Lesson 2: Fish Habitat

Activity: Observe, collect environmental data and describe an aquatic site near school using a field notebook.

Grade level: 4-8
Subjects: Science, social studies
Setting: Classroom, aquatic site near school
Duration: Three 50-minute classes
Key terms: Habitat, restoration

Objectives

Following this lesson, students will be able to:

- Name three basic requirements for fish survival.
- Name several Great Lakes fish species and their habitat.
- Explain two ways human activities impact Great Lakes fish habitat and affect the survival of fish and other organisms.
- Make purposeful observations of a nearby aquatic area using illustrations, photographs and narratives.
- Describe scientific questions about habitat and human impact based on observations.
- Use observations to predict which Great Lakes fish might favor that particular habitat.

Summary

A healthy environment supports a variety of native species. This is especially true for Great Lakes fish. Different species of fish require specific habitats, and loss or alteration of fish habitat can lead to population declines. This lesson explains some of the characteristics of healthy fish habitat and guides students in making their own field observations and scientific predictions.

Background

Like other living creatures, fish must meet certain basic needs for survival. Water, food and shelter are among the most important requirements:

- **Water:** Fish not only live in water, but they get oxygen from water. They breathe by taking water into their mouths and forcing it out through gill passages.
- **Food:** Fish must be able to find enough to eat at various life stages, whether they feed on microorganisms, small fish or larger prey.
- **Shelter:** Fish need a place to hide from predators and to reproduce. Some fish find shelter among submerged aquatic plants and shoreline vegetation, while others hide among rocks, soft sediments, or blend into clear, open waters.

Where can fish meet these needs? Fish are adapted to living in a variety of habitats. Some examples include the following:

- Rivers
- Streams
- Inland lakes
- Great Lakes
- Coastal wetlands

These habitats can vary greatly in water quality, turbidity, speed of water flow, amount of vegetation, water temperature, and water composition. Fish are particularly sensitive to water temperature and oxygen content, which play a major role in determining which species can survive in a given water body. See *Aquatic Habitat Data Worksheet* for examples of 14 common fish species and their preferred habitats.

Human Impacts on Fish Habitat

Over the last century, many factors have altered water quality and fish habitat and subsequently affected native fish populations. Some examples include:

- **Coastal Development:** Increasing development in coastal areas threatens the function and diversity of coastal wetlands. These areas are critical during the early life stages of many fish species. Removal of shoreline vegetation and trees from riverbanks can decrease shade and increase water temperature. Lack of vegetation also increases erosion and sedimentation, which alters spawning areas. Dams and other obstacles can prevent fish from migrating upstream to reach critical spawning habitat.
- **Invasive Species:** Invasive species compete with native fish for food and habitat. Round goby and Eurasian ruffe are examples of fish that have displaced native species in some locations. Invasive species can also change habitat. By filtering microorganisms, zebra mussels reduce food for native species and increase water clarity, which stimulates growth of aquatic plants.
- **Pollution:** Industrial pollutants, urban and agricultural runoff, and sewage overflows are some of the sources of pollutants that continue to impair Great Lakes water quality and impact fish habitat.

Habitat Restoration

People around the Great Lakes region are working to restore fish habitat for a number of native fish populations. Some examples include:

- **Lake Sturgeon:** Several groups teamed up to construct spawning reefs for lake sturgeon in the Detroit River to increase population of this threatened species.
- **Walleye:** The Fisheries Division of the Michigan Department of Natural Resources is implementing a walleye recovery plan for Saginaw Bay to enhance walleye populations and production in Saginaw Bay
- **Coaster Brook Trout:** Researchers in the Upper Peninsula and Canada are tagging and monitoring this fish to learn more about its unique habitat requirements.

Materials and Preparation

- Aquatic Habitat Data Worksheet
- Water thermometer
- Secchi disk: for measuring water clarity (optional)

Note: See Aquatic Habitat Data Worksheet and other materials at the end of this lesson (supplemental materials).

Procedure

1. Begin with a group discussion on fish habitat. Ask students: What do fish need in order to survive? (Basic needs include food, water and shelter.)
2. Ask students to name some different types of aquatic habitats where fish can meet their needs. Answers might include lakes, ponds, rivers, and small streams. How might these habitats vary? (Water might be warm, cold, fast moving, sluggish, turbid, clear, etc.) Explain that flowing water contains more oxygen than still water. Fish are very sensitive to the amount of dissolved oxygen available.
3. Using the Aquatic Habitat Data Worksheet download, discuss examples of common Great Lakes fish and their preferred habitats. Ask if students are familiar with these fish. Do they know of other examples?
4. Introduce the concept of indicator species. Explain that the presence of some organisms such as mayflies, stoneflies, and caddisflies indicates good water quality, an important part of healthy fish habitat. Note also that the number and type of aquatic plants (which form the base of the aquatic food web) can indicate health of a stream, river, pond or lake.
5. Next, ask if students are familiar with an aquatic habitat near their home or school. Ask them to describe its main characteristics.
6. Explain to students that they'll be visiting a nearby aquatic area (river, pond, marsh, drainage ditch, etc.) to examine the habitat, record their observations (field data), and make predictions about what fish might live there.
7. Create groups of three to four students. Distribute field notebook pages. Help students select roles:
   - Note taker: records observations
   - Observer(s): relays information to note taker
   - Illustrator/photographer: sketches or photographs key characteristics of the aquatic habitat.
   - Data analyst: creates simple table or graph using data collected.
8. Have the groups visit a nearby aquatic site, taking the field observation worksheet with them. Each student completes his or her task within the group, recording and/or illustrating characteristics of the aquatic habitat. Encourage students to record as much detailed data as they can. For example, if applicable, estimate the number of aquatic plants, or the number of different aquatic organisms. Numerical data can be used later to create a simple table or graph.

9. Return to the classroom and have groups complete their field data worksheets. Remind them to use the examples of common fish and their habitat to make a prediction about what fish species might favor that particular habitat. Write the prediction on the field notebook page.

10. Have the groups share their field notebooks and observations with the class. Did any groups see fish or other living organisms? Remind students that the presence of some organisms can be used as water quality indicators.

11. If no aquatic organisms were seen, what do students predict might live there based on the physical characteristics of the site? Emphasize how much we can learn about a particular habitat by making careful observations.

12. Finally, discuss any factors that may be impacting or altering the habitat, such as proximity to roads or buildings (which might increase runoff), and what steps could be taken to lessen or mitigate these impacts. Examples might include creation of grassy buffer zones to filter urban runoff, shoreline restoration projects that replace concrete banks with natural materials and native plants (soft engineering), or working with local watershed groups to post informational signs to prevent the spread of aquatic invasive species.

Extension

- Invite a local fisheries scientist or watershed expert to speak to the class about what is known about the particular habitat visited by the students. For larger rivers and water bodies, scientific assessments can often be found online that document major fish species and historic range. Compare the results with the student predictions.
  See: MDNR Fish Atlas.
- For older students: Use three-dimensional modeling software to create a virtual habitat that includes environmental threats. Discuss possible mitigations.

Source

FLOW Development Team

Acknowledgements

Jim Diana, Professor of Natural Resources, School of Natural Resources and Environment and Associate Research Scientist, Center for Great Lakes & Aquatic Sciences, University of Michigan College of Literature Science and Arts; and graduate students from Professor Diana's 2007 course, Biology and Ecology of Fishes.

Assessment & Standards

See separate document: FLOW_Assessment_GLCE.pdf

FLOW Feedback

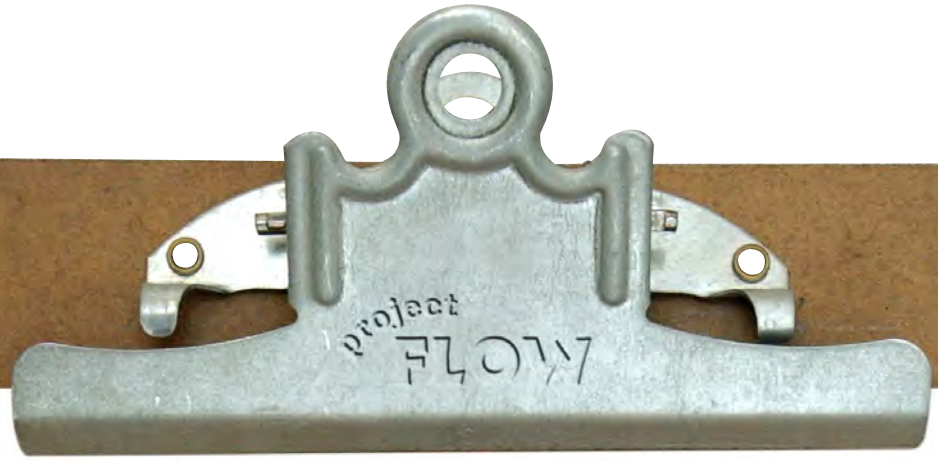
Please take 10 minutes to provide us with your feedback.

Go to: http://www.miseagrant.umich.edu/flow/flow-feedback.html

Supplemental Materials: FLOW Unit 3, Fish

Lesson 2 - Fish Habitat Document:

- Aquatic Habitat Data Worksheet



Aquatic Habitat Data Worksheet

Date: _____ Study location: _____

Field observation team: _____ Weather: _____

Water Temperature: _____

Habitat type: ☐ Ditch ☐ Stream ☐ River ☐ Pond ☐ Wetland ☐ Lake

Description: _____

_____

Soil: ☐ Sandy ☐ Rocky ☐ Clay ☐ Silt ☐ Sediment

Description: _____

_____

Shoreline Vegetation: ☐ None ☐ Moderate growth ☐ Dense plant growth ☐ Wooded

Description: _____

_____

Aquatic vegetation: ☐ None ☐ algae ☐ floating plants (ie, lilypads) ☐ submerged plants ☐ rooted plants (ie cattails)

Description: _____

_____

Water clarity: ☐ Clear ☐ Somewhat clear ☐ Cloudy (turbid)

Description: _____

_____

Water movement: ☐ Still ☐ Slow moving ☐ Gently flowing ☐ Fast moving

Description: _____

_____

Water depth (if known) _____ Vertebrates: _____

Living organisms _____ Macroinvertebrates: _____

Description: _____

_____

_____

_____

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Aquatic Habitat Data Worksheet

Observation Illustration and Summary

Use the space below to draw or photograph significant details of the aquatic habitat at this site. Write a short summary of the habitat based on field observations, notes, and illustrations. Be sure to record any other characteristics of this particular aquatic habitat. Additional factors might include fallen logs or other objects in the water, proximity of water to buildings or roads, whether the shoreline is altered in any way by humans (e.g. mowing, etc)

Based on the habitat illustration and summary above, make a predication about which species of freshwater fish might live in this type of habitat and why. Refer to habitat cards for examples.

Habitat prediction: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

FISH HABITAT

Unit 3, Lesson 2

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More than 160 species of fish thrive in the Great Lakes region. All species tolerate cold, near freezing water temperatures for several months every year. However, during warmer months, fish can be grouped by water temperature preference. Listed here are some common fish species and their habitat.

WARMWATER FISH
(higher than 75 degrees)

Black bullhead
Ameiurus melas
Habitat: Ponds, sloughs, and sluggish parts of creeks and rivers; in shallow and often silty water.

Bluegill
Lepomis macrochirus
Habitat: Vegetated lakes and slow-moving streams. Prefers weedy areas with lily pads and other aquatic vegetation.

Common carp
Cyprinus carpio
Habitat: Primarily warm rivers and inland lakes. Tolerant of silty and turbid environments. Bottom-feeder.

Largemouth bass
Micropterus salmoides
Habitat: Warm, weedy, or brushy lakes and ponds, bayous, backwaters, and quiet streams.

COOLWATER FISH
(higher than 65 degrees but less than 75)

Northern pike
Esox lucius
Habitat: Cool to moderately warm, weedy lakes, ponds and sluggish rivers.

Pumpkinseed
Lepomis gibbosus
Habitat: Cool, weedy ponds, small lakes and slow-moving streams.

Smallmouth bass
Micropterus dolomieu
Habitat: Clear, gravel-bottom runs in flowing rivers; shallow rocky areas of lakes.

Walleye
Sander vitreus
Habitat: Cold, clear waters of lakes and streams. Prefers sand, gravel or rock bottom. Seldom found in mud-bottomed waters.

Yellow perch
Perca flavescens
Habitat: Thrives in a variety of locations, including quiet ponds, streams with little current, and large and small lakes. Also found in the Great Lakes.

COLDWATER FISH
(less than 70 degrees)

Brook trout
Salvelinus fontinalis
Habitat: Cold, clear lakes and streams.

Chinook salmon
Oncorhynchus tshawytscha
Habitat: Deep open waters of the Great Lakes. Spawns in tributaries in autumn.

Deepwater sculpin
Myoxocephalus thompsonii
Habitat: Cold, bottom waters of the Great Lakes.

Emerald shiner
Notropis atherinoides
Habitat: Pelagic (open water) species found in large lakes and rivers.

Lake whitefish
Coregonus clupeaformis
Habitat: Cold, deep waters of the Great Lakes; cold, deep inland lakes.

Sources:
Fishes of the Great Lakes Region
Michigan Fishes (Michigan State University and Michigan Dept. of Natural Resources)
Reviewers: Gerald R. Smith; Solomon David