The Sacred Cycle: Weaving Indigenous and Western Knowledges of Pacific Salmon

Lesson Plans and Activities for Educators









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LKWUNGEN GREETING AND WELCOME

Esquimalt and Songhees Nations welcome visitors to their traditional territories with the following:

> A'si'em nu'shwala'kwa (Oh-sea-em new-shwa-la-kwa) My honourable close family

A'si'em nu schala'cha (Oh-sea-em new-chayla-cha) My honourable friends



Hay'sxw'qa gwns âne 'techul Lkwungen Tung'ex*

(Hy-sh-kwa gwuns ana techul Lakwunen too-nulth)
Thank you for coming to Xsapsam and Lkwungen land,
the land of the smoked herring

Hay'sxw'qa si'em nakwilia (Hy-sh-kwa sea-em na-kwil-ia) Thank you my honourable people

Traditional acknowledgement of Esquimalt and Songhees Nation territories:

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories, we live, we learn, and we do our work.

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Introduction

Pacific salmon are one of the most culturally and ecologically significant species to be found anywhere in the world. In North America, the rivers, lakes and oceans they inhabit extend all the way from Alaska, British Columbia, Washington, Oregon, and California. While their ecological significance and roles within ecosystems are well documented the cultural significance of Pacific salmon to First Nations around the Salish Sea is unquantifiable. For many First Peoples, salmon is intricately interconnected with their lives, communities and cultures by comprising significant parts of their diet, identities, cultural practices, social networks, histories and employment. And for thousands of years First Nations peoples have developed intricate understandings and knowledges about salmon, including the interconnectedness of salmon with other life forms. In this rapidly changing world it is becoming more imperative than ever that we endeavor to learn about the interconnectedness of salmon and what it means to be a 'good relative,' or to be in 'good relationship' with all things. Through weaving Indigenous knowledge systems, ways of being, and traditional ecological knowledge with Western science and knowledge systems, this resource will explore various worldviews, concepts, teachings, and lessons that seek to restore balance within the natural world by learning to become a 'good relative.'

"I think our students have to learn about nature... David Suzuki was one of the first ones that ever listened to our people. He knows what we were taught when we were young, how to look after nature, why it's not being looked after, what's wrong, so we have to learn how to be better people, human beings, and treat nature with more respect than we've been showing this last half-century..." - Mark Ahtleo

In braiding Western and Indigenous knowledge systems of pacific salmon, specifically where they relate to salmonid life cycles and the seasons, this resource focuses on the importance of salmon and threats that salmon face throughout their lives. Lorna Williams and Gloria Snively describe the concept of braiding Indigenous Science and Western Science as a metaphor used to establish a particular relationship. Linked by braiding, there is a certain reciprocity. Each strand remains a separate entity, but all strands come together to form the whole. When we braid Indigenous Science with Western Science we acknowledge that both ways of knowing are legitimate forms of knowledge. Strands of this braid include suggested educational games, activities and resources that allow students and educators to engage in the material, facilitating a deeper and holistic understanding of salmonid life cycles and their relational roles and responsibilities within that sacred cycle.

"I think as teachers there's a responsibility to teach children and students about climate change and how it's affecting our world, and it's really their world. Once things start changing the way they are with the different kinds of weather or extreme weather that we're having then the world is going to change if that's going to keep on. We can slow it down or we can sustain it but at this point it's really hard to see that we can do something about it unless we [think about] what kind of legacy we're leaving for the younger people of today.

The legacy should actually be them saying I want to learn more..." - Butch Dick



Pacific Salmon Overview

This resource provides a collection of educational information, materials, resources, games, and field trip ideas revolving around Pacific salmon in the Greater Victoria area. The information provided follows the British Columbia school curriculum from kindergarten to grade 12. Educators may use this to instruct students of any age on the stages of the salmon life cycle, including their preferred habitat, the physical changes they endure during each stage of the life cycle, the duration of each stage, and the food they require at each stage.

Refer to Appendix B for grade specific content highlighted throughout this resource.

Species of Pacific Salmon in BC

- 1) Chum
- 2) Sockeye
- 3) Chinook
- 4) Coho
- 5) Pink
- 6) Steelhead/Rainbow Trout
- 7) Coastal Cutthroat Trout (CCT)

For more specific information and graphics of each Pacific salmon species, refer to the links below:

- 1.Info on Chum, Sockeye, Chinook, Coho and Pink: Pacific Salmon Species Overview Posters (pacificwild.org)
- 2.Info on Chum, Sockeye, Chinook, Coho, Pink and Steelhead, as well as two species of salmon native to Asia and Russia, the Masu and the Taimen respectively: Pacific Salmon Wild Salmon Center

3.Info on Chum, Sockeye, Chinook, Coho, Pink and Steelhead, as well as a species of salmon native to Asia, the Masu: Species – NPAFC

Though Coastal Cutthroat Trout are also part of the genus Oncorhynchus, just like other Pacific salmon, and have similar life histories as Steelhead/Rainbow Trout, Cutthroat are often left out of most Pacific Salmon lists. Below are some resources on this lesser known Pacific salmon species:

4.BC Fish Facts (gov.bc.ca)

5. Cutthroat Trout Species Profile, Alaska Department of Fish and Game





Key Terms

Abiotic:

Refers to something that is not biological

Brackish Water:

ater that is a mix of fresh and saltwater

Coast Salish:

The Indigenous peoples of the Pacific Northwest Coast

Ecology:

The relationships between living organisms and their environment

Ecosystem:

A community of organisms that live and interact together in an environment

Estuary:

The part of a river where it meets the ocean

First Nation:

The original inhabitants of the land from the time before colonialism

Indigenous:

Originating or occurring naturally in a particular place; First Nations, Inuit, and Metis

Imprinting:

The action of the salmon recognizing and remembering the smell of their natal stream

Keystone Species:

A species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically

Milt:

The semen of the male salmon



Parr Marks:

Vertical black bars found on the side of juvenile salmon during the Fry or Parr stage of life.

pH:

How acidic or alkaline a substance is, salmon prefer a neutral pH of 6-8 roughly

Redd:

A gravel nest that the female salmon dig for their eggs

Salish Sea:

A culturally significant body of water for the Coast Salish people. It includes three smaller bodies of water; the Strait of Georgia, the Strait of Juan de Fuca, and Puget Sound

Smoltification:

The process where the kidneys and gills of Smolts adapt to handle saltwater instead of fresh as they transition into the ocean

Traditional ecological knowledge (TEK):

The ongoing accumulation of Indigenous knowledge, practice, and beliefs on relationships between living organisms which is acquired through hands-on and direct contact with the environment

Worldview:

A set of fundamental beliefs that determine an individual's point of view of the world

Zooplankton:

Microscopic animals that live in the water column in oceans around the world, they are often the larval or immature stages of larger marine animals





Pacific Salmon Life Stages



Egg

•Habitat: A redd (nest made of gravel by the female salmon), built in streams, rivers, or lakes. The eggs are laid in gravel to protect eggs from predators and strong water flow that can wash eggs away. They thrive in cool water, rich in dissolved oxygen, with proper pH, and appropriately sized gravel.

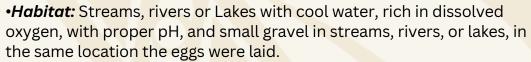
Did you know? Different species of salmon prefer different sizes of gravel to lay their eggs in.

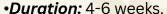
•Duration: Once a female lays her eggs, a male then fertilizes them with his milt (sperm), the female then covers up the redd to keep her eggs safe. The eggs will hatch anywhere between 6 and 20 weeks later depending on species and water quality conditions.

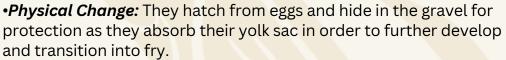
•Physical Change: Development within the egg.

•Food: N/A

Alevin



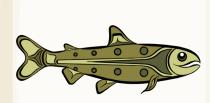




•Food: A yolk sac is attached to their body, acting as their food source.



Fry and Parr



•Habitat: Streams, rivers or Lakes with cool water, rich in dissolved oxygen with suitable pH, pools with slow flowing water and good instream (woody debris, boulders, etc.) and riparian (stream side vegetation) cover (overhanging branches, tree canopy, etc.). Some species move into estuaries, areas between the mouth of a river or stream and the ocean where freshwater and saltwater mix to create brackish water, immediately or soon after emergence. These fry require good cover (such as sea grasses and algae or "sea weeds") to hide from predators while their bodies transition to a salt water environment and they hunt to grow large enough to go out to sea.

•Duration: Depending on the species of salmon, some fry immediately head downstream into estuaries, while some stay in fresh water for up to three years.

Did you know? Because Pink salmon fry head out to estuaries immediately, they do not develop parr marks and remain silver in order to better camouflage in estuarine and ocean environments.

- •Physical Change: Alevin develop into fry after they emerge from gravel, their yolk sacs are absorbed and they start to hunt for food. They are also busy imprinting, or learning the "smell" of their environment. From rocks to vegetation to water, all of these combined create the distinct smell of their home environment. This process is crucial as imprinting allows them to return to the stream that they came from. As they get larger, most species begin to develop parr marks (stripes on the side of their body) which help them camouflage in their environment, at this stage they are called Parr.
- •Food: For species in freshwater their diet includes insects and their larvae, and zooplankton. For species that head out into estuaries their diet will include crustaceans and other invertebrates.

Smolt

•Habitat: Estuaries are very important to smolts, as they provide a lot of food and contain an abundance of vegitative and algal cover that can act as a shelter from predators, such as eelgrass beds.

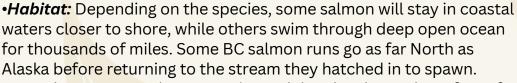
Did you know? The Gorge Waterway contains some of Greater Victoria's largest and densest eelgrass beds!

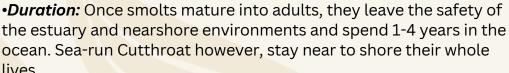
- **Duration:** Depending on the species, some leave estuaries immediately, while other species live in estuaries for months.
- •Physical Change: It is at this stage in the life cycle where they migrate downstream to estuaries. Smolts undergo smoltification, a process where their kidneys and gills will start to change and adapt to process saltwater instead of freshwater. They will eventually start to turn silver in order to camouflage in the ocean.
- •Food: Small fish, crustaceans, insects, and other invertebrates.











•Physical Change: Turn silver, most with some spots on at least one part of their body.

•Food: Smaller fish, zooplankton, squid and more.



•Habitat: As adults mature, they make their way back to the stream they were hatched in, using the imprinting from when they were fry, and make their way upstream to spawn. Once they reach their spawning grounds, females will dig a redd and lay around 2000-5000 eggs. Males secrete their "milt" on top of the eggs to fertilize them. Female spawners will then use the last bit of their energy to protect their redds for several days until they die. A salmon's death is an extremely important part of the life cycle as it provides nutrients to the land, animals and to the stream itself.

•Duration: Spawners can travel up to 3000 kms, depending on where their spawning grounds are located. Spawners can survive anywhere from a few days to a few weeks after they spawn before they die. Cutthroat however can spawn multiple times in their lives with sea-run Cutthroat often moving back and forth from fresh to saltwater multiple times a year.

Did you know? There was a Cutthroat in Alaska that, as of 2019, was 17 years old and was still going upstream to spawn!

•Physical Change: As they migrate, they will stop eating, and instead will gain energy by absorbing tissues in their body in order to move towards their reproduction stage. In addition, they start to change color and shape to attract mates. Males develop hooked noses or humpbacks to show females they are healthy and are able to fight off other males.

•Food: Internal tissues.

































































Importance of Salmon

Salmon supports biodiversity in their local environments as they are preyed upon throughout each stage of their life cycle by many other animals, and provide nutrients to the waterways and land once they complete their life cycle. As they migrate back upstream to spawn, many animals feed off these salmon such as bears, eagles, and wolves. These animals spread the nutrients from the salmon to the surrounding forest either through their droppings, or by bringing the salmon into the forest to eat which then decompose into the soil. This allows for different plants and trees to benefit from the salmon's rich nutrients as well. Additionally, when the salmon decompose in the river, their nutrients support the river and the animals within it. The importance of salmon in local ecosystems can not be overstated.

While salmon plays a vital role in the ecology of local ecosystems, the importance of salmon extends far beyond its biological significance as a keystone species. Salmon holds immense significance for coastal First Nations around the Salish Sea and beyond; from trade and commerce to food systems and sustainable practices – art and culture to traditional ecological knowledge and ceremony, salmon are integral to many Indigenous communities.

Elder Butch Dick emphasizes the importance of relationality and sustainable practice in his reflection that "salmon are really vital to us because we look at the salmon as family... and the trees are family and the birds are family, you know everything around us is family... and we had to be really careful about how much we took of each, we only took what we needed..." This understanding that salmon are our relatives means that we treat them with the utmost respect and care, only taking what we need and ensuring the health of salmon families for future generations.

Similarly, Elder Mark Ahtleo shares - "my Grandfather taught us to begin with... the best way I know how to say it in English... is look after nature, and nature will take care of you," highlighting the responsibility and reciprocity of our relationships within the natural world. He goes on to say that "salmon means a lot to me... it's like medicine to all our peoples and it's how I stay healthy... I eat every part of the fish." Understanding our relationality and responsibility within natural systems, and learning not to be wasteful, are fundamental teachings within many Indigenous communities and cultures. These holistic perspectives and practices involving salmon are woven throughout Indigenous ways of knowing and being, and echoed in the conversations with, and teachings of, Indigenous Elders and communities.

Find their full conversations here





Salmon Habitat

Salmon habitats, such as streams, rivers, or lakes, are shaped by abiotic factors, which can continually alter the landscape. Through the force of water, wind, or ice, banks of streams can become deteriorated, resulting in features such as cutbanks. These cutbanks can in turn provide shelter for fry. These abiotic factors can also create braiding of streams (new paths are formed for water to flow through), allowing for larger and new habitat. However, these abiotic factors can also degrade habitat, through erosion of banks. To avoid this, restoration can include certain plants that can be planted in these banks, and the roots of the plants will support the banks from collapsing. In addition, riffles are vital when it comes to keeping rivers and streams cool, and oxygenated. Salmon also require small, smooth spawning gravel to build a redd and lay their eggs. This is important as it protects the salmon eggs and does not injure the salmon as they dig through the gravel. Finally, stream coverage is required in order to protect the salmon at each stage in their life cycle. This coverage can include trees, overhanging shrubs, boulders, or large and small woody debris. This overhanging vegetation is also important as it provides both shade to keep the water cooler, along with nutrients from falling leaves and branches into the water.

Threats Salmon Face

Salmon face many threats during each stage of their life cycle. Natural threats include predation from other animals such as birds, whales, or bears. However, there are many non-natural threats that salmon face due to humans that have negatively impacted salmon populations. Pollution is a major threat, as polluted waters result in negative impacts upon salmon's overall health and ability to properly use their imprinting skill to smell their way back to their original stream. Commercial overfishing is another threat, as these fisheries capture large amounts of salmon, not allowing for their populations to return back to sustainable population numbers. In addition, climate change is another large threat that salmon face today. With warming water temperatures, salmon are unable to handle this increase in temperature as they need cool water. This often results in salmon waiting to migrate until water temperatures decrease, or dying due to this increase in temperature during their migration. Climate change and drought is also impacting water levels, which in turn affects the flow of water and its features that salmon rely on for safety such as riffles and pools. Human development and industry such as deforestation significantly impacts salmon, their habitat, and loss of habitat as large amounts of debris end up in rivers. As deforestation increases debris in the water, it causes potential blockages and can cover suitable gravel that is needed to build their redds. Human development can also completely destroy salmon habitat to the point where certain creeks no longer exist. Pollution, climate change, and human development negatively impact each stage in the life cycle, through habitat quality or loss.



Main Lesson Plan: Grades 2 - 5

Introduction

This lesson plan targets Grades 2 - 5. Please use the Pacific Salmon Information provided above.

Objectives

- Introduce the life cycle of salmon
- Discuss details of each stage within the life cycle
- Learn how salmon are important to the environment and culturally
- Learn threats that salmon and their habitat face

Grade and Topic	Science: Big Ideas	Science: Content to Know	Art: Big Ideas	Art: Content to know
2	-Living things have life cycles adapted to their environment -Water is essential to all living things, and it cycles through the environment	-Similarities and differences between offspring and parents -First Peoples use of their knowledge of life cycles -Water conservation -Local First People's knowledge of water	-Creative expression develops our unique identity and voiceInquiry through the arts creates opportunities of risk taking	-Elements in the arts, including but not limited to:visual arts: elements of design: line, shape, texture, colour, -Traditional and contemporary Aboriginal arts and artsmaking processes -A variety of local works of art and artistic traditions from diverse cultures, communities, times and places
3	-Living things are diverse, can be grouped, and interact in their ecosystems -Wind, water, and ice change the shape of the land	-Biodiversity in the local environment -The knowledge of local First Peoples of ecosystems -Observable changes in the local environment caused by erosion and deposition by wind, water, and ice	-The mind and body work together when creating works of artCreative experiences involve an interplay between exploration, inquiry, and purposeful choice.	-Elements in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour -Processes, materials, technologies, tools, and techniques to support arts activities -Traditional and contemporary Aboriginal arts and artsmaking processes -a variety of local works of art and artistic traditions from diverse cultures, communities, times, and places



4	-All living things sense and respond to their environment	-Sensing and responding (humans, other animals, plants)	-Artists experiment in a variety of ways to discover new possibilities -Exploring works of art exposes us to diverse values, knowledge, and perspectives	-Elements and principles that together create meaning in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour -processes, materials, technologies, tools and techniques to support arts activities -traditional and contemporary Aboriginal arts and arts-making processes -a variety of regional and national works of art and artistic traditions from diverse cultures, communities, times, and places
5	-Multicellular organisms have organ systems that enable them to survive and interact within their environment	-First Peoples concepts of interconnectednes s in the environment -the nature of sustainable practices around BC's resources -First Peoples knowledge of sustainable practices	-Artists experiment in a variety of ways to discover new possibilities and perspectives -Works of art influence and are influenced by the world around us.	-Elements and principles that together create meaning in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour -Processes, materials, technologies, tools and techniques to support creative works -traditional and contemporary Aboriginal arts and arts-making processes -a variety of regional and national works of art and artistic traditions from diverse cultures, communities, times, and places





Word Bank or Vocab

•Alevin

•Estuary

•Fry

Spawner

•Imprinting

Migration

•Smolt

Parr Marks

Art Activity Supplies

- Poster Paper
- •Colored markers
- •Glue stick/Tape

Structure (timing TBD)
Program Length: 1.5 hours

Instructions

TThese step by step instructions will allow for optimal learning for the students to understand the concepts highlighted above. This will be followed by activities that will engage students in the material, allowing for further understanding. Refer to the adaptation section below for adaptations of the lesson plan and activities for older grades.

Step 1) Introduction: To introduce the salmon life cycle, watch the Youtube Video "Life of the Pacific Salmon" by NOAA for a general understanding:

<u>Life Cycle of the Pacific Salmon</u>

<u>Wonderful Water with Chris Cook</u>

<u>Exploring Wonderful Water Educator Walkthrough</u>

Step 2) Lesson: Go over each stage of the life cycle, which is broken down in this lesson plan. This includes the importance of salmon, their habitat, and the threats they face. Refer to Appendix A for printable flash cards of each stage of the life cycle, including pictures and information on each.

Step 3) Discussion questions: What is a life cycle? Why do salmon migrate? What are the threats that salmon face throughout their lives?

Step 4) Art Project: Provided below.





Art Activity

Objective

This activity is adaptable for a range of students, allowing students to learn about the salmon life cycle, and gradually learn in more details about each stage of the life cycle, their habitats features, and threats they face throughout the life cycle. Please refer to the next section for adaptations.

Deliverable

A poster of the complete salmon life cycle, showing each individual stage in the correct order, along with habitat features and threats salmon face.

Supplies:

- -Poster paper
- -Colored markers
- -Glue stick/Tape

Steps based on grade:

- 1. Grade 2-3: To demonstrate that living things have life cycles that adapt to and interact with their environment, draw a circle that takes up a large portion of the page. At different points along the circle, going clockwise, name or draw the stage of the life cycle for salmon in the correct order (eggs -> alevin->fry->smolt->adult-> spawner)
- 2. Grade 4-5: To highlight how salmon sense, respond, interact and survive in their environment, older students can get creative and add to the life cycle different threats salmon can face throughout their life cycle such as bears, birds, fishing hooks/nets.

Optional Communal Project: Create a group project between one class or multiple classes. Split classes up into groups, and designate each group with a specific life cycle stage. They must draw that specific stage together, along with its correct habitat features and threats that the salmon may face. When the groups/classes are done, connect each stage together to create a complete life cycle.

Physical Activity

Impossible Salmon Tag resulting in engagement from the students and repetition of the life cycle stages, and threats.

Time: flexible





Objective

This activity allows students to learn the different stages of the salmon life cycle, along with the multiple threats (animal and human) that salmon face. This game will also highlight the small amount of salmon that survive the entire life cycle, from egg to spawner.

Steps:

- 1. Brainstorm different threats (animal and human) that salmon face and explain that these will be acted out by select students
- 2. Clarify what each stage of the life cycle is and explain that the majority of students will begin by acting these out at the beginning of the game
- 3. Depending on class size, chose a couple students to be a certain type of threat (bird, bear, fisher). The rest of the students will start off by being the first stage of the life cycle (eggs).
- 4. The eggs will run around and the "threats" will try and tag them. If a student is about to be tagged, they can link arms with another salmon for safety for 5 seconds, demonstrating safety in numbers just like salmon do. For those 5 seconds, students cannot be tagged.
- 5. Once a student has been tagged they will sit out for that round until the next stage of the life cycle begins. They will either be a threat or the next stage of the salmon. Every new round the students will advance to the next stage in the life cycle. At the beginning of each round a few more students should be chosen as threats that the salmon students will have to run from, demonstrating the large amount of threats salmon face. At the end of the game, in total there should be more students who act as threats then there are students who act as salmon, representing the large amount of salmon that do not survive.

Resource from Science World: https://www.scienceworld.ca/resource/impossible-salmon-tag/

Adaptions

"These are suggested adaptations, including activities and resources, for other grade levels. Each adaptation is constructed to fit the grade specific content laid out on the B.C curriculum.

Grades K-1

Objective

Attached are printable pictures of each stage of the life cycle. Students can use these pictures to see the observable features that salmon have in each stage of life, and how these features change over time of their life cycle. In addition, the information on the back explains how these features allow salmon to survive in their environment.



Grade and Topic	Science: Big Ideas	Science: Content to Know	Art: Big Ideas	Art: Content to know
K	-Plants and animals have observable features -Daily and seasonal changes affect all living things	-basic needs of plants and animals - adaptations of local plants and animals -local First Peoples uses of plants and animals -living things make changes to accommodate daily and seasonal cycles -First Peoples knowledge of seasonal changes	-People create art to express who they are as individuals and communityPeople connect to others and share ideas through the arts.	-elements in the arts, including but not limited to: visual arts: elements of design: line, shape, texture, color; principles of design: pattern, repetition -processes, materials, movements, technologies, tools and techniques to support arts activities -notation to represent sounds, ideas and movement -symbolism as a means of expressing specific meaning -traditional and contemporary Aboriginal arts and arts-making processes -personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment
1	-Living things have features and behaviours that help them survive in their environment	- behavioural adaptations of animals in the local environment -names of local plants and animals -local First Peoples knowledge of the local landscape, plants and animals -local First Peoples understanding and use of seasonal rounds	-People create art to express who they are as individuals and communityPeople connect to others and share ideas through the arts.	-elements in the arts, including but not limited to: visual arts: elements of design: line, shape, texture, colour; principles of design: pattern, repetition. Processes, materials, movements, technologies, tools and techniques to support arts activities -notation to represent sounds, ideas and movement -symbolism as a means of expressing specific meaning -traditional and contemporary Aboriginal arts and arts-making processes -personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment



Suggested Materials and Resources:

- Introductory Video: Run Salmon Run
- Refer to Appendix A for printable flash cards of each stage of the life cycle, including pictures and information on each

Grades 6 - 8

Objective

To demonstrate how salmon rely on their internal system to survive and reproduce, also to highlight their different life processes, students can draw a circle that takes up a large portion of the page (need extra room along the circle for details). After drawing each stage of the life cycle in the correct order, and the threats they face throughout their life cycle, they can draw the habitat features salmon need such as eelgrass, different sized rocks for protection and spawning, and the different types of food they eat. The students can then match the details about each life stage (provided on the cards) to the correct life stage.

Grade and Topic	Science: Big Ideas	Science: Content to Know	Art: Big Ideas	Art: Content to know
6	-Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment	-the basic structures and functions of body systems (excretory, reproductive, hormonal, nervous)	-Engaging in creative expression and experiences expands people's sense of identity and communityExperiencing art is a means to develop empathy for others' perspectives and experiences.	-purposeful application of elements and principles to create meaning in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour, form (visual arts), value; principles of design: pattern, repetition, balance, contrast, emphasis, rhythm (visual arts), variety, unity, harmony -processes, materials, movements, technologies, tools, strategies, and techniques to support creative works -image development strategies -symbolism and metaphor to explore ideas and perspective -traditional and contemporary Aboriginal arts and arts-making processes -personal and collective responsibility associated with creating, experiencing, or presenting in a safe learning environment



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	7	-Earth and its climate have changed over geological time(YES) -Evolution by natural selection provides an explanation for the diversity and survival of living things	-survival needs -First Peoples knowledge of changes in biodiversity over time -evidence of climate change over geological time and the recent impacts of humans (physical records, local First Peoples knowledge of climate change)	-Through art making, one's sense of identity and community continually evolvesEngaging in the arts develops people's ability to understand and express complex ideas.	-manipulation of elements and principles to create meaning in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour, form (visual arts), value; principles of design: pattern, repetition, balance, contrast, emphasis, rhythm (visual arts), movement, variety, proportion, unity, harmony -processes, materials, movements, technologies, tools, strategies, and techniques to support creative works -image development strategies -symbolism and metaphor to explore ideas and perspective -traditional and contemporary Aboriginal arts and arts-making processes -ethical considerations and cultural appropriation related to the arts -personal and collective responsibility associated with creating, experiencing, or presenting in a safe learning environment
	8	-Life processes are performed at the cellular level.	-Characteristics of life -First Peoples knowledge of local geological formations, significant local geological events	-Creative growth requires patience, readiness to take risks, and willingness to try new approachesIndividual and collective expression can be achieved through the artsArtists often challenge the status quo and	-manipulation of elements, principles, and design strategies to create mood and convey ideas in the arts, including but not limited to: visual arts: elements of design: line, shape, space, texture, colour, form (visual arts), value; principles of design: pattern, repetition, balance, contrast, emphasis, rhythm (visual arts),



	open us to new perspectives and experiences.	-processes, materials, movements, technologies, tools, strategies, and techniques to support creative works -image development strategies -symbolism and metaphor to explore ideas and perspective -traditional and contemporary Aboriginal arts and arts-making processes -ethical considerations and cultural appropriation related to the arts -personal and collective responsibility associated with
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Suggested Materials and Resources:

- Salmon life cycle videos from Indigenous perspectives: <u>I am salmon</u>, <u>Legend: The Salmon People</u>, <u>Wonderful Water with Chris Cook</u>, <u>Exploring Wonderful Water Educator Walkthrough</u>
- Introductory Video: Salmon's life cycle and their incredible impact on our ecosystem
- Pacific Salmon and their Circle of Life
- Lesson plan above that highlights detail about each stage of the life cycle
- Refer to Appendix A for printable flash cards of each stage of the life cycle, including pictures and information on each.

Grades 9 - 12

Objective

The salmon life cycle demonstrates content highlighted by the BC curriculum for higher grade levels. This includes how the different stages of the salmon life cycle depend on multiple bodies of water from creeks and rivers, to estuaries to the open ocean representing the interconnectedness of these bodies of water to the survival of salmon. The migration upstream demonstrates the conservation of energy as they stop eating to internally change and develop into spawners. Once they spawn and die, their energy is transferred to other living things and into their surrounding environments through decomposition. In addition, the stages of life demonstrate how human activities have an impact on ecosystems that salmon depend on and their survival rates due to overfishing, deforestation, and climate change.



In order to demonstrate all of these factors, students can draw a circle that takes up a large portion of the page (need extra room along the circle for details). First they can complete the life cycle by drawing each stage, habitat features, threats, details about each life stage (provided on the cards) to the correct life stage. Secondly, they can integrate the importance of salmon, from an environmental and cultural perspective. Within the life cycle drawing they can highlight how each stage of the life cycle is beneficial to both the environment and Indigenous culture.

Grade & Topic	Science: Big Ideas	Science: Content to Know	Art: Big Ideas	Art: Content to Know
9	-The biosphere, geosphere, hydrosphere, and atmosphere are interconnected , as matter cycles and energy flows through them	-Matter cycles within biotic and abiotic components of ecosystems -Sustainability of systems -First Peoples knowledge of interconnected ness and sustainability	-Identity is explored, expressed, and impacted through visual arts experiencesThe visual arts provide opportunities to gain insight into perspectives and experiences of people from a variety of times, places, and culturesArt experiences can build community and nurture relationships with othersThe visual arts use a unique sensory language for creating and communicating.	-visual arts elements, principles, and image design strategies to create mood and convey ideas, including but not limited to: elements of design: line, shape, space, texture, colour, form, value. principles of design: pattern, repetition, balance, contrast, emphasis, rhythm, movement, unity, variety, proportion, harmony. image design strategies: elaboration, simplification, magnification, reversal, fragmentation, distortion -personal narrative as a means of representing self-perception and identity in artistic works -traditional and contemporary Aboriginal worldviews and crosscultural perspectives as communicated through visual arts -personal and social responsibility associated with creating, experiencing, and responding to visual art



10	-Energy is conserved, and its transformati on can affect living things and the environment	Transformation of energy -Patterns of inheritance	-An artist's intention transforms materials into artTraditions, perspectives, worldviews, and stories are shared through aesthetic experiencesThe creation of visual art relies on the interplay of the mind and bodyVisual arts offer unique ways of exploring our identity and sense of belonging.	-elements of visual art -principles of design -image development strategies -materials, techniques, and technologies -creative processes -use of symbols and metaphors to represent ideas and perspectives -influence of visual culture on self- perception and identity -traditional and contemporary First Peoples worldviews, stories, and history as expressed through visual arts
11	-Complex roles and relationships contribute to diversity of ecosystems -Changing ecosystems are maintained by natural processesHuman practices affect the sustainability of ecosystems.	-ecosystem complexity (roles, relationships, population dynamics) -First Peoples knowledge and other traditional ecological knowledge in sustainable biodiversity -Benefits of ecosystem services	-An artist's intention transforms materials into artVisual arts reflect the interconnectedness of the individual, community, history, and societyArtistic expression is an artist's physical and cognitive articulation of our humanity.	-elements of visual art -principles of design -image development strategies -materials, techniques, and technologies for visual art -creative processes -symbols and metaphors



	-Humans can play a role in stewardship and restoration of ecosystems	-Human actions and their impact on ecosystem integrity -First Peoples ways of knowing and doing -Resource stewardship -Restoration practices	-Artistic works offer unique aesthetic experiences in a variety of contexts.	-influences of visual culture in social and other media -traditional and contemporary First Peoples worldviews, stories, and history, as expressed through visual arts
12	-Human actions affect the quality of water and its ability to sustain lifeHuman activities cause changes in the global climate systemLiving sustainably supports the well- being of self, community, and Earth.	-Availability and water use impacts • global water security (laws and regulation, conservation of water) -Changes to climate systems -Impacts of global warming -Mitigation and adaptations -Land use and degradation -Land management -Personal choices and sustainable living -Global environmental ethics, policy, and law	-An artist's intention transforms materials into artVisual arts are an essential element of culture and personal identityPurposeful artistic choices enhance the depth and meaning of artistic workAesthetic experiences have the power to transform our perspective.	-elements of visual art -principles of design -image development strategies -materials, techniques, and technologies -creative processes -symbols and metaphors -influences of visual culture in social and other media -traditional and contemporary First Peoples worldviews, stories, and history, as expressed through visual arts



Suggested Materials and Resources:

- Salmon life cycle videos from Indigenous perspectives: <u>I am salmon</u>, <u>Legend: The Salmon</u>
 <u>People</u>, <u>Wonderful Water with Chris Cook</u>, <u>Exploring Wonderful Water Educator Walkthrough</u>
- Introductory Video: Salmon's life cycle and their incredible impact on our ecosystem
- Pacific Salmon and their Circle of Life
- Refer to Appendix A for printable flash cards of each stage of the life cycle, including pictures and information on each.

Alternative Activity - Salmon Anatomy and Dissection

Objective

This will allow the students to learn about the external and internal features of a salmon. In addition, the students will gain knowledge about the differences between a female and a male salmon.

Teaching Materials:

- Print salmon anatomy vocabulary sheet and diagram:
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- Vocabulary sheet:
- Salmon Life Cycle Vocabulary
- •
- Diagram:
- Salmon Life Cycle Diagram
- •
- Watch video from PSF:
- Salmon Anatomy and Dissection

Deliverable

A completed poster containing the proper placement of the internal anatomy of a female and male salmon.

Supplies:

- Scissors
- Glue

Optional: Take students to a nearby creek to encourage learning from the land





Additional Resources

Free Recources for Educators

Fisheries and Oceans Canada:

Information about Pacific Salmon

Pacific Salmon Foundation:

Pacific Salmon Life Cycle

Stream to Sea:

Welcome to the Stream to Sea Program

Traditional Native Storytelling with Roger Fernandes: "Salmon Boy"
What would your life be like if you were a salmon?

Knowing Home: Braiding Indigenous Science with Western Science, Book 1 and 2:

https://pressbooks.bccampus.ca/knowinghome/

https://pressbooks.bccampus.ca/knowinghome2/

Legend: The Salmon People

Salmon and Interconnectedness

Educational Programs

Peninsula Streams:

Watershed & Salmon Life Cycle Education



Field Trip Opportunities

Organization	What they offer	Address	Contact Information
Sooke Salmon Enhanceme nt Society	Provide classroom incubation program and educational tours of the hatchery	Box 947, Sooke, B.C. V9Z 1H9 Canada	Phone: 250 642 - 0031 Email: sookeriverjbhatche ry@shaw.ca
Juan de Fuca Salmon Restoration Society	Provide opportunity to see spawning season, close up view of fry, and harvesting of eggs, along with fish related aspects of the ecosystem	2895 Sooke River Road Sooke, BC V9Z OY1	Phone: 250-642- 4200 or Email: admin@jdfcharters salmon.com
Salmon in the City	Count spawning coho at a fish fence, allowing for an educational opportunity	Fish fence located at: 315 Burnside Rd W, Victoria, BC V8Z 7L6	Webpage: https://colquitzcoal ition.com/contact/
Cowichan Lake Salmonid Enhanceme nt and Hatchery Society	Educates classrooms on watersheds, fish populations, and how to protect their habitat	131 Oak Lane, Lake Cowichan	Phone: 250-710- 4466 Email: kevinlowe992@gm ail.com
Salt Spring Salmon Enhanceme nt Society	Operate a hatchery on Cusheon Creek and run projects throughout schools on the island	334 Upper Ganges Road, Salt Spring Island	Phone: 250- 537- 8983



Nitinat Hatchery	Focus on stock conservation and assessment, stewardship and education, water management	PO Box 369 Port Alberni BC V9Y 7M8	Phone: 250-745- 3321 Email: Caroline.Cherry@d fo-mpo.gc.ca
Nanaimo River Hatchery	Main goals are conservation and enhancement of salmon stocks, education and stewardship	2775 Rugby Rd, Nanaimo, BC V9X 1T2	Phone: 250-245- 7780 Email: bbanks@nanaimori verhatchery.ca

First Nations Community Opportunities

The Seven Signs of Lekwungen Cultural tour Explore Songhees Cultural Tours

Appendices

Appendix A: Salmon life cycle flash cards

