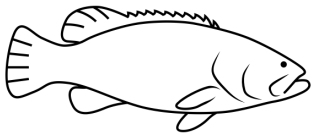
Our Responsibilities Module



Introduction

What we do in one part of the watershed affects the whole watershed. Travel as the Clear Lake hitch from the tributaries and into the lake as you learn from community members about how the watershed has changed over time, and collect data to support local Tribes, organizations, and agencies working to improve watershed health for all.

Introduce the concept of a watershed with a demonstration that builds the foundation for understanding how water and pollution move. Hear stories from community elders about the changes they have witnessed in the watershed over time. These anecdotes are one type of data, which students will explore while they look for patterns in hitch population data and compare those with known threats. Help one pollution cleanup effort by learning how to contribute data on the types and location of debris present in students' communities. Discover how people are working to improve watershed health from multiple approaches to protect the Clear Lake hitch. Then bring this all together to help make a plan and share it back with the people interviewed and/or organizations involved in Clear Lake's watershed.

Activities

Time Frame: 6 hours, 15 minutes

Outside

- Youth Engagement with Debris Tracker *(1 hour, 30 minutes)*: Add observations of trash in your community to Debris Tracker, including photos, location, and types of trash. Students will contribute data to scientific research while thinking about ways this tool can help improve the health of Clear Lake's watershed.

Either Inside or Outside

- Clear Lake Caretakers (*1 hour, 30 minutes)*: Learn about the different threats to Clear Lake hitch and learn about the different ways people are working to improve watershed health.
- Community Interviews *(1 hour, 30 minutes)*: Develop a set of questions to ask Tribal elders or other adults to hear their stories about the local impacts to the shifts in land management and cultural priorities.

Inside

- Understanding Your Watershed *(1 hour)*: Everyone lives within a watershed that drains to a local stream or river. Changes in small watersheds can affect the river systems downstream. This activity demonstrates the concept of a watershed and how upstream activities impact students' communities and Clear Lake.
- Data Talks *(1 hour)*: How does data tell a story about the impact of different threats to the Clear Lake hitch populations? Understanding how data can help add pieces of a complex puzzle will allow students to see both how others utilize data to advocate on behalf of the Clear Lake hitch, and how their own data are important contributions to this advocacy.

Suggested Flow

The 5E Inquiry-Based Instructional Model can serve as your guide during the design and implementation of STEM instruction. While these activities are ordered to build upon each other, you may complete them out of order as part of any of the 5E's. If there are time restrictions, these activities are also designed to be completed individually (one does not require another activity to be completed). Below is a suggested flow for this module:

Engage Activity: Understanding Your Watershed

What happens upstream impacts downstream communities and Clear Lake. By understanding the concept of a watershed, students can see why it's important to maintain the health of the whole watershed for aquatic species like Clear Lake hitch – and for all life.

Explore Activity: Community Interviews

The current conditions of the lake and its watershed aren't how things have always been. By interviewing a community elder, students can realize that these changes happen over lifetimes, and there is power in holding memories of what Clear Lake could be for the community.

Explain Activity: Data Talks

Anecdotes like the ones captured during the Explore activity are one type of data that tell the story of historical hitch populations. Students will explore patterns in the Clear Lake hitch population data since 2014, and compare it with precipitation data to learn about the compounding effects of drought, water diversions, invasive species, and pollution.

Elaborate Activity: Youth Engagement with Debris Tracker

Turning observations into data helps scientists understand the effects of trash pollution

both for local communities and for the world. Over time, students can see if advocacy efforts improved the type of debris recorded.

Evaluate Activity: Clear Lake Caretakers

What are Tribes, organizations, and agencies doing to help improve watershed health, and what places are they prioritizing? Students can learn about the threats to the Clear Lake hitch, and what people are doing to improve these conditions within the watershed.

Objectives

- Understand what a watershed is and how what's being done in one part of the watershed affects the whole
- Understand the cultural importance of the Clear Lake hitch to local Tribes
- Have students' prior knowledge and observations contribute to sense-making
- Use data and visuals like photos, maps, and graphs to tell a story
- Follow protocols to submit scientific data
- Understand links between trash, barriers, and Clear Lake hitch
- Develop student questions
- Engage with local groups and their projects

Key Vocabulary

Watershed, pollution, spawn, precipitation, population, water diversion/pumping, drought, invasive species, tributary, spawn

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Resources to Support Educator Background Knowledge

The health of the lake and the health of the people are intertwined. Factors within the watershed such as off-road vehicle use, lakeside construction, wildfires, excess fertilizers, and old septic systems all lead towards creating excess nutrients in Clear Lake. Longer periods of drier weather caused by climate change exacerbate the lake's water quality issues, and strand the culturally important Clear Lake hitch in pools as the tributaries dry up. A multi-pronged approach that includes regulating agricultural water use, removing illegal water diversions, trash pickups, cultural burns, replanting tule, and more is essential for the hitch's survival, and improving the lake's conditions. These efforts are being led by Tribes and local organizations as well as county, state, and federal agencies.

Supporting Background Information

Resource	Resource Type	Source
On the Water: From Cache Creek to Clear Lake, Hydro History: Scroll through the story of Clear Lake and how water in the region got to its current state of management.	Virtual Exhibit	Lake County Museums
Lake County Watersheds and Stormwater Interactions: Scroll through a series of videos, data, graphics, and maps demonstrating how stormwater moves in the Clear Lake Basin.	Map	Lake County Department of Water Resources
Op-ed: Saving this Fish Means Saving Our Tribe's Future: This article describes the efforts of Tribes to save the Clear Lake hitch, a small fish significant to Tribal culture.	Article	Civil Eats
Lake, Mendocino, and Sonoma County Tribal Listening Session: Summary Indicators of Climate Change in California: The Big Valley Band of Pomo Indians, the Middletown Rancheria of Pomo Indians of California, and the CalEPA Office of Environmental Health Hazard Assessment jointly convened a listening session with Lake, Sonoma, and Mendocino County Tribes. The listening sessions had the following objectives: 1.) Listen to perspectives from tribal communities in these counties on climate change impacts they are experiencing and identify common themes, and 2.) Collect tribal input to help the OEHHA Indicators of Climate Change in California report raise awareness about tribal-specific climate change impacts and increase recognition of the value of tribal knowledge in reporting climate change impacts.	Report	California Office of Environmental Health Hazard Assessment
Clear Lake Fish Advisory: Fish consumption guidelines for Clear Lake	Poster, fact sheet, report, press release	California Office of Environmental Health Hazard Assessment

Current Tribal Stewardship

Tribal stewardship ethics recognizes that everything is connected. To protect life within the entire watershed, Tribes are developing expansive water quality monitoring programs, bringing cultural burns back on the land, organizing resources for restoration projects, restoring traditional basket-making, and leading the way in advocating for protections for culturally significant aquatic food sources. Jesse Gonzalez, vice chair of Scotts Valley Band of Pomo Indians, explains in Emergency Endangered Species Act Protections Sought for Clear Lake Hitch, "The Clear Lake hitch — the chi — is an important part of our Tribe's culture that sustained our families for generations. We as Indian people have lost so much of our ways and our culture at the hands of others, and now we're trying so hard to hold on to what's left, for ourselves, for our families, and for our future. I remember catching chi as a young boy and now can only hope that my children will one day have that same experience."

Project	**Tribe(s)**	**Project Description**
Tule restoration	Tribal EcoRestoration Alliance and Big Valley Band of Pomo Indians	Planting tule along the Clear Lake shoreline.
Primrose management	Tribal EcoRestoration Alliance and Lake County Department of Water Resources	Restoring the Clear Lake shoreline by removing the invasive primrose.
Highland Springs	Tribal EcoRestoration Alliance and Lake County Department of Water Resources	Digging up tule to transplant for lakeshore restoration along Clear Lake.
Clover Creek restoration	Robinson Rancheria and Habematolel Pomo of Upper Lake	Removing invasive species and replant with native species in Clover Creek.
Forestry management	Middletown Rancheria of Pomo Indians of California, Robinson Rancheria	The Mendocino National Forest has major grants with Grindstone Rancheria, Robinson Rancheria, Middletown Rancheria, and Coyote Valley Tribe.

Lake County Strong Connections

This project's materials build off of the shared goals of the Lake County Strong curriculum. The purpose of incorporating this curriculum is to extend learning opportunities on environmental issues and activism within Lake County to build stewardship amongst youth and their families. These module activities incorporate lessons from the curriculum.

Activity	**Lake County Strong Lesson**
Understanding Your Watershed	Science - The Clear Lake Hitch
Clear Lake Caretakers	Science - The Clear Lake Hitch
Community Interviews	ELA - The Story of Clearlake: An Interview with Mayor Russ Cremer
Data Talks	Science - The Clear Lake Hitch

Youth Participatory Science Connections

By tracking debris in their community, students can develop deeper understandings of which types of trash are the most problematic, visualize trends over time and in varying scales, and think about ways they want to advocate for their community. Through the data collection process, youth learn more about how pollution is impacting the Clear Lake watershed, as well as how their contributions can help improve management decisions. By connecting with local organizations actively engaged in cleanups as well as fish rescues, listing efforts, cultural burns, and other watershed improvement activities, young people can build on their experiences to create change in their own lives or communities.

Core Activities and Key Practices Highlighted in this Module

Core Activity: Contribute data	Key Youth Practice: Take ownership of data quality
Core Activity: Develop expertise	Key Youth Practice: Youth engage with complex socio ecological systems
Core Activity: Make meaning	Key Educator Practice: Attend to the unexpected

Core Activity: Share the work and take action	Key Educator Practice: Position youth as people who do science
Key Youth Practice: Youth share findings with outside audiences	

Highlighted Youth Participatory Science Project(s)

The following projects can be used in any location around the lake. They are intended to build students' skills and understanding of the various types of pollution and impacts to the Clear Lake watershed.

Participatory Science Project	**Community Based Partner**	**Project Description**
Debris Tracker	(None)	Contribute local data on plastic pollution.
Clear Lake Fish Kill Monitoring iNaturalist Project	Big Valley Band of Pomo Indians	A record of fish kills in Clear Lake and nearby tributaries that contributes to ongoing data collection and environmental monitoring efforts.
Clean Swell	Lake County Department of Water Resources	Contribute local data on pollution and disposal. Those who participate on Coastal Cleanup Day can help the Dept of Water Resources record data on the trash collected.

The Way to Start a Day In Lake County

Kathleen Scavone

Breathe in a thank you

sweet air

cool morning

call of hawk

dawn chorus begins:

Blue jays, ravens, quail

Light playing through leaves

breathe the light

Deer disappear into wood's edge

Breathe in the wonder of a new morning