KERR WOOD LEIDAL
consulting engineers

Wood:
The Original Influencer

DFO / PSF Knowledge Exchange

Large Wood Applications in River Restoration

February 13, 2025

How we got here…

Widespread wood removal motivated by navigation, flooding, infrastructure and an aversion to “untamed nature”

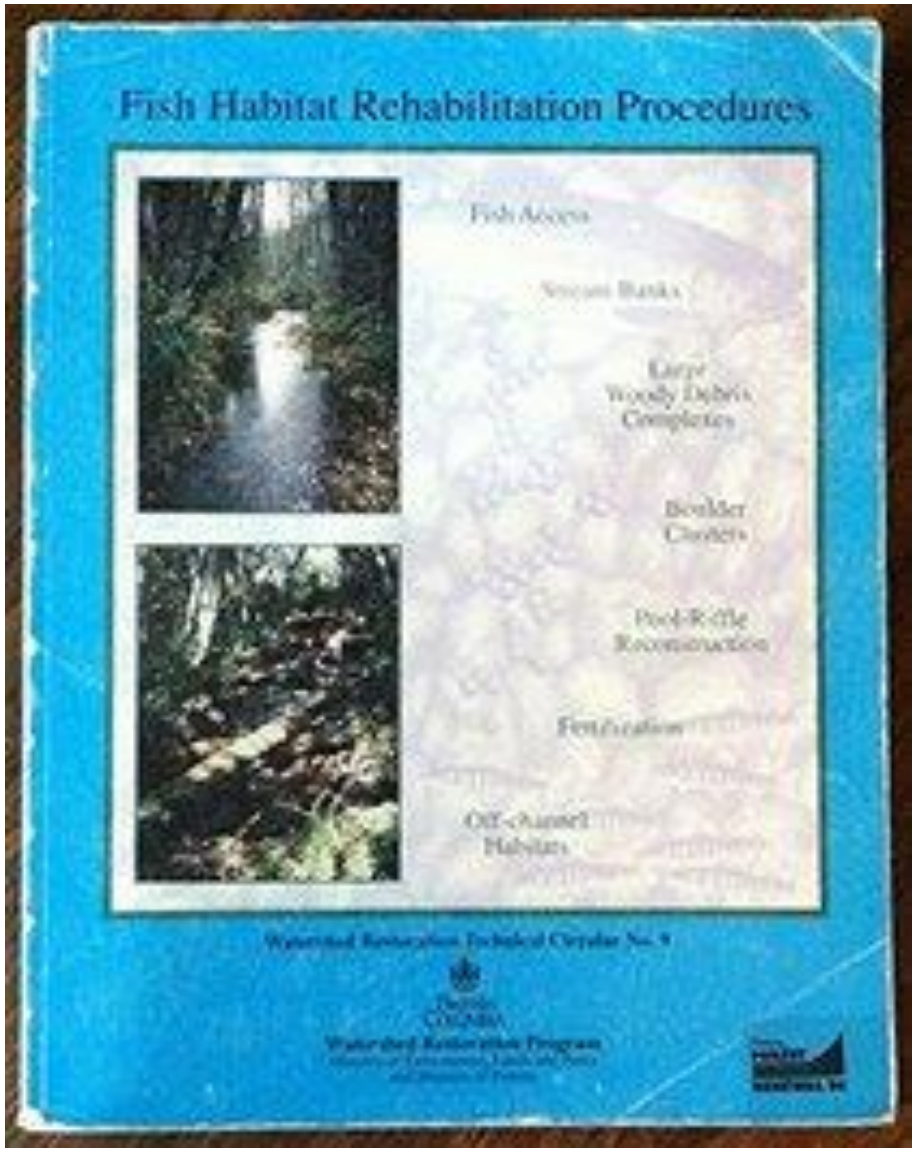
BC – Forest industry practices lead to general attitude “wood is deleterious to aquatic habitat”

The tide turns…

Watershed Restoration Program

Tech Circ 9. Slaney and Zaldokas 1997

Watershed approaches, bioengineering, Polster, off-channel, Newbury, riffle-pool, nutrients, Ashley, beavers, etc



…and stalls

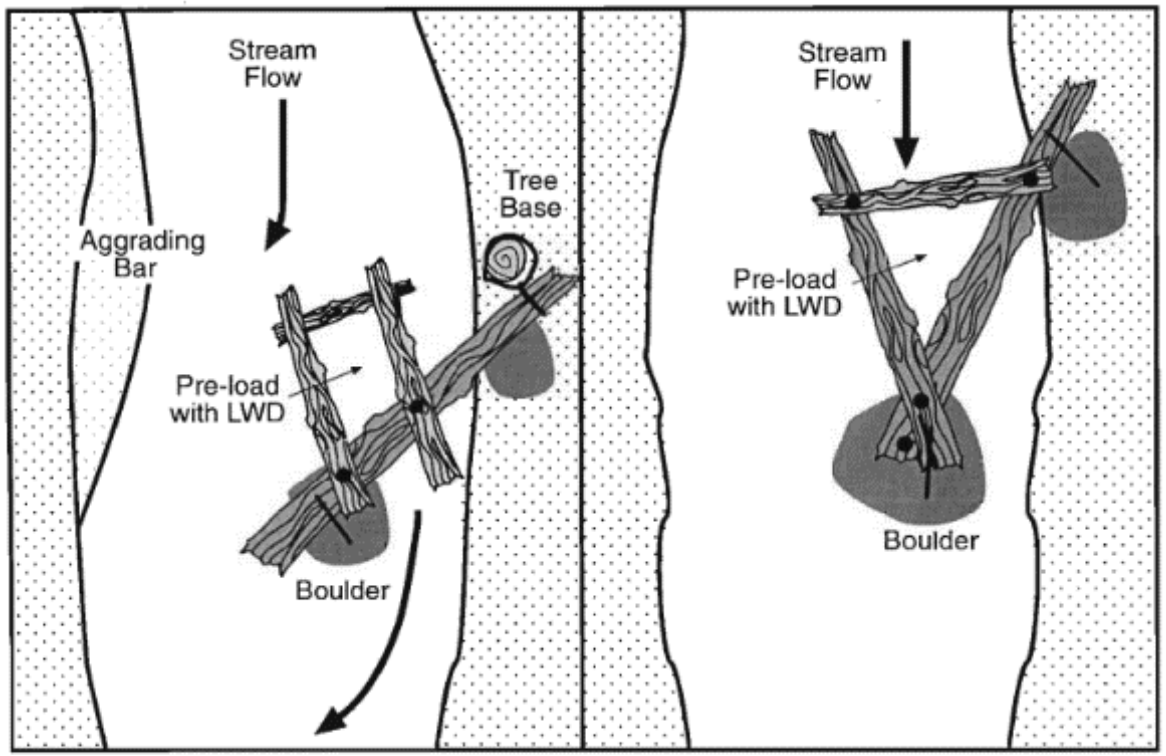


Figure 9-18. Examples of conceptual drawings of boulder-woody debris catchers, based on templates in lower gradient sections of the Quinsam River. Debris-trapping logs are a ramp spanning from the boulder attachments to the stream bottom.

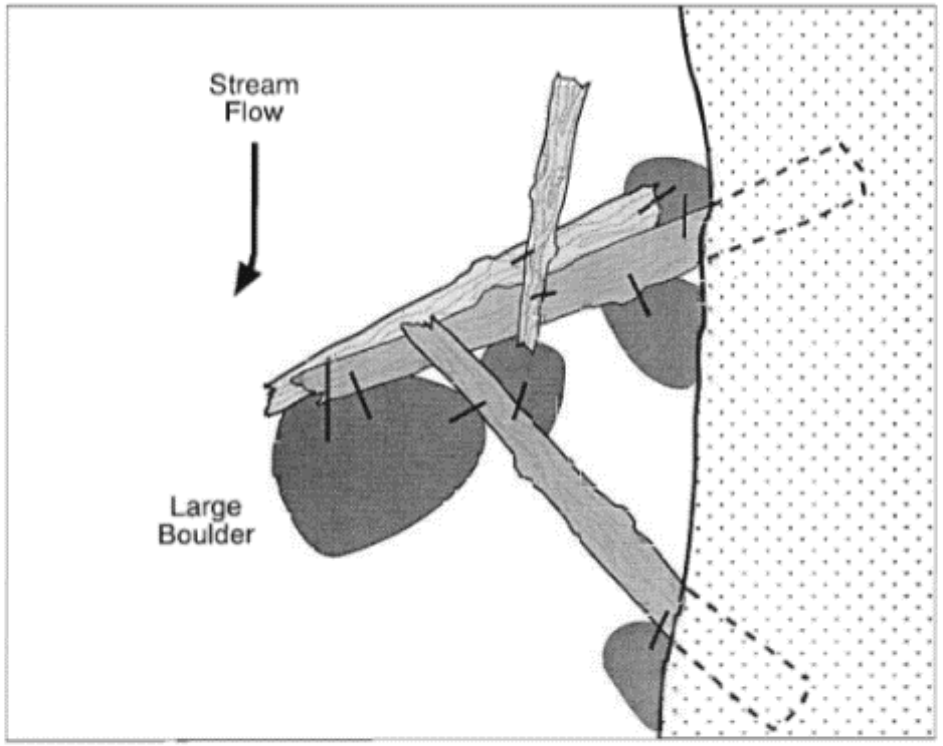
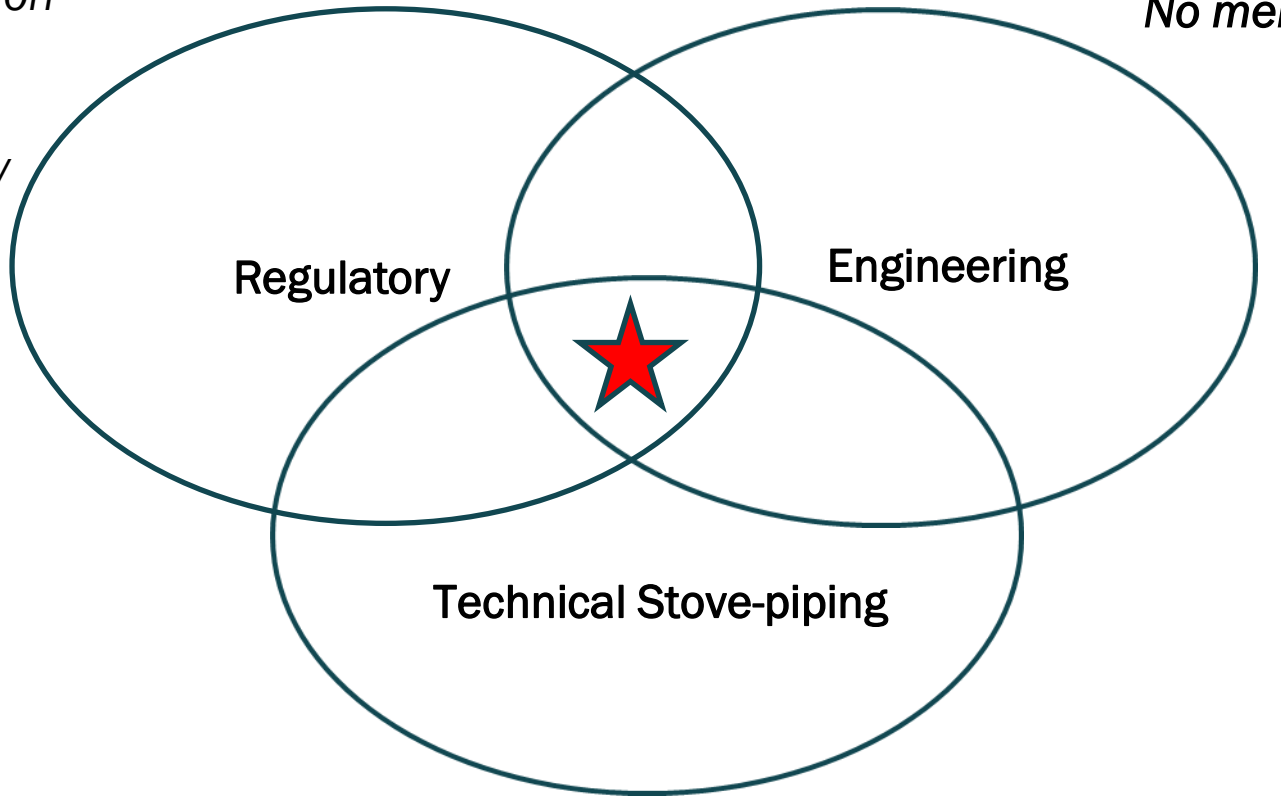


Figure 9-17. A conceptual drawing of a boulder-LWD catcher, similar to a natural analogue in the West Kettle River, including key logs for trapping drifting woody debris in floods. The front log facing upstream is set at about 45° from the stream bottom up to the cross logs to catch drifting wood.

What happened? (and continues to happen)

-Legal areas of offsetting
-DMA issues with vegetation
-Feedback loop of low expectations
-Lack of understanding by decision makers

”Looks risky…”
”This habitat stuff interferes with good engineering”
”This is niche work”
No mentors or PD



-Additive design processes
-Hierarchy of professionals
-Dis-integration

LWD is predominantly viewed as a “structure” for direct fish utilization rather than an influencer of morphology (productivity, stability etc)

Singular pieces
Sub-optimal orientation
Conservative placements
Limited to no effects on scour
Limited to no recruitment of fluvial debris*

Vs LWD as Influencer:

Scour – *depth and heterogeneity of channel*
Substrate sorting – *benthic productivity and spawning*
Grade control- *better habitat*
Bank stability- *increasing stability, protecting riparian*
Bar accretion - *vegetation colonization*
Side channel dynamics – *buffered habitat*
Nutrient retention - *productivity*

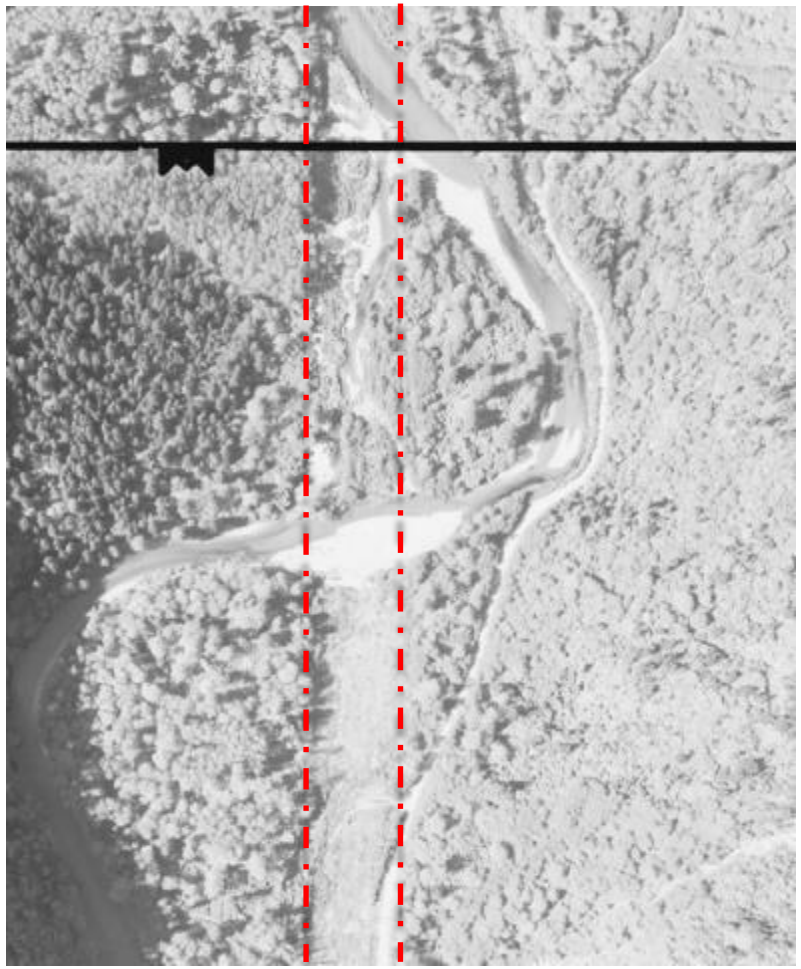
Case Study – Indian River

North Vancouver

Tsleil-Waututh Nation / tə səlilwətaɬ xʷəlməxʷ

Site History

1946



1978

2016

Site summary:

*Meander cut-off (increased channel gradient)
*Aggressive loss of riparian
*Dewatering of channel (eggs and juveniles)
*Possible transmission tower threat (future)
*Erosion of culturally significant area

Plan: “Nudge” the channel east to improve flow split using a spur, bar-head jam and one-time gravel removal

2017 Works

Spur Deflector

Bar Head Jam

Channel Dredging

Never Underestimate the River!

Fall 2017 – High waters

*Right bank spur – intact but extensive sandblasting of live stakes and loss of fill
*Bar-head Jam – completely lost, some ballast rock left
*Channel did not fully re-fill

2024 – Return to the River

Planetary alignment:

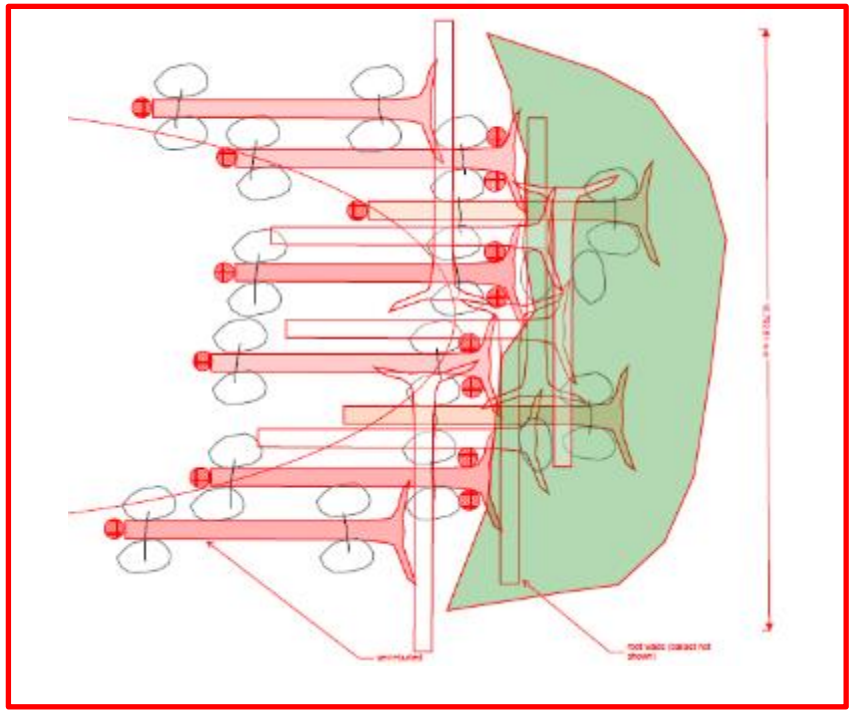
TWN has funding ✓
Gas transmission work in the valley can supply wood ✓
DFO and KWL share contractors and services ✓

Plan:

Implement experience from 2017 and 7 years of learning to construct a new bar head jam to achieve a stable channel split.

Design Development

-Uncertain design velocities (ungauged system)
-Limited selection of materials
-Remote location
+very low infrastructure risk
+good site conditions



Construction

-5 Days
-2 excavators and a rock truck
-Field fitting

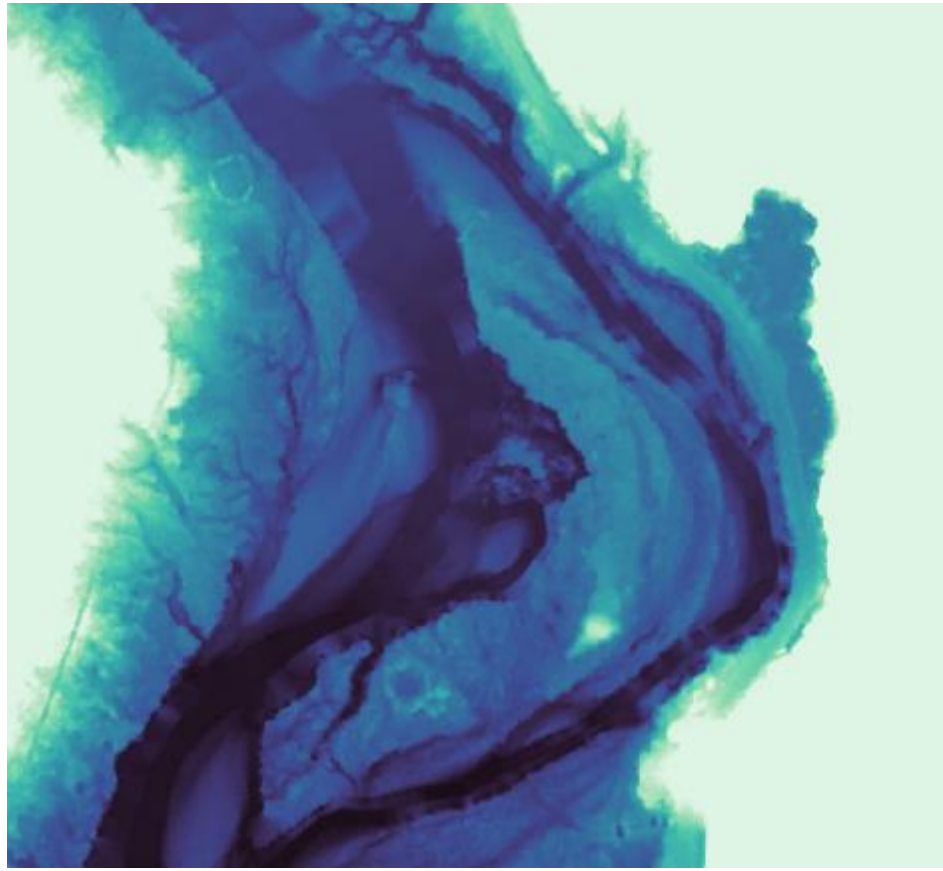
Completion

View upstream / north

View downstream / south

Next Steps:

-Observe geomorphic responses
-Live staking pilot
-LiDAR scan and analysis
-Potential future works downstream



Pre-project LiDAR (DFO-RRU)

Side Benefit:

-inspiration for ELJ projects by others in the valley

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Thank You!

(and thanks to TWN and DFO for making the Indian River Project possible)