

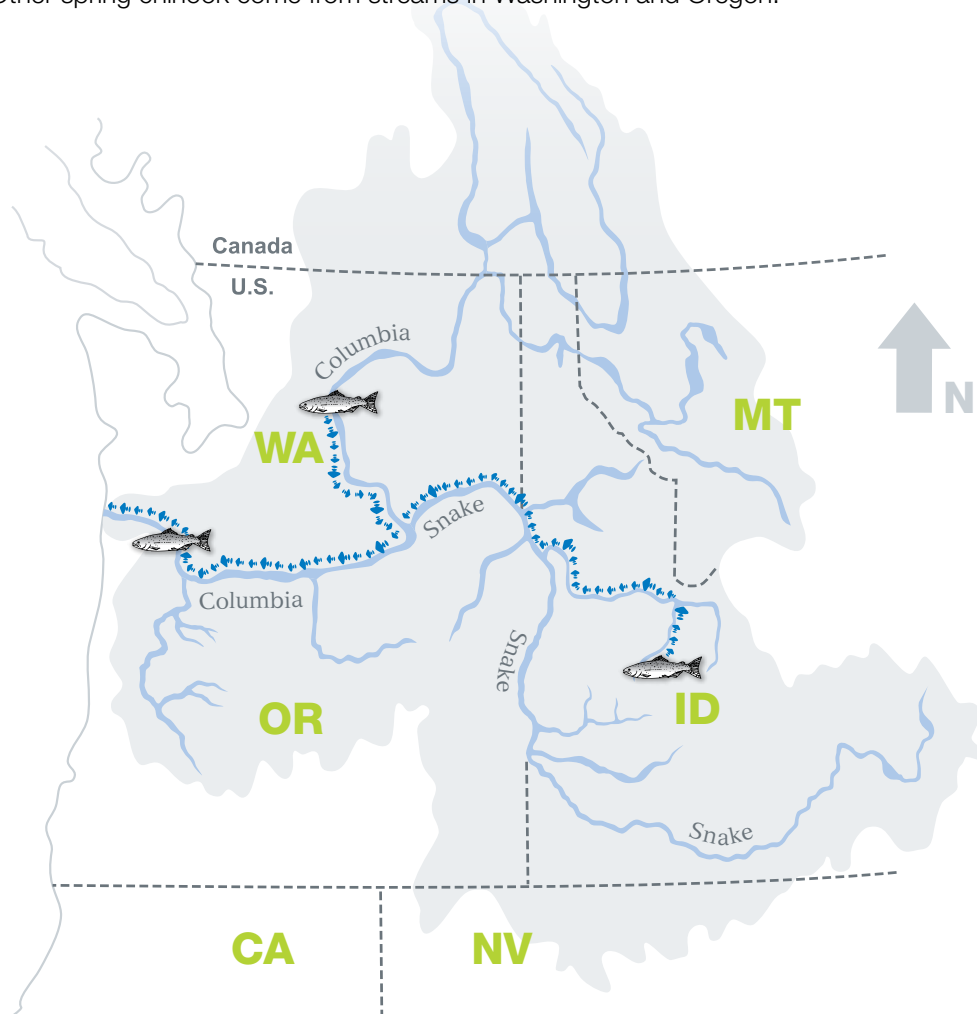
— THE AMAZING JOURNEY OF —
Columbia River Salmon



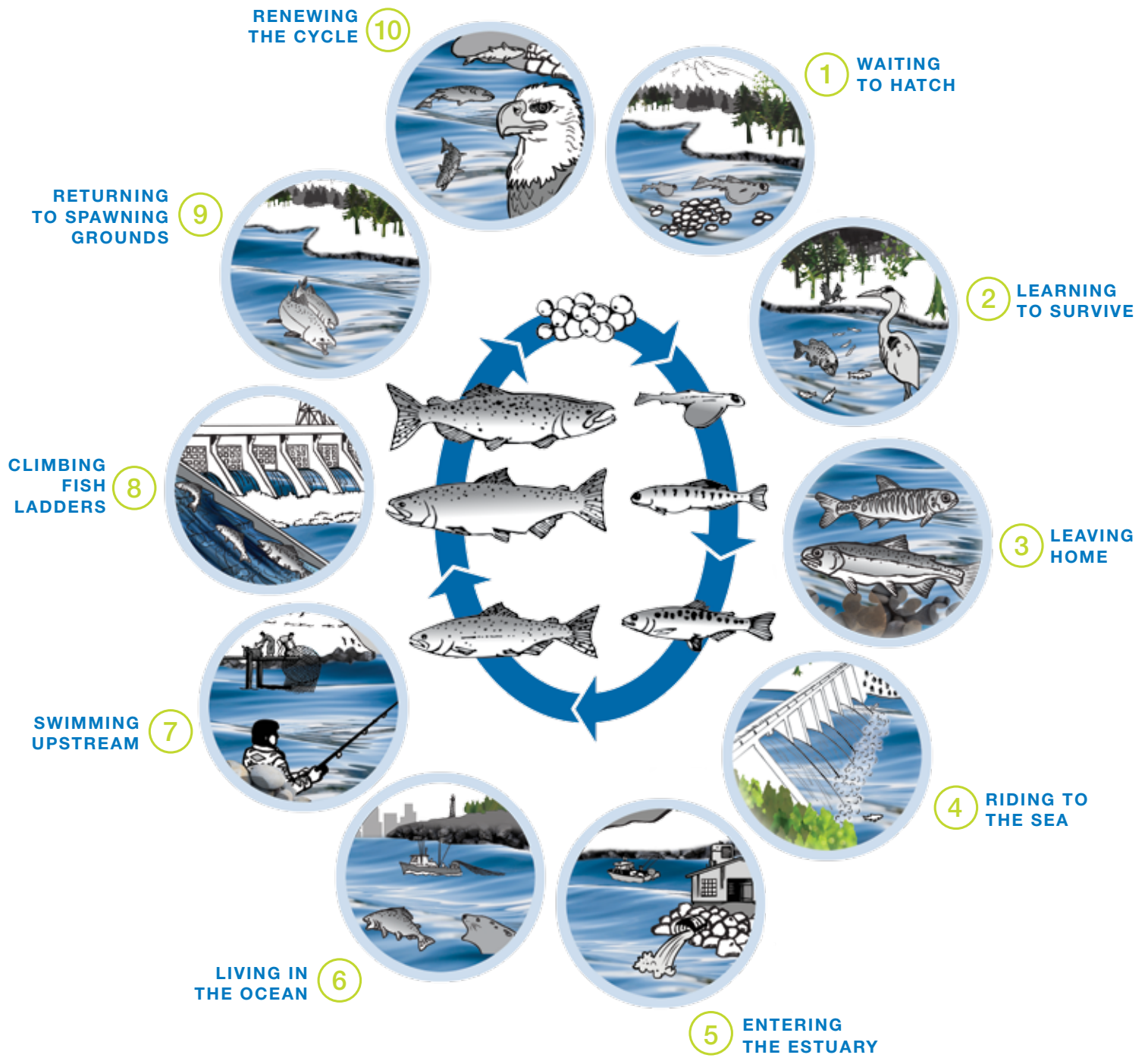
THE Columbia River Basin

The Columbia River starts in Canada and flows through Washington. Then it flows along the Oregon and Washington border and into the Pacific Ocean. Other major rivers empty into the Columbia River. Smaller rivers and streams flow down from the mountains and into those rivers. This entire network of streams and rivers is called the Columbia River Basin.

Salmon are born in many of these streams and rivers. They meet up with salmon from other places in the basin as they enter the Columbia River on their amazing journey to the ocean. This map shows the journey of the spring chinook that come from the Snake River in Idaho. Other spring chinook come from streams in Washington and Oregon.



LIFE CYCLE OF THE Columbia River Salmon

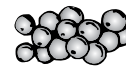




REDD

ALEVIN

YOLK SAC



FOUR MONTHS

① Waiting to hatch

Five thousand tiny red eggs lie hidden in a nest of stones high in Northwest mountains. The cold, clear water of a shallow stream gently washes over the nest, called a **REDD**. If you look closely, you can see two black spots inside each egg. The spots are the eyes of baby salmon waiting to hatch.

These fish will make an amazing journey in their lifetime. They will swim hundreds of miles to the ocean where they'll grow large and strong. Then, at the end of their lives, they'll find their way back upstream to where they were hatched, lay their own eggs and complete the cycle.

Spring approaches, and the salmon slip out of their eggs. Barely an inch long, each of these just-born fish, called **ALEVIN**, has large eyes and a bright orange **YOLK SAC** on its belly. They are too small to catch their own food. Their belly sacs provide nourishment during the first few weeks of their lives. As the baby salmon grow, the sacs get smaller.

When the sacs are gone, the baby salmon slip upward through the gravel and emerge as tiny fish called **FRY**. They're about the length of a fir needle and not much fatter. They swim near the banks of the stream looking for small organisms to eat.



KINGFISHER



BLUE HERON



BASS



FRY





FIVE TO SIX MONTHS

② Learning to survive

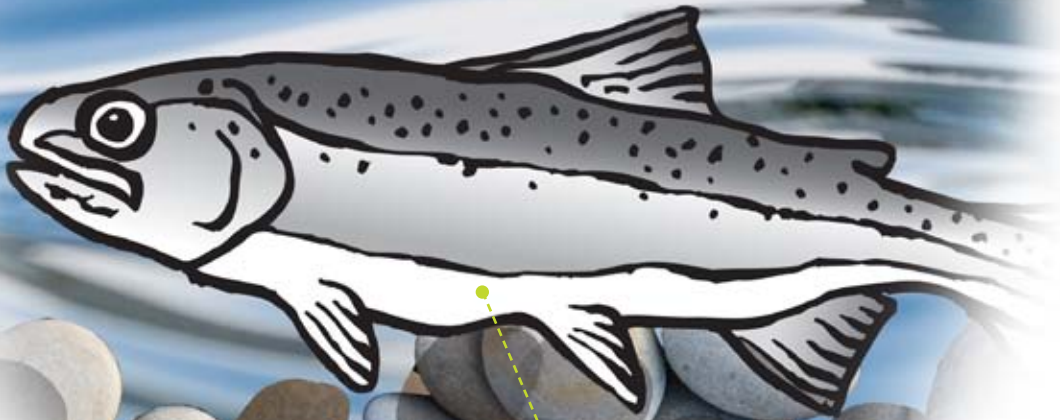
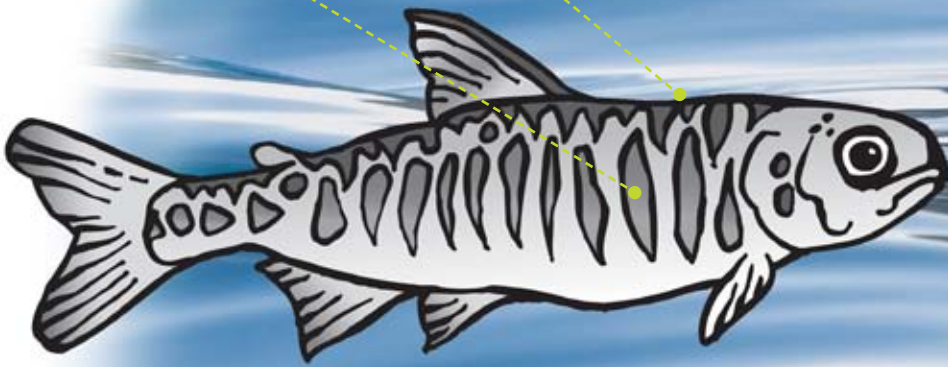
The small fish feel safe hiding in the slow water at the edge of the stream. Dark bands on the sides of their bodies serve as camouflage. The varied colors, called **PARR MARKS**, help them blend in with the stones and shadows on the stream floor.

The **FRY** learn to catch insects for food. They swim mostly along the banks where they can hide. Young salmon are a favorite food of trout, **BASS** and other large fish. Ducks, herons and **KINGFISHER**, even crows, devour fry. When the fry dart out into the middle of the stream to feed on insects, they are wide open for attack.

The skinny, straight legs of a great **BLUE HERON** can fool a young fish. The heron's legs look like sticks, but any fish that tries to hide between them will be gobbled up in an instant. The bird's long beak plunges into the water and snatches up an unsuspecting salmon. The young fish must learn how to stay away from predators.

FINGERLING

PARR MARKS



SMOLT



③ Leaving home

Some juvenile salmon migrate to the ocean in the first May or June of their lives. Others take their time. They stay in fresh water until the second year of their life before heading out to the Pacific.

While they live in their stream, the young salmon grow to about the length of a human finger. Now they are called **FINGERLINGS**.

Snow on the mountains is melting in the spring sunshine. Water flows down the mountain slopes, and the stream's flow rises and quickens.

The fingerlings are ready to leave their small stream and head toward bigger waters and the ocean. They move out of their hiding spots on the edge of the stream and into the swift current. They let the water sweep them downstream.

The little fish follow the current down to larger streams and rivers that are deeper and wider than the home they're used to. The migrating salmon are now sleek and silver and almost four inches long. Their **PARR MARKS** are fading and their insides are beginning to change so they can live in salt water. They are becoming **SMOLTS**.

As streams merge, great crowds of smolts join together in a mass migration. Many of these fish began life in hatcheries. The wild and hatchery salmon mingle, facing the same predators and competing for food. They travel mostly at night to avoid predators. The fish eat worms, flies and large insects along the way. They grow quickly on this diet.



RESERVOIR

SPILLWAY WEIR



4 Riding to the sea

As the fish reach the wide Columbia River, the current slows in a large lake behind a dam, a **RESERVOIR**. Bass, walleye and northern pikeminnow live there. These big fish like to eat small salmon. People release water from dams far upstream to keep the current flowing for salmon.

Columbia River salmon born the farthest from the ocean pass eight or nine dams before they reach the sea. Some young fish are collected at upstream dams, loaded onto barges or trucks, and ride downstream. Others keep swimming.

Inside each dam are turbines that make electricity. Turbines are usually the least safe way for a fish to get past the dams. People have created safer ways for salmon to get through the dams, and most avoid the turbines.

Instead of making electricity, part of the river's flow is sent over each dam's spillway every spring and summer,

carrying salmon smolts with it. New **SPILLWAY WEIRS** let the young fish stay close to the water's surface, where they naturally swim.

Most salmon who don't ride the spillways go through bypass systems — where giant screens guide them away from the turbines to safe channels through the dam.

When the fish re-enter the river, some are dizzy and disoriented. Birds and other fish wait to snatch up confused young salmon. People have put up wires, water sprays and other barriers to deter the birds from eating the young fish.

People do a lot to help young salmon pass the dams. Now, almost all young salmon safely pass each federal dam. But the trip is still hard on fish, because they go through as many as nine dams and reservoirs before they reach the ocean.



STORM DRAIN



5 Entering the estuary

The days are getting longer and warmer. The juvenile salmon now swim in wide, shallow water. And something about it is different — it tastes salty! The Columbia River is meeting the Pacific Ocean. The area where the salt water of the sea mixes with the fresh water of a river is called an **ESTUARY**. The Columbia River's estuary starts just below Bonneville Dam, more than 140 miles from the ocean.

The salmon pass between two large cities — Portland and Vancouver. The water changes. In cities, rainwater hits parking lots and streets and runs straight into the nearest **STORM DRAIN**. Chemicals come from gardens and lawns. Someone changed the oil in their car and poured the oil down the storm drain. The pollution can be poisonous to the fish. They hurry on, hoping for cleaner water ahead.

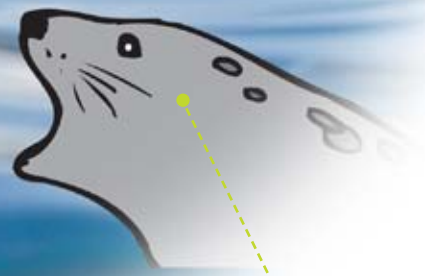
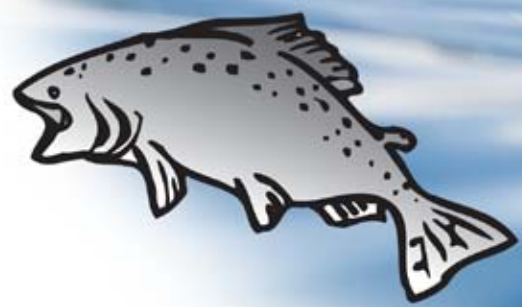
The salmon steer clear of the warm water released by factories and power plants near Camas, Kelso and Rainier. They swim under barges and boats.

The small salmon have other hazards to avoid. Bigger fish find them very tasty. Sea birds such as cormorants, terns and gulls also feast on young salmon.

The river broadens out as it reaches the sea, creating side channels and small pools. These areas offer plentiful food and places to hide from predators. The young salmon can stay here in the estuary for days or weeks, resting and growing before they head out to the ocean.

ESTUARY

FISHING BOAT WITH NET



SEA LION



⑥ Living in the ocean

The salmon swim head-on into cool ocean currents. They follow schools of anchovies, herring and shrimp. They feast on these smaller ocean fish and follow the food north, all the way to the waters off the coast of Alaska. The color of the small, pink shrimp they eat makes their own flesh salmon-colored.

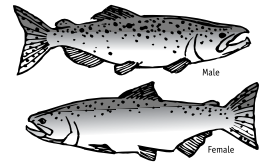
The salmon swim past a commercial **FISHING BOAT**. The fishermen extend large **NETS** in the water. Young fish are small enough to swim through the openings in the net. Fully grown fish are too big to escape. They are hauled up out of the water.

The salmon spend one to five years in the ocean. They grow big, very strong and two to four feet long. Their backs are dark green and their sides and bellies are silver. They are camouflaged by black spots on their backs and sides. This is good, because **SEA LIONS** are always on the lookout for a salmon to catch and eat.

At last, the salmon grow restless again. It's time for them to go back to their own small stream. So they turn south and head back toward the Columbia River.

DIP NET





TWO TO FIVE YEARS

7 Swimming upstream

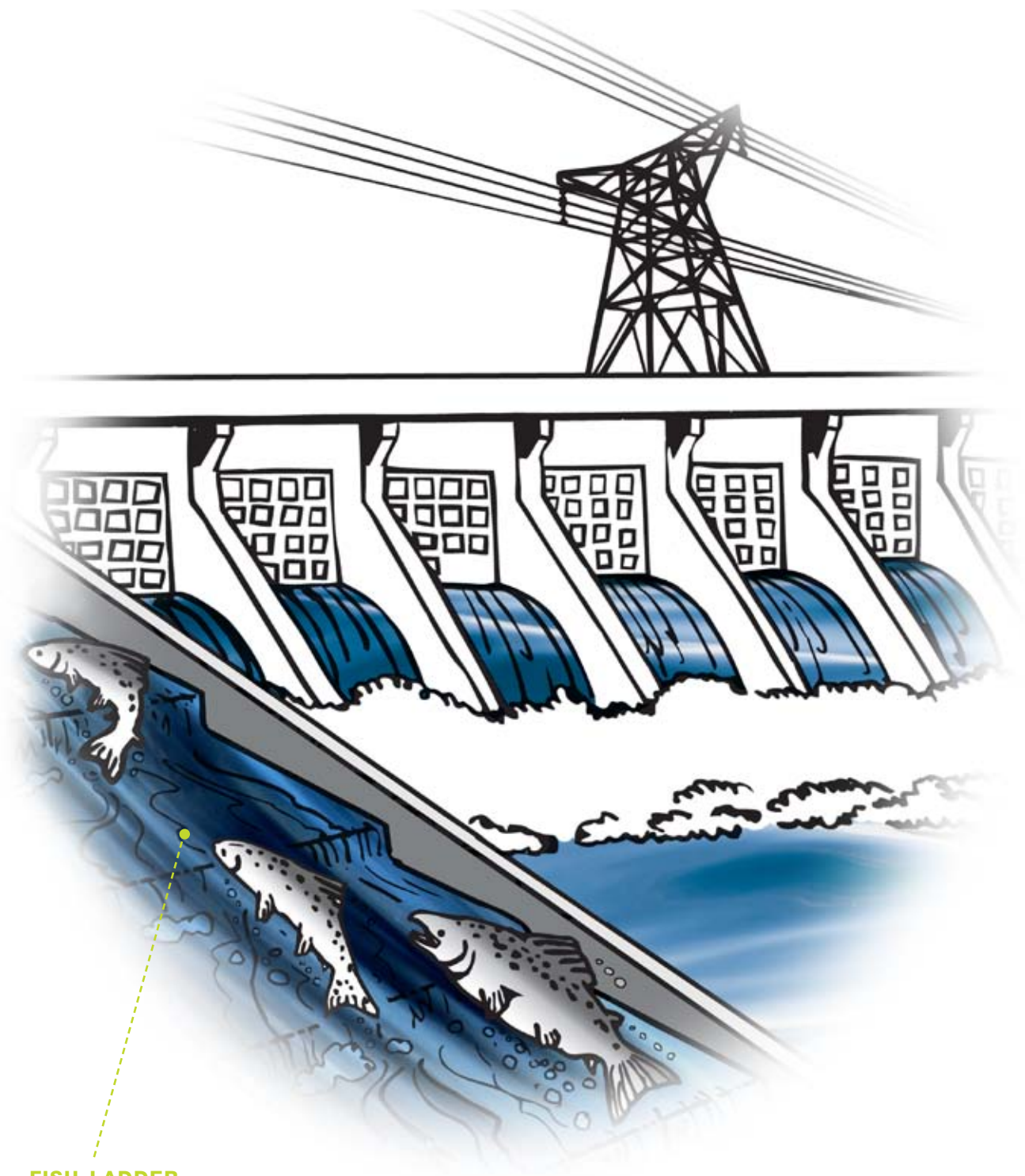
The fish swim up the Columbia River. A salmon sees the flash of a silver herring, and with quick flick of its tail, it dives for the tasty morsel. She misses, but she is lucky. The herring turns out to be a fisherman's lure.

Clouds pour spring rain on Oregon and Washington. The river rises and the salmon swim hard against a strong current. Suddenly, they are no longer hungry. All they want to do is swim as quickly as they can to the little stream where they were born. They are driven by instinct — a strong sense that tells them what to do.

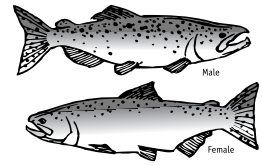
Salmon always return to the place where they were hatched. Near Longview, a small group of salmon takes a left turn up Washington's Cowlitz and Lewis rivers. The fish push straight ahead, toward home.

As they swim upstream, some of the salmon are caught by Native American fishers. For thousands of years, salmon have been important to Native American culture and religion. Many Native American fishers use fishing poles and modern nets to bring in the sacred catch.

Others also catch fish in the old way, on narrow wooden platforms built out from the rocks next to waterfalls. A fisherman ties one end of a rope to his waist and the other end to a stout board and walks to the end of the planks. He sweeps the water with a net at the end of a 25-foot pole. The net he uses is called a **DIP NET**. He stays until he has enough fish for his family and his tribe.



FISH LADDER



TWO TO FIVE YEARS

8 Climbing fish ladders

At last, the fish reach the Columbia River Gorge. Once again, they face the dams but this time from the other side. Each dam is equipped with **FISH LADDERS** to help the fish climb over. The fish are attracted by the fast, flowing water at each fish ladder's entrance.

To get to the fish ladder at Bonneville Dam, the salmon must out-swim hungry sea lions. The sea lions wait in the waters just below the dam. It's a good place for them to catch a meal.

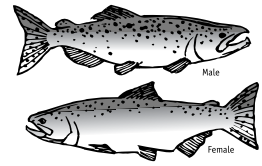
Most fish will get to the fish ladder before the sea lions can catch them. Once they make it there, they are safe. Engineers built special gates with openings large enough to let in salmon but small enough to keep out sea lions. There are very few sea lions farther up the river.

The salmon find their way up the fish ladder — all 60 steps. They can jump over each of the step walls, called **WEIRS**. Or, they can swim through holes in each of the weirs, under water. They climb similar ladders at each dam they reach on their way home.

The fish swim past underwater windows in each dam, where fish counters track how many fish migrate upriver each year. In 2001, almost 2 million salmon swam past Bonneville Dam. This was the largest run since 1938, when Bonneville Dam was built. In 2012, they counted 1,544,600 salmon passing the dam. That's a big number, but it doesn't mean people can stop worrying about the salmon. People will have to protect the salmon forever.



REDD



TWO TO FIVE YEARS

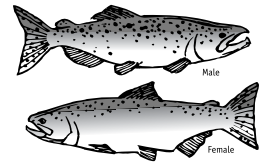
⑨ Returning to spawning grounds

On the fish swim. At every fork in the river, each knows which stream to take. Some salmon turn south into Oregon rivers such as the Grande Ronde or north into Washington rivers such as the Klickitat and Yakima. More head east up the Snake River to tributaries in Idaho. Others keep going on the mainstem Columbia or even up the Okanagan River into Canada. And through

this whole, amazing journey, the salmon don't eat. They just keep swimming.

At last, the salmon are home. They've reached the stream where they were born. They were once little fish here. Now they are adult salmon reaching the end of their lives.





TWO TO FIVE YEARS

10 Renewing the cycle

A female chooses a shallow spot shaded by an alder. The water runs fresh but not too fast. She begins to build her nest, also called a **REDD**, in the gravel. For an hour she moves over her chosen spot, wiggling out a trench with her body. She flips her tail to move the gravel into place. Finally the nest feels just right. The male swims up close to her and presses her side with his body. She lays her eggs, and he fertilizes them.

The female moves upstream from the nest. With one last effort, she flips up fine pieces of gravel to cover and protect her eggs.

Now their life work is done, and the fish rest in the stream.

In a few days, they die. Their bodies decompose and drift down the stream to become food for ravens, coyotes and smaller water creatures. Their bodies will enrich the stream, helping to nourish the next generation of Columbia River salmon.

LIFE CYCLE OF THE Columbia River Salmon

