

U.S. Fish & Wildlife Service

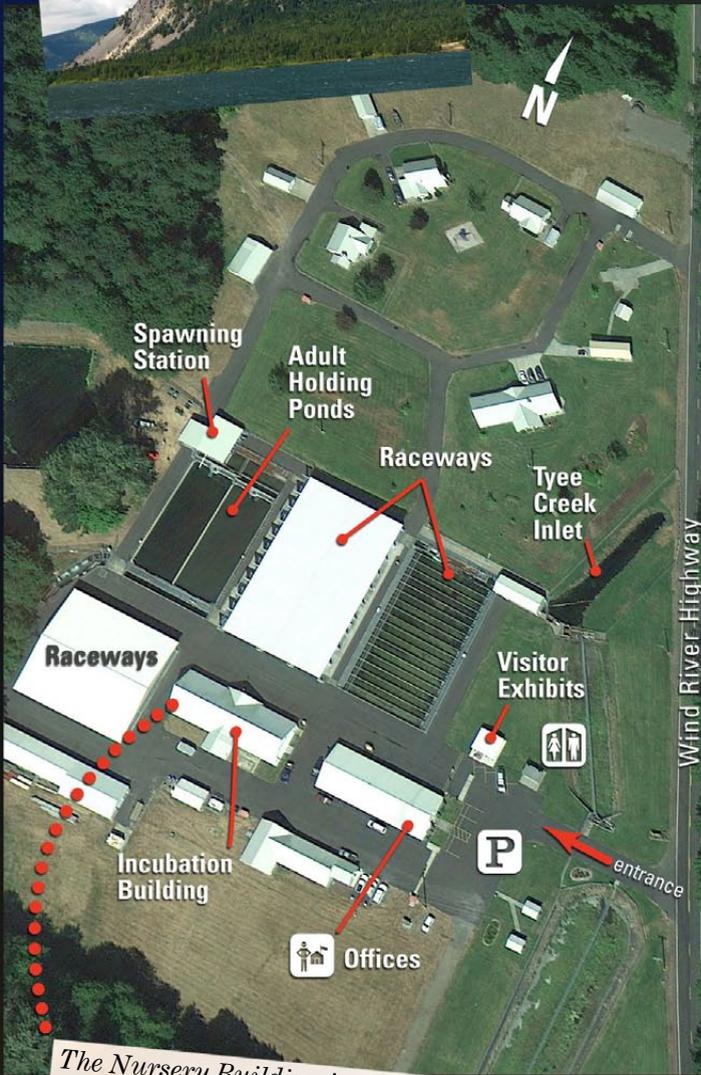
# Carson

*National Fish  
Hatchery*



*Wind Mountain  
seen from Oregon.*

© Curious Gorge



*The Nursery Building is the  
only remaining 1938 structure  
built by the CCC.*



## Welcome

Welcome to Carson National Fish Hatchery (NFH) in the beautiful Gifford Pinchot National Forest. We are open daily from 7:30 am to 4:00 pm. Here are some key events and times to visit the hatchery and see spring Chinook salmon:

- **mid-April:** salmon smolts released
- **May 1:** fish ladder opens to returning adults
- **May to June:** watch adults navigate the fish ladder
- **May to August:** big fish (adults) in holding ponds—always fun to watch!
- **August (first three Wednesdays):** Spring Chinook salmon spawning (call the hatchery at 509-427-5905 for specific dates.)
- **Kid's Fishing Day:** Saturday after Labor Day, 8:00 am - 1:00 pm (registration closes at noon)

Please take a short tour using this map and the yellow painted fish on the pavement. Don't hesitate to ask questions of our staff.

*Kid's Fishing  
Day is a popular  
event sponsored  
by the hatchery.*

USFWS image



## Why the hatchery exists



*The Yakama leader Ou-hi was one of many representatives at the treaty council of 1855 in Walla Walla. The hatchery helps the U.S. honor this treaty.*

Washington State  
Historical Society



*A leaping spring Chinook salmon.*

© Charles G. Summers,  
Junior

## A fish-happy location

Carson NFH raises spring Chinook salmon as required by the policies, laws, and treaties of the United States government. The fish raised here are released into the Wind River (primarily) and Walla Walla Basin as part of a treaty with the Native American tribes of this region. In exchange for much of the land we now call Oregon, Washington, and Idaho, the Tribes required that they be allowed to fish for salmon at their traditional fishing sites. Put simply, it would be a treaty violation if there are no fish to catch.

The creation of Carson NFH in the spring of 1937 was by a special act of congress. It was reauthorized (funded) a year later as part of the Mitchell Act. This act supports Columbia River salmon conservation mitigating the adverse effects of hydroelectric dams on fish. Funds from the Mitchell Act pay for state and federal hatcheries, fish screens to keep young fish out of agricultural fields, habitat restoration, and research into salmon biology/ecology.

Catching a 20-pound spring Chinook at the mouth of the Wind River is a memorable experience. Families build traditions around salmon fishing. Carson NFH provides fish to the sport fishery at all points from the ocean to the Wind River. Carson also supports the commercial ocean fishery.

This is a perfect spot for a salmon hatchery. Carson's ponds and incubation buildings are fed by pollution-free Tyee Spring, which stays at a constant 44 degrees—ideal for incubating salmon eggs. Adult salmon have only one dam to negotiate, and as a result, Carson has one of the highest adult return rates of any hatchery.

*Carson National Fish Hatchery is important to the tribal and recreational fisheries on the Wind and the Columbia Rivers. The hatcheries success is due in large part to the clean cold water of Tyee Spring (bottom)*



Benjamin Brink, The Oregonian



© The Columbian



USFWS image



*Construction of Bonneville Dam in 1936.*

History Museum, Hood River County

## **Tyee Spring**

In its early years, Carson NFH was referred to as the “Tyee Substation.” Tyee is a Chinook word meaning elder brother or senior (as in “older than...”). The Chinook people built a vast trade empire that stretched from the mouth of the Columbia inland to the Rocky Mountains. Salmon was the basis of this trade. In the early trade dialectic used by the first explorers to this region, tyee came to mean chief, or leader (along with another Chinook word we’ve adopted into English: high muckamuck which we take to mean “boss,” but originally meant someone who has plenty to eat).



*Tyee is a Chinook word. A reminder of the previous inhabitants here.*

Washington State  
History Museum

By the time Lewis and Clark passed by the mouth of the Wind River in October of 1805, the Chinook empire was in steep decline, ravaged by diseases that arrived with 18th century European sailors, and had moved inland with the trade. Some old encyclopedias erroneously report that the Chinook are “extinct.” However, the Chinook people are still with us today, although the tribe is not officially recognized by the U.S. government.

## **The Tyee Hatchery begins**

The decade of the 1930s overshadowed unease surrounding declining Columbia salmon runs. The depression and the economic and environmental disaster of the Dust Bowl were much more pressing concerns. Newly elected President Franklin Delano Roosevelt (FDR) promoted the Pacific Northwest as a remedy. Key to his vision was hydroelectric power on the Columbia and the vast potential for new irrigable farmland. “You have acreage capable of supporting a much larger population....By proceeding with these great projects [Bonneville/Grand Coulee Dams; Columbia Basin Reclamation Project], it will...give an opportunity to many individuals and many families back in the older, settled parts of the nation to come out here and distribute some of the burdens which fall on them more heavily than fall on the West.” Thus Washington and Oregon became the country’s economic safety net.

*President Roosevelt encouraged citizens to move to the Northwest during the dustbowl.*

[www.History.com](http://www.History.com)





*Bonneville Dam would tame the wild river at the Cascades, a treacherous run of river and a key salmon fishing site for Native people. Shown here in 1902.*

© Benjamin Gifford



*This Washington State hatchery built in 1899 at the mouth of the Wind River was submerged under the Bonneville Pool.*

In comparison to the upper tributaries and headwaters, at this time the Columbia's main stem was the least altered by development. That was to change. 1933 saw the completion of Rock Island Dam near Wenatchee. Congress approved Bonneville Dam construction that same year, and engineers already had the drawings for 25 more main channel dams to be built over the next 40 years. No one yet knew how salmon would navigate past such high dams. Some were pessimistic to the point of believing, despite the fish ladders, that all Columbia salmon runs soon would end at Bonneville.

Concurrent to the start of Bonneville Dam, Tye (Carson) Hatchery construction began in 1935. The proposed federal hatchery would replace a Washington State facility built in 1899 at the mouth of the Wind River. This state hatchery was lost in 1938 when water backed up behind the new dam.

## A Civilian Conservation Corps (CCC) hatchery



*The two-fold goal of the Civilian Conservation Corps (CCC) was "to build men and forests."*

Albert M. Bender,  
WPA Art Project, 1941

In 1933 unemployment reached 24.9% in the U.S. The depression was grinding down the morale of America, but FDR had a plan:

“The overwhelming majority of unemployed Americans, who are now walking the streets and receiving private or public relief would infinitely prefer to work.” —March 21, 1933, Message to Congress

By March 31, 1933 Roosevelt received congressional approval for 250,000 Civilian Conservation Corps members. Men aged 18-25 came to Fort Vancouver to sign on with the 9th CCC. The Army ran things. The Forest Service provided projects.

The 9th Corps covered 12 million acres of forest. Local Experienced Men (LEM), skilled craftsmen from the area, worked with the “boys.” Camp Hemlock was the first CCC camp in what was the Columbia National Forest. The Camp’s Company 944 started construction on the hatchery in 1935.

## One CCC Story from Company 944



*Phil Amoruso in 2003.*

Heritage Program,  
Gifford Pinchot NF

Phil Amoruso was born on a farm in 1920 between Heisson and Crawford, Washington. When he signed up in 1935 he was not 18 years old. He snuck the paperwork that would allow him to enroll at age 16 (even though he wasn’t) to his mother. “I knew better than to get my dad because he wouldn’t sign it for me.” Mom signed and he was carted off in a “little Chevrolet van” with half-a-dozen other boys to Camp Hemlock arriving in the frigid cold of January.

For the next three months Phil was isolated from his family, “You could get homesick as you wanted to, but you couldn’t get away from there.” His first job was splitting shake shingles for the camp equipment shed.



*This is the type of Caterpillar Phil would have driven right here in 1935-36.*

USFS image

Spring found Phil cutting brush to clear campsites at Government Mineral Springs campground. One day the foreman, Theed Worthington checked in:

“Old Theed come around a couple times and he says, ‘Boy, you guys are really working,’ he says, ‘I don’t ever have to check up on you,’ and he says, ‘You don’t want to be cutting brush all your life; what do you want to do?’ I said, well, I wanted to learn all I could about mechanics, and I said I liked to drive Cat and stuff like that. He said, ‘Well, I’ll see what I can do.’”

Soon Phil was driving an “old 60 gas Cat” out to Tyee Springs to start on the hatchery. With the Cat and draglines they dredged the Wind River to deepen a channel and raise flood-protection banks with the scooped out gravel.

The CCC worked on the hatchery from 1935 to 1937. The younger less experienced workers, like Phil, cleared the area of trees, brush, stumps and snags. CCC hands dug the ponds, raceways, and building foundations. They poured a lot of concrete. Intricate rockwork and high quality carpentry with distinctive details became the hallmark of CCC in the northwest and Carson bears this out.

*A CCC collage, from top to bottom: Company 944 Columbia National Forest in 1935; Camp Hemlock baseball team at Ft. Vancouver 1940; office detail at Camp Hemlock; a CCC trunk; brake maintenance at Camp Hemlock; a visit with the Camp Hemlock dentist; firefighters with pulaskis posing for a photo as they mobilize; CCC bronze button.*

All black and white images courtesy of the Heritage Program, Gifford Pinchot National Forest; trunk image courtesy of Minnesota Historical Society; button from icollector.com



## Mitigating the loss of Spring Chinook

© Darin Oswald



*A famous fish illustrates the plight of all inland salmon: Lonesome Larry was the last wild sockeye to make it to Redfish Lake, Idaho in 1992. Only 16 sockeye returned to the entire snake system between 1992 and 1998. The state of Idaho is using hatcheries to restore the sockeye, but should the dams on the river be removed instead?*

In 1944, Willis Rich and three other U.S. Fish and Wildlife Service biologists wrote a letter to their supervisor in Washington protesting the building of any more dams on the Columbia and Snake Rivers: “It goes without saying that some effort must be made to save the salmon runs. No competent fishery biologist is willing to assert that the salmon runs can be preserved if the full program of [dam] construction does go through.”

Rich and company planned an aggressive “frontal attack” on the dam construction program, but pressure from their superiors in Washington backed them down. Eventually they accepted the dams as inevitable and worked on a different plan, one that would reluctantly\* include hatcheries. Rich and colleagues proposed abandoning the upper river to the dams and to development. Meanwhile, the most important salmon runs would be moved from the upper basin to the lower—specifically to tributaries below the then proposed Umatilla [McNary] Dam.

By 1950 fully half of spring Chinook salmon habitat was blocked or degraded in the upper reaches of the Columbia basin. Spring Chinook have always been worth more commercially than their fall cousins. Under the new plan, the precedent was set to propagate high-value “springers” on rivers where they were not native. In other words, move them from the headwaters and tributaries to the river below McNary Dam. It would be another 30 years before this plan saw official fulfillment at the Carson hatchery.

\*Willis Rich and others did not believe hatcheries could augment natural production or replace runs lost to habitat degradation or overharvest. They knew that Canada had rejected both hatcheries (and dams) in its plans to revitalize sockeye salmon on the Fraser River, the next major system to the north, and Rich’s group wished to do the same for the Columbia.



## From many fish to spring Chinook

*Above, species propagated at Carson NFH before settling on spring Chinook exclusively.*

In the winter of 1937, Carson took delivery of three million fall Chinook eggs from the Little White Salmon Hatchery. Fall Chinook were the dominant species reared from 1937 to 1964. Rainbow trout, black spotted trout (Yellowstone cutthroat), brook trout, steelhead, spring Chinook salmon, Coho salmon, sockeye salmon (shipped as eyed eggs), and kokanee were raised intermittently from 1938 through 1981, the year production switched exclusively to “springers.”



*Completed in 1956, Shipherd Falls fishway allowed salmon to swim above the previously impassable falls under the cover of metal grates.*

© Chris Berger

The first spring Chinook came to Carson from brood stock supplied by Bonneville Dam's Hatchery in the 1950s. These were a mix of springers from the Snake, John Day, Deschutes, and Yakima Rivers. Imprinting the fish on the hatchery took time. Small numbers of springers were counted past the Shipherd Falls fishway up to 1959 when 107 adults actually entered the hatchery itself.

Carson NFH raises 1.42 million spring Chinook each year to mitigate for loss of habitat above McNary Dam. Of this yearly count, 250,000 pre-smolts are trucked to the South Fork Walla Walla River. The transfer is timed so that the pre-smolts will imprint on this river system in holding ponds. Once acclimated to the water, the smolts are released into the wild river. All this is under the direction of the Confederated Tribes of the Umatilla Indian Reservation. The goal is to rebuild spring Chinook runs above McNary Dam. The remaining 1.17 million smolts raised here are released directly into the Wind River.



*Adult "springers" in a holding pond.*

USFWS image

## **Our fish through the year**

When they return as adults each May and June, Carson's spring Chinook follow the scent of Tye Spring right up the fish ladder and into the hatchery's holding ponds. Here they stay until they are ready to spawn. Adults take 2 to 3 months to become "ripe" or ready to spawn. Periodically the fish are checked for readiness.

In July, about a month before spawning, the salmon are inoculated for bacterial kidney disease (BKD), which can be transmitted from adults to eggs (for more on BKD see below).

*Collecting eggs into a sanitized colander. Eggs are not mixed at first. Tracking eggs back to a particular female is important for disease control.*

When most of the fish are ripe in August, they are crowded into the spawning area. 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.



USFWS image



*In late winter, fry are transferred from the incubation building to the raceways.*

USFWS image

At the hatchery building, eggs are washed, disinfected, and poured into incubation trays. Cold, well-aerated water flowing through the trays mimics a stream environment. After 80 days, in November, 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 absorb the yolk.

In January and February their bellies suck in and “button up” once their yolk is spent. Hungry now, the young salmon called fry, instinctively swim upwards in search of food. At this time they are transferred outdoors and fed a nutritious diet containing fish and grain meal, plus vitamins and minerals.



*A chinook salmon smolt.*

© M. Sparkman

When fry are 18 months old and about 6 inches long, they transform into smolts in preparation for a life in salt water: tails lengthen and become more deeply forked, juvenile spots disappear, and the urge to migrate begins. In April, Carson’s smolts are released into the Wind River. They swim downstream to estuaries at the mouth of the Columbia River. They stay there for several weeks, feeding voraciously and adjusting to salt water.

### **The more we learn, the healthier the fish**



*A spawning rash from bacterial kidney disease.*

R. Pascho/D. Elliot

Managing fish health in a crowded environment can be a challenge. The hatchery works closely with the Fish Health Center in Willard, Washington to ensure the fish stay healthy. Spring Chinook are particularly susceptible to Bacterial Kidney Disease or BKD. This is a naturally occurring disease, but can be devastating in a high-density fish culture environment. Outbreaks of BKD have caused large fish losses in the past.

*A fish health biologist takes samples from each female to assay for potential risk of Bacterial Kidney Disease. Due to ELISA, fewer eggs need to be culled, therefore less females are needed to meet our egg requirement. That means more fish for the tribal and sport fisheries.*

USFWS image



Since BKD can be transferred to the eggs from the female, kidney samples are taken from the females during spawning. The enzyme-linked immunosorbent assay or ELISA identifies the potential risk of BKD in each female. Fish that assay at a high count of the bacteria per sample are termed high-risk. High-risk females are culled along with their eggs. The incidence of BKD high-risk adults returning has been greatly reduced by laboratory science. ELISA and antibiotic injections together have almost eliminated outbreaks of BKD at the hatchery.

### **Shading the raceways**



*Shade over the raceways makes for healthier fish.*

USFWS image

Who knew fish could get sunburned? They can, and this leads to fungal infection and a suppressed immune system. In 2012 we covered the raceways here in the tent-like triangles you now see. A sun-drenched raceway poses other problems. We noticed that fingerlings crowded in shady areas of the raceway. This led to less time spent on feeding and inhibited healthy growth. Lastly, covered raceways block avian predators like kingfishers and blue herons.

## Hatchery future

As early as 1944 Willis Rich and his fellow U.S. Fish & Wildlife biologists predicted the extinction of Snake River and Upper Columbia Basin salmon runs if all the proposed dams were built. Just as they foresaw, in 1991, the fall, spring, and summer runs of Chinook on the Snake were listed as threatened, and its sockeye runs as endangered. However, more alarming still, coastal coho were also listed that year even though less than 1% of coast habitat is blocked by dams.

Today, 1 in 5 Columbia salmon is wild, the rest are hatchery born. Has optimism in hatcheries caused us to lose sight of the bigger picture? Some salmon biologists and conservationists think so. They feel that hatcheries are actually a hindrance to salmon recovery because they mask the fact that salmon habitat from ocean to mountain is fractured and broken. They say we build hatcheries because we want to have lots of fish without having to care for our rivers.

The debate over hatcheries, salmon, dams, and rivers will continue, but it is much larger than dams and it is a much bigger issue than just salmon. The decline of Columbia's salmon runs from 16 million to 1 million fish is telling us something: A wild river is so much more than a salmon nursery. It is a very complex system that makes salmon as a byproduct not as a primary goal. If restoring rivers to their natural state becomes a high priority in our society, then leaving the need for hatcheries to the history books will be a happy state indeed.



*Someday, some other source of cheap clean energy will take the place of hydroelectricity. We can then remove as many dams in the Columbia Basin as we want, but will that be enough for the river to sustain Columbia's salmon?*

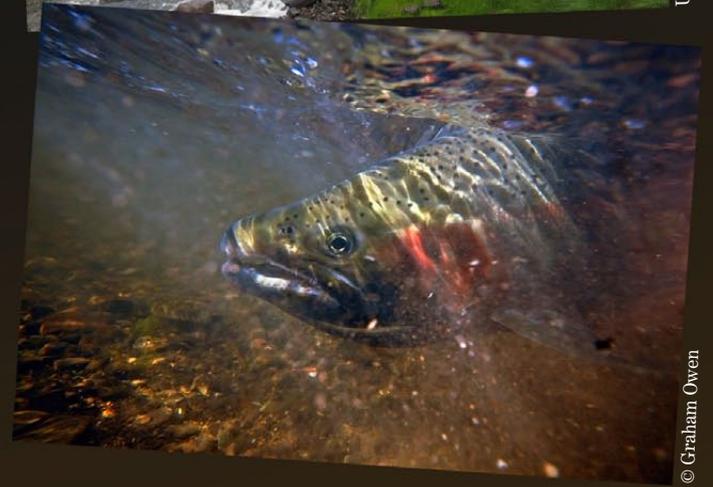
*Hemlock Dam was built by the CCC on the Wind River system the same time as this hatchery, 1935-37 (top). In 2009, it was removed, but first fish were gathered to safety (3rd from top). With the stream channel restored (middle) steelhead returned the very next year (bottom).*



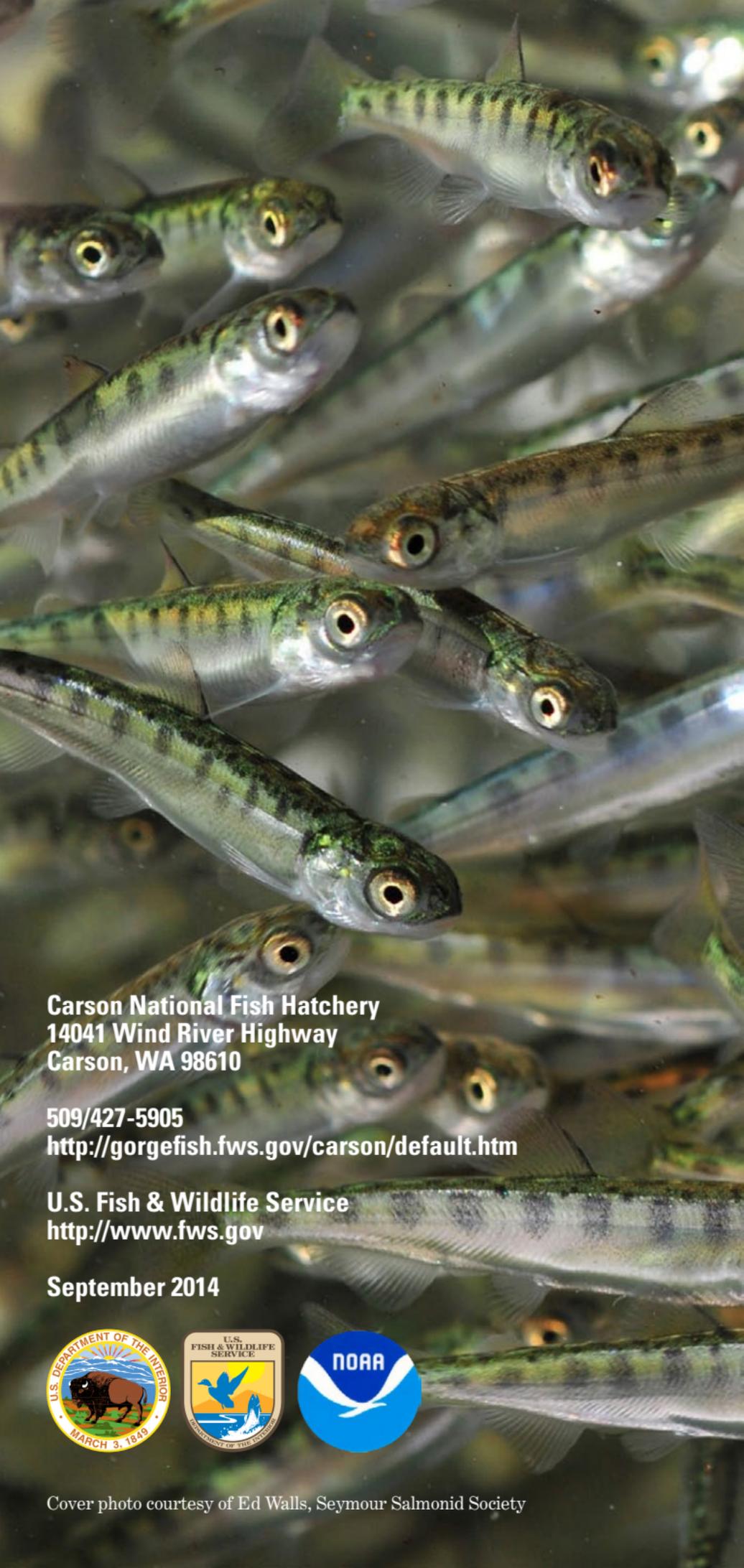
www.Smith-Root.com



USFS



© Graham Owen



**Carson National Fish Hatchery**  
14041 Wind River Highway  
Carson, WA 98610

**509/427-5905**

**<http://gorgefish.fws.gov/carson/default.htm>**

**U.S. Fish & Wildlife Service**  
**<http://www.fws.gov>**

**September 2014**



Cover photo courtesy of Ed Walls, Seymour Salmonid Society