George Davis Creek Fish Passage

A 1:12 scale physical model was used to develop and test performance of several LWM configurations, to restore and provide fish passage along a steep (7%) stream segment.

Tests include prototype-scaled sediment, LWM, and low to high (+100-yr) flows.

The physical model was pivotal in achieving design concurrence with regulator agencies and co-managers.

Peter Brooks, PE
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Northwest Hydraulic Consultants – Seattle, WA

NHC Physical Model Laboratory, Tilting Bed Flume (inset), Seattle, WA

Prototype: George Davis Creek, Sammamish, WA

Miami River Riparian Restoration

For almost 15 years, the Miami River Streamkeepers Society (MRSS) has been working to restore riparian habitat along the Miami River Greenway for the benefit of fish, wildlife, and Greenway users. A small dedicated group of volunteers meet on Mondays to maintain the work already done and plan future activities and priorities for the area.

Jillian Stewart, ABT, BTech, MRSS Member
Cell: 1-250-888-9653
Email: jdstewart1138@gmail.com

Miami River, Harrison Hot Springs Village, Fraser Valley, British Columbia

Upper Twisp River Large Wood Supplementation

- Placed 2,000 logs & heavy slash in a 4 mile project reach using a Vertol-107
- Slash and some trees were harvested from a local thinning unit. Rooted logs were imported.
- Project retained large amounts of sediment & woody debris with channel aggradation of up to six feet.

John Box john.box.fnw@colvilletribes.com

Fish Biologist & Project Manager

Colville Confederated Tribes

Twisp River, Okanogan-Wenatchee National Forest, Washington

Dunn Hatchery Mitigation Project

Large wood placed with an excavator upstream of Dunn Hatchery to increase stream roughness on the floodplain to limit undesirable channel migration away from hatchery intake.

Colin McGregor

Habitat Restoration Engineer

Fisheries & Oceans Canada, Kamloops

Email: Colin.mcgregor@dfo-mpo.gc.ca

Joseph Creek, tributary to North Thompson River, 100 km north of Kamloops, BC

Rainbow Bend Floodplain Reconnection

Removal of obsolete levee and construction of pilot channels and LWD installation

Willis Mansfield, King County

Will.Mansfield@kingcounty.gov

Cedar River (WRIA 8), Maple Valley, WA

Cheakamus River ELJ

Pile-supported ELJ constructed adjacent to Squamish Nation IR 11 on the Cheakamus River to prevent erosion and lateral channel migration into Squamish Nation residences and provide valuable Steelhead and Chinook rearing habitat.

Barry Chilibeck, P.Eng. (BC, YK), Derek Ray, P.Geo.
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dray@nhcwater.com

Northwest Hydraulic Consultants

Cheakamus River, Squamish, BC

South Fork Nooksack River Engineered Log Jam Effectiveness Monitoring Research Study

Objective 1:

Assess the effectiveness of different types of ELJs in creating localized upwellings of shallow, subsurface flow to provide cool-water refuge for salmon

Objective 2:

Assess the effectiveness of channel-spanning ELJs to increase floodplain connectivity and groundwater storage

Project Location: South Fork Nooksack River - Acme, Washington

Sydney Jantsch
Restoration Scientist
Lummi Natural Resources
SydneyJ@lummi-nsn.gov

hiłsyaqƛis:a holistic approach to watershed restoration

A long-term collaboration between the Tla-o-qui-aht Nation and Redd Fish Restoration aims to restore watershed processes degraded by early forestry and rebuild fish and wildlife populations. T

This project integrates landslide stabilization, riparian floodplain work, and large-scale wood placements to address the root causes of habitat loss

Tom Balfour

Redd Fish Restoration Society

tom@reddfish.org

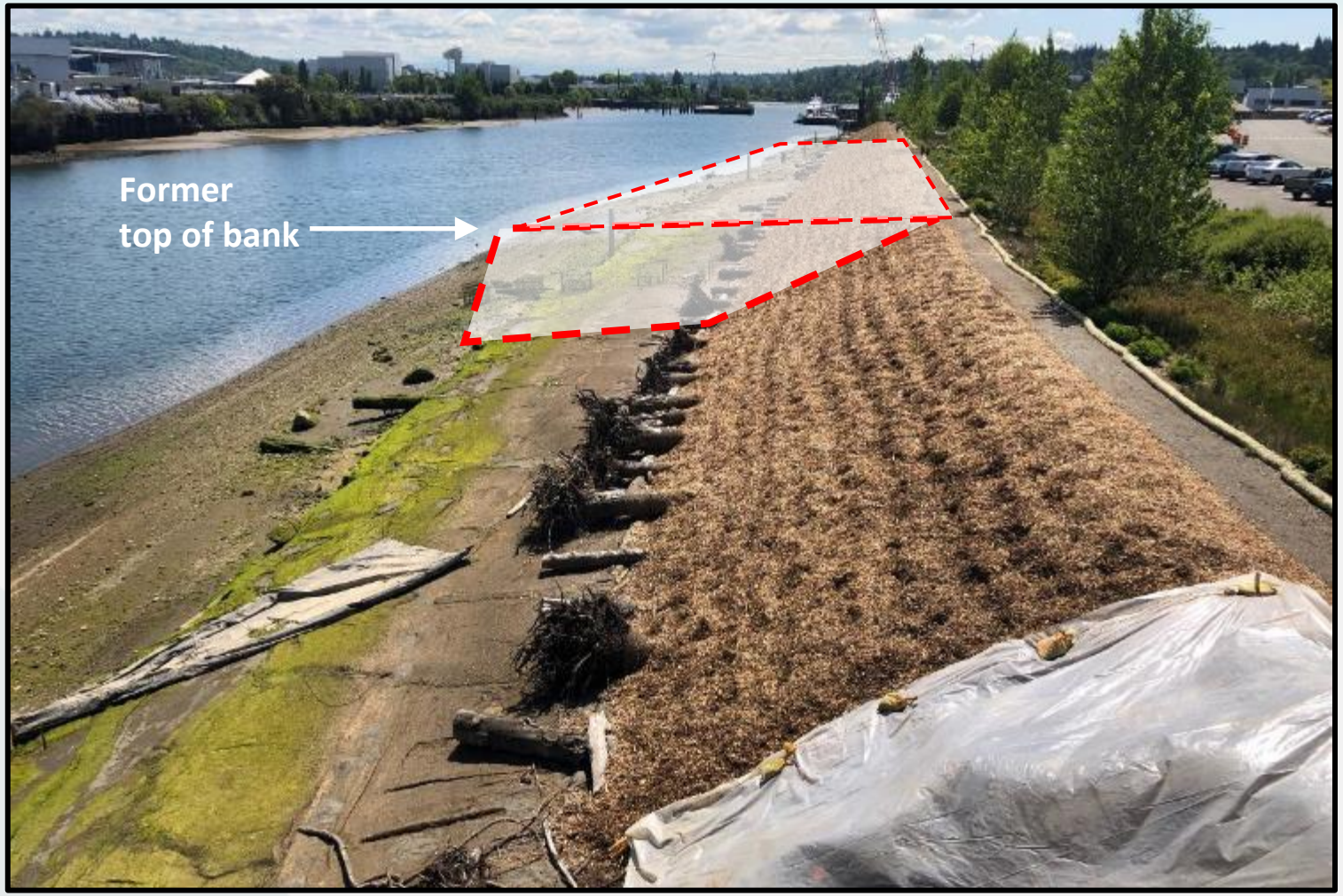
Hiłsyaqƛis (Tranquil Creek) Watershed, SE Clayoquot Sound, West Coast Vancouver Island

Duwamish River People's Park and Shoreline Habitat

- ~14 acres (5.6 ha) of estuarine marsh, intertidal mudflat, shoreline restoration, and public access.
- Over 800 pieces of LWM (at least 20 feet long, avg DBH 2 feet), totaling 1100 – 1225 tons of LWM onsite.
- Included toe, cross, edge, and riparian bench anchored logs, equaling ~4300 linear feet (1300 m).

Kathleen Hurley, Port of Seattle
hurley.k@portseattle.org

Jenn Stebbings, Port of Seattle
stebbings.j@portseattle.org



Lower Duwamish River; Green-Duwamish River Watershed; Seattle, Washington

Orville Road Floodplain Reconnection at Kapowsin Creek

- Use of engineered log jams to encourage floodplain reconnection and side channel formation while also resisting channel migration towards primary lifeline arterial road.

David Davis, Project Manager

Nina Biondolillo, Project Engineer

Natural Systems Design, Design Consultant

[Orville Road at Kapowsin Creek | Pierce County, WA - Official Website]

[Puyallup River Flood Protection at Orville Road | Pierce County, WA - Official Website]

david.davis@piercecountywa.gov

Upper Puyallup River Watershed

Orting, Washington State

Pine River Restoration Large ELJs

NHC designed and oversaw re-construction of multiple ELJs on the Pine River that were removed due to an oil spill.

Reconstructed ELJs helped to stabilize the river, prevent channel avulsions, and mitigate loss of habitat using pile-supported frameworks with no ballast.

Derek Ray, P.Geo., Bruce Walsh, P.Eng.
dray@nhcwater.com
bwalsh@nhcwater.com

Northwest Hydraulic Consultants

Pine River, Northeast BC

Lones Levee Removal Project (Cakwab)

Removal of levee and construction of setback revetment, pilot channels and LWD, reconnection to oxbow

Willis Mansfield, King County

Will.Mansfield@kingcounty.gov

Green River (WRIA 9), Auburn, WA

Habitat/Erosion Project

Large wood installed to slow erosion and protect septic system. Project also enhanced instream habitat.

Nikki Atkins

Lewis Conservation District

Nikki.Atkins@lewiscdwa.com

South Fork Newaukum River near Onalaska, WA.

“Knock On Wood”, Lolo Watershed Large Wood Project

Low tech approach to adding significant quantities of large wood to a degraded watershed to restore natural processes and improve salmonid habitat.
Cooperative project between:

- Nez Pere Tribe
- Trout Unlimited
- Nez Perce – Clearwater National Forests

Justin Peterson, Nez Perce Tribe DFRM Watershed justnp@nezperce.org

Aaron Penvose, Trout Unlimited, aaron.penvose@tu.org

Ashley Hurst, Nez Perce – Clearwater National Forests Hurst Ashley.Hurst@usda.gov

Lolo Watershed Weippe, Idaho

Middle Fork Nooksack River Porter Reach Phase 2 Instream Restoration

This project restored early Chinook, steelhead, bull trout, and other salmonid habitat with:

- 19 engineered log jams
- 9 flood fence post arrays to stabilize natural wood accumulations
- 1,300 feet of riparian plantings

Nathan Rice

Restoration Biologist

Lummi Nation Natural Resources

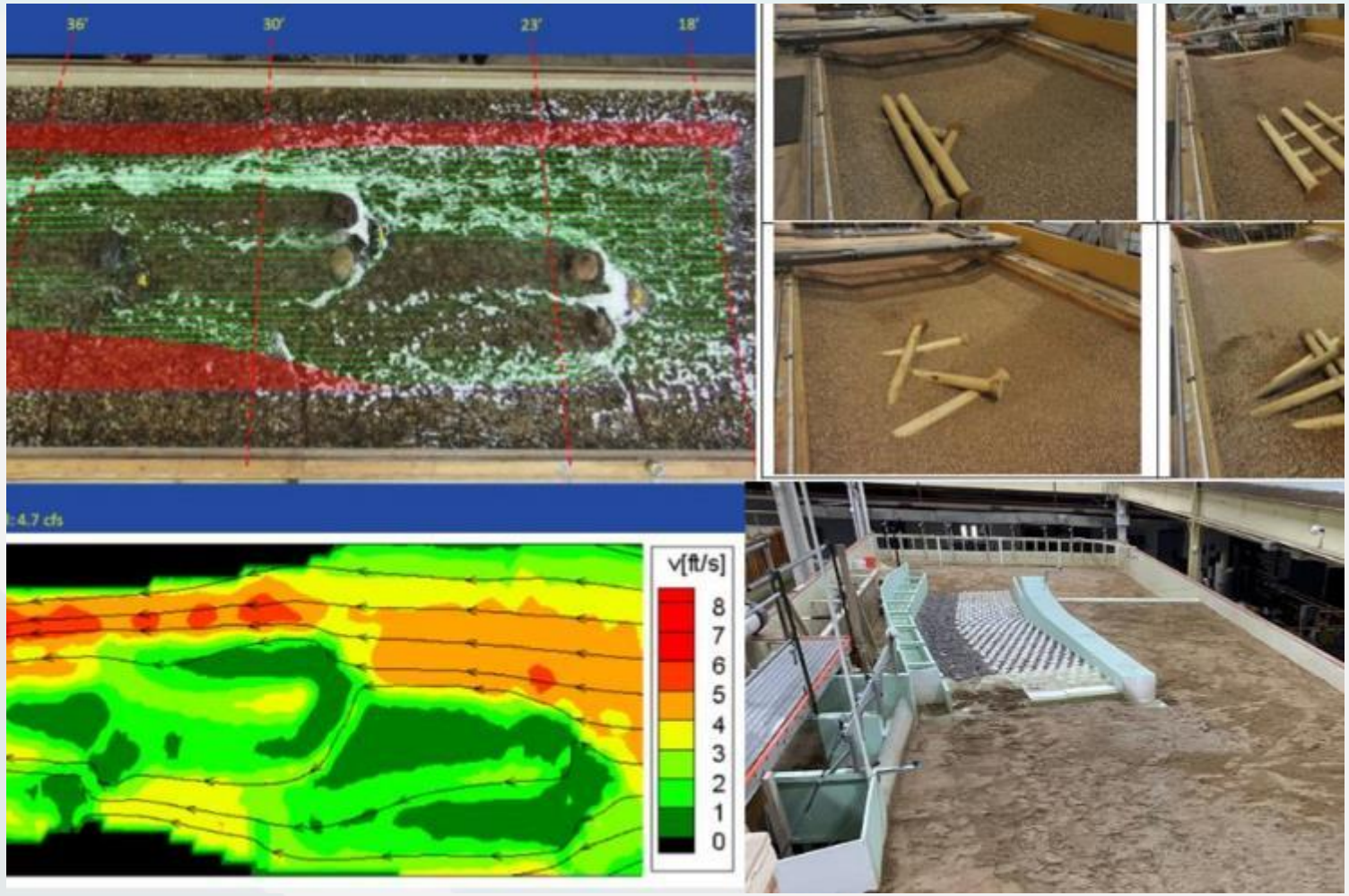
nathanr@lummi-nsn.gov

Middle Fork Nooksack River, Whatcom County, Washington

Hydraulics Laboratory Assortment

Instead of focusing on one project, a few related projects are shown. All projects were modeled in the Hydraulics Laboratory at the TSC. These pictures include: boulder clusters for fish passage, large woody structures, and a sediment model with a hardened ramp for fish passage.

Melissa Shinbein, USBR - Hydraulic Investigations and Laboratory Services, mshinbein@usbr.gov



TSC – Hydraulics Laboratory, Denver, Colorado

Cowichan River Erosion and Flood Protection

NHC designed and oversaw construction of ELJs on the Cowichan River to reduce the rate of meander migration towards a critical dike that did not have scour and erosion protection, while providing valuable habitat.

Graham Hill, P.Eng.
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Northwest Hydraulic Consultants

Cowichan River, Vancouver Island, BC

Riverbend Floodplain Reconnection Project

Removal of levee and construction of setback revetment, floodplain channels and LWD

Willis Mansfield, King County

Will.Mansfield@kingcounty.gov

Cedar River (WRIA 8), Renton, WA

Elwha River, Ranney Reach Wood Restoration

2024 Construction of 18 engineered logjams and stabilization of 2 natural logjams on ~1/2 mile of Elwha River mainstem.

Jamie Michel

Habitat Manager

Lower Elwha Klallam Tribe

Port Angeles, WA 98363

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Elwha River, Port Angeles, WA

Lower Klamath Project

With the removal of four dams on the Klamath River over 400 miles of historic anadromous fish habitat is now accessible.

RES used helicopter placed wood in priority tributaries impacted by reservoir inundation to immediately provide cover for fish, improve channel fringe complexity, increase floodplain roughness, provide instream habitat, and to promote geomorphic change.

Matthew Johnson, PE

Resource Environmental Solutions (RES)

mjohnson@res.us

Spencer Creek, a tributary to the Klamath River in southern Oregon. Chinook salmon utilized the large woody material and spawned in this tributary in the first time in over 100-years.

Clearwater River (WA) Large Wood Installation Project

The project removed 1-mile of forest road and installed 28-log structures along 1.5 miles of river, including four 120’ wide channel spanning structures pictured here. The intent of the project was to increase floodplain connectivity, reduce instream velocities, activate side channel and off-channel habitat, provide pools with overhead cover, and meter sediment to reduce mean substrate size for salmon spawning gravels.

Kristin Williamson

South Puget Sound Salmon Enhancement Group

kristinw@spsseg.org

Clearwater River, tributary to the Upper White River in the Puyallup Watershed, 11 miles east of Enumclaw in Pierce County, Washington State

Snow Creek Uncas Preserve Restoration Project

Stage 8 channel, side-channel, and floodplain restoration project to address an extremely incised stream. Prior to the project, the treatment reach was identified as the highest contributor of fine sediment to the primary area where ESA listed Hood Canal Summer Chum spawn.

Kevin Long, Project Manager

North Olympic Salmon Coalition

Projectmanager@nosc.org

Snow Creek, Discovery Bay, Port Townsend Washington

Reach owned by Jefferson Land Trust

South Fork Nooksack River Fobes Phase 2

- 39 log jams constructed in 2022 and 2023, restoring 1.1 miles of mainstem.
- Improve holding and rearing habitat by constructing log jams to form deep, complex pools.
- Combat channel incision and engage the floodplain through the installation of low-lying channel spanning log jams.

Kelley Turner, Lummi Nation Natural Resources Watershed Restoration Manager, KelleyT@lummi-nsn.gov

Alex Levell, Lummi Nation Natural Resources Deputy Watershed Restoration Manager, AlexL@lummi-nsn.gov

South Fork Nooksack River Watershed, Skagit County, Washington State

Twisp River - Helicopter Large Wood Restoration

In 2022 the Yakama Nation partnered with the USFS to implement three helicopter large wood restoration projects in the Twisp River watershed.

- Installed **1100** pieces of large wood with rootwads.
- Installed **40** bundles of heavy slash.
- Constructed nearly **80** large wood structures
- Treated **~3.5 miles** of high priority spawning and rearing habitat for endangered spring Chinook salmon, threatened Steelhead and Bull Trout.
- Constructed **8** piling ballasted, engineered log structures to retain flood mobilized material

Contact Information:

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Senior Habitat Specialist
Yakama Nation Fisheries
johj@yakamafish-nsn.gov
(509)881-1462

Twisp River, Methow Subbasin

Montesano Log Jack Construction

NHC evaluated and designed ballasted log jacks to be placed near a wastewater treatment plant to inhibit the Wynoochee River from avulsing around the treatment plant and to limit further scour and undermining of existing sheet pile infrastructure.

Chris Long, PE
clong@nhcwater.com

Northwest Hydraulic Consultants

Wynoochee River, Washington State, USA

Caldero Reach Restoration

Engineered Log Jams (ELJs) and Salmon Side Channel at Jamestown S'Klallam Tribe's Caldero Property.

Hilton Turnbull

Jamestown S'Klallam Tribe

hturnbull@jamestowntribe.org

Dungeness River, Sequim, Washington State

Line Creek - Restoration Project

Restoring LWD structure to Reach 1 of Line Creek (trib. of the Fording River in the East Kootenays), which until recently had cross-channel LWD jams. Numerous LWD bank jams, similar to the photo, and LWD bar structures, were built within a 1.5 km reach of Line Creek.

Herb Tepper

Sr. Restoration Biologist

Fisheries & Oceans Canada, Kamloops

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Line Creek, East Kootenays, BC

Satsop River Mile 0 to 2 Aquatic Habitat Restoration Project

Re-establish dynamic floodplain processes that support salmonids by installing engineered log jams and restoring 350 acres of riparian forest. Log jams installed to reduce erosion of >50 ft. per year, to create scour pools, provide cover, create/enhance side channels, and promote stability for regeneration of mature riparian forest.

Anthony Waldrop

Grays Harbor Conservation District

Watershed Restoration Program

awaldrop@graysharborcd.org

Montesano, Grays Harbor County, Washington State

Log Jacks for Habitat Mitigation

This project supplied stable complex habitat for aquatic organisms, with a secondary benefits of stabilizing the toe of a stream bank.

Garrett Jackson

Washington State Dept. of Transportation

Garrett.Jackson@wsdot.wa.gov

Pilchuck River near State Route 92, Snohomish County, WA

Andy Cr LWD Restoration

LWD placement site in Andy Creek that accumulated several feet of spawning gravel in one winter after project implementation. A winter steelhead redd was observed during the first spring after implementation in an area previously devoid of spawning gravel (bottom right picture).

Derek Wiley

Oregon Department of Fish and Wildlife

North Coast Fish Habitat Restoration Biologist

derek_wiley@odfw.oregon.gov

Andy Creek (Sand Lake Watershed, near Pacific City, Oregon)

Wood Placement on a Heavily Logged River

This summer we are planning to heli-sling in large conifers that are large enough to self ballast, potentially by stacking. The photo is one we're looking to emulate. Yes, that is a giant swirl of Chum enjoying the pool!

Dave West, James Ogilvie, Leif Burge

Ecofish Research Ltd.

dwest@ecofishresearch.com

River on the Sunshine Coast, BC

Skookumchuck Riverbend Ranch Habitat Restoration

The project increases in-channel large wood structure, promotes retention of gravel and wood, improves floodplain connectivity, increases the quantity and formation of side-channel and floodplain habitats, and restores and enhances riparian functions.

Clare Yurchak, EIT

Anchor QEA

cyurchak@anchorqea.com

Near Bucoda, Washington (Chehalis River Basin)

Somerville Creek Instream Restoration Project Effectiveness Monitoring Case Study

The Monitoring and Evaluation of Salmonid Habitat Restoration team monitored project effectiveness. After three years, 65% of features with a stated objective to scour and increase maximum residual water depth were successful. Additional case studies at https://www.calfish.org/ProgramsData/ConservationandManagement/RestorationProjects.aspx

Christine Ramsey

California Department of Fish and Wildlife

Chris.Ramsey@wildlife.ca.gov

http://www.wildlife.ca.gov/grants/frgp

Somerville Creek, tributary to Redwood Creek, tributary to the South Fork Eel River, tributary to the Eel River, tributary to the Pacific Ocean near Briceland, California.

SR 202 – High School Creek + UNT to Sammamish River Fish Passage

2 streams were re-aligned to cross SR 202 through a single structure and over 350+ pieces of LWM were installed for fish habitat/ stream restoration.

Brendan Leistiko, EIT

WSDOT HQ Hydraulics

brendan.leistiko@wsdot.wa.gov

Sammamish River Watershed, Redmond, WA

Engineered Log Jams for Bank Restoration

What: Nature-based bank restoration designed in collaboration with the Tsleil-Waututh Nation.

70 m of riverbank treated with engineered log jams, a root wad revetment, and brush layering. Total of 51 fir/cedar logs & 30 root wads used in construction.

Why: Restore the riverbank following new pipeline construction & mitigate progressive bank erosion threatening existing buried pipeline infrastructure.

BGC Engineering Inc.

Harmen Van Hove, M.Eng., P.Eng. (BC, AB)

hvanhove@bgcengineering.ca

Matthew Linehan, B.A.Sc., EIT (BC)

mlinehan@bgcengineering.ca

Indian River (xʔəl̓ílwətaʔɬ) Watershed, Greater Vancouver Area, British Columbia

Tucannon River Restoration Project

Multi-mile habitat restoration project to increase wood loading, provide in-stream structure, side channel, and floodplain connectivity with engineered log jams and floodplain channel excavations. Photo of main channel spanning log jam to create flow split being installed.

Andy Brew, PE

River Engineer

Anchor QEA

abrew@anchorqea.com

Near Dayton, Washington (Snake River Basin)

Skokomish River Mile 5 - Phase 1

The Skokomish Indian Tribe – Natural Resources Department in collaboration with the Mason Conservation District installed 8 engineered log jams, including one large apex jam and 7 smaller deflector log jams placed along the south bank downstream of the apex jam. In addition, a 2,000-foot-long side channel was excavated.

Alex Papiez – Restoration Biologist – Skokomish Natural Resources

apapiez@Skokomish.org

Post-Array Revetment Bank Stabilization

Rapid bank recession due to toe erosion of silty-sand substrate, minimal riparian vegetation and increasingly flashy system.

Bank stabilization using an interlocking matrix of large wood, driven piles, brush, and ballast rock. Soil wraps placed to buttress remaining vertical bank and restore riparian area.

Al Jonsson, Ichthyo-Fluvial Specialist

Kerr Wood Leidal Associates

ajonsson@kwl.ca

Salmon River, Langley BC

Simpcw Fish and Fish Habitat Restoration on Louis Creek

The objective of the project was to stabilize the banks of six stream bends along Louis Creek with woody debris, to allow for the re-establishment of the riparian area, while enhancing fish habitat.

Alexandras Terrick, Simpcw Resources Group

aterrick@simpcwresourcesgroup.com

Louis Creek, northeast of Kamloops BC

Lower Satsop River Bank Protection

NHC designed and oversaw construction of erosion mitigation measures on the Lower Satsop River. The design included ballasted log jacks, that were pre-assembled on the bank and allowed to fall into place as the bank eroded.

Vaughn Collins, PE (WA,OR,ID), CFM
vcollins@nhcwater.com

Northwest Hydraulic Consultants

Satsop River, Washington, USA

Coho Creek - crossing upgrade and bank restoration

Rootwad & boulder revetments to slow bank erosion and improve fish passage

https://vimeo.com/1010426881

Andrew Boxwell, RPBio

Andrew.Boxwell@mcwrightonline.com

M. C. Wright and Associates Ltd.
Biological Consultants

NCompas
Software Development

Iron River FSR 1.7km, Campbell River, British Columbia

Crooked River Valley Restoration

Large-scale river and floodplain restoration of historic dredge mining in the Upper South Fork Clearwater River

- 77 acres of graded floodplain
- 3 miles of reconstructed river channel
- 62+ large wood structures
- 4,000 feet of large wood as bank stability
- Large wood as floodplain roughness

Jenifer Harris
jeniferh@nezperce.org
Nez Perce Tribe DFRM Watershed

Partners:
Nez Perce Clearwater National Forest

Funding:
Bonneville Power Administration
Office of Species Conservation
Nez Perce Clearwater National Forest

Instream Complexing with Post-assisted Log Structures

Relatively uniform reach within urbanizing stream with very shallow flows.

A series of post-assisted log structures (PALS) were installed along the left bank to emulate nature LWD deposition patterns. Structures designed to retain natural floating wood after installation. PALS create localized scour and provide dense overhead cover adding habitat complexity.

Al Jonsson, Ichthyo-Fluvial Specialist

Kerr Wood Leidal Associates

ajonsson@kwl.ca

Clayburn Creek, Abbotsford BC