

Unit 5

Place-Based Ethnobotany

Overview

In this unit students look at the relationships between plants and people through the lens of the field of ethnobotany. Particularly, they explore the idea of First Peoples' Traditional Ecological Knowledge about plants as it relates to place.

Traditional Ecological Knowledge about the diverse plants growing in their territories is key to the sense of place held by First Peoples. When First Peoples go out on the land to pick berries, to dig bitterroot, to gather stinging nettle, bark or grasses, it provides a connection with the land and with the ancestors.

As with other resources, traditional knowledge views plants holistically, as a complete living organism interconnected with the rest of the world. There are many dimensions to the wealth of plant resources, such as healing, spirituality, ceremony, nutrition, and technology.

Central to this unit are the ways in which the interconnections that First Peoples have with the land results in a sustainable use of the resources.

The unit builds on students' scientific inquiry which is both respectful of, and informed by, Indigenous perspectives. The focus is on place-based activities as much as possible, as place is the essence of Indigenous knowledge and science. Try to gather as rich a collection of learning materials about the local ecosystems, foods and First Peoples Traditional Knowledge as possible.

A major element of this unit is connecting with the local First Nations community to talk to a member who can present their knowledge about the plants.

First Peoples Traditional Knowledge and Intellectual Property Rights

First Peoples have a strong relationship with the land. Each community, and specific people within communities, have knowledge and understandings of plants discussed in this unit. While much general knowledge has been shared with ethnobotanists and others, in some cases this knowledge is private.

Traditional Knowledge about plants is the cultural heritage of First Peoples and is considered part of a First Nation's intellectual property and should be treated with respect. While much of this knowledge is shared, remember that some understandings of plants and their uses are protected.

Alert: Caution When Using Local Plants

First Peoples have used plants for millennia, and have the knowledge of how and when to harvest, prepare and use the plants, especially powerful medicinal plants. Some of the plants the students may encounter can be toxic, carrying the danger of serious illness or death if used improperly. Others may be irritating or cause allergies to some people. Take care when handling plants and ensure that students respect the potential harm that could occur without the proper knowledge.

Guiding Questions

- How can humans interact with plants in a respectful and sustainable manner?
- How have First Peoples used knowledge of plants and their ecosystems to maintain their health and well-being?
- How do First Peoples' perspectives on interconnectedness and place reflect their understandings about plants and their habitats?
- How can Indigenous knowledge and understanding inform the scientific process?
- How do plants support all life?
- How does sustainability relate to ethnobotany and the environment?

UNIT 5 • PLACE-BASED ETHNOBOTANY

Relevant BC Learning Standards for Senior Secondary Science

Course	Key Content Standards	Key Curricular Competencies
Science 10	<ul style="list-style-type: none"> Diversity of life 	<p>Processing and analyzing data and information:</p> <ul style="list-style-type: none"> Experience and interpret the local environment; Apply First Peoples perspectives and knowledge
Life Sciences 11	<ul style="list-style-type: none"> First Peoples understandings of interrelationships between organisms First Peoples knowledge on classification 	<p>Questioning and predicting:</p> <ul style="list-style-type: none"> Make observation aimed at identifying their own questions, including increasingly abstract ones, about the natural world.
Environmental Science 11	<ul style="list-style-type: none"> Ecosystem complexity: roles; relationships; population dynamics Energy flow through ecosystems Matter cycles through and between living systems Succession First Peoples knowledge and other traditional ecological knowledge in sustaining biodiversity Benefits of ecosystem services Human actions and their impact on ecosystem integrity First Peoples ways of knowing and doing Resource stewardship Restoration practices 	<p>Planning and conducting:</p> <ul style="list-style-type: none"> Collaboratively and individually plan, select and use appropriate investigation methods, including field work and lab experiments, to collect reliable data. <p>Processing and analyzing data and information:</p> <ul style="list-style-type: none"> Experience and interpret the local environment; Apply First Peoples perspectives and knowledge, other ways of knowing and local knowledge as sources of information <p>Evaluating:</p> <ul style="list-style-type: none"> Consider social, ethical, and environmental implications of the findings from their own and others' investigations
Environmental Science 12	<ul style="list-style-type: none"> Soil characteristics and ecosystem services Land use and degradation Land management Personal choices and sustainable living Global environmental ethics, policies and law [including First Peoples perspectives, philosophies and responsibilities] 	<p>Applying and innovating:</p> <ul style="list-style-type: none"> Contribute to finding solutions to problems at a local and/or global level through inquiry <p>Communicating:</p> <ul style="list-style-type: none"> Express and reflect on a variety of experiences, perspectives, and worldviews thorough place.

Resources

For further information on these resources, see the annotations in the Bibliography, beginning on page 273.

Suggested Resources

- Materials: String and stake or little pieces of wood/metal to stick into the ground. (Activity 5.8)
- Bonneau, Nancy. “Shuswap and Okanagan First Nation Root Food Protocols.” Masters Thesis, Simon Fraser University, 2003. Available online at <http://ow.ly/m0If302O93Y>.
- E-Flora BC Electronic Atlas of the Flora of British Columbia. <https://tinyurl.com/fnesc67>.
- Flora and Fauna Survey Techniques, sampling concepts. Linked at <https://tinyurl.com/fnesc64>.
- Quadrat sampling and population dispersion. BiologyMonk, 2014. 5:39 min. <https://youtu.be/mDMOIpXVbVM>.
- Royal BC Museum, Botany webpage. <https://tinyurl.com/fnesc65>.

Resources for Devil’s Club study

- Burton, Carla M. and Philip J. Burton. “Recovery of *Oplopanax horridus* (Sm.) Miq., an Important Ethnobotanical Resource, after Clearcut Logging in Northwestern British Columbia.” *Ethnobotany Research and Applications*, Vol. 14, 2015. <https://bit.ly/2tNiw48>.
- Devil’s club - *Oplopanax horridus*. Identification and characteristics, UBC Forestry, 2018. Video, 1.28 min. <https://youtu.be/YR0xQKOh2Z4>
- Lantz, Trevor C., Kristina Swerhun, Nancy J. Turner. “Devil’s Club (*Oplopanax horridus*): An Ethnobotanical Review.” 2004; 62:33-48 *American Botanical Council*. Online at <https://bit.ly/2ToUgUh>.
- Turner, Nancy J. “Traditional use of devil’s club (*Oplopanax horridus*: Araliaceae) by native peoples in western North America.” *Journal of Ethnobiology* 1982;2:1-11. <https://tinyurl.com/fnesc66>.
- Turner, Nancy and Fikret Berkes. “Coming to Understanding: Developing Conservation through Incremental Learning in the Pacific Northwest.” 2006. *Human Ecology* v. 34, pages 495-513. Online at <https://bit.ly/2H9U9FD>.
- WorkSafeBC, “Toxic Plant Warning: Severe Eye Injuries from Devil’s Club (*Oplopanax horridus*.)” Linked at <https://tinyurl.com/fnesc63>.

Additional Resources

- MacKinnon, Andy. *Plants of Northern British Columbia*. Lone Pine field guide. 1999.
- Native Peoples, Plants & Animals: Halkomelem. A Halkomelem Ethnobiology Web Site. Simon Fraser University. <https://www.sfu.ca/halk-ethnobiology/> Pojar, MacKinnon, Alaback, Pojar, Jim, MacKinnon, A., & Alaback, Paul B. (2004).
- Pojar, Jim. *Plants of Coastal British Columbia including Washington, Oregon & Alaska*. Partners Publishing, 2016.
- Thompson, Judy. *Traditional Plant Knowledge of the Tsimshian*. 2003. <http://www.ecoknow.ca/curriculum.html>
- Turner, N. (1995). Food plants of coastal First Peoples / Nancy J. Turner. (2nd ed.). ed., Handbook (Royal British Columbia Museum)).
- Turner, Nancy and Fikret Berkes. Coming to Understanding: Developing Conservation through Incremental Learning in the Pacific Northwest. 2006. *Human Ecology* v. 34, pages 495-513. Online at <https://bit.ly/2H9U9FD>.
- Turner, N., & Royal British Columbia Museum. (1997). Food plants of Interior First Peoples / Nancy J. Turner. (Handbook (Royal British Columbia Museum)).
- Watt, J., & Colyer, J. (2014). IQ: A Practical Guide to Inquiry-Based Learning. Oxford University Press: Oxford. Excerpt: http://www.oupcanada.com/school/order_form/upload/forms/iq_sampler_3.2_2014.pdf

Blackline Masters

- 5-1 Sorting Nature
- 5-2 Plants as Indicators
- 5-3 Bitterroot and Indigenous Knowledge
- 5-4 Inquiry Using the 7Es

Outline of Activities

- 5.1 What is Living?
- 5.2 Traditional Plant Knowledge
- 5.3 Devil's Club Case Study
- 5.4 Bitterroot Case Study
- 5.6 Cultural Plant Use: An Ethnobotany Inquiry
- 5.7 Interviewing Elders and Knowledge-keepers
- 5.8 Evaluating Biodiversity
- 5.9 Make a Herbarium
- 5.10 Plants in Technology

Suggested Activities

Note: There are more activities here than most teachers will incorporate into their units. It is not expected that you will use all of the activities, or follow the sequence as it is described. These activities are intended to be adapted to fit the needs of your students and classroom, as well as inspire ways that you can respectfully include relevant Indigenous knowledge and perspectives in your course.

Activity 5.1

What is Living?

Students investigate two different perspectives on what is living.

- a. Give students a collection of images that show a diversity of items from nature, and have them sort the pictures in as many different ways as they can.
 - Students can use the images on Blackline Master 5-1, page 154, *Sorting Nature*, or you could have the class collect images. They should include a variety of things found in nature, such as plants, animals, rocks, rivers, sun or moon, and natural phenomena like a rainbow.
 - The images shown on Blackline Master 5-1 are: Row 1: amoeba, chiton, snowflake; Row 2: rock, mosquito larva, fir cone; Row 3: water, sun, trees; Row 4: bear, berries, rainbow.
 - Students can work in pairs or triads. Have students pick out common elements and group the images in any way that makes sense to them. Have them record the classification rules they use in each case. For example, they may make three groups: animal, plant, and other; or two groups: made of cells or not made of cells.
 - As a class have each group report out about the groupings and common elements they found. Ask, “Does the way you sorted the pictures say anything about how you see or understand the world?”
- b. Then ask students to identify what all of the items in the collection have in common. What elements or features do they all share?
 - Ask the groups to brainstorm as many shared features as they can. (For example, all part of the natural world; all are made of molecules or atoms; all transform energy; all are affected by gravity.)
- c. Discuss the perspective of many First Peoples that all things are living. Consider the phrase, ‘We are all made of molecules.’ Ask questions such as:
 - What does “we are all made of molecules” mean to you?
 - How might it be seen from an Indigenous perspective?

 Blackline Master 5-1,
page 154, *Sorting
Nature*

UNIT 5 • PLACE-BASED ETHNOBOTANY

- d. Read “The Creator and the Flea Lady.” In this narrative, told by Ellen Rice White in *Legends and Teachings of Xeel’s, the Creator*, everything is alive and has energy. See Unit 1, Activity 1.4 for a discussion of this story.

Teach or review the terms biotic and abiotic. Next have groups organize the abiotic images into factors which are supportive of biotic processes and those which are not. Likewise have students break up the biotic pictures into plants and animals. Write on the whiteboard the following questions, or variations on them, for group discussion:

- What abiotic factors support the biotic process and which ones don’t? What are the reasons for this?
 - In what ways are plants and animals similar and different? How are they mutually supportive? Can either be detrimental to each other?
- e. Ask students to reflect on the view that everything is alive or living. Ask questions such as:
- What impact might a perspective that all things are living have on how people interact with the environment?
 - How do you personally feel about the view that everything is alive?

Cross-Curricular Connection
English Language Arts

Legends and Teachings of Xeel’s, the Creator by Ellen Rice White.

 **Unit Link**
See Unit 1, Activity 1.6, Two Ways of Seeing the World for activities about “Two-Eyed Seeing.”

Activity 5.2 Traditional Plant Knowledge

Students assess what they know about Traditional Ecological Knowledge, and the plants used by First Peoples in your region.

- a. What is Traditional Ecological Knowledge?
- Review or introduce the concept of Traditional Ecological Knowledge. If you haven’t done so yet, you may want to use ideas from Activity 1.1, Unit 1, page 38.
- b. Plants as Indicators
- To begin thinking about Traditional Ecological Knowledge students can investigate the example of plants as indicators of significant events.
 - Plants are frequently used as indicators or signals of the timing of other events in First Peoples’ seasonal rounds. When people notice a certain flower blooming in the spring, they can reliably predict that another important event is about to happen.
 - Understanding plants as indicators demonstrates First Peoples’ understandings of the interconnected relationships between plants and other organisms.
 - Students can use Blackline Master 5-2, page 155, *Plants as Indicators*, to find some examples.

 **Foundations**
Traditional Ecological Knowledge, page 13.

 **Unit Link**
Traditional Ecological Knowledge, Activity 1.1, Unit 1, page 38

 Blackline Master 5-2, page 155, *Plants as Indicators*

UNIT 5 • PLACE-BASED ETHNOBOTANY

- Ethnobotanists call indicator species phenological indicators. Students could investigate what phenology means, and how this relates to TEK. (Phenology is the timing of events in the life cycles of plants.)
 - With students, find out some examples of plants as indicators in the local region. Consult Elders and knowledge-keepers, as well as available print resources.
 - Discuss with students the types of scientific knowledge and skills that are important when people use plants as indicators.
 - How does using plants as indicators demonstrate the idea of interconnectedness?
 - How do indicator plants help to create a “sense of place” for local First Nations communities?
- b. Have a discussion about the plants that local First Peoples harvest and use. Depending on your class, some students may be very familiar with them and involved in the harvesting and processing of the plants. Others may be able to make predictions, while others may have little or no prior knowledge.
- c. Display some pictures of different local plants that are important to local First Nations communities. You may be able to find pictures in books or online, or your school or district Aboriginal Education department may have resources you can borrow.
- Where possible, find the names of the plants in the local First Nations language before you show the pictures.
 - As you show various pictures to students, ask them if they are familiar with their names or how they are used.
- d. For further activities about local plant knowledge, see Traditional Plant Knowledge of the Tsimshian by Judy Thompson, 2003.
<http://www.ecoknow.ca/curriculum.html>
- Ask students to find out what the most significant plants for First Peoples are in your region? What makes them significant? How does their use incorporate Traditional Ecological Knowledge?

Activity 5.3

Devil’s Club Case Study

You can use the devil’s club to model some aspects of an ethnobotanical study. It is one of the most significant plants for First Peoples in most of the province. It occurs almost everywhere except for the northern boreal forests.

- a. Begin the lesson by showing a picture of Devil’s Club, or if possible, bring a sample in.
- Students could view a short video which illustrates its features and

UNIT 5 • PLACE-BASED ETHNOBOTANY

characteristics. See Devil's club - *Oplopanax horridus*. Identification and characteristics, UBC Forestry, 2018. 1.28 min.

<https://youtu.be/YR0xQKOh2Z4>

- Students can discuss or list the most obvious physical features of the plant.
 - Tell or have students find out the binomial scientific name for the plant. (*Oplopanax horridus*). Discuss how it might have received this name.
 - Ask students why they think this plant received such foreboding names in English and Latin. Ask, “What does this tell us about the Western scientific perspective on the plant?”
- b. Ask if any of the students have any experience with this plant. Students can volunteer to talk about stories or encounters they have had with it. For example, there could be some who have had allergic reactions or told to avoid it.
- c. Present information you have gathered about local First Nations' knowledge and use of devil's club. This may include guest speakers, references to books, or going on a walk to observe a plant. Students whose families have had experiences with the plant could ask their families for information and stories.
- Student should learn the name for devil's club in the language of the local First Nations. They may be able to find the name by consulting with the First Nations language teachers or dictionaries of the language.
 - They could also use the FirstVoices website (firstvoices.com) which has web-based dictionaries of a number of BC First Nations. They could either enter “devil's club” into the search field on the home page, to see the word in a number of languages, or they could go to the specific page for the local First Nations language, if it is there.
- d. Have students research to find out different ways that BC First Nations use devil's club. They can focus on the local community's knowledge, but also include information from other cultural groups. Some sources of information include:
- Ethnobotanical plant guides. Your library may have a number of books that have been published, covering both the whole province and specific cultural groups.
 - Ethnobotanical articles, such as:
 - Devil's Club (*Oplopanax horridus*): An Ethnobotanical Review by Trevor C. Lantz, Kristina Swerhun, Nancy J. Turner. *HerbalGram*. 2004; 62:33-48 American Botanical Council. Online at <https://bit.ly/2ToUgUh>.
 - Harvesting devil's club has special protocols in most First Nations communities. For example, only trained people can harvest it for medicine, and it is usually harvested in a remote place. For further examples see page 503 of Turner and Berkes, *Coming to Understanding: Developing Conservation through Incremental Learning in the Pacific Northwest*. <https://bit.ly/2H9U9FD>.

UNIT 5 • PLACE-BASED ETHNOBOTANY

- See also WorkSafeBC, “Toxic Plant Warning: Severe Eye Injuries from Devil’s Club (*Oplopanax horridus*.)” Linked at <https://tinyurl.com/fnesc63>.
 - Discuss with students what types of information could be gathered about devil’s club. Together they should create a list of topics that can be researched. These could include:
 - habitat; ecosystems
 - life cycle, how it reproduces
 - interconnectedness with plants and animals
 - distribution, where in the province it grows
 - how it used by First Peoples
 - role played in First Peoples’ belief systems
 - management techniques First Peoples used
- e. After students have learned about the importance of the devil’s club to First Peoples, have students compare the perspectives of Indigenous knowledge and Western science.
- Discuss the feelings that the English and scientific names evoke. (fear and danger; the name and understanding of the plant creates fear while the Indigenous understanding creates opportunity.)
- f. Learning from a Scientific Paper
- Students can learn about an ethnobotanical study involving devil’s club by studying a recent scientific article. In this study scientists investigated how well devil’s club recovered in an area that had been clearcut.
- Find the study report online at:
 - Carla M. Burton and Philip J. Burton. “Recovery of *Oplopanax horridus* (Sm.) Miq., an Important Ethnobotanical Resource, after Clearcut Logging in Northwestern British Columbia.” *Ethnobotany Research and Applications*, Vol. 14, 2015. <https://bit.ly/2tNiw48>.
 - Students could work individually, in groups or as a class, depending on how well they are able to analyze a scientific paper.
 - Students should focus on the Objectives (p. 3), Discussion (p. 10) and Conclusions (p. 11) to help them understand the purpose of the study and what the results were.
 - Ask students to summarize this study in their own words. Ask questions such as:
 - Why was there a need for this study?
 - What were the goals of the study?
 - What were the main conclusions?
 - How does this study benefit First Peoples?
 - How can the knowledge learned from this study be applied in the future?

Activity 5.4.

Bitterroot Case Study

This activity provides an example or model of a plant study that illustrates different types of Traditional Ecological Knowledge.

- a. Introduce the important plant bitterroot using Blackline Master 5-3, page 156 *Bitterroot and Indigenous Knowledge*.
- b. Ask students to create a graphic organizer or mind map to illustrate the many different types of knowledge First Peoples traditionally held about the bitterroot plant and its habitat.
 - Sample responses: Some of the areas of knowledge featured in the article include: the names in the language; where, when and how to harvest the plant; how it is connected to both the cultural and physical aspects of life; how to prepare it; how to harvest sustainably and how to manage the landscape to maintain and increase the potential harvest.
 - Ask students if they think there is any information missing. What further questions can they think of that could tell more about how the bitterroot fit into the lives of the Interior people in the past and the present?
 - For example, the article does not discuss traditional narratives that might talk about the importance of the bitterroot.
 - Ask students to identify the parts of their graphic or map that relate to “place,” that is to the local environment and the relationships the First Peoples have with it.
- c. You may want to discuss ways that the First Peoples traditionally used the land in sustainable ways. How did their beliefs in the interconnectedness of all things affect the way they harvest these and other plants?
 - You may want to make connections with Unit 4, Shaping the Land, to investigate ways First Peoples managed the landscape and harvested sustainably.
- d. Compare nutritional value. Ask students to study the tables of nutritional values for the bitterroot and the carrot. Can they decide which plant is better for you?
 - Students should note that the bitterroot values are for the dried plant, while the carrot values are for the raw plant. Also, they may question the validity of these single sources of information.
 - Ask students to design a way to be able to more accurately compare the nutritional values in these two tables.
- f. For an additional resource see *Shuswap and Okanagan First Nation Root Food Protocols*, an informative Masters’ Thesis by a First Nations scholar, Nancy Bonneau. She studied the protocols and harvesting practices of two important plants, bitterroot and springbeauty. It contains excerpts of interviews with people who still harvest these plants today. <http://ow.ly/m0If302O93Y>.

 Blackline Master 5-3, page 156 *Bitterroot and Indigenous Knowledge*.

Activity 5.6

Cultural Plant Use: An Ethnobotany Inquiry

Students conduct an inquiry into the relationship between local First Peoples and one or more plants and their habitats.

- a. Introduce the Inquiry activity. You could read the following or create your own introduction which suits your local context and place:

Inquiry is about inspiring curiosity through the formulation of questions about something of interest. It is this curiosity which drove the coastal First Nations of BC to build their fishing nets or develop uses for a potentially hazardous plant like Devil's Club. It is curiosity which pushed the Wayfinders and explores across treacherous oceans to new islands and lands. It is curiosity which created smart phones and computers and which drove humanity to land a rover named Curiosity on a planet named Mars.

- At this point students could view the short video of NASA's Mars Rover Curiosity: <https://youtu.be/Txti0XLxOzI>
- Continue with your introduction:

Curiosity is the start of inquiry. It lays the foundation. One of the reasons humanity is driven to explore Mars is a result of a fundamental, and culturally transcendent, inquiry question: Is there life beyond this fragile blue planet of ours? Yet this question is massive. So massive it creates a multitude of other inquiries which moves the inquirer into questions of early life forms. Some of the earliest life forms on earth were plants. Thus, the inquiry into ethnobotany can give us insights into what early life is like and how more complex life either benefits or is hurt by it. Now it is time for you to develop your own inquiry questions about your plant. Remember that inquiry itself is based on creating questions which drive curiosity forward.

- b. Provide students an opportunity to explore possible topics by presenting a variety of resources to inspire their thoughts.
- Set up a centre or display area of pictures, books, and real life objects.
 - Create a class list of local plants that are used by First Peoples, or were used in the past. This could be posted on a chart or other display.
 - Ask students to classify the different ways that First Peoples traditionally use plants: for food, for technology, for beverages and for medicines.
 - Visit a local museum or nature centre that has information about local First Nations' plant use.
 - Invite a First People's artist or craftsperson who uses plant materials to display their work and speak about their craft. (E.g. carver, canoe builder, basket weaver)

UNIT 5 • PLACE-BASED ETHNOBOTANY

- c. Decide how your class will engage in the inquiry activity. Students could work in groups, or individually.
- Decide on a way for students to select a plant to study, depending on your class makeup. Students could choose a plant that interests them, you could directly assign a plant or you could hold a lottery and pick the plants from a hat.
- d. Discuss with students how to create good inquiry questions. Reference some of the inquiry questions from the Mars Curiosity Rover video. Ask, what are the characteristics of good inquiry questions?
- Spend time discussing with students possible big ideas that could direct their inquiry. The class can hold a brainstorming session where students suggest a variety of questions. They can be posted on chart paper, or for older students, online at a class forum or wiki, if available.
 - Where appropriate, you can guide students to reformulate some questions. Help to connect student ideas and questions to the curriculum.
 - Ask students, or groups, to formulate an inquiry question that they will explore.
- e. Use the 7Es model to help organize students' inquiries.
- Adapt the learning processes about the 7Es, discussed in Foundations, 7E Model, page 31.
 - Use or adapt Blackline Master 5-4, page 158, *Inquiry Using the 7Es*.
- f. Next students should outline three or more steps they could take to facilitate answering the inquiry question.
- What sources could they use in their research?
 - Who are people of knowledge that the group could contact?
 - Where could they go to observe or interact with the plant?
- g. Have students bring their research to respond to their inquiry questions.
- It is also possible to bring in a class set of botany books if access to the computer lab or library is not available; however, it is encouraged that students get time in both of these to conduct their research.
 - Depending on what you have already done with your class it might be helpful to discuss best practices within regards to research. A discussion of sources, documentation, plagiarism, etc. may be important at this stage. Assess where your class is and plan accordingly.
 - Remind students that it is imperative that they have good note taking and information gathering techniques so that they can utilize what they research in their final product.
- h. Guide students' exploration of their questions.
- Discuss different ways they could find answers to their questions, such as story, scientific inquiry, asking local First Peoples, online and print resources.

 Blackline Master 5-4,
page 158, *Inquiry Using
the 7Es*

UNIT 5 • PLACE-BASED ETHNOBOTANY

- Encourage students to “think outside of the box” as they investigate their plant. Here are some possible suggestions to investigate:
 - Research First Nations knowledge and usage of the plant
 - Consult historical accounts of the plant
 - Contact a local botanist/ethnobotanist at the university/college
 - Research academic journals and articles
 - Find botany books at library which will have technical identification procedures
 - Find pictures on the internet of the plant
 - Go out and take pictures and video of the plant.
 - Create a drawing of the plant.
 - How frequent is this plant in my community? Are there any “hot spots” and what is the distribution?
 - Ask parents, elders and community members where they might have seen this plant.
 - Use smartphone to take pictures with geo-tagging
 - Plot geo-tagged pictures onto Google Earth
 - Is climate change affecting this plant? If so how?
 - Talk to indigenous elders who have long memories about harvesting and yields which can be traced back to their grandparents.
 - Search for any climate change research on my plant.
 - Look for any harvest logs or historical data about size, frequency, etc.
 - Is development/industrialization affecting the plant?
 - Which animals use this plant and how?
- i. Communicating Inquiry Findings. Students should decide on how to present the findings from their inquiry. Ask them to think about the best format for their content. For example, is it best told visually, with a video, digital presentation, or gallery? Or does it fit a narrative form, told in a story or graphic novel format. It may be best to present a lot of information clearly, using a poster or a pamphlet.
- j. Hold a culminating activity where students can present their findings. It could be as a presentation to invited guests, such as members of the local First Nations community or another class.

Activity 5.7

Interviewing Elders and Knowledge-Keepers

If possible, organize an opportunity for students to interview First Nations Elders or knowledge-keepers about local plant uses. This will be the most authentic way to participate in ethnobotanical research.

If and how this happens will very much depend on the location of your school and the relationship with a local First Nation.

- a. Important considerations when sharing with Elders and knowledge-keepers
The first step in interviewing an Elder is respect. Elders have both their own lived experience and the stories of their ancestor's lived experiences. This carries just as much weight, if not more, than a person with western academic credentials. It can be very exciting talking to elders because their knowledge can go back to their grandparent's stories about harvesting or what it was like. If students have a chance to talk to an elder in their 80s or 90s this could be knowledge of up to 200 years ago.
- b. Developing questions. It is imperative that students are prepared before they meet the Elder or knowledge-keepers.
 - Have each group come up with questions about their plants. How many will depend on your class size, group sizes and your conversations with the Elder or knowledge-keeper. You do not want to swamp them with questions. A reasonable number would be 10 to 20 questions. If you have too many questions you could ask for multiple interviewees or possibly there are some who are particularly knowledgeable about a certain plant a group is studying.
 - Questions for Elders/bands can be wide ranging. For example, you could ask about harvesting and changes they have seen or changes from the stories of their parents/grandparents. Let's say a group of students is focusing on Salmonberries. Questions could include:
 - When do you harvest salmonberries?
 - Have you noticed this harvest becoming later or earlier in the year?
 - Have the berries become juicier, sweeter, plumper? Or are the berries less tasty and waterier?
 - Have you noticed the berries growing in new places or have they receded?
 - These could be great questions for assessing potential climate change effects on salmonberries.
 - There are many more questions students could ask such as:
 - Are there any traditional stories you would be willing to tell about salmonberries?
 - How do you preserve the berries?
 - What are some of your favorite ways of eating salmonberries?



Formative Assessment Strategy

Debrief and discuss with the whole class after each interview. Discuss with the class what went well and where the class could have improved. If doing multiple interviews, be sure to have class make suggestions for the next interview.

- Students could also inquire about elements which support plant life or the harvest. For example, they could ask about the rates of rain, sun, snow, temperature, etc.
 - Consider contacting more than one community, if your school is near several communities. Students may come to know more about the diversity of ways that plants are used, stories, or other insights.
- c. Conducting an interview. There are several ways to conduct the interview:
- A visitation to the class
 - Field trip to the band office/reserve/elder
 - Through online video conferencing software or a phone conference
 - E-mailing the questions and getting a written response
- If you choose one of the three first methods you should e-mail the questions to the interviewee before the meeting so they have time to think and prepare their responses. Ideally organizing with the band/elder should take place a couple weeks prior to the interview.

Activity 5.8

Evaluating Biodiversity



Land-based activity

Students have an opportunity to get out of the classroom and do some field work using the scientific technique of quadrats. This lesson can be approached in different ways depending on your school setting and community.

- a. Explain or review with the class how quadrats work and what their function is. This could take up to one or more class periods depending on the background knowledge of the students.
- For more information about using quadrats, see:
 - Webpage: Flora and Fauna Survey Techniques, sampling concepts. Linked at <https://tinyurl.com/fnesc64>.
 - Video: Quadrat sampling and population dispersion. BiologyMonk. 2014. 5:39 min. <https://youtu.be/mDMOIpXVbVM>.
- b. After the students understand the fundamentals of a quadrat to your satisfaction take the class to a field with grass. Have groups find a random location throughout the field and proceed to collect quadrat data. Use this to estimate how many blades of grass, or other flora, are on the field.
- c. Have students apply the quadrat technique to analyze the population (and dispersion if you or they are so inclined) of their chosen plant within their community. How this is done will depend very much on your community, school culture and access. There are many ways to do this depending on the technology and resources available. Here are two suggestions:

UNIT 5 • PLACE-BASED ETHNOBOTANY

- Map method
 - Take out a map of your community.
 - Have the class (or individual groups) pick out 3 or more spots to survey within the community. Use a ruler and the map scale to assess distance, OR, once on site use the number of steps, OR, use string that you can measure, OR, use streets or landmarks. A group's method will depend largely on what plant they have chosen and distance.
 - If you have the capacity, take your class out to these three sites and have the groups survey for their plants. An alternative would be to let groups go during class time and have them report back at the end of class. Your method will depend on your capacity and school/district culture.
- Another method would be to use GPS coordinates and Google Earth. Similar to the method above, the class, or individual groups, would have to pick some particular areas to survey. During the survey they would document the GPS coordinates and any other pertinent information like number of plants.
 - Phones can geolocate images and this could be a great method of documentation.
 - Once students collect the data they can then feed it into Google Earth. Once in Google Earth groups can use the measuring tool to create boxes around their sample areas. This can then be used to calculate the area of the quadrat.

Activity 5.9

Make a Herbarium

Students participate in the creation of a plant library known as a herbarium, using locally found plants.

- a. Explain that scientists often collect samples of plants in the field and preserve them in a collection called a herbarium. It is like a plant library which researchers can study.
 - Discuss why it might be important for scientists like botanists and ethnobotanists to collect and catalogue specimens of plants. Some reasons include:
 - other scientists can study them at a later date
 - they can help scientists identify plants that they aren't sure about
 - they can compare a new plant with similar ones and perhaps discover a new species
 - identify invasive species of plants
 - understand the biodiversity of plants in BC
 - undertake genetic studies using DNA from the plants
 - use them for forensic studies to solve crimes

UNIT 5 • PLACE-BASED ETHNOBOTANY

- Students may be interested to find out about the herbarium at the Royal BC Museum, which has over 200,000 plants in its collection. They can read the website and also view a video in which botanists describes how they collect and preserve specimens for the herbarium. The website and video are found at <https://tinyurl.com/fnesc65>.
 - After students have read the text and viewed the video, ask them to write four questions that can be answered by the information. They can quiz a partner or group to see if they can answer the questions.
- b. Collect plant specimens. You or the class together should decide on how many specimens will be appropriate to collect.
 - How students collect plants will require some consideration, depending on their perspectives, your location, and the types of plants gathered. Here are some suggestions:
 - Work with a First Nations Elder or knowledge-keeper to collect plant specimens mindfully and respectfully. This will be important if students are collecting plants that are significant for First Peoples cultures and traditions.
 - Collect plants from the school grounds.
 - Collect only weeds or invasive plants
 - Collect only plant materials that have fallen to the ground
 - Students can bring plant samples from home.
 - Take a picture or draw the specimens rather than taking from live plants.
 - Follow any protocols and regulations when removing parts of living plants, particularly if they are from places that are significant for First Nations lands, are parks or private property.
 - Discuss why it will be important to collect the plants in a respectful manner. Ask the class how they could individually or as group make sure they collect the plant samples in a respectful way.
- c. Discuss with students what information they should record about the plant and its habitat when they are in the field. They can refer back to the Royal BC Museum video from Activity 5.1-a above.
 - You can have students work in groups to develop their own list of data to be collected, or have the class as a whole develop the list.
 - Possible types of data include: date, location, height of plant; habitat; description of soil; nearby plants; GPS coordinates of location; phenology of the plant at the time of collection (i.e. flowering, fruiting, senescence, etc.), weather, colours of the parts of the plant.
- d. Have students work in groups to decide how to preserve their specimens (unless they are using photographs or drawings).
 - Discuss what scientific principles or knowledge might be used to preserve the specimens.



Formative Assessment Strategy

Assess students understanding of the relationships of plants and their habitat. Do they just focus on the plant, or consider other elements?

- You may want to have the class agree on some basic parameters so the specimens can be all displayed in the same format, such as all mounting on an 8.5 x 11 page.
 - Students can refer back to the Royal BC Museum video from activity 1 or find some ideas on the internet.
 - If you prefer to provide your students with a procedure to follow, you can find suggestions on the internet. See “Pressing and Preserving Plant Specimens” linked at <https://bit.ly/2Dy8ta0>.
- e. Groups should then create labels for each of their specimens.
- f. Make sure students reference any photos taken from the internet and any description quoted directly from another source (i.e. personal communication, books, etc.)

Activity 5.10

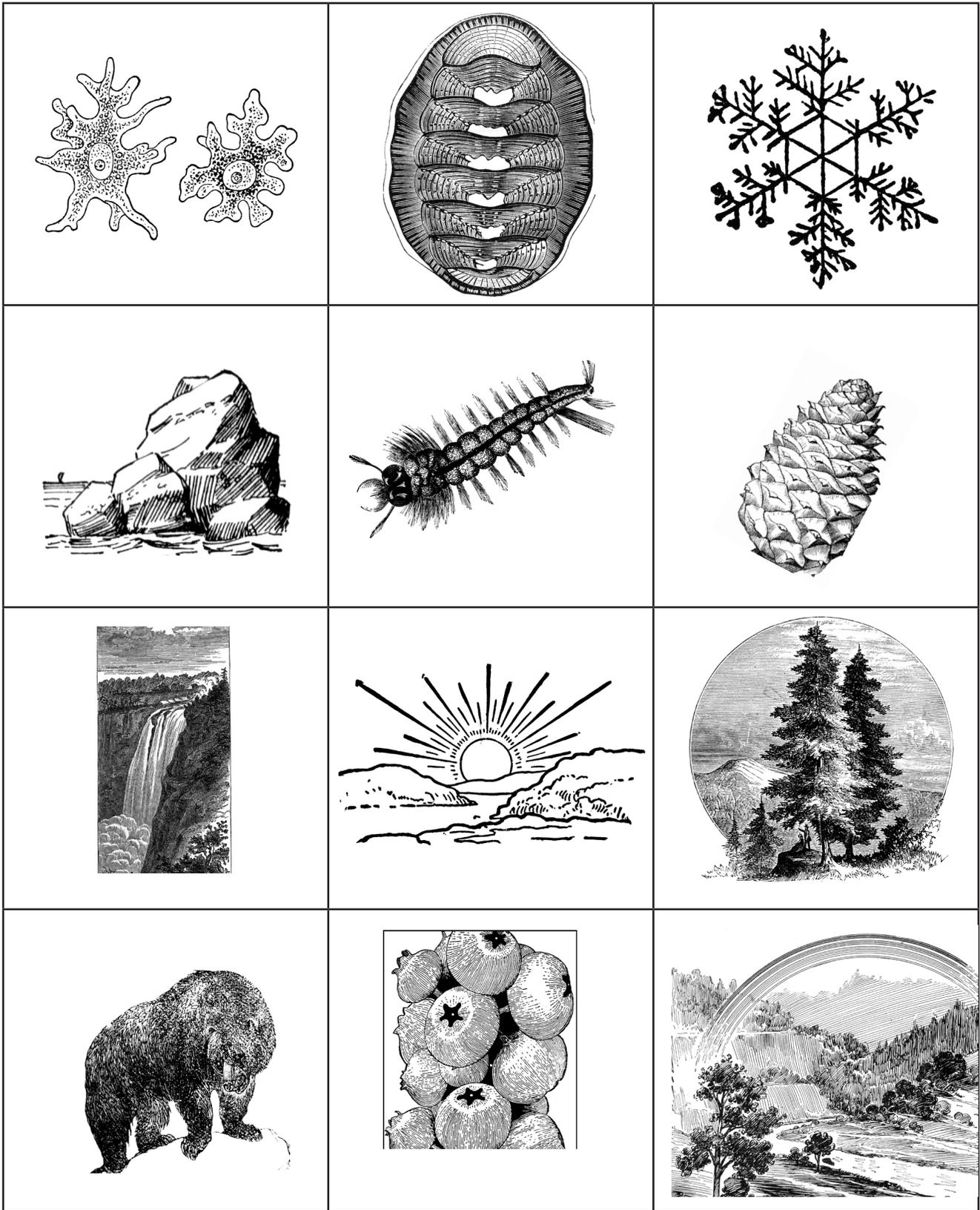
Plants in Technology

Students can explore the many ways in which plants are used in sophisticated technologies, such as basket making; carving daily implements as well as ceremonial and sacred objects; rope; buildings; transportation and harvesting tools.

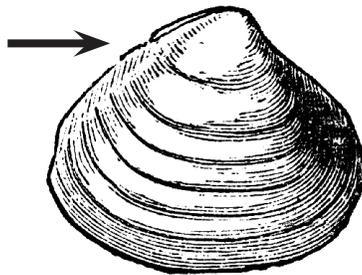
- Students can find out about the properties of the wood and other plant materials that make them useful in the many different technologies that use them.
- Bending Wood.** Invite students to explore bending different types of wood that have been soaked in water.
 - Students can design a lab test to see how different woods do or don't bend.
 - Hold a challenge to see who can bend a piece of wood the farthest, and get it to hold its shape.
 - Students should recognize and follow safety procedures when doing this test.
 - Students may want to investigate how First Peoples woodworkers bend wood in their work. (See for example how bentwood boxes are made.)
- Arrange, if possible, an opportunity to observe or work with a First Nations weaver use plant materials such as bark, roots and grasses.
- Discuss with students how continuing to use local plant resources for technologies is important for First Peoples' sense of place.

 **Unit Link**
See Unit 10, Living Technologies for further ideas exploring First Peoples' technologies.

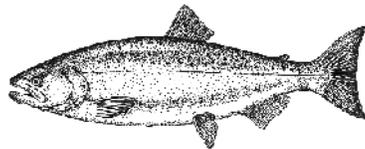
Sorting Nature



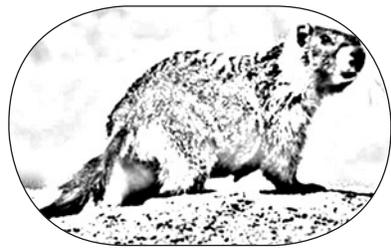
Plants as Indicators



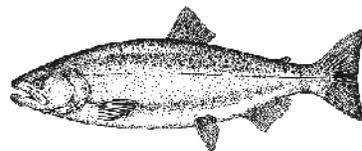
Signal: When the oceanspray plant blooms, the butter clams are ready to harvest.
Local knowledge of the Comox people.



Signal: When the sagebrush buttercup (called spring salmon eye) blooms, it means the first spring salmon are coming up the Fraser River.
Local knowledge of the Stl'atl'imx people.



Signal: When the lupine blooms, it is time to hunt marmots.
Local knowledge of the Okanagan people.



Signal: When the soapberries ripen it means that the sockeye salmon runs are starting.
Local knowledge of the Secwepemc people.

Blackline Master 5-3

Bitterroot and Indigenous Knowledge



Bitterroot is a perennial plant that grows in dry habitats of the Interior Plateau region of BC. Through most of the year it is hard to see among the grasses and sagebrush that dominate the landscape.

But each April or May, it comes to life for a few short weeks. Bright pink flowers blanket the earth with colour. That is why some people call the plant “desert rose.” Soon, however, the plants dry out and are hidden from view once again.

For thousands of years, bitterroot has been one of the most important plants for First Peoples who live in the driest regions of the BC Interior, including the Ktunaxa, Nlaka’pmx, Okanagan, Secwepemc and Sinixt. They were also important to their neighbours who live in what is now the United States. Part of their Traditional Ecological Knowledge was the high nutritional value of the bitterroot.

The roots are harvested just before the flowering stage, so people have to be able to judge when the roots will be in their best condition. Traditionally it was the women’s role to dig them out of the ground using a digging stick, although in more recent times, all the family may participate.

In most communities, a special ceremony takes place at the beginning of the harvest, sometimes called the First Root ceremony. When the Elders determine that the plants are ready, the first roots of the season are dug, and shared with the community, often at a feast.

Protocols vary by community, but usually involve words and songs of respect and thanks given to the plant for sharing itself with people.

Soon after the roots are dug, the bitter outer skin is peeled off. Then the roots are steamed, pit-cooked or boiled. In the past, some were eaten freshly cooked, but most were dried.

The dried roots can be stored for a long time. Traditionally they were stored for winter supplies, and also for trade with their neighbours where the plant doesn’t grow.

When it comes time to eat them, the dried plants are soaked overnight. They might be added to soups. Bitterroot traditionally is often mixed with other foods such as:

- saskatoon berries and deer fat
- black tree lichen and fresh salmon eggs
- tiger lily bulbs and ripened salmon eggs
- dried gooseberries

In the past, bitterroot grew in tremendous quantities in its native habitat. One observer who visited the Fraser Canyon region 100 years ago estimated that there were millions of plants, at least 100 per square metre in places.

Women harvested large amounts of the roots in the short period that they were available. Sometimes they dug up hundreds or even thousands of roots. You can imagine the amount of work involved to peel and dry that quantity.

You might think that digging out thousands of roots would be harmful for the plants. After all, the whole plant had to be taken. However, the First Peoples always harvested the plants respectfully. If they did not, it could endanger their survival.

Today we would say that they have always followed **sustainable management practices**.

First, their traditional knowledge would tell them if there were enough plants to harvest in large quantities. Often, they would move

from one area to another from one year to the next, so a digging ground could recover.

As well, they dug the roots **selectively**. That means, they didn't clean out one area, but made sure they left enough to grow in the future.

Another method used in the past was to replant parts of the roots. This shows us that the ancient people understood that a piece of a root will grow into a new plant. Scientists call this **vegetative propagation**.

The act of digging the soil with their diggers helped to keep the soil loose so the plants could grow.

Transplanting was another sustainable practice applied to the bitterroot. First Peoples sometimes moved the plants from a productive area to a region where there were few plants growing. This demonstrates that part of their TEK was an understanding of habitats, and what a plant needs to survive. This is an example of how some First People's scientific practices brought about a change to the landscape.

These examples of sustainable practices were also used by First Peoples to manage other plant species.

Since colonization, the number of bitterroot plants has been seriously reduced. Many traditional sites have become cattle ranches. Overgrazing and trampling the earth by livestock have packed the soil and otherwise impacted their habitat. Also many sites have become farmland, where the natural plants have been replaced with commercial crops.

Some people still harvest and use bitterroot today. For many First Peoples in the region, it is a strong link to their culture, and helps give them a sense of belonging to the place where they live and where their ancestors once ate and traded the bitterroot in huge quantities.

- **Bitterroot, dried**

- **Nutritional Value**

- per 100 grams dry weight
- calories 387
- calcium (mg) 235
- protein (g) 10
- iron (mg) 33
- carbohydrate (g) 85
- magnesium (mg) 74
- lipid (g) 1
- zinc (mg) 5

Source: US Forest Service.

<http://bit.ly/2dDBjGc>

- **Carrot, raw**

- **Nutritional Value**

- per 100 grams
- calories 41
- calcium (mg) 33
- protein (g) 1
- iron (mg) 0.3
- carbohydrate (g) 10
- magnesium (mg) 74
- lipid (fat) (g) 2
- zinc (mg) 0.24

Source: <https://authoritynutrition.com/foods>

Compare the nutritional value of the bitterroot with that of another root vegetable, the carrot.

Sources:

BC Ministry of Forests, Lands and Natural Resource Operations www.for.gov.bc.ca/rsi/fnb/bitter-root.pdf

Bonneau, Nancy. Shuswap and Okanagan First Nation Root Food Protocols

Turner, Nancy J. *Ancient Pathways, Ancestral Knowledge*.

Turner, Nancy J. *The Earth's Blanket*.

Blackline Master 5-4

Inquiry Using the 7Es

Inquiry Question:

Environment

Have you gone out to the environment, if possible, and explored your question?

Engage

What do you already know? What do you want to know about the question?

Explore

Find out more details about the question.

Elder

Are you able to learn from an Indigenous Elder or knowledge-keeper? Are there traditional stories related to your topic? What words are there in the local First Nations language?

Explain

Record your observations and research findings. Plan how you are going to present the answer to your question.

Elaborate

What other questions come out of your research? Complete your project.

Evaluation

How did you do? Were you satisfied with the answer to your question?