

# Satsop River – Right Bank Protection Project

Lower Satsop Advisory Group Meeting  
July 1, 2021

**Parametrix**

ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES



CONSERVATION DISTRICTS  
OF WASHINGTON STATE

Grays Harbor  
Conservation  
District

*your window to healthy lands*

**nhc**

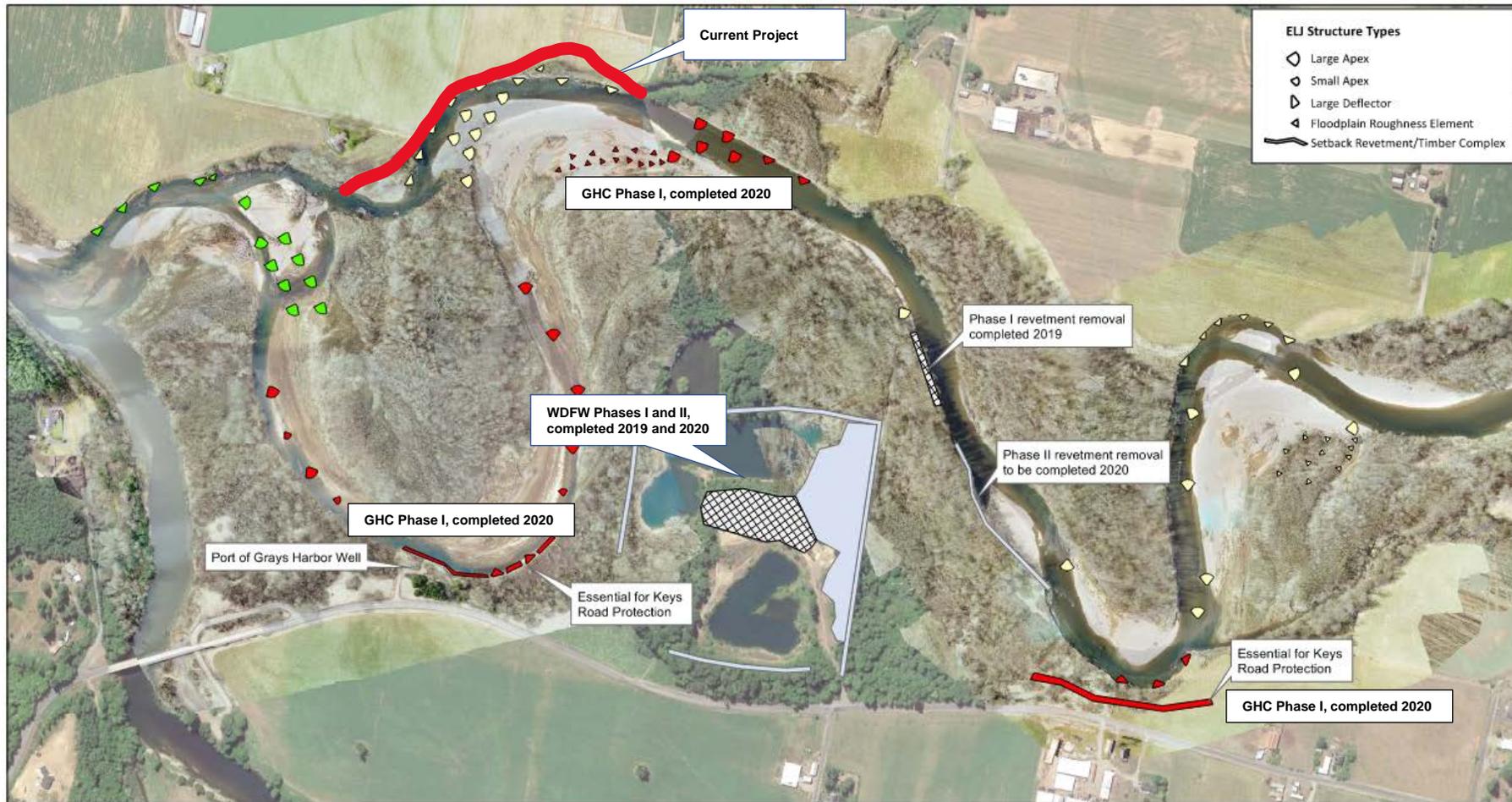
northwest hydraulic consultants

# Goals for Today

- Provide the Advisory Group with project context
- Describe the bank protection alternatives under consideration
- Engage everyone here in thinking about solutions to the problem we are presenting



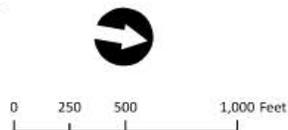
# Reach Context



Lower Satsop Reach Scale Assessment and Design: Protecting Infrastructure, Restoring Floodplain Function, and Reducing Erosion and Sedimentation.

**Preliminary Design Phased Construction Plan**

Aerial imagery 2017 NAIP with 2019 Drone Imagery  
 Lambert conformal conic projection, NAD 1983  
 State Plane Coordinate System (WA South Zone)



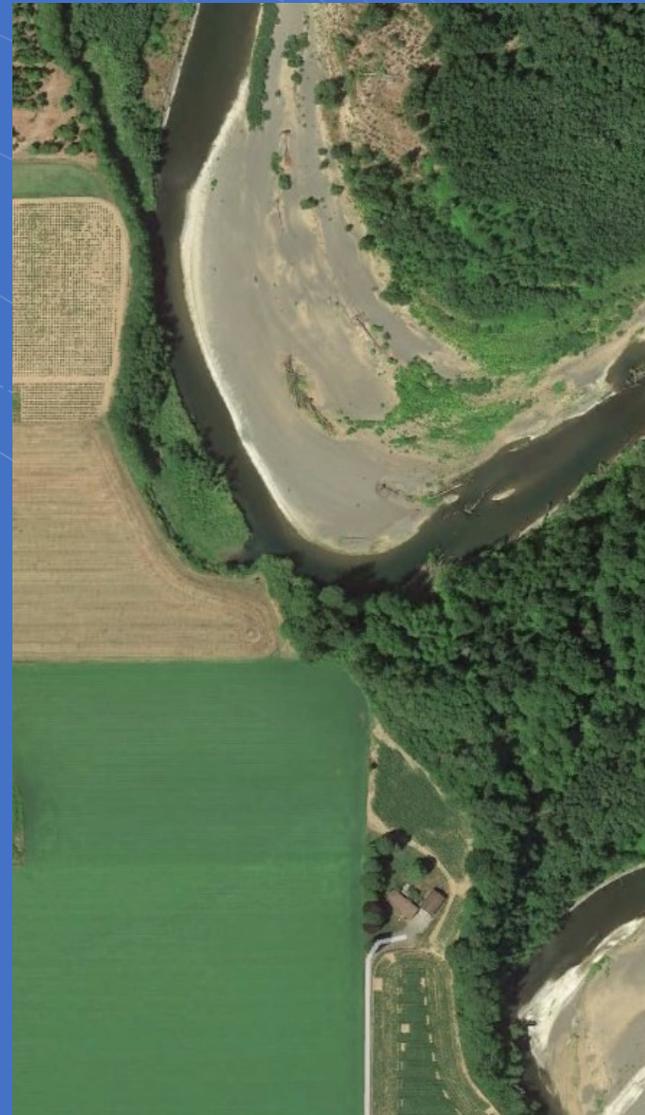
CONSTRUCTION [Funded, Not Funded, ]	WDFW "Restoration"	GHC "Restoration and Protection"
2019 -->	Phase I - Ponds, Revetment	
2020 -->	Phase II - Ponds, Revetment	Phase I - Keys Road, Port Well, Floodplain Restoration (A)
2021-22 -->		Phase II - Floodplain Restoration (B), Erosion Reduction (A)
2022-23 -->		Phase III - Floodplain Restoration (C), Erosion Reduction (B)
Future -->		Phase IV - Relocate Keys Road infrastructure (at end of useful life)



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# Project Overview

- In 2018 an avulsion cut through the existing meander neck
- The right bank is composed of highly erodible material
- The river is rapidly moving west, beyond its historic meander belt
- Very high erosion rates have occurred since the avulsion
  - ▼ • Destroying high quality farmland
  - Threatening a home
- Channel migration threatens significant previous left bank protection and habitat investments
- Large quantities of fine sediment continue to enter the Chehalis River and Grays Harbor
- Attempting to design, permit, and construct a bank protection project before the coming flood season

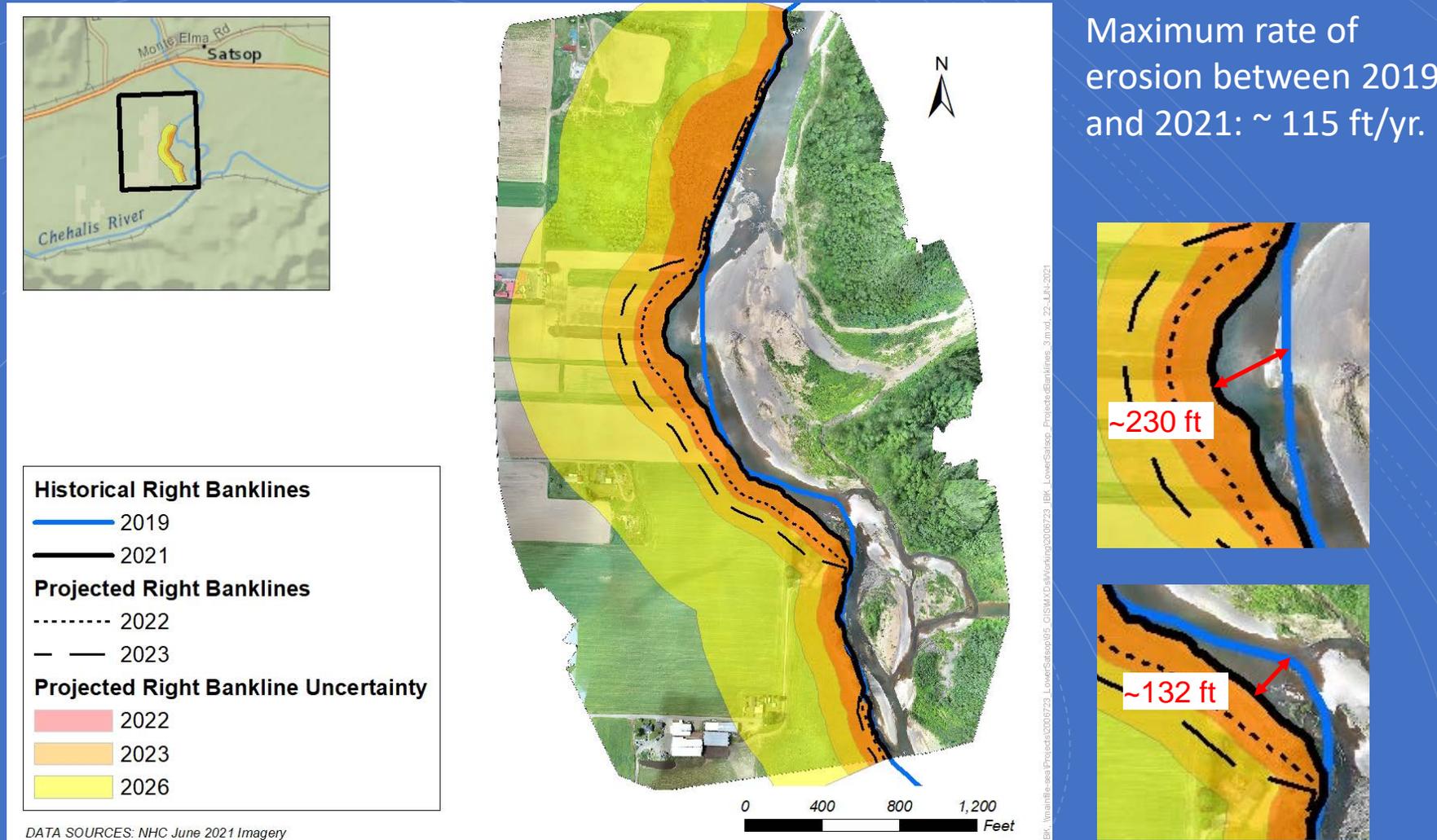


July 2018



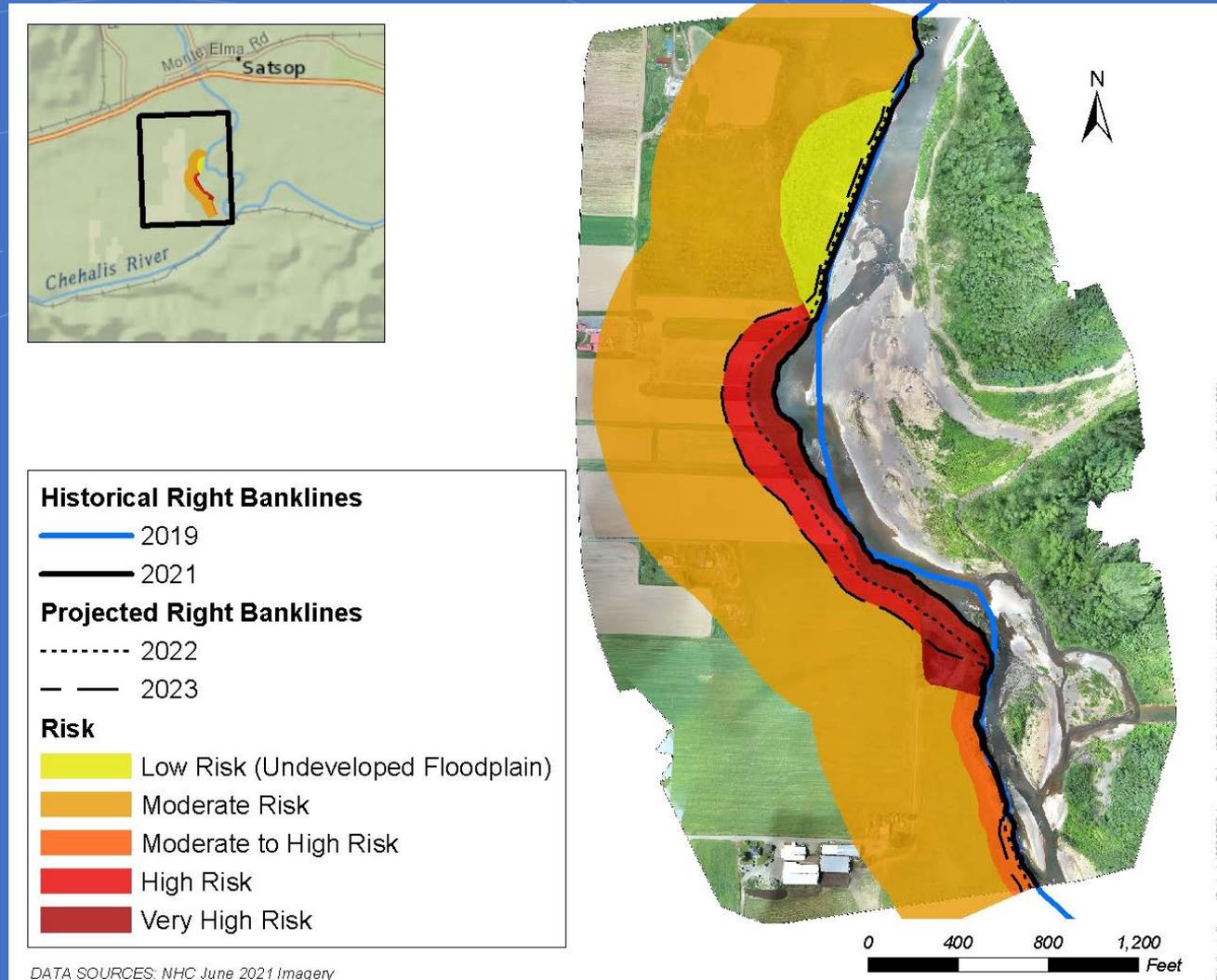
June 2021

# Historic and Projected Right Bank Locations



- There is a high degree of uncertainty about the future location of the channel for all projected years. A 2026 Projected Bankline has not been estimated due to the very high degree of uncertainty associated with projecting 5 years out.

# Predicted At-Risk Areas



- The areas at highest and most imminent risk correspond to the upper bend where the highest rate of erosion between 2019 and 2021 occurred, and the area between the upper bend and lower bend.

# Sediment Concerns



Year	Approximate Acres of High-Quality Farmland Lost	Approximate Sediment Volume (cubic yards)	Equivalent Dump Truck Loads of Sediment
2019-2021	3.3	100,000	6,700
2022 Estimate	4.4	130,000	8,600
2023 Estimate	5.0	150,000	9,950
<b>Total 2019-2023</b>	<b>12.7</b>	<b>380,000</b>	<b>25,250</b>

- Much of this fine sediment is carried as suspended load and deposited downstream in the Chehalis River and Grays Harbor, potentially damaging the Harbor ecosystem, including the region's shellfishery and aquaculture, and adding to dredging needs
- Sediment is added to the system continuously, not limited to high flow events



# Project Goals/Constraints

## GOALS

- Design, permit, and construct a project this year to reduce right bank erosion during the upcoming flood season
- Maximize the area protected with the available funding and time (scalability)
- Provide compatibility with, or at least don't hinder, past and future flood control and habitat efforts in the reach
- Minimize excavation and soil haul

## CONSTRAINTS

- Very limited time
- Project cost
- Stay above OHWM to facilitate permitting (OHWM in the project area is an elevation part way up the near- vertical bank)
- Construction and excavation limitations due to high, fragile bank
- Site access coordination with landowner agriculture and activities

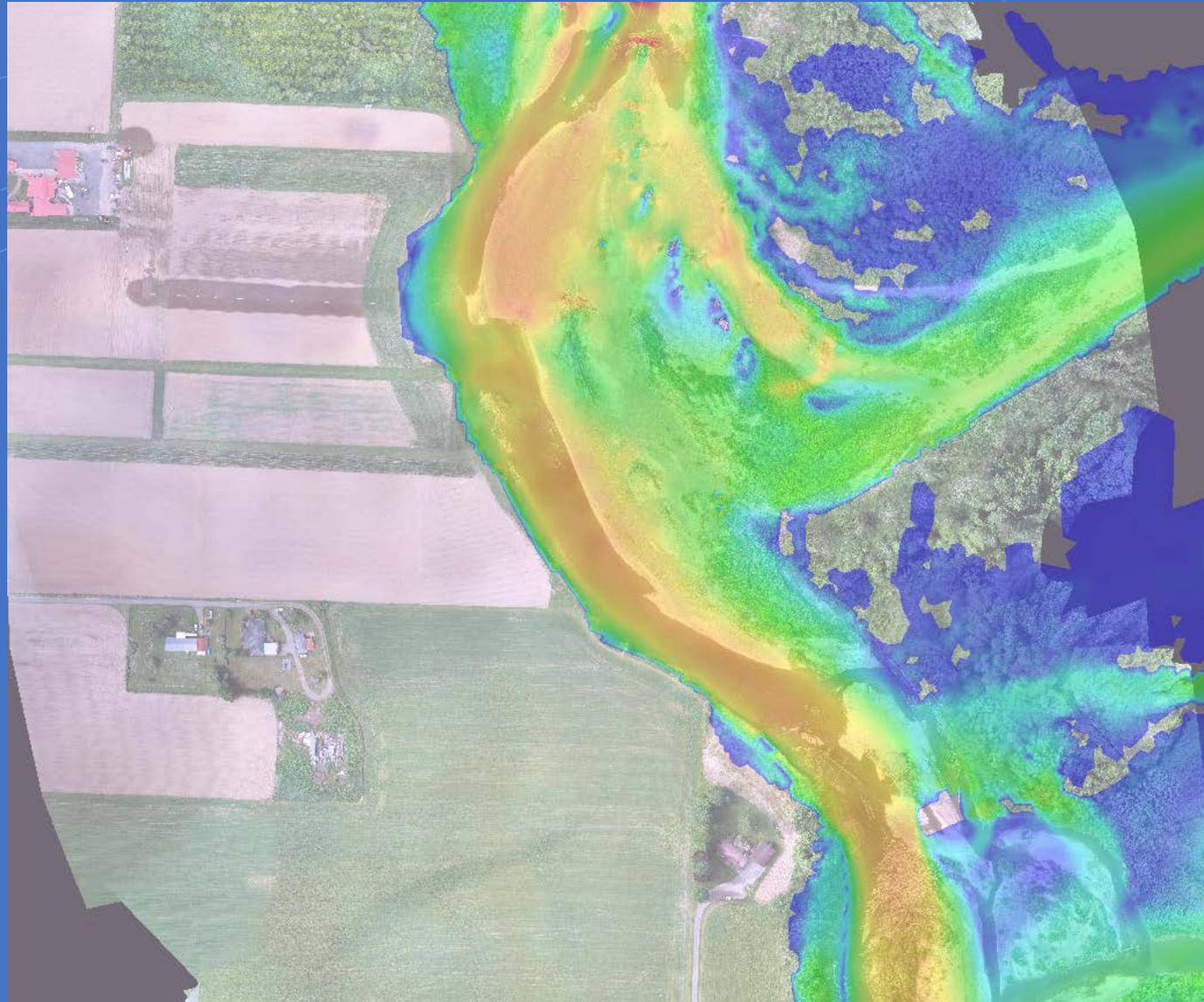


# Design Alternatives

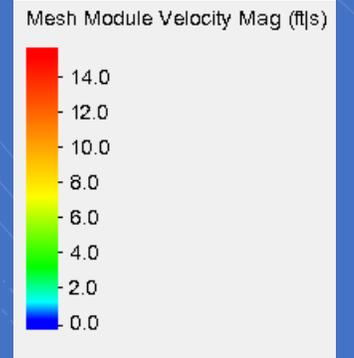
- Upland Alternatives
  - At Bank Launching Options
    - Ballasted Log Jacks
    - Launching Log Rows
  - Trenched Options
    - Rip Rap Revetment
    - Continuous Bank Log Roughening
    - Rock & Log Spurs
- In-Water Alternatives
  - In-Stream Wood Relocation
  - Streambed Gravel Relocation



# Hydraulic Modeling Results

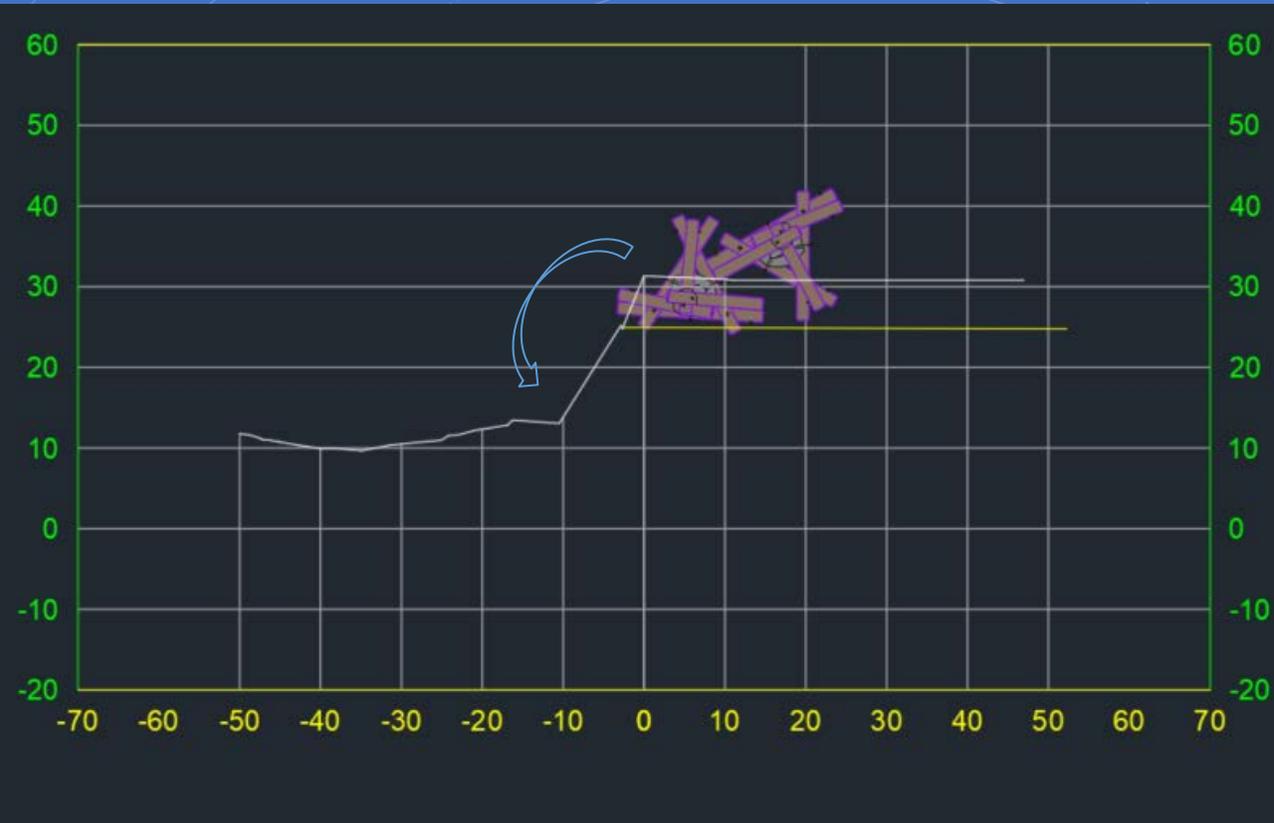


2-year Flow  
Velocity  
(ft/s)



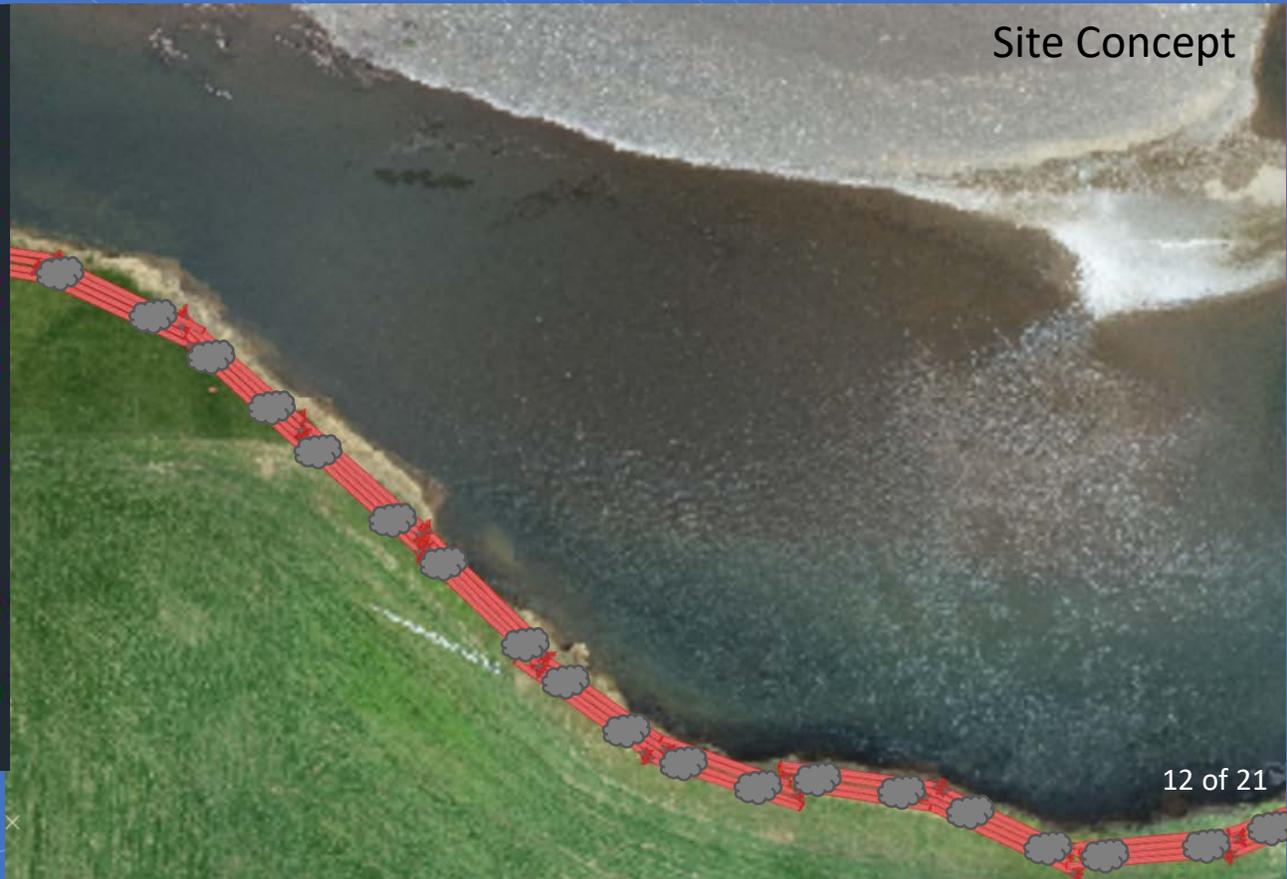
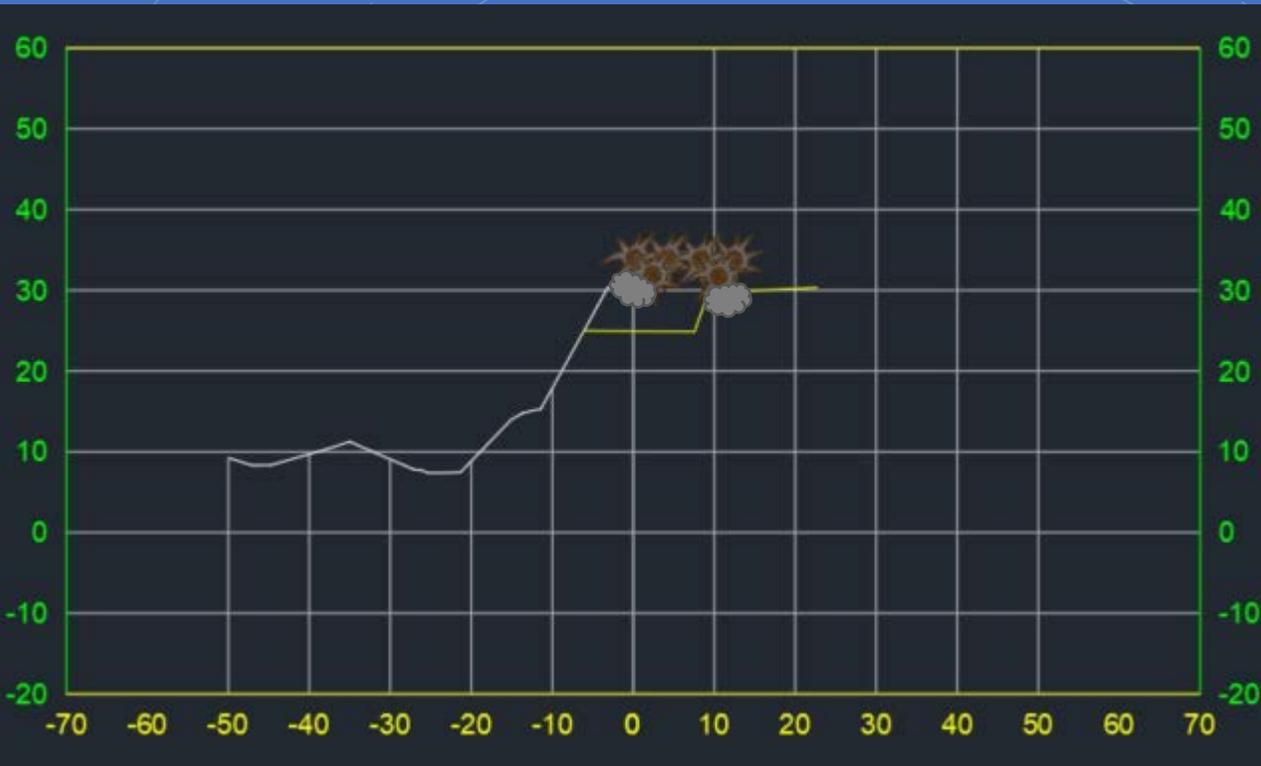
# Ballasted Log Jacks

- Pros: No excavation, can be staged and repositioned, provides increased protection and energy dissipation vertically and horizontally, may provide an anchor to recruit instream LWD
- Cons: Further bank erosion needed to engage, high profile



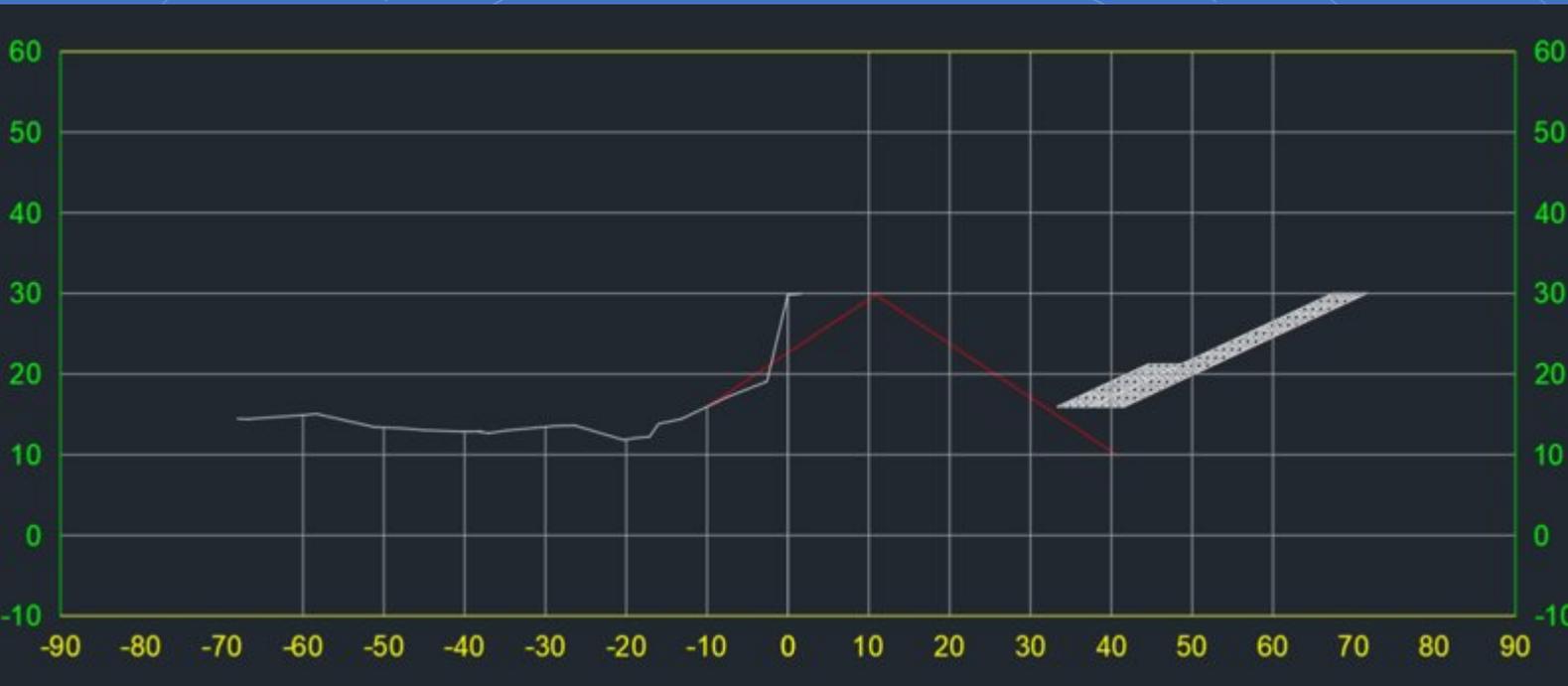
# Launching Log Rows

- Pros: No excavation needed, small footprint and low profile
- Cons: Further bank erosion needed to engage, provides toe protection only



# Rip Rap Revetment

- Pros: Cost/availability of riprap, simple to construct, continuous flexible revetment
- Cons: Not aligned with long-term reach restoration goals

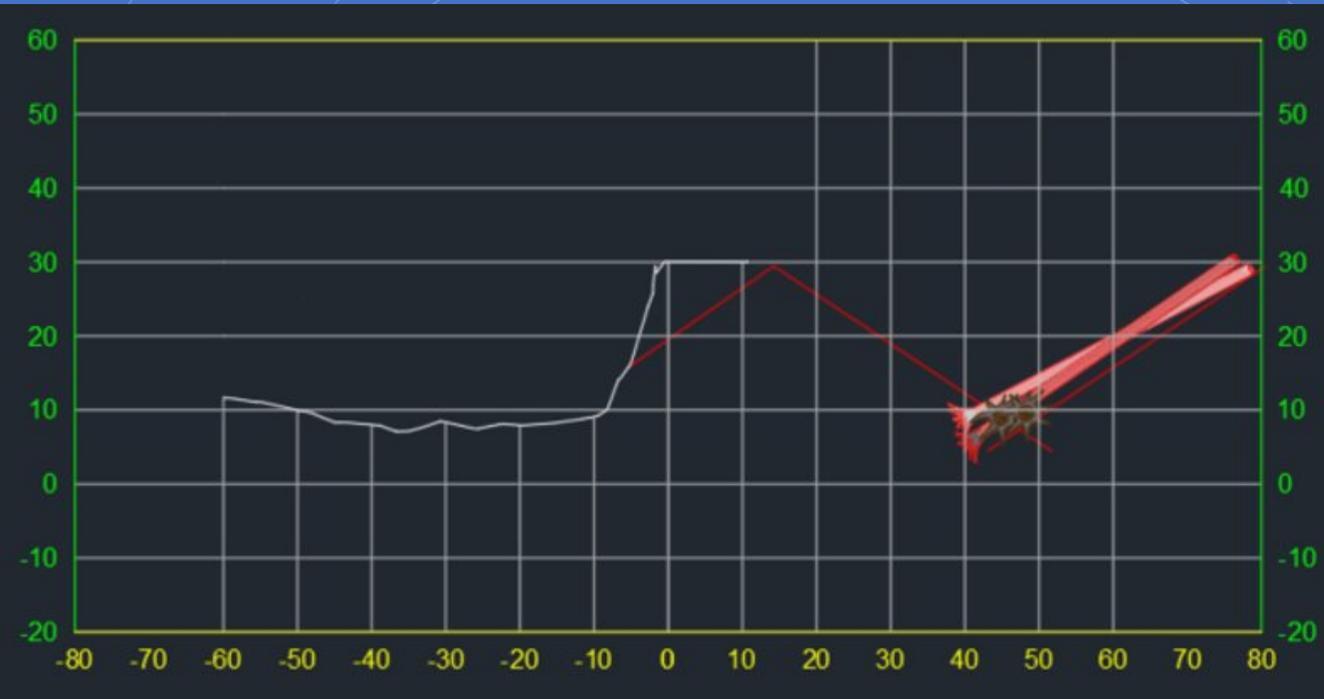


Example: Hoh River



# Continuous Bank Log Roughening

- Pros: Compatible with long-term restoration goals, high value LWD, higher certainty
- Cons: Larger & deeper excavation trench required than launching methods, greater anticipated land loss

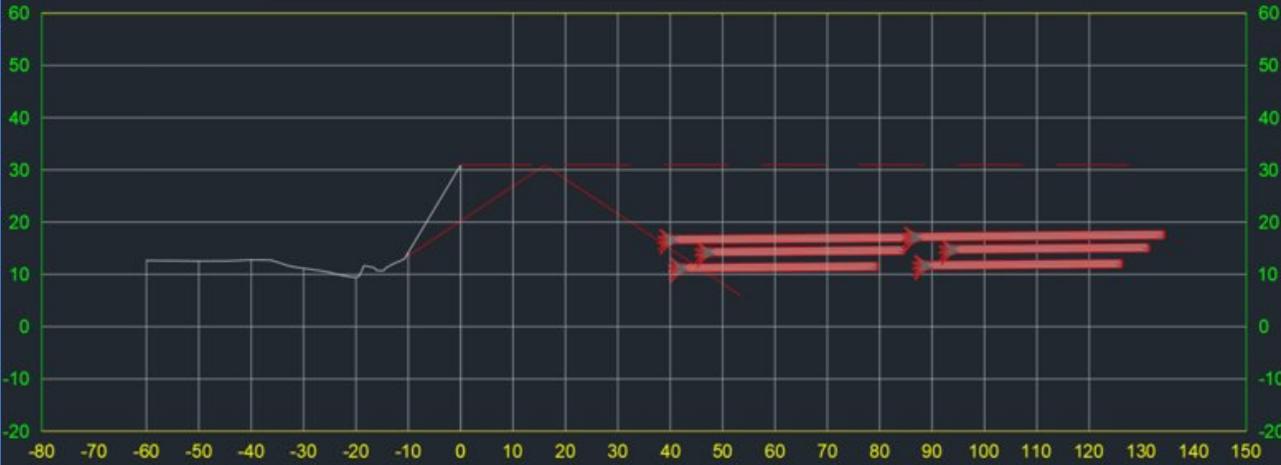


Example: Cowlitz River

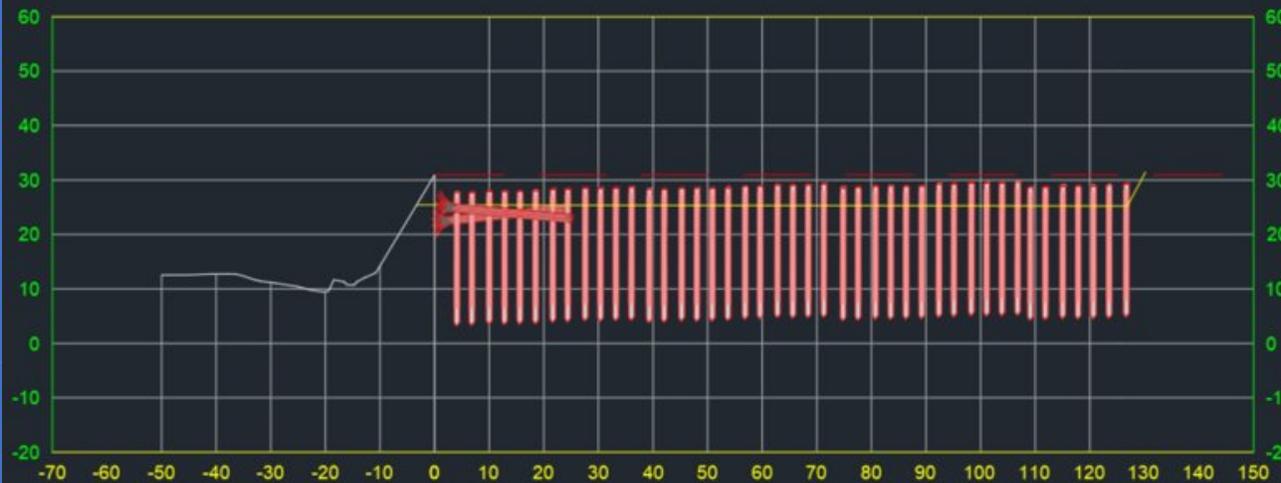
# Rock and/or Log Spurs

Example: Green River

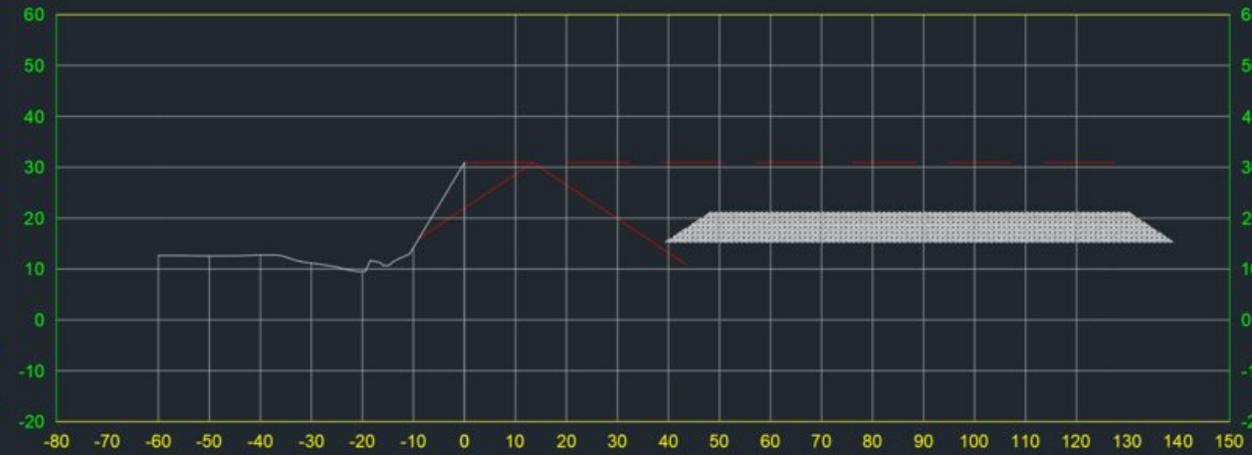
Buried Log Spur



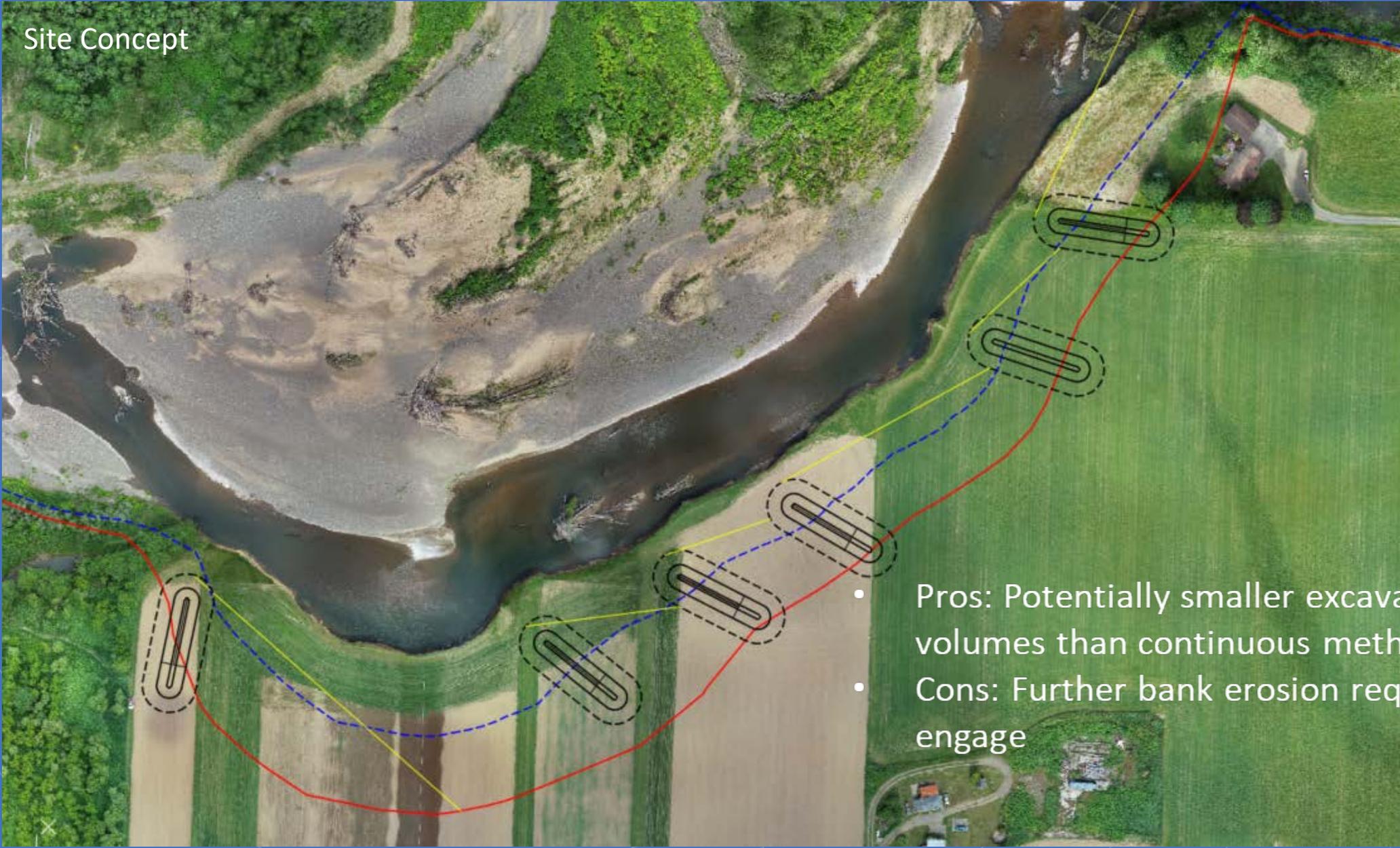
Pile Array w/ Log Roughening



Buried Rock Spur



# Rock and/or Log Spurs



Site Concept

- Pros: Potentially smaller excavation volumes than continuous methods
- Cons: Further bank erosion required to engage

# In-Water Alternatives



- Alternatives identified as challenging to permit in the available time
- In-Stream Wood Relocation
  - There is limited wood across from the project area, and a significant amount at the south end of the project reach
  - This wood could be placed shingled (unballasted) at the toe of the bank to reduce toe erosion
- Streambed Gravel Relocation
  - Excavate a channel through the gravel bar across from the project area, place spoils at toe of bank
- These would not be stand-alone alternatives, but could augment other alternatives
- It is uncertain how effective these measures would be

# Alternatives Plan View



# Permitability

Jurisdiction and Permits	Trenching, launchable options (above OHW)	Terracing (minor fallback, temporary access below OHW)	In-stream Wood Relocation	In-stream Gravel Relocation
<b>Federal</b>				
<b>US Army Corps of Engineers</b> Section 404 Permit				
<b>US Fish and Wildlife Service, National Marine Fisheries Service</b> Section 7 ESA Consultation				
<b>Department of Archaeology and Historic Preservation (DAHP)</b> Section 106				
<b>State</b>				
<b>Washington Department of Ecology</b> Section 401/Water Quality Certification				
<b>Washington Department of Ecology</b> NPDES Construction Stormwater Permit				
<b>Washington Department of Natural Resources</b> Aquatic Use Authorization				
<b>Washington Department of Fish and Wildlife</b> Hydraulic Project Approval				
<b>Department of Archaeology and Historic Preservation</b> Cultural resources review (EO 21-02 [formerly EO 05-05])				
<b>County</b>				
<b>Grays Harbor County</b> SEPA Threshold Determination				
<b>Grays Harbor County</b> Shoreline Master Program				
<b>Grays Harbor County</b> Critical Areas Protection				
<b>PERMITTING TIMEFRAME</b>	<b>3 months</b>	<b>3 to 6 months</b>	<b>6 months to 1 year</b>	<b>1 year</b>
<b>2021 FEASIBILITY</b>	<b>Feasible</b>	<b>Possibly feasible</b>	<b>Not feasible</b>	<b>Not feasible</b>

## LEGEND

No Permit Required
Permit May Be Required
Permit Required

# Selection Matrix

Score	Performance Rating
High	High
Medium	Medium
Low	Low
None	None
TBD	TBD

		Benefit Priorities						Implementation Priorities					
		Toe Stabilization	Energy Dissipation	Certainty of Performance	Decreased Sediment Transport/ Increased Deposition	Interim Shoreline Safety	Reach Approach Compatibility	Construction Costs	Constructable	Permittable	Scalable	Expected Land Loss	Stakeholder Approval
Weighting	Upper Reach												
	Middle Reach												
	Lower Reach												
Performance	Bank	Continuous Log Rows	High	Medium	Medium	Medium	High	None	High	High	Medium	None	
		Log Jacks	High	Medium	Medium	Low	High	None	High	High	Medium	None	
	Trenched	Buried Spur Jams - Rock	Medium	Medium	Low	None	High	None	None	Medium	Medium	Low	None
		Buried Spur Jams - Logs	Medium	Medium	Low	None	High	None	None	Medium	Medium	Low	None
		Buried Rock Revetment	Medium	High	Low	None	High	None	None	Medium	High	Low	None
		Buried Log Revetment	Medium	High	Low	None	High	Medium	None	Medium	High	Low	None

# Questions/Discussion

- Permitting
- Design Alternatives
- Success Factors
- What are we missing?

