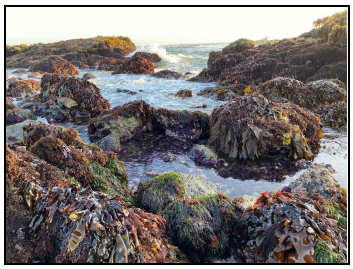

Traditional Native Ways of Conserving Marine Life

Learning Goals:

- Illustrate how all of California's coastline is Native ancestral territory
- Differentiate cultural uses of marine resources for food, regalia, ceremony
- Investigate the salmon life cycle, challenges to salmon's survival, and salmon food webs
- Understand Native conservation of marine resources
- Analyze climate change impacts on coastal species (warming ocean temperatures bull kelp die-off, and a trophic cascade)
- Consider how we can make life choices to protect marine resources and respect cultural traditions

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Teacher Directions

This unit is designed to bring many new insights into a science class, including new ways to think about the connections between natural and cultural resources for California's First Peoples, along with an in-depth dive into the complexity of interspecies connections associated with the salmon life cycle. Embedded within the materials are:

(a) ten key vocabulary words with accompanying definitions (Slides 4-6);
(b) multiple short videos of 1-9 minutes (which, again, students can engage with independently, within small groups, or as an entire-class viewing exercise);
(c) a set of unifying questions posed at the beginning of the unit (Slide 2) and revisited at the end of the unit (Slides 40-42). A sample set of answers are provided in the Lesson Script on Pages 6-8.

Additional resources include:

(d) a set of online interactive animations about salmon with accompanying mini-quizzes from the Smithsonian Institution, which students can engage with independently or within small groups;
(e) a fun hands-on food web card game which teaches ecological principles and extensive

organismal vocabulary and also contains worksheets for individual reflection;
(f) coloring worksheets and indigenous cultural insights from two different open-source coloring books.

This unit can be spread across two (DAY ONE: Sections 1-3, DAY TWO: Sections 4-6) or three class sessions, if you choose to make use of the additional resources and engage students in food web games (either, or both hands-on tactile games and online, interactive digital games) during Section 3.

SECTION 1/Slide 8 - All of California's coastline is Native ancestral territory

Class Discussion comparing the two maps on Slide 9 (10")

- Help students find their town/city/school location on the *Map of California Tribes at Contact*, and identify whose ancestral territory their town/city/school is located within.
- Display an updated version of the *Map of Tribal Trust Lands in California Today*, and
- Ask students to locate the nearest Tribal reservation to their town/city/school.
- Ask students to hypothesize why they think there is such an enormous difference between the extent of Tribal lands at Contact (shown by large, pastel-colored shapes on the 1st map) versus the extent of Tribal trust lands today (shown by tiny green shapes and dots on the 2nd map).

SECTION 2/Slide 10 - Native California Tribes have different cultural uses of marine resources for food, regalia, and ceremony

Class Lecture/Discussion using Slides 11-17 (15-30")

- ***Pausing on Slide 10 and before going to Slide 11***, Ask students to gather in small groups and list as many different marine species (types of marine organisms) that they can think of; once they have completed those lists, move onto Slide 11 and see how many of the species listed by students are included on the list shown in the slide.
- Invite students to do their own independent online investigations into abalone and dentalium, and see how many fascinating biological and ecological facts they can discover about abalone and dentalium.
- Read aloud the story of "The Thunder Being" to the class, **or** invite a series of students to read each paragraph aloud to the class, **or** make printouts of the story and distribute them to students to have them take turns reading to themselves or one another.
- Watch the 7.5-minute video (Slide 16) featuring Ron Sundberg (Yurok).
- Ask students to respond to the two discussion questions on Slide 16, either in an all-class discussion, in small groups, or as part of a short writing assignment or quiz.
- Watch the 9-minute video (Slide 17) featuring the Hoopa Tribe.

- Ask students to respond to the two discussion questions on Slide 17, either in an all-class discussion, in small groups, or as part of a short writing assignment or quiz.

SECTION 3/Slide 17 - The salmon life cycle, challenges to salmon's survival, and salmon food webs

Class Lecture/Discussion using Slides 19-22 (15-20" or up to 35" if playing salmon games)

- Walk students through the salmon life cycle on Slide 20, and invite students to draw simplified salmon life cycles, placing each part of the life cycle in the corresponding aquatic ecosystem (eggs, alevin, and fry in rivers, juveniles and smolts in estuaries, adults in oceans, and then later in rivers).
- Walks students through the "Salmon in food webs" graphics on Slides 21 and 22, and talk about the different ecosystems where the different organisms live (EX: clams on mussels on beaches, berries in forests, bears in many different habitats), then invite students to add to the drawings they made earlier by adding in the different organisms that feed on salmon during different life cycle stages (EX: eggs being eaten by other river fish, salmon carcasses being carried into the forest by bears and providing nutrition for berry bushes and redwood trees).
- Drawing from the "Additional Resources" section, have students play the Pacific Salmon Life Cycle & Pacific Salmon in the Food Web (this can add another 20-30" to the class time), and/or, if your students have access to computers or iPads (tablets), have them access the Smithsonian Institute "Salmon Challenges" interactive, animated game.

SECTION 4/Slide 23 - Native conservation of marine resources

Class Lecture/Discussion using Slides 24-26 (10-15")

- Read through Slides 24 -26, then ask students how they think the First Salmon Ceremony, combined with traditional fishing nets and weirs helped to equitably distribute salmon fishing across different Tribal bands, making sure that every band had food security.

SECTION 5/Slide 27 - Climate change impacts on coastal species

Class Lecture/Discussion using Slides 28-31 (10")

- Read through Slides 28-30 and watch the video referenced in Slide 31, then ask students, if they were in charge of making regulations to protect abalone, how they

would word the regulations and what they would look for in nearshore ecosystems to see if abalone populations were improving. (HINT: student answers should include reference to kelp ecosystem distribution and health, and density of urchins.)

SECTION 6/Slide 32 - How we can protect marine resources and respect cultural traditions

Class Lecture/Discussion using Slides 33-38 (15")

- Watch the 2-minute video on Slide 34, examine the map on Slide 35, then watch the 1-minute video on Slide 36. Ask students why they think so many people were excited when the dams came down.
- Walk students through the concepts listed on Slides 37 and 38, and invite students to share which of the actions they are already doing (or have done in the past), and which activities they think they would like to do in the future.

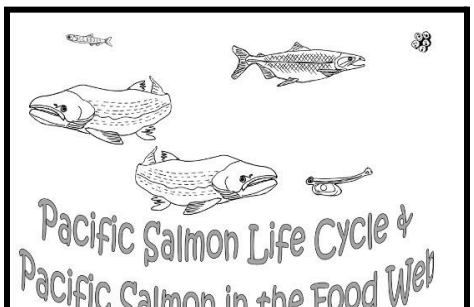
SECTION 7/Slide 39 - Conclusions & Additional Resources

The open-access 20-page bilingual (Spanish and English) *Marine Protected Area Coloring Book* contains extensive illustrations and marine biology concepts; the related open-access *Ancestral Waters Coloring and Activity Book* includes a range of cultural insights from Tribes throughout California.

The Wild Salmon Center website contains constantly updated resources – including a wide range of short (<10 minute), informative videos – on the Pacific Northwest environment and how salmon plays a vital role in Native culture, local economies, and ecosystems.

One of the best comprehensive guides to California abalone is contained within the beautifully illustrated 11/7/2019 LA Times article by Rosanna Xia, "Can the long-lost abalone make a comeback in California?

DIY CLASSROOM HANDS-ON GAME + COLORING SHEETS:



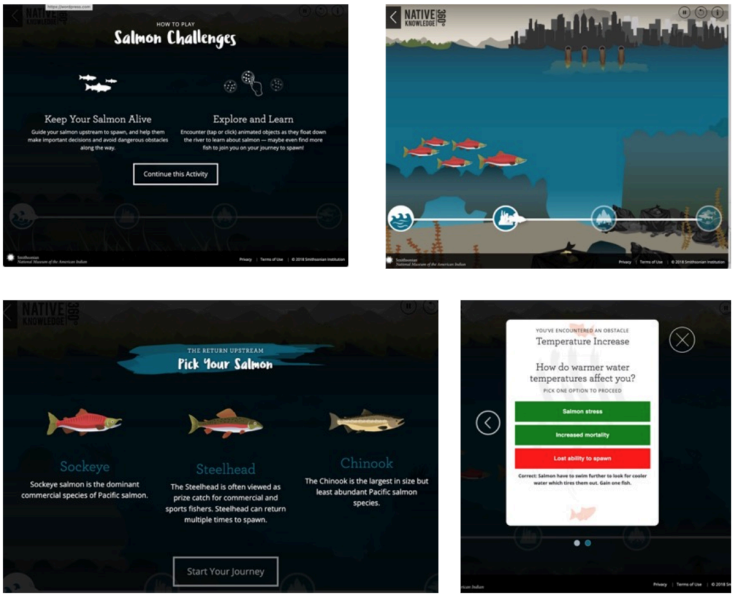
This terrific hands-on, multi-layer food web game, complete with illustrated game pieces, instructions, a glossary, coloring sheets, and quizzes can be sourced

from an open access teaching resources website which contains the downloadable 46-page PDF file: Salmon Life Cycle and Food Web Resources (*Note: you will be asked to create a free account in order to download the free materials*). The resource pack includes materials for exploring Pacific Salmon through their place in the food web and their life cycle.

- It includes cut and paste activities, fill in the blank activities and 32 food web cards with a variety of organisms to use for activities, games and in creating a variety of food webs.
- The package also contains a simple, student-friendly glossary of organisms and animals pertaining to a Pacific salmon food web.
- Suitable for a variety of ages and grades, and great for multi-grade learning camps or classes.

ONLINE ANIMATED VIDEOS AND INTERACTIVE GAME:

The Smithsonian Museum of the American Indian has created a series of open-access animated videos, each with their own short quizzes peppered throughout the videos.

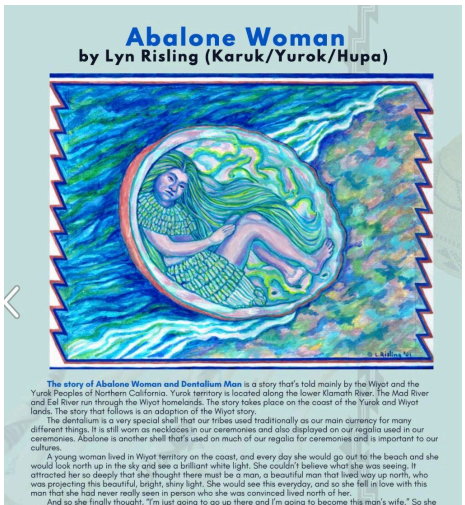


Engage

Salmon Life Cycle & Challenges

To illustrate the environmental challenges faced by salmon during their anadromous life cycle, students can play “Salmon Challenges,” an online interactive game created by the Smithsonian Institution, where they can follow three different salmon species and take quizzes along the way.

URL: https://americanindian.si.edu/nk360/pnw-history-culture/pnw1-salmon/



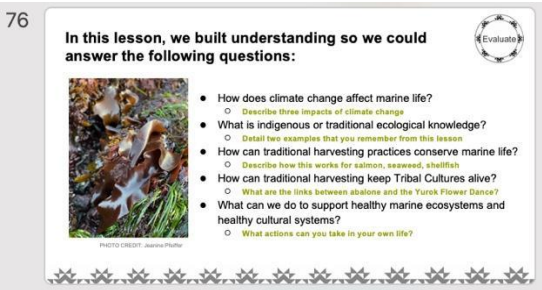
This is a story for more mature students.

This illustration and the beginning story text was reproduced from the February 2014 issue of *News from Native California*.

The story of Abalone Woman and Dentalium has

been told publicly by Lyn Risling (Karuk/Yurok/Hupa) for the National Indigenous Women's Resource Center. You can read the transcript of Lyn's storytelling on this link, and you can view the video on this link.

Potential answers to the questions posed in Slide 40 and Slide 42:



- How does climate change affect marine life?
    - **Describe three impacts of climate change**

Climate change increases global temperatures, including oceanic temperatures. When cold-water organisms like kelp are exposed to higher-than-normal ocean water temperatures, they can get overly stressed, sicken, and die. When a key producer species like bull kelp dies off, this causes a trophic cascade as other organisms dependent on kelp, such as abalone, lose their primary food source. This causes the abalone populations to severely decline.

- What is indigenous or traditional ecological knowledge?
    - **Detail two examples that you remember from this lesson**

Indigenous/Traditional Knowledge: ways of knowing about the world that come from lived experience in the same are by peoples who originated from that area and developed lifeways specific to that area.

Native peoples know how to harvest limited amounts (only what you and your extended family need) from specific places at specific times. Native peoples historically protected abalone by crushing sea urchins (who predate on abalone) near to abalone beds.

- How can traditional harvesting practices conserve marine life?
    - **Describe how this works for salmon, seaweed, shellfish**

Traditional harvesting, defined as harvesting limited amounts from specific places at specific times, helps ensure that the populations of fish, seaweeds, and shellfish, are not over-harvested and their populations remain stable (as long as external ecological factors, such as warming oceanic temperatures, or pollution events like oil spills do not occur).

For example, the planned escapism (where the traditional fish dams and fishing weirs always had one open side or escape holes) for salmon fishing in the rivers helped make sure that enough adult salmon made it further upstream to successfully spawn.

By only harvesting abalone during extreme low tides, this traditional method conserved the majority of the abalone population, which lives along the ocean floor or in deeper oceanic zones.

- How can traditional harvesting keep Tribal Cultures alive?
    - **What are the links between abalone and the Yurok Flower Dance?**

Traditional harvesting keeps Tribal Cultures alive by ensuring there are healthy populations of culturally significant resources available in the area. Abalone shell is used for traditional regalia (necklaces, skirt ornaments) in the Yurok Flower Dance, along with other ceremonies, and also used as jewelry for Native dolls.

The First Salmon Ceremony (Slide 61) was an inter-tribal collaboration that practiced Tribal cultural values of reciprocity to ensure that neighboring Tribes maintained good relations and incoming salmon were shared more equitably amongst Tribes who lived both upstream and downstream.

- What can we do to support healthy marine ecosystems and healthy cultural systems?
    - **What actions can you take in your own life?**
    - Try to spend less time in your cars: walk or bicycle to school, or take the bus. Combine multiple errands into one car trip.
    - Find a grocery store that sells things in bulk, so you can bring and fill your own reusable containers instead of buying new things in separate plastic boxes.
    - Participate in a Beach Clean-Up Day or a River Clean-Up Day.
    - Find out whose ancestral territory you live in, and where your school is located.
    - Visit a museum with interpretive displays about Tribes in your area, and bring friends and family members with you.
    - Share the video(s) you watched with friends and family on social media
    - Use the term “regalia” instead of “costume” when you are referring to traditional Tribal ceremonial dress.

- How does salmon contribute to multiple aquatic ecosystems?
    - **Describe how salmon feeds species in the ocean, in estuaries, in rivers, and in forests**

Because salmon are anadromous, they feed different species during different parts of their life span: as adults, salmon feed mammals including humans, orcas, seals, sea lions, bears, and eagles; as eggs on river bottoms, they feed other fish, water birds, and aquatic insects; as juveniles in estuaries they feed shoreline bird species, seals, sea lions, bears, coyote, etc.

- How do ecosystems suffer when salmon populations decline?

    - **What do you think happens when the nutrients from salmon are no longer playing a major role in feeding other organisms?**

Salmon carcasses carried or excreted by bears or raptors play a significant role in providing nitrogen to forests, and throughout their life cycle, salmon nutrients sustain hundreds of other species. Without nutrients from salmon, hundreds of marine and freshwater species, along with terrestrial plants, lose an important nutritional resource.

- Why was it so important to remove the dams from the Klamath River?
    - **Describe how returning salmon can help newly planted riverside vegetation to grow.**

The most important ecological intervention to date in saving declining salmon populations in California was restoring free passage to salmon on the Klamath River, because without access to their ancestral spawning grounds, it was difficult for salmon to reproduce successfully to maintain future generations of salmon. Additionally, a lengthy history of insufficient water releases from the dams meant that too little water flowed below the dams when salmon were spawning. Low water flows resulted in hotter, less oxygenated waters that stressed out salmon, making them more susceptible to disease, and ultimately resulting in a massive fish kill that salmon populations have not recovered from twenty years later.

The return of salmon to the ancestral territories of the Yurok, Hoopa, and Karuk peoples is vital for cultural continuance of traditional lifeways (salmon as a subsistence food) and ceremonies involving salmon.