

MATH

Catching Pacific Lamprey at Willamette Falls

ESSENTIAL UNDERSTANDINGS

- Since Time Immemorial
- Lifeways

LEARNING OUTCOMES

Students will use decimal notation for fractions with the denominator of 100 and compare two decimals to hundredths by reasoning about their size.

ESSENTIAL QUESTIONS

How can we determine how many lamprey are in a given river?

LOGISTICS

- Where does the activity take place?
Classroom
- How are the students organized?
 - ☐ Whole class ☒ Teams: 2 – 4
 - ☒ Pairs ☒ Individually

TIME REQUIRED

1 – 1.5 hours

Overview

Lamprey were an important food source for many Native American tribes in Oregon, particularly those in coastal areas and along the Columbia River watershed, and they continue to be an important link to traditional cultural practices. Like salmon, lamprey are anadromous, meaning they are born in fresh water, spend most of their life in the ocean, and return to freshwater to spawn.

Sustaining the population of lamprey has always been important to Native people, and one way to do that is by not overharvesting. In previous generations this was not a problem, but hydroelectric dams, pollution, and destruction of habitat have all led to a drastic reduction in the lamprey population over the past century.

Today, tribal biologists use both traditional and Western scientific methods—such as fish tagging—to protect and preserve lamprey, salmon, and other aquatic species. Using this real-world context, this lesson engages students in a mathematical process to determine the weights of lamprey using a fraction with each fraction having the same denominator, organizing the lamprey on a number line from lowest to highest weight, and comparing the weights of lamprey in decimal format.



Background for teachers

There is a wealth of information available on the Pacific lamprey and its importance to Native American tribes in Oregon. When teaching the lesson, consider including the following key ideas:

- Lamprey were an important food source for many tribes in Oregon and particularly those living along the coast and the Columbia River watershed.
- Lamprey were also important for trade and were used in ceremonies.
- Lamprey are a type of anadromous fish, but are often mistaken for eels because of their long, relatively round shape and sucker-like mouths.
- The oil of these fish was also used by some tribes for medicinal purposes or for hair grease.
- Several tribes in Oregon continue to harvest lamprey for food and for use in traditional ceremonies.

STANDARDS

Oregon Math Standards

4.NF.6 – Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

4.NF.7 - Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with symbols (greater than/less than, equal to) and justify the conclusions, e.g. by using a visual model.

MATERIALS

What materials are needed for students to engage in this activity?

- Pacific Lamprey Lesson Worksheet
- White board and/or document camera for providing examples



Resources

Brostrom, J. K., Wang Luzier, C., & Thompson, K. (2010). *Best management practices to minimize adverse effects to Pacific lamprey. U.S. Fish and Wildlife Service*. Retrieved from https://www.blm.gov/sites/blm.gov/files/policies/IB-OR-2010-041_att.pdf

Bull, B. (2018, August 24). Tribes and conservation groups study what's leading to low lamprey counts. *Oregon Public Broadcasting*. Retrieved from <https://www.klcc.org/environment/2018-08-23/lowly-lampreys-numbers-focus-of-tribes-conservation-groups>

Close, D. A., Fitzpatrick, M. A., & Li, H. W. (2002, July). *The ecological and cultural importance of a species of fish in danger of extinction, Pacific lamprey*. Retrieved from <https://onlinelibrary.wiley.com/doi/abs/10.1577/1548-8446%282002%29027%3C0019%3ATEACIO%3E2.0.CO%3B2>

Columbia River Inter-Tribal Fish Commission. (n.d.) *Pacific lamprey: A cultural resource*. Retrieved from <https://www.critfc.org/fish-and-watersheds/columbia-river-fish-species/lamprey/>
Confederated Tribes of Umatilla Indians. (2004). *Species of interest: Pacific and Western brook lamprey and freshwater mussel detailed life history, distribution, abundance, and other information*. Northwest Power and Conservation Council. Retrieved from https://www.nwcouncil.org/sites/default/files/AppE_SpeciesofInterest.pdf

VOCABULARY

Lamprey – Eel-like fish that are considered a traditional food source by tribes in Oregon.

First food – Traditionally harvested foods that provide sustenance and promote health.

Fish tagging – A form of catch and release in order to provide data about fish in an area.



- Eastern Oregonian. (2018, June 14). Pacific lamprey swarm Umatilla River in best numbers in years. *Eastern Oregonian*. Retrieved from https://www.oregonlive.com/environment/2018/06/pacific_lamprey_show_signs_of.html
- Flatt, C. (2013, July 28). How Pacific lamprey could help nourish streams. *Oregon Public Broadcasting*. Retrieved from <https://www.opb.org/article/2022/07/26/scientists-use-tiny-tags-to-learn-how-young-lamprey-travel-through-dams/>
- Flatt, C. (2018, June 15). Record lamprey return a cultural win for Native tribes. *Oregon Public Broadcasting*. Retrieved from <https://www.opb.org/news/article/record-lamprey-umatilla-native-tribes/>
- Hilty, I. E., Peters, J. H., Benson, E. M., Edwards, M. A., & Miller, L. T. (1980) *Nutritive values of Native foods of Warm Springs Indians* (Revised ed.). Oregon State University Extension Service. Retrieved from <https://ir.library.oregonstate.edu/downloads/tm70mv51j>
- Loew, S. (2018, July 13). Oregon's prehistoric fish making a comeback with Grand Ronde's help. *Salem Statesman Journal*. Retrieved from <https://www.statesmanjournal.com/story/tech/science/environment/2018/07/13/oregons-prehistoric-fish-pacific-lamprey-making-comeback/777520002/>
- Oregon Fish and Wildlife Office. *Pacific lamprey* (Fact sheet). Retrieved from <https://www.fws.gov/oregonfwo/articles.cfm?id=149489457>
- Oregonian. (2012, July 18). Pacific lamprey harvested at Willamette Falls (YouTube video). *The Oregonian*. Retrieved from <https://www.youtube.com/watch?v=Sc8VGyY5Hf4>

Considerations for teachers

Practices

You may choose to have students work individually or cooperatively with a partner or in a group setting on completing the Pacific Lamprey Lesson Worksheet.

Learning targets

- I can use decimal notation for fractions with denominators 10 or 100.
- I can compare two decimals to hundredths by reasoning about their size and recognize that comparisons are valid only when the two decimals refer to the same whole.
- I can record the results of comparisons with the symbols (greater than/less than, equal to) and justify the conclusions, e.g. by using a visual model.

Reflection/closure

Have students share and explain their math thinking in terms of the weights of the lamprey, what weights they chose and why.

Appendix

Materials included in the electronic folder that support this lesson are:

- Pacific Lamprey Lesson Worksheet

Pacific Lamprey Lesson Worksheet and Reflection

Time: 1 hour 15 minutes

Say:

The health and well-being of Native American people in Oregon has always been closely tied to the health of the natural environment—the rivers, streams, ocean, mountains, valleys, and plateaus. Fishing for salmon and lamprey, which is a type of fish that looks similar to an eel, has always been an important part of Native culture. Some scientists say the lamprey has been here for 500 million years, which is a long time ago! Native Americans refer to this as “since time immemorial,” which means before recorded history and long predating the arrival of Euro-Americans.

Maintaining a healthy balance between human nutritional needs and the resources of the earth is also important for tribes in Oregon and that includes the harvesting of lamprey. Tribal members only take what they need. Today, we’re going to learn about the lamprey and its place in tribal culture while also practicing our math skills. First, we’re going to watch a short video. I want you to watch closely and to think about questions you might have.

Watch the Pacific Lamprey Harvested at Willamette Falls video: <https://www.youtube.com/watch?v=Sc8VGyY5Hf4> (after viewing the video, allow time for reflection/questions).

Say:

There is a lot of documentation that tells us lamprey were once abundant in Oregon. This began to change with the coming of Euro-Americans in the 1850s. Over time, due to the building of hydroelectric dams, pollution, and the destruction of habitat, the lamprey population—like the salmon population—was drastically reduced. This also had a huge impact on the ability of Native people to live in their

traditional ways.

Over time, several tribes began to work with government agencies and other organizations to restore the lamprey population. In 2011, for example, the Bonneville Power Administration provided funds to support the Confederated Tribes of the Umatilla Indian Reservation and their work to make pathways around the dams for the lamprey. When this work began, a tribal biologist believed that getting 129 fish back in the Umatilla River would be a success. Only seven years later, however, in 2018, there were more than 2,600!

Today, there are regulations that determine when, where, and how many lamprey can be harvested in a given area. This helps protect the lamprey population, which is consistent with traditional Native practices that emphasized sustainability—never take more than you need.

Say:

One of the main ways to monitor the fish population in a given area is to actually catch some fish, tag them, release them back into the river, and then repeat that process at different times. In real life, scientists place micro-radio tags on the fish and return them to the river. When they catch them the next time, some have the tags and some don't. By comparing those numbers, they can make an estimate about how many fish, in total, are in the river and review the overall data of the fish.

Today, we're going to complete a Pacific Lamprey Lesson Worksheet that includes a list of ten tagged lamprey. Work individually (or with a partner/in a group) to complete the worksheet.

Note: *(Display the worksheet and provide examples from the worksheet on a white board or document camera and ask if there are any questions before students begin).*