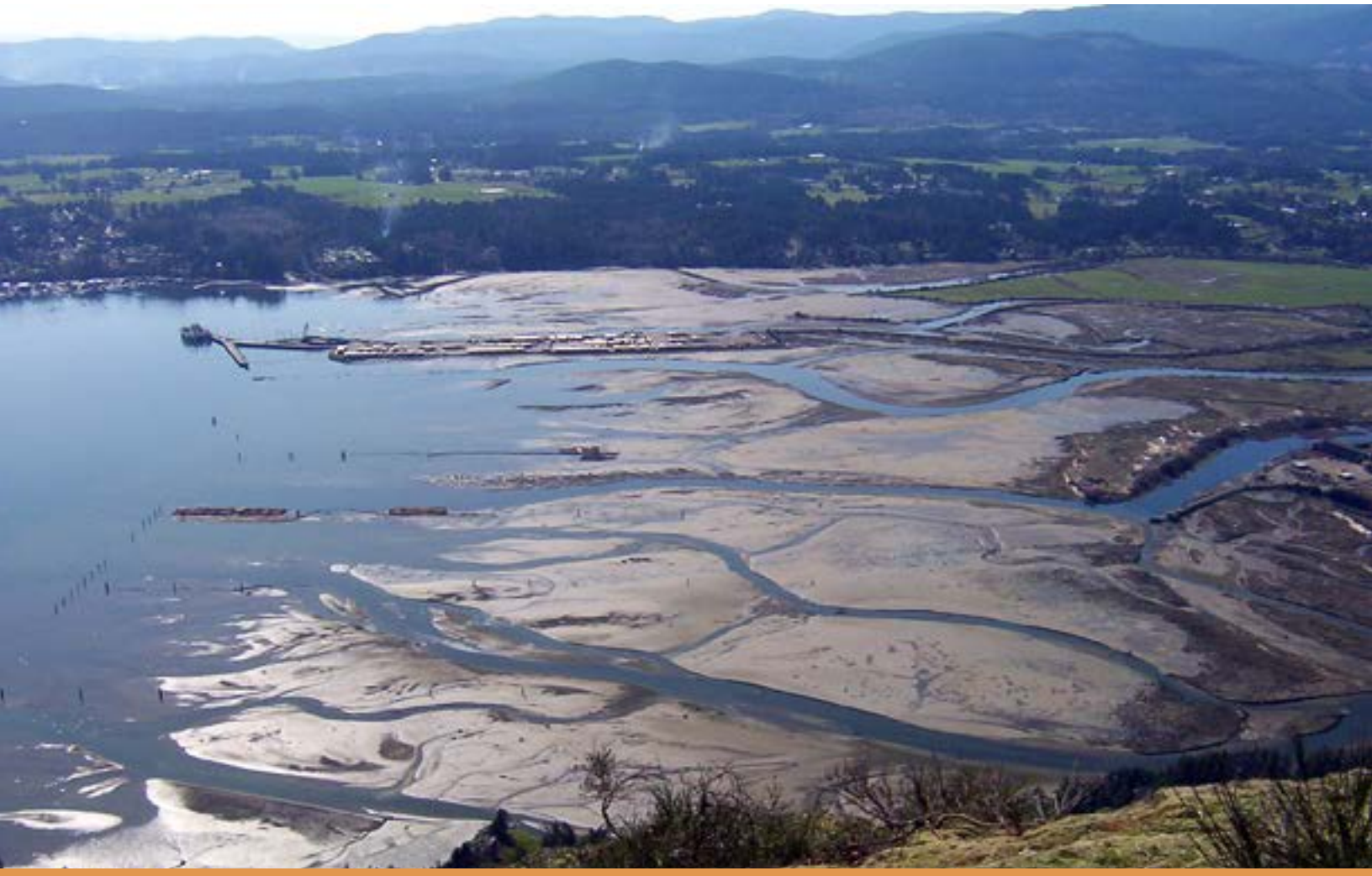
Best Water Ways

Watershed Literacy, Stewardship, and Restoration Place-Based Learning Resources



Educator's Guide

By Stephanie Cottell, MSc Education for Ecological Sustainability

Cowichan Land Trust

PACIFIC SALMON FOUNDATION

real estate foundation BRITISH COLUMBIA

This initiative was inspired and developed within the unceded Traditional Territories of the Quw'utsun, Penelakut, Halalt, Malahat, Stz'uminus, and Lyackson People. Huy tseep q'u Siem! Thanks to you all with respect and honour!

Acknowledgments

The Cowichan Community Land Trust is deeply grateful to the following kind folks who have generously contributed to the *Best Water Ways* creation process:

Our Subject Matter Expert and Educator Focus Group

- Ts'ules Chuck Seymour (Cultural Coordinator, Cowichan Tribes)
- Rosanna Jackson (SD79/Watershed Connection Education Working group)
- Jane Kilthei (Cowichan Estuary Nature Centre/Watershed Connection Education Working group)
- Craig Laurdisen (SD79/Watershed Connection Education Working group)
- Karen Mann (Ecosystem Restoration Specialist)
- Kathy O'Donnell (Watershed Connection Education Working group)
- Tom Rutherford (Cowichan Watershed Board/Watershed Connection Education Working group)
- Jill Thompson (Cowichan Watershed Board/Watershed Connection Education Working group)
- Alicia Taylor (Cowichan Estuary Nature Centre/Watershed Connection Education Working group)
- Joanna Vera Flores (SD79)
- Pamela Williams (Cowichan Estuary Nature Centre/Watershed Connection Education Working group)
- Christy Wilson (Fisheries and Oceans Canada Community Educator/Watershed Connection Education Working group)

The Open School BC Team

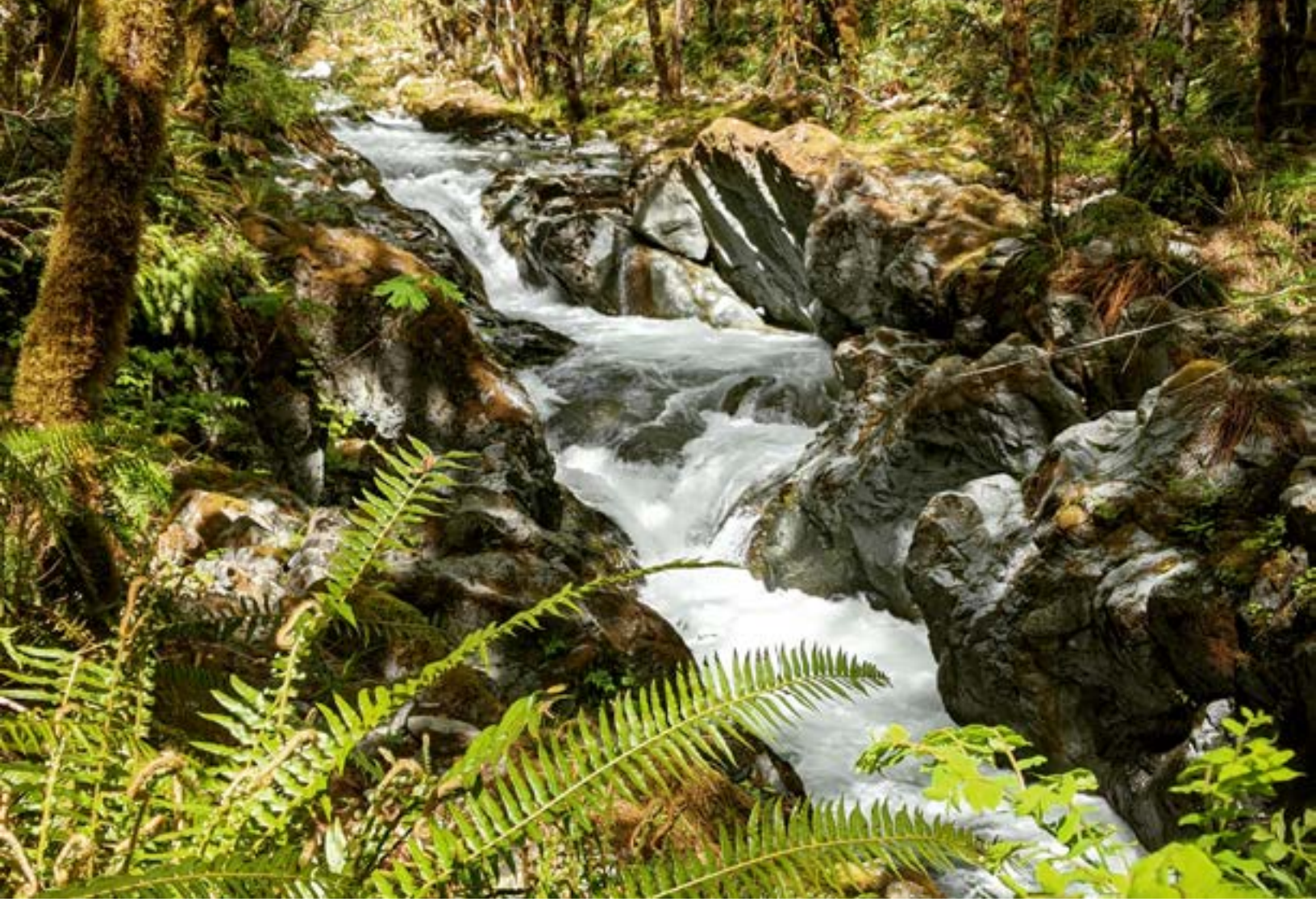
- Zoe Graham, Instructional Designer
- Solvig Norman, Instructional Designer
- Farrah Patterson, Production Manager
- Nori Sinclair, Production Technician
- Ian Horner, Production Technician
- Sophia Barton-Bucknor, Manager of Instructional Services
- Jennifer Riddel, Director

And of course to our generous funders!

- The Real Estate Foundation of BC
- The Pacific Salmon Foundation
- The Province of British Columbia

With special thanks to nature interpreter **Genevieve Singleton** for the use of her beautiful photographs.

Table of Contents



An Introduction to the *Best Water Ways* Resources

Greetings! If you are reading this guide you are likely a teacher or educator considering whether the *Best Water Ways* place-based learning resources have value, and may be useful to you and your class or learning group.

These resources have been created by the Cowichan Community Land Trust, with the input of a group of subject matter experts and educators like you. A brilliant team from Open School BC has provided their professional instructional design expertise to ensure that the resources are consistent with the curriculum objectives and are visually appealing.

The development and piloting of these resources has been made possible with funding from The Real Estate Foundation of BC, and the Pacific Salmon Foundation. We are most humbly grateful for opportunity to bring this vision into fruition.

The following backgrounder is intended to provide a bit of context around the *Best Water Ways* initiative, and will hopefully help you decide that "YES, these resources are just what we need!"

The Big Idea

As an educator, you are aware of the many challenges facing our Earth's biological systems. You teach students earth science/ecological concepts such as the 'Water and Carbon Cycles' and try to help learners connect these concepts to their lives and what is happening around us today.

Organizations like the Cowichan Community Land Trust have been involved with school and community learning for many years. For example, many local conservation groups organize Streamkeepers activities and provide resources for storm drain marking (think 'yellow fish' symbol). School groups often join in on planting or streamside clean-up days.

The Cowichan Community Land Trust was delivering a riparian restoration project recently that spontaneously involved a local grade nine group doing some planting. It was during this project that a beam of light came through the forest and illuminated the need for the *Best Water Ways* learning resources. Would it not be of great benefit to enrich these types of community stewardship and restoration activities with a deeper, place-based learning experience for students and educators? After-all, where and how our local water flows is about as place-based as it gets.

It is also vitally important that youth learn about their local watersheds, and how to protect, steward, and restore them.

Place-Based Learning

There has certainly been a lot of buzz about place-based learning recently. The theory and practice of place-based learning has emerged through the growing awareness that learning can be very engaging, meaningful, and effective when approached through direct exploration of our specific place in the world.

Ecos is the ancient Greek word for Home. Fittingly, the place-based learning approach is a great way to explore aspects of local ecology, such as watershed systems, and expand a learner's basic literacy around ecological themes. It also aligns beautifully with aims to nurture good citizenship and awareness of important sustainability issues we face, both locally and globally.

> *Place-based learning happens through inquiry-led, project-style, experiential activities that help learners understand overarching global macro-concepts by exploring through a tangible local lens.*

For example, students might learn about water use and conservation by looking at, and becoming familiar with, their school population's water consumption. The group may then try different water conservation methods, analyzing any changes to water usage over time.

We highly recommend that you visit gettingsmart.com/placebasededucation for more information about the theory, practice, elements, and benefits of place-based learning.

Inquiry-led Learning

Place-based learning is predominantly led by the process of learner inquiry. The beauty of this approach means that a set of learning resources, such as these, can be used by a range of different age groups and different subject curriculum. For example, science and social studies can be integrated because the group will engage with the content at their own level, and from the thematic lens of their own inquiry.

The inquiry-based approach was selected because we want the *Best Water Ways* learning experience to be exciting, memorable, and empowering to participants (including you!). The aim is to connect participants' learning experiences organically, yet tangibly, with the related curriculum and competencies through their own process of inquiry, curiosity, and discovery.

> *The intention is also to nurture an awareness of our human relationship with the health of watershed systems, and to motivate on-going involvement in stewardship and restoration in the places we call home.*

Inquiry-based activities are integrated into each session. They culminate with the "Shout Out and Share!" communication element. This activity is very self-directed, it lets learners hone-in on what they have connected with most tangibly during the sessions.

Indigenous Knowledge

The integration of local Indigenous knowledge in today's classrooms is invaluable because it broadly supports a holistic learning experience for students. In the context of local ecological sustainability, we have a great deal to learn about how to coexist better with nature, a theme which is central to Indigenous teachings. Our approach in *Best Water Ways* is to explore elements of local Indigenous knowledge throughout each session of the learning project.

We encourage you to connect with the Indigenous education department of your school district, and/or with the educational department of your local Indigenous community. They may be able to connect you with Elders and Knowledge/Culture-Keepers who can visit your classroom and/or join you on a field trip to a local water body.

Historically, Indigenous knowledge was spoken rather than written. However, many communities have published excellent local language dictionaries and other print-based materials. We have also added links to web-based First Languages resources that can be utilized in the session activities. These links can be found in the "Regional Resources" area of the *Best Water Ways* web page at cowichanlandtrust.ca/best-water-ways.

The Resources

The *Best Water Ways: Watershed Literacy, Stewardship, and Restoration Place-based Learning Resources* are a suite of six Educator's Guides with activity plans, and a Learner's Guide for each session. These resources can be used in a multitude of ways to facilitate learning about your local watershed, and how it can be protected and restored.

The suite of resources is designed to be delivered as five learning sessions (each approximately two-hours long). They culminate in (or begin with–but more on possibilities later!) a local restoration activity in a nearby stream, creek, lake, or wetland within your watershed. This restoration activity might involve an afternoon or a day-long clean-up or planting session. Or it might be a more intensive restoration project that takes from several days to a week, with learners contributing to the planning. This will depend on your context, grade, learning level, time, and capacity.

Ideally, you will be able to partner with a local group like the Cowichan Community Land Trust (there are many). They can help plan and facilitate the restoration activities and other learning session components that may be challenging for you. We have compiled a list of conservation groups and contacts, categorized by region. You can find this list on the Best Water Ways web page. We are also sharing information about *Best Water Ways* with these groups, with the aim that they will be familiar with the initiative when you contact them.

All smiles after a satisfying riparian restoration session!

Photo: Stephanie Cottell

On Curriculum

We understand that teachers must meet grade curriculum and competency expectations. This can make offering an extended 6-session learning experience, with a focus on watersheds, seem challenging. Because the learning process is inquiry-based, the participants will engage with the content at their own level, allowing the resources to be adaptable to a wide range of ages and learning capacities.

It's important that any supplemental materials that are brought into the learning experience are grade or learning level appropriate for your group (i.e., text and reference books, articles, research papers).

The following table describes the most obvious areas in which the *Best Water Ways* place-based learning resources connect to the BC Provincial Grade 9-12 Science Core Curriculum. However, these resources can also be used in an elementary level learning context.

Grade Level and Subject	Big Ideas
Grade 9 Science	• The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them
Grade 10 Science **special stand-alone sessions rather than the whole suite*	• DNA is the basis for the diversity of living things • Energy is conserved, and its transformation can affect living things and the environment • Indigenous classification of plants
Grade 11 Earth Science	• Earth materials are changed as they cycle through the geosphere and are used as resources, with economic and environmental implications • The distribution of water has a major influence on weather and climate
Grade 11 Environmental Science	• Complex roles and relationships contribute to diversity of ecosystems • Changing ecosystems are maintained by natural processes • Human practices affect the sustainability of ecosystems • Humans can play a role in stewardship and restoration of ecosystems
Grade 11 Science for Citizens	• Scientific processes and knowledge inform our decisions and impact our daily lives • Scientific understanding enables humans to respond and adapt to changes locally and globally

Grade Level and Subject	Big Ideas
Grade 12 Environmental Science	• Human actions affect the quality of water and its ability to sustain life • Human activities cause changes in the global climate system • Sustainable land use is essential to meet the needs of a growing population • Living sustainably supports the well-being of self, community, and Earth
Grade 12 Specialized Science	• Biodiversity is dependent on the complex interactions and processes between biotic and abiotic factors • Climate change impacts biodiversity and ecosystem health • Forces interact within fields and cause linear and circular motions

Curricular Competencies for 9-12 Sciences

- **Questioning and predicting:** Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
- **Planning and conducting:** Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- **Processing and analyzing data and information:** Experience and interpret the local environment and apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
- **Evaluating:** Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- **Applying and innovating:** Contribute to care for self, others, community, and world through individual or collaborative approaches
- **Communicating:** Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations and Express and reflect on a variety of experiences, perspectives, and worldviews through place

*For the **Grade 10 Science** applications, certain standalone elements within the learning resources package would be highly valuable, and appropriate to meet specific curriculum components for the upper level sciences.

More detailed information about each curriculum competency can be found at:
https://curriculum.gov.bc.ca/curriculum/science

These include:

- **Natural selection and genetics,** explored through learning about adaptive differences between wild and hatchery raised fish
- **Indigenous classification of plants,** explored through learning local Indigenous traditional medicinal plant names, and uses of species that grow in a riparian habitat

We plan to develop activity session plans that focus on these upper-level science core curriculum objectives to increase the accessibility and utility of these resources. Once complete, they will be accessible on the *Best Water Ways* web page.

The Resources: An Overview

The *Best Water Ways* suite of resources is made up of the following components:

Educator's Guide (EG)

The Educator's Guide contains

- An introduction and overview
- Six session guides providing a detailed look at each session's curriculum content and implementation methods
- Six session activity plans: providing a quick bullet-form reference to assist in session flow
- Complete list of "Words and Terms"
- Materials for activities

Learner's Guide (LG)

The Learner's Guide resources are designed to be compiled as a workbook for participants if you are offering multiple sessions, or as individual session resources. The workbook can be handed in after each session for your review, making the "Watershed Reflection" component an effective evaluation tool.

Each Learner's Guide includes

- An introduction to the session
- Guidance through the content and activities
- Related inquiry questions with space provided for their work
- A complete list of "Words and Terms"
- A "Watershed Reflection" component for learners to complete at the end of the session
- Associated learning materials (e.g., cut-out labels for activities)

The Sessions: An Overview

Note: The sessions are numbered for your convenience but can be used in any order.

Session 1: Watershed Detectives	
Big Idea/Inquiry	What is our direct connection to our watershed?
Words and Terms	Interconnectedness, culverts, ditches, storm drains, perimeter drain, bridges, dikes
Session 2: Wading In	
Big Idea/Inquiry	What is a watershed?
Words and Terms	Watershed, water basin, surface water, ground water, river, tributary, riparian ecosystem, physiography, Indigenous knowledge, local Indigenous language word for water
Session 3: Mapping Our Watersheds	
Big Idea/Inquiry	What does our local watershed look like?
Words and Terms	Topographic map, elevation, contour lines and intervals, gully, valley, slope, watershed boundary, local Indigenous place names of mountains or other features
Session 4: Watersheds In Distress	
Big Idea/Inquiry	How is our watershed being harmed?
Words and Terms	Deforestation, contaminants, run-off, phosphorus, nitrates, invasive species, reciprocity
Session 5: Watershed SOS	
Big Idea/Inquiry	How can we protect and restore our watershed?
Words and Terms	Ecological literacy, ecological restoration, selective forestry, rain gardens, decontamination, mitigation, local Indigenous language words for willow and/or red-osier dogwood
Special Note	In the *Watershed SOS* session, learners are also guided in planning a "Shout Out and Share!" project communication element in preparation for riparian restoration activities. The integration of this element will provide an effective approach for evaluation of participant learning.

Session 6: Riparian Restoration Workshop	
Big Idea/Inquiry	How do you DO riparian restoration?
	This session is a bit different than the others in the following ways: • it will take more time • you will be coordinating with an ecological restoration specialist to facilitate this session and follow-up restoration activities
Words and Terms	Bioengineering, plant cuttings, live-staking, natural succession species, pruning saw, loppers, hand-pruners, planting bar, the local Indigenous language place name for the creek, stream, wetland, or lake where you are learning.
Special Note	We have listed contact information for restoration professionals in each region who could deliver this session, as well as organizations who could potentially help write grants for funding from a variety of foundations and agencies. These are listed in the "Regional Resources" section of our project web page. We are also working on creating supplemental multimedia materials that could aid in the delivery of this session for those who are unable to connect with a professional. This session can be your final field activity or serve as the first day of an extended restoration project that will involve these techniques It may be more appropriate for you to do a stream clean up, planting session, storm drain marking, or other watershed restoration activity instead of offering this session. It's up to you and what works for your situation!

Tips for Implementation

Shout Out and Share!

Introduced in *Session 5: Watershed SOS*, this is the project communication element.

Learners will be doing their own information gathering for their chosen communication element throughout the riparian restoration activities. You will need to provide some additional class time for them to complete this component. We encourage you to organize a "Shout Out and Share!" event for participants to share about their learning experiences with the community. We also enthusiastically welcome anything that can be shared with our growing online community!

Go with Your Flow

These resources are structured and presented in a linear fashion, so that you could simply start at *Session 1: Watershed Detectives* and work through them in sequence. However, you may prefer to start with *Session 3: Mapping Our Watersheds*, or *Session 2: Wading In*. That is perfectly fine.

Watershed systems are interconnected networks and webs, without one official starting point. We encourage you to jump in where it works best for you, and proceed from there.

One idea is that you start with a stream clean-up activity to get the learners interested and connected to a tangible place. Then, you could end the learning project with more intensive restoration activities in the same location. There are many possibilities!

Evaluating the Learning

A game called the "Watershed Wiz Quiz" has been provided as an optional activity to assess the level at which learners have grasped the content. Giving learners in each group the chance to add insight as you play the game is a great way to let their learning about their "Word or Term" shine through. However, we recognize this type of game activity might not be the best fit for every age or group. We will leave that decision up to you!

The "Watershed Reflection" activity will be extremely valuable for your learners to connect with ideas and explorations that stood out for them during each session. It will also give you the chance to track and evaluate their learning process. We recommend that your learners hand in their Learner's Guides after each session so you can review their reflections.

We strongly recommend that you also integrate the "Sharing Circle" so that your group can talk together about their learning experiences. Sharing with each other is an invaluable way for learners to practice communicating about their perceptions, listen to and consider the perception of others, and provide each other with feedback in dynamic conversation.

Accessing the Resources

The *Best Water Ways* learning resources are available to be downloaded and printed as comprehensive documents (complete Educator's Guide and complete Learner's Guide) and as individual sessions. Both Educator's and Learner's Guides can be accessed electronically using Adobe Reader and are text-fillable, giving you the option to use the resources online or offline.

Adaptability

We want you to be able to adapt the resource materials to your context. It is place-based learning after all! Feel free to use whatever pieces of the resources that are useful to you, whether it is a single activity, a full session or the whole guide.

Jump In

Now that you have a clearer idea of what the *Best Water Ways* place-based learning resources are all about, we hope you are ready to start exploring your local watersheds with your learners!

Enjoy!

Notes