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Nason Creek

from **Engineering With Nature: An Atlas, Volume 3.**

by **US Army Engineer Research and Development Center**

Merritt, Washington, United States

Reconnecting a stream to its historical floodplain. In the 1950s, the formerly meandering Nason Creek was straightened into a confined channel hemmed in by a railroad, a levee, and powerlines. The once-abundant salmon habitat was lost. The river could no longer access its floodplain, severely degrading the ecological conditions that well-connected floodplains provide for fish, wetlands, water quality, and flood control. Therefore, Chelan County initiated a multiphase effort in 2014 to remove and relocate human constraints and to restore the river and floodplain habitats. This included removing a levee, rerouting a power line corridor, and creating almost one kilometer of a new meandering stream channel reconnected to a vegetated floodplain. Construction occurred in multiple phases from 2016 to 2018. Specific project accomplishments included relocating over one kilometer of Chelan Public Utility District's powerlines out of the floodplain, creating a new sinuous 0.6-kilometer channel alignment, removing 0.7 kilometer of levee, creating two backwater alcoves, planting over three hectares of floodplain, and installing 14 large wooden structures for fish habitat. A key objective was to restore the

ability of the stream to access its floodplain. The project resulted in a change from 0.4 hectare of connected floodplain to over 5 hectares of reconnected floodplain at the five-year recurrence interval flood event. In 2022, the project received the Silver Award in the Water Resources category from the American Council of Engineering Companies.

Article Cover: Aerial view of the project site three years after construction, with the power line corridor and rail line on the left and the remeandered channel and reconnected floodplain on the right. (Photo by Inter-Fluve)

Producing Efficiencies

This project demonstrates the intrinsic interdisciplinary nature of large-scale habitat restoration alongside the built environment. The collaboration of engineers, scientists, agencies, public utilities, and a railroad produced a project that restores and reconnects key ecological functions while relocating and protecting essential infrastructure, resulting in a brand-new stream channel emulating natural conditions. A key innovation was the use of a vibratory side grip pile driver to install over 100 timber piles into the channel banks and floodplain to stabilize the large wooden habitat structures. This specialized equipment minimized construction impacts and noise pollution compared to the more traditional approach.

Using Natural Processes

This project required the collaborative ingenuity of multiple disciplines to achieve its goals. Fishery biologists, natural resources specialists, hydrologists, engineers, planners, drafters, environmental regulators, and contractors worked together over multiple years, sharing their insights, perspectives, and interests to help make this project a reality. Design ingenuity included burying rock jetties as a failsafe for railroad protection in case of river erosion toward the rail line, installation of large wood complexes in the floodplain as hydraulic roughness to limit erosion, and the use of vibratory pile-driving to secure large wood habitat structures along the banks for erosion control and habitat enhancement.


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During the second year of construction, builders drove timber piles to support large wood habitat along the new channel banks.

(Photo by Inter-Fluve)

Broadening Benefits

This project is a triple win: meeting habitat-restoration goals, the public utility upgrading aging infrastructure, and the railroad reducing its need for long-term maintenance without the creek running along the grade. The project improved the health, safety, and welfare of the public while benefiting the natural environment and the service it provides to the region through a healthy salmon population. The public utility's upgrades and relocation of the power lines provides more reliable distribution of electricity to customers. The relocation of the creek channel away from the railroad grade reduced the risk to this critical transportation corridor from flooding and erosion.

Progress during the second year of construction. Looking up the valley, the remeandered channel connects to the alcove.

(Photo by Inter-Fluve)

Aerial view of the site two years after construction, showing the remeandered channel and floodplain on the left and the filled-in former channel on the right.

(Photo by Chelan County, Washington)

Promoting Collaboration

This project provides an encouraging example for engineers to reevaluate what is possible when confronting seemingly conflicting interests on projects where the natural and the built environment intersect. When engineers perform this type of work, it is critical that they design the project alongside ecologists, fluvial geomorphologists, and fish biologists. This project shows that sorting out these intersections and realigning them (both figuratively and literally) requires redefining classic engineering thinking toward a more open and interdisciplinary approach.

Aerial view of the site, taken three years after construction, showing the remeandered channel, large wood habitat, and vegetation growth on the new floodplain.

(Photo by Inter-Fluve)

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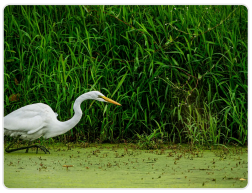

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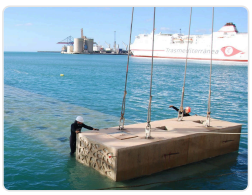

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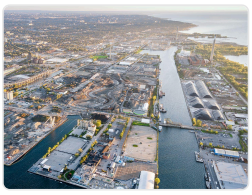

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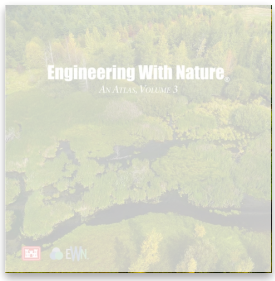

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