Activities to teach about endangered species and habitat preservation

A collaboration between Puffin Productions &
Canadian Parks and Wilderness Society
Hello!

This resource has been developed to help educators teach students about how species become endangered, why extinction is a problem, and most importantly, what to do to solve the problem. Endangered species offer a high-interest entry point for students to learn about habitat, ecosystems, and many key learning outcomes found in core curriculum. With over 500 species on Canada’s rapidly-growing list of endangered species, we owe it to young people to show them some positive solutions.

This resource was developed by Gareth Thomson in partnership with Peter Lenton of Puffin Productions, and accompanies Peter Puffin’s audio CD and tape, Passengers. This unique collaboration allows you to work through this resource, AND use music to inspire and educate students about endangered species. You can order the Passengers CD or book a school concert with Peter Puffin by visiting www.puffin.ca or calling 1-888-878-3346.

This activity guidebook is a living document and is a vital component of the Canadian Parks and Wilderness Society’s Endangered Species Elementary Education Program. We welcome all feedback and will incorporate suggested changes. For comments, questions and inquiries, please contact the CPAWS Education Team at education@cpawscalgary.org. This document is printed on 100% post-consumer recycled paper.

About Canadian Parks and Wilderness Society (CPAWS)

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 protected areas and ensure that nature comes first in their management. CPAWS has played a key role in saving almost 40 million hectares 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 CPAWS Southern Alberta Chapter is the only CPAWS chapter to offer formal education programs. We offer customized workshops and programs for teachers and students, including classroom programs, guided hikes and professional development workshops on a variety of topics. For more information, please visit http://cpaws-southernalberta.org/campaigns/education or call 403-232-6686.

We gratefully acknowledge these generous organizations for their support of this resource:
# Table of Contents

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description of Activity</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Curriculum Connections</strong></td>
<td>Links to the Alberta Learning Curriculum &amp; CPAWS’ Education Principles.</td>
<td>1</td>
</tr>
<tr>
<td><strong>Spaceship Earth</strong></td>
<td>An introduction to endangered species, using a spaceship metaphor.</td>
<td>2</td>
</tr>
<tr>
<td><strong>What does Endangered Mean?</strong></td>
<td>This activity explains what happens to animals when they lose their home.</td>
<td>4</td>
</tr>
<tr>
<td><strong>Shelter Shuffle</strong></td>
<td>Students discover that changes in the availability of water, food, and shelter result in changes in the size of an animal population.</td>
<td>6</td>
</tr>
<tr>
<td><strong>Who Am I?</strong></td>
<td>In a fun-filled activity, students find out more about the plants and animals found in natural ecosystems.</td>
<td>9</td>
</tr>
<tr>
<td><strong>Weird Webs</strong></td>
<td>What happens when you remove a grizzly bear or a flower from an ecosystem or food web? Play Weird Webs to find out!</td>
<td>19</td>
</tr>
<tr>
<td><strong>Mouse Roulette</strong></td>
<td>In this active simulation game, students learn about food chains and threats to nestling owls.</td>
<td>22</td>
</tr>
<tr>
<td><strong>We’re all Passengers</strong></td>
<td>Students learn how we lost the Passenger Pigeon and examine their thoughts and feelings about extinction.</td>
<td>25</td>
</tr>
<tr>
<td><strong>Endangered Species: What’s the Big Deal?</strong></td>
<td>Students learn about “extinction spasms” through time and consider what might be causing the spasm today.</td>
<td>29</td>
</tr>
<tr>
<td><strong>Bio-What?</strong></td>
<td>What exactly is biodiversity? Why is it important? Use these overheads to generate discussion.</td>
<td>33</td>
</tr>
<tr>
<td><strong>Uncertain Future</strong></td>
<td>Map-reading activities teach students about the change in distribution of large carnivores in North America.</td>
<td>39</td>
</tr>
<tr>
<td><strong>What Used to be Here?</strong></td>
<td>This activity lets students compare their schoolyard with what used to be there and understand that much has changed...</td>
<td>50</td>
</tr>
<tr>
<td><strong>What’s Protected?</strong></td>
<td>Students examine the concept of protection and how we protect Alberta’s natural spaces.</td>
<td>56</td>
</tr>
<tr>
<td><strong>How do Species become Extinct?</strong></td>
<td>Students discuss the five factors that cause extinction.</td>
<td>61</td>
</tr>
<tr>
<td><strong>What’s Endangered?</strong></td>
<td>This activity introduces students to listing and classifying endangered species in Alberta and Canada.</td>
<td>68</td>
</tr>
<tr>
<td><strong>So, Now What?</strong></td>
<td>Suggestions of other activities to engage your class, including ideas for taking it outside, poetry, and more...</td>
<td>72</td>
</tr>
<tr>
<td><strong>Take the Action Challenge</strong></td>
<td>The only way we can save endangered species is to Take Action! Find out how your class can make a difference by taking the Action Challenge for Nature!</td>
<td>75</td>
</tr>
<tr>
<td><strong>Contact Organizations</strong></td>
<td>A list of other groups who provide useful education services and opportunities.</td>
<td>78</td>
</tr>
</tbody>
</table>
Curriculum Connections

SOS: Saving our Species is an activity guide that deals with an important environmental topic. As with complex environmental issues themselves, it crosses content area lines and is a multidisciplinary, cross-curricular topic. Teachers might need to make slight adaptations to activities to suit their particular group or curriculum. Luckily, teachers are fabulously skilled at doing just that! Some of the more striking connections with the Alberta curriculum are shown below.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Curriculum Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>Science: Animal Life Cycles (specifically mentions endangered species)</td>
</tr>
<tr>
<td></td>
<td>Social Studies: Global Citizenship</td>
</tr>
<tr>
<td></td>
<td>Language Arts</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Science: Waste in our World; Plant Growth &amp; Changes</td>
</tr>
<tr>
<td></td>
<td>Social Studies: Alberta: the Land, People &amp; Stories</td>
</tr>
<tr>
<td></td>
<td>Language Arts</td>
</tr>
<tr>
<td>Grade 5</td>
<td>Science: Wetland Ecosystems</td>
</tr>
<tr>
<td></td>
<td>Social Studies: Canada: its Geography and People</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
</tr>
<tr>
<td></td>
<td>Language Arts</td>
</tr>
<tr>
<td>Grade 6</td>
<td>Science: Trees and Forests</td>
</tr>
<tr>
<td></td>
<td>Social Studies: Local Government</td>
</tr>
<tr>
<td></td>
<td>Language Arts</td>
</tr>
</tbody>
</table>

CPAWS’ Education 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.
Spaceship Earth: an introduction to your endangered species unit

Read the following to your students:

Right now you and everyone here are passengers on a huge spaceship. Does anyone know what the name of this spaceship is?” (Pause for answers). This spaceship is called ‘Planet Earth,’ and right now it is hurtling through space with all of us - over 6 billion humans – on board. (Make a transparency of the earth on the page following and display it on an overhead projector)

Every spaceship needs a life support system, and luckily we have an excellent one. Everything we need to make our voyage a successful one is here with us inside the spaceship: and our special life support system is made up of all the Earth’s plants and animals and nature. The natural world is our life support system; it gives us food, water and air to breathe - it enables us to survive.

But there’s a problem on board the Spaceship: some of the plant and animal species - our life support system – are mysteriously disappearing!! Something is making these species go extinct, at the rate of over 140 species per day. We still have between 10 and 80 million species of plants and animals left, so we must not panic - we still have a little time left to solve the problem before our life support system fails. But it is urgent that we take care of this problem!

Your mission over the next few weeks is to find out what is making these plants and animals disappear, and take action to help them. Do you want to help?

The answer should be a unanimous “yes!” Tell students about the unit of study you are beginning and share some of the things they will be learning about.
What does ‘Endangered’ mean?

This activity explains why animals need their “special places” and what happens to animals when these places are destroyed, and gives students a reason for learning more about the subject.

**Time required:** 30 minutes

**Instructions for the Teacher:**

1. Ask students:

   **What are the things that you need to survive?**
   Record answers on the board without comment. The resulting list may be broken down into basics (e.g. water) and frills (e.g. television, quiet time in nature). Next, ask students for their assistance in circling all of those needs that a wild animal also has. Whether or not animals share the same psychological needs as humans (i.e. love, togetherness, etc.) will make for an interesting discussion! Students should realize that wild animals and humans share the same fundamental physical needs of food, water, shelter, air, and space.

   **What if you lost your home? What would happen to you? What would you do?**
   This question is designed to get students thinking about something that we all have and we all need: our home. Just like any other animal, humans need food, water and shelter to survive: we can find these three things in everyone’s home! If a student were to lose their home – and couldn’t find anyone to go and live with – they’d be in serious trouble indeed!

   Many plants and animals on this planet are in serious trouble for exactly this same reason: they have lost their homes. If a single animal loses its home and has nowhere else to go, it dies; if enough of these animals lose their homes and die, then the species becomes an endangered species, because it is in danger of extinction.

   **What does the word “Endangered” mean to you? Use this word in a sentence.**
   Endangered means “to have been put in danger”. More simply, it means “in danger;” this may be easier for younger students to understand.
Have you ever heard of an endangered species? What is an endangered species in danger of?
An endangered species is in danger of becoming extinct.

Define for me what “Extinct” means.
Tell students that when all the members of an animal species die, that animal is said to be extinct. When the number of animals is low enough so that the species is in danger of becoming extinct, the species is said to be endangered.

Outdoors: a Special Place Activity

2. Tell your students that you are about to take them to a large natural area that is one of your very special places. Choose a pleasant, calm area - preferably within walking distance of the school.

At the area, invite students to spread out and find a place that they like or feel is special. Remember to set a boundary on how far they can go. Have them sit in their special spot and write about how that spot makes them feel - this could be a drawing, a poem, or a few paragraphs.

3. Ask the students:

What do you like most about nature? How does it make you feel?
Students may tell you that nature makes them feel good, or relaxed; they may tell you that they find nature to be pleasant or enjoyable. Humans need to experience nature not only because it is essential (see the SOS activity Endangered Species - so what’s the Big Deal?) but also because it makes us feel good!

Song: Kid Hearts

Listen to the song “Kid Hearts” with your students. Point out the following words to the students: “All the lessons we’ve unlearned somehow/Kid Hearts just know”. Tell students that the authors of the song wrote these words because ‘kid hearts” seem to recognize that to make an animal go extinct is just plain wrong! (Ask students if they agree). Hand out photocopies of a big heart for students to colour in, and have them write down all the things they know about endangered species inside the heart. Display them all to show visitors just how much “Kid Heart” you have in the class!
Shelter Shuffle

In this fun, active game, students will discover that changes in the availability of natural resources such as water, food, and shelter result in changes in the size of an animal population, and that populations are subject to limiting factors. *Based on concepts in the game ‘Oh Deer’ (Project Wild Elementary Activity Guide, 1985).*

**Time required:** 45 minutes

**Materials:** four markers to establish boundary lines, open space for playing the game (indoors you’ll need the gym, outdoors the playing field is best)

**Instructions:** Ask students to name some of the things that all living things need to survive. Whittle the list down to three fundamentals: food, water, and shelter (things like oxygen are also necessary, but for this game, we will assume there is enough to go around!). Tell the students that their homes contain the food, water, and shelter that they need to survive - and that the same holds true for all living things.

Ask the students to decide which animal each of them would like to be during this game. Tell them to choose an animal that might live in your park, schoolyard, or nearby natural area (remind them that insects are animals too!). Tell students that the word for an animal’s home is habitat.

Take students to a large open space, preferably outside. Have students count off in fours. All the number ones should form a line shoulder to shoulder. All the others should form a similar line facing the ones. The two lines should be about 2 metres apart. The number ones are animals; the number twos, threes, and fours are components of the habitat: food, water, and shelter.

At the beginning of each round, each animal will decide whether it needs water, food, or shelter for that round:
• if they decide they need food, they should place their hands over their stomachs.
• if they need water, they should place their hands over the mouths;
• if they need shelter, they should place their hands together over their heads.
Once the animals decide what they want, they cannot change their minds during the round. If an animal survives the round, it can change what it is looking for in the next round.

The number twos, threes, and fours will decide which of the habitat components (food, water, or shelter) they will be during that round. They too will make a sign according to the habitat component they choose. As with the animals, these players cannot change their minds during that round. They can, however, choose a new component for the next round. The game should consist of at least a dozen rounds, but the first round is a trial round. Have both lines of students turn their backs to the other students.

Ask the animals to make a sign for what they need, and habitat students to make a sign for what they are for that round. When the students have made their signs, count “1-2-3, turn around”.
The two lines should turn and face each other. Animals can then calmly walk (holding their sign, i.e. with their hands in front of their stomach) to the habitat component with the same sign, tag the students, and take the habitat component back to where it started from, effectively increasing the number of animals: this demonstrates to students that when an animal is successful and is able to meet its needs, then it can reproduce.

An animal that doesn’t meet its needs dies; therefore, an animal that cannot tag its habitat requirement must (after expiring noisily on the ground!) join the habitat line and become part of the habitat (food, water, or shelter). Habitat components stand still in their line until an animal takes them. If no animal needs the habitat component, it stays as part of the habitat.

Next, tell students that this is not a walking game, it is a running game, and that animals will have to run (holding their signs) in order to tag fellow ‘habitat’ students (who do not move from the spot!). Have all the #1 students move to a line 30-40 metre away. Play 12 rounds, keeping the pace brisk.

Discussion: Ask students:

Did anyone find that they were an animal more than once?
Probably. This game illustrates the concept of cycles: the molecules that make up an animal’s body may spend some time (after the animal dies) as a piece of habitat, but may later on become part of an animal again.

Did the number of animals go up after the first round of the game?
Yes - The animals were able to meet their needs and to repopulate. During the first few rounds the number of animals went up.

Recall the round when there were more animals than there was habitat. What happened after this round?
The habitat was depleted and there was not sufficient food, water, and shelter for all the animals. Lots of animals died after this round and returned to the habitat, thus restoring the balance of
nature. Have the students show with a simple teeter-totter action of their hands how nature establishes a balance.

Ask students what things could make a habitat endangered. Students should realize that both natural and human-caused things can endanger a habitat. Human-caused effects might include land development (roads, buildings, golf courses, farming), development around water (building of dams causing flooding, draining of wetlands, etc.), acid rain, greenhouse warming of the earth, oil spills, forestry, cutting down the forest for trees or to grow crops, pollution, etc. Natural things that could make a space endangered might include forest fires, natural calamities such as rockslides, volcanoes, natural climatic warming or cooling, etc.

**Extension:** Back in the classroom, graph what happened to the animal population as the game progressed. (This could be done in the game area using poster board.) This is a visual reminder of what the students have learned in the game. Your chart should show years (rounds) and number of animals, as shown in the example below. Discuss how graphs such as this might be used to help manage wildlife areas.

**Note to the teacher:**

1. Beware of over-eager animals! Stress to students that a light tag is all that is needed, and that a too-violent tag of the habitat student will result in that animal becoming penalized by having to watch the game from the sidelines.
2. As the game continues, students may confer with each other and decide to make the same sign. This is okay, but don’t encourage students to do this. If they all make the food sign, it would mean there was no water and shelter that year (drought, fire, logging of trees).
Who am I?

This is an entertaining activity in which students get a crash course in both schmoozing and ecology! Students are introduced to a number of different classification schemes for animals and plants, given a picture of a common ecosystem element (e.g. grass, hare, coyote, etc.) and then have to mingle with other students to determine which plant or animal they are. (Illustrations provided courtesy of the Canadian Museum of Nature).

Time required: 30 minutes

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

Instructions:

1. Introduce or review a number of different classification schemes with the students. As you review these words and their definitions, record them on the board so that students will be able to see them throughout the activity.

**Producer**: an organism that makes its own food (green plant)

**Consumer**: an organism that feeds on those below it on the food chain

**Decomposer**: an organism that derives its energy from decomposing matter

**Predator**: an animal that kills others for food

**Prey**: an animal that is hunted and killed by predators

**Carnivore**: an animal that eats meat (animals)

**Omnivore**: an animal that eats animals and plants

**Herbivore**: an animal that eats plants
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. Ask students to hang their sign on the back of one of their fellow students so that their fellow students don’t know what sign they have. Encourage students to distribute signs without talking. Tell the students:

*The object of this game is for you to determine what ecosystem element you are. You can 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! You can guess what your ecosystem tag is, but you only get ONE guess, so keep asking yes or no questions until you’re fairly sure what you are. Schmooze around and mingle with each other and think of as many yes/no questions as possible.*

4. Answer any questions and let the games begin! Monitor all questions and answers. If students find they need more information, stop the game briefly, and 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.

5. 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.

6. 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, Weird Webs, in which characters from this activity create a food web using string, is an excellent complement to Who Am I? and is best done immediately following it.
Grizzly bear

Wolf

Sun

Squirrel
Frog

Grass

Grasshopper

Ground squirrel
Human

Crow

Poplar tree

Elk
Porcupine  Weasel

Warbler  Robin
Aquatic Plants

Water Boatman

Dragonfly Larvae

Caddisfly Larvae

Snail
Weird Webs

Still 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 between 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.”

**Time required:** 20-30 minutes:

**Materials:**
- Signs from *Who am I?* activity
- Ball of at least 100m of string, wool or very thin rope

**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 make connections with everyone in the circle, so that no organisms are left out.

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. Tell students that something has just happened to change this ecosystem: a new community is being built nearby, and an area of the forest will need to be logged to provide the space. 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.

6. 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.

   Easy Option: Rather than have students drop their strings, ask them to gently tug on the string. Those feeling the tug can tug in turn, and so on. This eliminates the need to pick up the dropped string.

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

   - A developer drains a wetland 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

Emphasize two points to students:

a) Recent studies are showing that carnivores are far more important than previously thought. Their presence or absence may actually dictate how healthy the 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.
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).
Mouse Roulette

Every school child knows that owls have baby owls that they have to feed. In this active simulation game students expand on their knowledge, learning about food chain structure, the relationship between nestling survival rate and clutch size, distance to feeding ground, injury to hunting adults, and the random poisoning of the mouse supply.

**Time Required:** 40-60 minutes

**Materials:**
- small, different-coloured items (may be durable candies, buttons, etc. - in this activity description, 'candies' are used)
- forks - may be metal or plastic
- reusable cups
- large open bowl or tray

**Instructions for the Teacher:**

1. Divide the students into groups of between three and eight.

2. For each group, assign either one or two of the students to be the parent. Give each parent a fork to hunt with: some of these forks should have their tines either broken off or bent out of shape, representing a hunting adult that is injured.

3. The remaining students are all owlets! Give each student a cup: this represents the mouth and stomach of the owlet.

4. Place each nest of owlets at varying distances from the hunting ground (this is represented by the large bowl with the candies in it). Instruct the owlets to stay in their nests, to make as much noise as possible during the game, and to endeavour to get a many candies from an adult as possible - just as a baby owl would.

5. Tell the adults that, when you say “go”, they are to rush to the feeding area and pick up as many candies as possible with their fork. They are not allowed to put their hands over the fork to stabilize their load of candy, and they are not allowed to jostle other owls at the feeding grounds.

6. Say “go!” - and let the game commence. Encourage the owlets to crowd another out in their efforts to get candy - but don’t let them become too physical! End the game after a minimum of five minutes, or when the feeding ground bowl is empty.

**Discussion:**
7. The following set of questions allows the students to realize some of the factors that operate in a natural ecosystem.

**Did you enjoy the game?**
**How many students have three or more candies in their cups?**

NOTE: Following this initial question, ask the students to keep their hands up if they have five or more... ten or more... etc. Continue this until you reach a number at which only 50-70% of students still have their hands up - then tell students that, regretfully, it was **this** number of candies that you needed in order to survive. Those students who have less than this number of candies didn’t make it – they died of starvation or malnutrition.

Ask the students:
**In this game, what factors determine whether an owlet will live or die?**

The following factors should be among those that students mention:
- It is harder to feed a large family than a small family
- The ratio of parents to owlets is important
- Families with two adults have twice the feeding power of single-parent families
- Those owls who had farther to fly to the feeding ground will be able to “catch” less food than an adult whose nest is close by
- Sibling competition (i.e., more aggressive nest mates) may crowd out those weaker owlets (or at least the ones with the shorter arms!)
- Hunters with damaged forks (an “injury”) cannot bring home as many candies - i.e. their hunting efficiency is impaired, as if one of their talons were damaged

For each of the above factors, have students relate the game to real life by asking if that is a factor in the life of a **real** owl. It is also interesting to compare humans to owls. In our society, we generally have enough food, and we don’t encourage aggressive behaviour at the supper table! Ask the students if they could imagine any instances where aggressive behaviour, or even starvation, might occur among humans.

Tell the students that they were in fact playing “Mouse Roulette”: some of the mice in the hunting grounds had in fact eaten some grain that had been contaminated with a high dose of pesticides. Ask the students:

**Do any of you have two or more red candies in your cups? Because if you do - you died of poisoning!**

This offers a good opportunity to lead the discussion towards contamination of the environment, intentional or accidental, that can lead to deaths in animals that are at the top of the food chain. A good example of this is the insecticide DDT, which caused raptor populations to plummet in the 1970’s. This is a particularly good example to use because banning DDT actually **worked**, restoring the numbers of North American raptors such as the
Bald Eagle back to normal. Unfortunately this still hasn’t helped the number of Peregrine Falcons, which spend their winters in Central America - where DDT is still allowed.

For higher grade levels, the concept of adaptations and natural selection could be raised by asking the following question:

*Would it be an advantage in this game to have a wider fork or a cup with a larger diameter mouth?*

Yes it would. According to the theory of natural selection, those animals with these advantages would be more successful, and therefore be more likely to have more offspring than other owls. As a result, this trait (wider fork, larger mouth, etc.) would become the dominant trait in the species. It is this process that results in the owl having the superb adaptations that it does.

*What other traits would be an advantage in this game?*

Long arms and loud mouths may be among those traits suggested for the baby owls; fast legs and steady hands might be among those suggested for the parent owls.

**Extension Activities:**

**Adapt-an-Animal:** Have students design an animal that is wonderfully adapted to living in a particular environment, and present it to the rest of the class. You may choose to have them “perfect” the owl, or create a new animal.
We’re all Passengers

The Passenger Pigeon was once the most numerous bird in North America - yet it is now extinct. Students learn how this happened and examine their own thoughts and feeling about extinction.

**Time required:** 30 minutes

**Materials:**
- Transparency of two graphics in this activity
- Overhead projector and screen

**Instructions for the Teacher:**

1. Ask your students:

   *What is your favourite animal? Why? How would you feel if your favourite animal suddenly disappeared? How would you feel if you heard that all of the robins in the world had disappeared overnight?*

2. Using an overhead projector, show students the Passenger Pigeon cartoon. Ask them what they think it means. Then read students the story “The Last Passenger Pigeon.”

3. After the story, have the students answer the following questions:

   *How does the story make you feel?*

---

**PASSENGER PIGEONS...**

![Passenger Pigeons](image)

1814... ...1914
Once an animal is gone extinct it is gone from the Earth forever. There is nothing we can do to bring it back. No one will ever see a live Passenger Pigeon. How does this make you feel? (Ask them to use a descriptive word or phrase.)

4. Tell students that when all the members of an animal species die, that animal is said to be extinct. When the number of animals is low enough so that the species is in danger of becoming extinct, the species is said to be endangered.

5. On the board, draw a gravestone for the Passenger Pigeon, with an inscription that reads “Here lies the Passenger Pigeon - extinct because humans didn’t understand.”

Ask the students:

What does this inscription mean? Do humans understand any better now?
In the last century, humans didn’t properly understand that overhunting can lead to extinction. In the past, human actions have resulted in the extinction of species such as the Passenger Pigeon. We now understand that thoughtless exploitation and overhunting drove the Passenger pigeon to extinction; we now know much better the consequences of our actions. Because hunting is much more carefully regulated now, with limits on when hunting can occur and how many animals can be killed, hunting (and poaching, which is illegal hunting) is no longer a cause a big of extinction in North America (although it may be a contributing factor in some cases).

6. Ask the students:

If the Passenger Pigeon were still alive today, and if it were an endangered species, would you let it become extinct?
The answer will most likely be a resounding “No!” This question gives you the opportunity to provide students with a ray of hope. Tell your students that in the last century, humans weren’t as aware of our impact on the earth as we are today, and overhunted the pigeon into extinction (show the “Gunsight” drawing to the students). If the Passenger Pigeon were still alive today, and if it were an endangered species, humans might well mount a campaign to save it from extinction, a campaign that might include strict controls on hunting and habitat preservation.

Modern Alberta campaigns to help endangered animals include the Burrowing Owl, the Swift Fox, and the Whooping Crane. Several activities found towards the end of this guide will enable you to help your students take action to help endangered species.
7. Tell students that, despite what we’ve learned about overhunting, the rate of extinction is still increasing at an alarming rate. State of the World 1993 (Worldwatch Institute) estimates that nearly 140 species of species become extinct every day on the planet. Many of our fellow “Passengers” on spaceship Earth are at risk of extinction, and there is a huge need for concerned people (such as your students, perhaps) to take action to help endangered animals. Tell students that they will have a chance to help once they learn a little bit more about the problems. The last few sections of this activity guide details some of these actions.

**Extension activity**
8. Ask the students to write a poem or short story as if they were able to spend a day watching the last animal of a species (i.e. Martha, the last Passenger Pigeon). Ask them: “How do you think this animal might feel? How do you feel about it?” Have them describe this in their story. As a supplementary activity, ask them to do a drawing that shows this. As a follow-up, have students discuss their feelings in a small group setting.

---

**Song: Passengers**

Listen to the title song, “Passengers.” Write down the following lyrics from the song, and ask students the questions below that follow each snippet of song. Discuss with students and then listen to the song again!

“We’re just passengers - that’s all/fellow travellers/ on a blue-green ball.”

Q: The song suggests we’re travellers - on what? (The Earth).
Who are the fellow travellers referred to? (all other species of life on the Earth)

“The joy of life’s green web keeps me singing along...”

Q: What is the web referred to here? (The web that is the vast and complex network of relationships between all living things).

“We’re just passengers like the pigeons - were!”

Q: What does this line mean? (This is a play on words - not only are we passengers on the Earth, but we’re just another species - like the Passenger Pigeon that went extinct in 1914).

“All those thriving connections make up...diversity.”

Q: What does the word “diversity” mean? (It is a synonym for variety. The word biodiversity means the variety of life on the planet - and in a way, it’s kind of what this book is about!)
Read-aloud activity:

“Martha the Passenger Pigeon”

This is a story about a bird that is no longer found upon the earth, even though it was once the most numerous bird in all of North America. The name of the bird is the Passenger Pigeon.

This slender, fast-flying bird travelled in huge flocks of millions of birds. A single flock would literally darken the skies overhead as it flew, and might take 24 hours to pass a viewer. Pioneers used to rely on the Passenger Pigeon as an important source of food. But they were killed in such vast numbers that the species became extinct.

Around one hundred and eighty years ago, a famous birdwatcher called John James Audubon wrote about the arrival of one flock:

“...Everything was ready and all eyes were fixed on the clear sky that could be glimpsed amidst the tall tree tops... Suddenly a general cry burst forth ‘Here they come!’ The noise they made, even though still distant, reminded me of a gale at sea. As the birds arrived and passed over me, I could feel a blast of air from their wings. Then I saw a magnificent, wonderful, terrifying sight. The pigeons, arriving by their thousands, landed everywhere, until solid masses were formed on the branches all around. Here and there perches gave way with a crack under the weight, and fell to the ground, destroying hundreds of birds underneath. The scene was one of uproar and confusion. The birds made so much noise that I found it quite useless to speak, or even shout, to the persons next to me. Even the sounds of the hunters’ guns could not be heard...

“The uproar continued the whole night. I was anxious to know how far the sound could be heard, so I sent off a man used to roaming the forests, who returned in two hours to tell me that he heard it distinctly five kilometres away from the roosting place...”

~~~

Just one hundred years after this was written, a solitary bird sat in a cage in the St. Louis zoo. Its long tail and bright feathers showed that it was a Passenger Pigeon. A sign on the door proclaimed that its name was Martha. She would often sit with her head cocked to one side, looking at the sky intently as if waiting for a huge flock of Passenger Pigeons to fly over. But no more flocks would ever darken the skies again, no feathered wings would ever fan the air into a wind: for Martha was the last of her kind, the last passenger pigeon to live on the earth. On September 1, 1914 Martha died, and the Passenger Pigeon became extinct.
Endangered Species: So what’s the Big Deal?

This activity helps students understand that the earth is going through an extinction event greater than anything that has happened on the planet since the dinosaurs became extinct. If it isn’t stopped, this “extinction spasm” may one day make humans an “endangered species...”

**Time required:** 20 minutes

**Materials:**
- Chalk board
- Overhead projector and screen
- Transparency of extinction graph

**Instructions for the Teacher:**

1. Read the following phrase to your students:

   All of the species of plants and animals on the planet Earth are like the rivets on an airplane. Rivets are like strong little nails; their job is to attach the pieces of metal to each other and hold the plane together. When a species becomes endangered, then extinct, that is like a rivet popping off the airplane and disappearing. When a species becomes extinct, it is like having the airplane flying through the air with one less rivet holding it together.
Ask the students:

*What does this statement compare the earth to?*
*What does it compare the Earth’s plants and animals to?*
*How would you feel if you were a passenger on a plane that was losing rivets?*
*Do you think the planet Earth is “losing rivets” in the way I just described?*

Tell students that yes, the Earth is losing rivets - in other words, losing species.

2. Ask the students:

*Do we still have dinosaurs on the planet? If not, when did they go extinct?*

Dinosaurs disappeared 65 million years ago, in what is called an extinction spasm because the rate of extinction increased so dramatically. Most scientists now believe that a natural catastrophe caused this: they believe that a meteor collided with the earth in what is now Yucatan, Mexico. This collision sent up a huge cloud of dust that shaded the earth from the sun’s rays, cooling it down so that the dinosaurs could no longer survive.

Scientists believe that there have been a total of six major extinction events throughout the history of the Earth: five caused by natural disasters long ago in the Earth’s history, and a sixth one going on today - caused by humans.

3. Show students the “Six Great Extinctions” graph. Tell the students the labels of the horizontal and vertical axes, and ask the students:

*Does this graph show the extinction spasm in which we lost the dinosaurs?*

The answer is yes - it occurred 65,000,000 years ago.

*Is there an extinction spasm going on today? If so, what do you think is causing it?*

Yes there is, just like the one in which the dinosaurs went extinct. There’s a difference though; instead of a natural disaster like a meteorite, *humans* are the cause of the current extinction spasm.

Scientists such as Dr. E. O. Wilson calculate that we lose approximately 50,000 species per year, or ~140 species a day, to extinction. This extinction rate is at least 1,000 times higher than the “background rate of extinction,” the rate at which plants and animals typically go extinct during periods when there is no extinction spasm taking place.
Song: All god’s critters got a place in the choir

After listening to this song, ask students if the author of this song is referring to an actual choir when he says “All god’s Critters got a place in the choir.” (In fact, no - there is no actual choir. This whole song is simply one big metaphor. This is how metaphors work: by pretending that there is a choir, we are able to compare all the animals mentioned in this song to something we know a lot about – an actual choir).

Listen to the song and have students list the animals under the headings of wetlands, forests, and grassland ecosystems. Make note of animals that might be found in more than one ecosystem. Have students choose their favourite animal that “sings in the choir” where you live. Ask them to write a short letter as if they were the animal itself; the letter is addressed “Dear Humans” and ask humans to do a number of things to help ensure the survival of the individual animal, and the survival of its species.
The Six Great Extinctions:
five natural, one human-caused...

(based on information in National Geographic magazine, February 1999)
Bio-What?! What the heck is a “Biodiversity”?! In a recent study, only two out of ten adults reported having heard about or knowing about “the loss of biological diversity.” Yet the 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.

Time Required: 30-40 minutes

Materials:
- Biodiversity transparencies

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. Tell your students: *Every time a species goes extinct, we lose some of our biodiversity.*

Ask your students:

*Why might it be important to save a species from extinction? Why do we need biodiversity?*
Answers might include: to learn about it, it may keep other species alive, it may be beautiful to look at, it may be the “right” thing to do.

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

3. Using the overheads on 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**

**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 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 the land, whether it be in Alberta or 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.
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 what changes have occurred within the ecosystems in which they lived.

Time Required: 40 minutes

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

Instructions for the Teacher:

1. Ask the students:

What is a carnivore? What is a predator?
A carnivore is an animal that eats meat. A predator is an animal that hunts other animals for its food. While most carnivores are predators, some, such as the wolverine, are scavengers, eating animals that are already dead.
Tell students that you will be reviewing together a number of maps that show changes in the distribution of various large carnivores. The presence or absence of carnivores or large mammals in an area can usually be used as an indicator of ecosystem health because carnivores greatly influence the entire food web.

Carnivores require large areas for their habitat and they don’t like being close to human activities. For these reasons, they disappear when their habitat is fragmented by human activities into smaller areas. If large predators can survive in an ecosystem, it usually means the system is healthy enough that most other animal species can also survive.

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, which prevent large carnivores from living in their traditional habitat. 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 hospitable to 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 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 75 years ago. Ask students:

**Why do you think the range of the bear has shrunk?**
The answer is generally the same as for the other animals. The West experienced massive immigration of pioneering families in this period. 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.

Point out that 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.

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, bears cannot access or re-populate the area because the islands of habitat are no longer connected to each other.

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 300 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.

For older students

6. Ask students:

**If you were the park superintendent in the year 2015, and your bear population was becoming inbred, what could you do to save this population?**
You could introduce fresh genetic material to the area by:
a. creating sufficient **wildlife corridors** and **core refugia** (protected habitat) to allow the bears to reconnect with populations to the north.
b. capturing grizzlies from Canada and releasing them into Yellowstone. This approach 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 might include railways, highways, urban expansion, resort development, and increased human use.

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?**
The basic concept is that a whole range of different actions that we take now has the effect of creating a range of **possible futures**. The **probable future** is the one that is most likely, given what we do today; the **preferred future** is the one that we would most like to have happen. To attain this preferred future, we might need to change our current behaviour.

**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 extinction of bears from North America. Some groups might predict a more hopeful scenario.

**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?”**
The most important factor is the way in which we manage our remaining natural areas. Such as:
- Preventing human activities that negatively impact bears 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 into smaller chunks by roads and other developments
- Unprotected land that has been degraded should be restored to more natural conditions (e.g. close old roads)
• Legally protect grizzly bears under endangered species legislation

As citizens, how can we ensure that these actions will actually occur?
Point out that although science can help describe and predict grizzly bear distributions, it is up to us as a society to set our goals and make plans that will help us achieve these goals. As citizens in society, there are many things students can do. (Consider taking CPAWS’ Action Challenge to do something positive for the environment. Visit www.cpawscalgary.org/education for information about this great opportunity for taking action with your class!)

For more information on the Yellowstone to Yukon Conservation Initiative, and how to teach it, see the CPAWS activity guides, “Why the Y2Y?” and “Inventing the Future” at www.cpawscalgary.org/education/topics. You can also find additional information about the Y2Y by visiting the Initiative’s website: www.y2y.net.

Song: Where a Border need not be

After listening and singing along to this song, as students what they think it is about. Tell them that it is precisely the way we think in borders and “in lines” that gets animals into trouble, and threatens their survival. For example, a wolf can easily cross from the U.S., where it is protected by the U.S. Endangered Species Act, into Alberta, where wolves can legally be shot from September to May without a special hunting license.

Perhaps a solution is to think of “one world wild and free.” Think in terms of ecosystems and watersheds, not borders and boundaries created by humans.
Wolverine Distribution Map

Present range

No longer present
Cougar Distribution Map

- Present range
- No longer present
- Possible sightings

Possible sightings
Historical Distribution of Grizzly Bears (1800s)
1922 Distribution of Grizzly Bears
Present Distribution of Grizzly Bears
What Used to be Here?

Much has changed since settlers from the “Old World” began pouring into North America just a few hundred years ago. This activity lets students compare their schoolyard with what used to be there, and takes them outdoors to the schoolyard or nearby natural area to investigate the area.

**Time required:** 40 minutes

**Materials:**
- The map entitled “Natural Regions and Subregions of Alberta” – you can download a colour version of the map from the Alberta Government at http://www.cd.gov.ab.ca/preserving/parks/anhic/natural_regions_map.asp
- Transparency of cartoon entitled “Today…and 10 years ago”

**Instructions for the Teacher:**

1. To begin with, have students examine the cartoon below entitled “Today... and 10 years ago.” Ask them:

   **What is the same on both sides (or frames) of this cartoon?**
   The hills and river are two features that are found on both sides.

   **What has changed? What point is the artist trying to convey?**
   Most of the original vegetation is gone. Trees have been cut down to make way for the
TODAY...

...100 YEARS AGO.
houses and grasses have been paved over to make roads. Animals which relied on the original plants (like elk) can’t live there any more. The more places in which this happens, the less places animals like bear and elk have to live.

This process is called **landuse cascade**, or **landuse conversion**. Wildlands are generally converted to other uses in the following steps:

a. **Wildlands** - contain native flora and fauna
b. Wildlands become **extensively** use lands - e.g. lightly grazed grasslands
c. Extensively use lands become **intensively** used lands - crop fields or urban areas
d. Intensively used lands become **degraded** lands - abused beyond value to anyone (The fourth step is not commonly seen in Alberta)

2. Have students use the map to determine which Natural Region they live in. Alberta is divided into 6 different geographic zones, called Natural Regions: Foothills, Parkland, Montane, Dry Mixedgrass Grassland, etc. Find out where your community is on the map entitled “Natural Regions of Alberta.” For example, Calgary sits at the junction between Foothills, Parkland, and Foothills natural regions. (Note: on some maps, the six natural regions may be further subdivided into subregions)

Point out to students that this map tells us the characteristic features such as vegetation and animals that “used to be here” before human development (buildings, agriculture, etc.) changed the area. If you have the publication “Parks and Protected Areas” turn to the relevant page to show students these plants and animals.

Ask the students:

**What plants and animals were found in the area of the school before this area was developed by humans?**

This area was occupied by the flora and fauna associated with your natural region.

**If humans for some reason decided to “let nature come back” to this area, what plants and animals might eventually be found here?**

The flora and fauna associated with your Natural Region might return. There would be some problems: this will occur only if these plants and animals can colonize the newly created ‘natural area’ from a nearby source, and that they “get there first” before the area is colonized by weeds such as dandelions and thistles. For this reason, restoration projects (such as school naturalization) to restore areas commonly require human assistance initially to disperse seeds and keep weeds under control. Also, the area might be too small for some of the native animals to inhabit.

3. Ask the students:

**What is ‘habitat’?**

Habitat is the word we use for the place where all living organisms meet their basic needs of food, water, shelter, and space. For some reason, we humans use a different word for the same thing: we call it ‘home’!
Tell the students that you are about to visit a place that was once a pristine natural area, habitat for a large number of plant and animal species. Take students outdoors to the schoolyard or to a nearby natural area, preferably where some natural vegetation may be found. Bring your maps with you!

Ask the students:
*Is the schoolyard different from what used to be here before the school was built? If so, how? What did this area look like two hundred years ago, before your town or city was here?*

Students should realize that there have been many changes to your school area! By finding out which Natural Region your town or city is in, you can deduce what type of vegetation was here two hundred years ago. Many towns in Alberta are located in what was once Shortgrass or Mixedgrass prairie, or rolling Aspen Parkland.

*Look around you for visual clues, or just use your imagination to answer this question: What animals and plants live here now?*

Students should be able to list of some common animals: grasshoppers, ground squirrels, and birds such as house sparrows and starlings (all bird species listed above were introduced to North America by humans).

*Were there different animals and plants living here two hundred years ago? If so, why aren’t they here now?*

If you live in a prairie town, chances are good that there are few native plants left in the schoolyard - they have probably been replaced by non-native grass seeds such as Kentucky Bluegrass that grow into a good lawn.

Many of the animals that once lived here are no longer present because they have lost the habitat they relied on for survival: for example, the Burrowing Owl needs native, undisturbed prairie in which to live, of which there is very little left in Alberta. This is one of the reasons the Burrowing Owl is identified by the federal government as an Endangered Species, and on Alberta’s list of Threatened Species. Neither of these lists provide any legal protection to endangered species. See the activity, *What’s Endangered.*

In addition, many animals are not tolerant to the presence of humans - and vice versa! Wolves and grizzly bears were found throughout Alberta 200 years ago, and were much more numerous on the prairies than in the mountains, because the habitat was better. Because of hunting pressure, loss of habitat, and aversion to humans and human development, their range has been reduced to the mountainous areas of Alberta where there are less humans and less development (this topic is covered in more detail in the activity *An Uncertain Future*).

*Is there anything you can do to help some of the original plants and animals move back here? What would be the advantages and disadvantages of this plan?*

Proposals to bulldoze the school should be discarded as impractical! Some schools have begun naturalization plans for part of their school property: the students replant an area with the seeds of native plants, and protect the area from being trampled, in an effort to let it go
“back to the wild.” With time, and if the area is big enough, this natural habitat may attract back some of the animals that originally lived here.

**Note to the Teacher:**
For more information on school yard naturalization, contact the Calgary Zoo. The next step in understanding Natural Regions is to visit a nearby park or protected area. Contact the CPAWS Education Team for more information and to arrange a field trip.

---

**Song: Cowpie Serenade**

Remind your students that the water we drink fell to the ground as rain and had a complicated journey to get to the tap.

Cowpie Serenade is not a song against cows or agriculture - it is about irresponsible behaviour. Like anything else, agriculture has its place and can usually be properly managed so that water pollution and the degradation of riparian areas do not occur. Problems occur when we forget to practice land stewardship. Ask students if they can think of any other activities that if done right are good for humans - but if done improperly or to excess, can cause problems to us and to our environment through overuse or the pollution of air or water, etc.
What’s Protected?

In this activity students examine the concept of protection, and investigate how we protect - or (perhaps more accurately in Alberta) fail to adequately protect - Alberta’s natural regions.

**Time required:** 30 minutes

**Materials:**
- “Natural Regions and Subregions of Alberta” Map (previous activity)
- “Wild Alberta” map – you can order or download a larger, colour version of this map from Alberta Wilderness Association at [http://www.albertawilderness.ca/issues/pl/wilderness.htm](http://www.albertawilderness.ca/issues/pl/wilderness.htm)
- Transparency of “Who Owns Land in Alberta”

**Instructions for the Teacher:**

1. Ask students:
   
   *What does the word ‘protected’ mean?*
   
   ‘Protected’ means to look after, or to safeguard. Ask students for examples of things that they protect: younger siblings, household pets, or their own possessions are examples of this.

   In the case of land, protection means ‘to protect it from dramatic change, such as development.’ We sometimes protect land by turning it into a park of some sort. The Alberta government allows human activities in many of its protected areas. Activities such as oil and gas extraction, or forestry are believed by the Canadian Parks and Wilderness Society (CPAWS) to decrease the actual protection of the area.

2. Have students examine the map created by the Alberta Wilderness Association (AWA) entitled “Wild Alberta”.

   *Use the legend to find out where Alberta’s existing protected areas are.*

   Except for the huge Wood Buffalo National Park (home to the endangered Whooping Crane) the majority of these areas are in the mountainous areas in the western part of the province.

   *Which Natural Regions are well protected by parks? Which are not well protected?*
Areas such as the Rocky Mountain Natural Region are to some degree represented in
protected areas. CPAWS feels that more protection is needed in the Rockies, and is currently
working on protection for Kananaskis Country, and the Castle Wilderness area near
Waterton. On the other hand, hardly any parks are found in the Grassland Natural Region.
This area was settled extensively by pioneers and over 95% of this land is used for
agriculture and farming.

Does Alberta have more area protected within national parks or provincial parks?
Alberta has far more land protected within national parks than in provincial areas. 8.5% of
Alberta is in National Parks, but only 2% of Alberta lies within provincial parks. This poor
record of preserving provincial land has frequently earned the Alberta government low or
failing grades from the World Wildlife Fund Canada’s Endangered Spaces report card (a D-
was given by WWF in 1998). The creation of new protected areas in Alberta is a high
priority for CPAWS. Contact us, or visit our website, for more information on current
initiatives.

3. Tell the students to examine the areas of this map that show proposed protected areas.
   Ask the students:
   How do you think the Alberta Wilderness Association (AWA) decided which areas are
   “wild spaces”?
The AWA chose areas that were still in their natural state, unprotected, contained important
habitat, enjoyed high biodiversity of plants and animals, or represented Natural Regions not
found in many other sites in the province.

   What obstacles do you think might exist to the creation of these proposed protected areas?
These lands are commonly public lands that are leased by the government to one or more
leaseholders, such as cattle grazers, forestry companies, and oil and gas companies. They
may also be used for a variety of local uses, especially 4-wheel driving and snowmobiling.
Sometimes outdoor enthusiasts speak against protection because they worry that they will be
prevented from accessing their favourite areas if they become protected. Legal protection
can limit the types of activities that can occur in special natural areas.

4. Ask students:
   Who owns the land in Alberta?

5. Show students and review the transparency “Who Owns Land in Alberta.”

6. Tell students:
   Let’s remember that Alberta contains a number of species that are on the endangered
species list. Given what you now know about who looks after the land in Alberta, which
government has the most responsibility of protecting endangered species from extinction:
provincial or federal government?
It turns out that this is a very good question! Over two-thirds of the land in Alberta is owned
by the people of Alberta (otherwise known as crown land), while 28% is privately owned,
and 8% is under federal jurisdiction. CPAWS believes that provincial and federal
governments AND private landowners share responsibility to help endangered species.
Students can also play an active role in endangered species conservation by making different lifestyle choices, or working to raise awareness about endangered species.

*Do you think Albertans should be allowed to lease crown land?*
This is an interesting area for discussion. Activities on leased land can be detrimental to the area’s environment, and lessees sometimes stand in the way of environmental protection, and create access problems for Albertans who wish to use the public land. On the other hand, lessees like ranchers are often good stewards of the land, and the Province’s economy would almost certainly suffer if lessees had to purchase the land they currently lease. Have students debate this topic.
Insert PDF map/file resized to fit
Who owns the land in Alberta?

**Private land:**
Your parents may own the land your home is built on. First Nations also own their land. 28% of the land in Alberta is private land.

**Federal Crown land:**
Federal crown land is the name we give to public land that is looked after by the federal government, and includes all national parks. The land in Banff National Park is public land, ‘owned’ by all Canadians. Every four years we elect a federal government (in Ottawa) which looks after this land for us. 8% of the land in Alberta is federal crown land.

**Crown Land:**
Provincial crown land is the name we give to public land that is looked after by the provincial government. Every four years the public elects a provincial government (in Edmonton) which looks after this land for us. Many ranchers, foresters, and oil and gas companies lease the land from the government, just like your parents might rent a house or a car. 64% of the land in Alberta is provincial crown land.
How do Species become Extinct?

Overhunting or poaching used to be the main human activity that caused a species to become endangered. In this section, students will learn that loss of homes, or “habitat loss,” is now the main factor that puts species in North America and worldwide in danger of extinction.

**Time Required:** 20 minutes

**Materials:**
- length of string long enough to cross the classroom
- several signs saying “No Longer Usable”
- transparency of *How plants and animals become extinct*

**Instructions for the Teacher:**

1. Before students enter the room, stretch a string across the entire length of the room with a sign on it saying “No Longer Usable” so that students are forced to crowd into half or a third of the space that they are accustomed to using.

2. Ask the students:
   - What has changed in the classroom?
   - Would you feel comfortable spending the rest of the year in this new setting? Could you do it if you had to?
   - Students should agree that they felt more comfortable under roomier conditions.

3. Ask students to imagine that they are a wild animal (some of your students may find this easier than others). Ask them:
   - If your desk and the space around it represented your home range (i.e. all the habitat you need to meet your needs) would this new arrangement be unsatisfactory? Why?
   - There are now more students using the same amount of habitat.
In real life, do you think that animals would accept the new, more crowded conditions?
No. Animals have to meet their basic needs within their home ranges - a smaller area does not always provide enough habitat for the animal to survive. Explain that most animals are not happy living so close together. For example, a wolf that wanders into another wolf pack’s territory may be killed or chased away. When habitat becomes unusable some animals are left without a home and may die.

4. Remove the string/divider and have students return to their seats.

5. On the board, draw a square. Tell the students that this square represents a park that can support a maximum of ten grizzly bears; any more, and every bear would feel crowded and would not be able to meet its needs (food, shelter, space). Ask the students:

If there are two bears this year, and the number of bears doubles every two years, how long will it be before there are too many?
Two years from now there will be four; there will be eight in the forth year; and there will be sixteen in the sixth year. Therefore, in the fifth year the bears would start to feel crowded.

What do you think would happen in the fifth year?
Bears would either migrate from the park or die before they could reproduce.

6. Draw a dashed line down the centre of the square, and write the words: “Houses for Humans” in one half of the square. Ask the students:

What would happen to the ten bears that used to live in the park?
Students may at first feel that the bears may live together - if so, remind them of how crowded they felt when they themselves were forced in to a crowded classroom space!

What will happen to the bears that have lost their homes?
Unfortunately for these bears, there is no “vacant bear habitat”: unable to meet their basic needs, they will die. This habitat loss due to human activity - whether it is the building of human homes as shown here, or other human activities - is the main cause of extinction of animals.

What do you think might have happen to the cordoned-off area that you saw when you first entered the classroom? Apart from the loss of habitat, what else might have happened? Write answers on the board.

What things cause plants and animals to go extinct? Which of these is the most significant? Least significant?
There are a number of ways in which humans cause the extinction of plants and animals. Record students’ answers on the board, then put up the overhead entitled “How Alberta Plants and Animals go Extinct.”

This overhead lists the main six mechanisms of biodiversity loss in Alberta, in order of importance. Remind students that most of these mechanisms have only developed in recent decades, as the numbers of humans - and our uses of natural resources – have shot up. Emphasize to students that habitat loss is the #1 problem. Say to your students: “After all, if someone took your habitat (i.e. your home) and you couldn’t find another, you’d have problems surviving too!” Use the following to elaborate on the overhead entitled “How Albertan Plants and Animals become Extinct.”

A. Habitat loss: Species lose the food, water, and shelter they need to survive through habitat destruction and habitat fragmentation

In habitat fragmentation, roads, trails, pipelines and transmission lines carve natural habitat up into fragments too small for larger animals to meet their needs for survival. For example, less than 3% of Alberta’s vast foothills region is not fragmented. This is associated with habitat alienation, where habitat is still present but some animals won’t use the habitat because it is too close to human activity. For example, most of the Bow Valley near the Town of Banff is good habitat, but wolves will not use it because there are too many people and cars in the area.

B. Introduced species: Exotic species never before found in the food web have no natural predators, and crowd out the native species

Some biologists think that the problem of “weedy species” (introduced species) will one day replace habitat loss as the #1 cause of extinction. In the U.S. 4500 species have established free-living populations and cause $87 billion in damages every year. Writers such as David Quammen feel that we may be headed towards a “Planet of Weeds” in which weedy species will be all that is left, and will grow everywhere on the planet. Common examples of introduced species include purple loosestrife, which overtakes wetland areas and chokes out native vegetation, or the house sparrow, which competes with native songbirds for space and food.

C. Overuse of plant and animal species - using up more individuals than can be sustained

This is what caused the extinction of the Passenger Pigeon. Advancements in science allow us to study species better than ever before. We can now better manage those species that we harvest. The bull trout, a species at risk in Alberta, is now catch and release after science showed it was being over-fished and was suffering habitat loss due to dams on rivers. There are still some species, though, that are not formally protected, such as the grizzly bear or wolf, which can be hunted.

D. Pollution of soil, water, and atmosphere – industrial and household chemicals poison the ecosystem

Pollution includes greenhouse gas emissions, acid rain, sewage, or garbage. Specific example of the impact of pollution include burrowing owls that have been poisoned by Alochlor, a grasshopper insecticide, and the case of deformed frogs found in urban areas - possibly because of a family of chemicals called hormone disrupters.
E. Global climate change - changes in climate affect living things
Global warming is believed to have caused seawater to warm by up to one degree Celsius in tropical oceans, an increase which has caused widespread death of coral reefs - and the death of those fish that need the reef to survive. In Alberta, global warming may change the conditions of temperature and precipitation which determine where plants and animals survive. Some biologists fear that changing climate may cause extinctions to occur even within large protected areas. Scientists are also anticipating loss of polar ice with an increase in temperature. This will have a negative impact on polar bears that rely on the ice for traveling to find their prey.

For older students: About limiting factors:

7. Introduce the concept of limiting factor: a condition that limits population growth, or that keeps an organism’s population from growing in an uncontrolled manner. Ask students:

What does every living thing need to survive?
Every living organism generally needs four things: food, water, shelter and space. (Living things usually need air, too, but this is generally easy to find).

What are some limiting factors for people? For animals?
This is a trick question: although we sometimes forget, humans are an animal species. Availability of food, water, shelter, or shelter is a limiting factor for all animals.

8. Give the students the following scenarios or “thought experiments”.

What would the limiting factor be if the entire class was...
...marooned with food on an ice floe in the arctic?
Lack of shelter (in other words, an ability to keep warm) would most probably be the limiting factor in this case.

...crammed into a tiny room and left for a day or two?
This limiting factor would be something we normally take for granted - the availability of air. Tell the students (if you feel it isn’t too gruesome a story!) about the Black Hole of Calcutta, where British soldiers were left too long in a tiny dungeon and almost all of them died from suffocation. We can also be limited by our inability to dispose of wastes - in this case, waste carbon dioxide.

...locked into a canned good store with only a can-opener?
The limiting factor might be the availability of water.

What are the limiting factors for humans on the earth?
Answers may vary. In a desert area, availability of water may be a limiting factor. In an area where humans can’t grow plants because the soil is too saline or infertile (or where the human population is simply too large for the land to support), food may be a limiting factor. The ability of an ecosystem to support a population of a certain animal indefinitely is called its carrying capacity.
What do you believe is the Earth’s carrying capacity: five billion people? Ten million people? More than this??
This question serves as a brief introduction to the intriguing and controversial area of population studies. Some people believe that the present population of humans (6.45 billion in 2005) already exceeds the earth’s carrying capacity: that the earth can’t sustain this many people. On the other hand, a study by the Food Aid Organization in 1982 stated that the earth could support up to 30 billion people. Still others would argue that while there are certain areas that are prone to famine, the earth can still support more people.

Currently, the world’s population increases by 100 million more each year. It is estimated that the population of the earth may stabilize between 8 and 14 billion in the next century. Explore with your students the implications of twice as many people trying to meet their needs for survival on an earth that will never be any bigger than it is now. Ask them:

What are the consequences for our own behaviour (e.g. the amount of resources we each use)?
What will this mean for other species and the habitats necessary to meet their needs?

One thing is for sure - it will be more difficult to ensure the survival of endangered plants and animals. Engage students in a discussion about their ecological footprints. The Ecological Footprint measures human demand on nature. The eco-footprint is a tool that can help us see our effect on our planet. It estimates how much individuals, organizations, and communities consume and compares this amount to the resources that nature can provide. Canadians have the third largest footprint in the world. If every person on the world lived like the average Canadian, we would need FOUR EARTHS to provide the material and energy we demand! Have your students think about ways to reduce their ecological footprint.

“Anyone interested in the future of biological diversity needs to think about the pressure people [in the future] will face, and the pressures they will exert in return.”
- David Quammen, Planet of Weeds, Harpers magazine, 1998

For an up-to-date estimate of the world’s population, visit one of the population clocks on the internet. Students can actually watch the population grow each second at: www.census.gov/main/www/popcld.html.

For information on calculating ecological footprints, visit: www.myfootprint.org.
Song: Extinction Train

Listen to the words of this song. It contains many statements that need to be discussed by your group – write down and discuss those phrases that students may not fully understand and would like to talk about.

Ask students if they think the picture painted by the song and graphic below is an accurate one.

Sometimes our influences are hard to see. Almost 90% of Alberta’s electric power comes from burning coal. This results in pollution and open pit mines where natural habitats once existed. Have your students think of three actions they could take to address these issues.
How Alberta Plants and Animals become Extinct

1. Habitat loss
Species lose the food, water, and shelter they need to survive through habitat destruction and habitat fragmentation.
Example: the Burrowing Owl’s home being ploughed under for agriculture.

2. Introduced species
Exotic species never before found in the food web have no natural predators, and crowd out the native species
Example: Purple Loosestrife.

3. Overuse of plant and animal species
Using up more individuals than can be sustained
Example: overfishing of Bull Trout.

4. Pollution of soil, water, and atmosphere
Industrial and household chemicals poison the ecosystem
Example: Peregrine Falcons dying from pesticide use.

5. Global climate change
Changes in climate affect living things.
Example: Shrinking polar icecaps threaten polar bear habitat.
What’s Endangered?

In Canada we care about endangered species - sort of. We keep lists of them. Our provincial and national governments keep lists of endangered plants and animals, and update these lists as they do the studies necessary to monitor how the species are doing. This activity introduces students to both these lists.

**Time Required:** 20 minutes

**Materials:**
- Overhead projector and screen
- Transparencies of “COSEWIC & SARA” and “Endangered Species Bar Graph”

**Instructions for the Teacher:**

1. Using the transparency of Endangered Species terms, review with students the different endangered species designations. Most students will be familiar with the terms extinct and endangered, but the others may need a little more discussion.

   - **Extinct:** a species formerly indigenous to Canada that no longer exists anywhere in the world (e.g., the Passenger Pigeon or dinosaur)
   - **Extirpated:** a species which can no longer can be found in a certain location, but still can be found elsewhere (e.g., the Timber Wolf was once found throughout the Prairies, but is now extirpated from there)
   - **Endangered:** a species threatened with imminent extinction or extirpation throughout all or a significant portion of its range (e.g., the Burrowing Owl)
   - **Threatened:** a species likely to become endangered in Canada if the factors affecting its vulnerability are not reversed (e.g., the Western Blue Flag Iris)
   - **Special Concern:** a species is of special concern because it is particularly sensitive to human activities or natural events (e.g. the Long-Billed Curlew)

2. To use a simple analogy, ask students:

   - **Which is more risky:** walking across a busy street without paying attention to traffic; or playing tag in the playground?
   - Tell students about levels of risk: although both activities have some level of risk, the former (ignoring traffic) is much more risky than the game of tag. You might wish to give students other activities and ask them to categorize them between ‘very risky’, ‘quite risky’, ‘somewhat risky’, and ‘slightly risky.’

   - **Which category is more “at risk”: threatened or endangered?**
   - An endangered species is more at risk than a threatened one. This list is in ascending order of “riskiness”.

   - Explain to students that these terms are used to describe species listed under the federal Species at Risk Act, or SARA. The SARA became law in June 2003. Prior to this, there
were no laws to protect endangered species in Canada. SARA applies mainly to federal lands, which represent only 8% of Alberta. Comparatively, the United States has had federal legislation in place since 1973, and applies to species on both state and federal lands. Species listed under SARA are nominated and studied by the Committee on the Status of Endangered Wildlife in Canada, or COSEWIC. Tell students that this committee is a group of scientists and others who study living things. They include representatives from federal, provincial, and private agencies which assign national status to species at risk in Canada.

3. Tell students that there are currently 13 different species found under the extinct category. Ask students to guess how many different plants and animals are on the entire endangered species list (i.e. all categories added together). In July 2005, there were 500 species listed on Canada’s Species at Risk List. If you would like to print off the entire list, please visit http://www.speciesatrisk.gc.ca - printing the entire list is a very effective way of communicating to students how many species are listed.

4. Show students the bar graph depicting the change in listed species over the last few years. Ask students:

Do you think that the species counted here represent a complete list of ALL species on earth?
No. Although scientists have identified over 1.4 million species of organisms on the Earth, scientists estimate that there between 10 and 80 million in total. New species are always being discovered in places like the forest canopies of Canadian old growth rainforest, or soil organisms like new bacteria or fungi living in the soil underfoot. There are doubtless many species of plants, amphibians, fungi, and insects that are endangered - but we haven’t even identified them yet.

According to the graph, are the numbers of endangered species listed increasing or decreasing over time? Why do you think this is?
Clearly, the numbers are rising. There could be many reasons for the increase: humans continue to have a greater impact on ecosystems, global climate change, or pollution. It’s also important to highlight that science is becoming more advanced and allows scientists to identify and study more species than ever before.

According to the COSEWIC list, the Banff Springs Snail is listed as Endangered. The prairie population of the Grizzly Bear is listed as Extirpated. Which animal is more important to save?
This is a difficult question! We commonly spend a lot of time focusing on the “charismatic megafauna”, the big mammals. But who is to say that a snail is less important? The Rosy Periwinkle of Madagascar looked like just a normal green plant, and it almost went extinct - until they discovered it contained the cure for Childhood Leukaemia. Far better to not have to worry about extinction:

“The first law of intelligent tinkering is to keep all the pieces.”
- Aldo Leopold
Once an animal is on the endangered species list, is it on there forever?
No. Some animals that were once endangered are now deemed to be safe from extinction, and are no longer listed as endangered.

- the American White Pelican, which was once listed as a threatened species by COSEWIC in 1978, was entirely removed from the COSEWIC/federal list in 1987. Conservation efforts, protecting nesting grounds, and increased public awareness all helped to increase the pelican population.
- In the southern United States the Snowy Egret, once hunted to the edge of extinction for its showy plumes, recovered from this threat due to conservation efforts.
- Due to hunting and habitat loss, the swift fox became extirpated from Alberta by the late 1970s. Following the protection and reintroduction of this species, the swift fox has returned to Alberta and has been de-listed from extirpated to endangered.

Endangered Species in Canada

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>307</td>
</tr>
<tr>
<td>2002</td>
<td>402</td>
</tr>
<tr>
<td>2005</td>
<td>487</td>
</tr>
<tr>
<td>2010</td>
<td>???</td>
</tr>
</tbody>
</table>
Endangered Species terms:

*Extinct*: a species formerly indigenous to Canada that no longer exists anywhere in the world (e.g., the Passenger Pigeon)

*Extirpated*: a species which can no longer can be found in a certain location, but still can be found elsewhere (e.g., the Timber Wolf was once found throughout the Prairies, but is now extirpated from there)

*Endangered*: a species threatened with imminent extinction or extirpation throughout all or a significant portion of its range (e.g., the Burrowing Owl)

*Threatened*: a species likely to become endangered in Canada if the factors affecting its vulnerability are not reversed (e.g., the Western Blue Flag Iris)

*Special Concern*: a species risk because of low or declining numbers, small range, etc. - but not a threatened species (e.g., the Grizzly Bear is classified as a species of special concern)
So Now What???

It’s important to teach about endangered species; and it’s also important to make sure the students “got it”! The following activities allow students to work on endangered species concepts, demonstrating their level of understanding on the subject – and have fun, too!

Take it Outside
Most environmental educators agree on one thing: it is impossible to cultivate strong feelings of connection to the environment without going outdoors. Use some of the free teaching resources available on our website to design lesson plans that you can use in your very own school yard or local natural area. Be sure to look for our handy Five Minute Field Trips guide on-line. You can also book a CPAWS Educator to lead your class on an incredible interpretive hike in the mountains near Calgary. Call one of our educators at 403-232-6686. Visit our website at: www.cpawscalgary.org/education.

Picture Perfect
Have your students create a poster (or collage, or 3D shoe box montage) showing their chosen endangered species in its natural habitat. Remind them to show sources of food, water, shelter, a natural enemy or threat, and a human threat. Ask them to include all of those things that their endangered species needs in order to survive. Display the posters or collages in a public place to teach others and raise awareness about endangered species outside the classroom!

Development Choices
Using poster, photographs, or drawings of a natural area, challenge students to describe how a road (or another development) would affect this area: how would it affect food, water, shelter, and space requirements of the animals that live in this area. You may wish to use cardboard cutouts to show the proposed developments. (Note: if you can’t find a suitable landscape photo, Kananaskis Country prints a new landscape poster every year. Contact them at 403-678-5508). Ask the students: If you are the developer, could you reduce the impact of this development? What kind of planning would you use? Would there be anything that make you decide against the development?

Endangered Poetry
Have students draw a poem using the name of their plant or animal - e.g. using grizzly bear:

Grumbling
Roaring
Indifferent to most dangers
Zzzz.
Zzzzz...
Lying in its den to hibernate all winter long
Yawning when it wakes up

Brawny and tough, it wanders the hills
Eating plants, carrion, and the occasional ground squirrel if it is lucky
After walking fifty kilometres over rough ground it rests
Raising an ear to listen in its sleep as a plane flies far overhead...
**Endangered Story Time**
Ask students to write a story from the point of view of an endangered species: “Describe your life as you meet your needs. List threats to your life from human and non-human sources, and include your feelings and emotions.”

**Design Flaw**
Ask students to design a brand new endangered species, either with a drawing or by making a clay model. Accompany this visual image with written details on how it protects itself from enemies, any special adaptations that it needs, how it reproduces, how it meets its basic needs - and, most importantly, why the animal they drew is an endangered species, and what could be done to protect the endangered species from becoming extinct.

**Endangered Species Times**
Have the class design a newspaper front page called the Endangered Species Times. Have the students write articles (and include illustrations), giving the news about endangered species in your area. Have groups present these newspapers to other classes or other groups, and post them around the classroom or school.

**Zoo Trip**
Take your students on a trip to your local zoo, such as the Calgary Zoo. Use this trip as an opportunity to extend the concepts you have learned to other Canadian and international animals.

**I’ll give you seven good reasons...**
In *Endangered Species - So What's the Big Deal?* students learned at least seven reasons to preserve biodiversity. Have students select one of these reasons and make a collage or poster that illustrates this point. For research, have students find concrete examples of each – for example, one student might find out and document some medicinal plants that “help us heal ourselves”.

**Choose a Friend**
Tell students that they will be asked to “choose a friend”, choosing a plant or animal on the endangered species list that they care about and would like to know more about – and perhaps help! A summary sheet is provided to assist with this task; you might choose to ask students to fill in this summary sheet, accompanied by a hand-drawn picture of their selected plant or animal.

If students want to look through some visual material to help choose a plant or animal, refer them to the list of resources provided here - either “hard copy” resources or on the Web!
My Endangered Friend

The name of my friend: ____________________________________________

Here are some adjectives that describe my friend:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

My friend lives in this habitat:

__________________________________________________________________
__________________________________________________________________

These are my friend’s favourite foods:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

My friend and all of his/her species is wonderful, but they have a big problem -
they are listed on the COSEWIC list of Endangered Species. They are classified as
__________________________.

My friend is endangered because

__________________________________________________________________
__________________________________________________________________

... but the situation isn’t hopeless! Here’s how you can help: ________________
__________________________________________________________________
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 all about endangered species and spaces, you and your students may want to do something to help. Positive actions, from writing letters to picking litter, will help the environment.

CPAWS Calgary-Banff 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 Awesome Action 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 Awesome Action webpage. We have included our Action Reporting Form – please fill it out and fax/send it to us so we can add your actions to our Awesome Action webpage.

Not sure of where to start? Consider these ideas:
- Start a classroom composter
- Raise plants in your classroom
- School-yard cleanup or school-wide recycling programs
- Write letters to protect wildlife habitat
- 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. We’ve also included the following Living Lightly Checklist to “test” your class on their environmental impact. You might try to improve your “score” over the year. Whatever you decide to do, please know that action projects can be as simple or complex as you choose to make them. But, they 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
# Living Lightly Checklist

*Mark the answer that is closest to the right answer for you:*

- **N** ... stands for *never* or *no*
- **R** ... stands for *rarely*
- **S** ... stands for *sometimes*
- **U** ... stands for *usually* or *yes*

## Food Consumption
- I bring all of my lunch to school in reusable containers
- I get refunds from bottles and cans
- I compost apple cores and vegetable waste
- I "vote with my wallet" and don't buy overpackaged food

## Household Energy
- I turn off lights, TV, etc. when no-one is in the room
- I decide what I want from the fridge before I open the door
- I regularly walk or bicycle instead of asking for a ride

## Water
- I limit my shower to 5 minutes and keep the volume of water low
- I turn off the water when brushing my teeth

## Waste Reduction
- I recycle everything that is accepted for recycling in my community
- I use both sides of a sheet of paper
- I repair or re-use things instead of throwing them away
- I reuse plastic and paper bags

## Natural Contact
- I spend time in a natural area at least once a week
- I know what colour the sky is today
- When I hear a bird singing I try to see it and identify it

## Taking Action
- I pick up litter when I see it in a park or a natural area
- I write letters to decision-makers about the environment
- I am a member of an environmental club

---

For a perfect score (which is impossible for anyone to attain) all your answers should fall in the right hand column. Where your answer falls into another column, look at those questions and consider if you could make a commitment in this area to help minimize your impact. *Remember, every little bit helps!*
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, # of students: _______________________________
Name on Certificate:_______________________________________
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:
Email: education@cpaws.org
Fax: 403-232-6988
Contact Organizations

**Alberta Institute for Wildlife Conservation**
Variety of in-class presentations provided for all grades. They also run an adoption program for injured wildlife.

- [www.aiwc.ca](http://www.aiwc.ca)
- 403-946-2361
- education@aiwc.ca

**Alberta Parks - Fish Creek Provincial Park Environmental Learning Centre**
Focus on students' exploration and connection to the variety of natural ecosystems in the park. Programs are available for K-Grade 12.

- [www.albertaparks.ca/fish-creek/education/school-programs/](http://www.albertaparks.ca/fish-creek/education/school-programs/)

**Alberta Parks - Kananaskis Country Environmental Education**
Provides teacher in-services and/or staff led field studies in Kananaskis Country. Programs are available for Grades 4-12.

- [www.albertaparks.ca/kananaskis-country/education/environmental-education-programs-resources/](http://www.albertaparks.ca/kananaskis-country/education/environmental-education-programs-resources/)

**Alberta Tomorrow**
Educational tool to understand the process of sustainable planning to balance land-uses such as agriculture, oil and gas and forestry with ecological integrity. Free lesson plans provided.

- [https://albertatomorrow.ca](https://albertatomorrow.ca)

**Bow Habitat Station at Sam Livingstone Fish Hatchery**
Provides a variety of programs for Kindergarten to Grade 6 plus the Fish In Schools program.

- [www.bowhabitat.gov.ab.ca](http://www.bowhabitat.gov.ab.ca)
- 403-297-6561

**Canadian Wildlife Federation**
Programs for youth and teachers and resources that connect people with wildlife and nature through experiential learning.

- [www.cwf-fcf.org](http://www.cwf-fcf.org)
- 1.800.563.9453

**Calgary Zoo**
Zoo presentations and tours, Zoo School and teacher professional development workshops.

- [www.calgaryzoo.com](http://www.calgaryzoo.com)
- 403-232-9300

**City of Calgary**
The City of Calgary’s Nature Explorations programs provide environmental education and nature experiences for students in preschool to Grade 12.

- [www.calgary.ca/CSPS/Parks/Pages/Programs/School-programs/School-programs.aspx](http://www.calgary.ca/CSPS/Parks/Pages/Programs/School-programs/School-programs.aspx)

**Cross Conservation Area**
Natural area close to Calgary that offers on-site nature-based programming for grades 1-9 on curriculum related topics.

- [www.crossconservation.org](http://www.crossconservation.org)
- 403-931-2042
- info@crossconservation.org

**Evergreen Foundation**
Evergreen’s Learning Grounds program brings school communities together to transform typically barren school grounds into healthy, natural and creative outdoor classrooms.

- [www.evergreen.ca](http://www.evergreen.ca)
- info@evergreen.ca

**Evergreen Theatre**
Evergreen Theatre Society is a touring, educational theatre company dedicated to science theatre of the natural world. Has a variety of programs available, including a residency program.

- [www.evergreentheatre.com](http://www.evergreentheatre.com)
- 403-228-1384
- info@evergreentheatre.com

**Friends of Fish Creek Provincial Park**
A variety of programs your class can become involved with including monitoring (wildlife and weed monitoring), naturalization and stewardship projects including park cleanups.

- [www.friendsoffishcreek.org](http://www.friendsoffishcreek.org)
- 403-238-3841
- info@friendsoffishcreek.org

**Green Calgary**
Non-profit dedicated to assisting Calgarians in leading environmentally sustainable lifestyles. Recycling and composting information and school programs are available.

- 403-230-1443
Inside Education
Environmental education materials and services and public education and outreach programs provided. Inside Education also provides teacher training on a variety of subjects.
www.insideeducation.ca
403-263-7720

RiverWatch
Students learn about their local river ecosystem on a fun-filled rafting trip with their friends. This trip takes them out of the classroom and puts them right in the middle of the action.
www.riverwatch.ab.ca
780.919.7907
business@riverwatch.ab.ca

SEEDS
How does your school become a Green School? For more information on this, and SEEDS’ climate change resources, view their website.
http://seedsconnections.org/
403-264-5959
info@seedsconnections.org

Spark Science
TELUS Spark brings students hands-on experiences designed to encourage open-ended exploration, inquiry and participatory investigation.
www.sparkscience.ca
403.817.6800
info@sparkscience.ca

Trout Unlimited
Trout Unlimited’s Yellow Fish Road program educates Canadians that storm drains are the doorways to our rivers, lakes and streams. Participants learn that together we can prevent pollutants from entering our storm drains and protect Canada’s water.
http://tucanada.org/
403-221-8360

Yellowstone to Yukon Conservation Initiative (Y2Y)
Learn more about wildlife corridors, why they are important and what people are doing to conserve them. Learn what your class can do!
www.y2y.net
403-609-2666
info@y2y.net

Action-Related Websites

David Suzuki Superhero Challenge
Fun activities that help teach kids about our right to a healthy environment and connect them to the great outdoors.
Website: http://getbackoutside.ca

EcoKids Club Home Pages
Easy activities and fun games to help make the planet a little greener.
Website: https://ecokids.ca/take-action

Nature Conservancy of Canada
Features conservation work done across Canada.
http://www.natureconservancy.ca

World Wildlife Fund - Canada
Great information on action projects your class can take to help wildlife in Canada.
Website: www.wwf.ca

See more at www.actionchallenge.ca

Adopt a...
If your class is interested in raising money to support conservation efforts of a specific endangered species, check out these sites:

Alberta Birds of Prey Centre
Sponsor burrowing owls and more:
http://www.burrowingowl.com/

Alberta Institute for Wildlife Conservation
Adopt injured wildlife: www.aiwc.org

Canadian Peregrine Foundation
www.peregrine-foundation.ca/programs/adoptem/adoption.html

Cochrane Ecological Institute
Swift fox reintroduction program:
www.ceinst.org/endangered-species.html

Vancouver Island Marmot Recovery Project
Adopt a Marmot program: www.marmots.org

WWF Species Adoptions