NYSDEC Environmental Education

Wildlife Conservation III

For Students in Grades 6 through 12

A 45- minute discussion introducing the most common reasons that wildlife diversity is being reduced worldwide. Students will be encouraged to consider ways that they can actively protect and preserve wildlife at home, in their community, and worldwide.

Goal

Students are already familiar with the idea that there are wildlife species that are in trouble, but often these are species that live in other countries. We will involve the students in a discussion about why these animals are becoming scarce and the human needs that often fuel extinction. Students will get a sense of proportion in the struggle to prevent species extinction.

NYS Intermediate Level Science & The Living Environment Core Curriculum

Standard 1: *Scientific Inquiry*
Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Standard 4:
Key Idea 3: The continuity of life is sustained through reproduction and development.
Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

Background

As of December 1999, US Fish and Wildlife Service listed 939 plants and animals as endangered, and another 266 listed as threatened. Some of the reasons these animals are disappearing are because of the human actions.

Materials

Materials you may use can include examples of animals and products used for medicine, decoration, clothing or trophies. Use some or all of the following.

- live box turtle, or shell of box turtle
- whale bone or baleen
- reptile skins
- belts, shoes and handbags made from reptile skins
- traditional medicines

Procedures

Begin with a discussion about the reasons that animal species become scarce throughout the world. Focus on the human causes of the decline of biodiversity. During the discussion physical examples representing each topic will be presented to encourage intercourse and debate. For example, a box turtle may be used as a local representation of habitat loss.

Focus the discussion on the mnemonic HIPPO. This word represents five major causes of declining biodiversity in wildlife species. The topics are as follows:

H *Habitat Loss*

I *Invasive Species*

P *Pollution and Pesticides*

P *Population Growth (human) and the Pet Trade*

O *Over-hunting and Over-collecting*

Concept Descriptions

Habitat Loss: Because of encroachment of human activities and land development, many species are in decline due to their environment being unable to fulfill a population's basic requirements. All species require space, food, water, shelter, and the ability to find a mate and reproduce. Some species require a small habitat to find all of these things; other species require vast areas of territory to successfully survive.

Invasive Species: Around the world, animals and plants are transported from one country or region to another. If introduced into the wild, most of the time these organisms would languish and die. Sometimes, however, these species establish viable breeding populations in new areas. They may be assimilated into the food web and play a healthy role as a newcomer but often these organisms out-compete native species for their niche in the food web. When this happens, biodiversity decreases, and occasionally the balance of nature is upset so much, it is unrecognizable.

Pollution and Pesticides: In many industrialized areas, pollution is taken for granted or regarded as a necessary cost of progress. Pollution takes many forms; air or water pollution, soil contamination, light or noise pollution, or garbage and trash. Aside from harming the environment aesthetically, these contaminants can have deadly consequences on ecosystems and wildlife.

Pesticides are chemicals used to reduce or eliminate organisms that have a negative impact on human health, agriculture, or property. Some are toxic beyond their target application or quite harmful to the environment if misused. The loss of many species of birds-of-prey due to the widespread use of the insecticide DDT (**d**ichloro-**d**iphenyl-**t**richloroethane) in the mid 20th Century is a prime example of unforeseen consequences.

Population Growth and the Pet Trade: As human populations expand, we find it necessary to claim more and more wilderness areas for housing and industry. Through this expansion, less land is available for wildlife and native animals are commonly forced into less suitable habitats. Unless steps are taken to stabilize these threatened species, wildlife populations can decline or disappear entirely.

The human desire for companionship has cast a wide net, and beyond domesticated animals the list of creatures that we keep in our homes is extensive. Tropical fish, snakes, turtles, spiders, rodents, and even more exotic organisms can be seen in an average pet store. Many of these organisms are harvested from the wild, in some cases with no thought to the sustainability of the harvesting.

Over-hunting and Over-collecting: Probably the most well known cause of the loss of large animal populations, over-collecting has impacted many familiar endangered species. The 19th Century slaughter of the American bison would be an obvious example, but the collection of sea snails in the tropics for tourists and the harvest of tropical birds for ladies' hats in the early 20th Century have had major impacts on those ecosystems.

Encourage students to draw their own conclusions. Suggest examples of how the students themselves can take actions that could mitigate some of the impacts on wildlife diversity- methods of lessening the 'footprint' each of us leaves on the earth.

This list represents many of the concepts and products that you might use in the classroom.
- **Ivory**
  - Uses: decorative pieces, handles of weapons
  - Sources: elephant, walrus, sperm whale, hippopotamus
  - Causes of Decline: over-hunting
- **Horn**
  - Uses: medicines, handles of weapons, trophies
  - Sources: rhinoceros, antelope and deer family antlers, other herbivores
  - Causes of Decline: over-hunting
- **Sea turtle shell**
  - Uses: decorative pieces, women's jewelry, combs, eyeglass frames
  - Sources: sea turtles
  - Cause of Decline: over-hunting, loss of nesting beaches
- **Whale products**
  - Uses: blubber used in cosmetics and oil lamps, baleen used in girdles and corsets (most of these uses are no longer current)
  - Sources: baleen from baleen whales, blubber from all whales, dolphins
  - Cause of Decline: over-hunting
- **Pelts**
  - Uses: fur trade, fur coats, leather clothing
  - Sources: nearly any animal
  - Cause of Decline: over-hunting, loss of habitat
- **Snake skin**
  - Uses: boots, shoes, belts, hatbands
  - Sources: snakes

> ➢ Cause of Decline: over-hunting, loss of habitat, misinformation
- **Box turtles**
  - ➢ Uses: pets and pet trade
  - ➢ Sources: wild places
  - ➢ over-collecting, loss of habitat, habitat fragmentation

With each introduction, the students should have a sense why the animals are sought after by humans, alternatives, or conservation methods that might allow some animals to be taken if the species is preserved. Students should be left with a sense that there are alternatives, and not with a bereft feeling of despair. If everyone makes better choices, then we can cohabitate with these species for a long time.

Many other examples are possible. Some of the discussion will be based on the props and products, but a great deal of the discussion will be determined by the student's interests and questions. Discussions prior to or following this lesson may help spark lively debates on these somewhat controversial topics.

Extensions
Provocative questions:

➢ What animal species in our area have become extinct or extirpated? Try to identify species that have disappeared in the last few centuries. Why did they disappear?

➢ How big does an animal's habitat need to be?

➢ Why should we care about endangered species? If they are going to become extinct, why should we do something about it?

➢ What sorts of challenges exist in protecting endangered species? What contributions do the animals make ecologically, economically, medicinally, aesthetically or socially?

➢ Is it better to protect a critically endangered large and recognizable animal, or the habitat that it lives in? Does the cost of the efforts matter? What about the certainty of the animal's survival?

➢ If you know how to care for a wild animal, why shouldn't you be allowed to keep it as a pet?

➢ What can be done to slow the loss of habitat in New York State?

➢ Great white sharks have been known to eat people. Why shouldn't we hunt them to extinction?

➢ Mosquitoes carry fatal human diseases, such as malaria and yellow fever. Should insecticides that have *potential* long term negative effects to the environment be used to limit mosquito populations and protect human health?

➢ How many animals in a population are enough? Can six individuals survive? Sixty? Would any of these animals still be there in ten years? Fifty years?

➢ Weasels are in decline in New York State. Since house cats and weasels both eat mice, why shouldn't cats replace them in the woodlands?

Activities

There are several activities to engage the students for demonstrating some of the principles.

Classroom Carrying Capacity

To demonstrate the effect of habitat loss, have the students role-play wild animals in your local neighborhood.

The classroom represents the historic range of their species (whether they represent deer, chipmunks or box-turtles is unimportant). The students must follow only three simple rules: all participants must stand, students cannot touch any classroom furniture, and they cannot touch one another. Review that an animal's habitat is the area that provides its needs (food, shelter, water, space, and a mate).

The animals (students) must move from their locations to a narrower strip of floor in the classroom (designated by you). This area represents their current range. The other sections of the classroom have been developed by humans into houses, stores, schools, roads, and utilities. To test whether this area provides enough space, have the students seek the other side of the area, moving without touching any other students.

The population of animals is further impacted, as a portion of the open space that is part of their habitat gets developed into human needs (housing, lumber yard, coffee shop, etc). Perhaps a third of the space the group is currently occupying is no longer available. The students occupying this restricted space must cram into the remaining habitat, or the animals they represent die (the student returns to their seat).

The population gets impacted again and further development takes place (another third gets removed). Students can now try to move as they did before. The students at this point will be occupying nearly all of the available space, and be uncomfortable with how close everyone else is.

When populations become artificially dense like this, they are susceptible to many new problems. Introduce that a disease passes through the environment that affects their species. A majority of animals die, leaving a few (pick a characteristic to designate victims, such as lettering on shirts or everyone wearing a necklace).

Introduce nuisance controls or poisoning (intentional or accidental) that the animals suffer because of the proximity of so many people. Another characteristic is selected to represent this die off, leaving 2-5 students. These animals have enough room and can fill their needs. The students can determine if these animals are sufficient to maintain a population, and what may happen if more animals are added to the environment (for example, if the population remaining is three female students, the population would have no reproductive potential and is doomed).

Maximum Sustainable Harvest

Use an example on the chalkboard to illustrate how hunting can be used as a wildlife management tool and how hunting and over-hunting differ.

There is a population of imaginary animals that some people like to hunt for (they can be eaten and their fur can be used as well). The habitat we are managing only has enough resources to sustain 100 individuals. If the population exceeds 100, the extra animals will die from lack of resources or move out of the managed area in search for better habitat. Every breeding season the population has the capacity to double their numbers, up to 100.

The students in the class represent the decision-making board of a wildlife management agency. They want to let the maximum number of these creatures to be hunted (allowing the greatest public satisfaction), while maintaining the population of animals for future years. The students will be asked to propose how many licenses (1 license = 1 hunted animal) should be granted.

If the students select a number of 50 or less:

	Animals	hunted	remaining	after breeding season
Year 1:	100	40	60	100 (60 x 2, with a population max of 100)
Year 2:	100	40	60	100
Year 3:	100	40	60	100

This would represent a sustainable harvest. 50 would be the maximum that would maintain this balance.

If the students select a number greater than 50:

	Animals	hunted	remaining	after breeding season
Year 1:	100	65	35	70
Year 2:	70	65	5	10
Year 3:	10	65	0 (and 55 hunters don't get anything)	0

In the above example, the population of animals has been extirpated (locally extinct). Quickly, the students should see that 50 is the maximum that can be taken. Then introduce the idea of additional factors, such as disease, poor breeding conditions, or poaching.

	Animals	hunted	remaining	after breeding season
Year 1:	100	50	50	100
Year 2:	100	50 + 8 poached	42	84
Year 3:	84	50	34	78
Year 4:	78	50 + 15 disease	13	26
Year 5:	26	*moratorium?*		

Many students may recognize that a reduction of hunting pressure may be a way of allowing the population to rebound. Students are encouraged to alter the regulations to sustain the population. The facilitator will remind them that public reaction may be strong if hunters are told they can't hunt for a year or two. In some wildlife management situations, such as Long Island's commercial fishing industry,

the harvest of these species is the hunter's livelihood, and a moratorium on hunting is a reduction of salary.

Explore other possible ways of limiting the negative impacts, while maximizing the opportunities for both the public and wildlife.

Bioaccumulation of Chemicals in the Environment

Illustrate the process of biomagnification and bioaccumulation of pesticides and other chemicals as they move up the food chain.

Relate the historic uses of DDT in our area as a crop insecticide and a mosquito suppressant in residential communities. The use was commonplace and widespread. DDT was relatively harmless to people and effective against insects when used as directed. Over time, we were able to learn some of the long term effects on wildlife, especially predatory birds.

The mosquitoes, now contaminated with minute doses of the chemical, can be eaten by small fish, dragonflies, spiders, bats, songbirds or other small predators. If those animals ate many mosquitoes, they received a greater proportion of the chemical than was present in the environment.

As those animals were in turn eaten by other predators, the magnification increased. At the top of the food chain, predators such as eagles, falcons, and osprey had thousands of times the background level of the chemical in their systems. DDT affected the reproductive capacity of these birds, causing egg shells to be brittle and flakey. When the adult birds attempted to incubate the eggs, the shells would break. After many years of unsuccessful breeding, as the adults died due to natural causes, there were no new birds to take their place and populations crashed.
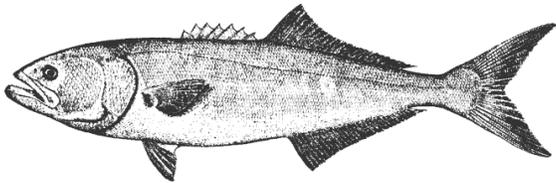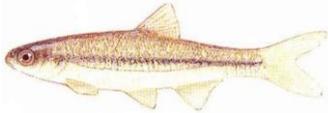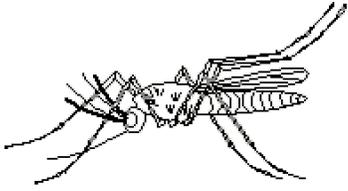
Mosquito   1 dose of DDT

Minnow eats 25 mosquitoes- 25 doses DDT

Bluefish eats 30 minnows- 750 doses DDT

Osprey eats 8 bluefish- 6000 doses DDT

Note: The numbers above do not represent actual data, and are merely used as an illustration to demonstrate the effects of biomagnification. This example assumes many things, such as even distribution of the pollutant, 100% retention in the animal's system, and other artificial factors.

Related Project WILD lessons

grades 7-8 *Hazardous Links, Possible Solutions*- Pesticides and food chains

grades 5-8 *World Travelers*- Introduced and alien species

grades 5-8 *Rare Bird Eggs for Sale*-   Identify reasons that wildlife is collected

grades 7-12 *Pro and Con: Consumptive and Non-consumptive Uses of Wildlife*-   Explore intrinsic value of wildlife

grades 5-8 *History of Wildlife Management*-   Define wildlife management, trends and philosophies

grades 7-12 *Cabin Conflict*- evaluate different points of view over land use

grades 4-12 *Planning for People and Wildlife*- explore considerations for land-use planning for people and wildlife

grades 4-12 *What Did Your Lunch Cost Wildlife?*- trace impacts of foods and processing on the environment

grades 7-12 *Deer Dilemma*- debate about a nuisance population of wildlife

Project WILD is one of the most widely-used conservation and environmental education programs among educators of students in kindergarten through high school. It is based on the premise that young people and educators have a vital interest in learning about our natural world. A national network of State Wildlife Agency Sponsors **ensures that Project WILD is available nationwide --training educators in the many facets of the program. Emphasizing wildlife because of its intrinsic value, Project WILD addresses the need for human beings to develop as responsible citizens of our planet. The NYSDEC Public Affairs and Education staff are available to teach Project WILD workshops for educators. Please contact NYSDEC to organize a workshop at your school. Please call 518-402-8043 or via e-mail at** projwild@gw.dec.state.ny.us**.**