

The Spring Chinook Salmon



Ocean phase (males and females similar)



Freshwater phase male, showing spawning changes

Like all salmon, spring chinook spend their early lives in fresh water; migrate to sea, where they grow to adult size; and return to fresh water to spawn. Adults average 15 pounds but can reach over 50 pounds. At sea their color is silver below and olive-green above. During their stay in fresh water, they become much darker, and their flanks turn gray. Males can be almost black.

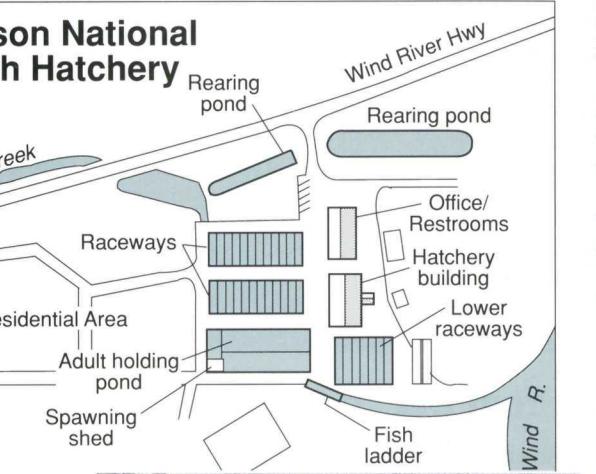
Spring chinook are named for when they run upriver. Migration occurs in April and May, when rivers are highest and most difficult to negotiate. Spring chinook are well-adapted to cope with these conditions. Like a whitewater kayak, they are slender and rounded in cross-section.

Spring chinook fry spend more than a year in fresh water. Once they are strong enough to hold their place in the current, they disperse into fast-moving water. In this way they avoid competing with other salmon fry, which stay in quiet water.

At sea, spring chinook travel great distances. One Columbia River fish was caught near Adak Island in the Aleutians! Most of Carson's chinook probably migrate to the north Pacific, but their exact range remains a mystery since few are caught at sea. In April, spring chinook arrive by the thousands at the mouth of the Columbia River, making an important contribution to the river fishery.

Visiting the Hatchery

Carson National Fish Hatchery is open to the public 7:30 a.m. to 4:00 p.m. daily. The best time to visit is May through August when large adult salmon are in the holding ponds. Salmon are inoculated against disease in mid-June and mid-July and spawned in August. In May, fry are marked before being released. Call the hatchery office for information on group tours, lectures of fish culture, and dates of hatchery activities.



Feeding time for salmon fry living in outdoor raceways at Carson.

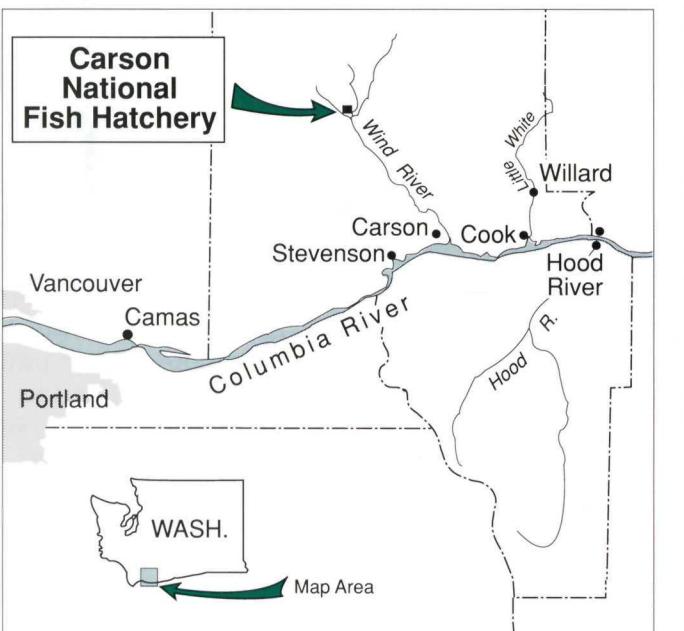
HATCHERY ACTIVITIES

- Adult Salmon Viewing:** May through August
- Marking Fry:** May
- Self-Guided Walking Tour:** Open Year Round

Carson National Fish Hatchery is located at the confluence of Tyee Creek and Wind River about 14 miles north of the Columbia River, about 60 miles east of Vancouver, Washington. About 3 miles east of Stevenson, turn north from State Highway 14 to the Wind River Highway. Proceed 14 miles to the hatchery.

For additional information, please write or call:

Carson National Fish Hatchery
Carson, Washington 98610
(509) 427-5905



The U.S. Fish and Wildlife Service manages National Fish Hatcheries and National Wildlife Refuges throughout the country for the continued conservation, protection, and enhancement of our fish and wildlife resources and their habitats.

U.S. Department of the Interior
Fish and Wildlife Service



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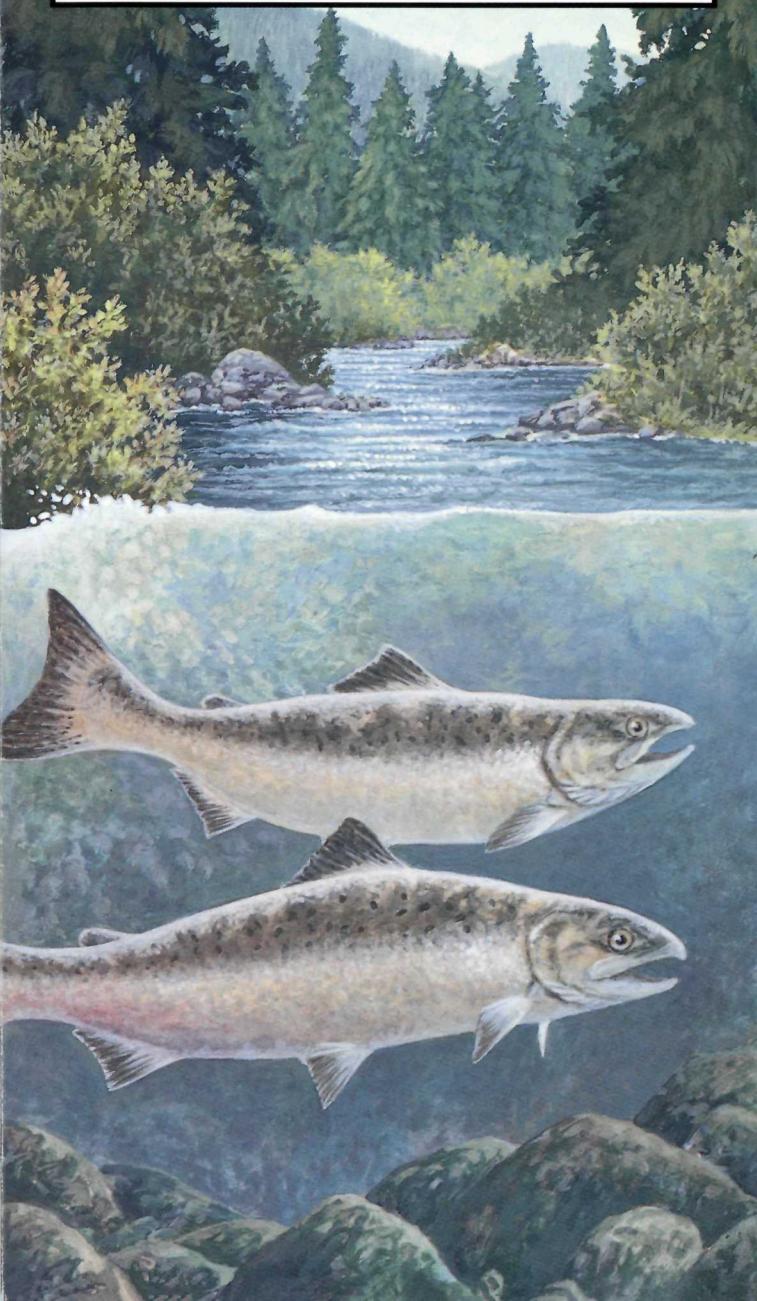
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Carson

National Fish Hatchery

Washington



Welcome to Carson National Fish Hatchery!



Carson National Fish Hatchery, built by the Civilian Conservation Corps, began raising salmon and trout in 1937. During the 1950's, the hatchery began raising spring chinook salmon exclusively. Because of the loss and degradation of spawning habitat and the impact of dams on migration, the spring chinook was in rapid decline. Since 1960, hatchery production has helped spring chinook populations recover in the lower Columbia River. Today Carson releases over 2-1/2 million smolts (young salmon) annually and supplies millions of eggs to other hatcheries.

Spring chinook are not native to the Wind River. Falls 3 miles upstream blocked their passage until a fish ladder was built in 1955. But the location is ideal for a hatchery. Adult salmon have only one dam to negotiate, and as a result, Carson has one of the highest return rates of any hatchery.

Carson's ponds and incubation buildings are fed by pollution-free Tyee Spring, which stays at a constant 44 degrees—perfect for incubating salmon eggs. When they return as adults, they follow the scent right up the fish ladder and into the hatchery's holding ponds. Here they stay until they are ready to spawn.

Hatchery Operations

Once they arrive at the hatchery, adult salmon take 3 to 4 months to attain spawning condition. Periodically the fish are checked to see if they are "ripe" (ready to spawn). They are also inoculated for bacterial kidney disease, which can be transmitted from adults to eggs.

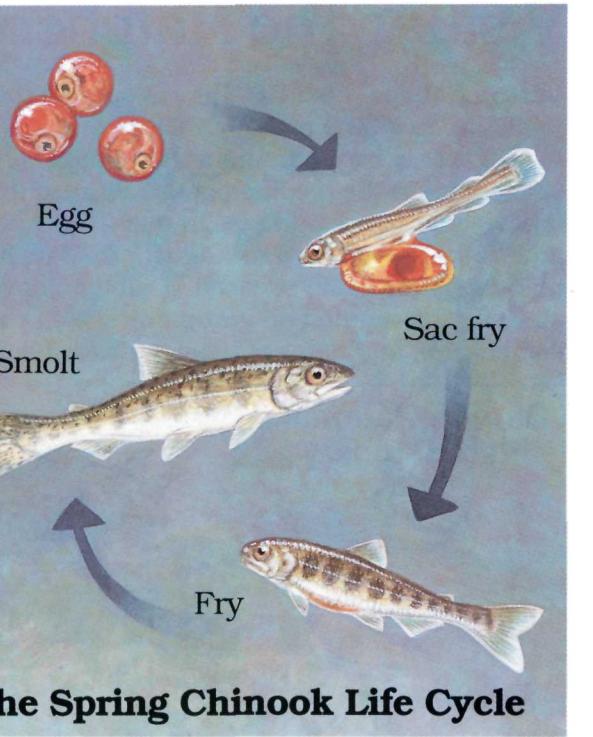
Right: An adult salmon is inoculated for bacterial kidney disease.
Below: Taking eggs.



When most of the fish are ripe, they are crowded into an anesthetic tank, sedated, and lifted to the spawning shed. Ripe fish are quickly killed to facilitate handling; "green" fish are sent back to the holding pond. Females are then cut open to release their eggs. Milt, stripped from a male, is mixed with the eggs to fertilize them.



At the hatchery building, eggs are washed, disinfected, and poured into incubation buckets. Cold, well-aerated water flowing through the buckets mimics a stream environment. When the embryos' eyes can be seen, the eggs are transferred to wire-mesh trays and immersed in troughs of Tyee Spring water.



From Egg to Smolt

After 80 days eggs hatch into *sac fry*, eel-like creatures about an inch long, with sacs of egg yolk attached to their bellies. They stay in incubation trays for 10 weeks, until they use up the yolk. As the yolk sac shrinks, belly tissue closes around it—a process called "buttoning up."

Hungry now, the young salmon, now called *fry*, instinctively swim upwards in search of food. They are transferred to outdoor raceways and fed a nutritious diet containing fish and grain meal, plus vitamins and minerals. Some of the fry are raised in earthen ponds rather than raceways. These are more similar to a natural environment. When they are 5 months old, fry are marked with coded wire tags (see "Research at Carson").

When fry are 18 months old and about 6 inches long, they *smolt*: tails lengthen and become more deeply forked, juvenile spots disappear, and the urge to migrate begins.

Release to the Wild

In April, Carson's smolts are released in the Wind River or loaded onto tank trucks for release elsewhere. Smolts swim downstream to estuaries at the mouth of the Columbia River. They stay there for several weeks, feeding voraciously and adjusting to salt water. Time spent feeding in the estuary is critical to their survival in the ocean: larger smolts are better at evading predators.



In the spring, smolts are loaded into tank trucks for release elsewhere.

Journey to the Sea

Finally, smolts begin the journey to their ocean feeding grounds, swimming north along the coasts of Washington, British Columbia, and Alaska, and then spreading out into North Pacific waters. Spring chinook typically spend 2 to 3 years at sea before returning home, but up to 7 years has been recorded.



For every 100 released smolts, only one adult chinook salmon returns to spawn.

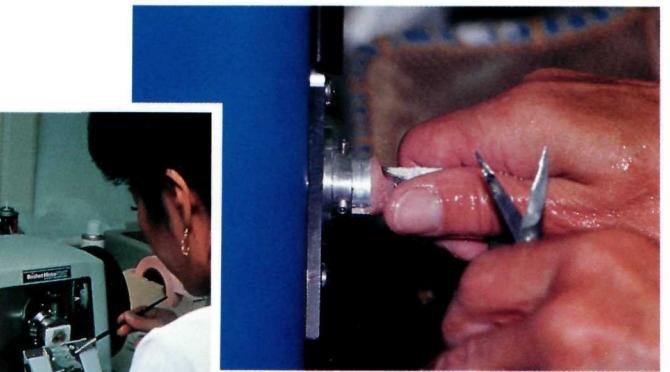
Research at Carson

Carson participates in ongoing research projects in cooperation with the U.S. Fish and Wildlife Service's Fish Health Centers and fishery resource offices.

Marking Before Release

Many of Carson's fry are marked with tiny coded wire tags. Tags recovered from adult fish provide valuable information about the survivorship of each year's release, migration routes, and the success of experimental rearing techniques.

Workers use a tagging machine to insert a hair-thin bit of wire into the fry's nose and then clip the adipose fin to signal the presence of a tag. Coded notches on the tag tell where and when the fish was raised and if it was part of an experimental group. Biologists collect heads of tagged adult salmon that are caught in ocean and river fisheries, remove and decode the tags, and enter the information into a computer database.



Above: Marking fry with coded wire tag.
Left: At a Fish Health Center, tissue samples are prepared for analysis.

Fighting Fish Diseases

Since hatchery conditions are relatively crowded, disease can spread rapidly. Fish health specialists work with hatcheries to study and combat disease. At Carson, several raceways often contain fry being given experimental medicated food. Fish health specialists collect tissue and ovarian fluid samples from adult salmon at spawning time and report any findings of disease to the hatchery.