Naval Base Kitsap Replaces Fish-Blocking Culvert

After Decades, Wild Salmon Returning to Their Spawning Grounds

WHEN THE NAVY built a railroad through the Pacific Northwest rainforest over 60 years ago, it never dreamed it was contributing to the decline of the Pacific Wild Salmon population.

Towards the end of World War II, the Navy constructed approximately 50 miles of rail lines through the forests of Washington's western Puget Sound region to link the Puget Sound Naval Shipyard in Bremerton and the Navy Ammunition Depot at Bangor with the Northern Pacific's main line at Shelton, Washington. Today, these Navy-owned rail lines continue to serve the present day installations of Naval Base Kitsap (NAVBASE Kitsap) Bremerton and NAVBASE Kitsap Bangor under the management of the Public Works Department Kitsap (PWD Kitsap). In line with construction practices of the 1940s, the Navy installed approximately 300 culverts in the numerous streams and drainages along the railroad without full consideration that some of these culverts would present barriers to fish. Today, barriers to fish migration, such as culverts, are much better understood and have become a major issue in the Northwest. Fixing these barriers is seen as a key step towards restoring salmon populations including threatened and endangered salmon species. This need was further solidified in March 2013 when it was ruled in Federal court that fish-blocking culverts owned by the State of Washington violate Tribal Treaty Rights.

In light of this need, PWD Kitsap began surveying culverts along the Navy railroad ten years ago to identify fish barriers and is on target to complete surveys of all culverts in fish-bearing streams by the spring of 2015. By then all active railroad culverts in fish-bearing streams will be assigned Fish Passage Priority Index (PI) scores per Washington Department of Fish and Wildlife (WDFW) criteria in order to prioritize the repair or replacement of barrier culverts. PI scores include factors that gauge a fish passage project's feasibility including habitat gain, production potential of the blocked stream, fish stock health, and cost. The

Today, barriers to fish migration, such as culverts, are much better understood and have become a major issue in the Northwest.

higher a PI score for a barrier culvert, the higher the priority should be for its repair or replacement.

Following the most recently completed surveys in 2004, the culvert at railroad milepost 28.24 on the Airport Tributary of the Union River had the highest PI score along the Navy's railroad. The Union River supports Endangered Species Act (ESA) listed steelhead trout, coho salmon, Hood Canal summer run chum and sea-run cutthroat trout. This culvert was found to be a complete barrier to fish passage due to its length and small diameter, and because the outlet was approximately three feet above the level of the stream. The culvert was a 48-inch diameter precast concrete pipe culvert, nearly 280 feet in length. In addition, it was discovered that the culvert structure was on the verge of failure due to age and erosion with steel rebar exposed throughout the pipe. Potential failure and collapse of the culvert could have caused the entire railroad embankment to fail.

In 2011, PWD Kitsap awarded a design study for replacement of this culvert. The study indicated that at a minimum, a 15-foot wide culvert would be required to meet Washington State fish passage regulations. To further enhance fish passage, and to alleviate maintenance challenges, the Navy opted for a 20-foot diameter natural-bottom tunnel.

The construction project was awarded with Fiscal Year-end funds in 2012. Mobilization, preliminary access roads, and logging were started in April 2013 and the environmental work permits arrived in mid-May 2013, allowing the start of the in-stream work. Barring fish passage concerns, this culvert would likely have been replaced by jacking a new pipe through the embankment which is a fairly standard, and considerably less expensive, construction practice.

Replacing a 48-inch culvert with a 280-foot-long, 20-foot-wide tunnel that's 70 feet below an active railroad line and half-mile from the nearest road was a challenge. To further complicate construction, traffic on the railroad line could not be disrupted, as multiple private entities and the Navy depend

CONTINUED ON PAGE 54

Coho salmon gather in a pool at the culvert outlet prior to reconstruction. This was the end of the line for them before the tunnel.

The culvert prior to reconstruction.

The culvert outlet prior to reconstruction.

The culvert inlet prior to reconstruction.

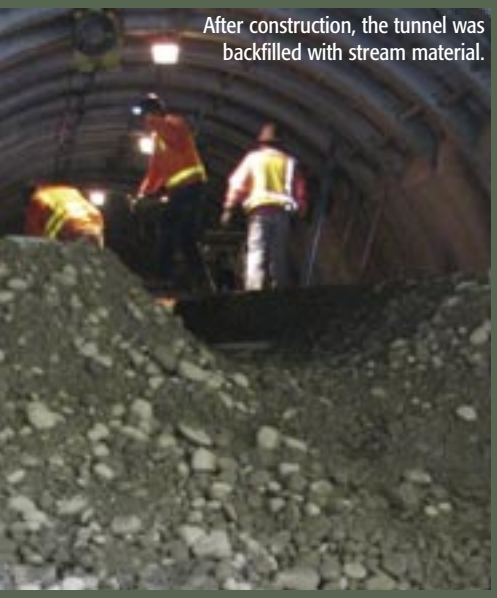
Biologists trapped and removed juvenile fish from the work zone prior to in-water construction.

Tunnel construction in progress.

The tunnel before backfilling.

The railroad grade above the project area.

All fish were removed from the work zone prior to in-water construction and netting was placed across the stream to prevent them from coming back during work.



After construction, the tunnel was backfilled with stream material.

Approaches to the new tunnel and laydown area were hydroseeded and revegetated with over 10,000 native plants and trees.

Completed tunnel outlet, reconstructed stream channel and new plantings.

Completed tunnel (winter 2014).

CONTINUED FROM PAGE 51

on the railroad. Additionally, all construction had to be completed in a five-and-a-half month window before salmon began their migration back up the Union River to spawn. Chum salmon, steelhead and other salmonids spawn in small streams throughout the Northwest during the fall through winter months. The smolts (young salmon) then migrate out to sea during the spring and summer.

Before entering the creek channel, the construction crew spent several weeks building roads and lay-down areas, and ensuring a stream diversion plan was in place to allow the creek to continue flowing throughout construction. With the stream diversion in place, it was necessary to remove any fish left in isolated pools in the creek channel and move them downstream. After the creek diversion was in place, the tunneling could finally begin. Foot by foot, the tunnel team excavated into the railroad embankment installing steel liner plates as they went. By working two 10-hour shifts, six days a week, tunneling production averaged approximately five feet per day through the summer of 2013.

After completion of the tunnel, the final steps were to restore and enhance the stream channel, including approximately 250 feet of immediate up- and downstream portions of the channel, and restore the surrounding forested areas disturbed by construction. This work involved the placement of several thousand yards of native soil and topsoil to backfill the stream channel and restore the access roads and lay-down areas. As a cost savings to the project, excess native soil was given to adjacent property owner, Waste Management, at no cost for use as additional cover on their nearby closed and capped landfill. In return, Waste Management allowed access through their property for construction. The contractor restored the forest as personnel backed their way out of the approximate half-mile access road that was created to access the site. Native plant species, including over 10,000 fir, cedar, and hemlock trees and an equal amount of ground cover native species such as sword ferns, salal, and bracken ferns were used to restore the construction site and access route. To ensure that the access roads stay decommissioned, log barriers and root wads were placed to block vehicle access.

In October 2013, just as the wet season in the Northwest began, the tunnel and associated restoration work was completed—in time for the arrival of migrating salmon. The tunnel reopened nearly one mile of stream that had been closed to fish passage since the 1940s and is proving to be a highly successful ecological enhancement. The Navy's work supports Union River restoration plans and will provide a long-term benefit to ESA-listed species.

The tunnel reopened nearly one mile of stream that had been closed to fish passage since the 1940s and is proving to be a highly successful ecological enhancement.

During the permitting process, the Navy worked with WDFW and the Suquamish tribe to ensure the completed tunnel met State fish passage criteria. The Navy addressed all of the comments and concerns provided by WDFW and the tribe and altered design elements as necessary to ensure success. The design changes included altering the stream bed material gradation to be placed following tunneling, and softening an unnaturally sharp bend in the upstream channel. Consultations were concluded with all parties in agreement that once completed, the tunnel would meet the State's fish passage criteria and provide a significant habitat improvement to this stream. In November 2013, the Navy filed with the state to remove this culvert from their statewide inventory of barrier culverts. Long-term monitoring of the tunnel and this site will continue under both the Navy's Railroad Bridge Inspection program and NAVBASE Kitsap's Integrated Natural Resources Management Plan.

Teaming up with WDFW, the Suquamish and Skokomish Tribes, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service all reviewed the project plan during the permitting process to ensure that all requirements were met. Cooperation by Waste Management, the Port of Bremerton, Puget Sound and Pacific Railroad, and a few adjacent private property owners was invaluable to the success of this project. The collaboration between the Navy and participating entities not only assured the success of this project, but established relationships that will ensure that future stream restoration projects are planned accordingly.

The construction cost for this project was approximately $6 million and took 13 months from contract award to re-establishment of the site with native plants and trees. In March 2014, WDFW removed this stream crossing from its statewide inventory of fish passage barriers and assessed the new tunnel as 100 percent passable for fish.

As the PI ranking system has changed since 2004, all railroad culverts previously surveyed are now being reassessed. In addition, those culverts not previously surveyed are scheduled for assessment in the upcoming year. Once all culverts have been surveyed, priority rankings will be assigned, and PWD Kitsap will proceed with funding requests where appropriate. ⚓

Photos by John Knowles

Restoring the Wild Salmon Population

THE SALMON POPULATION in the Pacific Northwest has undergone a sharp decline in the last few decades. By 1999, wild salmon had disappeared from 40 percent of their historic breeding grounds in Washington and Oregon (according to the Washington State Recreation and Conservation Office). As of today, 16 different species of salmonid are listed as threatened or endangered in the area.

There are numerous factors associated with this loss, and state agencies are taking various approaches to the problem, including restoration of wetlands, increasing the production of salmon at hatcheries to provide stock for anglers, and tagging wild salmon to prevent harvesting. The permanent solution, however, lies with the ability of salmon and steelhead to swim upstream to their traditional spawning grounds. Deteriorating culverts, outdated bridges, and other barriers block fish passage in many streams and undermine the state's recovery efforts.

During the past two decades, numerous fish passage barriers have been fixed through salmon restoration funds, and salmon populations in many areas are remaining static or increasing. However, WDFW estimates that there are still roughly 30,000 barriers within the state of Washington which need correction.

CONTACT

Mike Hardiman
Naval Base Kitsap–Bremerton
360-476-6082
DSN: 439-6082
michael.hardiman@navy.mil