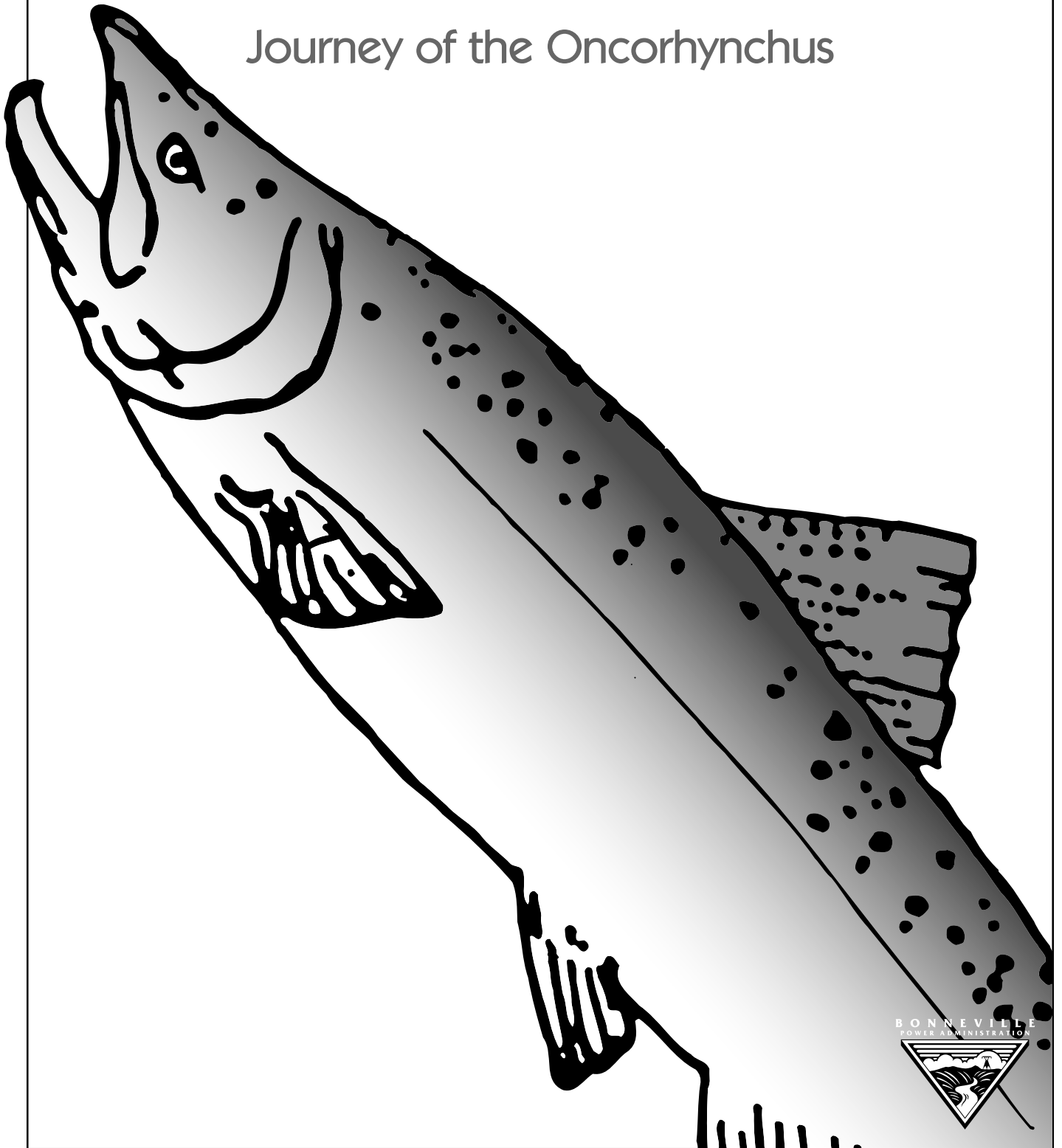


# The story of the Pacific Northwest Salmon

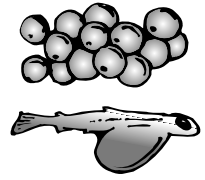
Journey of the Oncorhynchus



# The Columbia River Basin



# The journey begins



Four months

5,000 tiny, red eggs lie hidden in a nest made of stones in the shallow water of a cold, clear stream at the foot of Mt. Hood. A nest of fish eggs is called a **redd**. Cool water gently washes over the eggs in the redd. If you look closely, it's possible to see two black spots inside some of the eggs. The spots are the eyes of baby salmon waiting to hatch.

These small fish will make an amazing journey in their lifetime. They will swim to the ocean where they'll grow large and strong. And then, when it's time, they'll swim back upstream to the same place where they were hatched, years earlier.

When the salmon slip out of their eggs, they are barely an inch long. The newly hatched fish, called **alevins**, have large eyes and sacks on their bellies. They are too small to catch their own food. The pouches on their bellies give them nourishment during the first few weeks of their lives. These sacs are bright orange, like the yolk of an egg.

The young fish hide deep in the gravel of the stream until their yolk sacs are gone. When they start to get hungry they swim out through the water near the banks of the stream looking for small insects to eat.

## **Oncorhynchus**

(pronounced on-kor-HINK-us) is the biological name of wild salmon. In Greek, onko means hooked and Rhynchos means snout. The male salmon develops a sharp hooked snout before it spawns. To **spawn** means to lay and fertilize eggs in a redd.



alevin

yolk sac

redd

# Learning to survive



*Five to six months*

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 coloring, called **parr marks**, helps them blend in with the stones and shadows on the stream floor.

The young fish are growing and now they are called **fry**. They are learning to catch insects for their food. They swim mostly along the banks where they can hide. Young salmon are the favorite food of trout, large fish and birds. When the fish dart out into the middle of the

stream to snap up 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 very much like sticks and 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.

Kingfishers, bright blue, white and black birds, are another danger. They dart out of the trees, swoop down to the water and snap up fish to take home to feed to their own young.

kingfisher

finglerling

bass



blue heron



*A few months to two years*

# A secret signal

The young chinook live in their stream for an entire year. In that time, they grow from half an inch to about the length of a human finger. Now they are called **fingerlings** and their **parr marks** are fading.

The snow on Mt. Hood is melting in the spring sunshine. Water flows down the mountain slopes and the stream rises and quickens. The fish become restless. They are ready to leave their small stream and head toward bigger waters and eventually, the ocean.

The little fish move out of their hiding spots on the edge of the stream and into the swift current. They let the water carry them downstream.

The chinook follow the current to the place where their stream joins Hood River. Hood River is deeper and wider than the water they're used to. They move down deeper into the river and travel mostly at night to avoid predators. The fish eat worms, flies and large insects along the way. The fish grow quickly on this diet.

*fingerling (or Parr)*

*parr marks*



*smolt*

# Finding their way



*A few months to two years*

The salmon are growing quickly. They are sleek and silver and almost four inches long. They are becoming **smolts**. They are traveling downstream, trying to get to the ocean.

When Hood River joins the Columbia River, the water becomes brown and slow. The chinook swim into a reservoir behind Bonneville Dam. The dam stops the flow of water and makes a large lake, called a **reservoir**.

When the fish enter the reservoir, there is no current. The water is warmer and sluggish, not like the brisk, cold water they are used to. Without the flow of water, the fish lose their sense of direction and become confused.

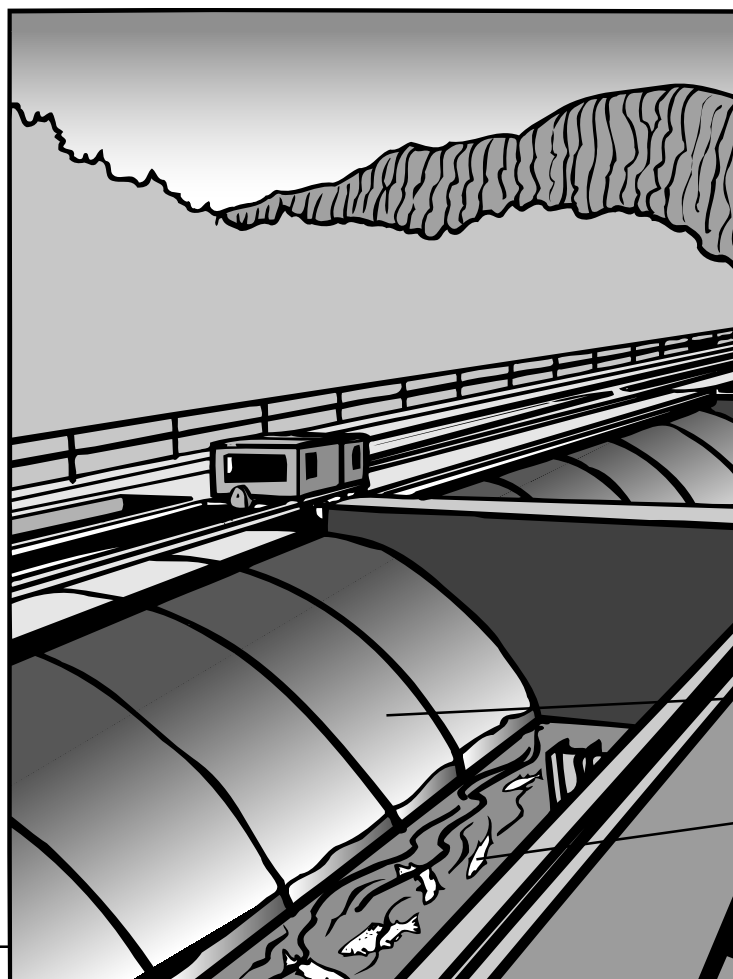
There are bass, walleye and bigmouth minnows living in this warm water of the reservoir. These big fish like to eat small salmon. The chinook are determined to get to the other side of the dam and continue their journey.

People have several ways of helping the fish get through the dam. At times, water is passed through the

dam. It flows quickly and carries the fingerlings with it to the other side.

Inside the dam there are turbines that make electricity. If a fish is swept into the turning blades of a turbine, it could be killed. Engineers have created large **fish screens** that guide the fish out of harm's way. The screens steer the fish past the turbines and into a channel that goes through the dam. The channel leads the smolts to the downriver side. When they are spilled back out into the river, they are dizzy and stunned from their ride through the dam's inner workings. Outside, gulls wait to snatch up the bewildered fish. The chinook swim down low in the river, out of the reach of the waiting birds.

Sometimes fish are collected upstream of the dam, loaded onto trucks and barges, and driven downstream. People do a lot to help the fish past the dams. But the trip is still hard on the fish.



*fish screen*

*smolts*

# To the ocean and back again



*Maturing in the ocean*

The days are getting warmer and longer. The chinook are now swimming 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 chinook swim head-on into cool ocean currents. They follow schools of anchovies, herring and shrimp. They feast on these smaller ocean fish and follow their 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 chinook swim past a commercial **fishing boat**. The fishermen stretch a long **net** in the water. The Hood River fish are small

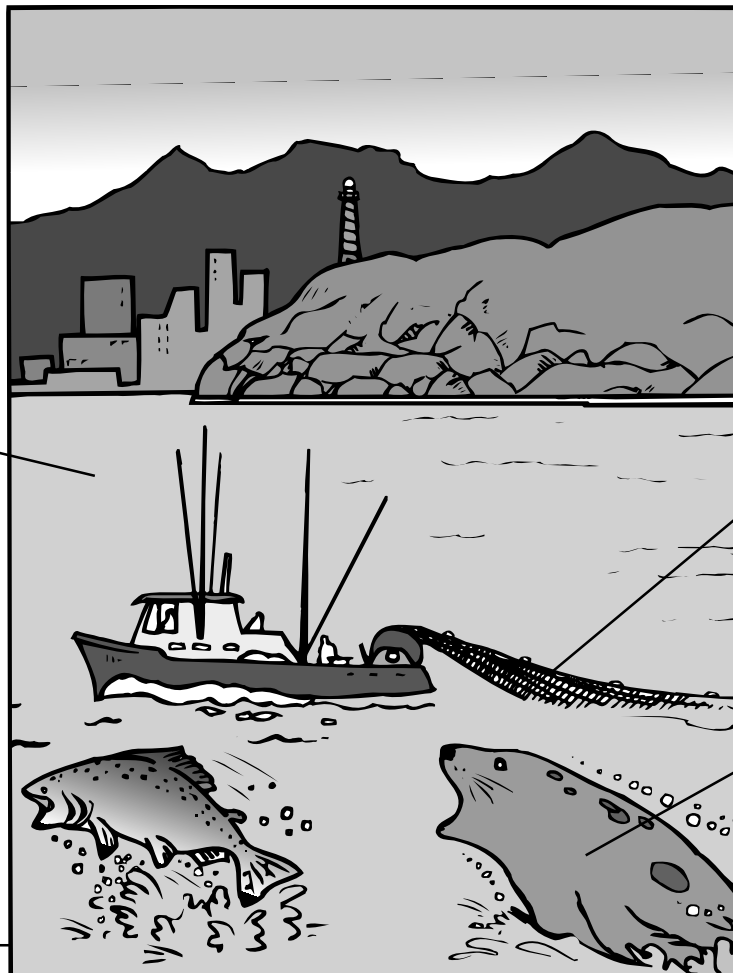
enough to swim through the openings in the net. The fully-grown fish are too big to escape. They are hauled up out of the ocean. But the small chinook have other dangers to avoid.

**Sea lions** are always on the lookout for a tasty chinook to catch and eat.

The little chinook spend a long time in the ocean. By the time they are three years old, the chinook have grown big and very strong. They are three feet long. Their backs are dark green and their sides and belly are silver. They are camouflaged by black spots on their backs and sides.

The chinook are growing restless again. They've heard the secret signal and they want to go back to their own small stream. So they turn south and head back toward the Columbia River.

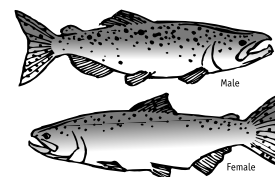
estuary



fishing boat with net

sea lion

# Sacred salmon



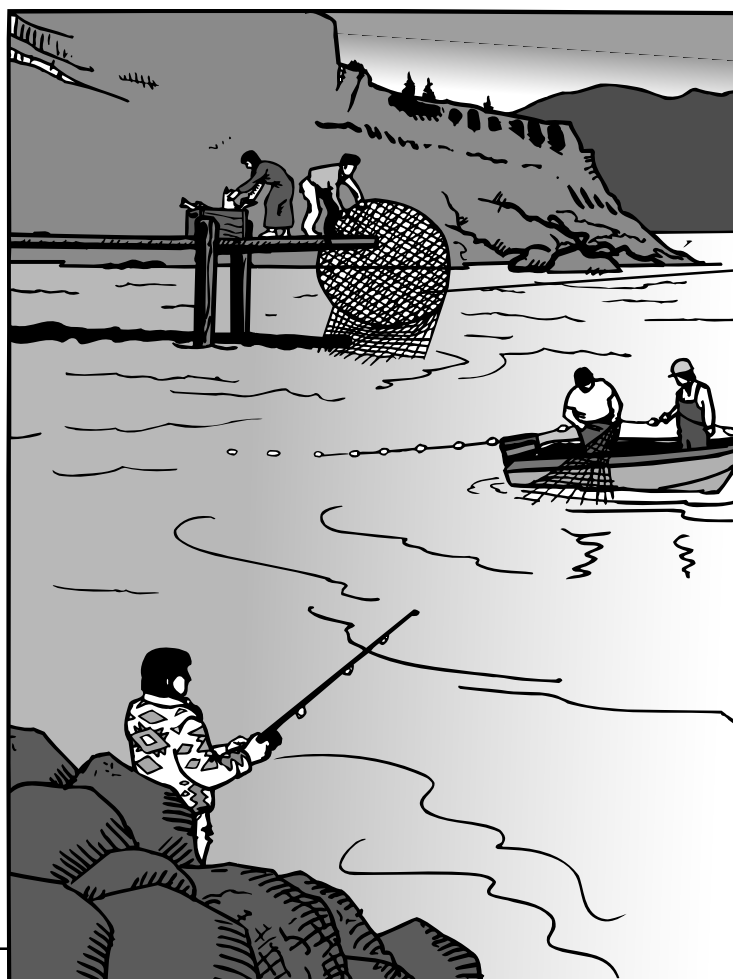
*Two to five years*

The fish swim up the Columbia River. It's a warm day and swarms of flies hover over the water. One especially fat and shiny fly drifts on the water's surface. A chinook darts up to catch it. But as soon as the fish closes its mouth around the fly, it is yanked through the water. The fly is a fisherman's lure, not a real insect. After a struggle, the chinook is hauled up out of the water on the end of a fishing line.

For thousands of years, salmon have been important to tribal culture and religion. Tribal fishermen use fishing poles, and modern netting

techniques to bring in their sacred catch. Many native fishermen also catch fish in the old way.

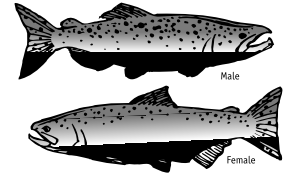
Traditionally, tribal members built narrow wooden platforms out from the rocks next to the falls. A fisherman tied one end of a rope to his waist and the other end to a tree and walked to the end of the planks. He stood all day, and sometimes all night, sweeping the water with a net at the end of a 25-foot pole. The net he used is called a **dip net**. He stayed until he had enough fish for his family and his tribe.



*dip net*



# Water pollution



*Two to five years*

The chinook pass between two large cities — Portland and Vancouver. The water becomes foggy and murky. In cities, rainwater hits parking lots and streets and runs straight into the nearest storm drain. Water leaks from old garbage dumps. Soap runs from washing machines. Chemicals come from gardens and lawns. Someone changed the oil in their car and poured the oil down the sewer. The fish choke as they swim through oil and fumes. They hurry on, hoping for cleaner water ahead.

The chinook steer clear of the warm water released by factories and power plants near Camas, Kelso and Rainier. They swim low in the

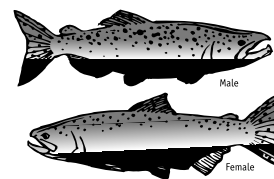
water, under barges and boats.

Clouds pour spring rain on Oregon and Washington. The river rises and the chinook 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 their little stream off Hood River.

Salmon always return to the place where they were hatched. At Longview, a small group of chinook take a left turn up Washington's Toutle River. At Portland, another group takes a right. The Willamette chinook are heading back to their hatcheries. The Hood River fish push straight ahead, toward home.



# Mount St. Helens

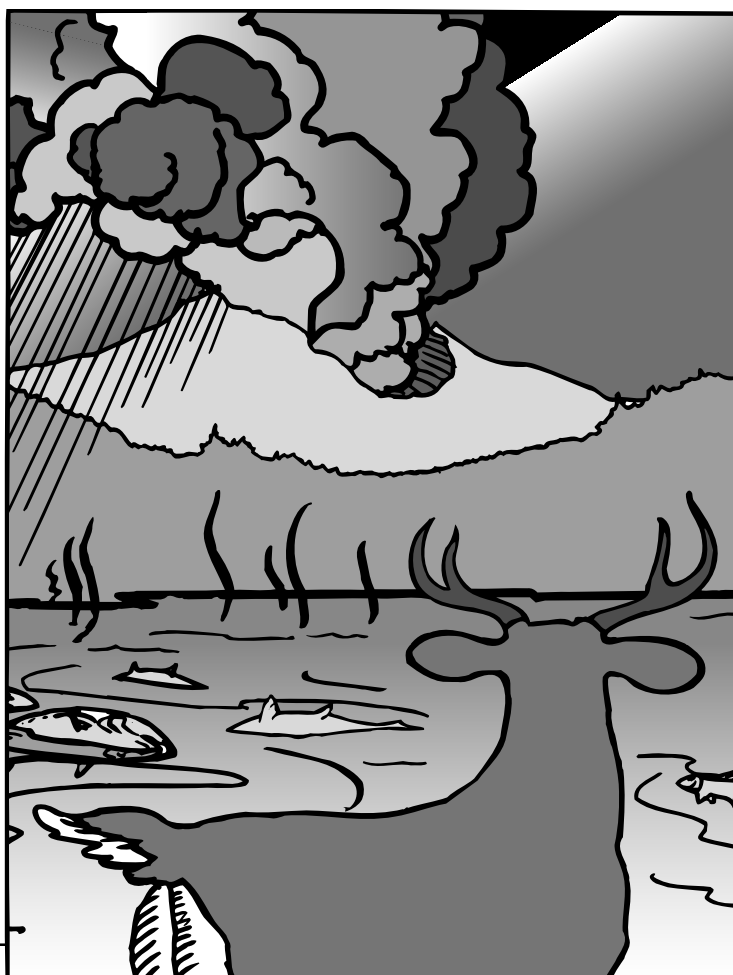


*Two to five years*

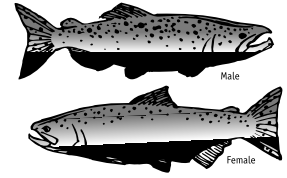
The chinook that swam up the Toutle River in 1980 did not complete their journey. On May 18, at 8:32 a.m., Mount St. Helens blew its top. Hot ash blew over the region and covered the Northwest from Washington to Montana. The blast blew down all the trees in its path. Mud spilled down the mountain slopes and washed the trees

into the Toutle River. The hot mud boiled and buried everything in its path, including the river's salmon.

No one thought the salmon would ever return to the Toutle. But the salmon proved them wrong. Within two years, chinook found their way to the river's mouth and began building their nests.



# Almost home



*Two to five years*

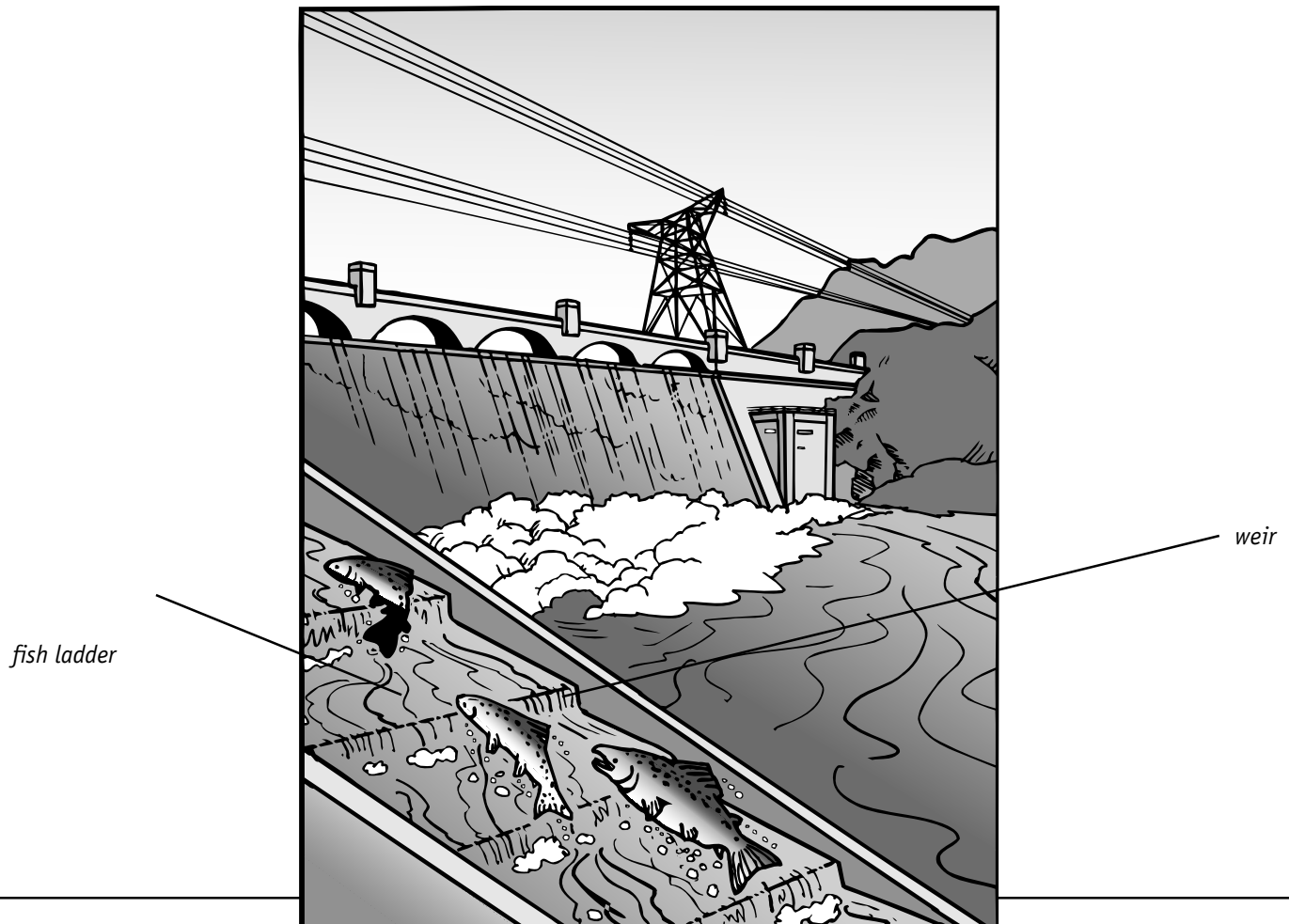
Finally, they have just one mile to go. They haven't eaten in a long time now and sense that they don't have much time left.

Once again they face an enormous barrier — the Bonneville Dam.

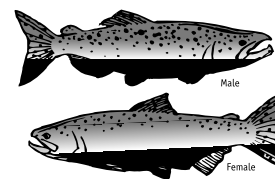
The dam is equipped with **fish ladders** to help the fish climb to the other side. The fish are attracted by fast, flowing water. They find their way up and into the fish ladders. They swim up 60 steps. The fish can jump over each of the step

walls, or **weirs**. Or, they can swim through holes in each of the weirs, under water.

The fish swim past under-water windows in the dam. Fish counters watch and keep track of how many fish migrate upriver each year. In 2001, almost two million salmon swam past Bonneville Dam. This was the largest run since 1938, when the dam was built. In 2002, 1,549,477 salmon passed the dam. But this doesn't mean that people can stop worrying about the salmon. People will have to protect the salmon forever.



# An end and a beginning



*Two to five years*

At last, the Hood River chinook are home. They've reached the stream where they were born. They were once little fish here. Now they are adult salmon, nearly four feet long.

A female chooses a shallow spot shaded by a clump of grass. The water runs fresh, but not too fast. She begins to build her nest 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

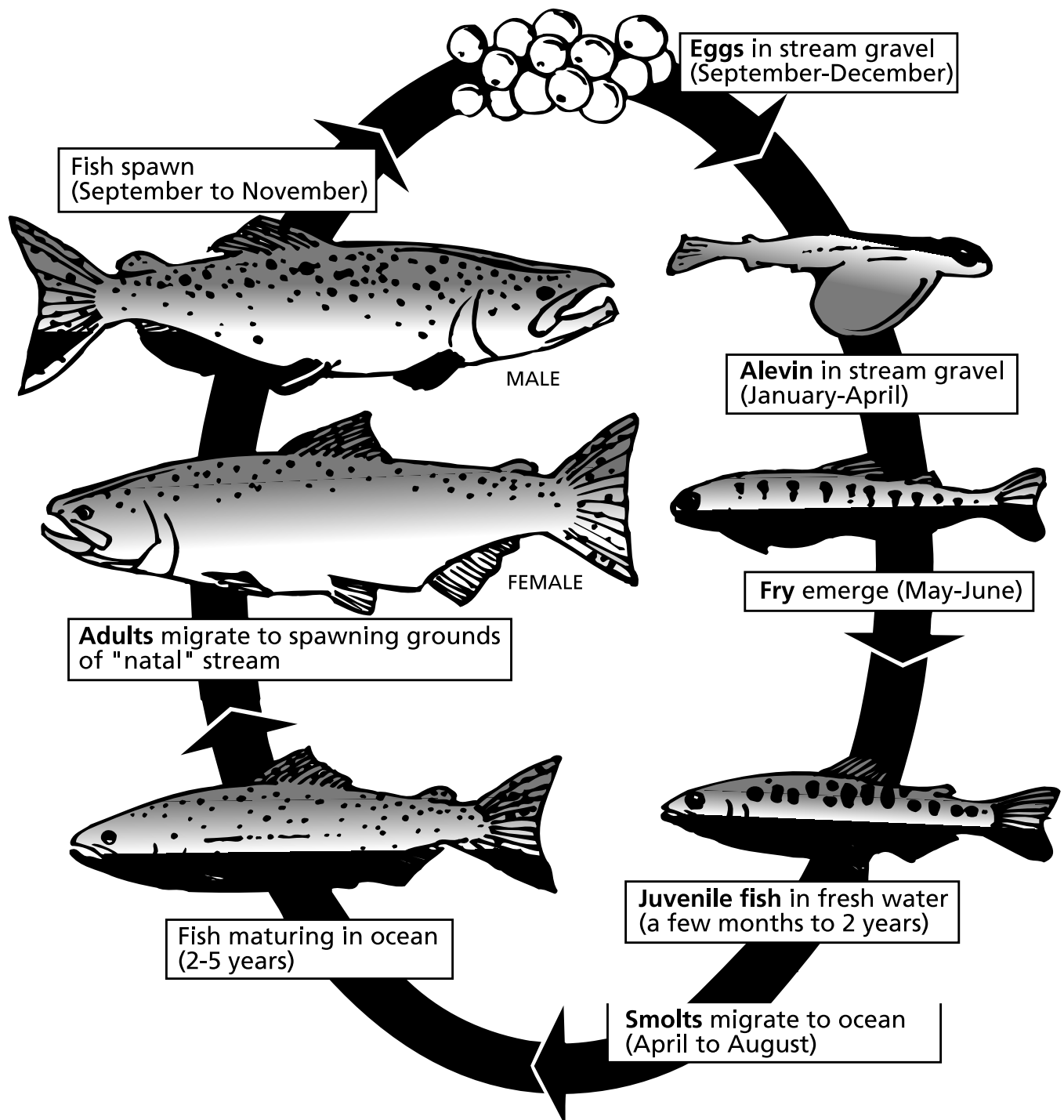
her and presses her side with his body. She lays her eggs and he fertilizes them.

The female moves upstream of 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 the crows, raccoons and smaller water creatures. Their bodies will enrich the stream, helping to nourish the next generation of chinook.



# Life cycle of the chinook salmon



# Notes

# Notes

Much of the electricity in the Northwest comes from dams on the rivers. These dams provide great benefits, particularly by providing clean, nonpolluting electricity at low costs. But dams can also be harmful to native fish. Fish are very important to the ecology and culture of the Northwest. Two laws, the Endangered Species Act and the Northwest Power Act, give BPA the responsibility to make up for any harm done to these fish and their habitat because of building or operating the dams.

Through a number of programs, such as those described in this book, BPA strives to make up for fish habitat lost when the dams were built and to help fish make the journey safely past the dams to the ocean and then back to their spawning grounds.