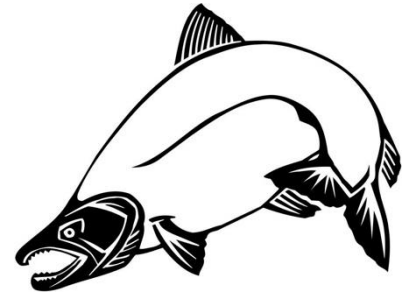


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# Salmon Scales

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## Purpose:

- This lesson introduces students to the use of scales by fish biologists to age individual fish, assess the health of watersheds, and monitor fish populations. Students will use microscopes to investigate fish scales to determine the age of a salmon.

## Objectives:

- Students will use observations of fish scales to estimate the age of the salmon.
- Students will explain how environmental factors, such as food availability, pollution and water temperature, affect the growth of salmon by discussing the scales as a class.
- Students will explain how fish scales can be used to determine watershed health.

## Materials:

- Scale sample slides (green-16, blue-5) (provided)
- Salmon Scales PowerPoint (provided)
- Microscopes (not provided)
- For making your own scale slides:
  - Scalpel (not provided)
  - Paper towels (not provided)
  - Food dye (not provided)
  - Clean slides or scotch tape (not provided)

**Time Required:** 1 hour

**Appropriate grades:** 6-8

**NGSS and Common Core Standards:**

**MS-LS1-5:** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

**CCSS.ELA-LITERACY.SL.6-8.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics, texts, and issues, building on others' ideas and expressing their own clearly.



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## Activity:

<p><b>Introduction</b></p>	<ul style="list-style-type: none"> <li>• You can use the blue and green pre-made scale slides provided, or your students can make their own scale slides.</li> <li>• <b>How to make your own scale slides:</b> (Scale samples can be taken following the <i>Salmon Dissection</i> lesson, or from a salmon filet dinner— just take the sample before cooking.)             <ul style="list-style-type: none"> <li>○ Wipe the slime off the fish. With the scalpel or other knife scrape backwards, against the natural alignment of the scales. As you scrape, scales will dislodge from the skin. (Fisheries biologists take scale samples from the left side of the fish, above the lateral line and just back from the dorsal fin, but scales may be sampled from any part of the body).</li> <li>○ Rinse dislodged scales gently and dry briefly on paper towels.</li> <li>○ Mix 2 parts water to 1 part dark food coloring.</li> <li>○ Dye scales by allowing them to soak in the dye solution for a couple minutes.</li> <li>○ Place scales on slides or use clear scotch tape (place your scale on one piece and then place another piece of tape on top).</li> </ul> </li> <li>• Ask students if they know how biologists tell the age of a tree. (Most students are familiar with tree rings).</li> <li>• Explain that many fish scales have rings similar to tree rings; biologists can often tell the age of a fish by counting the rings on a scale.             <ul style="list-style-type: none"> <li>○ Display diagram of tree ring and scale and compare (see Salmon Scales PowerPoint).</li> <li>○ Point out that a tree gains a new ring with each year of growth, similar to the rings students will be seeing on the salmon scales</li> </ul> </li> <li>• Display scale diagram (see Salmon Scales PowerPoint) and explain the function of scales and how scales relate to salmon growth.</li> </ul>
<p><b>Body</b></p>	<ul style="list-style-type: none"> <li>• In pairs or teams, students will examine scale samples under a microscope. Handle the scale slides with care as they are made of glass. There are green scale slides and blue scale slides provided in the kit **</li> <li>• Students will draw a diagram of their scale sample and roughly estimate the age of their salmon.</li> </ul>
<p><b>Closure</b></p>	<ul style="list-style-type: none"> <li>• Discuss the students' results and any implications on the fish's life history and watershed health: Can the scale tell you anything about how your salmon grew? Look for differences between the two specimens provided</li> </ul>



	<p>(green vs. blue scales). If students make their own scale slides have them compare their scales to those in the kit.</p> <ul style="list-style-type: none"> <li>• Possible Discussion Questions: <ul style="list-style-type: none"> <li>○ Why might two scales from the same fish have different numbers of annuli? <i>(Sometimes fish lose scales and those that are lost will be replaced with new ones that lack the original growth rings).</i></li> <li>○ What factors would cause a fish to grow slower? <i>(Decrease in food supply, decrease in metabolic rate that results from cooling water temperatures, stress from pollution, stress from spawning, etc.).</i></li> <li>○ What factors would cause a fish to grow faster? <i>(Ideal water temperatures, lack of competition, abundant food supply, etc.).</i></li> <li>○ Why would scientists be concerned with the age of fish? <i>(Oftentimes when a body of water is thought to be polluted, scientists will collect scales from fish and compare their age to their size. They can compare the results to known growth rates of fish from healthy bodies of water and determine if a fish's growth is being hindered by environmental conditions).</i></li> </ul> </li> </ul>
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\*\*There are scales from two very different salmon provided in this kit. The green scales were taken from a fillet of a wild, Alaskan sockeye salmon. The blue scales were taken by a US Fish and Wildlife Service crew on the Klamath River near Iron Gate Dam. The fish was a large, male Chinook salmon and most likely a hatchery born fish, given the location of its return.

## Modifications:

- **Elementary:**
  - Images from a teacher microscope, or other images online, could be projected onto the board for the class to look at and count the annuli together.
  - Students could create paper models of salmon scales with circuli and annuli on them.
- **High School:**
  - Extend the investigation into what traits a fisheries biologist may look for in scales to indicate the health of habitat.
  - Have students research the rivers or streams that their fish was found in to look for specific sources of pollution or other indicators of watershed health.

This activity was adapted from the AmeriCorps Watershed Stewards Project Education Handbook, Service Year 16 (2010).

