Unit 6
Salmon and Interconnectedness

Overview

Salmon is an essential resource to many First Nations people and communities in BC. Salmon is found in almost every part of BC, with the exception of northeast regions that are in the Peace and McKenzie River watersheds.

For thousands of years, First Nations peoples have developed an intricate understanding and knowledge about salmon, including the interconnectedness of salmon with other life forms. Before contact salmon was a foundational trade item, contributing significantly to the economy and social structure of First Nations societies. Salmon helped to ensure the sustenance of large, vibrant populations of people. First Nations developed a myriad of technologies to capture and preserve the salmon. The value and respect that the people had for the salmon is reflected in the representation of salmon in traditional stories, songs, dances, and art throughout BC.

One instance of interconnectedness is the remarkable role that salmon plays in returning nutrients to the riverine and forest ecosystems. The carcasses of spawned salmon are taken by other animals such as bears above the river bank, where the molecules of the salmon are cycled through to the forest ecosystem.

For many First Peoples, salmon is inextricably interconnected with their lives, community and culture. As well as making up a significant part of the diet of many First Peoples, salmon forms part of their identity, their cultural practices, their social network, their history and for some, their employment.

As evident in many traditional narratives, salmon has always been respected as a gift to people, but Indigenous knowledge emphasizes that this gift must be reciprocated.

This unit approaches only a few of the many ways to study how salmon is interconnected with diverse ecosystems and human lives. Students learn about the life cycle of salmon and come to understand how integral salmon are to maintaining both the First Nations ways of life as well as the ecosystem around all of us.

A principal part of the unit is a long-term field study of a local stream to assess it for its value as a salmon habitat. Students will have the opportunity to collect scientifically significant information from their local environment. The information from the collection of this data will be compared to their newfound-understanding of the needs of salmon to give students stronger placed-based knowledge.

Guiding Questions

- In what ways are salmon a significant species for First Peoples?
- How are salmon interconnected with other aspects of the natural world?
- How do salmon embody the concept of transformation?
- How can the health and viability of a stream be assessed to determine its suitability as salmon habitat?

Resources

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

Suggested Resources

- Materials for salmon habitat water sampling. See Activity 6.5.
- *D. Suzuki, Salmon and the Forest*. Steven Holzberg, 2013. 5.29 min. at https://youtu.be/UOtkekP-sxk
- Menzies, Charles R. and Caroline F. Butler. "Returning to Selective Fishing through Indigenous Fisheries Knowledge." *The American Indian Quarterly* v 31, n 3. pp 441-464. 2007. Download at http://ow.ly/pdQB302lWrU.
- *Millions of Salmon Return Home*. National Geographic, 2014. 4:14 min. https://youtu.be/ZR4_LhPCgbo
- Salmon Anatomy (19:22 min). https://youtu.be/Nmwhmh_6rXI.
- *River of Salmon Peoples*. Theytus Books, 2015
- *St'at'imc The Salmon People.* St'at'imc Government, 2016. 15:45 min. https://youtu.be/KMtdVqHDrwc.

Suggested BC Learning Standards for Senior Secondary Science

Course	Key Content Standards	Key Curricular Competencies
Science 10	• Patterns of inheritance • Mechanisms for the diversity of life	Questioning and predicting: • Make observation aimed at identifying their own questions, including increasingly abstract ones, about the natural world. Planning and conducting: • Collaboratively and individually plan, select and use appropriate investigation methods, including field work and lab experiments, to collect reliable data. Processing and analyzing data and information: • Experience and interpret the local environment; • 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 finding solutions to problems at a local and/or global level through inquiry Communicating: • Express and reflect on a variety of experiences, perspectives, and worldviews thorough place.
Life Sciences 11	• First Peoples understandings of interrelationships between organisms	
Earth Sciences 11	• Evidence of climate change • First Peoples knowledge of climate change and interconnectedness as related to environmental systems • First Peoples knowledge and perspectives of water resources and processes	
Environmental Science 11	• Ecosystem complexity: roles; relationships; population dynamics • Energy flow through ecosystems • Matter cycles through and between living systems • First Peoples knowledge and other traditional ecological knowledge in sustaining biodiversity • Human actions and their impact on ecosystem integrity • First Peoples ways of knowing and doing • Resource stewardship • Restoration practices	
Environmental Science 12	• Changes to climate systems • Impacts of global warming • Mitigation and adaptations • Land management • Personal choices and sustainable living • Global environmental ethics, policies and law [*including First Peoples perspectives, philosophies and responsibilities*]	

Additional Resources

- Carlson, Keith Thor. *You Are Asked to Witness: The Stó:lō in Canada's Pacific Coast History.* Stó:lō Heritage Trust. Chilliwack, BC, 1997.
- Fisheries and Oceans Canada salmon life cycl poster to download: https://bit.ly/2VewtmY.
- Fisheries and Oceans Canada. Salmonids in the Classroom, https://bit.ly/2WAPfGl.
- *Luutigm Hoon – Honouring the Salmon : An Anthology Told in the Voices of the Tsimshian*. Tsimshian Nation, School District 52 (Prince Rupert), 1999.
- *Meet a Local Legend: The Salmon*. Indigenous Tourism BC, 2015. 1.43 min. https://youtu.be/aRe1ePS_hwg
- Monk-McKenzie, Katelyn. *Against the Current: Interconnected Lives of Salmon and People on the Skeena River.* Living Landscapes, Royal BC Museum. Linked at https://tinyurl.com/fnesc40.
- Watkins, Stephen. "Life after Death: The Importance of Salmon Carcasses to BC's Watersheds." Stephen Watkins. *Arctic* 53:1, pages 92-99. https://bit.ly/2Nr9qCY.

Blackline Masters

6-1 Salmon Anatomy
6-2 Salmon Life Cycle
6-3 The Importance of Salmon Carcasses Study Questions
6-4 Salmon Habitat Sampling Data Recording Sheet

Outline of Activities

6.1 Respecting the Salmon
6.2 Salmon Anatomy
6.3 Salmon Transformations: Life Cycle
6.4 Salmon Ecosystem Interconnections
6.5 Salmon Habitat Assessment
6.6 Indigenous Salmon Sustainability

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 6.1
Respecting the Salmon

Students build on their understanding of the importance of the salmon to most First Nations in BC, including cultural, spiritual, economic and nutritional aspects. Where possible, link the activities to local First Nations communities.

a. There are many resources available to introduce the topic of the relationship of First Peoples and salmon. If possible, identify resources that apply to your region of the province.
   - One suggested resource to introduce the unit is the video *St'at'imc The Salmon People.* This video, produced by the St'at'imc Nation, discusses a number of aspects relating to the fate of salmon in its territories, but it emphasizes the central connections that the salmon has to the life and culture of the people.
   - Other resources to illustrate the First Peoples' relationship with salmon include:
     - *Meet a Local Legend: The Salmon*. Indigenous Tourism BC, 2015. 1.43 min. https://youtu.be/aRe1ePS_hwg.
     - *Luutigm Hoon – Honouring the Salmon: An Anthology Told in the Voices of the Tsimshian*. See pages 88-92, "Voices of the Elders" and pages 100-109, "Voices of Today."
     - *River of Salmon Peoples*. Examples can be found throughout.
     - *You Are Asked To Witness*. This ethnohistory of the Stó:lō contains an Elder's description of a First Salmon Ceremony and other information related to traditional salmon fishing (pages 3-7)
     - Living Landscapes, Royal BC Museum, *Against the Current: Interconnected Lives of Salmon and People on the Skeena River* by Katelyn Monk-McKenzie. See the interviews with Melodie Johnson and Art Mathews. Online at https://tinyurl.com/fnesc40.

St'at'imc The Salmon People. St'at'imc Government, 2016. 15:45 min. https://youtu.be/KMtdVqHDrwc

b. Share with students a First Nations traditional narrative about respecting the salmon. If possible find one that is relevant to your region. The interviews with Melodie Johnson, and Art Mathews in *Against the Current* include some Tsimshian and Gitxsan traditional stories.

c. Find out if the local First Nations communities have any traditional ceremonies associated with salmon, such as a First Salmon Ceremony.
   - Ask questions such as:
     - What are some of the protocols around the catching of salmon or the disposal of fish bones?
     - Do the people in your area have any predictors or indicators for the size of upcoming salmon runs?
   - For a description of a First Salmon Ceremony in a Stó:lō community, see *You Are Asked to Witness*, page 3-4.

Blackline Master 6-1, page 173, *Salmon Vocabulary*

d. If possible, students can make a list of words relating to salmon in the local First Nations language. They can use Blackline Master 6-1, page 173, *Salmon Vocabulary*, as a guide. These are some words found in many First Nations languages; undoubtedly there are more words that could be added.
   - Students can use Blackline Master 6-1 when interviewing Elders or knowledge-keepers, or when using dictionaries for the local First Nations language, if available.
   - Students can refer to the website First Voices (https://www.firstvoices.com/) to find salmon-related words in some First Nations languages.

e. Have students work in groups to list examples of Indigenous scientific knowledge related to First Peoples use of salmon.

Activity 6.2
Salmon Anatomy

Students understand the anatomy of salmon in terms of the names of their structures as well as their function.

a. First Peoples Knowledge About Salmon Anatomy.
   If your school is situated in or near a First Nations community that regularly harvests and processes salmon, students could investigate how the people who deal with the salmon understand its anatomy. What evidence can they find of traditional knowledge about the salmon anatomy?
   - If possible have students learn the names of different parts of the salmon anatomy in the language of the local First Nations community.

b. Students can view a video which explains the anatomy of a chinook salmon: Salmon Anatomy (19:22 min). It is available at https://youtu.be/Nmwhmh_6rXI.

Blackline Master 6-2, page 174, *Salmon Anatomy Question and Vocabulary Set*

   - As students watch the video, they can follow along with Blackline Master 6-2, page 174, *Salmon Anatomy Question and Vocabulary Set*.
   - Express to students that the person who made the video said that he is going to eat the salmon, which is one way the salmon is a gift. Students

should know that the salmon in the video gave themselves to further their learning about the natural world around them. The gift of learning and understanding salmon will hopefully help these organisms in the future.
- You may want to stop the video at some places to let students catch up on the parts of the Salmon anatomy. Students that have Internet access outside of class can go back over the video to review this vocabulary and the structure and function of the salmon anatomy.

c. Challenge the class to work together to create a collaborative mural of a salmon's anatomy. Explain that each student group is responsible for drawing one of the organs or other body parts of the salmon. They also need to write the characteristics of that body part.
- The eventual goal for the entire class is to have the body parts on different sheets fit together into one the entrails of a salmon. Groups will need to coordinate with each other to ensure that one group's picture correctly connects with the next organ/part in the line.

Activity 6.3
Salmon Transformations: Life Cycle

Through its life cycle, the salmon is transformed through a number of different phases – from the laying of eggs to mature, spawning salmon returning back to lay or fertilize more eggs. The journey through this life cycle happens in different places over a varying length of time. At the end of this activity, students should have an understanding of the salmon life cycle.

a. Students can view a video that shows one stage of the salmon life cycle, when the salmon return to spawn.
- A suggested video is *Millions of Salmon Return Home*. National Geographic, 2014. 4:14 min. https://youtu.be/ZR4_LhPCgbo.

b. Ask students if they know how the Pacific salmon is transformed during its life cycle. Students who are familiar with the salmon, or who have studied it previously can share their understandings of the stages of the salmon life cycle.
- Have students use what they know about the salmon to draw a diagram or a flow chart of the salmon life cycle.
  - If they can, they can sketch what the salmon look like at each stage, and indicate the various locations where the transformations take place.
  - If they feel unsure about what to draw, ask them to predict what they think the life cycle looks like, and different places where it happens.
- Students can work with a partner to compare their diagrams and check their work. Then they can refer to a poster or diagram of the life cycle to self-correct their diagram. You may have posters of the salmon life cycle to display, or students can find them online. For example, the Department of Oceans and Fisheries has a poster to download: https://bit.ly/2VewtmY.

- Depending on your students, you may want to provide a blackline master of the life cycle that students can use. For example, the Salmonid Enhancement curriculum package has a diagram on page 11 (page 31 of the pdf) online at https://bit.ly/2WAPfGl.

b. Have students draw what the salmon look like at the different stages in their life cycle. Students could use their first drawings, or create new ones based on what they have learned about life cycles.
   - Diagrams or pictures for this activity could come from a textbook or from the internet.

c. After students have completed their drawings, have students work in groups to figure out how long each stage lasts and where these stages take place (such as estuary, ocean, streambed).
   - Group members can research the length of time and location of different stages and then come back together the next day to share what they have found out with the group.
   - Students should save their diagrams to use in later activities. After they have done the sampling or other activities, students can take their Salmon Life Cycle diagrams and introduce new material into the diagram. For examples, they can include all of the obstacles there are to each part of the salmon life cycle.

d. Have students work in groups to discuss other cycles in nature. They may remember one of the cycles they learned in their Science 10 class, such as change of seasons, the rain or carbon cycle.

e. Students can communicate their understanding of the transformations that the salmon go through in their life cycle through some form of creative expression. For example, they could portray the salmon as a superhero in a comic book or graphic novel form.

f. If your class raises salmon fry, look into the possibility of collaborating with your local First Nations community for a traditional release of the fry into local watersheds.
   - Here is a video of one example from Penticton when students raised salmon fry and released them in a joint effort. *Freedom for the fry*. (Castanet, 2018.1:24 min.) https://bit.ly/2WAUmXa.

Activity 6.4
Salmon Ecosystem Interconnections

In this activity students explore the remarkable story of how the salmon are interconnected with multiple ecosystems.

Salmon are one of the most important sources of ocean-based nutrients brought to complete the nutrient cycle in forest ecosystems. Salmon hatch in rivers then travel out to the ocean to feed and mature before coming back to their original spawning grounds. With them, they bring back important nutrients from the ocean.

This activity can be adapted to a number of topics, including:
- nitrogen cycle
- trophic levels
- salmon life-cycle
- interconnectedness of spheres

a. Review or discuss the concept of Interconnectedness from an Indigenous perspective. For some suggestions see Unit 1, Activity 1.4, starting on page 43.

b. Ask students to brainstorm as many ways as they can that salmon are interconnected with humans and other species.
   - Explain that scientists have recently uncovered far-reaching connections between salmon and a number of ecosystems.

c. Students can view a video in which David Suzuki tells the story of the interconnectedness of the salmon and multiple ecosystems. See the video *D. Suzuki, Salmon and the Forest* (2013, 5.29 min.) at https://youtu.be/UOtkekP-sxk.
   - Before viewing, ask students to watch and listen to find out the clue that helped researchers learn about the transformation of marine nutrients into terrestrial organisms. (^{15}N)

d. Students can read one or more articles to learn more about the salmon's interconnectedness.
   - "Life After Death: The Importance of Salmon Carcasses to B.C's Watersheds." Stephen Watkinson. *Arctic*, 2000. https://bit.ly/2Nr9qCY.
     - Watkinson is an Indigenous scientist. Have students find places in the study that reflect an Indigenous perspective. Ask how he planned to conduct his study from an Indigenous perspective. See especially page 94-95, Incorporating Traditional Ecological Knowledge, and Personal Background.
     - Advanced students may be interested to look at the results of the study in his master's thesis, Life after death: the importance of salmon carcasses

to watershed function. Stephen Watkinson (UBC 2001) Linked at https://tinyurl.com/fnesc42.

- "Salmon nutrients, nitrogen isotopes and coastal rainforests" by Tom Reimchen (2001). It is linked at https://tinyurl.com/fnesc41.
- Both these articles are around twenty years old. Students can search for more recent studies to see if the observations and hypotheses have changed.

e. After students have engaged with the materials, discuss questions such as
   - How does the forest help raise the salmon?
   - What evidence exists that the nutrients from salmon carcasses are mostly marine derived?
   - What evidence is there that other organisms are utilizing these carcass nutrients?
   - What is the relationship between invertebrates and the fish?
   - What is the end result of the carcass deposits for juvenile salmonids?
   - How is the nutrient deposits in salmon carcasses distributed to areas away from the water?
- Student can discuss some of the relationships between the salmon carcasses and the nutrient cycle.
- Students can write a reflection on the new learning they have experienced.

f. Students can work in groups to create a representation of the story of salmon interconnections. They could use a graphic form such as a web or infographic; develop a play or video that enacts the story; create a picture book for younger audiences, or design a game that involves the interactions.
- Students should try to include that path taken by nitrogen in their representation.

Formative Assessment Suggestion
Use the reflection questions to assess students' understanding of the salmon's interconnections with multiple ecosystems.

g. Students can write a reflection about this activity. They can consider questions such as:
- What was the most surprising thing you learned in this activity?
- How does this story involve the ideas of transformation and interconnectedness?
- What are some ways that it important to understand the way the interconnections between salmon and the ecosystems works?
- The natural world recycles the nutrients from salmon but what do humans that eat salmon do to complete the nutrient cycle?

Activity 6.5
Salmon Habitat Assessment

Students conduct a field study of an actual or potential salmon habitat to assess the health and viability of the study site as a salmon habitat.

Unit Link
Unit 3, Relationships to Water
Activity 3.4, Water Sampling Investigation, page 97

Use the Water Sampling Investigation, Activity 3.4 from Unit 3, Relationships to Water, with the set purpose to assess the stream as a salmon habitat.

This is a multi-day activity. The duration of time on any one day depends on how accessible the location is in relation to your school. Working in teams, the data collection process can be completed by a class in as little as 20-30 minutes.

This is a long-term activity that should continue for several weeks. The goal of this activity is to choose a physical location at a local fish habitat and have students collect biotic and abiotic data over time. The students will then use this data to determine the health and viability of this location as a salmon habitat.

The data collection can happen before students gather historical information or political policies governing your chosen site. Sometimes gathering data from a site can spur increased curiosity into finding out more about that particular location so the background information can be collected after you start collecting biotic data. Monitoring what is going on in the students' own local environment will help them understand perspectives of Indigenous science through place-based experiences.

A possible extension would be for students to share the data they have collected with other schools that share the same salmon habitat and invite them to collect data as well. The sharing of data with other groups will expand their knowledge as well as their personal experience with the environment around them.

a. Use the suggestions in Activity 3.4 to plan and carry out the field and lab activities, selecting the appropriate tests and observations to assess a salmon habitat.

b. Data that the students collect will not have any meaning unless they can compare it to some known levels or required standards. Students compare the collection data to water quality standards.
   - "Optimal Water Quality Values for Aquatic Ecosystems) is a brief guide to some major values that are important to salmon, including temperature, dissolved oxygen, biochemical oxygen demand, fecal coliform, pH, nitrates and phosphates and turbidity. It is linked at https://bit.ly/2CtU4sf.
   - For a more extensive list of values students can consult the Approved Water Quality Guidelines set by the BC government. The most recent guidelines are linked at https://tinyurl.com/fnesc43. Go to the link for "Summary of Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture."

c. Assessing the habitat and draw conclusions.

- Students can work in groups to develop criteria to use to assess when assessing the habitat.
- Then they can decide whether or not the stream be make a good spawning ground for salmon. Have them give evidence to support their conclusion.

Stream Habitat Assessment Parameters

Below is a discussion of some to the key parameters in assessing salmon habitat. Directions for measuring each factors are found in Activity 3.4.

1. Temperature

Water temperature is a very important physical measurement because if the water is too warm salmon become physically stressed and more likely to get diseases. Also, warm water holds less oxygen than colder water causing fish to breathe harder. Salmon eggs can hatch too quickly in high temperature water.

2. Water Depth

- Depth of the water is very important for salmon spawning areas. Different types of salmon require different depths of water because most species have their own specific egg burial depths.
- The link below has information about the spawning ground needs of different species of salmon.
  https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/Lmh66/Lmh66_ch14.pdf
- Associated Activity: Working in groups, have each group make a chart of the water and egg burial depth required by each species of Salmon.

3. Stream Flow Rate

The flow rate of a river will vary both seasonally and in relation to a particular area's current weather averages. Different species of salmon require different flow rates in their spawning grounds. You can find the conditions necessary for different species of salmon on the link in the Water Depth section above.

Chemical Measurements

6. pH

High pH in freshwater streams can decrease the activity levels of salmon and consistent low pH can cause reproductive failure.

7. Nitrates

High levels of nitrates can cause secondary effects in water systems. Plants, including algae, use nitrates as a food source. If they have all they want they can grow at an uncontrolled rate. The result of this is that the plants can cause a fluctuation in the dissolved oxygen level.

- Associated Activity: Have students find out what are acceptable levels of nitrates in water ways.

8. Nitrites

Elevated nitrite levels can lead to the uptake of excessive chlorine. Nitrite can accumulate in tissues as in gills, liver, brain and muscle.

9. Ammonia

Ammonia is what animals produce after they metabolize proteins. It is also an indicator of pollution if the levels are high enough. Ammonia sometimes doesn't allow oxygen to move across the gills in fish. Levels of 0.2 ppm to 0.4 ppm are generally acceptable.

- Associated Activity: Have students research what the effects are in fish if the levels of ammonia are too high.

10. Dissolved Oxygen

This is probably one of the most important aspects of the water environment for fish. Salmon need dissolved oxygen in the water to bring across their gills and into their bodies. The effect that insufficient dissolved oxygen can have in salmon crosses every part of their life cycle. Over 9 mg/L is usually the optimum level for Salmon.

Observational Measurements

11. Turbidity Test

Turbidity is a quality of water that is readily seen because it is the cloudiness of the water. When particles are suspended in water it becomes cloudy. More particles equals higher turbidity. In salmon, turbidity can alter their physiology and behaviour thus resulting in reduced survival rates of both adult fish and their spawn.

- Associated Activity: Have students research what an acceptable level of turbidity is for salmon. Have students research and report on the sources of water turbidity in salmon spawning habitats.

12. Invertebrate Identification

Invertebrates and their presence is very important to salmon species. The young juveniles, after spawning, eat a diet of primarily insects, plankton and invertebrates. A large population of diverse invertebrates will help support large numbers of juvenile salmon thus helping to increase the number that return.

- For this section of the testing you can have students "gently disturb" some of the rocks in the pools to find some of the larger invertebrates. Upon finding some, you can instruct the students to take pictures of them making sure to record the time and date that the pictures were taken. It is best to leave the area as pristine as possible to insure the survival of as many salmon offspring as possible in your sampling area.
- Associated Activity: Pictures taken of the invertebrates in your sampling area can be taken back to the classroom for students to try and

identify. There is a source that you can go to and see a classification and identification key for different types of river or freshwater invertebrates.

11. Plant Identification

Once again, we want to identify the plant species in and around the water quality sampling site. These plants are very important because they act like a filter for pollutants entering the waterway. Plants also help to stabilize the shoreline of waterways to reduce erosion.

- Here is a link to a source about the importance of streamside vegetation: https://tinyurl.com/fnesc44.
- Plants can be identified using the "E-Flora" Website at https://tinyurl.com/fnesc67.

Activity 6.6
Indigenous Salmon Sustainability

Students will investigate some First People's practice ensured that salmon were a sustainable resource.

In the past First Nations employed a number of measures that ensured the sustainability of the salmon fishery. This was based on the underlying concept that you never take more than you need.

a. Ask students to suggest some ways that they think First Peoples may have made sure that the salmon resources stayed sustainable year after year.
   - Ask how they may have

Blackline Master 6-4, page 177, *Traditional Salmon Conservation Methods*

b. After discussing student suggestions, share Blackline Master 6-4, page 177, *Traditional Salmon Conservation Methods*.

c. Have students find out different types of salmon fishing techniques, and explain how they enabled selective fishing.
   - Students can study an article that discusses some traditional fishing techniques of the Gitxaała which ensured sustainability.
     - See "Returning to Selective Fishing through Indigenous Fisheries Knowledge" by Charles R. Menzies Caroline F. Butler. (*The American Indian Quarterly* 2007). Download at http://ow.ly/pdQB302lWrU.

d. Students can create a poster, infographic or digital slide show that illustrates the traditional salmon conservation methods.

e. Students can consider how traditional fishing technologies and habits at management practices could be applied today. They can refer to the Menzies and Butler article noted above.

Blackline Master 6-1

Salmon Vocabulary

Species

fish (general)
salmon (general)
female fish
female fish of specific species
male fish
male fish of specific species
chinook (spring) salmon
chum (dog) salmon
coho salmon
humpback salmon
sockeye (general)
Salmon in certain phases, eg:
sockeye (red male spawning phase)
chum - old chum salmon
young salmon/jack
Salmon relatives:
trout
steelhead

Anatomy

anal fin
backbone
belly
dorsal fin
fin
gills
head
heart
liver
salmon tails
scales
slime

Life cycle

eggs, roe
fish that have spawned
spawning
spawn

Harvesting

First Salmon
fish trap
net
to catch fish, to catch salmon
to troll

Processing

barbecued fish
boiled fish
cured, buried salmon eggs
dried: sun dried
dried: roast dried
dried: wind dried
fresh fish
smoked
half-smoked
jelly from boiled fish heads
fillets, thinly sliced
store for winter
salmon stretcher, stick used to hold it open
salmon split open
powdered salmon

Seasons or Months connected with salmon

Blackline Master 6-2

Salmon Anatomy Video Question and Vocabulary Set

Follow along with the video to provide details about the structure and function of the following terms.

Hooked Jaw-

Teeth-

Nostril-

Eyeball-

Operculum-

Gills-

Gill Filaments-

Gill Arch-

Gill Rakers-

Pectoral Fin-

Pelvic Fin-

Vent (Urogenital Opening)-

Anal Fin-

Caudal Fin-

Follow along with the video to provide details about the structure and function of the following terms.

Adipose Fin

Dorsal Fin-

Lateral Line-

Colouration-

Top-

Side-

Belly-

Dissection

Heart-

Pyloric Caeca-

Enzymes-

Follow along with the video to provide details about the structure and function of the following terms.

Liver-

Stomach-

Spleen-

Intestines-

Air Bladder (Sac)-

Male Genetalia-

Milt-

Kidney-

Fish Skeleton-

Stream Study Data Recording Sheet

Recorder Names _____

Stream Name _____

Location _____

GPS Coordinates _____

Collection Date _____

General Conditions

Time of Data Collection _____ am/pm

Days Since Last Data Collection _____

Weather Conditions (describe the weather as you see it…ie clear, cloudy, rainy, snowy)

_____

_____

_____

Physical Measurements

Current Air Temperature _____ Co

Current Water Temperature _____ Co

Depth of Water (multiple trials across the stream)

Trial 1 _____ (m) Trial 2 _____ (m) Trial 3 _____ (m) Trial 4 _____ (m)

Average Depth _____ (m)

Distance across water _____ (m) Average Cross Section _____ (m2)

Total Average Cross Section _____ (m2)

Stream Surface Velocity (try this 3 times)

Distance in meters between the 2 flagged stakes _____ meters

Time it takes for the float to drift between the 2 flagged stakes

Trial 1 _____ seconds Trial 2 _____ seconds Trial 3 _____ seconds

Velocity (m/s) =

Trial 1 _____ m/s Trial 2 _____ m/s Trial 3 _____ m/s

Velocity Average _____ m/s

Stream Study Data Recording Sheet page 2

Chemical Measurements

pH _____ (1 – 14) Nitrite Test _____ 0 – 5 ppm (mg/L)

Nitrate Test _____ 0 – 160 ppm (mg/L) Ammonia Test _____ 0 – 8.0 ppm (mg/L)

Dissolved Oxygen _____ 2 – 14 ppm (mg/L)

Observational Measurements

Water Turbidity _____ 10 – 250 (NTU)

Invertebrate & Plant Identification

(these might be identified at a later time from pictures)
Record the date and time of each picture taken

Photo 1 Date/Time _____ Identification _____

Photo 2 Date/Time _____ Identification _____

Photo 3 Date/Time _____ Identification _____

Photo 4 Date/Time _____ Identification _____

Photo 5 Date/Time _____ Identification _____

Photo 6 Date/Time _____ Identification _____

Photo 7 Date/Time _____ Identification _____

Photo 8 Date/Time _____ Identification _____

Photo 9 Date/Time _____ Identification _____

Streamside Plant Identification

Draw an aerial sketch of where the plants occur in relation to the stream on the next page.

Add the following features where they occur in your sampling location
Log
Riffles
Rapids VVVVVVV
Overhanging bank or cutback
Rocks along a shoreline
Garbage or Refuse

Blackline Master 6-4

Traditional Salmon Conservation Methods

Conserving salmon populations was vital to most First Nations in BC in the past.
Here are some of the ways that salmon stocks were traditionally conserved:

- World view, cultural protocols and oral traditions entrenched respect for the salmon and recognize the spiritual connections people have with salmon. At the beginning of the season they usually held a First Salmon ceremony.
- Selective fishing technologies. People fished salmon using techniques that were selective, or allowed them to harvest certain types and release others. This relies on knowledge of the right equipment to use at a certain time in a certain place. Knowledge was also need to fish selectively for the particular species of salmon being caught, the time of year, and other factors.
- People limited the number of salmon they took at any one fishing site. They understood the capacity of the river or stream, and made sure to let enough salmon move upstream.
- People looked after salmon spawning habitats. For example they cleared obstructions from a stream to make sure salmon could make their way upriver.
- Some First Nations were known to have improved the productivity of streams that had small runs by moving fertilized eggs from one creek to another.