



Grade Level: 7
Subject: SCI

Salmon Population Monitoring

ESSENTIAL UNDERSTANDINGS

- Lifeways
- Sovereignty
- Language

LEARNING OUTCOMES

- Students will be able to analyze data from salmon population monitoring to determine trends in numbers.
- Students will be able to construct an explanation that predicts patterns of interactions between man-made items and fish populations.
- Students will be able to construct an argument supported by evidence that changes to physical or biological components of an ecosystem affect populations.
- Students will be able to apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

CULTURALLY RESPONSIVE PRACTICES

- Connecting to the lives of students
- Proximity
- Preserving and honoring cultural history
- Student talk, working together and individually

ASSESSMENT

Students will be assessed on their active participation in the group observation activity and their proficient completion of the “Design A Method” worksheet.

Overview

Monitoring and maintaining the salmon populations in the waters of Oregon is a critical concept in maintaining a thriving ecosystem. In this lesson, students will analyze, discuss, and ask questions about authentic statistical data regarding the status of Oregon’s waters and the recorded salmon population over the last ten years. Students will be presented with scenarios after reviewing the data and will be asked to design a method for either monitoring or minimizing human impact on the environment.

MATERIALS

- [Background Information Reading Document](#)
- [Population Data Packet](#)
- [Salmon Population Monitoring Presentation](#)
- [Human Impact Scenarios](#)
- [Design a Method Worksheet](#)

LOGISTICS

- Where does this activity take place?
Classroom
- How are the students organized?

Whole Class Teams: 3-5

Pairs Individually

TIME REQUIRED

2, 45-60 minute sessions

STANDARDS

Next Generation Science Standards

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Background for Teachers

[Tribe celebrates return of this year's first salmon](#)

[Tribal Government Day honors Native First Foods](#)

[Coho salmon return to Agency Creek](#)

[Grand Ronde returns to the Willamette Falls fishing platform](#)

[The First Fish Celebration](#)

[nsayka munk-smuk k'apa k'wənat \(We Smoke Salmon\)](#)

[Coyote Builds Willamette Falls and the Magic Fish Trap](#)

[Coyote and the Fish Trap Recorded in Chinuk Wawa](#)

[CTGR Wildlife Management Plan](#) - See pages 21-30 for salmon information

[Grand Ronde tribes call on Congress to help lift Oregon hunting and fishing restrictions](#)

[Tribal member Sara Thompson, the Tribe's only female ceremonial fisher, speaks to the consent decree](#)

[NPS: The Salmon Life Cycle](#)

VOCABULARY

- **Smolt** - a young salmon, about two years old, that is at the stage of development when it assumes the silvery color of the adult and is ready to migrate to the sea.
- **Population** - the number of people or things in a certain area
- **Monitor** - to watch something or someone closely to make sure it is working or behaving as it should
- **Weir** - a barrier built across a river or stream to raise the level of the water. It is often used to measure the amount of water flowing in a river or to control flooding
- **Fish Ladder** - a pathway built for fish to swim upstream. Fish ladders are made up of a series of steps or pools, each one slightly higher than the one before it. The steps help the fish move up the river, over dams or other obstacles, so they can reach their spawning grounds
- **Hatchery** - a place where fish are bred and raised until they are big enough to be released into a lake or other body of water.
- **Native Run** - the natural event when a fish swim up rivers and streams to spawn, or lay eggs.

Opening

Begin by having students brainstorm what they know about fish populations in Oregon.

- What type of fish are prominent in Oregon's waters? (trout, salmon, sockeye, steelhead)
- Do they think there are more or less fish in our rivers and streams each year?
- What factors would affect fish population? (i.e building dams, water temperatures, predators, fish hatcheries, fishing tags, etc.)

Consider reviewing vocabulary terms with students prior to starting the activity.

Activity

1. Pass out the Background Information document. Allow time for students to read through the document. At the bottom of the page, have students write down two questions or "wonderings" they have about population monitoring.
2. Pass out a copy of the Population Data Packet to each student (will need printed beforehand). Give students 2 minutes to review the data in the packet. Ask them to follow along as you move through the presentation.
3. Have students form groups of 4 to share their thinking. Assign each student as 1, 2, 3, and 4.
4. Use the Salmon Population Monitoring presentation to present salmon data to students. Explain to students that they are viewing data from two different locations.
 - Slide 2: Review map of dams in Willamette River System. Share advantages and disadvantages, *Optional Information to Share: Dams can potentially block off key habitat to salmon & lamprey species and interrupt natural flows to rivers among many other things. Dams also can create bottlenecks as fish try to use passages. At dams where passage is available, it can become a hotspot for predators, like sea-lions at Willamette Falls.*
 - Slide 3: In their small groups, have students discuss their observations and their wonderings about the presented map and information. See slide 4 for more details.
 - Slide 4: As students work in small group, each person will take turns presenting their observations and their wonderings. Once sharing begins, students do not need to share something that's already been shared - they can add anything that someone else hasn't already said. Person 4 is responsible for recording the observations. Person 3 is responsible for recording the questions.
 - Slide 5: Explain to students that the next two slides will contain data for Agency Creek, a small creek on the Grand Ronde Reservation. Show students where this is located on the map. Have students locate where they would be on the map compared to Agency Creek. Also have students consider the potential amount of impact from human presence, pollution, etc. How would this compare to other water sources in Oregon?
 - Slide 6: Agency creek fish counts are done by Tribal Biologists at the weir and day camp one mile from Agency creek's confluence with the South Yamhill River. Smolt counts are obtained using a screw trap and a capture/recapture methodology. Adult counts were obtained in two different ways. (2007-2015) Fish were hand counted at weir, but counts were subject to flow and data tended to be inaccurate. (2016-Present) Data was collected using a sonar device that allows for 24/7 monitoring.
 - Slide 7: Repeat instructions from Slide 4

- Slide 8: Water quality temperatures are compared using 7-day maximum averages. This is the calculation of the average of a daily maximum temperature from seven consecutive days on a rolling basis. Water Quality data was obtained by Tribal Biologists from the reservation and surrounding areas.
 - Slide 9: Repeat steps from Slide 4
 - Slide 10: Slide 5: Explain to students that the next slide will contain data for Historic Willamette Falls, a well-known fishing and harvesting location for many Oregon Tribes throughout the last hundreds of years. Show students where this is located on the map. Have students locate where they would be on the map compared to Willamette Falls. Also have students consider the potential amount of impact from human presence, pollution, etc. How would this compare to other water sources in Oregon?
 - Slide 11: These runs are counted by Oregon Department of Fish and Wildlife at the Willamette Falls fish ladder. Some of these runs, like Spring Chinook are maintained by strong hatchery runs, while native runs suffer. Fall chinook are good examples of mainly native fish runs and the graphs represent that with such a steep decline.
 - Slide 12: Repeat steps from Slide 4
 - Slide 13: Allow time for each group to share some of their key observations and wonderings. Person 2 will share observations. Person 1 will share wonderings.
5. After students have presented their group findings to the class, each group will be assigned one of four scenarios pertaining to fish populations and human impacts on the environment.
 - In a local lake, the fish population has been decreasing because people are catching too many of the fish and not giving the population time to replenish. This has a negative impact on the environment because the fish are a source of food and income for other wildlife, as well as humans.
 - Pollution from factories and other sources is making the water in a river too toxic for fish to survive in. This has caused the fish population to drastically decline, and the lack of fish is having a negative impact on the environment because the fish are a source of food for other animals, as well as humans.
 - The introduction of invasive species of fish to a lake has caused the native fish population to decrease. This has a negative impact on the environment because the native fish are an important food source for other animals, as well as humans.
 - Development along a river has caused the water to become too warm for the fish to survive in. This has caused the fish population to decrease, and the lack of fish is having a negative impact on the environment because the fish are a source of food for other animals, as well as humans.
 6. Students will work with their teams to answer the following questions using the “Design a Method” worksheet. :
 - What is the human impact on the environment in this situation?
 - What is the effect of the human impact on the fish populations?
 - In what ways could the fish population be monitored?
 - Design a plan to reduce the human impact on the environment in this situation.
 7. *Note:* As students design their method to reduce human impact, have them consider whether they are missing any valuable information and how they may obtain that information.

Closure

Allow time for students to share their design methods with another group or with the entire class.

Differentiation

- Students can complete the Design a Method Activity in pairs or individually.
- Teachers can conduct the observation/questioning activity for each data set as an entire class.

Extension

- This lesson can be paired with the lesson 7.SCI.Salmon Lifecycle to create a small unit.
- Allow students more time to explore impacts on salmon populations. What are some of the laws in place that help to protect salmon? What are some of the key factors contributing to the changes in population numbers?

Notes/Other

Jan Michael Looking Wolf's or Grand Ronde Canoe Family audio tracks can be played as background music while students are working. These audio tracks can be found on Spotify or Apple Music.

Jan Michael Looking Wolf: [Spotify](#) and [Apple Music](#)
Grand Ronde Canoe Family: [Spotify](#) and [Apple Music](#)

Appendix

- Background Information Reading Document:
https://drive.google.com/file/d/1MdaO-ndmNg6xaqF4FOacqU1KS68EGDmG/view?usp=share_link
- Population Data Packet:
https://drive.google.com/file/d/11f9Wb8nSHZrLGC0ZVaCupZ2oIBXDccFq/view?usp=share_link
- Salmon Population Monitoring Presentation:
https://docs.google.com/presentation/d/1iC6HO3FkK_p156DyGR5ZEKPAI6v0BbhbXRtlz5DMvdc/edit?usp=share_link
- Human Impact Scenarios:
https://drive.google.com/file/d/1vQDlyQzYJ5KsX2pxVA98UGRqEPpQrG1m/view?usp=share_link
- Design a Method Worksheet:
https://drive.google.com/file/d/1sh10vV4jpa4-yqa6QlPlPZ6aUEyz4nN/view?usp=share_link