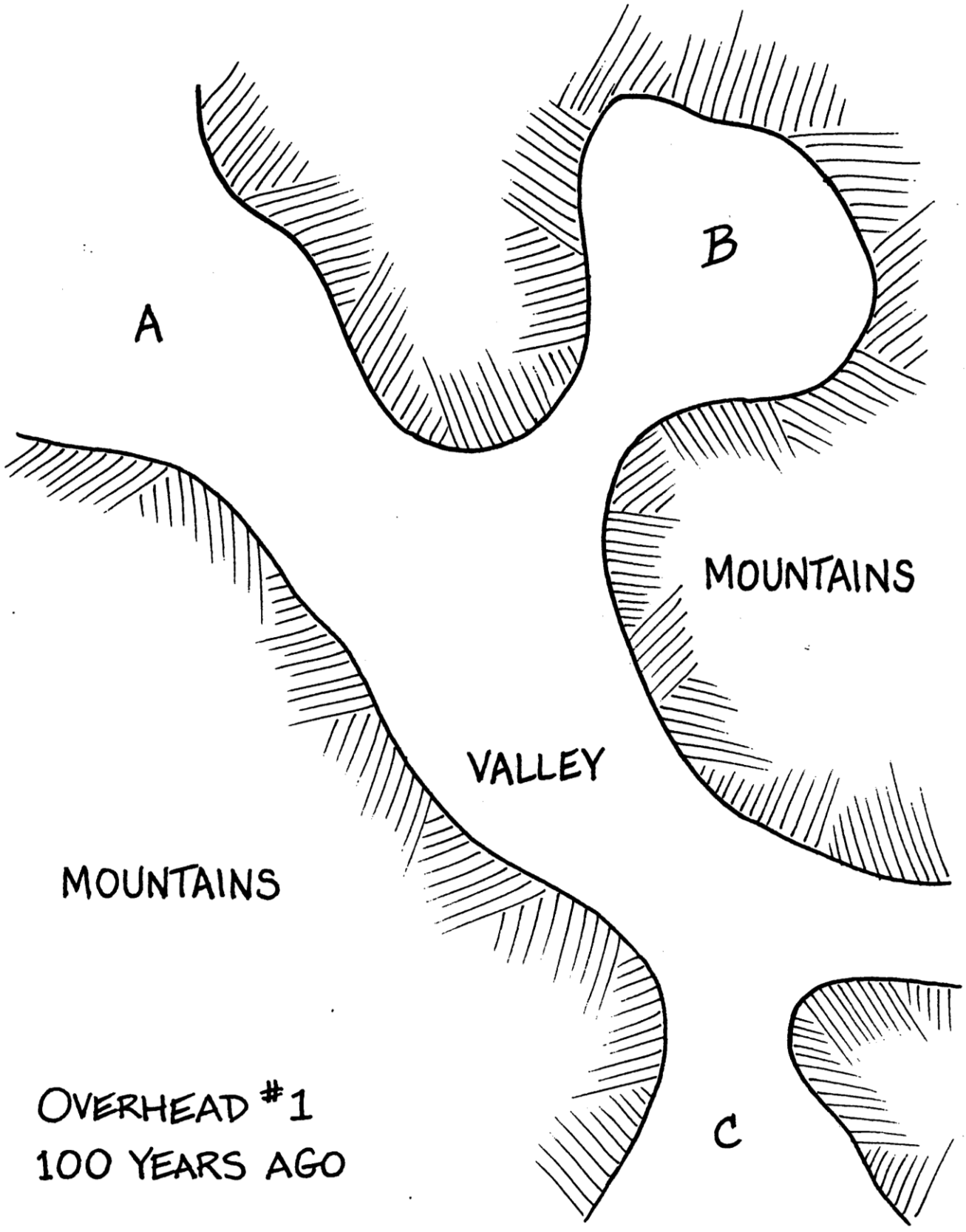
Discussion

Tell students that this simulation is based on *real life:* the area shown in the overheads is based on recent development in the Bow Valley in the area of Banff National Park (area A), Wind Valley (area C) and the rapidly growing town of Canmore. Some of the measures described in the Preferred Future section have been carried out (i.e. the highway in Banff National Park has been fenced and new animal overpasses constructed). The Park has also begun a Restoration phase, in which the Buffalo Paddocks, the Airfield, and the Cadet Camp are all in the process of being removed in order to restore a wildlife corridor that used to exist. A pack of wolves made several kills in this restored corridor during 1998!

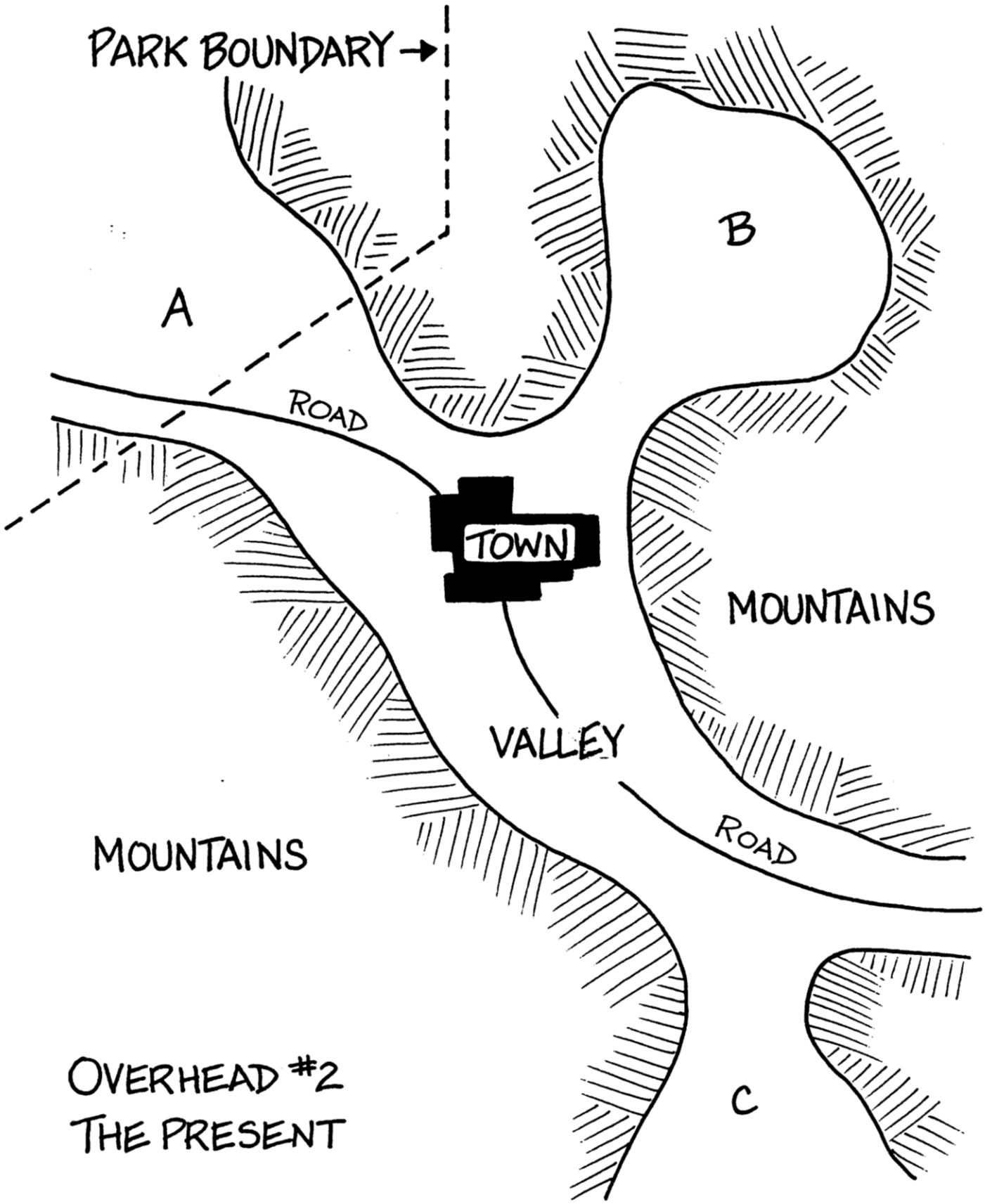
The Nature of Science

It is important to note that in the very new sciences of conservation biology and landscape ecology that are studied in this activity many questions are unanswered: How wide does a corridor have to be to allow a grizzly bear - or wolf - to use it successfully? Will the newly constructed 50 m wide overpasses work, or should they be 200 m wide - like the wildlife overpasses that grizzlies seem to be using in Europe?

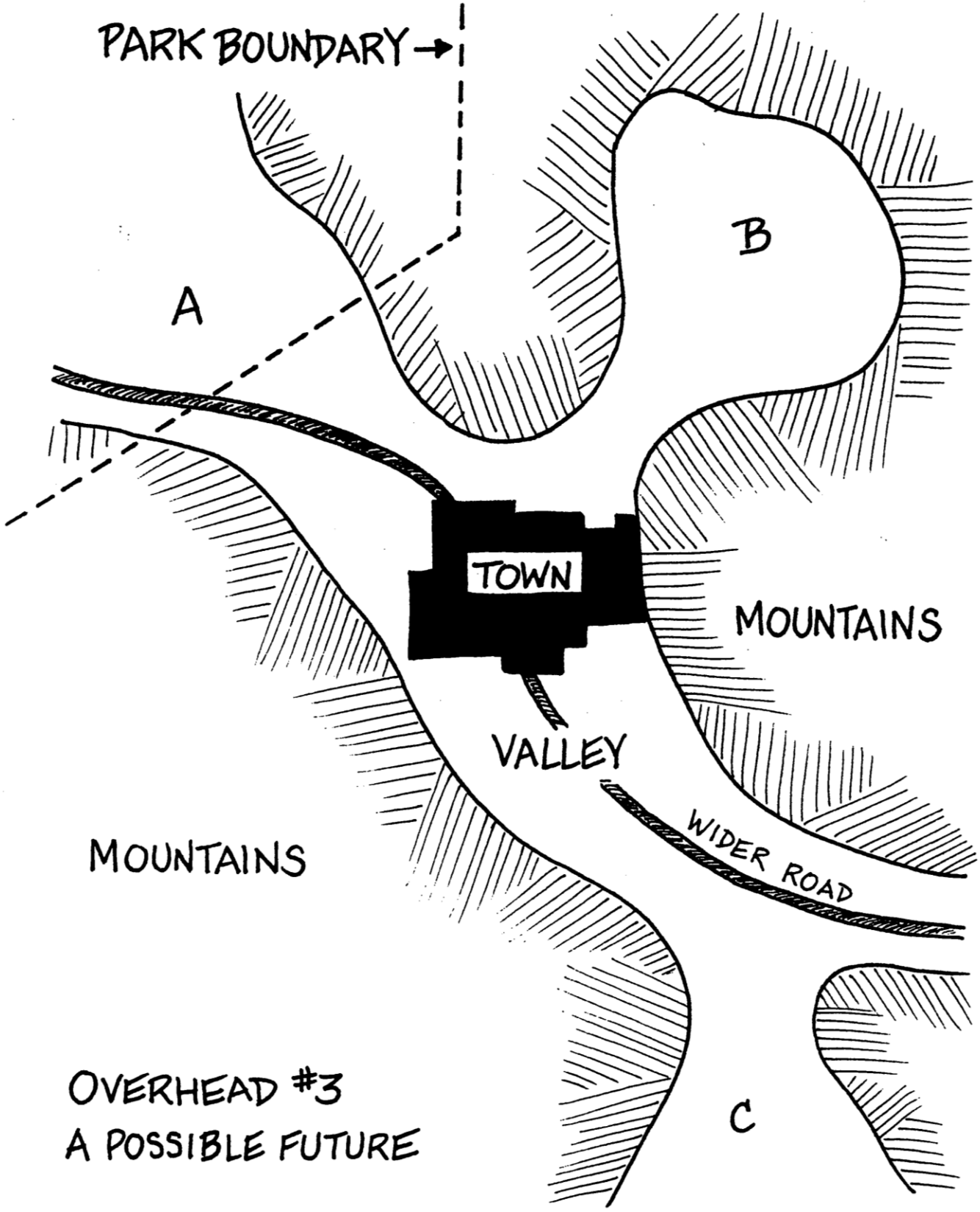
It is part of the nature of science that there will always be outstanding questions. Yet development continues in spite of biologists' unanswered questions. The reaction of biologists and of many in the environmental community has been to call for decision-makers to use the *"**precautionary principle***." Concerned citizens and professionals say: "In the face of so many uncertainties please be conservative in your decision-making and take precautions to avoid unnecessary environmental damage." Support is growing for the use of this principle. In June of 2001, the Supreme Court of Canada ruled in favour of the town of Hudson, Quebec, who used the precautionary principle to support their decision to ban all pesticide use from the municipality.



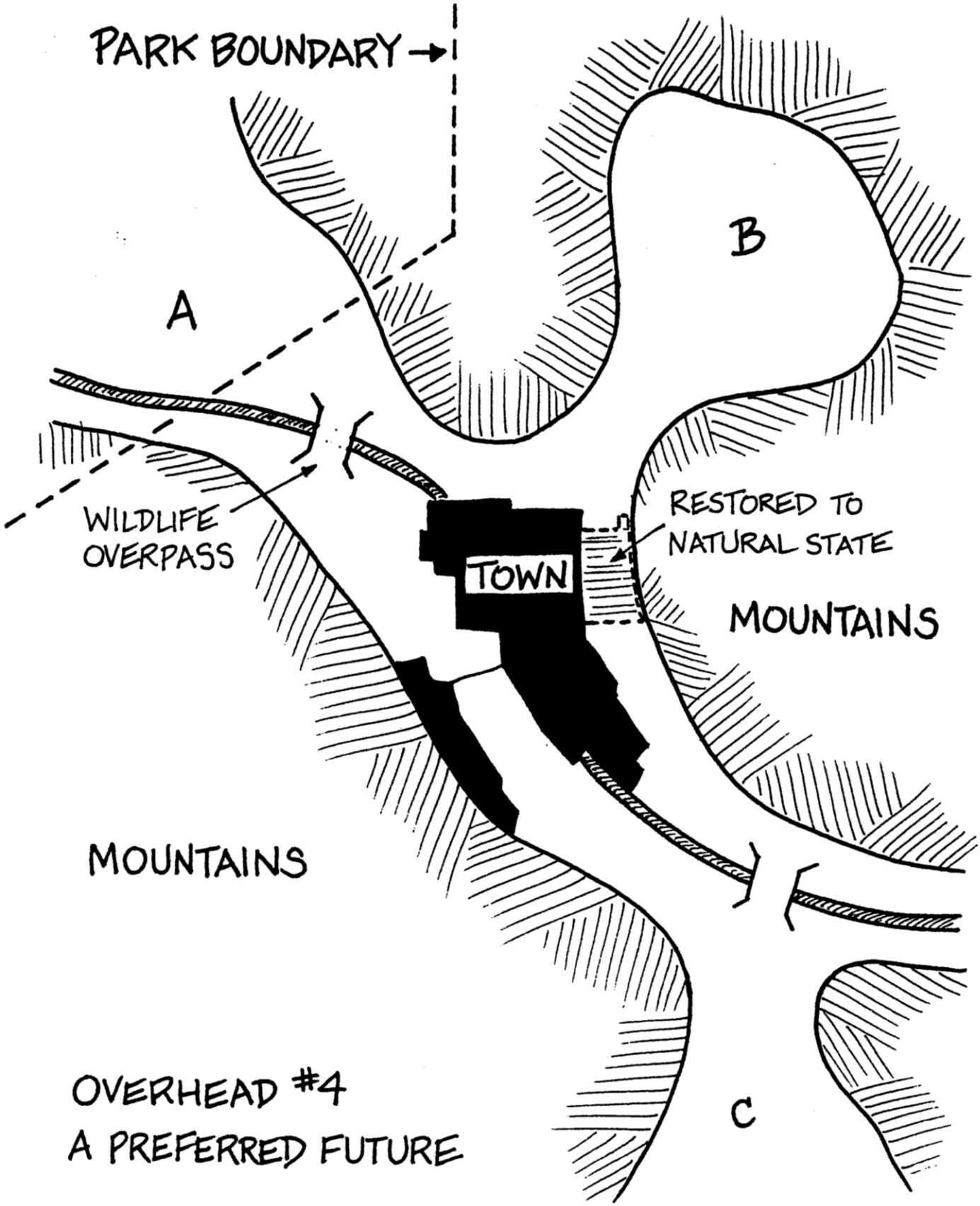
OVERHEAD #1
100 YEARS AGO



OVERHEAD #2
THE PRESENT



OVERHEAD #3
A POSSIBLE FUTURE



OVERHEAD #4
A PREFERRED FUTURE

The Great Bear Debate

This culminating activity will have students represent various stakeholders in the issue of conserving habitat for bears, and illustrate the complexities of the situation. Through role-playing, questions about development, conservation, and land use will be addressed.

Curriculum Connections

Science 7A: *Interactions and Ecosystems*
Outcomes 1,3,4

Science 8E: *Fresh and Saltwater Systems*
Outcome 4

Science 9A: *Biological Diversity*
Outcomes 4

Materials

- Role cards
- Any literature from previous activities that might help students make their point

Time required

- 60 minutes

Instructions for the Teacher

1. Tell the students that in this simulation activity they will play the parts of various sectors of society.

Ask students to predict what the position of the following groups is with respect to conserving habitat for grizzly bears: conservation biologists, outdoor enthusiasts, grassroots environmentalists, hunters and anglers, business leaders, government land managers.

2. Divide the students up into six groups and distribute the role cards to each group. Tell them:

In 10 minutes, I will be convening the first-ever multi-stakeholder meeting regarding grizzly bears in Banff and I need you to be ready. Each of you has been handpicked to represent all members of your sector of society. The main goal of this meeting is to consider a proposal by Parks Canada to close a popular trail and snack shop in prime bear habitat in Banff National Park in order to increase the habitat effectiveness of the area.

3. Advise the groups that they will have 10 minutes to discuss their position and their strategy for the meeting. Tell each group they should begin by having one person in their group read the role card out loud, and that each group must choose a speaker to address the class. Ask the groups to prepare a one-minute statement that summarizes their position on the issue.

4. Gather into a circle with group members sitting together. Ask each group for a one-minute opening statement. Then allow a few minutes of questions so the groups can sort out the various positions being taken.

5. Allow the students to discuss and debate the various facets of their arguments. The teacher should act as a facilitator, keeping the discussion on track, and mediating when required.

6. Tell the group they have been involved in a style of decision-making known as a consensus process. The group as a whole must now strive to agree on the recommendations to be made to Parks Canada.

Ask the group:

- ***Are there some things that the whole group can agree on? What is our common ground?***
- ***Is anyone here willing to make a compromise in order to help the discussion progress?***
- ***Are there any sectors of the public who are missing from the table?***

Discussion

7. Tell the students that the simulation is now over – they can go back to being students! Have each group review their role card. Ask them:

- ***Do you think these cards create an over-generalized image, or 'stereotype' of the different groups? (You may need to give an example of a stereotype: e.g. "All long-haired young people smoke drugs.")***
- ***Were you surprised by the amount of common ground that was***

identified?

- ***Are the personalities and abilities of the individuals involved important to this process?***
- ***Do you think your initial feelings about this process (on the role card) might change with time?***

Remind students that there exists a grizzly bear crisis in our Central Canadian Rockies. The Eastern Slopes Grizzly Bear Project has shown that habitat fragmentation and lacking security may threaten the future population of bears in Banff National Park and Kananaskis Country. Trail closures are only one small way to improve bear habitat. Although it seems simple, the general public often doesn't respect these closures and tries to have closures lifted. In the past, a popular hiking trail, Mt. Indefatigable in Kananaskis Country, has been closed for a grizzly bear and her cub. This is usually only a short closure, but is often met with public outcry. How do you think that park managers should handle these situations?

Conservation biologists

What you believe in:
Your job strives to maintain the preservation of natural areas and the animals that inhabit them. You base your work on scientific research and fact. In your opinion, genetic and species biodiversity are crucial components of a healthy ecosystem.

Your position regarding conservation of grizzly bear habitat:
As a conservation biologist, you know that grizzly bears are indicators for ecological integrity. This means that the presence or absence of a healthy grizzly bear population is an excellent indicator of how well human impact upon a region is managed. You are also aware that the grizzly bear is an umbrella species, meaning that if grizzly bears can successfully thrive in an area, then all the species protected by the 'umbrella' of grizzly bear conservation can also successfully live there. Your work has revealed that bears in Banff National Park are suffering from low genetic biodiversity and would benefit greatly from an enlarged protected area to roam, as well as stricter controls of human use within the Park.

Your initial feelings about this meeting:
You're a bit uncomfortable with politics and hope there won't be any arguments or unpleasantness.

----------✂----------

Outdoor Enthusiasts

What you believe in:
You value natural areas not only for their beauty but also for what they offer and enable you to do: hike, bike, rock climb and ski. You would like to manage the Park so that you and your family can enjoy its benefits for years to come.

Your position regarding conservation of grizzly bear habitat:
You are keen to help protect grizzly bears in Banff National Park. You are "bear aware" and take all the necessary precautions in the backcountry. You feel that since you act responsibly there is no reason to close trails and/or limit access to them.

Your initial feelings about this meeting: You are excited to have the opportunity to speak your mind. You want to ensure your way of life remains unchanged by the outcome of the meeting.

Grassroots environmentalists

What you believe in:
You believe in the preservation of all living things and the ecosystem that houses them. You put the environment first on your list of priorities and feel that living sustainably is the only option.

Your position regarding conservation of grizzly bear habitat:
It's totally necessary and should happen as soon as possible. This initiative gives a greater meaning to all the local campaigns you're involved in. You believe what scientists have told you about needing more secure areas within the park to preserve biodiversity. You want there to be a park left with grizzlies in it for your grandchildren to see, and for you and your "tree-hugger" friends to enjoy. You feel that Banff is over-developed and that restoration (including the removal of some development) is necessary. In fact, last year you started a letter writing campaign urging Parks Canada to develop a grizzly bear management plan.

Your initial feelings about the meeting:
You are suspicious of the business leaders and don't like the style of the facilitator. You feel it is your duty to save the grizzly bears, and any compromises you make will come back to haunt you. You disagree with hunting because you believe all animals should live – plus, you're a vegetarian.

----------✂----------

Hunters and Anglers

What you believe in:
The rights of the individual, the right to own guns, fiscal conservatism, access to natural areas, predator control and the conservation of prey species like elk, deer, and sheep.

Your position regarding conservation of grizzly bear habitat:
It seems like an OK idea, but you're uneasy because you've never really got along with environmentalists. You love fishing, hunting, driving and camping in the great outdoors. You support this conservation initiative as it will help ensure that the Park will be able to supply grizzly bears to adjacent, unprotected areas where grizzly bear populations are limited.

Your initial feelings about this process:
You're a little impatient with long-winded meetings, and are liable to jump up and start shouting if things don't go your way.

Business leaders

What you believe in:
You are aware that development means trouble for bears, but you're confident that these can be solved by better management and technology. You believe in the capitalist system and think things are being run just fine.

Your position regarding conservation of grizzly bear habitat:
Yikes! This looks like trouble for all those new condos and shops you had planned and you don't like it one bit. This conservation initiative represents a threat to the bottom line of your company and you owe it to your shareholders to maximize profits in your area.

Your initial feelings about this process:
You feel that you can tolerate this process so long as it doesn't create any major changes. You yearn to explain to everyone the importance of allowing your business to continue to grow in Banff National Park, as it represents your livelihood.

----------✂----------

Government land managers

What you believe in:
Conservation, protected areas, keeping a level head, the ability of a democratic state to reflect the will of the people, and the government's ability to enforce things.

Your position regarding conservation of grizzly bear habitat:
You feel that it is a good idea (but your boss doesn't). You also feel a little insulted by the premise that the status-quo in Banff National Park is inadequate to conserve habitat. You work really hard at protecting the park's environment while keeping businesses and townspeople happy. You suspect that one of the environmentalists across the table is the person who started last summer's letter-writing campaign that gave you so much trouble.

Your initial feelings about this process:
Given political realities and the power of business and industry, you're pretty sure this idea is going nowhere, and that this process will end up being a waste of time. You're also afraid to speak out in favor of conservation in case your political bosses make life difficult for you.

Helping the Great Bear

Learn how personal actions can make a difference and how to answer the question, "WHAT CAN I DO?!" In this activity, students are empowered to take responsibility into their own hands by example of a past success story.

Curriculum Connections

Science 7A: *Interactions and Ecosystems* Outcomes 1,4

Science 8E: *Fresh and Saltwater Systems* Outcome 4

Science 9A: *Biological Diversity* Outcomes 1,4

"If you think that the action of one individual can't make a difference, just try spending the night with a mosquito in your tent!"
-Unknown-

Materials

- None

Time Required

- 45 minutes of class time to discuss action options; students' action projects will take them longer than this, though!

Instructions for the Teacher

1. Read the following success story to your class or ask a student to read it.

2. Ask your class if the story is inspiring and if they wish to help the grizzly bear. If yes, brainstorm with the class some ideas to help grizzly bears and write all ideas on the board.

3. Together with the class review the list of actions and evaluate which actions are realistic and feasible. It is important that you pick actions that have a good chance of success as well as feel comfortable for you, the teacher.

Minister of Canadian Heritage Sheila Copps recognizes student action on the environment

Kids in the Bow Valley, just outside Alberta's Banff National Park, care a lot about wildlife. In September 2000 students from Canmore's Lawrence Grassi Middle School invited Gareth Thomson, Education Director of the Canadian Parks and Wilderness Society, to talk to their classes about wild animals and how to help them. Following his presentation they focussed on a goal: persuading all stakeholders to build an engineered wildlife crossing structure over the Rundle Forbay, a man-made lake that interrupts a major wildlife corridor. With the help of teachers Brenda Davidson and Wendy Allsopp, the students used local media to raise this issue within their community, and made presentations to hundreds of elementary students, who sent posters, postcards and letters to local decision makers...

What happened? In June of 2002, the Honorable Sheila Copps, Minister of Canadian Heritage, announced that the federal government and its partners would build a wildlife crossing structure, as part of the federal government's 'G8 Legacy,' a commitment designed to help improve the quality of the local environment. The longest and loudest applause was reserved for the students, who were told in no uncertain terms by the Minister: "Today, it is clear to everyone in this room that your actions have made a difference."

For many more inspiring examples of how Alberta students have made a difference through the CPAWS Education Program, visit

How to Make a Difference

- Participate in the Action Challenge program to make a difference. Visit our website, use the tool kits for teachers and students, and get inspired by what others have done! www.actionchallenge.ca See below, too.
- Be informed about development issues in Alberta. What implications do they have for bear habitat?
- Educate yourself about the challenges faced by grizzly bears.

- Learn as much as you can about grizzlies and share your knowledge with other classes in your school, or with elementary classes at a school nearby
- Write letters to the editor to remind people to slow down when driving through our parks, to avoid stopping to take pictures of wildlife and causing habituation or bear jams or to support grizzly bear conservation
- Design a website that informs people about the science behind grizzly bear research and the issues grizzlies face
- Start a "coffeeshop" club: meet once or twice per month to discuss conservation issues (grizzlies, Kyoto, recycling)
- Create and send postcards to the government to tell them that you support grizzly bear research and conservation
- Design and present a grizzly bear display for Earth Day (April 22); design Grizzly Bears Forever posters and hang them around your school
- Write letters to Parks Canada telling them you support any actions they have to take to ensure grizzlies' long-term survival
- Raise money (brainstorm ways) to donate to environmental conservation organizations
- Share your knowledge and concern with parents, friends and various teachers. Develop a presentation about bears that you teach to other classes
- Join or make a donation to an environmental conservation organization. Perform a web search to find out about organizations in your area that support the same things you do. Check out our suggested links in the next section
- Practice careful management of your food and garbage when you are in bear country. If you see carelessness, help others understand the importance of being bear aware.
- Practice more environmentally friendly lifestyles. Grizzly bears and their habitat are threatened by development that is a direct result of consumer habits and lifestyle choices. Industrial activities such as forestry, and oil and gas exploration are reduced in their scale and rate if we all conserve energy, recycle materials, and make lifestyle decisions that have lower environmental impacts.

Spirit Bear Youth Coalition

In grade nine, Simon Jackson wanted to help protect B.C.'s spirit bears (a rare white Kermode bear). He launched a letter writing campaign to protect the bears' habitat.

Simon is now the founder of one of the largest youth environmental networks in the world, and is supported by Jane Goodall, Charlotte Church and the Backstreet Boys. Time Magazine honoured him as one of 60 Heroes for the Planet in 2000.

http://dsimonjackson.com/

Take the Action Challenge!

Your class can be part of a special group of students who are taking CPAWS' Action Challenge for Nature. After learning about grizzly bears and conservation biology, you and your students may want to do something to help. Positive stewardship actions, from picking litter or being bear-aware while camping, will help grizzlies.

CPAWS Southern Alberta has created some terrific resources to help students brainstorm action ideas and make them happen. We've designed a special website, www.actionchallenge.ca for classes who want to take positive action to help the environment. This website features special tools for teachers and students to help them with their projects from start to finish.

Need ideas? We've created an Action Menu that can be downloaded from our website (or call our office for a copy). Be sure to check out the **Action Challenge** section of the website, where we've collected actions other classes have achieved – look here for ideas and inspiration! And when you've accomplished your goals, be sure to let us know so we can feature **your** work on our Action Challenge webpage. We have included our Action Reporting Form – please fill it out and send it to us so we can add your actions to our webpage.

Not sure of where to start? Consider these ideas:

- Have students develop and deliver a public (school) education campaign to teach people how to travel safely in bear country
- School-yard cleanup or school-wide recycling programs
- Write letters to protect wildlife habitat
- Find creative ways to raise money to adopt-a-species or donate to an environmental organization

In the following pages, we've provided you with contacts of other organizations that provide environmental education and action opportunities. Action projects can be as simple or complex as you choose to make them. But they all have a measurable effect on students and on the environment.

Never doubt that a group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has.

– Margaret Mead

www.actionchallenge.ca

CPAWS' Action Challenge Reporting Form

We are so happy you've decided to do something to help the environment – every action, large or small, counts! We'd like to find out what you've done so we can profile your work on our webpage and send you a certificate for participating in our program!!!

Please fill out this form and send to the address below. Please print clearly.

School Name: _____
Teacher name: _____
Number of students:_____
School Address:_____
_____
_____
Tel/Fax:_____
Email:_____
School Website URL: _____

Please describe the action your class will take to help grizzly bears or endangered species. Feel free to use extra pages. If you need help with your action plans, contact us – we have lots of great ideas!

_____
_____
_____
_____

How much time did it take to work towards your project goals? _____
What resources will/did you need?_____
_____
_____

* Please send/email us pictures of your class, posters or events, and copies of any letters, reports or posters you create so we can post them on:

www.actionchallenge.ca

SEND TO: Canadian Parks and Wilderness Society (CPAWS)
Southern Alberta Chapter
88 Canada Olympic Road SW
Calgary, AB T3B 5R5
Email: education@cpaws.org
Fax: 403-232-6988

Related Resources and Web Sites

Find out more about grizzly bears, safety in bear country, and other educational resources.

Canadian Parks and Wilderness Society Education
http://cpaws-southernalberta.org/campaigns/education

- Learn more about CPAWS field trips, in-school presentations, teacher P.D., student action awards, and activity guides.

Canadian Parks and Wilderness Society
http://cpaws-southernalberta.org/

- Information about membership, volunteering, current campaigns and special events

Eastern Slopes Grizzly Bear Project
http://www.canadianrockies.net/grizzly

- ESGBP created to address the need for scientific information about the cumulative effect of human development and activities on grizzlies in the Central Rockies Ecosystem
- Grizzly bear facts, reports, publications and feature articles
- Video/film productions and other resources

Foothills Model Forest Grizzly Bear Research Program
http://www.fmf.ca/pa_GB.html

- Aims to advance the long-term survival of bears worldwide by replacing misconceptions with scientific facts about bears, their role in ecosystems, and their relations with humans.
- Works to conserve bear habitat, stop poaching, rehabilitate injured and orphaned bears back to the wild, and implement methods to reduce conflict between humans and bears.

Alberta Parks - Kananaskis Country Environmental Education Programs
http://www.albertaparks.ca/kananaskis-country/education/environmental-education-programs-resources/

- Download free teaching resources for all grade levels

Craighead Environmental Research Institute
http://craigheadresearch.org/

- Aims to increase understanding, appreciation and protection of the natural environment
- Information on the status, distribution and trends for North American grizzly populations
- Map of Canadian grizzly bear population sizes

Environment Canada - Canadian Wildlife Service - Hinterland Who's Who
http://www.hww.ca/

- Excellent information about many species, including grizzlies

Friends of Banff National park - Bear Edukit
http://www.friendsofbanff.com/learn-more/edu-kit-rentals/

- Book the Friends of Banff Edukit for pelts, books, movies, tracks and classroom activities

Interagency Grizzly Bear Committee
http://www.igbconline.org/

- Working for recovery of the grizzly bear in the lower 48 states
- Many useful pages on this site, including a report on the monitoring of grizzly bear populations using DNA

International Association for Bear Research & Management
http://www.bearbiology.com/

- Dedicated to conservation of all species of bear
- Find out about bears and what is being done to protect them

National Wildlife Federation spotlight on Grizzly Bears
http://www.nwf.org/Wildlife/Wildlife-Library/Mammals/Grizzly-Bear.aspx

- Offers a glance into the life and activities of the grizzly bear, as well as current reintroduction efforts
- Science facts, creatures in conflict, life cycle, audio/video clips, Q&A

North American Bear Center
http://www.bear.org/website/

- Promotes understanding & appreciation of bears
- Amazing photos of grizzly bears in Katmai National Park (Alaska) - suitable for presentations/reports

Wind River Bear Institute
http://www.beardogs.org/

- Innovative bear conservation program aimed at preventing the destruction of 'problem' bears
- Karelian bear dogs used in 'aversive conditioning' to teach bears to recognize and avoid human territory

Why Bears? Video
https://www.youtube.com/watch?v=yGC6Ja1ZZkQ

- This film is for teachers, scientists, non-profits and people interested in bears and preserving wild spaces.

WWF Canada Grizzly Bear Species Profile
http://wwf.panda.org/about_our_earth/species/profiles/mammals/brown_bear2/

- Learn more about the Grizzly Bear and what is being done to protect them.