

# Science and Engineering Practices

## Salmon Habitat Restoration



## LESSON 2

### JIGSAW

#### Salmon Survival

**Problem Statement:** How can our classroom take responsibility for stewardship actions that measurably improve the ecological conditions of our watershed address allowing both salmon and people to thrive?

**Subject:** Human Geography, Science, Engineering, Math, Civics, Common Core

**Grade Level:** Middle School or High School

#### DESCRIPTION

Deepen your knowledge of the challenges our local salmon face (and the solutions!) by analyzing selected graphics, videos, maps, and text.

#### ACTIVITY 1: Analyzing Infographics

See if you can deepen your understanding of the problem statement by analyzing how different graphic artists have designed the infographics shared below to help people understand the problem and take action.

Here are some suggested prompts.

- What grabs your attention first on this infographic? Why?
- What grabs your attention second, third, or fourth, and what graphic design strategies were used to guide your eye around and through the infographic?
- How would you describe the color scheme for this infographic? Does it help unify, group, or compare main ideas?
- How are shapes used to help organize and feature critical information? Does the size, color, and placement of shapes guide your eye around the infographic?
- How does the size, font, and placement of text support the main ideas without being “too much reading?”

- How is data displayed? How does the color, size, and placement of numbers help you understand what's quantifiable and measurable?
- Are icons used to help symbolize key concepts?

Explore these infographics. Which designs do you think are the most successful in telling their part of the story? Defend your answer.

- **Reinders on the Basics**
  - [Simple Diagram of Chinook Salmon Life Cycle](#)
  - [Poster of Puget Sound Food Web](#)
- [Salmon Timeline Depicts Rapid Population Decline](#)
- [Chinook Juvenile Rearing Trajectories](#)
- [Fit for a King Graphic Poster](#) (Zoom in on this excellent high resolution infographic)
- [Graphics excerpted from Fit for a King Poster](#) (Also as [SLIDES](#))
- [Bioaccumulation of Toxins in the Puget Sound Ecosystem](#)
- [Progress on Vegetation](#) (Is this good news?) Also see: [3 Million Trees](#)

## **ACTIVITY 2: Analyzing Videos**

Engage students in analyzing 2-3 of these videos or facilitate a jigsaw with a broader set. Use the built-in viewing guides to get the most out of each video. Facilitate a reflection following the viewing sessions on how students' knowledge and interest has expanded. Perhaps return to the mind-map produced in Lesson 1 to refine collective insight or to begin generating answers for some of the sub-questions.

- **VIDEO: What do our Chinook Salmon need?** [Viewing guide](#) on critical habitat for salmon success in the Green River, featuring Kollin Higgins, senior ecologist with King County Department of Natural Resources.
- **VIDEO: Nearshore Ecosystems for Salmon:** [Viewing guide](#) about the importance of nearshore habitat for spawning, featuring Kollin Higgins, senior ecologist with King County Department of Natural Resources.
- **VIDEO: Why are Salmon dying before they can spawn?** [Viewing guide](#) about pre-spawn mortality in salmon in Longfellow Creek, featuring Kathryn Davis, the Stewardship Manager for Puget Soundkeeper.
- **VIDEO: Reducing stream temperature for Salmon - Newaukum Creek:** [Viewing guide](#) examining the effects of temperature on salmon, featuring Josh Kahan, the Middle Green/White River Basin Steward for King County Department of Natural Resources and Parks.

- **VIDEO: Microplastics and Me:** [Viewing guide](#) on microscopic plastics in our water, featuring Hillary Sanders, Volunteer Coordinator for 21 Acres Center for Local Food and Sustainable Living.
- **VIDEO: Bioaccumulations of Toxins in Orca:** [Viewing guide](#) about toxin effects in Orcas, featuring Lynne Barre, Recovery Coordinator for our endangered Southern Resident Orcas.

### **ACTIVITY 3: Analyzing Maps**

Explore some or all of these maps to gain a better geographic understanding of the problem statement. Are salmon and people thriving?

**[Puget Sound Potential Salmon Spawning Habitat:](#)** This generalized map shows in red lines where salmon have potential for traveling and spawning. This was probably true for native cultures who thrived here because of the unbelievable abundance of salmon using all of these rivers and streams before colonization and rapid urban development.

**Chinook Distribution Survey:** The collection of three maps listed below depicts in much greater detail than the Puget Sound Map (above) the known freshwater distribution of chinook salmon based on the collective personal knowledge of participants in the WRIA 9 mapping project and data they gathered from published and unpublished databases.

- **MAP:** [Upper Green River](#)
- **MAP:** [Middle Green River](#)
- **MAP:** [Lower Green and Duwamish River](#)

**MAP:** [Full Watershed with Divisions for each Subbasin](#) (Zoom in to your neighborhood)

**MAP:** [Land Use Designations in WRIA 9](#) (Zoom in to your neighborhood)

**Maps of Individual Subwatersheds in WRIA 9** showing Habitat Projects Recommended in the original [Salmon Habitat Plan](#). Zoom in on the map that contains your neighborhood or school.

- **MAP:** [Upper Green River Subwatershed](#)
- **MAP:** [Middle Green River Subwatershed](#)
- **MAP:** [Lower Green River Subwatershed](#)
- **MAP:** [Duwamish Estuary Subwatershed](#)
- **MAP:** [Marine Nearshore Subwatershed](#)

**Review from Lesson 1 as needed:** Take another look at this map: [Open Space Inequities in King County](#). As the website states... “This map shows **opportunity areas** that meet certain income, health and open space access criteria established in King County Code.” On the

[Interactive Version](#) of this map you can zoom in to see the strange shapes of neighborhoods when defined by who does or does not have easy access to open, green spaces.

### Some questions to ask...

- What is the relationship here between access to green space like parks, forests, and trails, and the level of a family's income?
- How does the text near the legend for this map define “**Lack of Open Space Access?**”
- Based on this definition, how does your neighbor rank?

**Swipe to Compare two different map layers (expanded from Lesson 1)** Invite students to open up the Community Impact Mapping Website [My Watershed Address](#). Click open all of the map layers and scroll down to explore the map layers listed under the section **Demographic Data**. Use the “info” icon to learn more about what each of these map layers mean.

- Tree Equity Score
- % Below Double Poverty Level
- % People of Color
- % Foreign Born
- Life Expectancy

Set up the “**Swipe**” tool to cross reference the **Demographic Map Layers** listed above with the map layers listed below. Find the Swipe tool in the top menu bar and use it to pull up two different map layers at the same time, one from the left side of your screen and another set from the right side of your screen. Swipe back and forth between them to compare and study the connections in dynamic detail.

- Impervious Surface Area
- Riparian Solar Analysis
- Salmon Spawning Habitat
- Historical Duwamish River
- 1936 Aerial View

### Some questions to ask...

- What is the story here for human populations?
- Why are some communities better off than others?
- Do you notice connections between poor quality salmon habitat and human inequities?
- Are salmon and people thriving in these places?
- Is there a way to identify stewardship actions in our neighborhood that would benefit both salmon and people?

For a deeper dive into environmental disparities, especially related to human health, take a look at this interactive mapping tool: [Washington State Environmental Health Disparities Map](#)

## **ACTIVITY 4: Analyzing Text**

**State of Salmon**: This is the official report for statewide salmon recovery planning led by the Governor's Office. Scroll down on this page to learn about what's at stake, especially the short, powerful data stories on salmon's relationship to our economy and our ecosystem.

**WRIA 9 Salmon Recovery Plan 2005**: Here are a couple very useful sections of the foundational Green Duwamish Watershed Salmon Recovery Plan adopted by all of the stakeholders in 2005.

- [Web Page with links to all 10 Chapters and Appendices](#)
- [CHAPTER 1 - Executive Summary](#)
- [CHAPTER 3 - Historical Background for Salmon Decline](#)
- [TABLE - Anticipated Climate Impacts on Salmon](#)

**WRIA 9 Salmon Recovery Plan UPDATE 2021**: This Update represents the next chapter of salmon recovery efforts in the watershed by providing a science-based framework for identifying, prioritizing and implementing salmon recovery actions over the next 10-15 years. The Plan Update integrates over a decade of new science and monitoring; provides updated habitat goals; outlines refined recovery strategies and embedded policies and programs; updates the capital projects list; and outlines a monitoring and adaptive framework for tracking implementation and making strategic adjustments.

- [CHAPTER 1 - Background](#) - Includes an updated graphic for the Chinook Salmon Recovery Timeline and a statement on why using an equity and social justice lens is essential for ensuring outcomes that benefit both salmon and people.
- [CHAPTER 2 - Great Snapshot Descriptions of Each Subbasin](#) - This chapter includes two excellent watershed-scale maps, one that is marked with "River Miles" so you can find where projects are located and the other featuring land use.
- [CHAPTER 3 - The Chinook Salmon Life Cycle in the Green Duwamish](#) - You know the Salmon Life Cycle from 5th grade, but here's how it plays out specifically in our watershed.

**For a deeper dive**: This [technical briefing](#) synthesizes and evaluates available Chinook salmon habitat use and productivity literature. Includes excellent graphs, tables, and explanations.

## SHOW WHAT YOU KNOW

Okay, so what have you learned about the concepts and issues revealed in the problem statement? Take some time to reflect on your current knowledge. Where does your curiosity take you? What do you want to learn more about? If you are motivated to take some kind of stewardship action at this stage what might that look like and how would you know if it mattered to salmon or to people, or both?

Have we answered all of the questions we unpacked from the problem statement? What would it take to actually begin solving the problem? Who is working on it?

### A few ideas...

1. Redesign your original mind map into a **beautifully rendered** team or classroom poster. We can refer to this as a benchmark as we explore more in this unit.
2. Write a **short reflection** on how your understanding has changed from when we started. Include a reflection on both your intellectual, conceptual knowledge, as well as the emotions or feelings that may have come up for you as you analyzed how salmon and people are thriving or not at your watershed address.
3. Write a short narrative piece, or produce a vlog on the same content, but tell the story of this situation from the **point of view of a salmon**. What is it like to be a salmon in our watershed? What is your day-to-day experience as your travel upriver to spawn? What are you thinking about? What are you feeling? What memories or legends have been passed down to you from the salmon kin who have come before you? What wisdom, dreams, or warnings do you have for the next generation, those who will swim this river after you have spawned and passed away? Or try a different species like Orca, Cedar Tree, Seagull, or Oyster. What's your unique perspective?
4. Host a student panel in front of the class to take turns naming and describing the key insights gained from probing into the problem statement.
5. Produce a series of short, video statements reflecting verbally on the same questions above. How might you edit some of these together with what you think are the most essential images, graphs, or maps to establish a classroom group statement?
6. Use a graphic organizer to brainstorm all of the groups of people you think would be stakeholders in this issue. Who is working on it and what can we learn from them? Who is a stakeholder but doesn't yet know that they have a role to play in solving the problem? How can we best interact with the first group and engage with the second? See the full lesson framework on [Engaging Stakeholders](#), especially the graphic organizers on page 12.



## WHAT CAN WE DO?

### Volunteer for Salmon!

Outdoor volunteer opportunities are waiting for you. Sign up now so you know the right seasons to help out, usual fall for tree planting and spring for removing invasive species.

- [Miller and Walker Creeks Stewardship](#)
- [Salmon Monitoring Program - Community Salmon Investigation \(CSI\) for Highline](#)
- [Duwamish Alive!](#)
- [Earth Corps](#)
- [Nature Consortium](#)
- [The Dirt: Calendar of hands-on volunteer opportunities in King County](#)
- [Seattle Parks Volunteers](#)
- [King Conservation District](#)

### Go See Salmon

Bookmark the [Salmon SEEson webpage](#) so you know where to go with your family to see salmon when they are coming back upriver to spawn each fall.

### More Ways to Steward Your Watershed Address

1. Help plant [3 Million Trees](#)
2. Switch to these strategies for [Natural Yard Care](#) (in 15 different languages!)
3. Take personal action at [Puget Sound Starts Here](#)
4. Don't Feed the Tox-Ick Monster - [7 Simple Actions](#)
5. See playlist of 20 King County informational videos on [Yard Talk](#)
6. Build a Rain Garden at [12,000 Rain Gardens](#)
7. Advocate for [Green Stormwater Infrastructure](#) around your school neighborhood
8. Follow the indicators that scientists track on the dashboard [Puget Sound Vital Signs](#)

## HELP IMPROVE THIS LESSON

1. What advice do you have for making this lesson better?
2. How would you teach parts of this lesson to younger students?
3. Are there broken links that we need to know about?
4. Did you find even better links in your research?
5. Would you like to share examples of your work so that other classrooms can learn by your example?

**CONTACT:** [info@sustainabilityambassadors.org](mailto:info@sustainabilityambassadors.org)

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