



Critter Clean Up

Grade Level: 6-12

Length: 60-90 Minutes

www.pwsrcac.org/lessons

Adapted by Elizabeth Trowbridge from Sea World Education

NGSS Standards

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Crosscutting Concepts

Cause and Effect Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

Stability and Change For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

Related Resources

Pair With: Oily Experiments, Sheen-Oil-Mousse

Overview

It is difficult and expensive to clean oiled animals.

Objectives

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

Materials

- Motor Oil
- Small Container
- Rubber Gloves
- Cooking Oil
- Black Craft Oil Paint
- Water (or leftover slick from Oil Experiments/Sheen-Oil-Mousse)
- Three Types of Detergent
- Mild Hand Soap
- Powdered Laundry Detergent
- Grease-Cutting Dishwashing Detergent
- Feathers (craft or real)
- Leather (faux or real)
- Fur (faux or real)
- Hand Lens or Microscopes
- Paper or Science Notebooks
- Pencils or Pens
- Newspapers
- Oil Absorbent Pads
- Funnel

Notes

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, 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

1. Set up this activity outside if possible. If not, use old newspapers to cover the floor.
2. Mix vegetable oil and black oil paint and beat well to create pretend crude oil students can safely work with.
3. Fill five bowls with water.
4. In the first bowl, pour a slick of 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.
5. Leave the second bowl as plain water, and dissolve 1-2 tablespoons of one detergent into each of the remaining bowls. Do not let the students see which solution is in each bowl.

Introducing the Lesson

>>*Educator Tip: If you've already done the Oily Experiments activity with your students, skip this introductory section.*

1. Ask students, what are some things that come to mind when you think of oil? Are there some different kinds of oil you can think of? What makes these oils different, and where do they come from?
2. Hold up a vial with a small amount of crude oil in it. Pass around the vial with a small amount of crude oil in it. Open the vial just a bit and allow students to smell a small whiff of the oil.
3. Ask students to describe what the oil smells and looks like. List their words on the board.

4. Pass out the worksheet to each student and have them record the smell and look of crude oil.
5. Ask students to think to themselves for 1-2 minutes
6. Pair with another student to discuss their thoughts, and then discuss as a larger group the following questions:
 - Did you picture crude oil when you thought of oil a few minutes ago? How is what you pictured similar or different?
 - Is crude oil something that you use every day?
 - What types of products and everyday materials do you think might be made with crude oil?
7. As you discuss as a whole class, show them some objects in the classroom or nearby that are petroleum products, such as plastic bottles, synthetic jackets, phones, etc. You can also bring in additional products, like mineral oil, motor oil, gasoline, paraffin candles, petroleum jelly, etc. Explain that in order for all of these things to be produced, the crude oil has to be removed from the ground and transported to a place to be refined. This is when accidents like oil spills can happen.
8. Tell students that in a moment, they are going to look at one example of a really big oil spill. However, an unfortunate amount of oil also gets into the environment every day through small leaks and spills. These small leaks and spills really begin to add up and can have a big impact on the environment.
9. Ask them to think about ways that these items might accidentally get into the environment. (This might include things like litter, improper disposal, small leaks around boats or houses, etc.)
10. Now explain that they are going to simulate some of what happens when crude oil or other forms of liquid petroleum oil are spilled in a marine environment and investigate how it may impact animals.

Activity

1. Ask students to think-pair-share a brainstorm of ways that local animals might be affected by oil. List their ideas on the board.
2. Have students examine samples of feathers, leather, and fur with a hand lens or microscope and sketch what they see.
3. 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.
4. Finally, place each sample in the bowl with vegetable-tempera for 1-2 minutes. Students should then examine, sketch, and compare these samples.

5. 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.)
6. 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.
7. 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?
8. 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?
9. 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 “cold water challenge” by seeing who can leave their hand in submerged ocean temperature water (about 45 degrees Fahrenheit for south coastal 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 coats. How do birds and sea otters clean their coats? What would happen to a bird or otter if it ingested oil? Discuss how people try to clean animals affected by oil spills to minimize the harm from hypothermia or ingestion. However, cleaning animals can cause its own problems.
10. Ask students to brainstorm some problems cleaning might cause for the animals. Possibilities include stress, loss of waterproofing, injury, disease, etc.
11. Examine the ingredients listed on the detergents. Could any of them be harmful for the animals? Have students discuss the following questions in a small group.
 - Is attempting to clean a heavily oiled animal the best option? Would euthanasia (the intentional and painless killing) be better for heavily oiled animals? Explain your thinking.
 - What are some factors that need to be taken into account when deciding the best action for animals caught in oil spills?
 - How might different groups of people think differently about it?

>>Educator Tip: If you haven't already developed scaffolds for productive and respectful science discourse, this is a great time to do so. See this Primer from Ambitious Science Teaching for some ideas on how to do so

and how to think about your own role as a teacher and the types of questions you can ask initially and use to follow-up with students:
<http://ambitiousscience-teaching.org/wp-content/uploads/2014/09/Discourse-Primer.pdf>

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 monitor pollution and minimize the impact on animals, people, and ecosystems. Ask them to work together in small groups to choose one (or a combination of multiple ideas). Working on a piece of poster paper, they should draw or describe a project they could undertake that would help to monitor pollution and minimize negative impacts. Guide them to include discussion of how science ideas, personal experience, and/or family or cultural practices combine to inform their stewardship actions. Have student groups present their ideas to the class. If possible, choose and complete some of these stewardship projects as a class.

Assessment

Review written work for complete answers to questions during the lab. Listen during discussion for thoughtful responses to questions about the ethics of attempting to clean animals after an oil spill. There are no correct answers to this question; instead, listen for evidence that students are forming opinions based on their understanding of the risks and benefits of cleaning animals, their own experiences and knowledge, and personal, family, or community values. Evaluate how students build on, respond to, and respectfully disagree with their classmates. Evaluate the stewardship project posters and presentations on the quality of the ideas, the clarity of their presentation and a demonstration of understanding (1) ways pollution can impact ecosystems and (2) that humans can use scientific ideas to monitor and minimize negative impacts on the environment.

Pair With

Oily Experiments Lesson Plan
Sheen-Oil-Mousse Lesson Plan