

CSI Red River

Grades 9 – 12

Educational Program Guide

PASS

High School Science Process 1.1, 1.2, 1.3, 4.1–4.8, 6.1– 6.4

OAS

HS-LS2-2 | Science Practices 1, 2, 3, 4, 5, 6, 7, 8 | Core Ideas LS2, ESS3

Crosscutting Concepts, Cause and Effect, Stability and Change

Program Overview

In this two hour laboratory session, students will become familiar with basic water chemistry and aquatic biology. They will use this knowledge, along with fresh water test results, interviews and geographic information, to solve a series of mysteries based on actual Oklahoma Department of Wildlife case studies.

Objectives

After participating in this program, students will be able to:

- Have an understanding of how plants and animals interact within an aquatic ecosystem;
- Understand how natural conditions, pollutants and toxins affect freshwater organisms;
- Use science process skills (observation, communication, classification, measurement, inference and prediction) within the parameters of actual case studies.

Background

Fish kills are often the first visible signs of environmental stress and are usually investigated as a matter of urgency by environmental agencies. Many fish species have a relatively low tolerance for variations in their ecosystem and death is often an indicator of problems that could affect plants, insects and other invertebrates. These same environmental problems may have a direct impact on the water we drink and use every day. Factors that affect aquatic ecosystems are:

- Extreme water temperatures;
- Dissolved oxygen levels;
- Natural toxins such as golden algae;
- Fertilizer, pesticide and chemical runoff from residential or commercial areas

At the Museum

Orientation Gallery

Locate the Ichthyology display to learn about how Sam Noble Museum scientists collect, study and protect fish species around Oklahoma!

Hall of Natural Wonders

Be sure to visit the Upland Stream in the Hall of Natural Wonders. Compare and contrast fast flowing areas, such as riffles, to slow moving areas, like deep pools and ponds. Consider the following questions:

- What kinds of animals and plants live in each area?
- What adaptations do they have that allow them to survive in their environments?
- If a chemical spill occurred in the Upland Stream, which populations would have a better chance of survival (populations in the Deep Pool or the Riffle)? Why?

Vocabulary

Aquatic Ecosystem

A group of organisms within a body of water that depend on each other for survival.

Invertebrate

A multicellular animal without a backbone, for example, arthropods and mollusks.

Dissolved Oxygen (DO)

Oxygen that is dissolved in water through diffusion or plant photosynthesis.

Golden Algae

Aquatic, photosynthetic organisms belonging to the Kingdom Chromalveolata. Golden Algae produce a toxin that negatively affects gill-breathing species such as fish, and some invertebrates.

Be familiar with the importance of the following in freshwater environments:

Phosphate

Phosphate is necessary for photosynthesis. Small amounts are natural. Large amounts can cause algal blooms.

Nitrates

Nitrates are needed for plants to create protein, but in large amounts (over 30 parts per million) can cause illnesses and death in fish.

pH

pH is the measure of acidity or basicity of a liquid. A pH of 7 is neutral and the ideal pH for water. Water that is too acidic or basic is fatal to plants and fish.