Watching Over Water
In Times of Changing Climate

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Introduction

In this unit, 2nd graders will gather and use diverse information to explain, predict, map, and model how the kinds and shapes of water in their community and in California are changing. Over four instructional segments, students will apply foundational science concepts about how water shapes a landscape and study the history of resource management and river advocacy by regional tribes to explain actions that support the **environment and climate justice** for themselves and for Indigenous communities. Students will engage in read alouds and comprehension strategies to support interdisciplinary learning. Storytelling, essential in all disciplines, helps children effectively communicate ideas, examine an issue from multiple perspectives, and advocate for change.

The anchoring phenomenon is the Klamath River dam removal, an important regional event in CA. The Klamath River is a large freshwater body in Northern California and is one of the most important rivers for salmon in the United States. Over millennia, the river has slowly changed the surrounding ecosystem, including creating and sustaining marshes and unique habitat for plants and animals. It has been used and **protected by Native Americans for over 7,000 years**, whose stewardship of the river began to be jeopardized in the 1800s gold rush. Corporate and government collaboration led to the placement of dams along the Klamath as a solution to flood management and for electricity production. Flooding is a fast process that can move a lot of dirt and change the shape of rivers and can move diseases into places where people, animals, and plants live and contaminate drinking water. The dam also limited the ability of salmon to spawn because they could not swim upstream. This was a very rapid change to the river that did not allow plants and animals to adapt. Consequently, salmon did not spawn upriver in over a century. Following decades of advocacy from the Karuk, Yurok, and Hoopa tribes of California as well as the Klamath River tribes of Oregon to restore the river flow, four dams were removed in 2024. It is the largest dam removal process in US history. To launch the unit, students will create a whole-class consensus model of the past, present, and future of the Klamath River to explain how land stewardship and land ethics impacts the shape and kind of water bodies.

The investigable phenomenon (a pedagogical strategy of science education to anchor structure in exploring a real-world event) will engage students in taking what they learned at the regional level to activate their agency at the local level. At this local scale, students will be provided with a range of resources on **how water systems and climate systems interact,** and they will research and investigate additional resources on rejuvenating water and climate systems. They will use these resources to make predictions through modeling about how various justice-oriented solutions might impact the well-being of local water bodies in relation to global warming and climate change. Students will engage in sensemaking about local climate disruptions and rejuvenating actions that organizations in their community are taking for water and climate justice.

Students will create initial and revised predictive models in small groups to demonstrate the impact of a local action that is meaningful to them.

The unit includes four interactive read alouds of illustrated children's literature and comprehension strategies that support students in meaning making and effective communication. The texts serve as resources for information about the health and shape of rivers as well as ways of becoming and being water protectors. For example, wondering becomes a model for inquiry, or asking questions about the water and land in Wonder Walkers. These read aloud experiences encourage students to use observation and imagination to learn about the environment. The comprehension strategy paired with this text, "Listen and Connect" (Seravallo, 2023), supports active listening and questioning, skills used throughout the unit. Other books contribute to scientific knowledge, such as The River that Wolves Moved: A True Tale from Yellowstone. This book examines how apex predators are essential to the health of a river by making visible the complex, interconnected relationships between water, land, plants, and animals.

Two of the texts in the unit written by Anishinaabe/Metis author Carole Lindstrom activate student agency and **underscore the importance of Indigenous knowledge** and relationships with water to sustain water and life well into the future. Autumn Peltier, Water Warrior is told from the perspective of water and honors the Indigenous women who have taken the role of water protectors, like Autumn Peltier and her Grandmother, Josephine. Autumn Peltier followed in the footsteps of her grandmother and the elders before her. This text also underscores **equity and justice**, as well as youth agency: Autumn was 13 years old when she spoke to the U.N. about water issues and models how to be a voice for water.

Anchoring Phenomenon - regionally relevant

Rejuvenation means bringing new life and vitality to degraded systems or relationships. The Klamath Dam removal rejuvenates the watershed as an act of climate and environmental justice.

Investigatable Phenomenon - locally relevant

How are local groups rejuvenating water to support water and climate justice in my community?

Targeted Standards

NGSS Standards
2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly
2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area

ELA Standards
Meaning making
RL2.3. Describe how characters in a story respond to major events and challenges.
RI2.6. Identify the main purpose of a text, including what the author wants to answer, explain, or describe.
Foundational Skills
RF2.4. Read with sufficient accuracy and fluency to support comprehension.
Effective Expression
W2.1. Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.
SL2.1. Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
Language Development
L2.3. Use knowledge of language and its conventions when writing, speaking, reading, or listening.

HSS Standards
2.2 Students demonstrate map skills by describing the absolute and relative locations of people, places, and environments.
2.3 Students explain governmental institutions and practices in the United States and other countries.
2.5 Students understand the importance of individual action and character and explain how heroes from long ago and the recent past have made a difference in others' lives.

Storyline Summary and guiding questions for the four instructional segments

Examining Rivers	Exploring Water Sources In My Community	Tracing Water Sources in My Community	Taking Action
What can change the shape and health of a river over time?	What water near our home do we want to watch over?	How can we predict helpful ways to watch over water?	What activities can I help with to watch over water near our home?

Storyline

Appendix Connections	Subject matter	Guiding question	Instructional activity
EXAMINING RIVERS			
	Hook (All Subjects)	What do we know about water watchers and the Klamath River? What do we wonder about water watchers and the Klamath River?	***Cordel*:** A **multi-modal,** arts-based activity in which text excerpts, photos, maps, data, and stories about the Klamath River hang from a clothing line that is strung across the classroom for students to view and discuss. ***Water Stories:*** Students are invited to write a short narrative about a time they played with, interacted with, or used water in their lives. This activity aims to make the broad topic of water more personal and relatable for students.
	History-Social Science 1	**Who/which groups have influenced the shape and health of the Klamath River over time?**	Construct a timeline of the Klamath River from the pre-colonization period through the construction of the dams and the dismantling of dams, keeping in mind **who had authority** in which eras.

	English Language Arts 1	What words and symbols can we use to best convey our ideas about water watching?	*Concept Map* Mapping and finding connections between tier 2 and tier 3 vocabulary. This would include academic vocabulary and words associated with critique, hope, and action. ● Goal: Find the best signs (i.e., words, images, symbols) to convey our ideas. ● Format: **Class anchor chart/ bulletin board** that grows over the unit
	English Language Arts 2	**What can change the shape of a river?** What water near our home do we want to watch over?	2 **Interactive Read Alouds** with a Focus on Meaning-Making-Comprehending Plot 1. *A River Ran Wild* ● Comprehension Reading Strategy: Track the problems as they snowball (Serravallo, 2023, p. 185). 2. *The River that Wolves Moved: A True Tale from Yellowstone* ● Comprehension Reading Strategy: Use Story Elements to Identify Problem(s) (Serravallo,2023, p. 178)
	Science 1	How and why has the shape of the Klamath River changed over time?	Create a scientific model (consensus, as a whole group) to explain changes in the Klamath River **(past, present, future)** and **identify the impact of who is watching over the water**
EXPLORING WATER SOURCES IN MY COMMUNITY			
	History-Social Science 2	**Where are bodies of water in my community?**	Locate on a simple letter-number grid system the school's location as well as the bodies of water in the community.
	Science 2	What can change the shape of a river? **What water near our home do we want to watch over?**	Analyze resources on a local waterways (small groups or whole class make a selection of a focal water body) **Analyze data and resources on fast and slow natural and anthropogenic processes that shape landscapes**

	English Language Arts 3	What water near our home do we want to watch over? What wonderings do we have?	Interactive Read Aloud with a focus on Effective Expression: *Wonder Walkers* • Reading Strategy: Listen and Connect (Seravallo, p. 395) • Examine observations that generate questions or wonderings
TRACING WATER SOURCES IN MY COMMUNITY *See Sample Lesson Plan below for more detailed lessons for this storyline*			
	Science 3	How can we predict helpful ways to watch over water (initial)? **How are water and climate systems interconnected?**	• Create initial, preliminary scientific model (in small groups or individually) to predict how an action by a local organization can rejuvenate a waterway • Generate a list of questions on additional information needed to improve model • Guided discussion on how water and climate systems interact
	Data Visualization	How can we use data visualizations to understand and communicate changes in local water systems?	Design a Data Visualization Artifact This workshop equips pre-service teachers with tools to integrate data visualization and climate justice into their interdisciplinary teaching. Participants will: • **Part 1:** Analyze and create basic data visualizations using Excel or Google Sheets (e.g., rainfall trends, pollution levels). • **Part 2:** Design infographic posters using Adobe Express or Canva to communicate water stewardship and climate justice visually. **Goal:** To enhance educators' ability to teach environmental change through visual storytelling.
	English Language Arts 4 / History-Social Science	**How can we watch over water?**	Interactive Read Aloud with a Focus on **Meaning-Making-Comprehending Plot:** ***Autumn Peltier, Water Warrior*** • Comprehension Reading Strategy: Find the Problem by Focusing on the Reaction (Serravallo, 2023, p. 179)

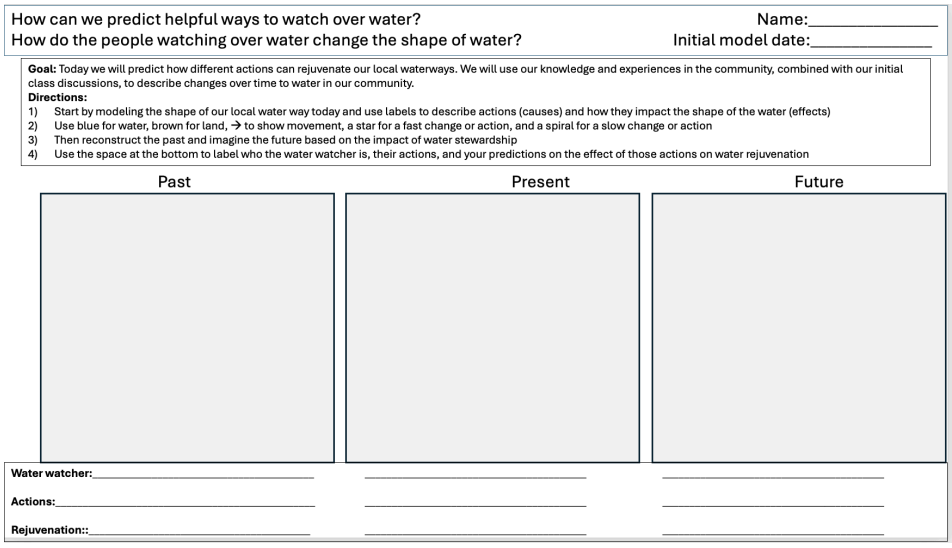
	History-Social Science 3	Who is someone who has watched over the Klamath River?	Watch the following video about the efforts by the Yurok, Hoopa and Karuk to restore the Klamath as the basis for a lesson on the importance of individual action and character. • Swiftwater Films - "Bring the Salmon Home"
	Science 4	What activities can I help with to watch over water near our home? How can we predict helpful ways to watch over water (revised/final)?	Gather and analyze resources on actions to justice oriented rejuvenation of selected waterway Revise predictive model of how to rejuvenate selected waterway
TAKING ACTION			
	Culminating task - Create a PSA (All Subjects)	How can we watch over water?	A. Create a Cordel Public Service Announcement (PSA) Artifact: Create an artifact that will persuade the community to watch over a local source of water. It could be a poster, an opinion piece, a video, a picture book, infographic, example. B. Hot Seat**:** Students have one minute to share their PSA to entice readers to pick up their PSA on the cordel.

Sample Lessons- *Segment 3 - Tracing Water Sources in My Community*

SCIENCE LESSON SAMPLE

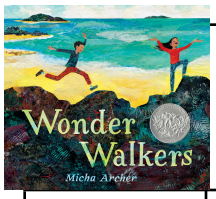
How can we predict helpful ways to watch over water (initial)?

	Instructional Activities questions/prompts/activities
5Es	NGSS standard: 2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area
Engage	Position the previous “exploring water sources in our community” segment as an elicitation of student experiences and ask new questions: Teacher shows pictures of local bodies of water (an ocean, river, lake, or pond). Ask students to think about and discuss: ● What animals live in this water? What plants grow near the water? ● How do humans use this water (e.g., swimming, fishing, drinking)? ● What organizations do we know that work to protect these local waterways?
Explore	*Initial predictive model (SEP2)* Small groups or individual students create an initial model of the local focal water body (can be any type - man-made or natural, but should be fresh water as the activities won’t work with the ocean) in the present and in the future future with an action they care about 1. Teacher groups the students and encourages them to choose one local body of water and one environmental organization to focus on in the lesson today. Write the group choices on the board and strive for different bodies of water/organizations across the student groups. 2. Teacher asks students what humans do to impact their bodies of water. Write these ideas on the board and ask students to help think of causes and effects related to the local bodies of water. 3. Teacher explains to students that scientists often predict future events based on what is happening now. "We are going to create a model that helps us predict how our body of water might change in the future depending on what we do today. For example, if we clean up litter today, the water will stay clean and animals will be safe. But if we continue polluting, the water could become dirty, and animals might not survive."

	4. Provide each group with a large piece of chart paper with the template (below). Instruct students to draw three sections on the chart paper: past, present, and future. 5. With their chosen body of water in mind, instruct students to discuss ideas as a group and then to draw pictures in the “Present” section to show what the water body looks like now (e.g., fish, plants, clear water). 6. Remind students that the data visualization activity, “Autumn Petlier, Water Warriors” read aloud, and videos on Yurok, Hupa and Karuk people are evidence to include  How can we predict helpful ways to watch over water? Name:_____ How do the people watching over water change the shape of water? Initial model date:_____ **Goal:** Today we will predict how different actions can rejuvenate our local waterways. We will use our knowledge and experiences in the community, combined with our initial class discussions, to describe changes over time to water in our community. **Directions:** 1) Start by modeling the shape of our local water way today and use labels to describe actions (causes) and how they impact the shape of the water (effects) 2) Use blue for water, brown for land, → to show movement, a star for a fast change or action, and a spiral for a slow change or action 3) Then reconstruct the past and imagine the future based on the impact of water stewardship 4) Use the space at the bottom to label who the water watcher is, their actions, and your predictions on the effect of those actions on water rejuvenation Past / Present / Future **Water watcher:**_____ **Actions:**_____ **Rejuvenation::**_____
Explain	Teacher introduces the concept of environmental cause and effect by showing the students a "Cause and Effect" chart. For example: **Cause**: People in the organization clean up trash in the waterway → **Effect**: The water stays clean and animals stay healthy. 1. With their chosen body of water and environmental organization in mind, instruct students to discuss ideas as a group and then to draw pictures in the “Future” section to show what might happen to the body of water based on different actions and different stewards. Foreshadow that in the next science lesson they will research the work of local environmental organizations (e.g. cleanup efforts). 2. Teacher leads a discussion with the class where each group shares their model with the class and explains why they predicted certain outcomes for the future based on the impacts of the environmental organization. 3. After each group shares, ask the group to reflect on each body of water by asking students: a. How did the actions of local environmental organizations support the rejuvenation of our waterways?” b. "What actions can be taken today to make sure this body of water stays clean and healthy? By us? By local leaders?"

	4. Generate a list of questions with the students on any additional information they might need to improve their models. 5. Teacher reviews the students' predictive models to assess their understanding of cause and effect relationships related to environmental groups and actions. Guided discussion and Venn diagram activity on interactions of climate and water systems 1. Introduction and elicitation of prior knowledge of climate change/global warming - "Imagine you have a big garden. If you don't water the plants or take care of them, the garden won't grow well, right? Well, our Earth is like that garden, and the way we treat it can help it grow strong or hurt it. Climate change is like when we forget to take care of the garden. It happens when things like cars, factories, and even too many plastic bottles make the Earth warmer, and that can hurt animals, plants, and even us." 2. **Share ideas to create Venn diagrams on similarities, differences, and interactions of water and climate systems**. Working through each dimension (components, scale, processes, and roles) one by one. This may require review of the water cycle basics and the definition of climate and weather. This activity can be extended in to a full lesson to elicit students experience and knowledge about the similarities and differences: - Water system - Components: rivers, lakes, aquifers, - Scale (spatial and temporal): primarily local; short times - Processes: evaporation, runoff - Roles: shapes land - Climate system - Components: atmosphere, biosphere, - Scale (spatial and temporal): primarily global; long times - Processes: carbon cycle, greenhouse effect - Roles: controls weather - Similarities: - Components: ocean - Scale: Global problems that are caused and solved locally - Processes: driven by solar energy; conservation of matter and energy - Roles: supports life

ENGLISH LANGUAGE ARTS LESSON SAMPLE



Read Aloud: *Wonder Walkers*
Standard: ELA SL2.1.
Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.

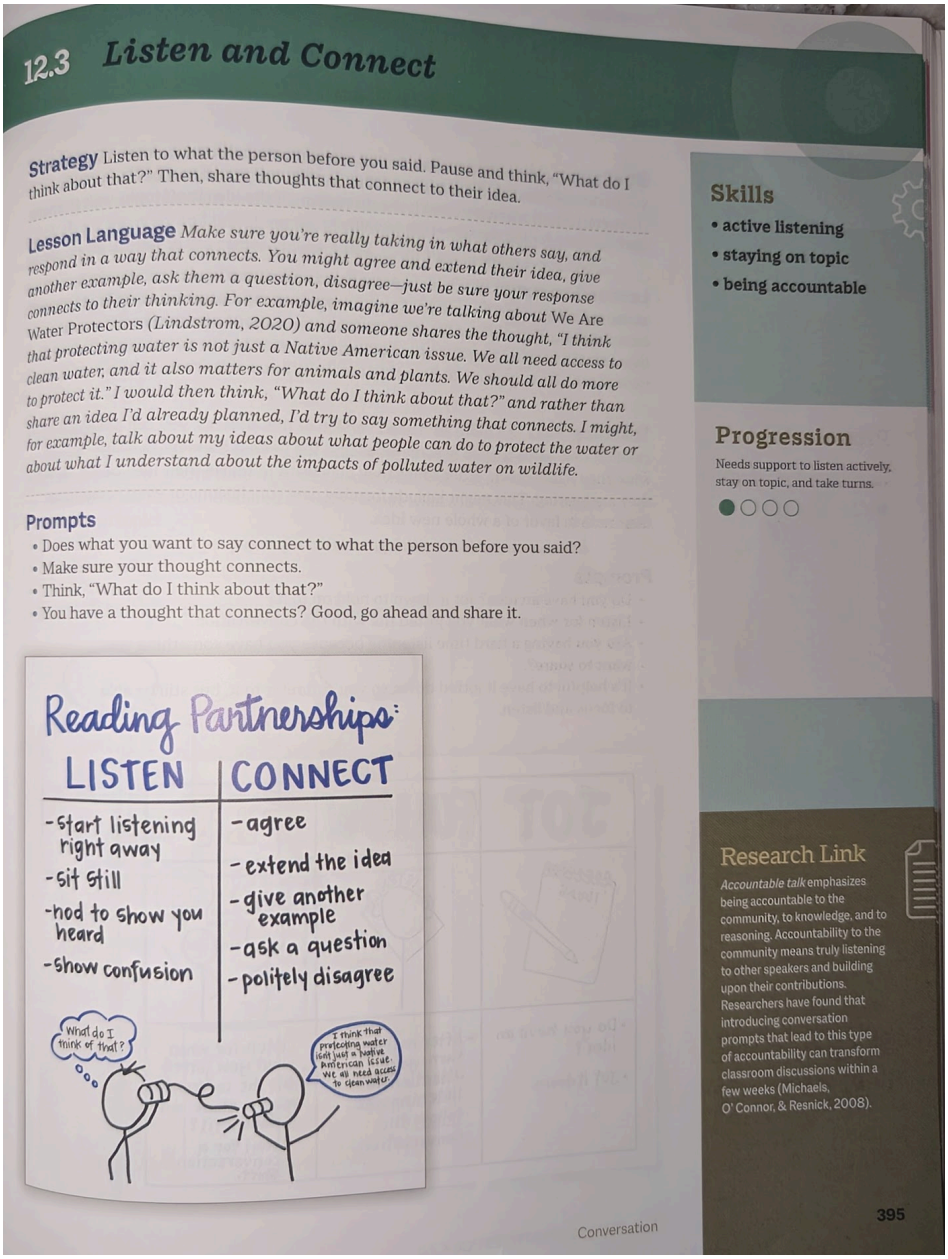
Anticipatory Set

- **Recap:** Remind students that they examined how rivers change in class, specifically the Klamath River (point to classroom artifacts). We know that scientists and earth-loving citizens observe and examine the world around them.
- **Think-Pair-Share:** *What does it mean to wonder?; What does it <u>look like,</u> and what does it <u>sound like</u> to wonder about our natural world?*
    - As students share, capture their ideas on an anchor chart.
- **Introduce Text**: Introduce students to the book *Wonder Walker.* Have them examine the cover and predict what a Wonder Walker may be.

Interactive Read Aloud

PB page number	Question Type	Teacher Talk/ Question:
p. 9	Think Aloud	Wow, these two kids are asking a lot of questions… hmmm… a lot of *wonderings*. I can't help but notice that as they walk around their community, they are taking a close and creative look at the world around them. Thumbs up if you notice that, too. Let's keep reading to see what else they notice and wonder.
p. 13 "I wonder. Me too"	Turn and Talk	What's so neat is how they are wondering together. We can always see more when we're with someone else. Turn and talk to your neighbor about ways you've explored or wondered with a friend or family member.
p. 19 Is the dirt the world's skin? Are roots the plant's toes?	Think Aloud	These aren't just any questions. They are really thinking about their world creatively. How interesting to think of dirt as the skin of the earth and plants' roots as its toes. Make the earth feel alive, hand on your heart if you feel that way too.
P. 23 Are shells the shore's necklace? Is the ocean the world's bath?	Think, Pair, Share	Let's try to be creative in our wonders of the world, too. Look at this page. Whisper in your hands what do you see? Release the whisper from your hand on the count of three. 1, 2, 3… [Revoice what you hear]. What might these kids or you wonder about these things?
P. 27 Is the wind the world breathing?	Think and Act	Let's try breathing like the wind. Try again; capture it in your hand. Thumbs up if your breath felt like wind on your hands.

Teaching the Reading Strategy	**Reading Strategy Focus:** Listen and Connect (Serravallo, 2023 p. 395) **Recap:** *Before we read this book, I asked you to think about what it means to wonder. In this story, we got to see two kids wonder about the world around them. What I really loved about this book is that it showed wondering is not something we always do alone, it is often done with others. The ideas of others can expand what we can see and think. Today, just like the children in the book, we are going to practice being wonder walkers together.* **Strategy Teach:** Explain that to be successful in wondering together, it's important for them to listen to the wonderings of their classmates and find ways to connect. Explicitly teach Serevallo's strategy *12.3 Listen and Connect* **(pictured below).**



12.3 Listen and Connect

Strategy Listen to what the person before you said. Pause and think, "What do I think about that?" Then, share thoughts that connect to their idea.

Lesson Language *Make sure you're really taking in what others say, and respond in a way that connects. You might agree and extend their idea, give another example, ask them a question, disagree—just be sure your response connects to their thinking. For example, imagine we're talking about* We Are Water Protectors *(Lindstrom, 2020) and someone shares the thought, "I think that protecting water is not just a Native American issue. We all need access to clean water, and it also matters for animals and plants. We should all do more to protect it." I would then think, "What do I think about that?" and rather than share an idea I'd already planned, I'd try to say something that connects. I might, for example, talk about my ideas about what people can do to protect the water or about what I understand about the impacts of polluted water on wildlife.*

Prompts
- Does what you want to say connect to what the person before you said?
- Make sure your thought connects.
- Think, "What do I think about that?"
- You have a thought that connects? Good, go ahead and share it.

Reading Partnerships:

LISTEN	CONNECT
-start listening right away	-agree
-sit still	-extend the idea
-nod to show you heard	-give another example
-show confusion	-ask a question
	-politely disagree

Skills
- active listening
- staying on topic
- being accountable

Progression
Needs support to listen actively, stay on topic, and take turns.

Research Link
Accountable talk emphasizes being accountable to the community, to knowledge, and to reasoning. Accountability to the community means truly listening to other speakers and building upon their contributions. Researchers have found that introducing conversation prompts that lead to this type of accountability can transform classroom discussions within a few weeks (Michaels, O' Connor, & Resnick, 2008).

Conversation 395

Figure 1: Listen and Connect Strategy, from The Reading Strategies Book 2.0 by Jennifer Serravallo

	Model: Model using this strategy with one high-performing student using the question, what does it mean to wonder? **Practice**: Have students practice this strategy with their elbow partner. Walk them through the following three questions and pause in between to discuss how the strategy is going. *Book Discussion Questions* 1. What does it mean to wonder? 2. How did the children in the book wonder about nature in their community? 3. How do / how could you wonder about the natural world in our community? *Strategy Reflection Questions* ● Thumbs up, thumbs down -was it easy to listen? Why? ● What are ways you are finding connections? ● Hands on your head if you disagreed with your partner. What did you do?

HISTORY-SOCIAL SCIENCE LESSON

HSS 2.5 Students understand the importance of individual action and character and explain how heroes from long ago and the recent past have made a difference in others' lives.

After learning about the history and impact of the dams along the Klamath River, students will watch a video highlighting the efforts of regional tribes (Hoopa, Yurok, Karuk, Klamath River) to demand dam removal and the restoration of salmon habitat. If your students have already learned that dams along the Klamath River were successfully removed, explain to students that this video was made before this became a reality, and that this community run for the salmon was part of the successful campaign to fight for dam removal. Students will consider how individual and collective action can make a positive difference about issues that matter to communities and the environment.

As you watch the video, use this guide to support student learning (you may want to pause the video to ask certain questions at certain times, or you may want to experience the 14-minute video in one go to feel the full emotional weight of the film):

Student Action	**Instructional Guiding Questions**
Observe	What is this video about? What do you notice about the Klamath River and the surrounding environment? What do you notice about the ages of the people in this video? What feelings and emotions do they express with their words and their actions? Write down three phrases that you heard people in this video say that you thought were important. Do you have any questions about what you are seeing in this video?
Reflect	Why are people running? What do they want to see happen? How do you think the people in this video understand their relationship to salmon? To the Klamath River? To each other?
Consider Action	What do the young people say about why they are choosing to run and to support the salmon? Do you think they see their actions as working toward something for themselves only? Do you think they see their actions as working toward something for their community? Do you think they see their actions as working toward something for their environment? What other reasons do you think these people are involved with this run?

Text Set for Lessons

Title	Author/ Illustrator	Summary
A River Ran Wild	Lynne Cherry; Illustrated by Lynne Cherry	Over 7,000 years ago, Native Americans settled on the Nashua River, but industrialization led to environmental decline; through contrasting illustrations, Lynne Cherry tells a hopeful story of modern-day efforts by diverse communities to restore the river, inspiring young readers to take action in conservation.
The River that Wolves Moved: A True Tale from Yellowstone	Mary Kay Carson; Illustrated by David Hahn	Cumulative tale* and informational text. The cumulative narrative builds sentence by sentence to show how each element impacts the next. Supported by facts and key vocabulary about river habitats, plants, and animals.
Autumn Peltier, Water Warrior	Carole Lindstrom (Anishinaabe/Metis); Illustrated by Bridget George (Anishinaabe)	A story told by water about Indigenous women who have been water protectors and centers the stories of Grandma Josephine and youth activist, Autumn Peltier. How can we protect and nurture water for seven generations? Now the seventh generation raises their voice!
We Are Water Protectors	Carole Lindstrom (Anishinaabe/Metis); illustrated by Michaela Goade (Tlingit/Haida)	This is a story inspired by the Dakota Access Pipeline protests. It centers on the story of an Ojibwe girl who fights against an oil pipeline in an effort to protect the water for generations to come..