

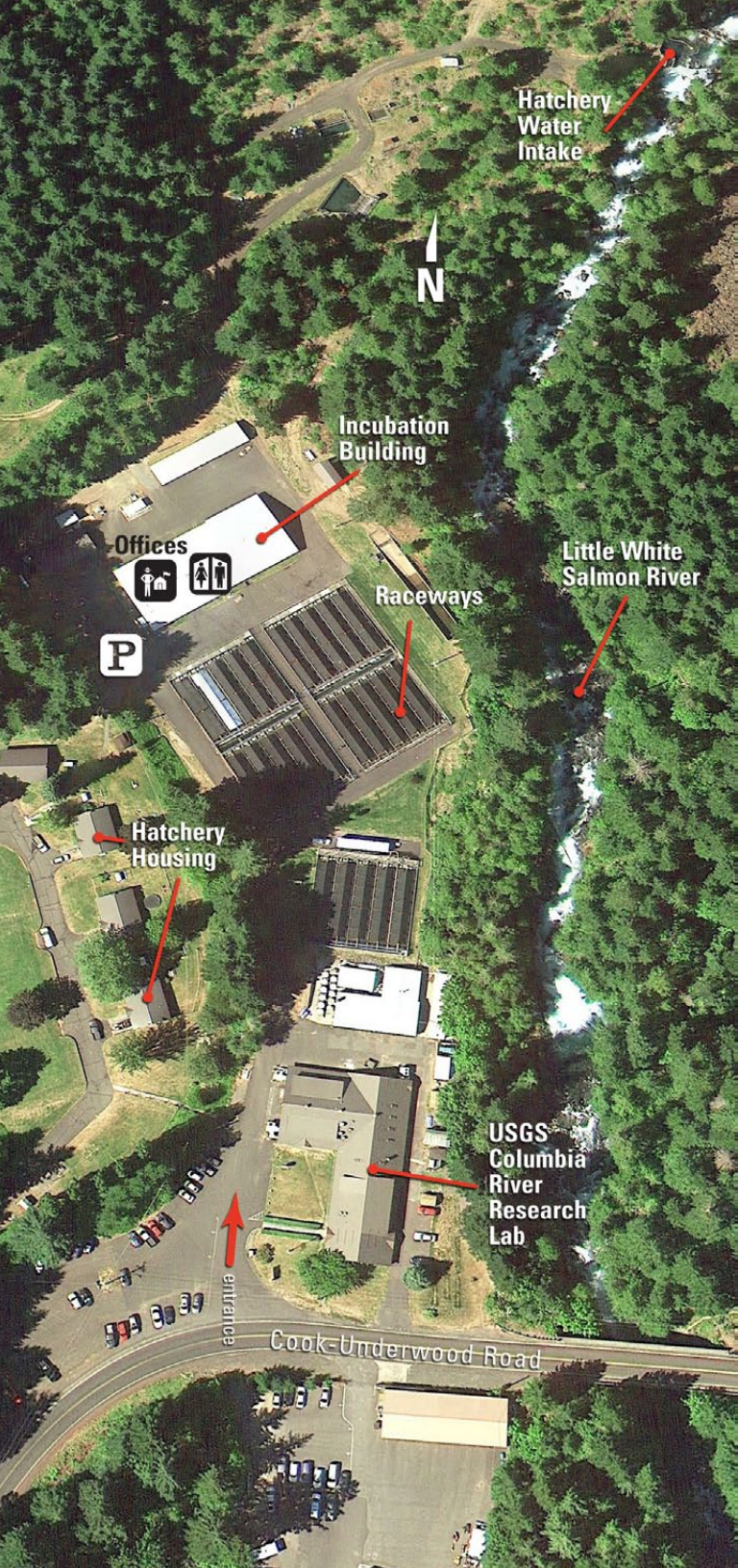
U.S. Fish & Wildlife Service

# Willard

*National Fish  
Hatchery*







## Welcome



*There is plenty of watchable wildlife in and around the hatchery.*

© Glenn Bartley

Welcome to Willard National Fish Hatchery (NFH). The hatchery is open daily from 7:30 am to 4:00 pm. Take the self-guided tour of interpretive panels in the main building and along the raceways. This tour and brochure will give a better understanding of Willard's contributions to Columbia salmon science, propagation, and conservation.

Take the time to enjoy the forest and its wildlife. The hatchery sits right on the river at the edge of Gifford Pinchot National Forest. A set of binoculars to watch birds and other wildlife is helpful. Or, simply stand still and listen to the sounds of water, fish, birds, and the wind.

## No adult fish here



*30-foot high Spirit Falls on the Little White Salmon River.*

© Long Nguyen

"Where are the big fish?" Willard is unusual as a hatchery in that we do not hold adult salmon here for spawning. Historically no salmon could get above Spirit Falls to reach this part of the Little White Salmon River. Today, a containment dam at Little White Salmon NFH on the lower river stops fish even sooner.

At this time, Willard receives eyed eggs spawned at Little White Salmon NFH (fall Chinook) and either the Peshastin Incubation Facility, Leavenworth NFH or Winthrop NFH (coho). These are raised here for approximately 18 months. We consistently have two brood years of salmon in our nursery and raceways.

## About Willard National Fish Hatchery

Established in 1952, Willard NFH is part of the Columbia River Gorge NFH Complex including Carson, Eagle Creek, Little White Salmon and Spring Creek hatcheries. Initially intended as a fall Chinook facility, it was designed to be a major salmon producer in the region.





*Chief Tommy Thompson of Celilo was born in 1855 when the treaties guaranteeing access to salmon were signed. He lived to see and regret the Dalles Dam completion in 1957.*

OldOregonPhotos.com

In its first year, the hatchery released 10,159,057 fall Chinook fingerlings. Six years later the hatchery peaked at 39,602,182 fall Chinook released into the Columbia. In 1963, coho became the species of focus and fall Chinook took a “back seat.”

This hatchery’s main purpose is to mitigate for the loss of salmon associated with large-scale hydroelectric projects such as the Mid-Columbia dams. This mitigation effort serves commercial and recreational fisheries both in the river and ocean.

A third fishery supported by Willard is the Native American Fishery. The hatchery meets obligations outlined by 19th century treaties—and subsequent 20th century court rulings on treaties—between the United States and Northwest Indian tribes. Producing fall Chinook for the Columbia River, specifically Drano Lake, and efforts to restore coho runs in the Wenatchee Basin are ways in which the hatchery honors U.S. Treaty obligations.

### **Finding the ideal food**



*The goal of hatchery food is to mimic the rich nutrition of aquatic invertebrates like this blackfly larvae eaten by wild salmon fry.*

© NWnature.net

Coupled with the Western Nutrition Laboratory (now the U.S. Geological Service Columbia River Research Lab), Willard entered the quest for the perfect salmon food. In 1953, the fish diet was a 50/50 blend of beef and hog liver to start. Once the fry were feeding well, the recipe shifted to 15% beef liver, 15% hog liver, 34% salmon eggs, 34% salmon flesh, and 2% salt—this was the official “production diet,” but it was labor intensive and inefficient.

The holy grail of food would be dry pellets not requiring refrigeration. It would be cheap, palatable, and efficient: more food in the fish at less cost with a high protein to calorie ratio. It would contain readily available ingredients, and

*Many hatchery workers were proficient butchers. Grinding Willard’s “production diet” from domestic livestock and adult salmon was time consuming smelly work.*

USFWS image



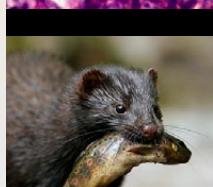
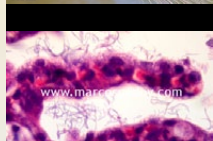
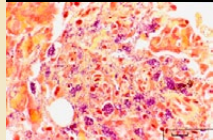
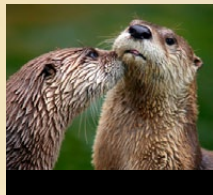
*A hatchery worker feeds salmon fry food that owes its existence to experiments performed here at Willard NFH.*

USFWS image

derive vitamin content from these ingredients (not from expensive additives). It would feed “hot”—fatten fish quickly in Willard’s cold water. The proof of the food’s efficacy would be larger fish, specifically 15 fish per pound at release.

Willard and the Nutrition Lab were pioneers in salmon food science. Fine tuning ingredients over decades of side-by-side testing yielded breakthrough after breakthrough. In the late 1960s, a series of recipes by Oregon Moist Pellet were tested and version “number 4” was the clear winner. Pitted against other foods like “Clark’s New Age Salmon Feed,” number 4 was the food of choice into the 1970s. The last quarter of the 20th century saw the program taper off, but the impact of Willard’s pioneering work is still found in the salmon food industry today.

## It isn't easy



*Many things attack Willard salmon fry. By far the most devastating are disease pathogens: bacterial kidney disease (histological cross-section, 2d from top; and, cold water disease bacteria (4th from top).*

otters © Dmitry Azovtsev; BKD image by R. Pascho; great blue heron © Jim Coda; CWD © Marcos Godoy; mink © John MacAvoy

Two problems were noted in the hatchery's first season: 1) the cold water here (40-42°F) slowed egg incubation and fry growth, and 2) winter floods spread silt and debris throughout the hatchery.

In 1970, Carson Depot Spring's (a separate facility located about 15 miles away, near the Columbia River) 48° F water was used to accelerate coho incubation. Eggs were fertilized at Carson Depot, then the "eyed" eggs were trucked here. This strategy proved successful. Eventually, Little White Salmon NFH took over this part of the process leaving Carson Depot open for other experiments requiring its relative isolation.

Siltation from winter flooding increased mortality in the nursery and raceways. In 1973, 81 tons of mud was deposited in the raceways. Some debris is expected during winter flooding, but logging and logging roads aggravate the problem. Soil erosion has been an ongoing issue since the hatchery opened. A recent concern is herbicide runoff. Timber companies regularly spray to control plants that compete with newly planted trees. Herbicides are a health hazard to juvenile salmon not to mention the watershed as a whole.

Disease is a major concern at any hatchery. Of particular concern at Willard is one called bacterial cold water disease. The bacteria (*Flavobacterium psychrophilum*) favors cold water; thus the name. Antibiotics in the feed control it.

1995 illustrates hatchery woes. Low coho returns to the Little White Salmon River required the hatchery to seek eggs elsewhere. One batch was riddled with bacterial kidney disease. The decision to destroy the lot was in the interest of keeping diseased adults from contaminating

healthy ones when they returned from the ocean. The same year, a family of mink made the hatchery its larder eating 23,313 fish in raceway 40. (A year later, otters would eat 51,329 of 57,960 fish in raceway 50.) Heron predation was also particularly bad in 1995.

## Mothballed hatchery?



*Columbia salmon hatcheries span over a century of tradition, expertise, and professionalism. These 1960 hatchery workers weighing fish here at Willard NFH would also have noted that it is cold hard work.*

USFWS image

Hatchery work is a rewarding profession. The task of raising salmon is taken seriously here. In one sense, the fish are an extension of the hatchery staff, a kind of "family." Disease in the raceways is taken as both a personal and professional insult. The task to eradicate it puts science and expertise into frantic but efficient motion. Career satisfaction comes from releasing healthy fish to hopefully thrive in the wild.

In August of 2003 the U.S. Fish & Wildlife Service announced that due to shortfalls in funding for fiscal year 2004, Willard NFH would be closed. The Service intended to "mothball" the facility. This hard news only got harder.

The low point came in the December of 2003. Faced with imminent closure, hatchery workers destroyed some 2,500,000 coho eggs and sac fry by burying them in the ground. "That was one of the most displeasing things my staff and I have had to do in our careers," one manager said at the time. As a final professional indignity, the hatchery was directed to release its brood year 2002 coho three months early. It looked like the end for Willard NFH.

However, there was a silver lining. The only coho left at the hatchery in 2003 were fish from the Yakama Nation Mid-Columbia reintroduction project. These fish, and the particular niche they represented to salmon restoration, would save the hatchery.



## Hatchery's new niche



*A healthy coho smolt.*

© Eric Ettlinger

As recently as 13,000 years ago, mega-floods scoured the Columbia from Spokane to Astoria. Many Columbia salmon runs vanished. Biologically speaking, they were extirpated. A salmon run is extirpated when it is locally extinct. Unlike universal extinction, the same type of fish could return to reestablish itself locally again. After the floods, salmon runs were reestablished naturally throughout the Columbia System.

In contrast, the extirpation of coho runs within the Clearwater River system of Idaho was not natural. Dams, mining, logging, agriculture, fishing and human development all ate away at these runs until they were completely erased. In 1998, Willard NFH partnered with Idaho's Nez Perce Tribe to reintroduce coho into Lapwai and Potlatch Creeks.



*Official logo of the Yakama Nation.*

Mid-Columbia basin coho were extirpated by 1980. From the mid-1980s to 1995 the Yakama augmented the coho harvest by releasing hatchery fish. But, there is a difference between augmentation and restoration. In 1996, the Yakama Nation proposed restoring coho to the Mid-Columbia, specifically the Methow River, and Willard NFH was a good fit to help in this effort.

The hatchery found itself in a new niche: helping Northwest Tribes establish locally-adapted, naturally spawning coho populations in rivers where they were extirpated. In 2000, the Yakama added the Wenatchee River system to their coho reintroduction plan. This is the project that solidified a more reliable funding source for the hatchery allowing it to continue operating.



*The young derived from locally adapted adults—like this male coho below—are raised here. As smolts, they are trucked to acclimation ponds as directed by the Yakama Nation. Eventually they enter the open river and the ocean having primarily imprinted on Mid-Columbia waters.*

## Hatchery future



*Willard NFH has participated in experiments to raise endangered bull trout (above); and, there has been talk of raising Pacific lamprey here as well (below).*

© Associated Press (top)  
© Rick Bowmer for AP

Willard's re-introductions of coho is a big deal for Columbia salmon conservation. To take a lower river stock of coho and adapt it over several generations to become a "naturalized" inland river fish is remarkable. Recently, there have been fishable populations of coho in the Methow and Wenatchee Rivers and there is every reason to be optimistic about these becoming self-sustaining runs.

Such advances in conservation may put Willard NFH out of business. The sunset for the Mid-Columbia coho restoration program is set for 2028. Ideally, by that time the runs will be self-sustaining and Willard NFH will conclude this project. But, there may be need for this facility yet.

In 2011 and 2012, Willard raised endangered bull trout. The cold, clean water supply along with the fact that effluence can be sequestered made Willard an ideal bull trout nursery. Maybe this hints at Willard's future: saving imperiled species.

Such collaborative efforts could go outside the usual fish culture of trout and salmon. Willard NFH could experiment with raising Pacific lamprey, another species of concern. Still, these projects in fish culture are patchwork solutions. Hatcheries don't address the big-picture problem of compromised river health. They don't fix broken rivers.

Remember, there were no salmon hatcheries helping the Yakama Nation or any other native people 250 years ago. Columbia salmon once numbered in the range of 16 million fish, and people benefitted from this natural bounty for centuries. Could we ever put every hatchery out of business? Probably not. Can we find a balance between healthy rivers for salmon and healthy human communities? That would be a good place to start.

*Coho fry continue to swim the raceways here, but Willard National Fish Hatchery may yet raise different fish—maybe even different aquatic animals—whatever is needed to supplement river restoration and conservation efforts.*



© Michael Durham



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**September 2014**

