

SALMON WORD SEARCH

Find the hidden words (up/down, across, diagonal).

ALEVIN	HABITAT	A A F R Y Q O J W M S P A W N I A
CHINOOK	HATCHERY	P O L L U T A N T P R E D A T O R
CHUM	LARVA	R C O H O A L E V I N W J O W M B
COHO	MIGRATE	L E G D C U L T U R E H T P Y J O
COMMERCIAL	OXYGEN	A B D T S A L T W A T E R I S H X
CULTURE	PINK	S Z E D G N G W K A W D X N L C Y
ECOSYSTEM	POLLUTANT	Q P J S A E W V V Q J H S K F O G
ENDANGERED	PREDATOR	E L E I T G N R O M F G P F I M E
ENVIRONMENT	REARING	M C I C J U A E U A N I E E N M N
EROSION	REDD	S E O D I L A H R I L K R C G E L
ESTUARY	SALTWATER	M M N S K E C R R A A C M E E R Q
FERTILIZE	SMOLT	O J C V Y K S A Y D T Z B N R C I
FINGERLING	SOCKEYE	L V I E I S E N A O K I N D L I O
FRESHWATER	SPAWN	T L K F E R T I L I Z E O A I A H
FRY	SPECIES	F B N I X R O E W O U I S N N L J
GENERATION	SPERM	F Z G G C H O N M Z X M O G G H M
		Q U A D U B G S M G Z R C E V A I
		H A T C H E R Y I E T Z K R M B G
		G N D C B S W Z H O N W E E A I R
		Z H B B O S Z B B T N T Y D J T A
		J A C H I N O O K T Z M E V I A T
		N B W N L F R E S H W A T E R T E

VOCABULARY MATCH-UP

Draw a line between the word and its definition.

Commercial	A group of animals or plants that has many things in common
Migrate	The baby form of an insect, right after it hatches
Endangered	To move from one place to another
Predator	Where plants and animals naturally work together
Ecosystem	One step in the family line, from parent to child
Pollutant	The plants, animals, soil, and climate all around us
Species	Being in business to make money
Environment	An animal that hunts other animals
Culture	Where freshwater and saltwater mix
Larva	The place where a plant or animal lives
Generation	To enrich so that an animal or plant can reproduce or grow
Habitat	Threatened with disappearing
Fertilize	Something that makes water, soil, or air unclean
Estuary	Ways of living that hold a group of people together

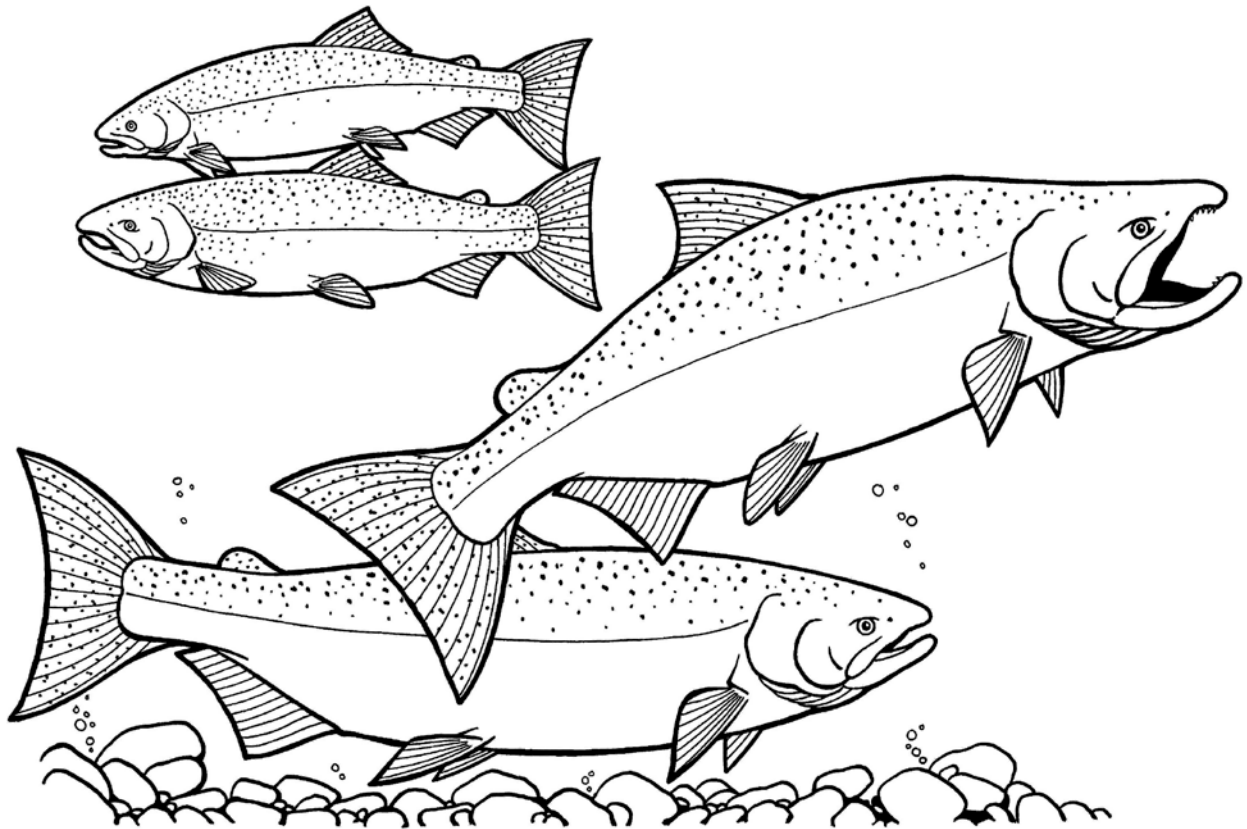
Text by Judy Pickens Major illustrations by Gary Whitley

Produced as a resource for Salmon in the Classroom, Seattle, Washington, 2012

Additional resources at www.faultleroywatershed.net

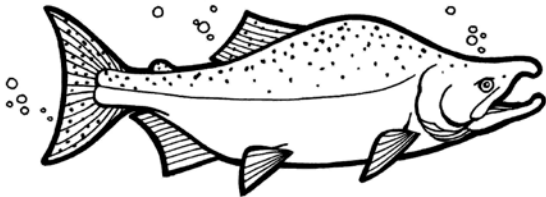
Based on the *Pacific Salmon and Steelhead Coloring Book* produced by the U.S. Fish and Wildlife Service, Pacific Region. Used with permission and generous assistance.

Salmon of the Pacific Northwest

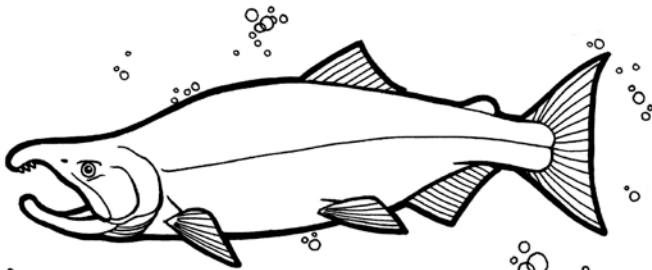


Salmon are fish that live part of their lives in freshwater and part of their lives in saltwater. They hatch in freshwater, live there for awhile, and then migrate to saltwater, where they grow into adults.

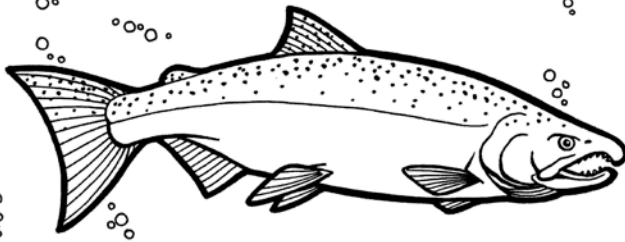
This book focuses on the five major species found in the Pacific Northwest: pink, sockeye, coho, chum, and Chinook.



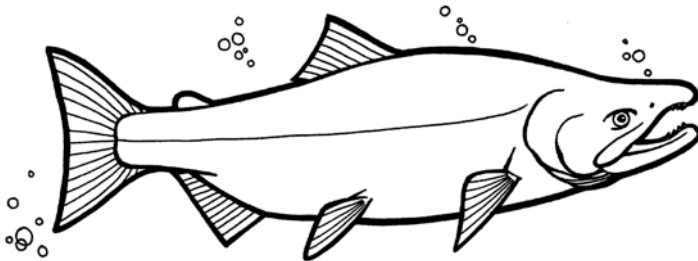
Pink (or humpback) salmon live 2 years and weigh up to 5 pounds.



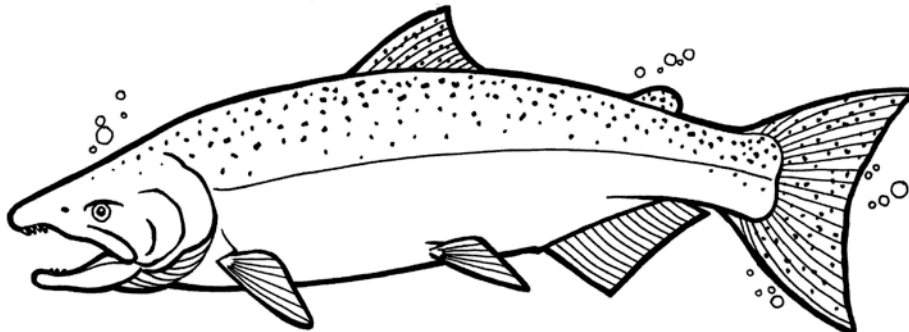
Sockeye (or red) salmon live 4 to 5 years and weigh up to 7 pounds.



Coho (or silver) salmon live 3 years and weigh up to 15 pounds.



Chum (or dog) salmon live 3 to 5 years and weigh up to 10 pounds.



Chinook (or king) salmon live 5 to 7 years and weigh 40 to 60 pounds (sometimes more!).

As we have learned, salmon have a **past** and a **present** in the Pacific Northwest. We can all help give them a **future** by not doing things that hurt their habitat and by doing things that help it.

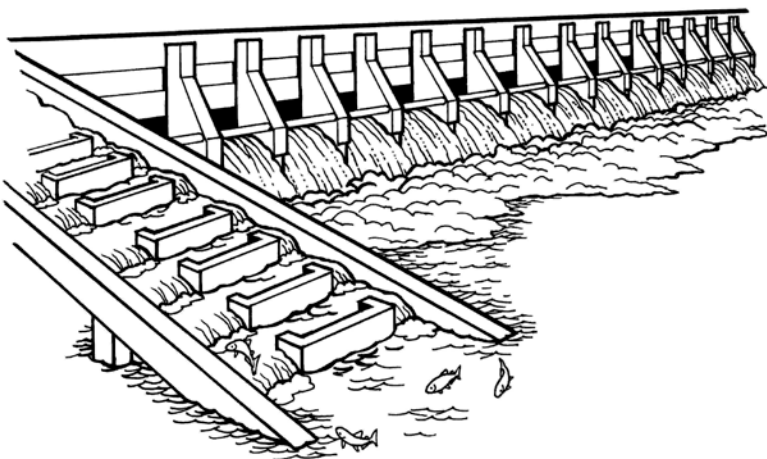
✓ Create as little plastic waste as possible and recycle all you can. An easy change is to carry a water bottle that you refill at the tap instead of buying water in a throw-away bottle. Plastic that finds its way into Puget Sound can find its way into fish, seals, whales, and other saltwater animals.



✓ If you have a dog, scoop up after your pet to keep dangerous bacteria out of streams, rivers, lakes, and the Salish Sea. If you have a cat, bag used kitty litter and put it in the garbage.

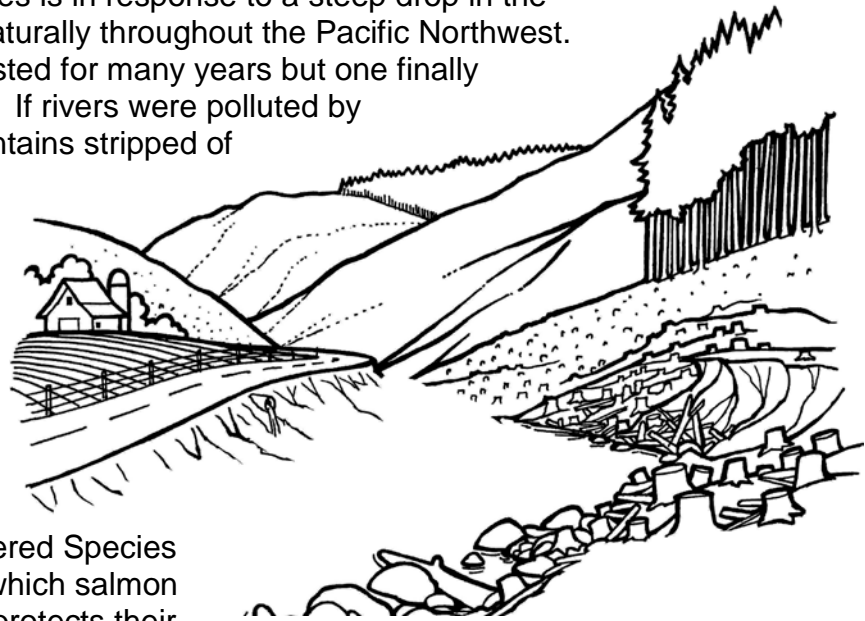
✓ Encourage your family members to take the bus whenever possible. Chemicals from cars can wash into the water during heavy rain and make salmon too sick to spawn.

✓ Plant a tree or bush every chance you get. The greener the environment, the more roots are there to hold the soil and the more habitat birds and insects have. If you get a chance to plant that tree or bush along a stream or river, all the better for salmon!



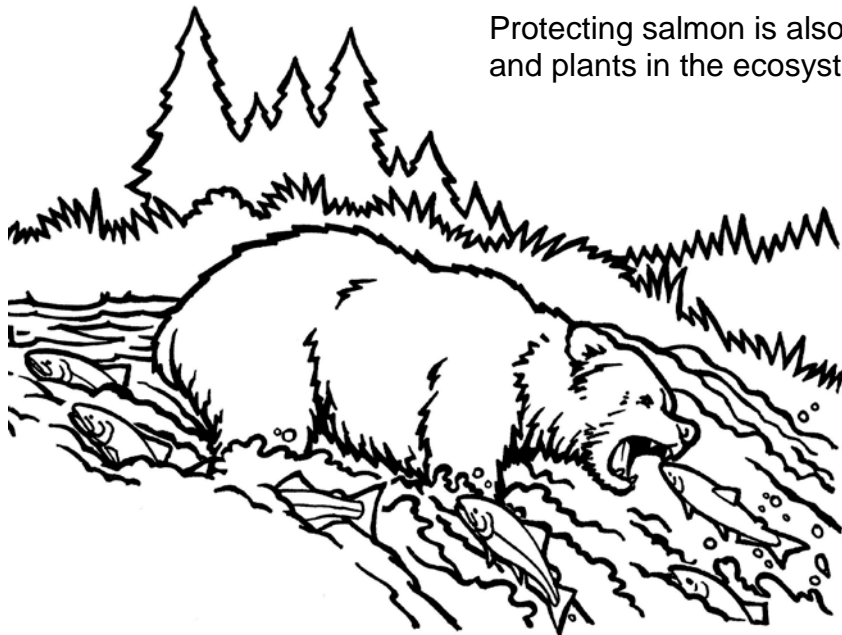
✓ Learn as much as you can about healthy habitat for salmon. Take a field trip to a stream or river when spawners are coming in and watch where they hide and rest. Visit a dam that salmon can migrate past to see how they do it. Talk with someone who fishes for a living about how habitat affects how large the catch is.

Rearing salmon in hatcheries is in response to a steep drop in the number of salmon found naturally throughout the Pacific Northwest. Many reasons were suggested for many years but one finally became clear: habitat loss. If rivers were polluted by chemicals, if dirt from mountains stripped of trees covered spawning gravel, and if dams blocked migrating salmon, how could any possibly survive?



Fortunately, here and there, they did, and governments made laws to protect them. In the United States, the Endangered Species Act is a law that identifies which salmon species are in trouble and protects their habitat until it can be improved.

Throughout much of the Pacific Northwest, Chinook are "endangered," meaning they get the highest level of protection. Here are examples of that protection: Fishing for Chinook is limited, houses cannot be built where they would destroy Chinook habitat, and factories cannot send polluted water into rivers where Chinook spawn. In some areas, coho are "threatened" (one step down from endangered). Their numbers are being monitored to see if more protection is needed.

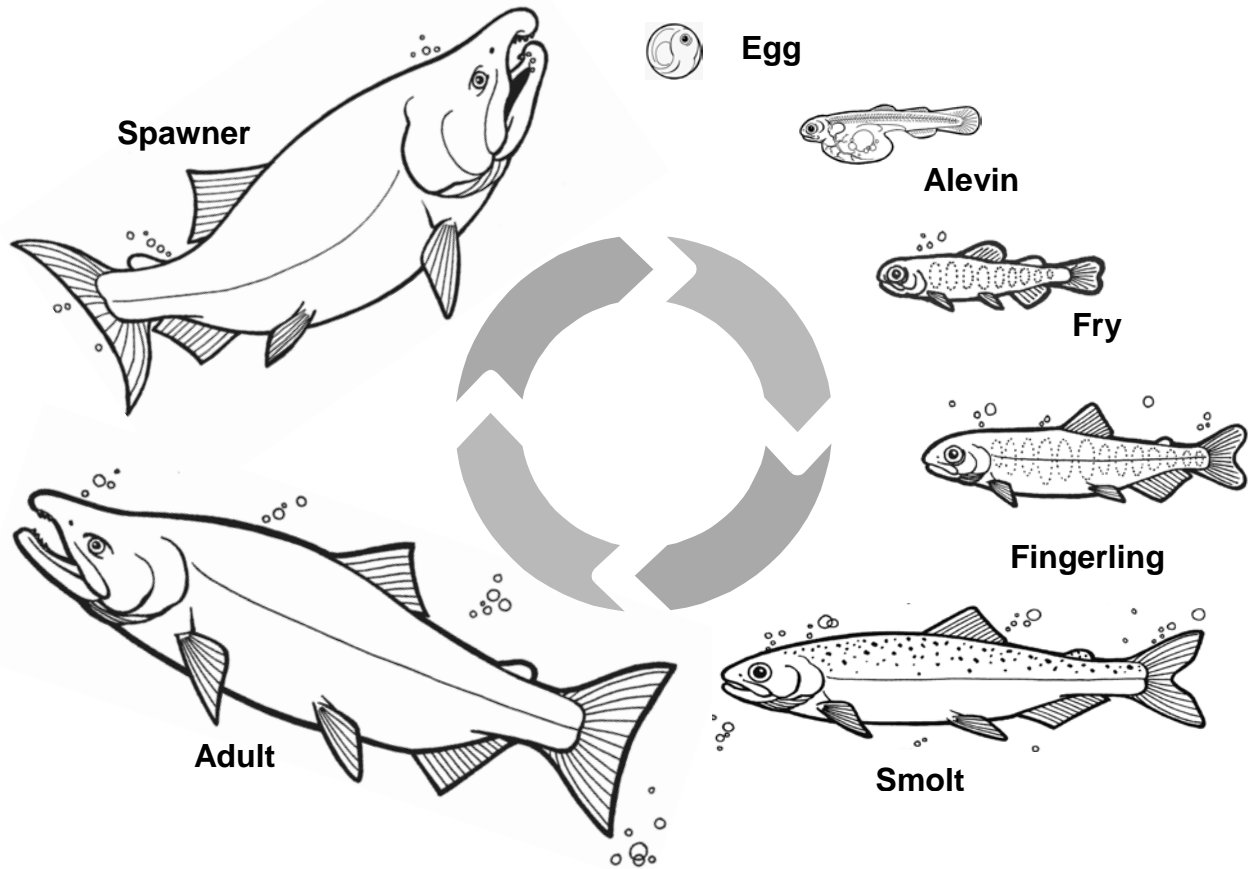


Protecting salmon is also a good thing for the animals and plants in the ecosystem that depend on them.

Salmon are a big part of the diet of bears and eagles but they also feed many others species that live near or in the water. Tiny bacteria and insects that feed on spawners that have died.

Plants, too, get food from dead salmon as they decay and when birds and other animals carry pieces of fish into the woods.

All living things go through a cycle (or circle) of life. Animals and plants are born in some way, grow to maturity, create new life, and die. This drawing shows how salmon live their life cycle.



Salmon start life in a stream or river as eggs and hatch into alevin. After they grow into fry, pink, sockeye, and chum salmon leave their freshwater stream or river for saltwater (the Salish Sea or Pacific Ocean) and continue to grow there. Coho and Chinook fry stay in freshwater, where they grow into fingerlings and smolts before heading to saltwater grow into adults.

When the time comes to make the next generation, all species of Pacific salmon return to freshwater to spawn and die, leaving eggs to start the cycle of life again.

We enter this study of the salmon life cycle when they are adults living in saltwater and about to return to freshwater to create new life.

Salmon travel as far into saltwater as they need to in order to find enough food. If they find enough in the protected waters of the Salish Sea (which includes Puget Sound), they will stay there. If not, they will swim hundreds of miles into the northern Pacific Ocean.



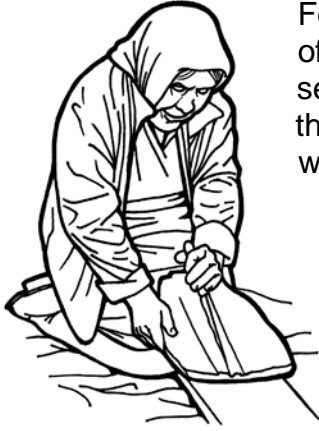
First they eat to survive and then they eat to store fat. Fat is the "fuel" that they will need to make the trip home.



Have you ever visited a friend's house and noticed that it smells different from your own house? It doesn't smell bad, just not the same as what you're used to home smelling like.

People who study salmon don't know everything about how they find their way home but they do know that salmon can smell the difference between water from home and water from someplace else.

Young salmon learn the smell of their home water so that, when they come in from saltwater, they will know home by its smell.



For centuries, salmon have been very important to native peoples of the Pacific Northwest. They caught salmon when it was in season, cut each fish down the middle to open it flat, and dried it in the sun or smoked it by a wood fire. This dried or smoked salmon was welcome food at other times of year.

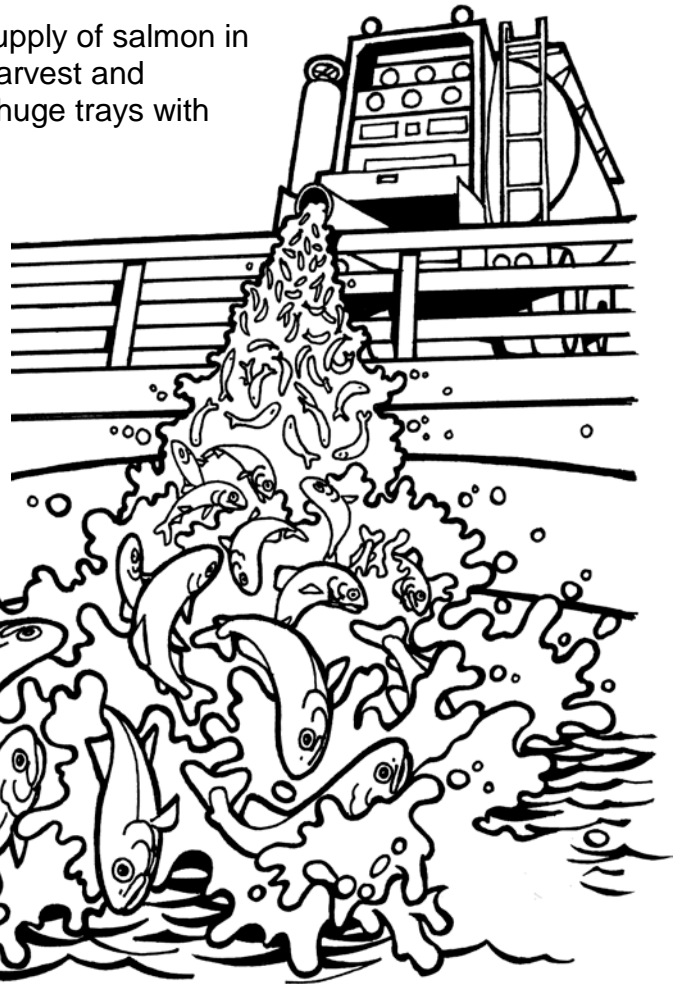
Salmon continue to be important to area tribes. Because of treaties that their elders signed with white settlers decades ago, tribal fishers have the right to take up to half of the salmon catch. And to help make sure many salmon are out there to be caught, tribes have fish hatcheries throughout the region.



Salmon also play a big role in the culture of Native Americans that have long called the Pacific Northwest home. Art and storytelling keep customs and values alive and teach respect for nature.

Government hatcheries also add to the supply of salmon in the region. Hatcheries catch spawners, harvest and fertilize their eggs, and rear the young in huge trays with cold, clean running water.

When the fish grow to be smolts, the hatcheries clip off a small fin on the back of each smolt and then release them into rivers. Because they migrate right away to saltwater, they don't have a freshwater home. When the time comes to spawn, these salmon come into a stream or river where the water smells healthy.

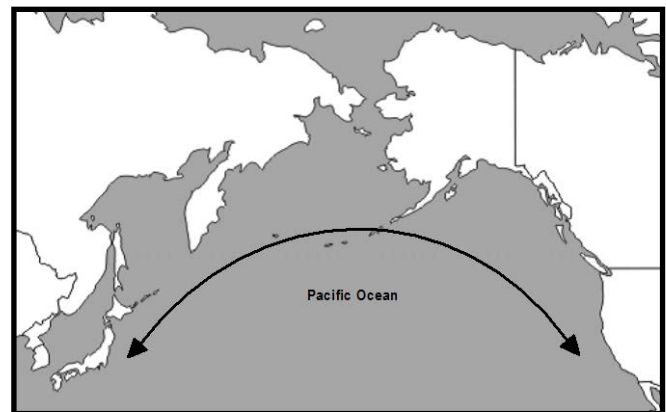
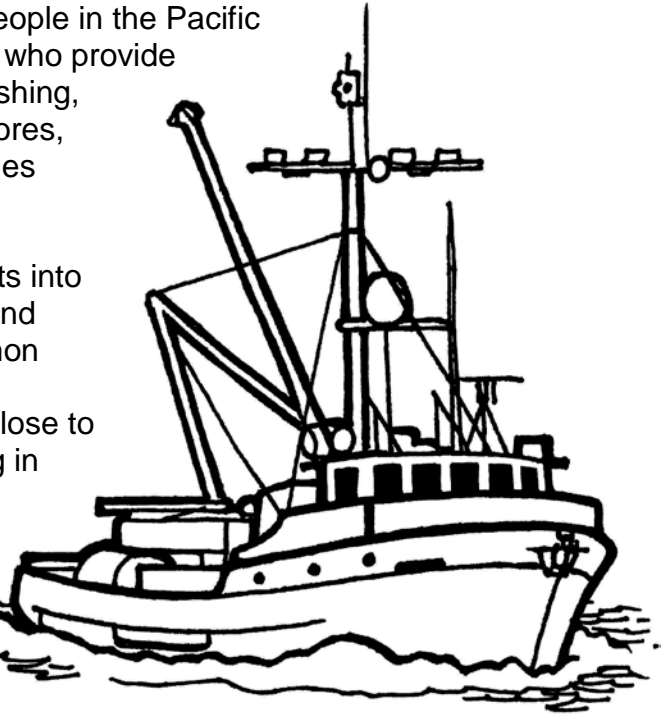


Salmon fishing for a living is how many people in the Pacific Northwest make a living. Add the people who provide equipment and supplies for commercial fishing, who process the fish, and who sell it in stores, and the number of jobs created and families supported by salmon is huge.

People who fish for a living take their boats into the Salish Sea, along the Pacific Coast, and into the waters off of Alaska to catch salmon during their saltwater phase. Also, Native American fishers use nets on rivers and close to shore to catch salmon as they are coming in to spawn.

Depending on the species, salmon are sold fresh, frozen, smoked, and canned. Pink and chum eggs are sold for use in sushi or for caviar.

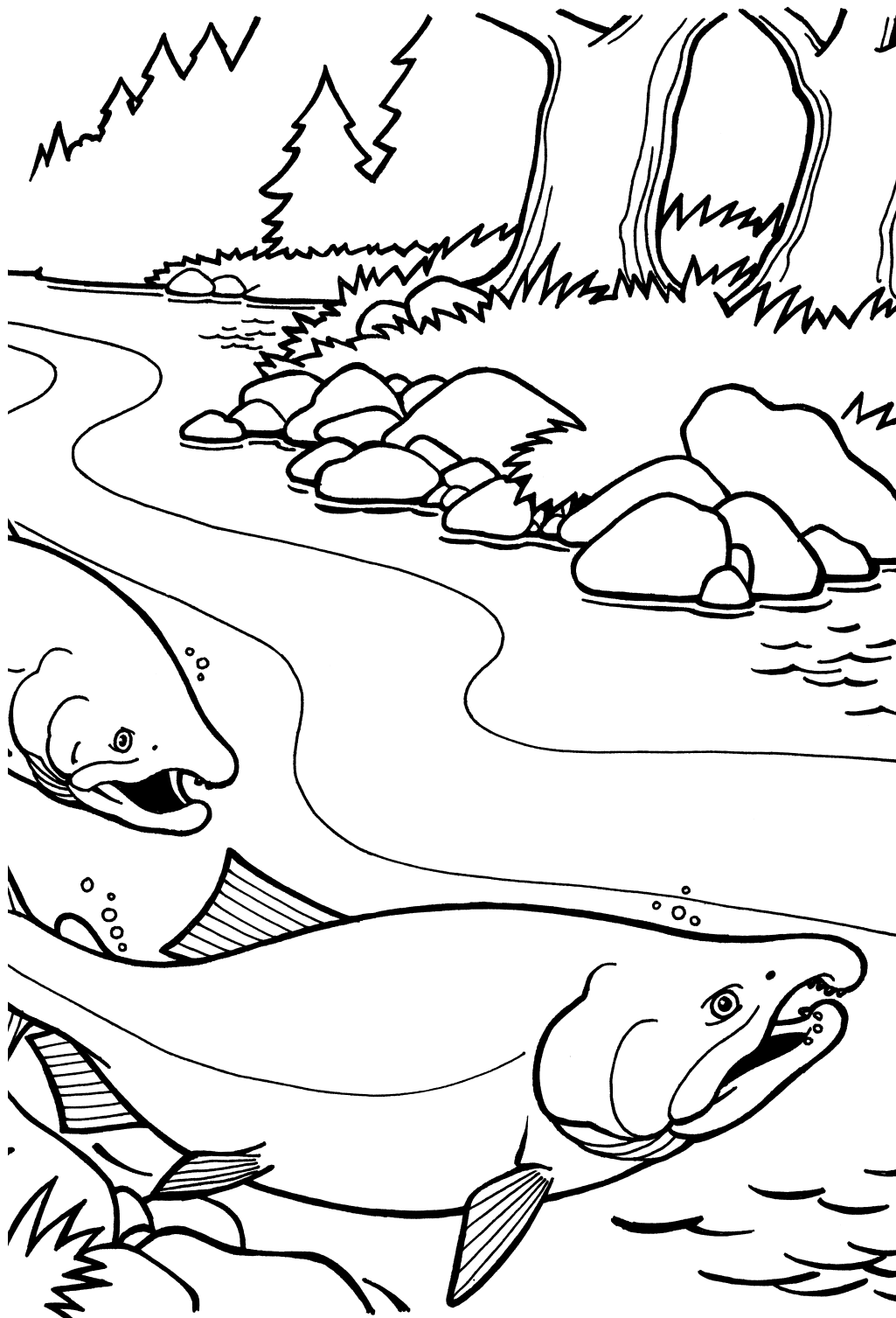
Salmon fishing is big business all around the "Pacific Rim," from California north to Canada and Alaska, then across to Russia, Japan, and Korea. Commercial fishers catch salmon along the coast, as well as miles up big rivers. Many people also catch salmon as food for their own families.



Salmon give people the pleasure being in the outdoors with family or friends. People who fish for sport may hike into mountain lakes, cast lines from river banks, or take boats to favorite fishing spots that they can't reach from shore. They may bring home a fish or two for dinner but most let go the fish they catch.



Thousands of people have jobs because sport fishing for salmon is good in the Pacific Northwest. Those jobs include designing and making boats; equipping fishers with rods, reels, and rain jackets; guiding them to out-of-the-way places; and selling them food. The list of products made and sold for sport fishing is a long one.



Adult salmon stay in saltwater until their bodies tell them it's time to return to freshwater. Coho, for example, return to freshwater after two years in saltwater.

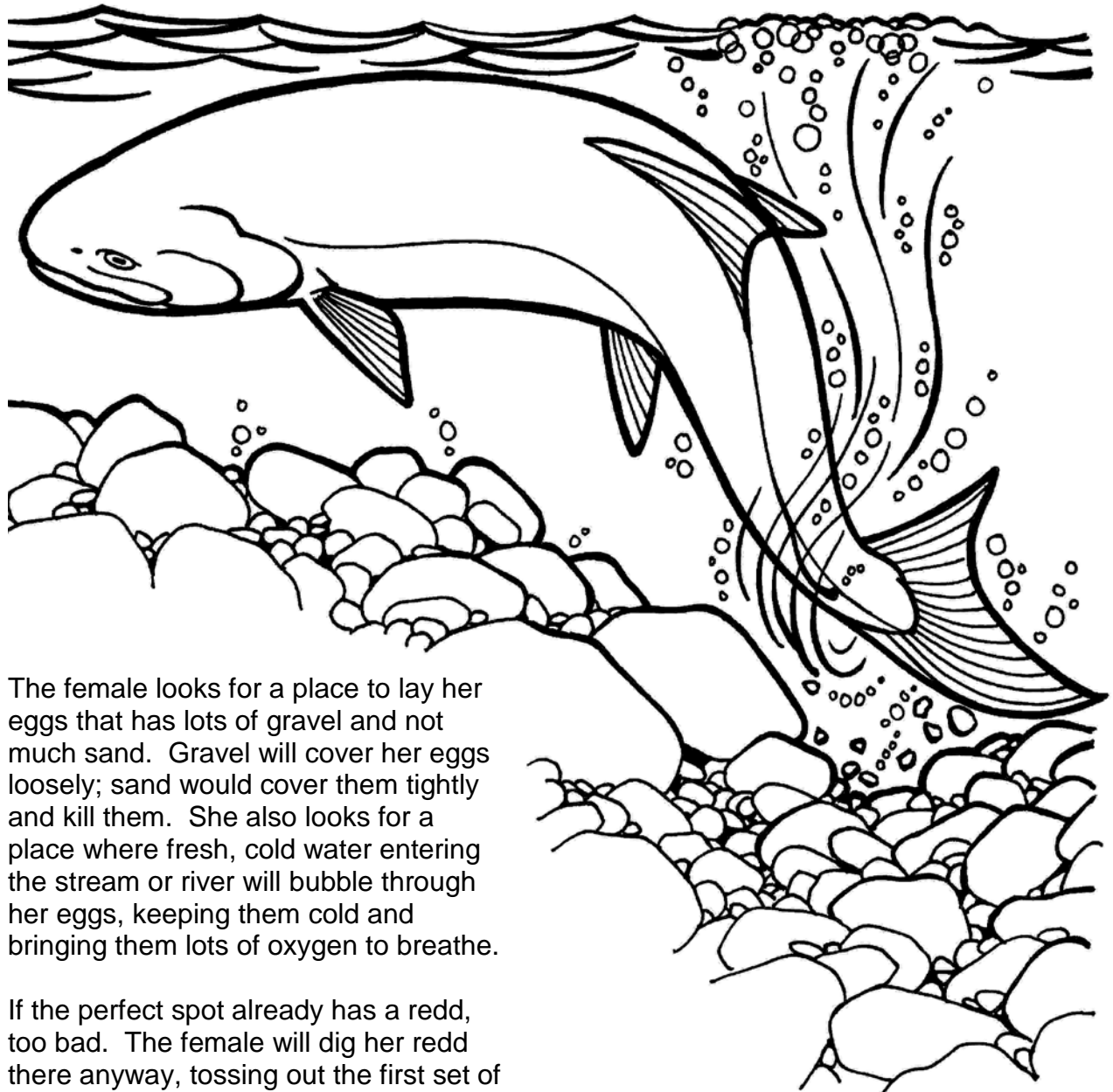
All species of salmon change both outside and inside as they return to freshwater. Some change more than others.

Males develop a hooked nose and a red color on their sides. Sockeye males are especially red, which is why they are sometimes called "red salmon". Males also develop sharp teeth. Females change less on the outside but, inside, they are filling with thousands of eggs.

As they near freshwater, salmon stop eating and their organs used for digestion begin to shut down. They have just enough energy to swim into their stream or river - and if they're lucky, to stay away from seals and other predators that hunt them until their last minutes in saltwater.

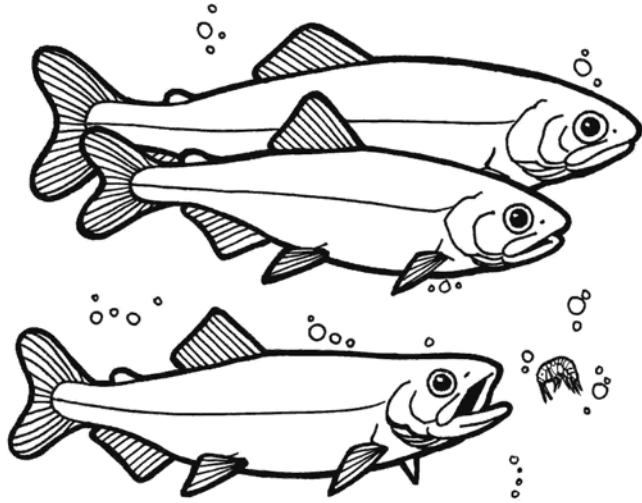
Like birds, salmon build nests, not with sticks and feathers but with gravel. The female salmon digs the nest (called a redd) by swishing her tail and flapping it up and down to loosen gravel in the stream or river. For this job, she is ALL muscle!

Some Native Americans used the regular beat of a drum to make the sound of the female salmon's tail slapping the water. The idea was that other salmon would hear the sound and come in to spawn, too.



The female looks for a place to lay her eggs that has lots of gravel and not much sand. Gravel will cover her eggs loosely; sand would cover them tightly and kill them. She also looks for a place where fresh, cold water entering the stream or river will bubble through her eggs, keeping them cold and bringing them lots of oxygen to breathe.

If the perfect spot already has a redd, too bad. The female will dig her redd there anyway, tossing out the first set of eggs to die in the flowing water.



As young salmon get close to the sea, their bodies change so that they can live in saltwater. Smolts finish this change when they reach an estuary - the place where freshwater and saltwater mix. They mix in pools on the beach and when a high tide pushes saltwater a ways into the freshwater of the stream or river that has been home for the smolts.

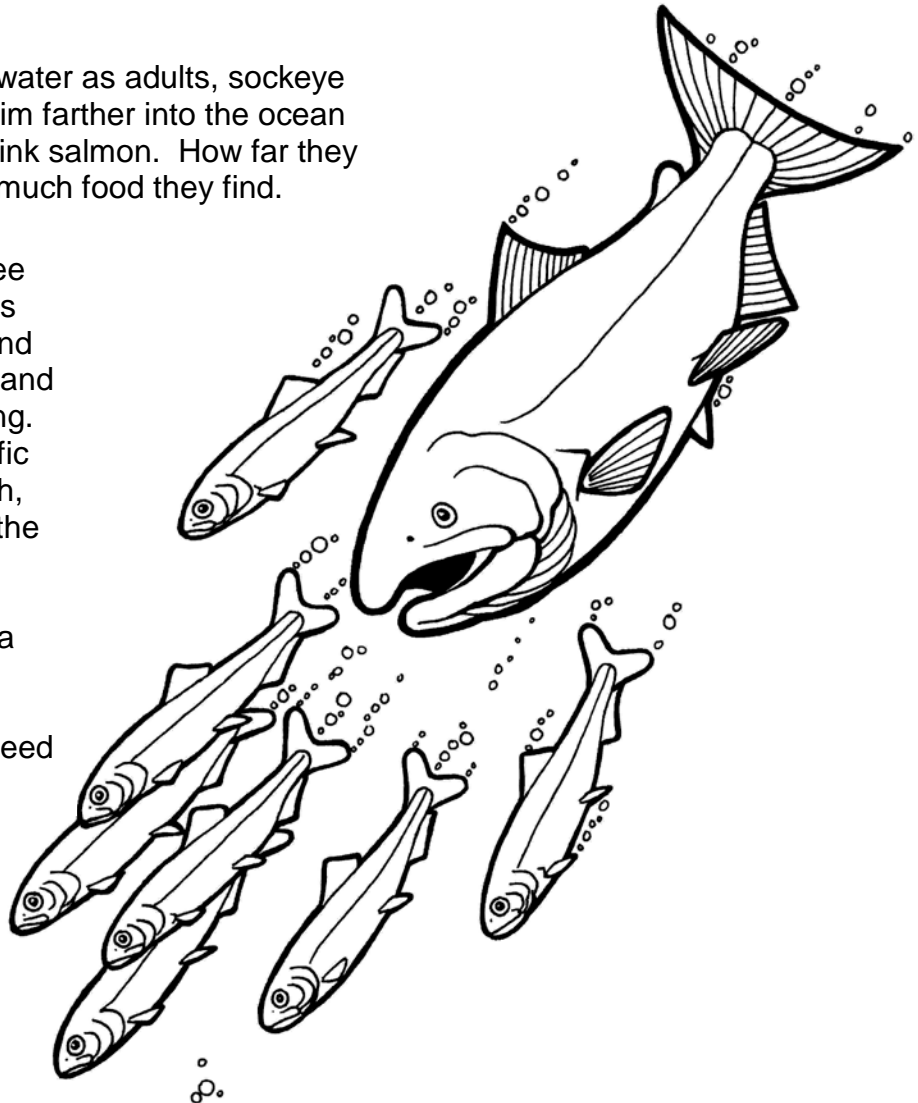
In the estuary, smolts feed on smaller fish and tiny plants and animals along the shoreline. A healthy estuary will also have eel grass or other water plants in

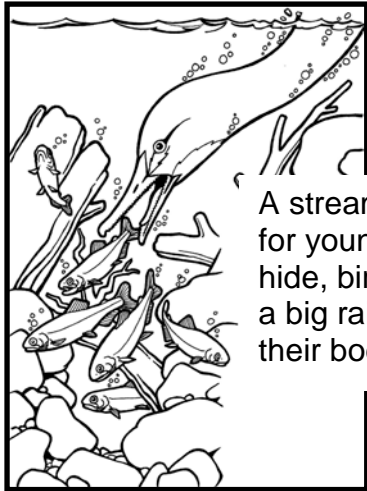
which small salmon can hide. The bigger and stronger they grow now, the better their chances of surviving in the Salish Sea or Pacific Ocean.

When they reach open water as adults, sockeye and Chinook usually swim farther into the ocean than coho, chum, and pink salmon. How far they travel depends on how much food they find.

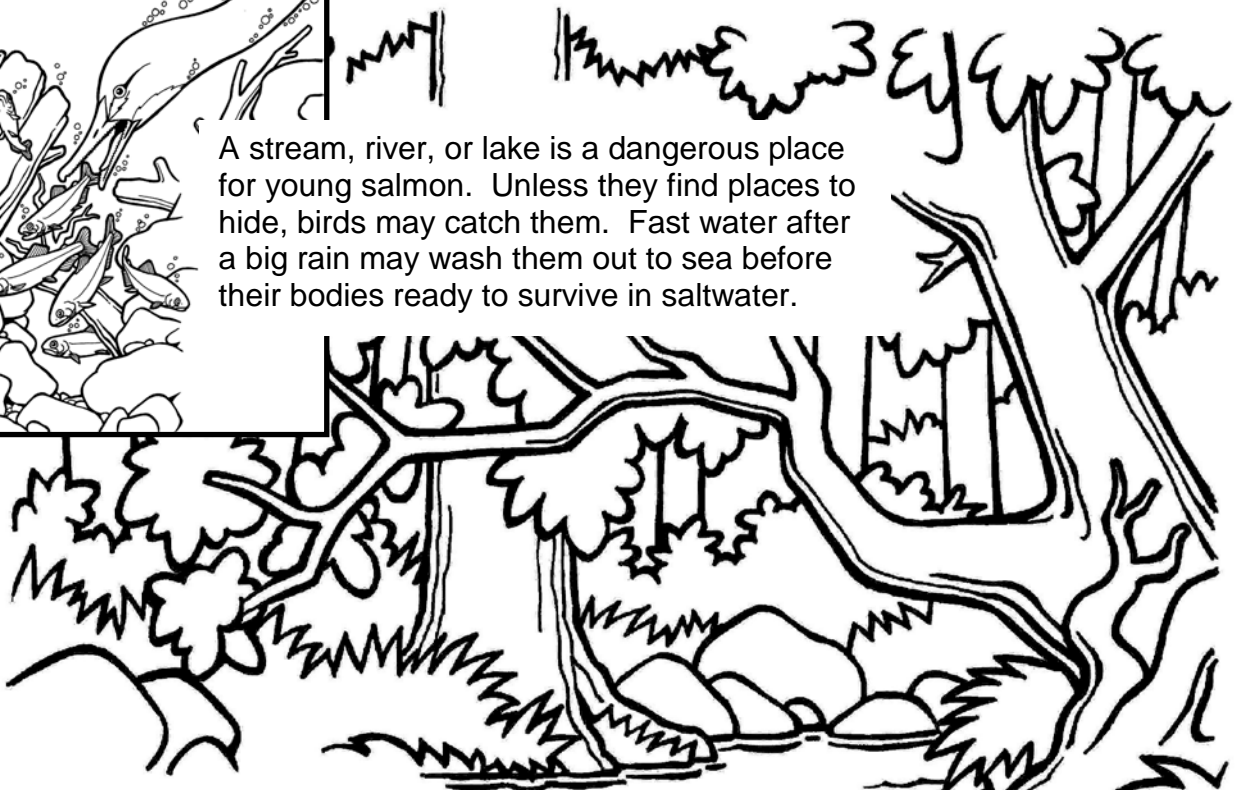
Clean, cold saltwater free of trash and chemicals is dense with tiny plants and animals, squid, shrimp, and small fish such as herring. When areas of the Pacific Ocean get warm, though, this food dies and then the salmon die.

In saltwater, whales, sea lions, and commercial fishers are the main predators that salmon need to avoid.





A stream, river, or lake is a dangerous place for young salmon. Unless they find places to hide, birds may catch them. Fast water after a big rain may wash them out to sea before their bodies ready to survive in saltwater.



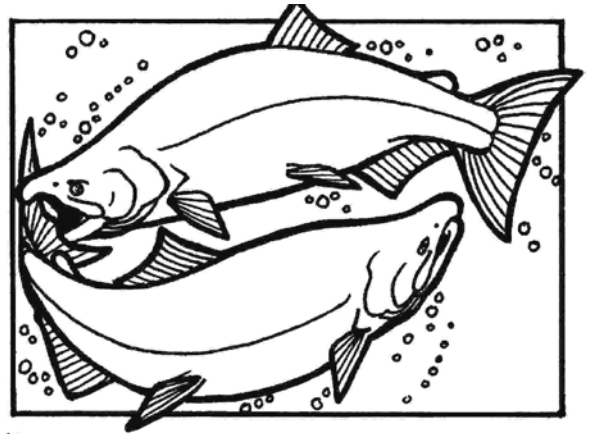
A healthy freshwater habitat has lots of trees, bushes, and low-to-the-ground plants. During heavy rain, their roots hold soil to keep it from washing into the water. Plants also make oxygen and cool the water with their shade. Some of that oxygen gets into the water when it flows over logs and rocks. Salmon take in this oxygen through their gills.

When trees fall into a stream or river during a strong wind, they make safe hiding and resting places for small salmon. Adult salmon coming in to spawn also use these spots to hide and rest.

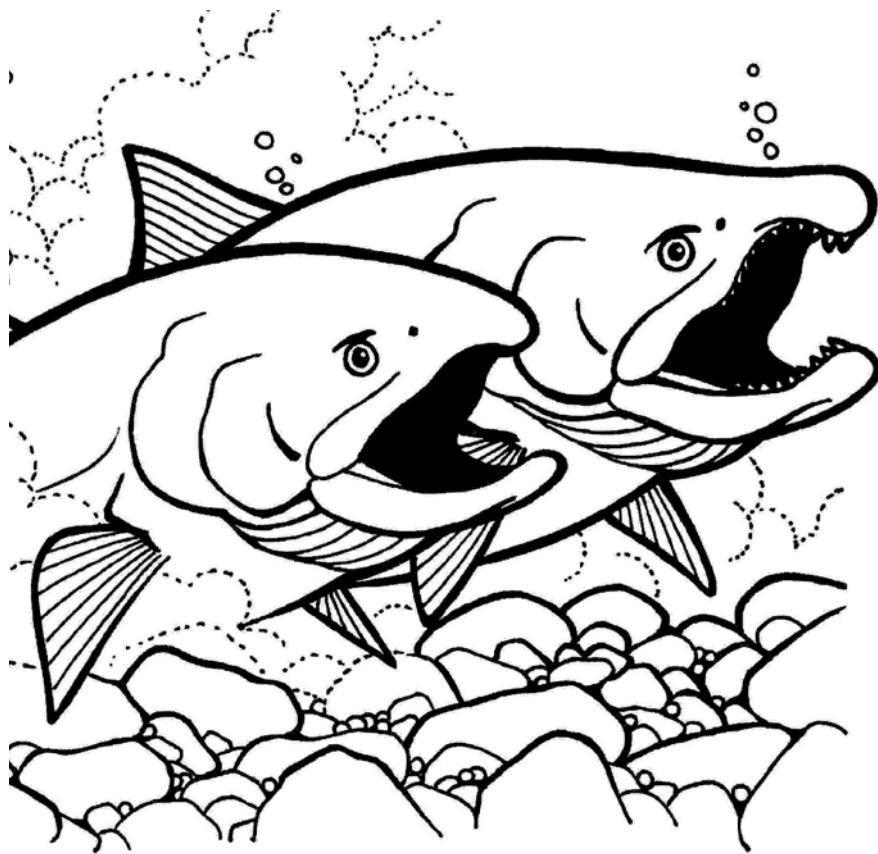
Chemicals from backyards and cars may wash into salmon habitat and kill the fish or the insects living in the water that are a big part of a young salmon's diet.



While the female salmon is digging the redd, her male partner may need to chase off another male in the area. Females may also use their teeth to fight over a single male. Fighting takes a lot of energy, though, and a third fish may give up so that it is still strong enough to find and mate with another partner.



When the redd is finished, the male and female swirl over it in a dance that can go on for an hour or more, until the female is ready to release her eggs.



Salmon eggs are an orange-pink color and about the size of a green pea. Salmon need to produce a lot of eggs to keep the species going because most will die before becoming adults. A female coho, for example, may lay 2,000 to 3,000 eggs.

At the same time as the female releases eggs, the male releases sperm. The trick is to fertilize as many eggs as possible before the current washes away the tiny sperm. Salmon may spawn more than once, with the same or a different partner.

After laying her eggs, the female does the swishing motion again to cover her eggs with gravel. The small stones will protect her eggs from hungry trout or birds and from fast-flowing water after a heavy rain.

Within hours of spawning, all salmon die. They will not be around to help their babies survive.

A few days after eggs are laid and fertilized, they develop a large black dot. This dot and a second dot tucked inside will become the baby salmon's eyes. A few weeks later, eggs begin to hatch. As they do, the thin skin that covered the egg floats away. At this stage, they are called alevin and they stay hidden in the gravel where they hatched.



Alevin

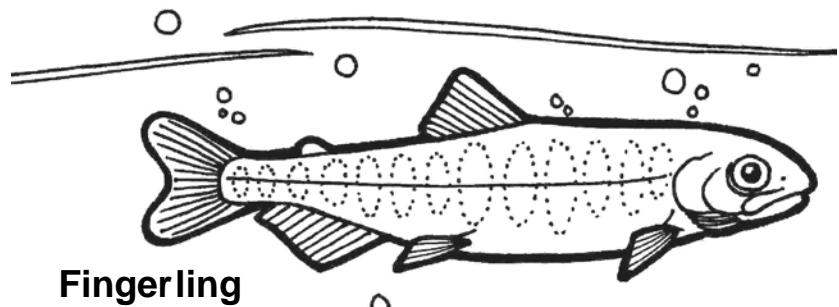
In the wild, only 1 out of 100 coho eggs survives to become a fry. Thank goodness the spawners left so many! Alevin bodies are nearly see-through, with spine and eyes the only features that stand out. Except for their big bellies, that is! This yolk sac is full of rich food to keep them alive until they are ready to eat on their own. As this food gets used, the sac shrinks and disappears. Now they are fry.

Fry swim out of the gravel to start feeding along the banks of their stream or river. Some may swim downstream into a lake to feed. They eat the larva of insects and worms that live in the water. They also learn to eat what floats by, especially insects that fall into the water.

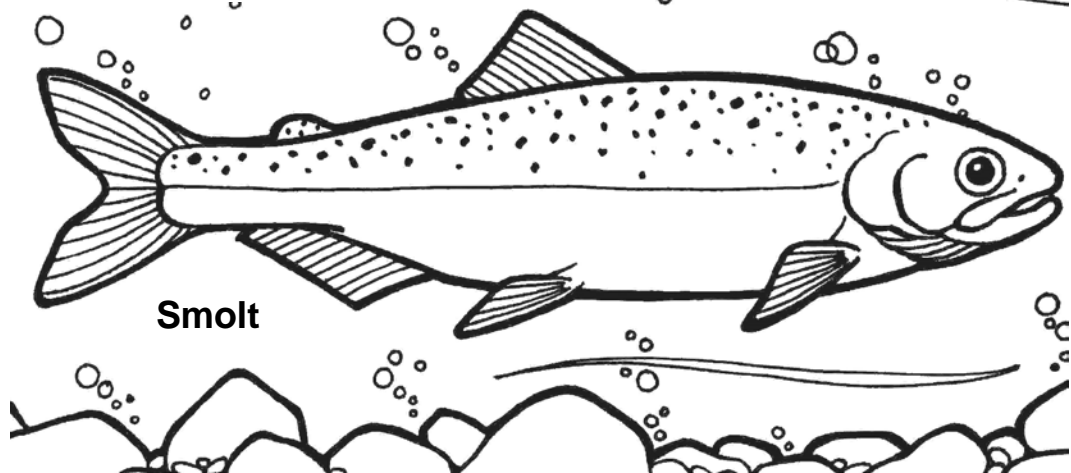


Fry

Chum, pink, and sockeye salmon migrate into saltwater as fry. Chinook and coho stay in freshwater another 4 to 18 months, growing into fingerlings and then into smolts. A Chinook smolt is about 6 inches long when it leaves for saltwater; a coho smolt is 4 to 5 inches long.



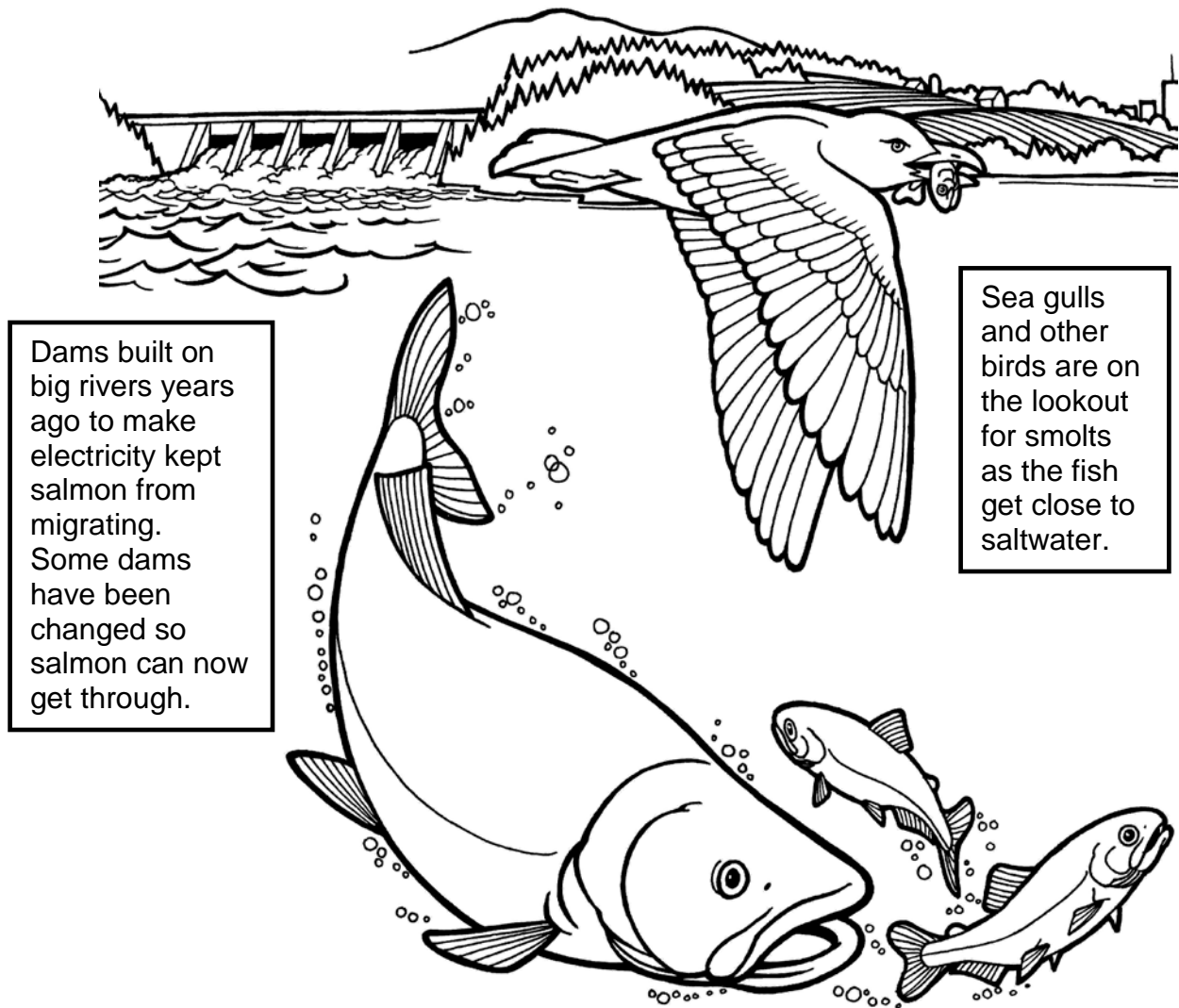
Fingerling



Smolt

When coho and Chinook fingerlings turn silver in color, loose dark markings on their sides, and grow to four inches or more in length, they become smolts. Now they are ready to migrate to saltwater, joining the pink, chum, and sockeye that went to saltwater when they were fry.

The journey can be a short one for smolts that started their life in streams that spill directly into the Salish Sea or Pacific Ocean. It can be a long one for smolts that must migrate many miles, from stream to small river to big river.



Dams built on big rivers years ago to make electricity kept salmon from migrating. Some dams have been changed so salmon can now get through.

Sea gulls and other birds are on the lookout for smolts as the fish get close to saltwater.

In big rivers, larger fish prey on smolts as they make their way to saltwater. They may also get killed by the machines used at dams to make electricity.