

Plastic Pollution: It Can Be Deadly

Background:

The Great Lakes--Michigan, Superior, Huron, Erie, and Ontario--form the largest surface freshwater system in the world. Together, they hold nearly one-fifth of the earth's surface freshwater. The Great Lakes have over 10,000 miles of shoreline and serve as a drain more than 200,000 square miles of land ranging from forested areas to agricultural lands, cities and suburbs.

The Great Lakes watershed includes some of North America's more fascinating wildlife such as the [gray wolf](#), [Canada lynx](#), moose and [bald eagle](#). The lakes themselves are home to numerous fish, including lake whitefish, walleye, muskellunge and trout. Millions of migratory birds pass through the region during their spring and fall migrations. The Great Lakes region has been home to Native Americans for nearly 10,000 years. The first Europeans arrived in the 1600s and began to utilize the region for animal furs. It wasn't long before more settlers were drawn to the region seeking farmland.

Today, over 35 million people live in the Great Lakes basin in Canada and the United States. The Great Lakes are important sources of drinking water, irrigation, transportation and recreation opportunities such as fishing, hunting, boating, and wildlife watching. The Great Lakes are a critical component of the regional economy on both sides of the border.

Today there are many threats to the water quality and quality of life for wildlife in the Great Lakes. The amount of water entering and leaving the lakes each year is less than one percent of the total in the lakes. Persistent chemicals that enter the lakes can remain for many years, with many building up in the food web. The source of toxic pollutants includes decades of industrial waste, raw sewage overflows, runoff from cities, and mining operations. Excess nutrients that throw the ecosystem out of balance enter the lakes from agricultural runoff and untreated sewage. Additionally, solid waste in the form of litter and specifically, plastic pollution, threatens the wildlife that call the Great Lakes home. Animals like the river otter, trout, sturgeon, salmon and bird species like the bald eagle, as well as many other endangered bird species become can become tangled in plastic pollution like plastic fishing line, plastic strapping bands, six-pack rings, or other plastic trash that ends up in the Great Lakes. Once tangled, they spend energy trying to get free, may become sick or weak, and even die. Certain animals also mistake plastic trash for food and eat it. Many animals have difficulty digesting plastic, so the plastic remains in the animal's stomach causing a feeling of fullness. The animal, feeling satiated, stops eating and eventually starves to death.

This deadly trash is known as plastic pollution. It is trash found in the lakes or along its shores. An estimated 80% of this pollution comes from land-based sources in the form of litter, illegal dumping, and poor waste management practices.

Grade: K-3

Objectives: Students will be able to

1. Experience in a simulated setting the negative effects that plastic, in particular, can have on the feeding activities and health of marine animals, and
2. Consider the effects of plastic debris in the oceans and on the beaches from an animal's perspective

Time Needed to Complete: 40-50 minutes (game for K-1); 60 minutes (game for 2-3)

Materials Needed:

For grades K-1:

- Pictures of marine wildlife (included in this guide)
- One rubber band for each child
- A tray or shoe box for every three children
- Plastic foam pieces (from packaging, beanbag chairs, or potting soil) ½ cup per tray
- Bird seed, white beans, or popcorn 1 ½ cups per tray
- A spoon and cup per child

For grades 2-3:

- Pictures of marine wildlife (included in this guide)
- Tape
- Multi-colored beads or any other small multi-colored items
- A calorie chart and score card, included in this guide



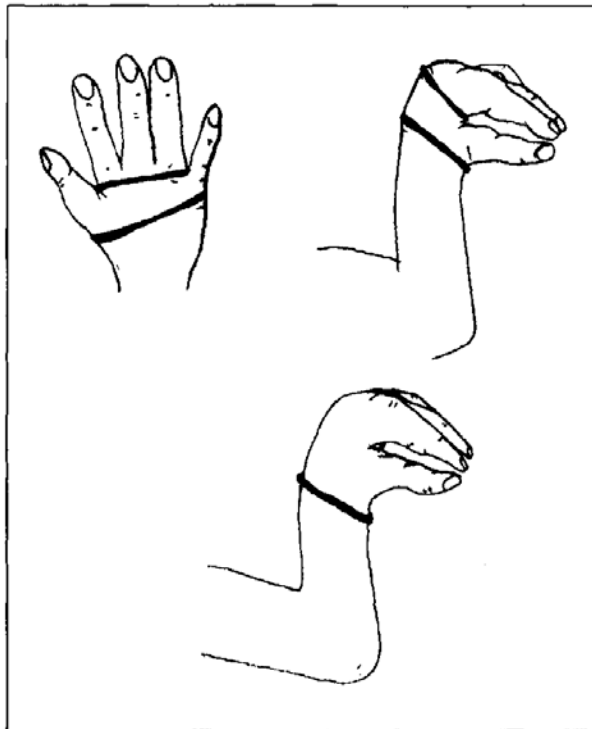
Procedure:

Part 1: Before playing the games that follow, talk about “who’s who” in the Great Lakes ecosystem, using the supporting pictures of the various animals.

Part 2: Grades K-1

“Getting Out of A Bind” is a simple activity that teaches empathy for wildlife by simulating an animal’s entanglement in plastic litter. The procedure is as follows:

1. Use a volunteer to demonstrate. Put a rubber band around the back of his or her hand, catching the thumb and the little finger (see diagram). Have the child try to remove the rubber band without using the other hand or teeth or rubbing it against something.
2. Hand out rubber bands for everybody to try. Tell each child to pretend his or her hand and arm is a bird entangled in plastic. For example, the hand is its head, the fingers its beak and the forearm its neck. Cup elbow with free hand. Place rubber band around the “beak” or “neck”. Allow children only 30 seconds to free themselves. No helpers!
3. Is everyone successful in untangling themselves? Many animals don’t get free, of course, and starve, strangle, or suffocate.
4. Discuss the following with the children: What plastic or other material could the rubber band represent in a natural setting (fishing line, plastic six-pack rings, fishing nets, packing straps)? How could an animal get into a situation in which fishing line, strapping bands, six-pack rings, or a net would entangle it? (By swimming into plastic accidentally. Also, a bird might eat the bait on a fishing line, then become entangled or take the line back to a nest of vulnerable babies. Some students might have rubbed their hands against the table to remove the band. In the natural environment, what would animals rub their heads against? Probably a rock. What would happen to an animal that rubbed its head against a rock until the band came off?



Part 3: Grades K-1

“The Early Bird Gets the...Plastic?”

This activity helps children understand how animals can mistake plastic for food.

1. The object of this game is to collect as much food as possible in the time allotted. Because of the collection method and the short time allowed, some plastic will be gathered also.
2. In each tray, mix plastic pieces with bird seed or popcorn. Have three children “feed” at each tray for 30 seconds, using their spoons as beaks. Each child should place the spoonfuls of food into his or her cup or “stomach”. When time’s up, the children will examine their cups for real food and plastic. Help the children count and record the pieces in two columns on a sheet of paper.
3. Have the students return the plastic pieces to their cups and begin the feeding exercise again. Continue the exercise until the birds’ stomachs are full of plastic and they don’t feel like eating anymore.

4. Ask the children what they think will happen to birds that eat plastic. (Since plastic is difficult to digest, it can build up in the birds' stomachs taking the place of real food. The birds feel satiated, gradually stop eating, and slowly starve.)

Part 2: Grades 2-3

"The Feeding Game: A Simulation of the Perils of Plastics"

This game simulates the negative effects plastic trash can have on the feeding and survival of animals. Through several rounds of play, players collect colored beads that represent the food of animals in the Great Lakes. In the first round, the players determine the number of calories their animal needs to stay alive. In the subsequent rounds, the players are physically hindered in some way from gathering food in their normal way.

Round #1:

1. Read the second to last paragraph of the background information ("Today there are many threats to the water quality...") aloud to the group, and explain that they will be playing a game that simulates the way animals can be harmed by plastic debris in the Great Lakes.
2. Remove all of one color of beads from the bag (e.g. all the white beads) and set them aside for later.
3. Have the players stand along one wall or on the side of the playing area. Designate an equal number of the players as double-crested cormorants, bald eagles, river otter, and trout. Pin or tape a picture of the corresponding animal on the front of each student. Tell the players that they will soon find out how much they need to eat each week in order to stay alive.
4. Explain that one round of the game represents a week of feeding and that when the round begins they should collect as much food as they can in 30 seconds. Warn them to move safely and not to run into other players.
5. Scatter two handfuls of beads around the room (approximately 6-10 players). Say "go!" and then 30 seconds later call out "Stop!" The players should return to their positions along the wall with the beads they have collected.
6. Players should then count the number of beads they collected and calculate the "calories" by color according to the chart (attached). Each player's total is the number of calories required by their animal each week and is the amount they will need to collect in the following rounds in order to stay alive. Have each player, one by one, call out the number of calories they will require in the following rounds and enter their names and the calories they gathered under Round #1 on the score card.

Round #2:

1. Collect the beads from the players, scatter them again, and explain the following:

The river otters were curious about something they saw floating in the water and got tangled in a plastic strap. To symbolize this, the players who are river otters must crouch down, grab their ankles with their hands, and waddle in this position, instead of walking or running, during the next round of play. (They can still use their hands to pick the beads up.)

The trout swam into a six-pack ring and got stuck. To symbolize this, the players who are trout must keep their little fingers clasped together behind their backs at all times during the next round of play, even while picking up the beads.

The bald eagles tried to eat a plastic bag, which got caught in their throats, so now it is very hard to swallow anything else. To symbolize this, the players who are bald eagles must put one hand around their throat and may only use their free hand to pick up AND hold their beads once they've collected them.

The double-crested cormorant's feet got caught in plastic fishing line that was left on the beach. To symbolize this, the players who are double-crested cormorants must hop on one foot during the next round.

2. Just before beginning the second round of play, designate one or two of each type of animal and tell them that they were lucky enough to have recovered from ingesting or becoming entangled in the plastic trash, and can play the game unhindered. Then circle the Y or N on the score card to indicate which players are or are not impaired.
3. Call out the beginning and end of the 30-second feeding period. Players should again return to the sidelines and calculate their calories according to the calorie chart. Enter the number of calories each player collected under Round 2 on the score card. Compare and discuss the differences between calories collected in Rounds 1 and 2 for the hindered and unhindered animals.

Round #3:

1. Collect the beads from all players, this time quietly adding the white beads that had been previously removed. Scatter them again in preparation for the final round.
2. Tell the players who were hindered last round that they remain hindered by the plastic debris, and those who were unhindered remain so as well.
3. Call out the beginning and ending of the 30-second period.
4. Players should return to the sidelines and calculate their calories. Explain that the white beads represent plastic pieces that have no nutritional value, but instead the animal wasted energy finding and foraging on the plastic items. For each white bead collected, each player must subtract 10 calories. Enter the number of calories each player collected under Round 3 on the score card.

Discussion – Discuss which players did and did not meet their caloric requirements. Find out if any of the hindered players improved their collection rate in the third round. If any did, explain that this may be due to them growing accustomed to their hindrance. Explain that danimals could also become accustomed to their hindrance, but that they many also weaken and die.

Assessment:

Ask your students what kinds of trash represent a danger to animals in the Great Lakes, either through ingestion or entanglement. Where does this trash come from? Have students glue the trash from the entanglement and ingestion activities onto the class collage made the previous day.



Adapted from "Marine Debris: It Can Be Deadly" developed by The Center for Marine Conservation and the California Coastal Commission in the Save Our Seas curriculum guide

5GYRES

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“The Feeding Game: A Simulation of the Perils of Plastics”

Calorie Chart

Each colored bead represents an item of food for each animal

Each color represents a different amount of calories.

Color	Number of Calories
Yellow	3
Red	5
Green	10
Orange	20

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Wildlife of the Great Lakes



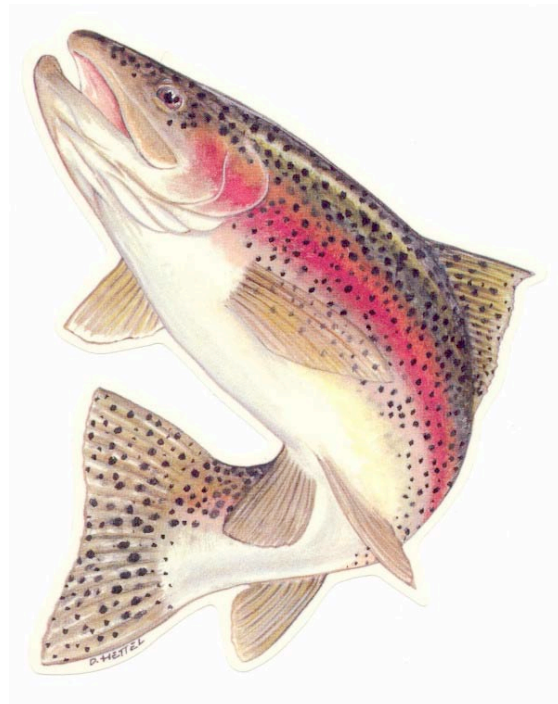
River Otter



Double-Crested Cormorant



Bald Eagle



Trout