

# An Uncertain Future

Carnivores are indicators of ecosystem health. Using a number of maps, students compare the historical and present distribution in North America of a number of large carnivores, and try to deduce from this information what changes have occurred to the ecosystems in which they lived - and what the consequences might be for all the other organisms that share that ecosystem.

## Materials

For this activity you'll need

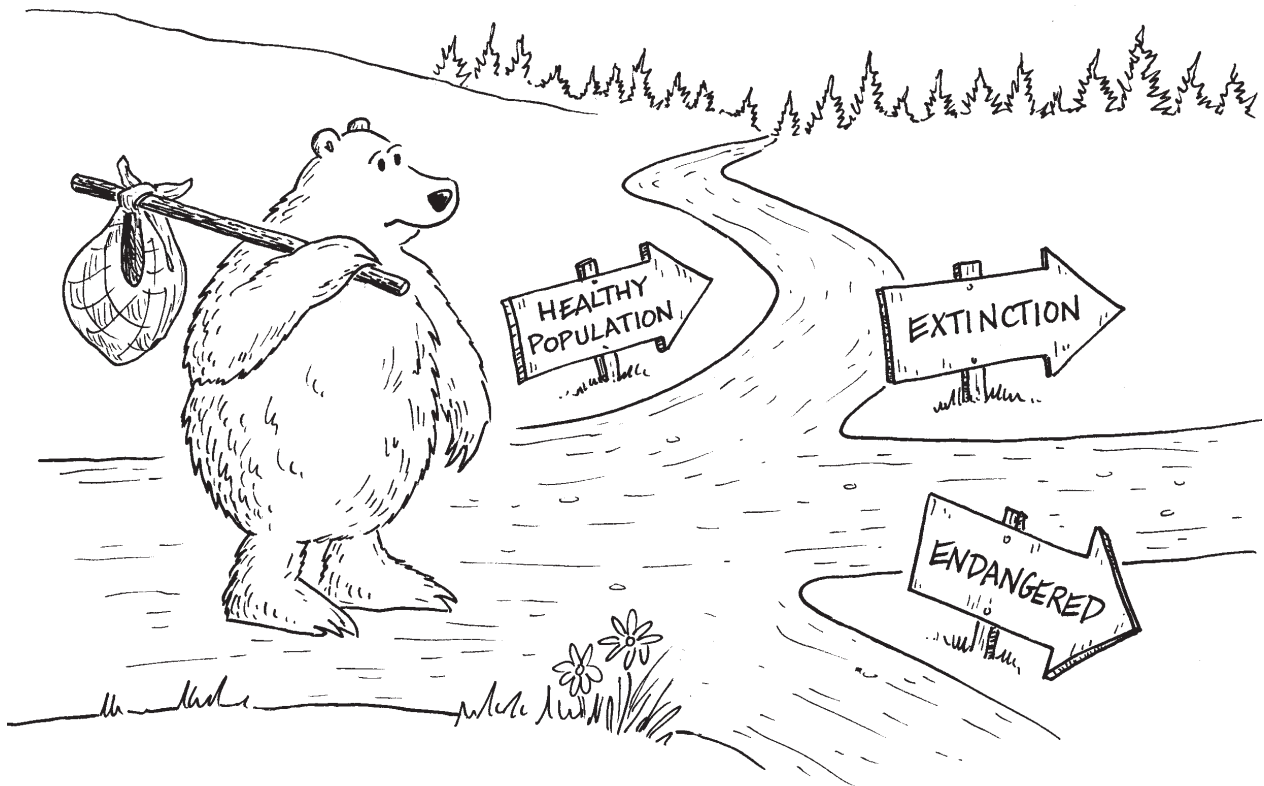
- transparency copies of all illustrations, including distribution maps for wolverine, cougar, wolf, and grizzly bear
- paper copy of the "Grizzly Bears - Present Distribution" map for each group of students.

## Instructions for the Teacher

1. Ask the students:

- **What is a carnivore? What is a predator?**

A carnivore is an animal that eats mainly meat. A predator is an animal that hunts other animals for its food. While most carnivores are predators, some (such as the wolverine) rely mostly on scavenged meat (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 in an area can usually be used as an indicator of ecosystem health, because carnivores greatly influence the entire food web.

They also require large areas for their habitat, and don't like being close to human activities. For these reasons, carnivores disappear when that 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.

Because they require large areas of relatively undisturbed land, carnivores are also an indicator of a precious and increasingly rare commodity that humans value greatly: wilderness.

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

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

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

- *Looking at 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 because they are more difficult to access. Some large untouched forests may also be home to these animals. Prairies have been dramatically altered by humans because their native grasslands have been ploughed up and are no longer habitat for these animals.

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

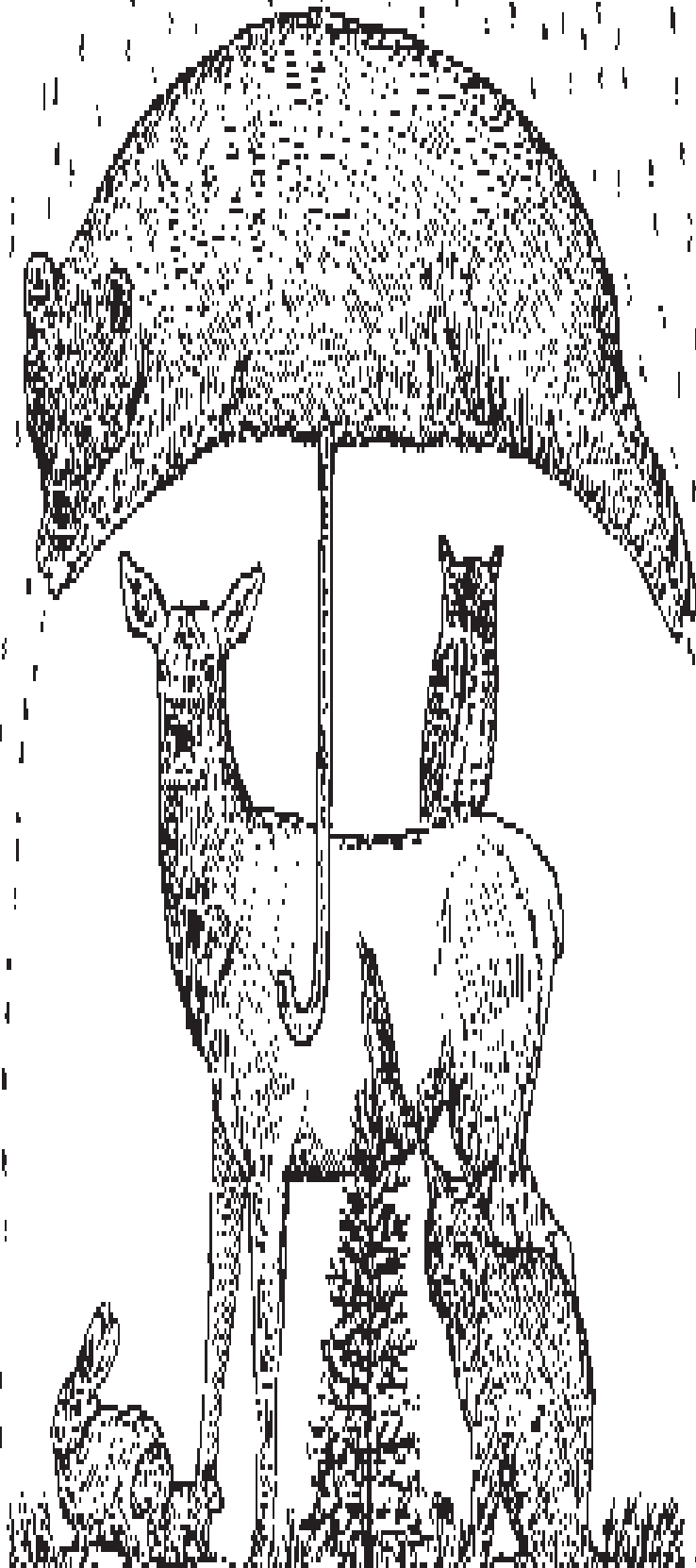
- *Was the Grizzly once found in Mexico, throughout the mid-west states, or Saskatchewan?*

The answer to all three questions is yes! In fact, the Grizzly is believed to have evolved on the Great Plains, developing its long claws and hump of muscle on its back to help dig up prairie plants and Prairie Dogs.

Next, show the 1922 distribution of the bear. Tell students that this map shows where the Grizzly bear 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 bears to disappear from settled areas.



Point out that, in 1922, the scattered remaining 'bear areas' in the U.S. were each surrounded by human development; they might as well be *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 on the 1922 distribution map). Would you predict that Grizzly bears still live there today? Why or why not?***  
The answer is no. The "islandization" of bear populations means they are isolated from other populations. They can't connect with each other for breeding purposes. As a result, inbreeding and weakening of the population occurs, usually resulting in the local extinction ("extirpation") of the bears from the area. Once a population dies out, whether from disease or overhunting, no new bears can get there to re-populate the area because the islands of habitat are no longer connected to each other.
- 4. Show students the present-day distribution of the Grizzly bear. Ask them:
  - ***What is the name of the remaining U.S. "island?"***  
This is Yellowstone National Park. It contains a population of 300 bears, which are isolated from 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 and still be sustainable. The U.S. government spends millions of dollars annually to keep the Yellowstone population alive.

### **For older students**

- 5. Ask students:
  - ***If you were the park superintendent in the year 2010 and your bear population was becoming inbred, what could you do to save this population?***  
You could introduce fresh genetic material to the area in two ways:
    1. Every few years, you could trap bears in Canada and release them in Yellowstone. This approach assumes a healthy Canadian bear population, political will on both sides of the border, and must be done forever.
    2. Create sufficient wildlife corridors and core refugia (refugia are protected areas that provide habitat and areas to rest) to allow the bears to reconnect with populations to the north.
- 6. On the "present-day distribution" map, point to 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 completely pinch off, forming a second island of habitat?***  
Increased development in the Bow Valley would do this, particularly if it cut off the wildlife corridors that connect this peninsula with habitat to the north of the valley. This development might include railways, highways, urban expansion, and increased human use.

- On the board, write the following terms: *probable future*; *possible future*; and *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 do now has the effect of creating a whole range of possible futures. The probable future is the one that is most likely, given what we do now; the preferred future is the one that we would most like to have happen - although 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?***  
The following activities can be done with the whole group (using an erasable marker on the overhead) or by the students in small groups. Use the "present distribution" map to show what the probable future of the bear might be. Some groups might predict the complete extinction of bears from North America (this is 'extirpation', when a species goes extinct in one area but still exists elsewhere. Some groups might predict a more hopeful scenario.

Ask the students:

- ***What is your preferred future for the distribution of the Grizzly bear (keeping in mind that the Grizzly is an important indicator of wilderness and ecosystem health).***  
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.
  - In protected areas, human developments that negatively affect bears need to stop.
  - Care should be taken to preserve (or reopen) the travel corridors that bears use to move from one habitat area to another.
  - Important unprotected lands should be given protected status.
  - Unprotected lands still used by bears should not be fragmented by roads and other developments into smaller chunks of habitat.
  - Unprotected land that has been degraded should be restored to a more natural condition (old roads should be closed, etc.)

Ask the students:

- ***How can we as citizens ensure that these actions stated above will actually occur?***  
Point out to students 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 conservation biologist Dr. Reed Noss says: **"In conservation, science tells us *what to do*; but our values tell us *why we should do it*."**

As citizens in this society, there's lots you can do! The action-oriented sections at the end of this booklet will assist you and your students take meaningful action on this topic.

# Wolf Distribution



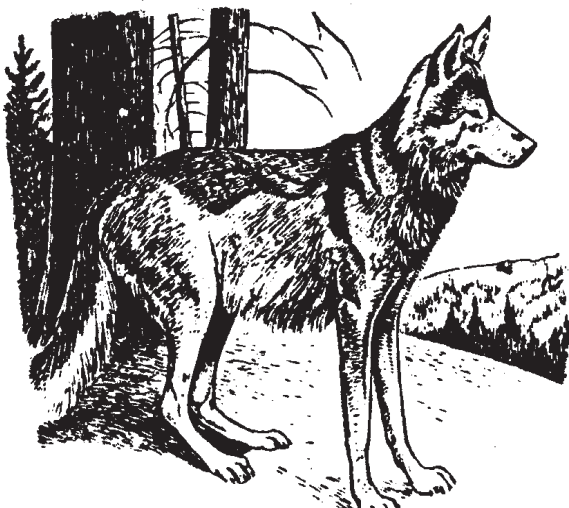
Present range



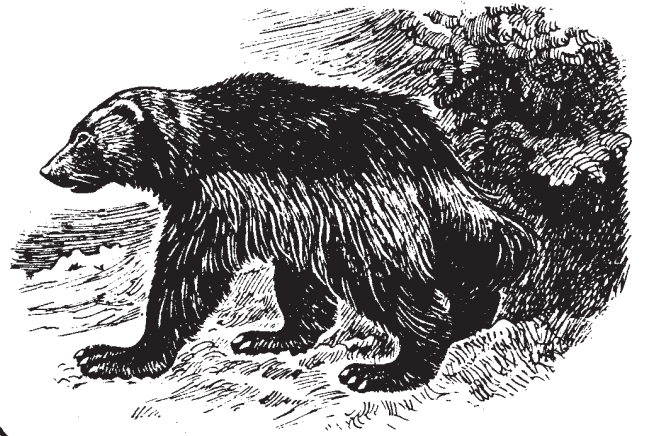
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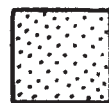
wolf restoration project



# Wolverine Distribution



Present range

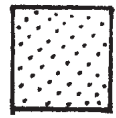


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# Cougar Distribution

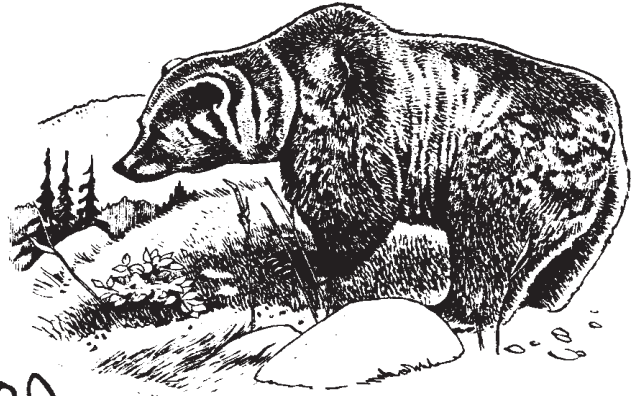


Present range



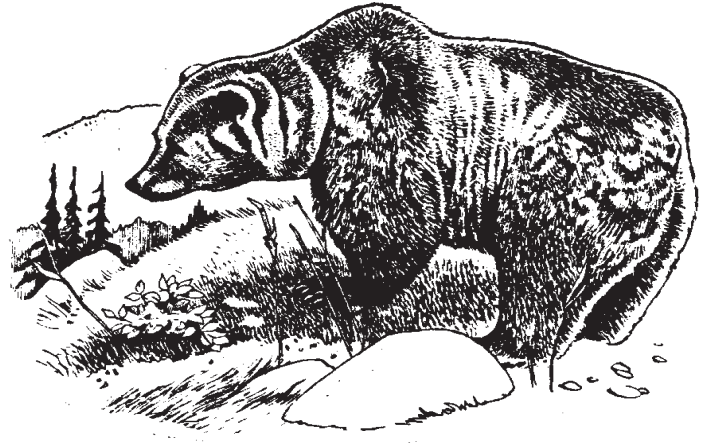
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# Historical Distribution of Grizzly bears



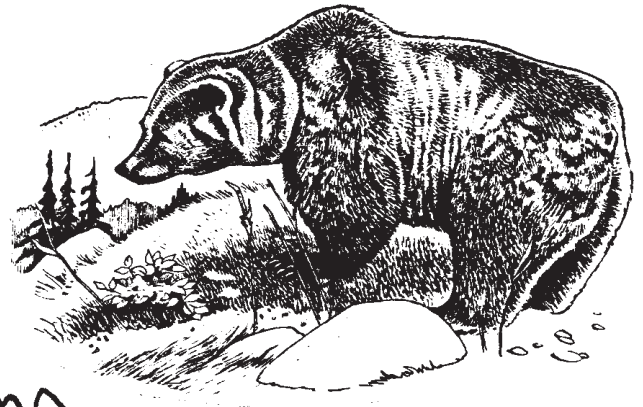
Historical distribution

# Distribution of Grizzly bears - 1922



Distribution in 1922

# Present Distribution of Grizzly bears



Present distribution