

Lesson 15

Water Threats

What is the reason salmon populations have declined?
Why is the Rainbow Dam fish ladder in Windsor important to the salmon?
What are Farmington River Watershed and DEP doing to help the salmon?

GOAL To understand that salmon were once plentiful in the Farmington River Watershed and restoration projects are ongoing.

OBJECTIVES Students will:

- ✓ become familiar with the life cycle of the salmon
- ✓ understand the reasons for the decline of salmon
- ✓ identify ways that schools and organizations participate in the restoration of salmon to this area
- ✓ create and participate in a salmon game

MATERIALS butcher block paper, markers, scissors,

CORE CURRICULUM CONTENT STANDARDS

- Science 3(1-3), 5(4,6,7), 6(1), 14(2,8)
- Social Studies 4(1,2), 9(2), 11(7), 12(4)

VOCABULARY fish ladder, incubating, alevin, fry, restoration, anadromous, pollutants

PROCEDURES

1. Discuss the salmon restoration project with students. Explain that the Connecticut River Watershed and the stocking of the Farmington River and its tributaries are helping to restore Atlantic salmon to the Connecticut River watershed. Because of dam construction and other restrictions to waterways, salmon and other *anadromous* (*return from the sea or ocean to where they were originally born to spawn*) species of fish population declined. With the construction of the fish ladder at the Rainbow Reservoir, fish use the ladder as a passageway to return to spawn. In order to promote the proliferation of salmon, CT DEP Whittemore fish hatchery, housed one-mile downstream of the Goodwim Dam, produces 150,000 to 300,000 Atlantic salmon eggs. Connecticut DEP and its partners continue to help restore Atlantic salmon to the Connecticut River watershed. The program involves incubating Atlantic salmon eggs in a chilled aquarium tank beginning in early January. These eggs were previously harvested from salmon that returned to the Connecticut River. The eggs hatch around mid-February into alevin, a small fish of about one to one and half inches. See Atlantic Salmon Life Cycle - ASF (by P.O. Pennenan) on CD. Supported by a yolk sac (the egg residual), its sole source of food supply, the salmon alevin approaches the "fry" stage at the end of April or early May. At this point, the sac will be gone and the fish look like streamlined small minnows. Many schools participate in programs that involve raising salmon and releasing them into rivers as fry. Many species of salmon are anadromous—they spawn, or lay their eggs, in fresh water; the young migrate to salt water and grow

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up there; and the fish return to fresh water to breed after they reach maturity. The migratory instinct of members of the salmon family is remarkably specific, each generation returning to spawn in exactly the same breeding places as the generation before it. Some salmon migrate hundreds or even thousands of miles to reach their spawning grounds. Even those species that do not migrate from fresh water to salt water spawn in the same freshwater streams as did their ancestors.

1. Inquire about the reasons salmon populations decline. Provide time for students to reflect on this. Before the colonization when Native Americans inhabited this area, salmon fish were plentiful in the rivers. Since salmon migrate to the ocean and then return, an unobstructed passageway is necessary to its survival. Also, salmon are sensitive to changes in water quality.
2. Discuss with students and explain that paper factories and other industries grew along the river, and a lot of pollutants flowed into the river from the factory wastes. Environmental laws did not exist, so plants were not regulated or restricted as they are today.
3. Also, dams were built to control the river flow and in some cases, to prevent flooding. This wall or dam prevented the salmon from returning to their original home.
4. The salmon's diet consists of microscopic plants and small animals, such as insects.
5. In order for students to understand the challenges of a salmon, have them participate in a salmon game that demonstrates the migratory route.
 - a. Have students create 17 circles out of butcher block paper. Inside circles, have them write the information listed at the end of this lesson. Have circles arranged on floor to demonstrate the migratory route of the salmon.
 - b. Ask if the salmon will make it to the CT River and return to its original habitat. Explain that the purpose of the game is for salmon to be able to return to its original habitat.
 - c. Have students make several games so more students can participate. Have them use one die to determine amount of spaces.
 - d. The information for the circles follows:
 1. Small fry are released in Stratton Brook, Simsbury CT. Go forward 5 spaces.

2. Salmon continue to Hop Brook and feed on lots of water insects. Go forward 2 spaces.
 3. Salmon connect to Farmington River. Go forward 3 spaces.
 4. Salmon take wrong turn and head towards Salmon Brook, Granby. Go back 1 space.
 5. They enjoy the cool waters in a shaded area and decide to remain in this habitat for awhile. Lose a turn.
 6. High river levels cause turbulence in river waters. Salmon head in opposite direction. Go back two spaces.
 7. Perfect conditions to head towards East Granby and Windsor. Go forward 6 spaces.
 8. Salmon make it to Rainbow Reservoir in Windsor. Go forward 4 spaces.
 9. The water is calm. Salmon remain for two weeks. Lose a turn.
 10. Salmon continue on their journey making it to CT River and to Atlantic Ocean. Go forward 10 spaces.
 11. Salmon returns to head back to original release area. Go forward 1 space.
 12. Low levels near the CT River turn to Rainbow Fish Ladder. Go back 5 spaces.
 13. Goes up fish ladder. Go forward two spaces.
 14. Gets caught in turbine. Go back 3 spaces.
 15. Salmon continues on Farmington River in Windsor. Go forward 2 spaces.
 16. Stream flows enable salmon to make turn towards Simsbury. Go forward 2 spaces.
- j. Ask students what a fish ladder is.(passageway that helps the salmon go upstream when there is a dam).
- k. Ask why the Rainbow Reservoir in Windsor and fish ladder are important to the continuation and restoration of salmon.

EXTENSIONS

1. Have students create their own salmon game and migratory route.
2. Have students read a salmon story and write a story from the salmon's viewpoint.
3. Draw a poster of the salmon's life cycle - visit the Atlantic Salmon Federation's website at www.asf.ca for details.
4. Follow a salmon's route on a map.

RESOURCES

<http://www.asf.ca/Overall/lifecycle.html>, Atlantic Salmon Federation, J.O. Pennanen.

GLOSSARY

alevin - young fish; fry

anadromous - migrating up rivers from the sea to breed in fresh water

fish ladder - a series of pools arranged like ascending steps at the side of a stream, enabling migrating fish to swim upstream around a dam or other obstruction

fry - small fish, especially young, recently hatched fish

incubating - to sit on (eggs) to provide heat, so as to promote embryonic development and the hatching of young; brood

pollutants - something that pollutes, especially a waste material that contaminates air, soil or water

restoration - something, such as a renovated building, that has been restored