



**Title: Critter Clean-Up**

Adapted by Elizabeth Trowbridge from Sea World Education.

**Theme:** It is difficult and expensive to clean oiled animals.

**Objectives:**

- Students will identify ways oil spills can adversely affect animals.
- Students will experiment with ways to clean oiled animals.
- Students will understand that it is difficult to clean oiled animals.

**Duration:** 60-90 minutes

**Age Range:** 6<sup>th</sup>-12<sup>th</sup> Grade

**Materials:**

- Heavy weight motor oil
- 5 hard-boiled eggs
- Small container
- Rubber gloves
- Cooking oil
- Black tempera paint
- Water (leftover slick from Oil Experiments/Sheen-Oil-Mousse works too)
- Three types of detergent/dispersant:
  - mild hand soap
  - powdered laundry detergent
  - grease-cutting dishwashing detergent
- Feathers
- Leather
- Fur
- Hand lens or microscopes
- Notebooks or paper
- Pencils or pens
- Newspapers
- Oil absorbent pads
- Funnel

**Background:**

The impacts of pollution are often difficult to see. A major oil spill, though, provides dramatic evidence of effects on wildlife. Examples of potential effects include damage to feathers and fur (leading to hypothermia), killing of embryos if oil seeps into eggs,

suffocation of fish if gills are clogged, and death to marine and terrestrial animals if they ingest food or water contaminated by the oil.

After such spills take place, people try to clean up, but it is a difficult, challenging, and expensive process. Sometimes the clean-up has unfortunate consequences. For example, the process of using detergents to clean bird feathers may actually damage the feather structure and arrangement, thus threatening the birds waterproofing. Birds may also be more susceptible to disease during this time of stress.

### **Preparation:**

Set up this activity outside if possible. If not, use old newspapers to cover the floor. Mix vegetable oil and black tempera paint and beat well to create pretend crude oil students can safely work with. Fill five bowls with water. In the first bowl, pour a slick of the vegetable-tempera oil, or add the leftover oil slick from Sheen-Oil-Mousse. If you use the leftover oil slick, remember that it contains motor oil, which is toxic. Students will need to wear gloves while working with it. Leave the second bowl as plain water, and dissolve 1-2 tablespoons of one dispersant into each of the remaining bowls. Do not let the students see which solution is in each bowl.

### **Introduction:**

Ask students to brainstorm ways animals might be affected by oil. List their ideas on the board. If students didn't think of damage to embryos and eggs, mention this idea and ask them if they think oil could actually get inside of an egg.

### **Activities & Procedures:**

Put enough motor oil in a small container to submerge the hard boiled eggs. Put on protective gloves. Roll one egg briefly in the oil and then leave it on a newspaper for 30 minutes.

Submerge 3 other eggs in the oil and leave them there.

Remove one egg from the oil after 5 minutes. Examine it. Remove the excess oil from the outside with an absorbent pad. Carefully peel off the shell. Have students record observations about the egg in their notebooks.

Remove the second egg after 15 minutes and the third egg after 30 minutes. You may move on to the next parts of this lesson while waiting for the time to elapse. Examine each egg carefully before, during, and after peeling. Compare the results with the fourth egg that was only dipped in oil, and the fifth egg that didn't touch oil at all. What effect might an oil spill have on the eggs of birds nesting near the water?

What other effects might oil have on birds and animals? Have students examine samples of feathers, leather, and fur with a hand lens or microscope and sketch the items in their notebooks.

Then dip each item into the bowl of clean water for 1-2 minutes and examine again. Students should sketch the items again and compare to the original observations. Finally, place each sample in the bowl with vegetable-tempera for 1-2 minutes. Students should then examine, sketch, and compare these samples.

Have students try to clean each oily sample with plain water. Record what happens to each sample. (Make sure the oily water is disposed of properly.) Have students try to clean their samples in each of the detergent solutions. Try one sample per detergent.

Ask students to write down which detergent (solution #1, solution #2, or solution #3) worked the best. Let the students compare the results and record them.

Look at the samples once more under the hand lens. Discuss the changes in the samples after exposure to oil and then to the detergents. What effect could these changes have on normal animal activities?

Reveal the names of the detergents and show the students the containers they were in. Which detergent was the most effective? The bird and otter rescue centers in Alaska used Dawn Detergent. Does this match what you found?

Discuss what might happen to a bird, otter, or seal in an oil spill. Why are feathers, fur, and leather important to wildlife?

Have students participate in the “coldwater challenge” by seeing who can leave their hand in submerged ocean temperature water (about 45 degrees Fahrenheit for southcoastal Alaska) for the longest. Ask the winning student to try to write on the board with their cold hand.

Explain the importance of feathers and fur for warmth, and how birds and otters continuously clean and fluff their feathers. How do birds and sea otters clean their feathers? What would happen to a bird or otter if it ingested oil? Discuss how people try to clean animals affected by oil spills.

Articles about the wildlife rescue attempts after the *Exxon Valdez* Oil Spill are available online at <http://www.adn.com/evos/stories/EV252.html> and <http://www.adn.com/evos/stories/EV250.html>. The UC Davis Oiled Wildlife Care Network website provides excellent information and photos about their rehabilitation work: [http://www.vetmed.ucdavis.edu/owcn/oiled\\_wildlife/rescue\\_and\\_treatment.cfm](http://www.vetmed.ucdavis.edu/owcn/oiled_wildlife/rescue_and_treatment.cfm) and a video of their veterinarians and volunteers at work during the 2007 oil spill in San Francisco Bay can be seen here: <http://www.youtube.com/watch?v=gRHFyHUhY9o>.

Ask students to brainstorm some problems cleaning might cause for the animals. Possibilities include stress, loss of waterproofing, injury, disease, etc. Examine the ingredients listed on the detergents. Could any of them be harmful for the animals? Ask students if cleaning an animal is the best option. Would euthanasia – intentional and painless killing – be better for heavily oiled animals? What are some factors that need to be taken into account when deciding the best action for animals caught in oil spills?

### **Wrap-Up:**

Discuss possible impacts of oil on other animals, humans, and the ecosystem. Ask students about other examples of human-caused pollutants that can have negative consequences for wildlife, people, and ecosystems. Have students brainstorm ways to prevent and clean up pollution that might affect animals, people, and ecosystems. Put one of these plans, such as a marine debris clean up, into action as a class.

### **Evaluation:**

Assess science notebook sketches, data, and analysis for completeness, neatness, and accurate work. Because the characteristics of items available to you will vary, use common sense and your own observations to evaluate student sketches and observations about eggs, natural materials, and the efficacy of the detergents. Observe student cooperation, participation, and adherence to safety guidelines during group work.

## **Critter Clean Up Standards**

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

### **SA1**

Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[6, 7, 8, 9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

### **SE1**

Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:

[6] SE1.1 recognizing that technology cannot always provide successful solutions for problems or fulfill every human need

### **SE2**

Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

The student demonstrates an understanding that solving problems involves different ways of thinking by:

[6] SE2.1 identifying and designing a solution to a problem

[7, 8] SE2.1 identifying, designing, testing, and revising solutions to a local problem