Oil and Feathers

Grade Level: 5-8

Subject Areas: science

Duration:
Preparation - 20 minutes
Activity - 50 minutes

Setting:
Classroom

Group Size:
20-50 students

Materials:
• feathers, at least one per group
NOTE: It is illegal to collect or posses feathers from many bird species. Feathers for this activity can be purchased at craft stores.
• vegetable oil
• shallow containers or pans (baking dishes work well)
• mild dish soap (I.e. Dawn)
• paper towels or towels
• water
• copies of the "Oil and Feathers" worksheet - one per student or group.

Skills Used:
investigating, interpreting, analyzing.

Vocabulary:
density, pollution, contamination

Project BEAK Links:
• Adaptations - Feathers

OBJECTIVES
• Students will investigate the structure and functions of feathers and determine the effect of oil on the ability of feathers to float and regulate a bird's temperature.
• Students will discuss the effects of human actions on wildlife and propose strategies to prevent negative effects on wildlife.

Nebraska State Science Standards
• 8.2.1, 8.3.1, 8.4.5

BACKGROUND

On the night of March 24, 1989, the Exxon Valdeze oil tanker traveling through the Prince William Sound in Alaska went a ground on a reef. Crude oil began leaking from the damaged ship. Oil continued to leak for two days totaling 11 million gallons of oil. This was the largest oil spill in United States history.

The oil, traveling through the water eventually covered approximately 1,100 miles of Alaskan shoreline.

Several thousand sea mammals, including otters and sea lions, were killed due to the oil spill. Additionally, hundreds of thousands of shore-nesting birds were killed. The oil spilled caused the bird's feathers to loose their buoyancy which makes it much harder for these shore birds to float in water.

Feathers also help the bird maintain a constant body temperature. When the feathers are penetrated with oil, the bird becomes vulnerable to hot and cold temperature fluctuations and extremes.

Additionally, when birds which have been coated in oil try to preen themselves, they ingest the oil causing liver and kidney problems. Much of the bird's food is also coated in oil furthering the ingestion of oil. Because of this and the limited foraging abilities, most birds suffer from dehydration and starvation.

Oil coated feathers also make it harder for birds to fly. This in turn makes it hard to forage for food and escape predators.

Most birds effected by an oil spill do not survive without human intervention.

Oil is a hydrophobic liquid. This means that the molecules within the oil do not mix with water. Rather, oil will float on the surface of water. Because oil floats on top of the water, it is considered less dense than water.

ACTIVITY

Give each student or group of students a feather to investigate. Provide students with magnifying lenses to look closely at the feathers. NOTE: It is illegal to collect or posses feathers from many bird species. Feathers for this activity can be purchased at craft stores. Alternatively, you can use chicken feathers.

Give each group of students a shallow container filled with water. Ask students to put the feather in the water and observe how the feather interacts with the water. Students should notice that water is repelled from the feather and the water does not penetrate the feather. Students should also notice that the feather floats on the water.

Next ask students to pour the vegetable oil in the pan of water. Have students observe how the oil and water interact. Do they mix? Which one floats on top? Why do they stay separate?

Then ask students to put the feather into the oil and water mixture. What happens to the feather? Have students describe what they see happening to the feather.

Next provide students with a fresh pan of water. Have students put the oily feather in the fresh water. What happens to the feather? How does the oily feather compare with the clean feather earlier in the experiment. Does the oily feather float?

Next ask the students to clean the feather with only the clean water. Are they successful? Now provide the students with mild dish washing detergent (such as Dawn). Ask the students to clean the feather without hurting or damaging the feather. Explain to students that in the event of an actual oil spill, wildlife rescue personnel use mild cleansers like this to clean the birds and wildlife. Mild detergents are used rather than harsh chemicals to prevent further harm to the animals.

Finish the activity by having a classroom discussion about the effects of oil spills on wildlife.

EXTENSIONS

• Ask students to investigate historical oil spills. Write reports covering the spill itself and the effects it had on wildlife including birds.

ASSESSMENT

• Evaluate students participation in the feather/oil investigation and classroom discussion.

• Read and evaluate student responses on the “Oil and Feathers” worksheet.

ADDITIONAL RESOURCES: WEBSITES

• U.S. Fish & Wildlife Service: Environmental Contaminants Program
http://www.fws.gov/contaminants/Issues/OilSpill.cfm

• U.S. Fish & Wildlife Service: Effects of Oil Spills on Wildlife Fact Sheet
http://alaska.fws.gov/media/unalaska/Oil%20Spill%20Fact%20Sheet.pdf

• U.S. Environmental Protection Agency
www.epa.gov

PERMISSIONS & CREDITS

Oil and Feathers: Better Left Apart

When you placed the clean feather in the water, what did observations did you make?

When you added the oil to the water, what happened?

When you added the feather to the oily water, what happened to the feather?

When you placed the oily feather in the fresh water, what happened? How does the oily feather compare with the clean feather earlier in the experiment.

Were you successful in cleaning the feather with plain water? Why or why not?

What happened when you cleaned the feather with the mild detergent?