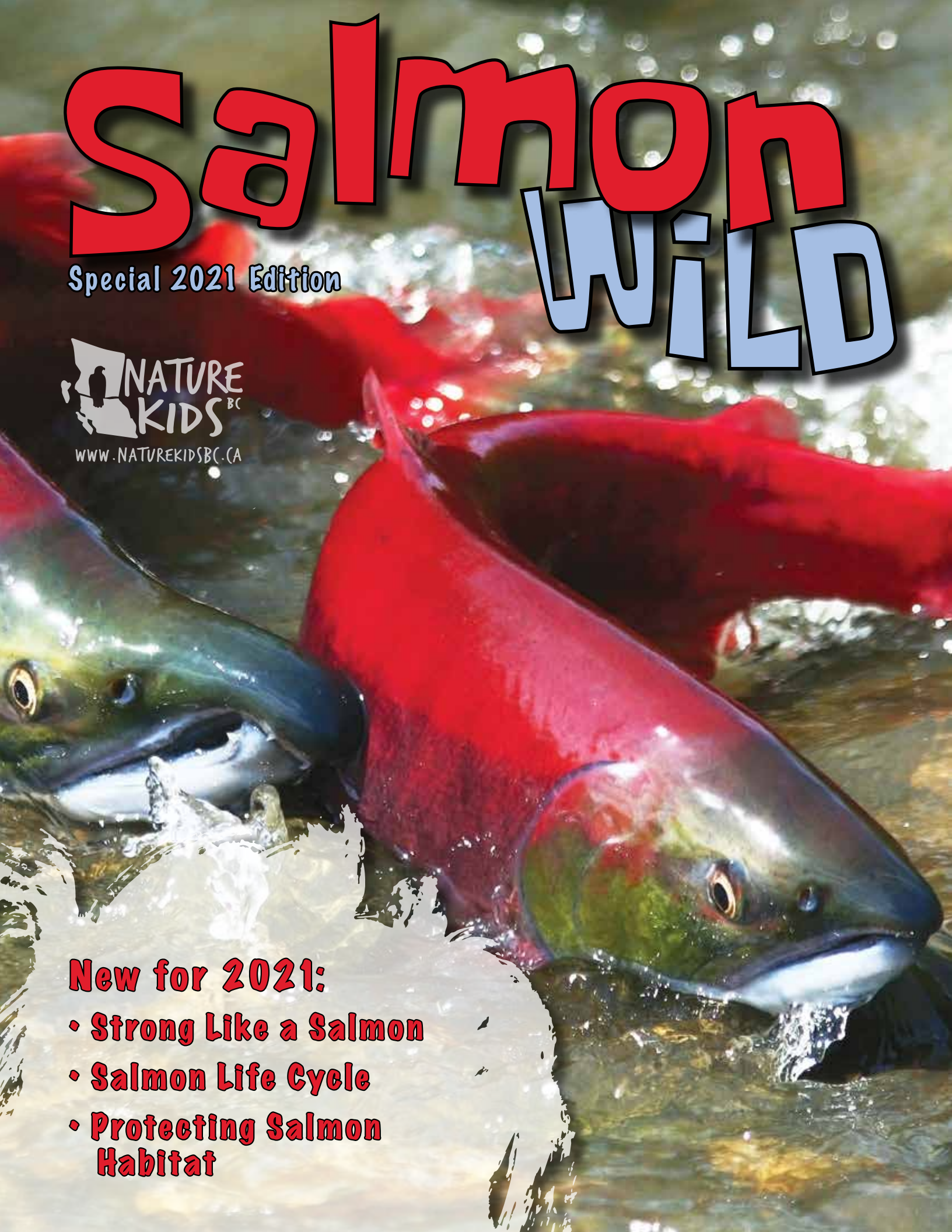
Salmon WILD

Special 2021 Edition



NATURE KIDS BC

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New for 2021:

- Strong Like a Salmon
- Salmon Life Cycle
- Protecting Salmon Habitat

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QUESTIONS? COMMENTS?

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An introduction to NatureKids BC's Focus on Salmon

Salmon are really amazing! I don't think there's anything as incredible on this planet as a fish that leaves the river no bigger than 50 centimeters, goes out into the ocean, and returns four years later to the exact same river it was born in! Salmon **give to the environment** in every single phase of their life cycle. From the time they are eggs to when they go out to the ocean where predators find them, and then when they return to produce the next generation, salmon play an important role in sustaining other forms of life. Even when their life is over, the nutrients in their bodies feed the soil and the forest. Salmon are such an integral piece of healthy ecosystems here in B.C., supporting all the other animals that we enjoy. At the same time, they are so vulnerable to human activity and we need to help them!

My connection to salmon started when I was a little boy, being out on the water, fishing with my uncle in a very beautiful place. And then we would bring the fish home, to provide for my loved ones, my family. I have such cherished memories of the coming together of our family. And that's really why I push myself to do all that I can to ensure that future generations can build these same incredible memories with their families.

I'm hoping that you can get out to the rivers in your area so that you can witness the salmon returning and appreciate how they contribute to healthy ecosystems. And I'm hoping that you will find ways to work within your family and community to help with salmon restoration. Be a strong voice to make sure salmon are there for all people and all generations to come.

Bob Chamberlin - Founder, First Nations Wild Salmon Alliance with Union of British Columbia Indian Chiefs.

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NatureKids BC is **THE** club for children and families who love to be outdoors. Members discover nature on Explorer Days organized by volunteer leaders and guided by experts, participate in stewardship projects, earn Action Awards and receive NATUREWILD magazine 4 times a year.

Come join us! Family membership: **$35** per year. Individual adult membership: **$25** per year. Or subscribe to NATUREWILD magazine: **$20** for 4 issues per year. For more information and to sign up online go to: naturekidsbc.ca

Thank you to our sponsors and supporters who share our vision that all children be connected with nature.

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Photo credits: Cover: OVasik, istockphotos.com • Introduction: Bob Chamberlin, B.C.

Bears and Salmon-

Hidden Objects Puzzle - Created by Sara Theuerkauf

These bears are happily eating the salmon in the river. Sadly, a couple of months ago some people camped beside the river, leaving a lot of trash behind. Hidden in the picture is all the garbage they left (*shown down the left side of the page.*) Can you find everything?

Chip Bags (1)

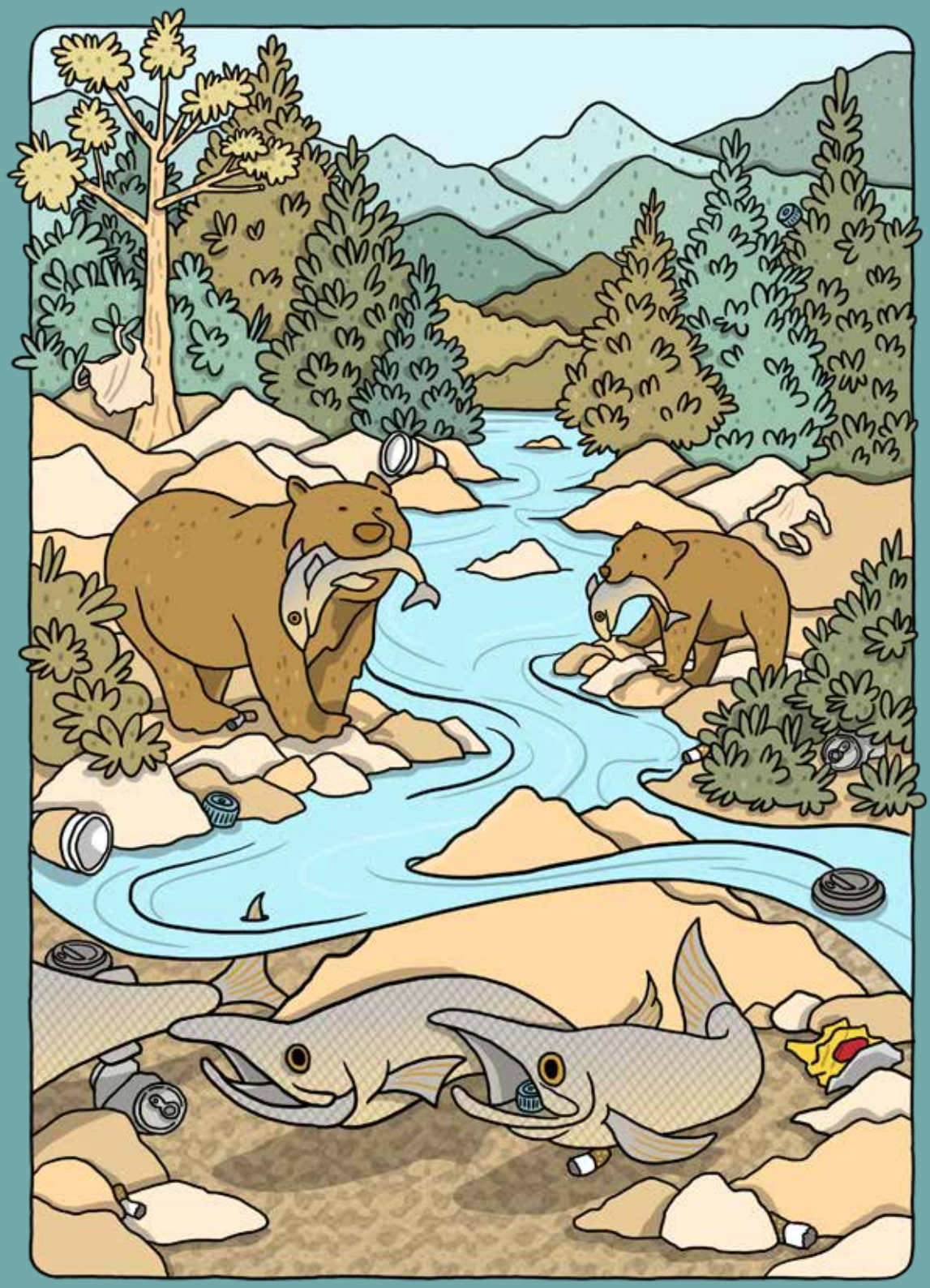
Plastic Bags (2)

Pop Cans (2)

Coffee Cups (2) & Lids (2)

Bottle Caps (3)

Cigarette Butts (5)



Salmon are

Author: Carrielynn Victor - **Xwementelot**

Salmon are sacred to the First Nations people that live in British Columbia. The First Nations people that live on the South West Coast of BC are called Coast Salish.

The Coast Salish people call the Fraser River **Stó:lō**. It is pronounced **Stah-Low** and it means "the river". **Stó:lō** is also the name for the people who live in the Fraser River Valley. It is everyone's job to make sure the river is clean and cool so the fish swimming home have a safe journey. Nobody is allowed to throw garbage in the river or spit in the river. The river is the home of the salmon; we wouldn't want them making a mess in our home, so we respect their home.

Each year when the salmon start swimming back up the **Stó:lō**, the people gather for the first salmon ceremony. The first fish is shared with all the people who attend the ceremony, and all the bones are put back in the **Stó:lō** as a sign of respect. The Coast Salish people believe that by thanking the salmon for coming back every year, and putting the bones back in the river in a special way, the salmon will continue to return each year.

A lot of **Stó:lō** kids learn to fish when they are really young. Some kids start fishing when they are only two years old. Kids catch salmon, sturgeon, minnows, and many other types of fish. Learning to catch fish is important, because when kids get older, they will help to feed their families.

The **Stó:lō** people still catch fish in the same river today that they did a long time ago. To catch fish, fishers used to use hand-made wooden traps, or nets that were made of stinging nettles or cedar bark on the end of long poles, and long spears to catch salmon. Today, some fishers use big nets and boats with motors to catch salmon. Some traditional ways are still used. **Stó:lō** people wind-dry salmon and can salmon in the summer, and smoke them in the fall. Smoking and wind-drying salmon are old traditions that have been passed on from generation to generation.

Face Of Our Ancestors –
acrylic on canvas
Artist: Carrielynn Victor

Sacred

Coast Salish people believe that the salmon used to be people. The salmon people would send their young men and women to the humans every summer so they could feed and nourish the humans. The cedar tree, many types of plants, and even rocks were once human beings, but were transformed into helpers for the rest of the people. When we see all the parts of nature as our relatives, we can respect everything like family.

The Coast Salish people sing special songs just for the salmon. Some people wear masks and blankets that have symbols on them of salmon. Dances are performed by children and adults that show the journey that salmon take in the rivers and oceans. Coast Salish people paint and draw pictures of salmon. Masks and totem poles are carved from cedar to show how important salmon are to the Coast Salish people.

Salmon are sacred.

Salmon are also important to the four-legged creatures, like the bear and the cougar. Creatures with wings eat salmon too, like the eagle and the raven. Even the plants and the trees near rivers like salmon. There are lots of different ways that salmon help the environment.

Kw'as Hoy Kw'as Hoy

Carrielynn Victor - **Xwementelot** is a community-based researcher with the **Stó:lō** Tribal Council.

Sockeye On The Mind - acrylic on canvas
Artist: Carrielynn Victor

Artist: Carrielynn Victor

Artist: Carrielynn Victor

Guess what! **Kw'as Hoy** means "thanks." Next time your Mom or Dad makes dinner, say, Kw'as Hoy!

The Big Question

How DO salmon find their way home?

The Migration of Sockeye Salmon

For hundreds of years, the life of Pacific salmon and their migrations have been a mystery. Salmon hatch from eggs laid in the gravel of freshwater streams, grow into little fish, go down the rivers, out into the ocean and - apparently – vanish.

Years later they reappear as full-grown adults and swim back up to the very stream where they first hatched out. The adult salmon spawn and die and the whole mysterious cycle begins again. But the real mystery is how salmon know to return to the exact stream where they were born (their 'home' stream).

When the little salmon swim down the river and into the ocean, they do not hang around near the river mouth but migrate northward along the British Columbian and Alaskan coast and out into the north Pacific Ocean. Then, for a year or more they swim for thousands of kilometres as they search for food until they are ready to come back to their home stream to spawn and begin the cycle all over again.

But where do the salmon go when they travel for years through the vast waters of the Pacific Ocean? And just HOW do they find their home again? These are mysteries that scientists have studied for years.

There are seven species of migratory Pacific salmon (Sockeye, Pink, Chum, Coho, Chinook, Steelhead trout, and Cutthroat trout) living in British Columbia waters. All of them follow similar life cycles, but each is a little different. Pink salmon are the smallest and most abundant, and every Pink salmon only lives two years. Chinook salmon are the least abundant but are the largest, sometimes weighing over 50 kilograms (!). But the most important salmon to the people of British Columbia has been the sockeye salmon, especially from our largest river, the **Fraser River.**

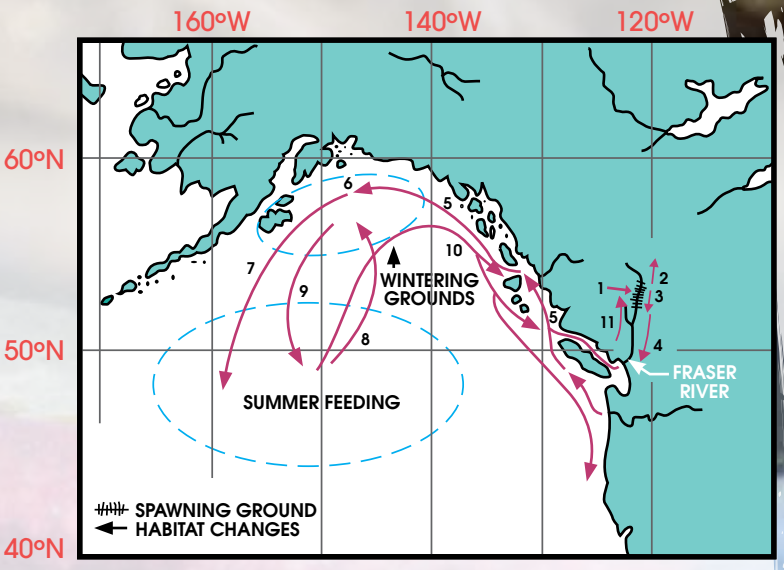
Fraser River sockeye almost always live for 4 years, so let's follow the adventures of a ***Fraser River sockeye*** that will return this year, 2021.

These sockeye hatched from eggs that were laid in the fall of 2017. After hatching in early spring 2018 the juveniles spent a year in their nursery lakes until the spring of 2019, when they travelled down the Fraser River into the ocean.

Photo credits: background: Hagerty Ryan USFWS, CC • sockeye: Clive Bryson, B.C. • question mark graphic: opico, istockphotos.com • smolts: Clive Bryson, B.C.

Before starting their long trip (migration), each little salmon has to get ready. The little salmon uses water temperature and hours of daylight to trigger when it changes its behaviour, its appearance, how its body works. At last, it is ready to stop being a freshwater fish and become a saltwater fish. Then, one day the whole sockeye population moves off together, leaving their nursery lakes and travelling down the streams and rivers to their date with the ocean.

After they entered the ocean in 2019, the sockeye swam a thousand kilometres north to their ocean-feeding grounds (map). Salmon prefer to stay in colder waters between 10-14°C in summer and only 8-12°C in winter. As the temperatures changed between seasons, the young salmon migrated through the Pacific Ocean where they feasted on zooplankton, squid, and sometimes on small fish. After feeding and swimming through 2019, in 2020 they circled those distances all over again to continue to grow.



In summer 2021, after two years at sea, the now-adult sockeye will migrate back to the British Columbia coast and back to their home river. That's approximately 3,000 to 5,000 kilometres of swimming in the ocean! Then they may still have to travel several hundred kilometres upriver to get back home.

Of course, the ocean is a dangerous place for a small salmon – salmon are prey for many other animals such as birds and other fishes, as well as orcas and sea lions that depend upon salmon for a large part of their diet. As they migrate home, many are caught by fishers. Others perish on the way back up the river because in some places the water is too warm or the channel is blocked by a rockfall. Of all the millions of salmon that go out, only about 8% will return. That means that for every million young salmon that head out to the ocean, only about 80 000 will return. Years ago, the return numbers were higher. It's a tough life being a salmon!

So how DO the Fraser River sockeye find their way on their long, long journey back home to where they were born? This is what we know so far – or think we know.

1 The direction that salmon fry and smolts need to take through their nursery lake to the river outlet and down to the sea is fixed in their genes. No matter which part of the lake they live in, the fish know which way they need to swim to exit the lake.

2 To find their way out of the lake and down to the sea, the young sockeye can use the position of the sun in the sky or the earth's magnetic field for direction finding. So they have two compasses, a sun compass and a magnetic compass, to guide them during their migrations. As they swim out to sea, they learn the places they move through and form some kind

of map in their brain, so that they can find their home stream again when they return to spawn. This ability of salmon to find home again is called ***navigation*** and we do not really know how they can do it so well.

3 To be able to use the sun for orientation, salmon must have a ***biological clock*** to determine the time of day. This clock helps them to change the angle with the sun as it moves through the sky (15° per hour) so as to maintain a constant migration direction.

4 Once the sockeye salmon have returned to the river and become freshwater fish again, they can use their super-sensitive sense of smell to track the water of their birth stream and follow it back to where they were born.

As to WHY the salmon return to their natal (birth) streams, maybe only the salmon know for sure. However, a likely reason is that they know it was a good place to grow up themselves, so it will probably be a good place for their babies to grow up as well.

So now you know almost as much about salmon migration as the scientists do! Perhaps when you grow up you will discover some more salmon secrets.

The information upon which this article is based was kindly provided by Dr. Kees Groot, fish behaviourist with the Department of Fisheries and Oceans, and Dr. Brian Riddell, Chief Science Advisor, Pacific Salmon Foundation.

AL Answers Your Salmon Questions

Can salmon communicate with each other?

Yes. They may not communicate one-to-one as we do (unless they are spawning), but they can send out messages, using colour, body movement or sound. Some fish species, such as carp, send out a special chemical when they are injured which warns other carp of danger, and they swim away as fast as they can. Some fish can make audible sounds like clicks or croaks, but most salmon communicate with body language.

Can salmon hear?

Salmon have no outer ears, but they do have sound wave and vibration detection systems like humans. Salmon hear with a special organ called a ***lateral line*** along their sides that is connected to the inner ear.

Can salmon smell?

Yes, better than humans. Smell is one of senses that help salmon migrate back home.

How long can a salmon survive out of water?

Only a few minutes. Once out of the water salmon gills collapse like wet tissue paper, so even though there is oxygen in the air the salmon can't breathe it.

Do salmon moult their scales like birds moult feathers?

No, salmon keep their scales for life, but the scales develop growth rings like a tree does. Wide rings indicate good seasons (summer) and narrow rings indicate poor seasons (winter). Salmon are born in winter so there is one narrow ring for each salmon birthday.

How do salmon breathe?

While swimming, the salmon gulps water into its mouth and sends it out again through the gills. The gills absorb the oxygen and get rid of the carbon dioxide.

What do salmon eat?

Salmon eat everything from one another to plankton to insects. Juvenile salmon living in fresh water eat zooplankton, and larval and adult insects. In the ocean, salmon eat zooplankton, shrimps, and smaller fish, such as herring.

ASK AL

Al Grass has worked as a career park naturalist and ranger throughout B.C. Now he is a well-known nature tour leader and photographer. Al especially likes birds, insects, and spiders. Photo of Al, Credit: Robert Alexander, B.C.

Photo credits: background: MariuszBlach & eggs: sheva07, istockphotos.com

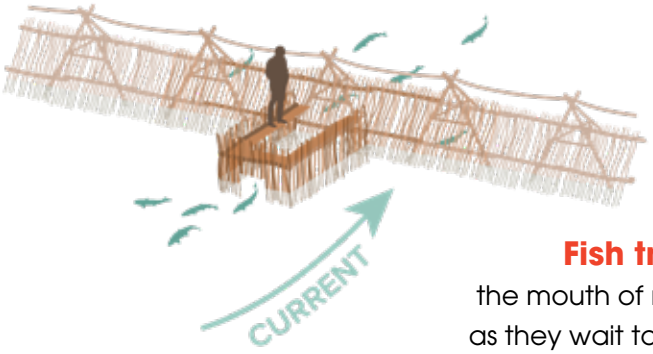
STRONG Like a Salmon

learning from youth leader, Tyler Jensen

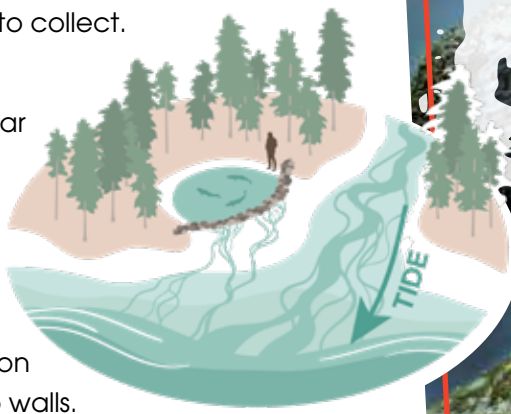
Tyler Jensen is of Secwépemc ancestry. He grew up in the interior of B.C. He spent time in Vernon and currently lives in Kamloops, B.C. He loves to drum and especially feels connected to salmon. Tyler has liked to go fishing for salmon with his family since he was really young. Tyler has learned from his elders that nothing is as strong as the salmon. They travel thousands of kilometres, from rivers out to the ocean and then all the way back, swimming upstream just to spawn. Because the salmon is such a strong creature, Tyler has learned that it is traditional to pray to salmon to help you so that you can be strong too.

Fishing techniques

For thousands of years, indigenous communities around the North Pacific harvested salmon with in-river and selective fishing tools. There were not too many people, so these traditional fishing methods were both efficient and sustainable:

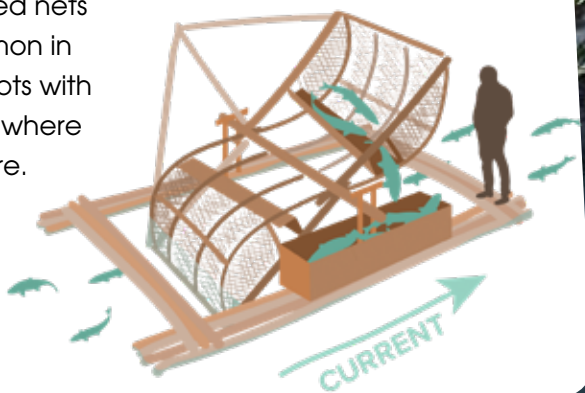


Weirs are fences that are built across rivers to channel salmon into a trap or a shallower channel where they are easy to collect.



Fish traps are built at or near the mouth of rivers to catch salmon as they wait to move into the river. The traps, made out of rocks or wood, are under water at high tide. The salmon move inshore with the high tide. When the tide falls, the salmon are stranded behind the trap walls.

Dip nets are long-handled nets that are used to catch salmon in the river. They work well in spots with a waterfall or a narrow canyon where the salmon are forced close to shore.



Fish wheels are placed in the river current and are turned with the power of the river. They scoop salmon out of the river into a holding box.

Photo credits: Tyler Jensen: Jo Anne Malpass, B.C. • Illustrations: Atlas et al., developed by Fuse Consulting Ltd.

These techniques also allow for in-season monitoring. Fishers can look at the health of the run in real time. They can also keep an eye on the traps or nets so that any other species that are caught can be released unharmed.

An important principle is to **take only what you need**. Traditional methods allow enough fish to pass on safely to the spawning grounds to ensure that there will be healthy runs in the future.

Terminal fishing is another practice that enables fishers to monitor the health of salmon in a particular run. This means catching the salmon in the rivers, near the end of their lives, not while they are still in the ocean.

Salmon are not only a main food source for indigenous communities. They are also seen as our relatives. For many communities, salmon are at the centre of creation stories, ceremonies, family structures, and cultural identity. In the fall, many communities gather for a three-day feast to honour the traditions of the salmon and the sacredness of the river.

Photo credits: background: Imagesbystefan & Salmon photos: photographywest, ChristinaPrinn, Kresopix: istockphotos.com

Not all salmon

reach their destination. Many won't succeed because of all the animals that catch and eat them on the way – animals like whales, seals, humans and bears. And when it comes to salmon fishing, no one has tricks like a wily old bear.

When the salmon return to the rivers, bears from all over the forest put their hermit ways aside and gather together to fish. It's like a great big, months-long fishing derby because to a bear there's nothing better than the season's first taste of salmon; to them it's like chocolate to a child. As usual, the biggest, strongest bears – usually the biggest, strongest grizzlies – get the best fishing spots. Weaker bears and mothers and cubs have to make do with places where the pickings aren't as rich. But in the fall, if everything goes the way nature intends, there should be so many salmon that no one goes hungry.

The Cir

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and have created the next
of salmon, their work is don
die. This seems sad but real
gift to many other creatures
upon the meat from the salm
In the Great Bear Rainfores
food for bears, wolves, river o
and more than two hund
species of rainforest ani

Bears

like people, have different tastes
especially when it comes to eating salmon.
Some like the fatty eggs best. Others like the skin a
brains. Some aren't nearly as fussy and will eat the h
the tail and almost everything in between. What the
eat they throw away. After a day of bear fishing, the r
riverbanks stink to high heaven. The odour is so strong
think you'd walked into a fish-packing plant by mista
for long, because in the end not one fish scale is waste
such thing as garbage in the rainforest, especially when it com
It is probably fair to say that the whole rainforest lives in som
salmon's shiny backs. Even the trees benefit because when t
the salmon carcasses from the water they leave what they do
ground. Then, thanks to all the microscopic creatures th
those carcasses, they decompose into the soil and fill it with

Think of it as nature's compost. Just like compost that
vegetable garden, the good things that come fro
salmon help the rainforest trees grow faster and talle
any gardener will tell you, it's not unusual to us
fish fertilizer to help plants grow. Now you
know why.

Photo credits: background: sekarb, 2 salmon: OVasik: istockphotos.com • giant salmonfly: Rob Alexander, B.C. • black bear & Spirit bear: Dave Hollis

Not only bears feed on salmon

Circle of Life

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Wolves

We think of wolves as hunting deer for food, but every autumn, when the salmon come upriver to spawn, many wolves change their diet and feed on salmon. It makes sense for wolves to switch from deer to salmon. Salmon provide extra nutrition in fat and energy, plus they are much easier and safer to catch. While hunting deer, wolves are often seriously injured by hooves and antlers; that doesn't happen when catching salmon.

Eagles

Throughout B.C., hundreds of Bald Eagles sit on trees beside the river banks, watching and waiting for the Pacific salmon to return. Feeding on salmon carcasses gives eagles a rich food source to see them through the winter and their breeding season which starts in fall. Eagle chicks hatch as early as March, earlier than most other birds.

Other Birds

American Dippers dive into the spawning streams to feed on the left-over eggs. Many gulls – Glaucous-winged, Herring, Bonaparte's, and Mew – also like to feed on loose salmon eggs, as do ducks such as Mallards, goldeneyes, and mergansers.

Insects

Decomposing salmon provide rich nutrients for many aquatic insects such as mayflies, stoneflies, caddisflies, and crane flies. In turn, the insects are eaten by young salmon and so the **Circle of Life** is completed.

*Excerpted from **Salmon Bears** by Ian McAllister and Nicholas Read, Published 2010 by Orca Books, Victoria, BC. Reprinted with permission.*

harbour seal, American Dipper &
ss, B.C. • wolf: Ian McAllister, B.C. • eagle: B Roitberg, B.C

Home Stream

By Tom Saare

Look at your home and what do you see? A clean place that shelters you from wind and bad weather, where you are safe from enemies. You have rooms, furniture, a bed to sleep in and cupboards with food. Then look at a stream. What do you see?

See the clean, cool water flowing over and around rocks and logs, the lush leafy shrubs and trees that shadow the stream? These are what provide the salmon with shelter from rough water, safety from enemies, resting places, and hiding places for food. In its home a salmon needs just the same things that you need.

Water is obviously the most important part of this home. Cold, clear unpolluted water contains lots of ***oxygen*** which salmon take in through their gills. As the water turns and rumbles on its way downstream, it collects more life-giving oxygen, rather like you opening **windows** to let in fresh air.

For **furniture** salmon need all different size: little marble-sized rocks **(gravel)**, rocks the size of a baseball **(cobble)**, and large **boulders**. The gravel is the nursery area. When adult salmon return to their natal (birth) streams to spawn, they dig ***redds*** (nests) in the gravel where they lay thousands of eggs. These eggs remain safe under the gravel until they hatch into ***alevin*** (little fish). The alevin hide in the spaces between the gravel while they grow bigger. When they are big enough to come out from the gravel, the young salmon are called ***fry***.

Between the large boulders the salmon fry can find spaces to hide from ***predators*** (creatures that want to eat them). These boulders also help form deep pools which are important for fish feeding and resting areas – the salmon's **dining rooms** and **bedrooms**.

Other hidden spaces in the cobble and gravel are the **food cupboards** where insects and their larvae can be found, providing meals for salmon.

Logs and the tangled root systems of trees that fall into streams (known as ***large woody debris***) are also important parts of a salmon's home. They too provide cover and protection from predators. As the woody debris decays in the stream, it supplies food for insects which in turn are food for both young and adult salmon.

Photo credits: background: Valery Bocman, istockphotos.com • salmon close up: Clive Bryson, B.C. • mayfly: David Shackleton, B.C. • woody debris & rocky bed: Clive Bryson, B.C.

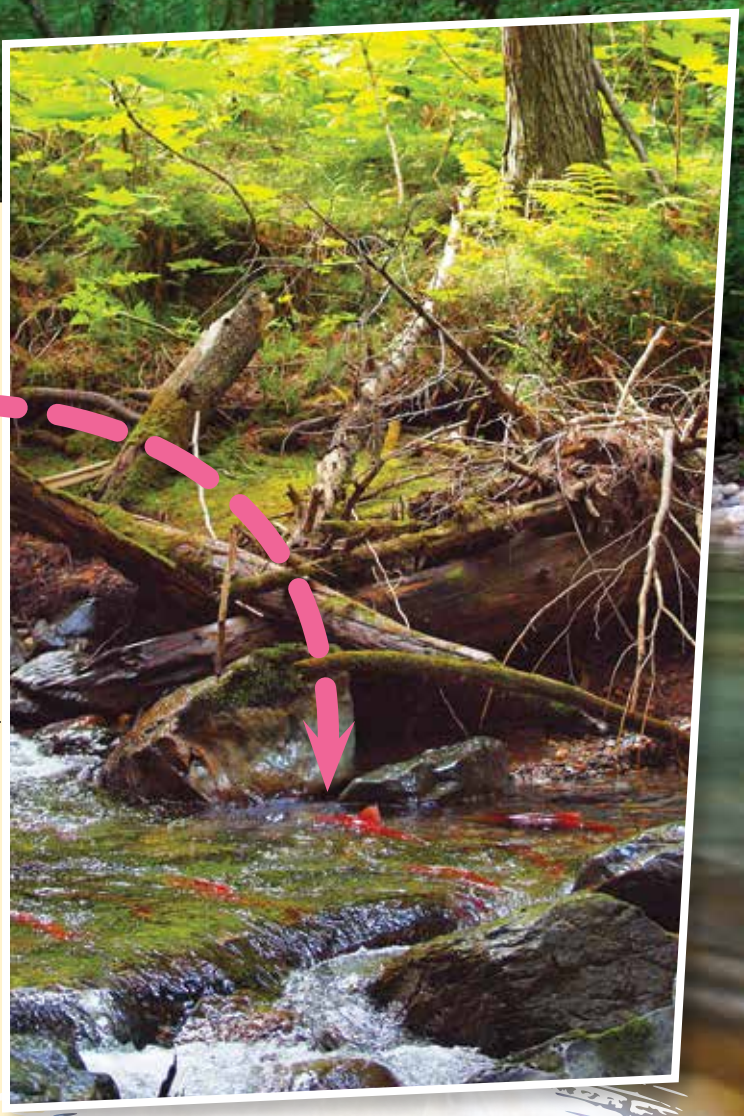
Home

Another important feature of the salmon's home is the ***riparian area*** – the trees, shrubs and other vegetation found along the banks of streams. These are almost like gardens for salmon.

During warmer weather the overhanging vegetation helps shade the stream and keeps water temperatures cool. This is very important for salmon as they cannot live in water where the temperature is over 18 degrees Celsius. Insects fall from the trees and shrubs into the water and provide yet more food.

In some places there are eroded (washed away) areas underneath the stream bank. These ***undercut banks*** are fine areas for fish to hide from predators and to rest safely. Just as we enjoy certain necessities and comforts in our homes, salmon do too.

The next time you happen to be near a stream, take a look. Could this be a salmon home? What habitat characteristics of the stream can you identify as being the important parts of a salmon home? If you look very carefully, you might even see some of the salmon at home.



As a young boy, Tom Saare was fascinated to discover that the small stream in his neighbourhood contained cutthroat trout and other aquatic life. His passion for nature stayed with him throughout his life. Tom now teaches at the Rivers Institute (BCIT), an organization that promotes public awareness about the importance of healthy rivers, supports stream restoration initiatives, and mentors future generations of environmental stewards.

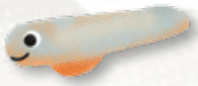
Learn about how you can look after streams in your neighbourhood. Check out **"Home Tips for Healthy Streams,"** an on-line resource from Fisheries and Oceans Canada. https://www.pac.dfo-mpo.gc.ca/publications/pdfs/hometips_2000_e.pdf

Salmon Life Cycle

Glossary: Bobs & LoLo

Illustrations: Lori Joy Smith

Salmon Egg Adult salmon lay their **eggs** in gravel nests called redds. Baby salmon called alevin hatch from these eggs.



Alevin **Alevin** are newly hatched trout or salmon. They carry the yolk sac from their egg with them; the yolk is their food.

Fry Alevin grow into **fry**, and fry now swim to find food as their yolk sac has been absorbed. They also make a strong connection to their home stream; this is called **imprinting**.

Smolt Fry grow into **smolt**. Smolt go through a change so salt water is no longer absorbed into their bloodstream. This allows them to move from fresh water into salt water as they migrate to the ocean.

Salmon A large fish that is born in streams but lives most of its life in the ocean. The Salmon is a keystone species in both water and land environments; their presence can influence the survival or reproduction of other species.

Krill Shrimp-like creatures that salmon and other marine animals feed on. **Krill** are found in all the world's oceans.

Spawn When adult fish have finished growing they return to the rivers where they were born in order to **spawn**. Spawning is when adult fish pair up to make and lay eggs in a gravel nest, or redd.

Salmon Run When salmon swim from the sea up into rivers to spawn.

Excerpt from Run Salmon Run by Bobs & LoLo. www.bobsandlolo.com

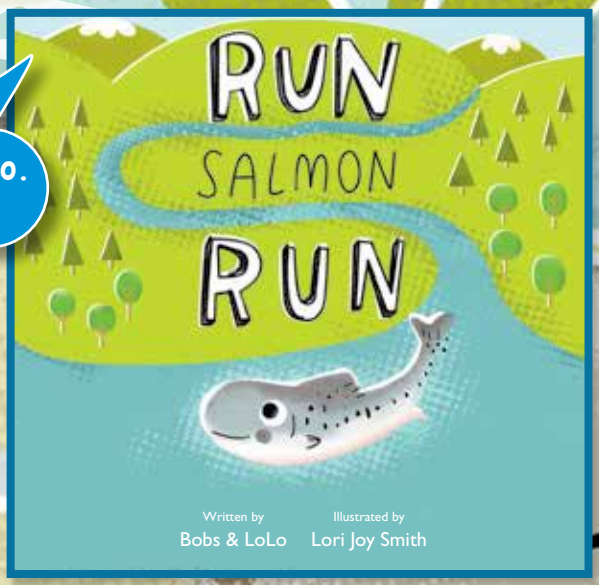


Photo credit: Salmon: ChristinaPrinn, istockphotos.com

Salmon Art: Recycled Salmon (made from recycled newspapers)

What you'll need:

- Newspaper (whole and shredded)
- Wax crayons or oil pastels
- Salmon image
- Utility candle stubs
- Tempera paint in green, red, black
- Stapler
- Scissors
- Googly eyes (optional but very fun!)

Take one full sheet of large format newspaper (e.g. *Globe and Mail, Vancouver Sun*) and fold it in half vertically. Now you have the perfect proportions for a good-sized adult salmon. Find an image of a real salmon (online or on a poster). Observe closely taking note of the shape. Starting with the nose of the salmon, draw the outline in black crayon. Make your outline big enough that it reaches all sides of the folded paper.. Press lightly at first. As you get the proportions right, press more firmly to define the outline of the salmon. Use a variety of wax crayons to define the darker markings. Have fun pressing hard to show the scales. Using white utility candle stubs to draw the scales will give a very interesting texture. When you are finished, take a wash (tempera paint diluted with water so that it is transparent) in red, green or black and lightly brush over the newspaper fish. Cut out your outline. Staple around the edges, and then stuff your fish with newspaper clippings or shredded paper. Make some more salmon! Display them on a bulletin board, making sure to overlap the fish as they swim upstream!

Spawner Come Home

How does a spawning salmon find its way back home after 3 to 5 years? It smells its way back. Try this fun activity to see whether you can make it to your home creek.

Time: 10 minutes **Ages:** all **Materials:** Film canisters with four different scents. You need a canister for each member of the group.

Introduce the activity by asking the group how they think salmon find their way back to their home river to spawn. Road maps? Landmarks? Gyroscopes? Salmon rely on water temperature and the earth's magnetic field to find their way to the right part of the coast, but they use smell to find the right river. Designate four players to be home rivers. They do not move. The rest of the players are spawners who must find their home creek by moving (swimming) from river to river to find their home by smell.

Give each 'river' a film canister with a different scent extract (e.g. cherry, lemon, peppermint, or coconut extract). Give the rest of the players a film canister at random. This represents the smell they remember from when they were fry in the river. Everyone should use their sense of smell to determine their home river by taking the lid off their canister and sniffing and comparing it to the canisters of the different 'rivers' to find the right one. As soon as they find it, have them stay together until all the salmon find their home river.

Finish by asking the participants what might affect the salmon's ability to recognize their home stream. Discuss how environmental pollution might affect these animals.

Thanks to Metro Vancouver Regional Parks for this activity

Photo credit: background: jessicahyde, istockphotos.com

The Long Journey of the

Adams River Sockeye Salmon

rest and feed up in the eelgrass

Salmon eggs.

delta eelgrass beds

rest and feed

Pacific Ocean

Fraser River

Male (larger) & female sockeye become crimson coloured after they go to freshwater to spawn.

DANGER!

enter marine waters through the Salish Sea and migrate to central Pacific Ocean.

A sockeye is bright and shiny silver in the ocean.

Salmon
Orca
Seals
Sea lions...

two years later - leave ocean

Fraser River Canyon!!

fish ladders

eggs hatch, fry move to Shuswap Lake

adults spawn

eggs hatch

Shuswap Lake

Fry stay for 1 year

leave lake and start travelling down Thompson River

back to the lake

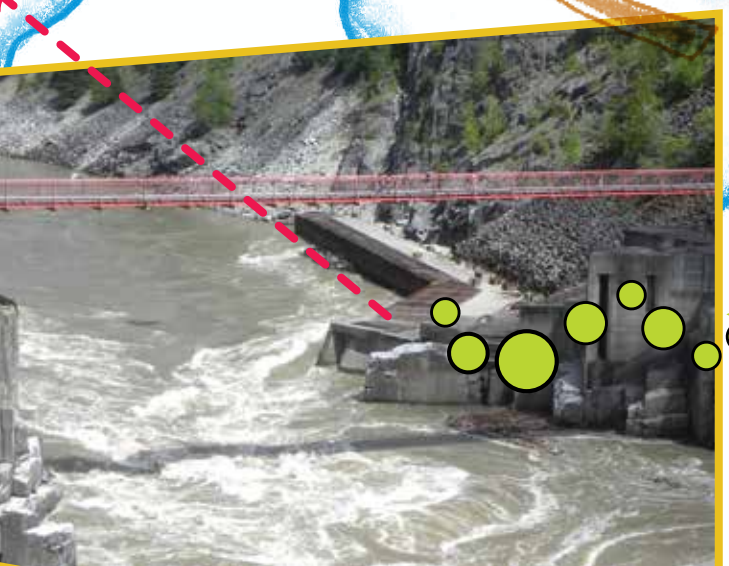
Thompson River

Thompson River

The confluence (or meeting place) of the Thompson and Fraser Rivers.

To Ocean 480 km

Fraser River



Fish ladders make it easier for fish to jump up rivers and get past rapids and rockfalls.

Photo credits: salmon eggs: USFWS, CC • crimson salmon: 27707, CC • adult Sockeye illustration: Brenda Guiled, B.C. • Vancouver illustration: Boobigum - Thompson/Fraser: redfishweb, istockphotos.com • Hell's Gate: Vancouver Archives

Protecting Salmon Habitat

B.C. has more species of plants and animals than any other province or territory. Yet nearly half of our species are in trouble. Their numbers are low or falling. What can we do to protect biodiversity in our province?

The first step is to protect habitats. In the case of salmon, this is not a simple job. Salmon don't live in just one habitat. They need multiple, interconnected ecosystems—streams, rivers, estuaries, intertidal regions, and the ocean.

Habitat restoration for salmon starts in the streams and rivers where they spawn. Each female lays thousands of eggs. Many factors determine how many will survive:

- **Temperature**
- **Disturbance of gravel**
- **Pollution**
- **Diseases from fish farms**
- **Removal of trees near waterways (riparian zones!)**
- **Habitat encroachment or destruction**
- **Fishing**
- **Predators (seals, eagles, sealions)**
- **Migration obstacles (Dams, logs, rockslides)**
- **Climate change**

Land along the margins and banks of rivers and streams is called the **riparian zone**. The plants that grow in this zone, known as riparian vegetation, are typically **hydrophilic** (water-loving or water-tolerant) plants such as aspen, cottonwood, cedar, willow, red osier dogwood, and wild rose.

What Can You Do to Protect and Restore Salmon Habitat?

To maintain healthy salmon habitats, all of us have to work together. There are simple ways you can help:

- Make sure that toxic substances do not enter streams or rivers in your neighborhood.
- Prevent erosion by volunteering to plant stream banks with native vegetation.

But these individual efforts are not enough. To restore entire rivers and watersheds, we need governments and communities to work together. There are many big jobs to do:

- Building and reconnecting side-channels
- Improving water flows
- Stabilizing stream banks
- Rebuilding estuary marshes
- Removing barriers to fish migration
- Restoring streamside vegetation

If we all work together, we can ensure that salmon have the habitats they need for their entire life cycle.

Illustrations: Lori Joy Smith, B.C. • **Photo credit:** DeltaHL, Cougar Creek Exploration: Maria Stavoravdis, B.C.

Stream Assessment

Find out if your local stream is healthy and provides good habitat for salmon

Name of stream or lake _____ Name of the local First Nations _____

The stream or lake bed habitat checklist:

- ❒ clean gravel
- ❒ clean flowing water
- ❒ does not dry up
- ❒ not blocked by waterfalls
- ❒ vegetation on its banks
- ❒ signs of aquatic life (e.g. insects, fish, birds, animals)
- ❒ not damaged by people
- ❒ cared for by people

Water temperature: _____°C

Clarity of water:
❒ Clear ❒ Cloudy ❒ Silty ❒ Muddy ❒ Brown

Stream or lake flow:
❒ Flat and calm ❒ Moving quickly ❒ Mix of calm and moving water

Stream depth (measure or guess visually): _____

Stream or lake bottom:
❒ Boulders (30 cm across or larger) ❒ Cobble (rock pieces 10 to 30 cm across)
❒ Gravel (rock pieces 1 to 10 cm across) ❒ Sand ❒ Mud

Describe the stream bank (e.g. steep, eroding): _____

Plant Life along the Bank:
❒ Tall trees ❒ Low Bushes ❒ Overhanging Bushes ❒ Ferns ❒ Grass ❒ None

Insects you can see:
❒ Ground level ❒ On plants ❒ Airborne ❒ In water or on surface

Numbers: _____ Types: _____

❒ Garbage ❒ No Garbage - Describe any evidence of harmful human activity: _____

_____

_____

What could be done to make the stream or lake a better habitat for salmon? _____

_____

_____

_____

Adapted from Salmonids in the Classroom, Department of Fisheries and Oceans Canada

Photo credits: background: artisteer, istockphotos.com • Merritt Grasslands Day: Sarah Desrosiers, B.C.

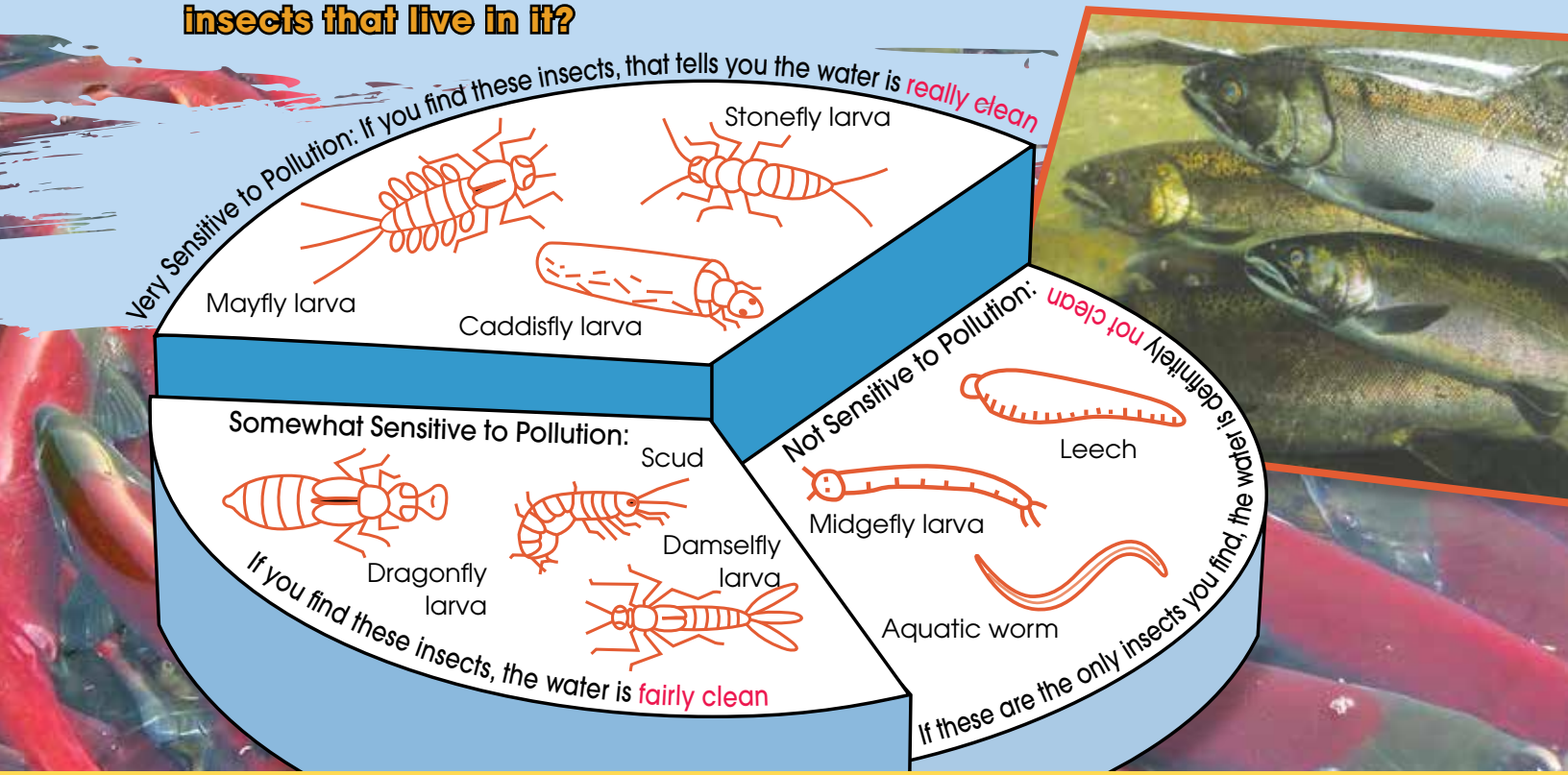
Healthy Habitat for Salmon

Young salmon live in streams and lakes. Some species can spend up to a year or more there after they hatch. Young salmon, like human babies, are very sensitive to their environment. They need cold, clean, fresh water (ideally between 5ºC and 9ºC), lots of tasty insects to eat, and safe places to hide as they prepare for the challenging trip downstream.

A healthy salmon stream has a clean gravel and rock bottom with some shallow areas for spawning, and calm pools for resting. Overhanging bushes and trees along the banks of the stream keep the water shady and cool. They also provide habitat for insects that the salmon like to eat.

Sometimes people and pets cause trouble for salmon. Biking, running, or playing in a stream makes the water muddy and hard to breathe for fish. Soap, oil, and chemicals that get washed down the drain can poison the water or the food salmon eat. You can help by reminding others to keep streams clean and safe for salmon. Adapted from Salmonids in the Classroom, Department of Fisheries and Oceans Canada.

Did you know you can tell a lot about the water quality by the insects that live in it?



Want more information on healthy habitat for salmon? Go to:

- Department of Fisheries and Oceans www.pac.dfo-mpo.gc.ca/education (for Salmonids in the Classroom, Storm drain marking and other activities)
- Pacific Streamkeepers at www.pskf.ca
- SeaDoc Society at https://www.seadocsociety.org/junior-seadoctors

Books:

- **The Sockeye Mother** by Brett D. Huson
- **S is for Salmon** by Hannah Viano
- **The Salmon Twins** by Carol Simpson
- **Salmon Bears** by Ian McAllister and Nicholas Read

Salmon Watching

This year try to see one of the most amazing sights in nature – millions of salmon returning from the ocean back to the place they were born so they can lay eggs for new generation in exactly the same place!!

Improve your chances of seeing fish and other aquatic life by following these tips.

Tip #1

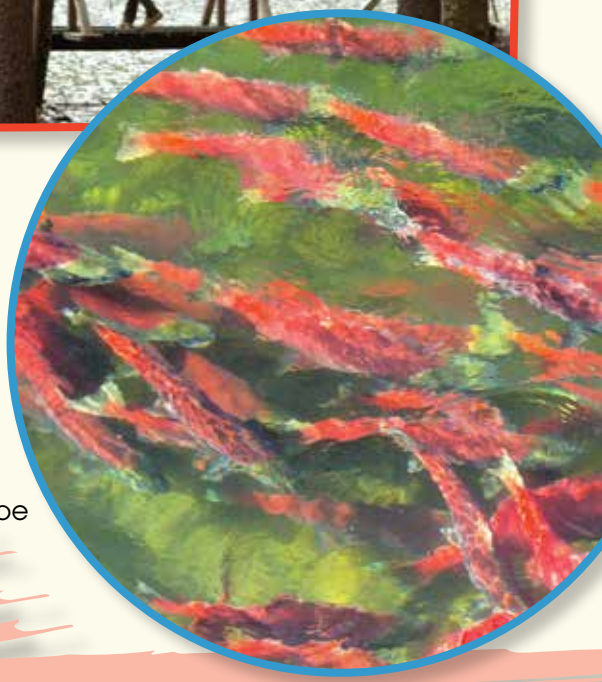
Get as high as possible above the water. The best view of the bottom of a stream or river is from high above like a bridge, tree or large rock. You will see much more from this height than you will on shore.

Tip #2

Walk softly and quietly as you approach the water. The sound of heavy footsteps will be carried through rock and soil and travel to the water, scaring fish. Talking is OK as sound waves in the air do not transfer easily to the water.

Tip #3

Walk with the sun at your back and watch your shadow. If the sun is behind you, it will light up the water, giving you a clear view and reducing the glare. But be careful your shadow doesn't move across the water. That will tell a fish it has company!



Tip #4

Keep low when walking along water. When a fish looks up, it sees what looks like a hole in the water. The hole is like a wide-angle lens or periscope that lets the fish see what is above and on both sides. So to stay out of sight, stay low!

Where the salmon are spawning look for white flashes under water. This is the female turning on her side and using her tail to dig her nest **(redd)** in the gravel. Her mate stays beside her fighting off other males. (Redds are visible through the water as patches of clean white gravel.)

Down by the river mouths and estuaries, look for adult salmon leaping in shallow water – these are salmon returning from the salty ocean and getting used to the taste/smell of the birth stream's fresh water so that they can follow it back home.

Where and When to See Salmon in BC.
http://www.pac.dfo-mpo.gc.ca/sep-pmvs/see-observer-smon-eng.html

Salmon Rivers in B.C.

Some of the world's most important salmon rivers are in British Columbia: the **STIKINE, LIARD, NASS, SKEENA, PEACE, FRASER, THOMPSON, ADAMS,** and **COLUMBIA.** Do you know where these rivers are? Unscramble the names and find out!

We have given you some hints!

#1 _ _ _ _ _

#2 S _ _ K _ _ _

#3 _ _ _ _

#4 _ _ _ _ E

#5 _ _ _ _ _ A

#6 _ _ _ _ E _

#7 _ _ _ _ P _ _ _

#8 _ _ _ _ _

#9 _ O _ _ _ _ I _

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