Lesson Plans

MOSS

McCALL OUTDOOR SCIENCE SCHOOL

University of Idaho

College of Natural Resources

Title: Have to Have a Habitat
Grade Level: 5th-8th grade

<table>
<tr><td>Topic:</td><td>Trout Habitat</td></tr>
<tr><td>Background:</td><td>The following chart lists the ideal conditions for trout habitat.
<table>
<tr><td>Dissolved Oxygen:</td><td>> 7 mg/L</td></tr>
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<tr><td>Next Generation Standards:</td><td>ESS2.C</td></tr>
<tr><td>Goals:</td><td>In this lesson, students will learn about ideal trout habitat conditions. They will also learn about why these conditions are important and what it means for the trout when these conditions are not present.
The essential questions for this lesson will address:
• What are the components of a trout habitat?
• What things might a trout need to live?
• What makes certain conditions more ideal than others?</td></tr>
<tr><td>Objectives:</td><td>Students will understand what conditions make for an ideal trout habitat.
Students will be able to point out characteristics that make one habitat more suitable for trout over another.</td></tr>
<tr><td>Materials:</td><td>Notebooks or journals for drawing and taking notes</td></tr>
<tr><td>Set up:</td><td>Students need a prior base knowledge of water characteristics including pH, water velocity conductivity, nitrates, and water temperature.</td></tr>
<tr><td>Classroom Time:</td><td>45 min-1 hour</td></tr>
<tr><td>Introduction (Engage):</td><td>Ask “what is a habitat?”
Activity:
Have students draw a concept web in their journals of all the things that people need in order to live. Have the students circle things that trout also need. Have students pair with another student to share their webs.

Sing “Habitat Song:” (to the tune of “Lollipop, Lollipop”)
Habitat, Habitat, Have to Have a Habitat</td></tr>
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	Habitat, Habitat, Have to Have a Habitat The trout that swim in creeks like ours Need certain things That's how they are: Food to eat like caddis flies And a place to hide From you and I Habitat, Habitat, Have to Have a Habitat Habitat, Habitat, Have to Have a Habitat They like the water cold you see With plenty oxygen to breathe Water that's moving fast and clear It's how the trout are healthy here Habitat, Habitat, Have to Have a Habitat Habitat, Habitat, Have to Have a Habitat Discuss: What are components of a trout habitat? What things might trout need in order to live?
Activity (Explore):	Play Trout habitat game (adapted from Oh Deer) copied from http://wildlife.state.co.us/Education/TeacherResources/ProjectWild/OhDeer.htm and adapted for trout instead of deer 1. Tell students they will be participating in an activity that emphasizes the most essential things animals need in order to survive. Review the essential components of habitat with the students: food, oxygen, shelter, and space in a suitable arrangement. This activity emphasizes three of those habitat components— food, oxygen and shelter—but the students should not forget the importance of the animals having sufficient space in which to live, and that all the components must be in a suitable arrangement for wildlife populations to reach their maximum size. Since we are adapting this game for trout, we will use food, oxygen and shelter as the three limiting factors. 2. Ask the students to count off in fours. Have all the "ones" go to one area; all "twos", "threes", and "fours" go together to another area. Mark two parallel lines on the ground or floor 10 to 20 yards apart. Have the "ones" line up behind one line; the rest of the students line up behind the other line, facing the ones. 3. The "ones" become "trout". All trout need good habitat in

order to survive. Again, ask the students what the essential components of habitat are: food, oxygen, shelter, and space in a suitable arrangement. For the purposes of this activity, assume that the trout have enough water in which to live, but they are limited by oxygen. The trout (the "ones") need to find food, oxygen, and shelter in order to survive. When a trout is looking for food, it should clamp its "fins" over its stomach. When it is looking for oxygen, it puts its "fins" over its mouth. When it is looking for shelter, it holds its "fins" together over its head. A trout can choose to look for any one of its needs during each round or segment of the activity; the trout cannot, however, change what it is looking for (e.g., when it sees what is available during that round). It can change what it is looking for in the next round, if it survives.

4. The "twos", "threes" and "fours" are food, oxygen and shelter—components of habitat. Each student is allowed to choose at the beginning of each round which component he or she will be during that round. The students depict which component they are in the same way the trout show what they are looking for; that is, hands on stomach for food, etc.
5. The activity starts with all players lined up behind their respective lines (trout on one side, habitat components on the other side) — and with their backs facing the students along the other line.
6. Begin the first round by asking all of the students to make their signs—each trout deciding what it is looking for, each habitat component deciding what it is. Give the students a few moments to put their hands in place—over stomachs, mouths or over their heads.
7. NOTE: Switching symbols in the middle of a round can be avoided by having stacks of three different tokens, or pieces of colored paper, to represent food, water, and shelter at both the habitat and trout ends of the field. At the start of each round, players choose one of the symbols before turning around to face the other group
8. When the students are ready, say: "Oh Trout!" Each trout and each habitat component turn to face the opposite group, continuing to hold their signs clearly.
9. When trout see the habitat component they need, they are to run to it. Each trout must hold the sign of what it is looking for until getting to the habitat component student with the same sign. Each trout that reaches its necessary habitat component takes the "food", "oxygen", or "shelter" back to the trout side of the line. "Capturing" a component represents the trout successfully meeting its needs and

	successfully reproducing as a result. Any trout that fails to find its food, oxygen or shelter dies and becomes part of the habitat. That is, any trout that died will be a habitat component in the next round and so is available as food, oxygen, or shelter to the trout that are still alive. 10. NOTE: When more than one trout reaches a habitat component, the student who arrives there first survives. Habitat components stay in place until a trout chooses them. If no trout needs a particular habitat component during a round, the habitat component just stays where it is in the habitat. The habitat component can, however, change which component it is from round to round. 11. Record the number of trout at the beginning of the activity and at the end of each round. Continue the activity for approximately 5 + rounds (time dependent). 12. At the end of the rounds, gather the students together to discuss the activity. Encourage them to talk about what they experienced and saw. For example, they saw a small number of trout (seven students in a class size of 28) begin by finding more than enough of its habitat needs. However, because the population of trout expanded over two to three rounds of the activity until it exceeded the carrying capacity of the habitat, there was not sufficient food, oxygen, and shelter for all the members of the herd. At that point, trout starved or died of lack of oxygen or lack of shelter, and they returned as part of the habitat. Such things happen in nature also. NOTE: In real life, large mammal populations might also experience higher infant mortality and lower reproductive rates. 13. Using an overhead projector, a flip chart pad, or an available chalkboard, post the data recorded during the activity. The number of trout at the beginning of the activity and at the end of each round represents the number of trout in a series of years. That is, the beginning of the activity is year one; each round is an additional year. *For example:* The students will see this visual reminder of what they experienced during the activity: the trout population fluctuated over a period of years. This process is natural as long as the factors that limit the population do not become excessive, to the point where the animals cannot successfully reproduce. The wildlife populations will tend to peak, decline and rebuild; peak, decline, and rebuild—as long as there is good habitat and sufficient numbers of animals to reproduce successfully.
Explanation	Graph results of habitat game and begin to discuss why we see the

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<tr><td></td><td>trends we see.
In discussion, ask the students to summarize some of the things they learned from this activity. What do animals need to survive? How do these components influence carrying capacity? What are some "limiting factors" that affect the survival of animals? How do factors limiting carrying capacity affect the health, numbers, and distribution of animals? How do these factors affect competition within a species? Why is good habitat important for animals? Are wildlife populations static, or do they tend to fluctuate as part of an overall "balance" of nature? Is nature ever really in "balance" or are ecological systems involved in a process of constant change?</td></tr>
<tr><td>Elaboration:</td><td>Begin Discussion of Ideal Trout Habitat Characteristics:
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Have the students write in their journals and make a hypothesis about why each of these characteristics is “ideal” for trout. Have the students share their ideas within smaller groups and then have the small groups share a few of their hypotheses with the whole class. Within the discussion, make sure to elaborate on these points:
Dissolved Oxygen: Organisms living in the water require oxygen to breathe. Different organisms show different tolerances for DO levels. A DO of at least 5 mg/L is required for the water to support a diversity of organisms.
pH: Measuring pH can tell us lots of things about what might be happening around our water site. Rather than looking for a single number to determine “good” or “bad” water quality, we use the numbers we find to try to understand what is going on. If we get a low pH, can it be explained by the substrate? The surrounding plant life? If we get a high pH, this might mean there is phosphate and nitrate run-off into our water – are there</td></tr>
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	Different organisms can tolerate different pH levels. Bacteria have a wide range of tolerance (2-13). Catfish, suckers and plants have a smaller range of tolerance but it is still fairly wide (4 – 10 or so). Trout, salmon and many macro invertebrates are very sensitive to changes in pH and can only tolerate a very narrow window around neutral (6 – 8). Temperature: Moderate maximum summer water temperatures were the best for trout density (12.6-18.6 °C) with very few trout recorded in areas with maximum summer water temperatures less than 6 °C or greater than 26.4 °C in North American streams. Warmer water allows for faster rates of photosynthesis and growth. This leads to greater rates of decomposition and an increased demand for oxygen. Warmer water increases the metabolic rates of organisms, thereby increasing their sensitivity to toxins and disease. Colder water holds more oxygen Nitrogen: Nitrogenous compounds are often limiting in freshwaters and thus higher levels would result in higher productivity, more food items and therefore more predators, including trout. However, very high concentrations, particularly combined with low pH and high temperatures, results in eutrophication and may limit oxygen levels or act as a direct toxin to trout, especially in the form of nitrite (NO2) or ammonia (NH3). Shelter: Trout cover- Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas have an excess of 55% of the available area of the stream containing some form of cover. Stream Velocity can have a direct influence on the health, variety, and abundance of aquatic communities. If water flows too quickly, organisms might be unable to maintain their hold on rocks and vegetation and be washed downstream; if water flows too slowly, it might provide insufficient aeration for species needing high levels of dissolved oxygen. Stream velocity by dams, channelization, terrain, runoff, and other factors.
Evaluation:	Write a story about a trout and the place where it lives, or draw a picture of its perfect home. Students' ability to demonstrate healthy trout habitat conditions indicates their understanding from the day.

Additional resources:

- "Oh Trout" game adapted from: http://wildlife.state.co.us/Education/TeacherResources/ProjectWild/ OhDeer.htm
- USGS Water Quality Info: http://waterdata.usgs.gov/nwis/qw