SUSTAINABILITY AMBASSADORS

Science and Engineering Practices
Salmon Habitat Restoration

LESSON 3

How People Replumbed an Entire Watershed

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

Students learn the full geographic, political, and economic history of the Green Duwamish Watershed by examining how engineered manipulations on a massive scale cut a once mighty river system from three sources down to one, built the Ballard Locks, shrunk Lake Washington, erected the Howard Hanson Dam, and sent the White River towards Tacoma.

ACTIVITY 1: Youth-Voiced Videos and Viewing Guides

Take some time to view and then analyze our fascinating, youth-voiced story of how, in the last 100 years, we have completely replumbed the Green Duwamish Watershed. **VIDEO:** Replumbing the Green Duwamish Watershed [14:22]

Some questions to ask…

- What happened here? What was the sequence of huge changes and why were these decisions made?
- What surprised you the most? And how do you feel about it?
- Which communities benefited most from these changes and who was marginalized?
- How did each of these changes impact the natural life cycle of salmon?

ACTIVITY 2: What Changes Occurred Over the Last 200 Years?

Invite students to choose 3-5 of the following resources that they are curious about. Or facilitate a jigsaw to increase the breadth of exploration. Use the research to strengthen students' knowledge of local geography, engineering, policy making, politics, and socio-economic drivers.

Encourage students to use some of these questions as a research framework:

- How did local tribes interact with the watershed since time immemorial? And what changed for them with the forced signing of treaties?
- What were the economic motivations for making such dramatic changes in our watershed?
- What were some of the engineering challenges?
- What were the consequences for industrial growth in the lower Duwamish?
- What were the consequences for farming in the middle Green River?
- How was flooding controlled in the Green River Valley? From Nature's point of view, is flooding good or bad?
- How did towns and cities grow as a result of these changes? Which communities benefited most from these changes and who was marginalized?
- How did each of these changes impact the natural life cycle of salmon?
- What solutions are needed in the next 30 years? Who is working on it? Can we help?
- How will climate change add to the challenge? TABLE - Anticipated Climate Impacts on Salmon

NATIVE LEGEND: Story of the Origin of the North Wind Weir

ESSAY: President Establishes the Muckleshoot Reservation by Executive order Get Essay

- Muckleshoot Tribal History - Tribe Website
- Treaty of Point Elliott - 1855 - What the treaty actually says
- Duwamish Tribe Point of View on the Treaty of Point Elliott - Tribe Website
- Duwamish Tribal History - Tribe Website

ESSAY: Duwamish-Green Watershed History

WRIA 9 Salmon Recovery Plan: CHAPTER 3 - Historical Background for Salmon Decline

POSTER: 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

GRAPHIC: Salmon Timeline Depicts Rapid Population Decline

ESSAY: Lake Washington Ship Canal (Ballard Locks)
VIDEO: Engineering at the Ballard Locks Katherine Garon, US Army Corps of Engineers

ESSAY: Howard A. Hanson Dam History
VIDEO: Howard Hanson Dam Engineering History - Richard Smith, US Army Corps of Engineers

Duwamish River Superfund Site

- **TIMELINE:** Community Action - Duwamish River Community Coalition
- **WEBSITE:** Superfund Site Cleanup Activities - Environmental Protection Agency
- **WEBSITE:** Duwamish Cleanup - Port of Seattle
- **WEBSITE:** Cleaning an Urban Waterway - Boeing
- **WEBSITE:** Plant 2 Habitat Restoration and Sediment Cleanup - Boeing Project Brief
- **VIDEO:** Environmental Remediation at Boeing Plant 2 - Brian Anderson, Boeing
- **RADIO / ARTICLE:** The Plane that Won a War and Ruined a River
- **VIDEO:** (youth-voiced) Engineering Strategies Superfund Cleanup | SPANISH | ENGLISH Cesar Lopez, Sustainability Ambassador

BOOK: The Once and Future River, Reclaiming the Duwamish, Photos by Tom Reese, Essay by Eric Wagner UW Press

From the publisher's website: Explore through photographs and words, the complicated relationship between Seattleites and their only river. Central to the indigenous settlement that preceded the city, the Duwamish was critical to Seattle's founding and growth, but it has paid a steep price. Straightened, filled with trash and toxins, and generally neglected by those who benefited from it the most, the river was declared a Superfund site in 2001. Long before then, however, some Seattleites were already trying to reclaim their river, and for almost twenty years, Tom Reese has documented the river landscape and the people engaged with this important place. His images bring forward what might seem like contradictions: a seal surfacing near an active sewage pipe, a family playing at a park adjacent to a barge loaded with scrap metal, a salmon swimming past a sunken tire. His attentive study offers a way not to turn away from this river, but rather to learn to understand the changed beauty of the Duwamish and the possibilities for its future.

BOOK: The River That Made Seattle, by B.J. Cummings UW Press

From the publisher's website: "With bountiful salmon and fertile plains, the Duwamish River has drawn people to its shores over the centuries for trading, transport, and sustenance. Chief Se'alth and his allies fished and lived in villages here and white settlers established their first settlements nearby. Industrialists later straightened the river's natural turns and built factories on its banks, floating in raw materials and shipping out airplane parts, cement, and steel. Unfortunately, the very utility of the river has been its undoing, as decades of dumping led to the river being declared a Superfund cleanup site. Using previously unpublished accounts by Indigenous people and settlers, BJ Cummings's compelling narrative restores the Duwamish River to its central place in Seattle and Pacific Northwest history. Writing from the perspective of environmental justice—and herself a key figure in river restoration efforts—Cummings vividly portrays the people and conflicts that shaped the region's culture and natural environment. She conducted research with members of the Duwamish Tribe, with whom she has long worked as an advocate. Cummings shares the river's story as a call for action in aligning decisions about the river and its future with values of collaboration, respect, and justice."

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?

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FUNDER & PARTNER ACKNOWLEDGEMENT

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