



# Black Cottonwood Restoration in the Lower Deadman River

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*Knowledge Exchange Workshop on  
Restoring Watershed Resilience  
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Canada

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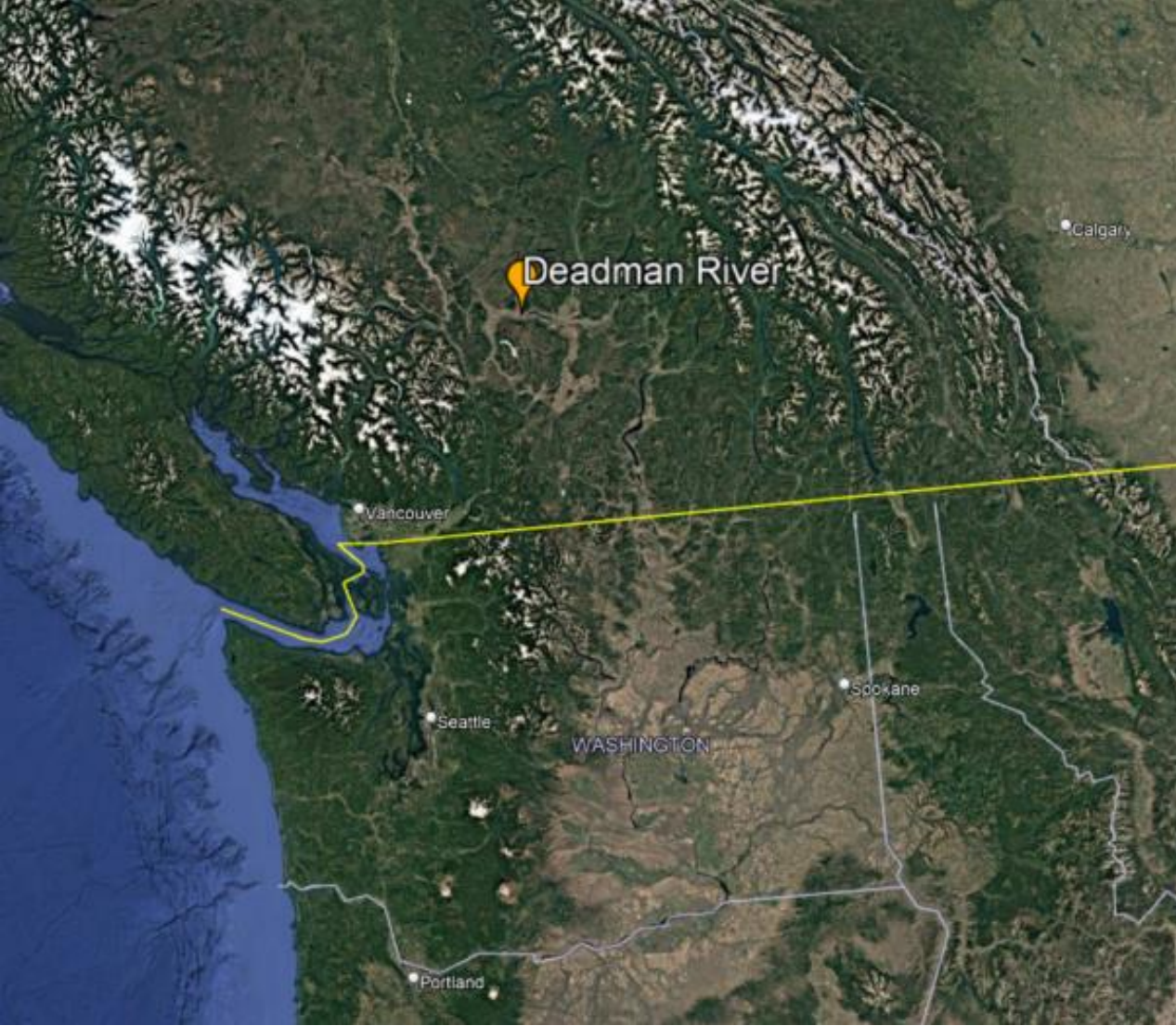
# Cottonwood Riparian Ecosystems in BC's Southern Interior

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- **Oases in an otherwise arid environment**, cottonwood forests are a key factor of resilience for a diversity of aquatic and terrestrial wildlife
- These ecosystems have been **reduced to fragments** due to **land conversion**, and **disruption of natural flood processes** that drive their formation and maintenance





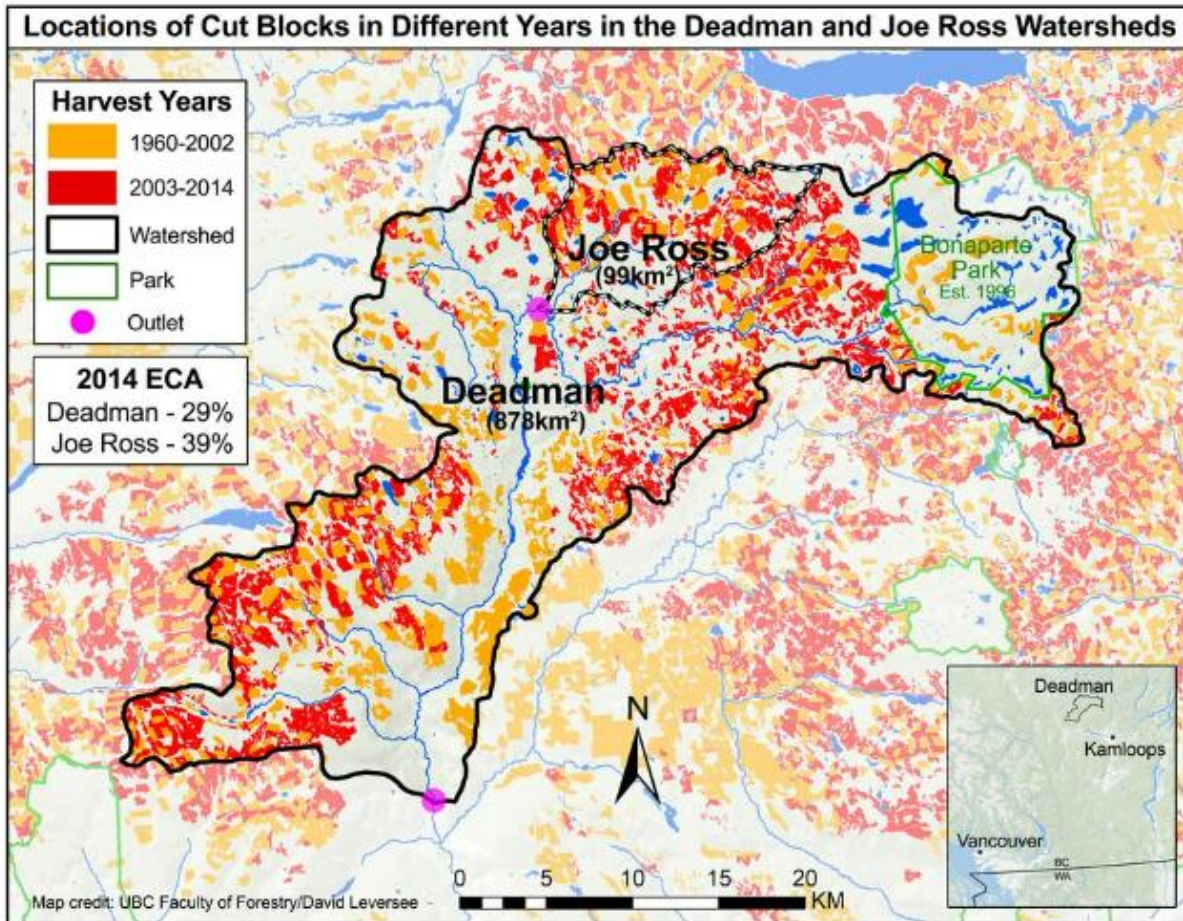


## Project Location

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# Deadman Watershed Stressors

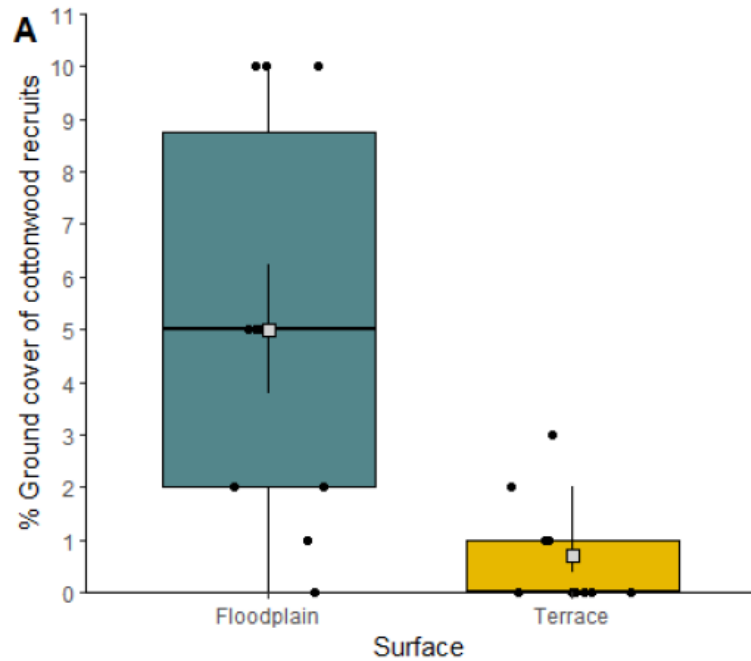


- **Upper watershed:** loss of forest cover and subsequent hydrological change
- **Middle reaches:** loss of floodplain function with private landownership
- **Lower reaches:** riparian flood damage, incision, and decoupling of historic floodplain → loss of cottonwood habitat

Traditional Ecological Knowledge highlighted **increased flood intensity** and physical changes indicative of a river that has shifted from a state of **equilibrium to degradation**



# Low Cottonwood Cover in the Lower Deadman



**Low cottonwood abundance likely due to low active floodplain area**

How can we increase active floodplain area while addressing root causes?







# Two Restoration Approaches

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**Process-based approach:** creating conditions required for black cottonwood seedling recruitment to promote natural regeneration

**Solar drip irrigation:** reducing maintenance needs for planting after-care



# Process-based Design Considerations



Requirements for cottonwoods	Requirements for salmonids	Measures to slow continued incision
<ul style="list-style-type: none"> <li>Seasonally flooded floodplain with bare mineral soil</li> <li>Intermediate flood disturbance</li> <li>4-week inundation period (on average)</li> <li>Floodplain &lt; 1.5 m above baseflow water table</li> </ul>	<ul style="list-style-type: none"> <li>Minimum depths over riffle crest</li> <li>Target depths in floodplain for juveniles</li> </ul>	<ul style="list-style-type: none"> <li>Constructed riffle to reduce tractive force</li> <li>Widen bankfull where needed</li> </ul>

Design criteria were used in HEC-RAS hydraulic modeling to create construction-level designs.



# Riffle Construction

- Constructed over 2 days
- Created a backwater of 120 m and 1-m deep pool upstream at low flow
- Allowed for low flow passage
- Monitor over next freshet for high flow function





# Floodplain Construction

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- 1,700 m<sup>2</sup> area of floodplain excavated and recontoured
- Bankfull width widened along 60-m length
- Large woody debris added
- Planted, staked, and hydroseed
- Monitor over next 5-10 years for natural regeneration





# Solar Drip Irrigation

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- Drip lines hooked up to a solar-powered pump and timer
- Cistern or direct intake
- Relatively easy to setup





# DFO Technical Bulletin Coming Out Soon

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Pacific Salmon  
Strategy Initiative

Initiative de la Stratégie  
relative au saumon du Pacifique

Salmon Habitat Restoration Center of Expertise  
Technical Bulletin Vol. X

Dec 2024

## **Solar-Powered Drip Irrigation System**

*By Natalie Mahara, Dave Pehl, & Brenley Yuan*

### **SHR-COE Technical Bulletins**

Technical Bulletins are published by the Salmon Habitat Restoration Center of Expertise (SHR-COE) in Pacific Region as a means of disseminating technical information, guidelines, workflows and instructions relevant to restoration practitioners.

This Technical Bulletin is for SHR-CoE staff and external restoration practitioners describing the design and construction of a solar powered drip irrigation system used for riparian restoration initiatives. This document aims to provide restoration practitioners with a method that requires very low maintenance while providing newly planted areas with a means to receive daily watering to increase the likelihood of planting success.



# After 1 Irrigation Season

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# Next Steps

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## Long-term Monitoring

- Natural regeneration of floodplain vegetation
- Long-term survival of irrigated cuttings
- Floodplain inundation and function
- Geomorphic response
- Biological response > fish use

## Expand to Other Sites

- Replicate along lower reach
- Watch and learn as we go



# Thank you

## Project Partners



*Dr. Kasey Moran*

## Funders



Fisheries and Oceans  
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