



## U.S. Fish and Wildlife Service

### Leavenworth National Fish Hatchery



The hatchery was authorized in 1937 and built by the Bureau of Reclamation from 1939-1940. It was at that time the largest salmon hatchery in the world! Entiat and Winthrop National Fish Hatcheries opened in 1941 and 1942, creating a complex of hatcheries working together. The purpose of the hatcheries was to keep salmon and steelhead in the Columbia River system after dams like the Grand Coulee were built.

Leavenworth NFH currently raises 1.2 million juvenile spring Chinook salmon every year, releasing them into Icicle Creek. In 1998, Leavenworth NFH was placed on the National Registry of Historic Places. Visitors today can see the nursery, adult holding ponds, fish ladder, raceways, rearing ponds, and other features of an active hatchery, still operating from the original buildings.

Come take a walk through time and explore the ambitious past, the busy present, and the hopeful future of our relationship with salmon in Washington State!



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### *Leavenworth National Fish Hatchery*

*The Leavenworth site was chosen in 1936 “because of the natural S-curve meander necessary for spawning ponds and the large terrace that would easily accommodate the large rearing ponds and hatchery buildings needed for the extensive fish-culture operation,” according to Hanford Thayer, who was on the survey team. A team of engineers and biologists designed the facility, surveying and planning from 1936-1938.*

Construction began in the summer of 1939. The nursery needed to be ready in December or the whole year’s run of salmon would be lost; so despite delays, seven contractors worked rapidly and simultaneously to dig canals and rearing ponds, install pipes, and build dams, roads, the hatchery building, a garage, and a refrigeration plant. The work was finished in the summer of 1940, and houses were built in spring of 1941.



*Staff in 1949 in front of main hatchery building.*

#### *Main Hatchery Building/Nursery*

Leavenworth NFH was the administrative headquarters and laboratory for a multi-hatchery plan that included hatcheries at Entiat, Winthrop, and the Okanagan. Entiat and Winthrop NFHs were built in 1941 and 1942, but the fourth hatchery was not. The main building at Leavenworth, housing the nursery and offices, was meant to be impressive, befitting the world’s largest hatchery, with a row of six square columns at the front.



*Loft walled in, trough supports and pipes in progress. March 12, 1940.*

What was originally a laboratory is now a break room; and second story storage in the front and back sections were converted to offices. All the doors have been replaced with updated versions, or filled in.

The tall windows proved vulnerable to winter snow and ice, which curls in as it slides slowly from the eaves and breaks the glass; so shutters were added in 1944. The concrete



*Original gutters torn loose by sliding snow. February 16, 1943.*

*Main hatchery building, June 15, 1976.*



The 90 x 225 foot building cost \$159,999 when it was finished in April 1940 (\$2,683,183 dollars in 2015). The original plan called for an even larger building, 162 x 308 feet.

The central main section of the building is an open, unheated, single room, originally filled with 228 concrete hatchery rearing troughs. These have been replaced now with fiberglass troughs.

Tall windows provide natural light. A 28 foot wide loft runs the full length of the building, and has side walls but no ceiling. The loft was intended to fill always-critical needs for storage space, but has seen limited use.



*Concrete nursery troughs in place. May 9, 1940.*

building was not painted until 1976.

Landscaping around the building was once more elaborate. The birches and the tall grand firs at the back entrance were planted soon after the building was completed, a living reminder of the passage of 75 years.

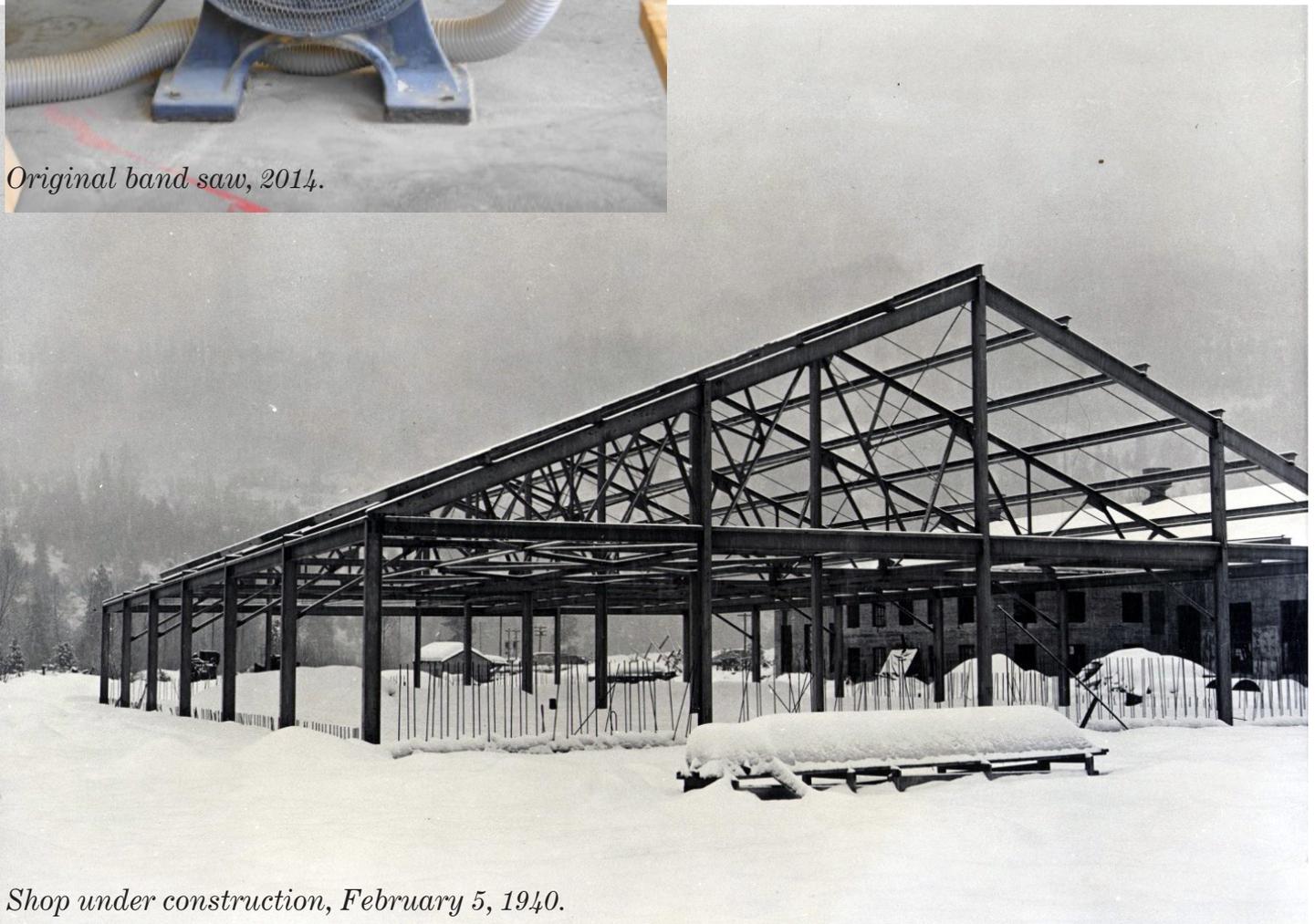


*Original band saw, 2014.*

### *Garage/Shop*

Constructed by the David A. Richardson Company of Idaho, this structure is 89 feet 8 inches x 142 feet 8 inches, and cost \$65,686 to build (\$1,101,554 in 2015). Across the front are the carpenter, blacksmith, and general machine shops. In the rear is a large storage area for vehicles and other equipment. The shops were used for building and repairing pipes and fashioning equipment and hardware for the hatchery. Many of the tools are the originals, like the band saw and the drill press; and the original blacksmith forge and vent are in place.

Accordion wooden doors have been replaced with modern overhead ones. A few other changes have been made; but the building is largely the same, and still serves the same purposes for which it was built.



*Shop under construction, February 5, 1940.*

### *Cold Storage Building*

Feed for fish had to be made on site for many years. For decades, the ingredients and the feed itself needed to be frozen or refrigerated. MacDonald Construction Company built the cold storage building in 1940, housing a heating plant that warmed all the buildings with steam from two coal-fired boilers, refrigeration machinery, cold storage space, an ice-making room, and food preparation rooms. The building was 67 feet 8 inches x 96 feet 8 inches; and cost \$84,007 (\$1,408,797 in 2015).



*Cold storage and heating plant building under construction, August 28, 1940.*



*Boiler room heat and refrigeration plant, September 1940.*

*A side note:* fish feed in the 1940s was made from horse meat, beef liver, hog spleen, and salmon carcasses, among other things. The animal products had to be ground, then extruded into smaller pellets. For smaller fish, it had to be pressed through a ricer. Later feeds incorporated herring meal, wheat germ and cottonseed meals, dried whey, fish oil, and other ingredients. The photo of the meat grinder to the right is from Coleman National Fish Hatchery in northern California.

Several ventilators and twin chimney stacks once made the roofline distinctive. The heating plant was converted from coal to oil in 1958; then eventually removed, along with the chimneys. The interior is reworked for new purposes, converting the boiler and coal storage area to vehicle storage and outfitting one room into a laboratory used by the USFWS Fish Health Center, when they visit from Olympia, Washington, and the Mid-Columbia River Fishery Resource Center. The walk-in cold storage rooms kept moist fish feed chilled until 2010, when the hatchery converted to dry feed.



### *Fish Culture*

Specialized buildings and structures are necessary for raising fish. The hatchery cycle begins with adult salmon returning to Icicle Creek to spawn. Adults are collected in rearing ponds. In the early fall, eggs and milt are collected and mixed in the spawning shed, and the eggs placed in trays in the nursery building. After about 50 days, when the eggs hatch, they are moved into the nursery troughs. In early spring, the fingerlings are transferred to outside rearing ponds or raceways. They are kept until they reach the smolt stage and released to make their own way in the world. Currently about one third of one percent return to the hatchery as adults to restart the cycle. (For wild chinook salmon, the return rate is about one hundredth of one percent.)

Leavenworth NFH attempted an innovative method for rearing fish when it was initially built. A series of ponds were developed in Icicle Creek, using a meander channel of about one mile in length. The channel was divided into three ponds using dams to help raise the water levels. Although the idea was interesting, it failed. Water levels in summer were too low and temperatures too warm for healthy conditions; and the concentration of fish proved irresistible to a wide range of predators. After just five years, fish culture shifted to constructed raceways on the grounds.

One dam remains; the others have been removed. Three spawning sheds were built beside the three ponds. All three of these are also now demolished.



*Dam 2 and flood diversion channel, May 8, 1940.*

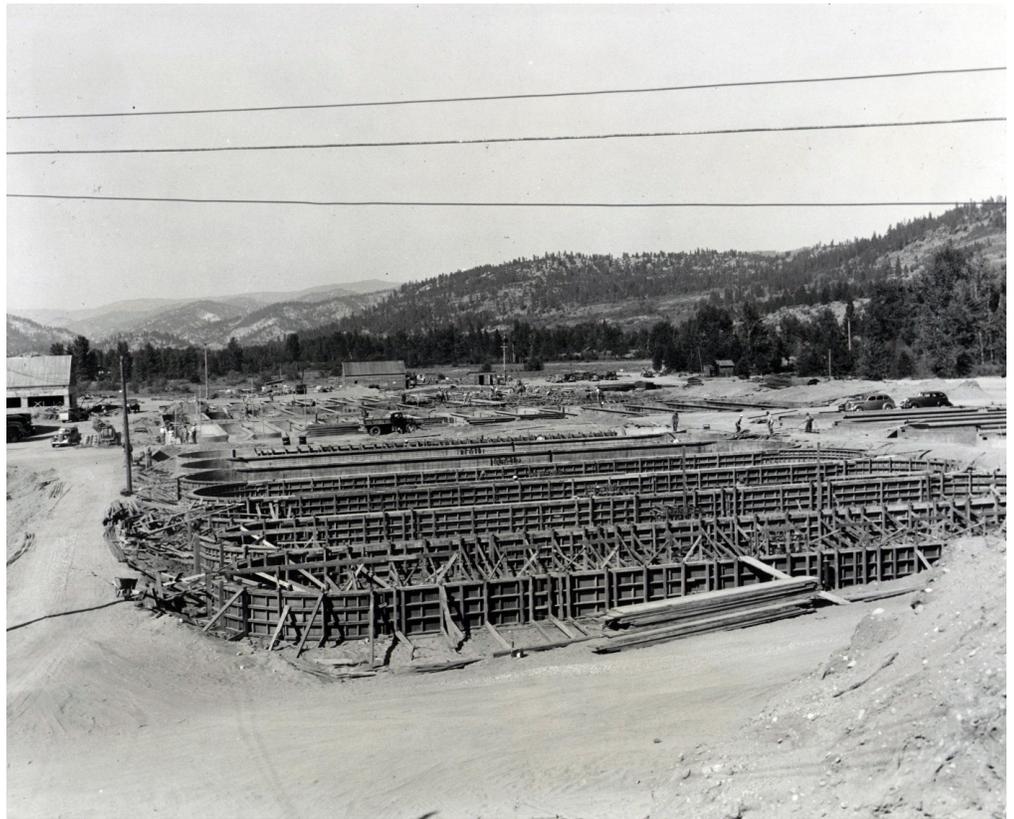
### *Foster-Lucas Ponds*

Developed at Quilcene National Fish Hatchery, these oval ponds were named for Fred Foster, Director of the US Bureau of Fisheries (later incorporated into the US Fish and Wildlife Service); and his assistant Clarence Lucas. Research done here in 1946 proved the F-L ponds to be unhealthy for fish. Two sizes were built here: larger ponds are 130 feet long, 29 feet wide, and 5 feet deep; while smaller ones are 76 feet long, 17 feet wide, and 4 feet deep. They are arranged in “banks” of 7 or 8 large units and 13 small units.

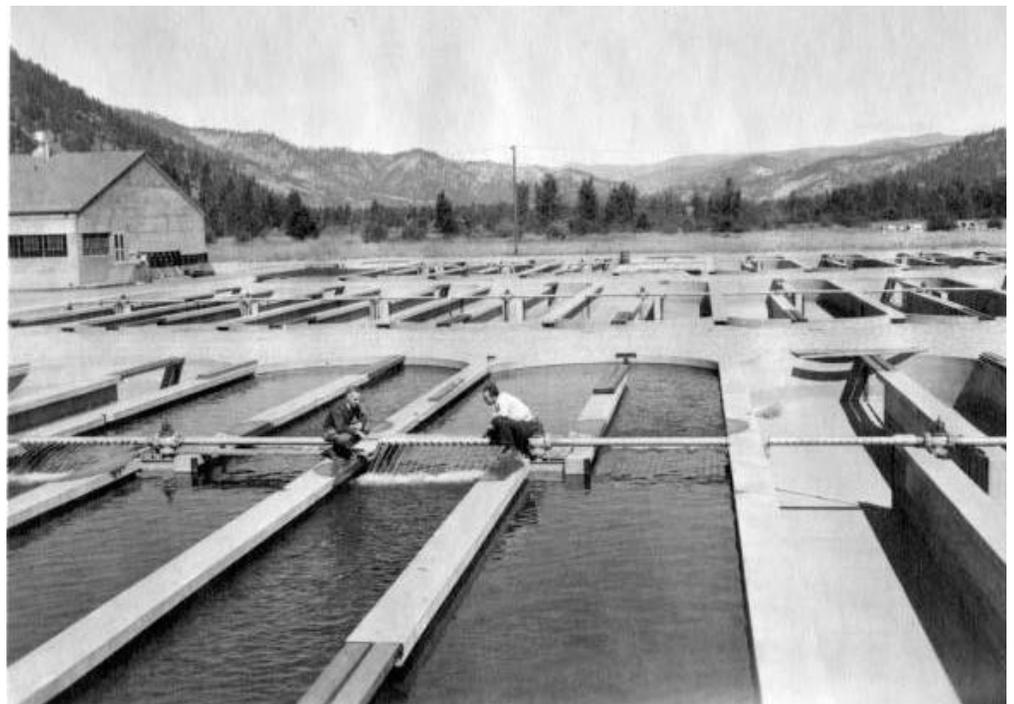
Although requests to build new raceways began in the 1950s, new ones were not constructed until 1979, when the easternmost bank of eight large F-L ponds were replaced with three banks of raceways. Each bank of raceways consists of 15 units. In the same year, an adult holding pond was built by Icicle Creek.

In 1998, a second bank of seven large F-L ponds were replaced with single land raceways. The westernmost bank of large F-L ponds was used the longest. One pond was converted into an interpretive station for viewing fish.

Current plans are to build circular tanks at Leavenworth NFH. Some circular tanks are already in use at Winthrop NFH.



*Rearing ponds, August 16, 1940.*



*Small Foster-Lucas ponds completed, 1940. Washington State University Libraries, Digital Collection.*



*Diversion channel, May 8, 1940.*

*Icicle Creek Diversion Channel*  
Constructed during the summer of 1939, the 4,085 foot diversion canal was a major project, with excavation carried on around the clock in four shifts. The dam upstream is used to divert water into the channel from Icicle Creek. It was intended to control water flow to the holding and spawning ponds. The diversion channel is capable of carrying twice the maximum recorded flow of Icicle Creek. Building the channel cut off the portion of land where the spawning sheds were located, creating an island.



*Diversion channel and Sleeping Lady Mountain, December 9, 1940.*

### *Residences*

Seven simple residences were built to house hatchery workers. Care of fish is round-the-clock, and housing on site makes that easier. Heavy snow interrupted construction, so the houses were not completed until late March 1941.

The design of the houses was straight out of the Bureau of Reclamation's design book. The Type-4 plan is very plain. It includes a three-quarter finished basement, a single car garage, and one and a half stories. Four of these houses remain, and three are occupied by hatchery employees. The fourth is used as office space and storage.



*Personnel residences, September 18, 1942.*

### *A History in Progress*

Other structures were part of the scene at Leavenworth NFH. But change is a fundamental part of the story. As improvements were made, the old made way for the new. Original wooden-stave pipes were replaced with cement and steel. These are being replaced in 2015 by plastic pipes. The old screening chamber was replaced with an enlarged one. An aerator was added to remove excess nitrogen from well water. A sand settling basin was built in 1994 to reduce sediment entering the rearing ponds.

Despite the changes that have occurred over the years, the hatchery still looks much as it did in the 1940s. Leavenworth NFH was placed on the National Register of Historic Places in 1998 as representing twentieth century conservation and fish restoration on a grand scale.