

Module Overview

Module 5: Systems Respond to Change

Driving Question: How can we use what we know about the impacts of past systems changes to salmon populations to help with decision making in the future?

Teacher Facing	Student Facing	Data	Additional Resources
Background Readings: California Salmon Strategy for a Hotter, Drier Future Teacher: Handout Guide	Student Readings: Climate Change Impacts on Salmon and Steelhead **Student Reading Handout	- Data Submission (Google Form) - Classroom Data Sheet - Data Submission Video	
Slide Deck	** Student Video Handout (Fisheries Face Climate Change)	FieldScope- Spinning Salmon Main Page	NOAA- CLEAN Resources (teaching climate change)
YCCS: Youth engage with complex socio-ecological systems SEP: Develop and Use Models (NGSS Performance Expectations)	Meet the Researchers: Video: US Fisheries Face Climate Change Challenges (with collaborating researcher Rachel Johnson)	TDC Flowchart NOAA Central Valley Hatchery Data	US Climate Resilience Toolkit (Modeling tool: Link past, present and future exposure) Understanding Global Change: hmi Biointeractive Site Video: Warmer Water Kills Salmon Eggs

Overview of Activities

- Inquiry: Developing additional model elements to include understanding of the impacts of climate change on salmon populations.
- Readings: Climate Change and the Impacts on Salmon and Steelhead
- Activity: Understanding Global Change: [hmi Biointeractive Site](#)
- Data Engagement: Connecting student data with fisheries decision making

Learning Goals

- Students connect their understanding of climate change with the modeling of the ecosystem
- Students learn more about the complexities of climate change and decision making when thinking about ways to build resilience into a system

Environmental Principles and Concepts (EP&Cs)

- **Principle 3 - Natural Systems Change in Ways that People Benefit From and Can Influence.** Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.
 - Concept C. Human practices can alter the cycles and processes that operate within natural systems.

Community and Citizen Science Core Activities - Connections to Framework:

- Youth engage with complex socio-ecological systems
- Make Meaning

Key Educator Practices:

- Attend to the Unexpected
- Frame the Work Globally and Locally

Key Youth Practices:

- Engage with Complex Social Ecological Systems

Key Vocabulary

Connections to Community Science Observations:

CTE Connections: Getting to Know the Research Team

- Meet the Research Team
- Connections to Common Core
- Productive Dialogue (Speaking and Listening)
 - Dialogue Protocol: Golden Line
- Purposeful Reading
 - The Ocean's Mysterious Vitamin Deficiency (NOAA 2021)
- Meaningful Writing
 - Modeling Your Thinking and Generating Questions