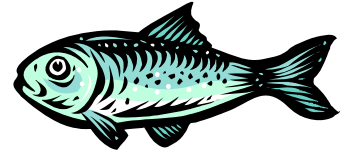


Fred the Fish, Pollution Activity

The original Fred the Fish activity, from which this was adapted, was published in *Water, Stones, & Fossil Bones* and was written by Karen Lind, National Science Teachers Association, 1991, ISBN 087355101X

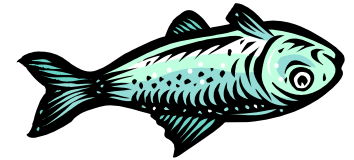


Grade Level: 6th - 12th Grade

Subject: Science

Duration: 45 minutes

Materials: Pollution and Fred the Fish power point, Fred the Fish travel log, large jar filled with water, paper towels, sponge Fish and other included containers which consist of:



Pollutant	- Use this
Eroded soil	- garden soil
Fertilizer	- brown sugar
Motor oil	- cooking oil
Animal waste	- chocolate sprinkles
Trash	- small pieces of foil, paper, etc
Factory discharge	- dish detergent in warm water (mix ahead of time)
Sewage	- red food coloring
Hazardous waste	- green food coloring

Next Generation Sunshine State Standards:

SC.6.E.6.2, SC.7.L.17.3, SC.8.P.9.3, SC.8.L.18.1, SC.912.L.17.20, SC.912.L.17.16, SC.912.L.17.15, SC.912.L.17.7

Common Core: LACC.68.RST.1.1, LACC.68.RST.1.2, LACC.1112.RST.1.1, LACC.1112.RST.1.2

Overview: Through a simulation activity, students will apply cause and effect relationships to water pollution in a river. They will also recognize that their actions affect the quality of water in our waterways.

Objectives: Students will identify the two sources of pollution and the cause and effect relationships pertaining to water pollution. They will also explore means of preventing the problems before they occur, solutions to the problems that water pollutants pose to the river, and organisms that depend upon the river for survival.

Background: In Florida, water is everywhere and the quality of this water is important to residents, visitors, and businesses. As our population has increased our water resources have

Fred the Fish (continued)

become polluted. **Water pollution** is the contamination of water with harmful chemicals or waste materials either by nature or people. A body of water is considered polluted when it is no longer usable by people or other living things. There are two main sources of water pollution: point source and nonpoint source pollution. **Nonpoint source pollution** is difficult to control because it does not come from one specific source. Instead it comes from many places or from a widespread area. Most nonpoint source pollution enters our waterways by stormwater runoff. In open space natural areas stormwater can soak into the ground. When there isn't enough open space, stormwater runs across urbanized covered surfaces, washing harmful pollutants into Sarasota Bay. We add pollutants like fertilizers, pesticides, gas, oil, and animal and pet waste. Nonpoint source pollution is very difficult to control and is the biggest source of pollution in Florida. **Point source pollution** is easier to manage and can be traced to a single source like a pipe or culvert. Some industrial and sewage treatment plants connect directly to a water body and create point source pollution. Because it comes from one identified place, point source pollution is often easier to control. Many pollutants affect the oxygen level in the water which can have a negative effect on aquatic organisms. Examples are organic pollution, nutrients, pesticides and herbicides, hazardous waste, bacteria and viruses, heavy metals, petroleum products, sediments, and saltwater intrusion.

Procedure:

1. Add clean tap water to jar, almost full so that Fred can swim easily. Prepare containers of Pollutants in proper order for the students to add to the jar. The types of pollution he encounters, and what substance will represent each type, is listed in the materials and prepared in the box.
2. Add warm soapy water to the "Factory discharge" container. Soap is in your supplies.
3. Tell students they will be learning about the sources and types of pollution and how pollution affects our wildlife.
4. To understand student's prior knowledge, ask questions such as: What is pollution? How do you think it might affect the aquatic organisms? How might pollution affect you? What is stormwater runoff? Do you know the difference between point source and nonpoint source pollution?
5. Show the first part of the power point presentation, which provides students information on watersheds, water cycle and the sources of pollution.
6. Pass out the Fred the Fish Travel log to each student.
7. Show the second part of the power point, which is a simulation of what happens to Fred the Fish as he travels down a river. Introduce the activity by introducing Fred.

"I would like you to meet a little friend of mine named Fred. Fred is a fish who spent most of his life in a clean, pristine river, until one day he decided to venture downstream. He's lucky, and so are you, because he lived to share his adventure with you. Are you ready to hear about his adventure?"

8. Use the power point to tell Fred's story. Have volunteers from the class add the types of pollution to Fred's river (jar of water)

Fred the Fish (continued)

9. As Fred travels down the river, have all students keep track of his travels in their Fred the Fish Travel Log by writing down what he passed as he swam, the type of pollution he encountered, and indentify the source of pollution.
10. Discuss what happened to Fred at each stop. Ask for suggestions of things that students could do to help Fred's situation.
11. After completing the activity discuss which water quality test students might be used to see how each pollutant is affecting Fred. There will be overlap. For example:

Eroded soil – clouds the water (turbidity)

Fertilizer – contains phosphates and nitrogen (phosphate and nitrate)
lowers oxygen (dissolved oxygen)

Oil – harmful but no specific test (oil floats and can be seen)

Animal waste – decomposition released nitrates which can act to increase plant growth which could affect oxygen (nitrate and dissolved oxygen)

Trash – harmful but no test use eyes to look for trash

Warm soapy water – warm water holds less oxygen then cold water (dissolved oxygen)

Sewage – like animal waste decomposition releases nitrates which act like a fertilizer and lowers oxygen (nitrates and dissolved oxygen)

Hazardous waste – cause water to become too acidic or basic (pH)

CARE SHOULD BE TAKEN WHEN DISCARDING THE WATER USED IN THIS ACTIVITY. THE CONTENTS SHOULD BE Poured THROUGH A STRAINER SO THE SOLID MATERIALS AND OIL DO NOT CLOG THE DRAIN.

Assessment:

- Using Fred's travel log, have students research one of the types of pollution that Fred encountered and write about strategies that could be used to decrease the effect on Fred.
- Draw a cartoon that shows Fred's travels and the effect each pollutant had on Fred
- What wrong with this picture?

Sources:

Water Pollution; <http://www.sjrwm.com/waterbodies/pollutionsources.html>

The Dirty Details, Pelotes Island nature Preserve, <http://pelotes.jea.com>

Fred the Fish- A River ran Wild, Keys, Cheri, Brookville, Pennsylvania

<http://www.scilitlinks.org/fredthefish.htm>

Water, Stones, & Fossil Bones and was written by Karen Lind, National Science Teachers Association, 1991, ISBN 087355101X