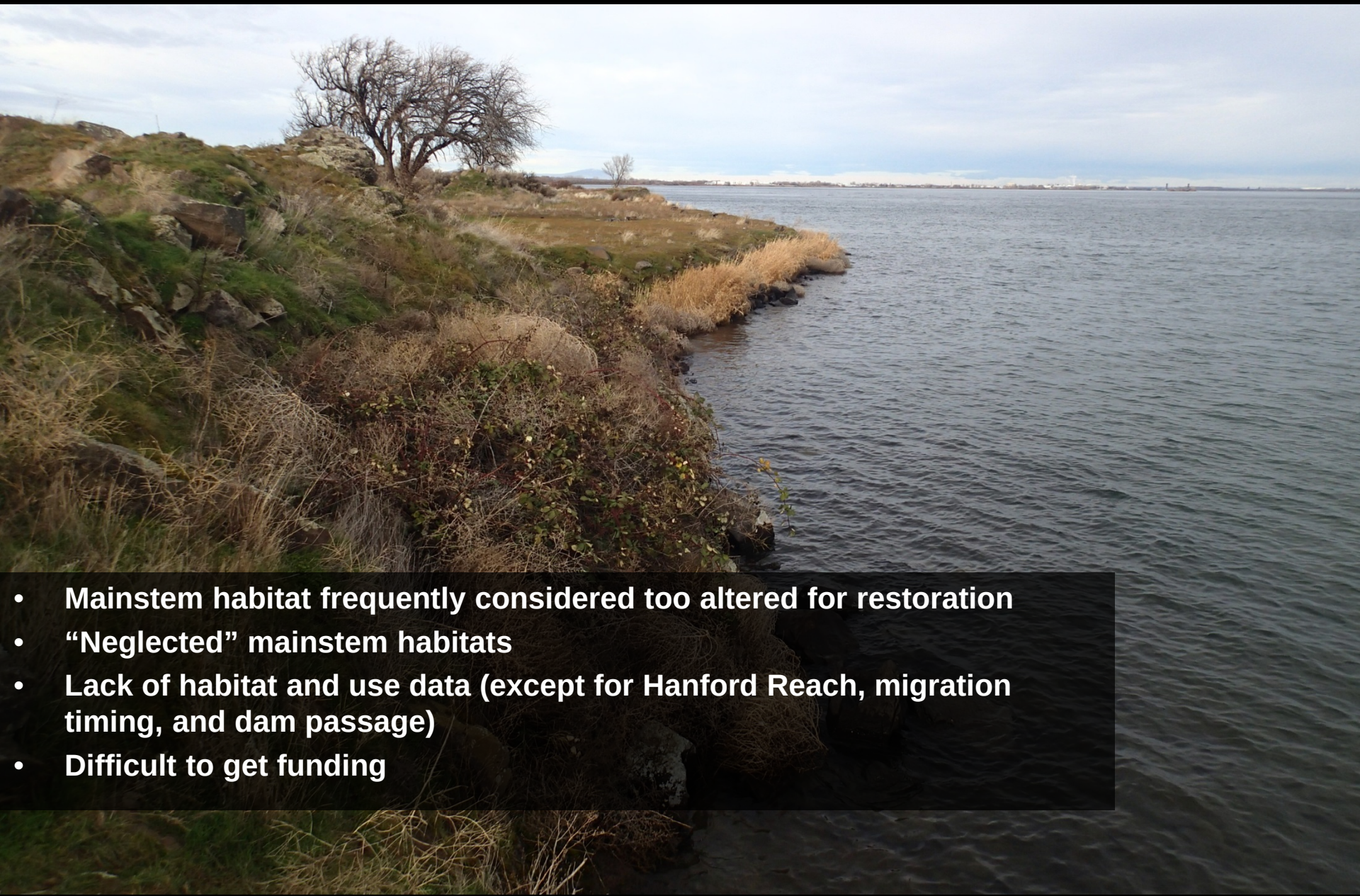
Habitat Restoration on the Mainstem Columbia

Klickitat & White Salmon Rivers
Fisheries and Watershed Science Conference
April 15, 2014

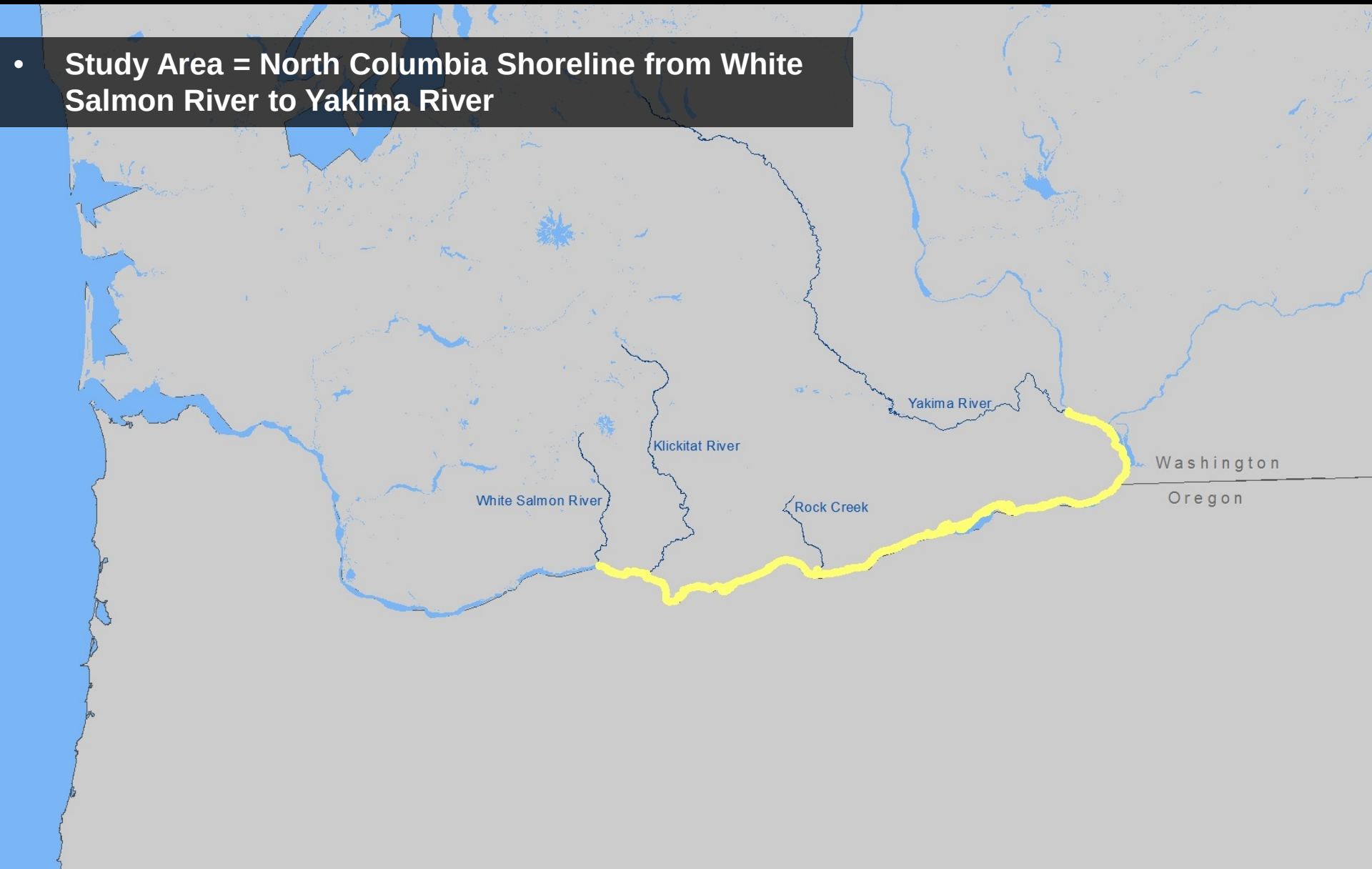
Project Background



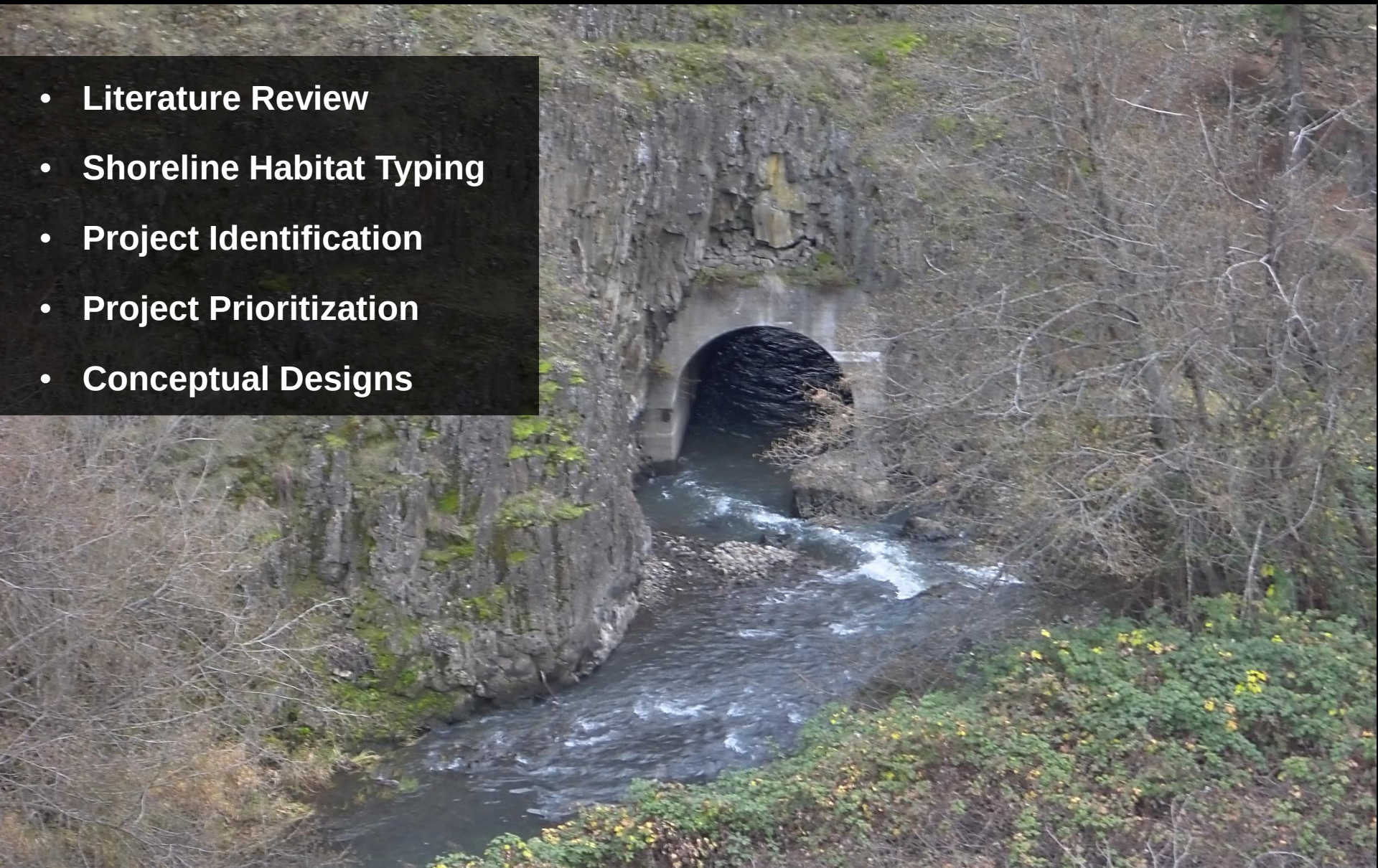
- Mainstem habitat frequently considered too altered for restoration
- “Neglected” mainstem habitats
- Lack of habitat and use data (except for Hanford Reach, migration timing, and dam passage)
- Difficult to get funding

Study Area

- **Study Area = North Columbia Shoreline from White Salmon River to Yakima River**

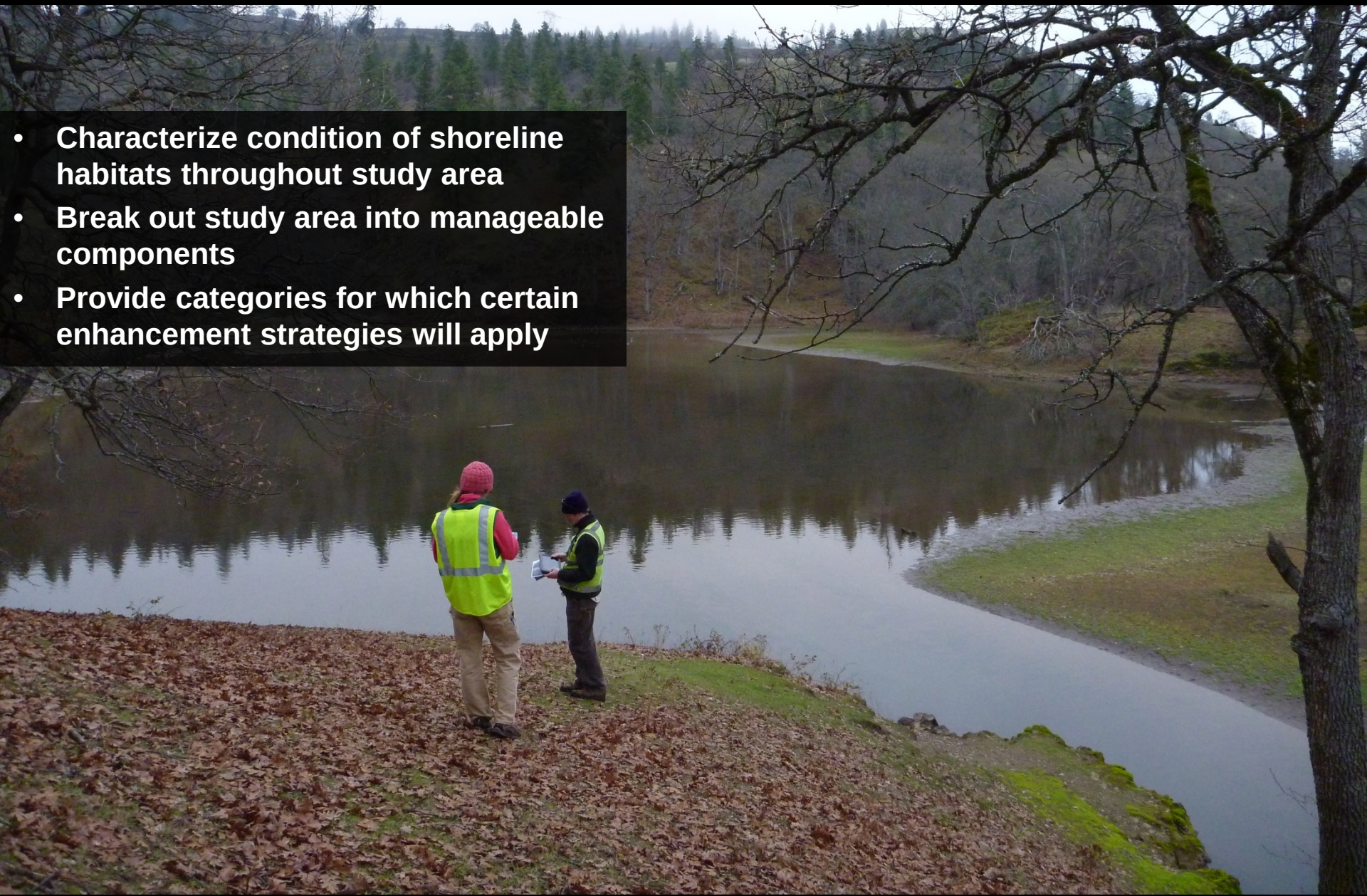


Project Components



- Literature Review
- Shoreline Habitat Typing
- Project Identification
- Project Prioritization
- Conceptual Designs

Shoreline Habitat Typing



- Characterize condition of shoreline habitats throughout study area
- Break out study area into manageable components
- Provide categories for which certain enhancement strategies will apply

Shoreline Habitat Typing

Field Name	Classification Descriptions
Sediment size class	Bedrock: bedrock Boulder: 256mm or larger Cobble: 64-256mm Gravel: 2-64mm Fines: 2mm or smaller Riprap: rock placed to armor shoreline (primarily 64mm+)
Bank slope	Sloping: 2:1 or less Steep: 2:1-1:1 Vertical: 1:1 or steeper
Bed depth	Shallow: <6 feet Deep: >6 feet
Vegetation class	Tree – Tree species; typically >15ft tall Shrub – Shrub species, typically <15 ft tall Herb – Herbaceous plants Mix – Evenly mixed vegetation types No – Vegetation was not present, or made up less than ~70% of the segment
Backwater	0: Not a backwater shoreline – segment is along the mainstem of the Columbia and interacting with the main current 1: Backwater shoreline – segment is located within a backwater area, including tributaries
Connectivity	0: Disconnected – this also refers to areas that are only partially connected via one or only a few culverts or that are only connected to the mainstem during flood events 1: Connected – areas that are well connected via surface flow and fish passage to the mainstem
Island	0: Mainstem shoreline 1: Island shoreline (includes islands connected by causeways)
Land-use	Multiple designations
Field Surveyed	1: Field surveyed 0: Not field surveyed – shoreline designation was estimated using aerial photos. In most of these cases, land access was not possible given ownership or terrain issues.

Shoreline Habitat Typing

Shoreline Habitat Typing - Results for Sediment Type

River Mile 168 to 188

Aerial Photos from Bing Maps via ESRI ArcGIS

Sediment Type

- bedrock
- fines
- gravel/cobble
- riprap
- infrastructure
- unidentified

- Cities
- River Miles
- Railroad
- Highways

Shoreline Habitat Typing

Riprap banks (RM 178)

Shoreline Habitat Typing

Bedrock coves (RM 176)

Shoreline Habitat Typing

Gravel beach (RM 209)

Shoreline Habitat Typing

Disconnected backwater (RM 178)

Shoreline Habitat Typing

Connected backwater (RM 325)

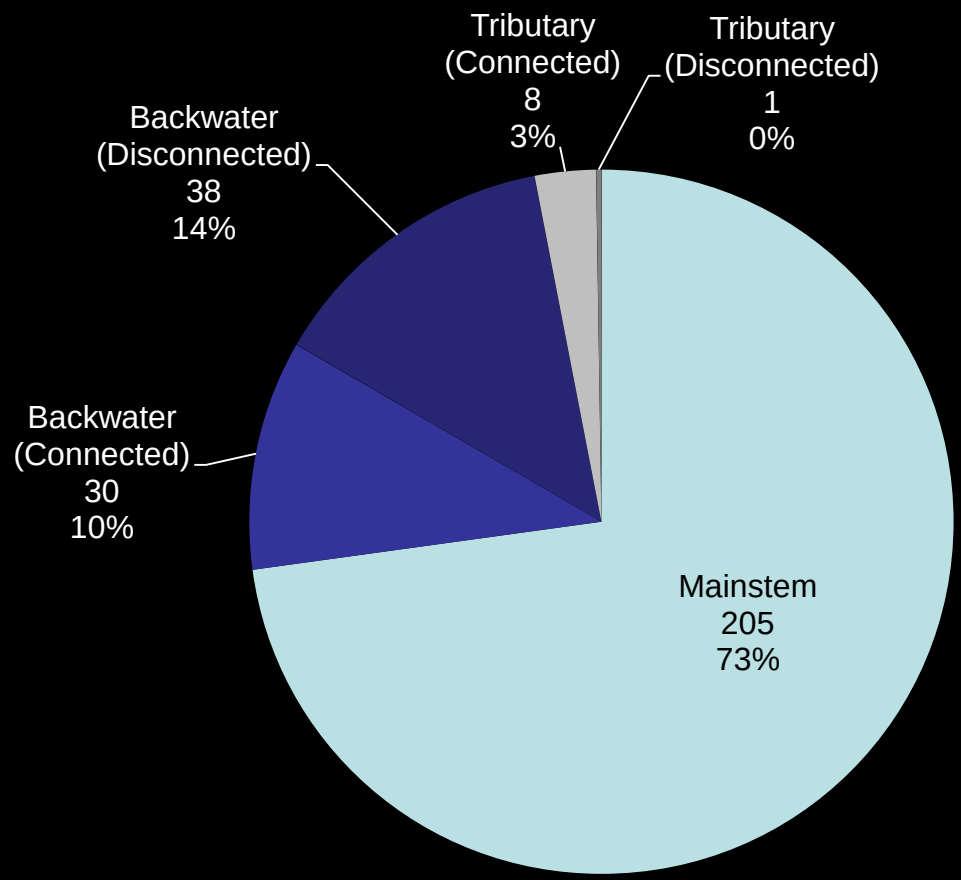
Shoreline Habitat Typing

Tributary confluence (RM 273)

Shoreline Habitat Typing

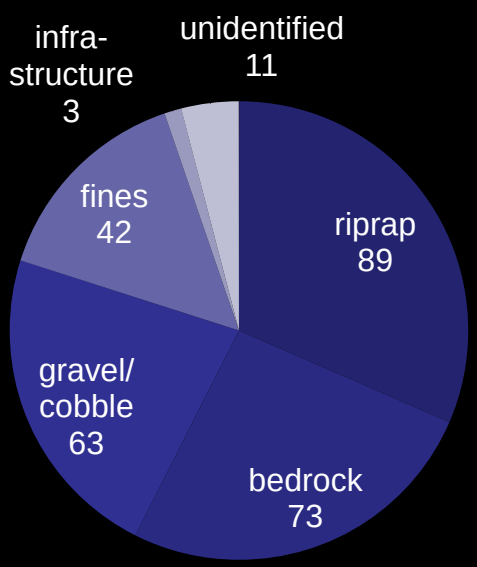
Three primary categories

1. **Mainstem Shorelines**
2. **Backwaters**
3. **Tributary Confluences**

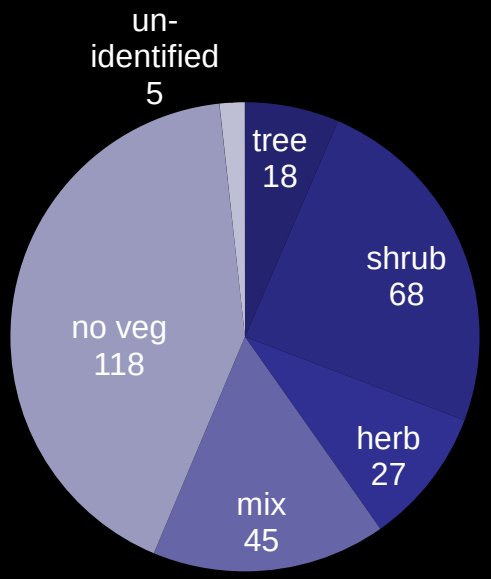


Shoreline Habitat Typing

Shoreline Sediment Type (miles)



Shoreline Vegetation Type (miles)



Project Types

Mainstem Shorelines

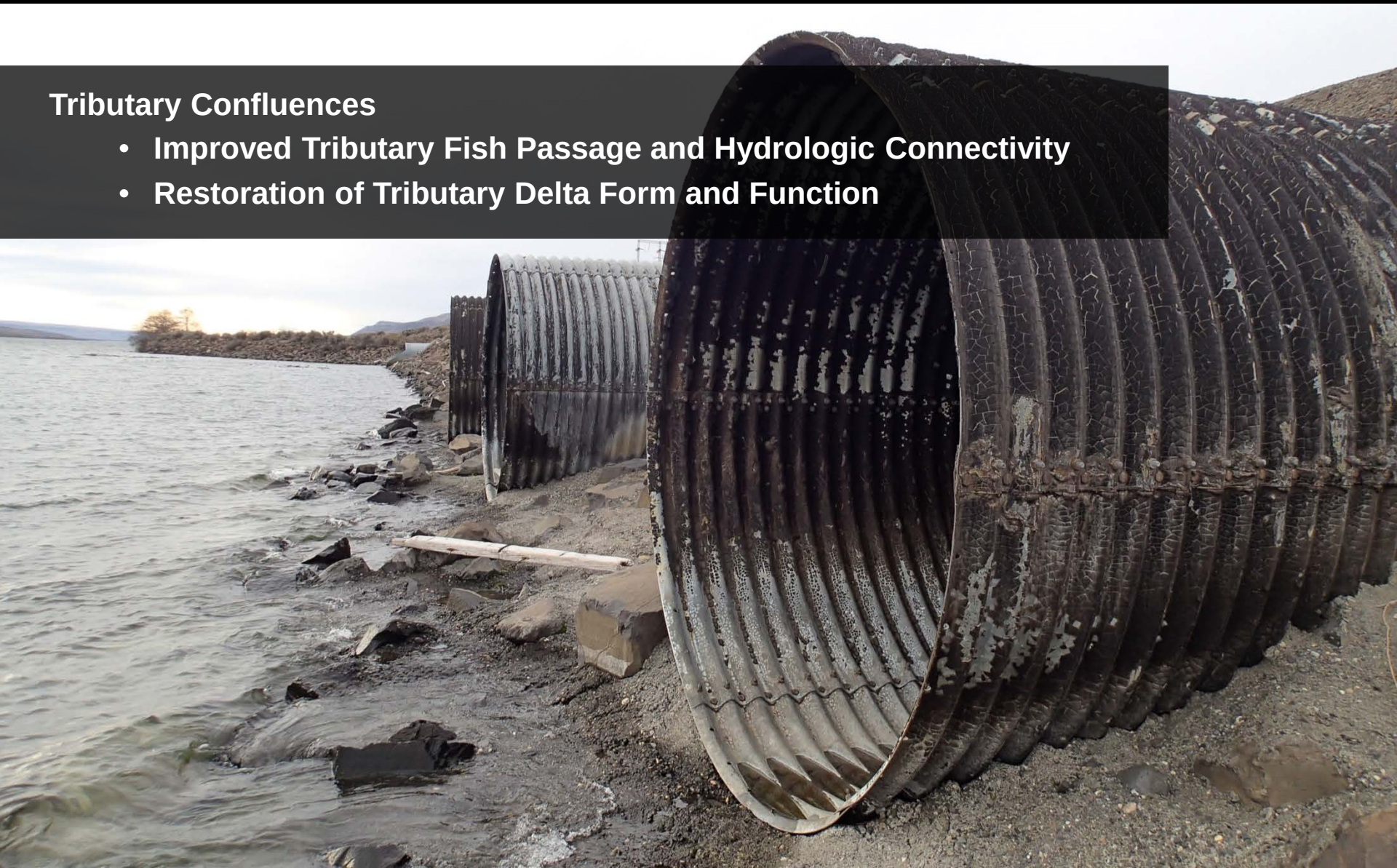
- **Creation of Shallow Nearshore Habitat**
- **Enhancement of Shoreline Complexity and Vegetation**

Project Identification

Backwaters

- **Improved Fish Passage and Hydrologic Connectivity to Backwaters**
- **Enhancement of Backwater Form and Function**

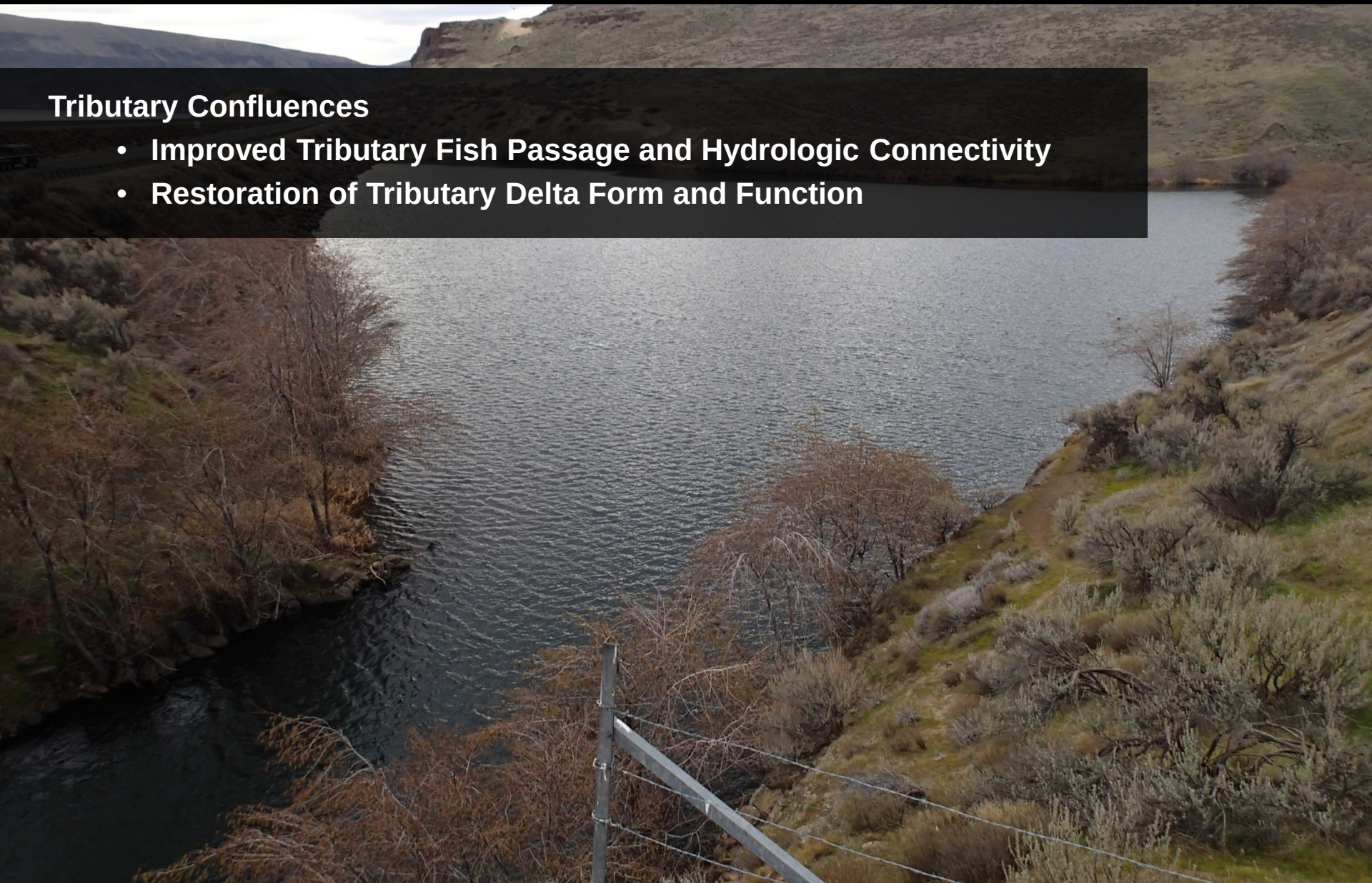
Project Identification



Tributary Confluences

- **Improved Tributary Fish Passage and Hydrologic Connectivity**
- **Restoration of Tributary Delta Form and Function**

Project Identification



Tributary Confluences

- **Improved Tributary Fish Passage and Hydrologic Connectivity**
- **Restoration of Tributary Delta Form and Function**

Specific Project Identification

Project Opportunity List

River Mile	Area Name	Type	Description	Restoration / preservation potential	Potential constraints	Priority Tier
168	White Salmon River					
171	Bingen Lake	B	• Disconnected off-channel wetland • Owned and maintained by Port of Klickitat as a wetland enhancement site.	• Enhance hydrologic and fish passage connectivity • Improve wetland vegetation and habitat (this is a wetland enhancement area by the Port of Klickitat)	• Water quality. Determine if this receives treated wastewater • Invasive and predatory species • Infrastructure (levee would need to be culverted, bridged, or breached). • Future commercial development anticipated around the site	3
172	Bingen Harbor	B	• Industrial connected backwater • Impaired shoreline habitat (armoring and simplified habitats) • Impaired and cleared riparian vegetation	• Recontour bed topography to achieve a complex range of depths and plant communities • Enhance shoreline tortuosity, complexity, and structure • Establish riparian buffer and manage for native riparian plants	• Future commercial development anticipated around the site. • Boat ramp access located at far end • Recontouring would likely require importation of fill • Design needs to be compatible with boat access	3
175	Look Lake	B	• Two isolated backwaters due to Hwy 14 and BNSF. • Limited hydrologic and fish passage connectivity via culverts (?)	• Enhance hydrologic and fish passage connectivity • Recontour bed topography to achieve a complex range of depths and plant communities	• Potential for existing poor water quality (temps, DO, nutrients) • Invasive and predatory species • Recontouring would likely require importation of fill • Significant infrastructure constraints (Hwy 14 and BNSF)	3
176	Rowland Lake	B	• Two isolated backwaters due to Hwy 14 and BNSF. • Limited hydrologic and fish passage connectivity via culverts (?)	• Enhance hydrologic and fish passage connectivity • Recontour bed topography to achieve a complex range of depths and plant communities	• Potential for existing poor water quality (temps, DO, nutrients) • Invasive and predatory species • Recontouring would likely require importation of fill • Significant infrastructure constraints (Hwy 14 and BNSF)	3
178	Major Creek	T	• Major Creek confluence • Large corrugated metal pipe (CMP) under Hwy 14 and concrete box culvert under BNSF • There is a disconnected (at most flows) off-channel area between the Hwy and BNSF that appears to be fed by subsurface flow under the Hwy fill	• Expand off-channel area and provide a year-round surface water connection between off-channel area and Major Creek • Water quality and quantity is likely adequate given hyporheic source of flow	• Significant potential access constraints for machinery unless access can be obtained via railroad corridor • Potential size of off-channel area is less than 0.2 acres. • Need to confirm seasonal pattern of stage and water quality (temps, DO, nutrients) in off-channel area	2
180	Chamberlin Lake	B	• Isolated backwaters due to Hwy 14 and BNSF. • Limited hydrologic and fish passage connectivity via culvert(s) • Sharp temperature gradient between lake and Columbia River based on unpublished YN data	• Enhance hydrologic and fish passage connectivity • Recontour bed topography to achieve a complex range of depths and plant communities	• Potential for existing poor water quality (temps, DO, nutrients) • Invasive and predatory species • Recontouring would likely require importation of fill • Significant infrastructure constraints (Hwy 14 and BNSF)	3
180.5	Klickitat River	T	• Klickitat delta has extensive sand deposits. Island development at east end of delta. Otherwise very little vegetation of deltaic sediments or development of distributary channel network • Potential juvenile exposure (avian predation) and adult passage issues across shallow delta areas under certain conditions • Lower Klickitat River within Columbia backwater is mostly steeply banked (bedrock) and deep. • There is a backwater cove (Canyon Creek Cove) on east bank at RM 0.4	• Delta: recontour and import material to create vegetated islands and distributary channel network. Add large wood structures to help retain placed sediments • Delta: add large wood structures to enhance available cover and complexity for adults and juveniles • Canyon Creek Cove: recontour bed topography to achieve a complex range of depths and plant communities. Add structure • Canyon Creek Cove: consider routing Klickitat River into cove at upstream end • There is potentially significant use of the lower Klickitat by upriver 'dip-in' fish as well as local populations (YN unpublished data)	• Delta: significant effort and expense to recontour delta, especially due to need to import material • Delta: wind and erosion effects would make soil stabilization and vegetation establishment challenging • Delta: recreational uses (boating, wind sports) • Canyon Creek Cove: potential for existing poor water quality (temps, DO, nutrients) • Canyon Creek Cove: invasive and predatory species	2
183-184	Doug's Beach and upstream	M	• Intermittent bedrock coves and sloping beaches with sand and gravel • Tree and shrub vegetation	• Mostly high quality complex shoreline habitat that should be protected • Vegetation could be enhanced in some areas • Portions offer a good analog for restoring complex vegetated shorelines		3

Etc….

Concept Designs

Existing Conditions

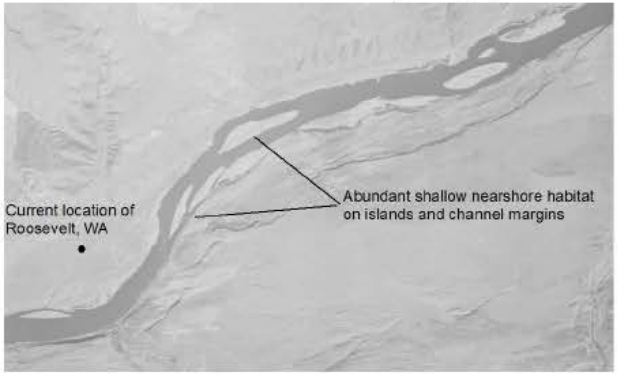
Plan View - showing existing depth contours (ft)

Restored Conditions

Plan View

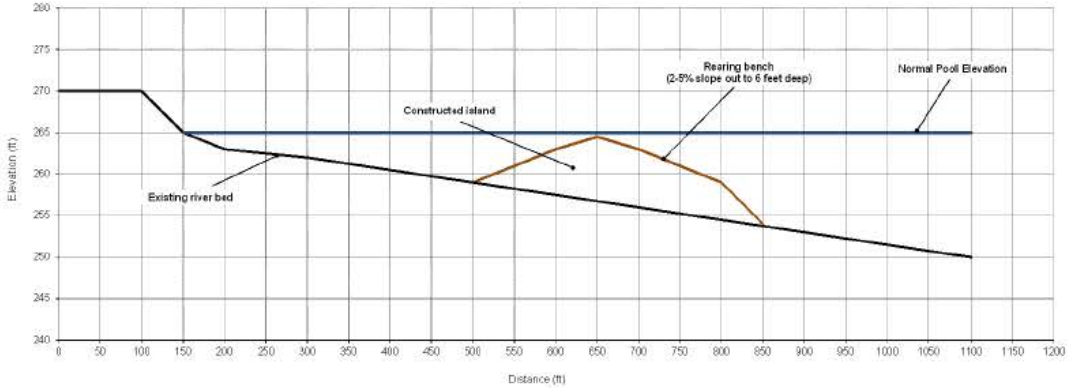
Historical Conditions

Plan View - October 1952 aerial photograph



Restored Conditions

Cross-Section View



Concept Design

Creation of Shallow Nearshore Habitat

Note: this location is selected solely to provide an example of the concept that could be used in many potential locations. This example is not intended to advocate for a project at this particular site. Selecting a project for any specific site will require significant additional site information and coordination with landowners and other entities.

Columbia River Shoreline Project Identification

Mid-Columbia Fish Enhancement Group

Drawings provided by:

inter·fluve

1020 Wasco Street, Suite I
Hood River, Oregon 97031
www.interfluve.com
541.386.9003

Concept Designs

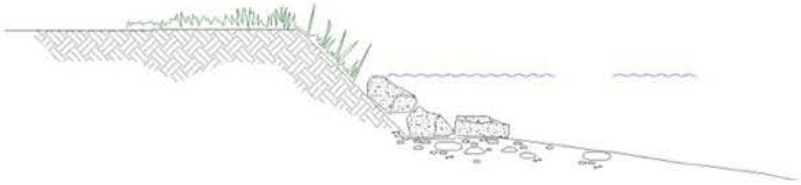
Existing Conditions

Plan View - Existing

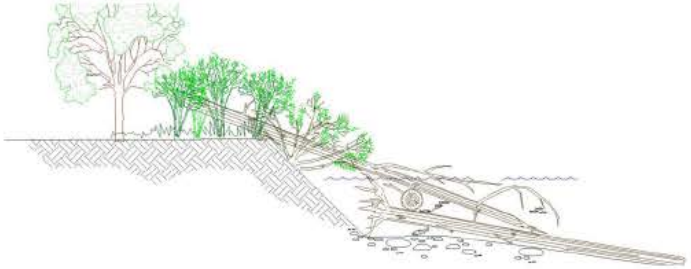
Restored Conditions

Plan View - Restored

Cross-Section View - Existing



Cross-Section View - Restored



Analog Conditions

East Maryhill - River Mile 210

Photograph - Existing

Photograph - River Mile 183

Concept Design

Enhancement of Shoreline Complexity and Vegetation

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Concept Designs

Existing Conditions

Plan View

Restored Conditions

Plan View

Site Photograph - culvert outlets

Site Photograph - culvert inlets

Analog Conditions

Photograph - Alder Creek RM 258

Concept Design

Improved Tributary Fish Passage and Hydrologic Connectivity

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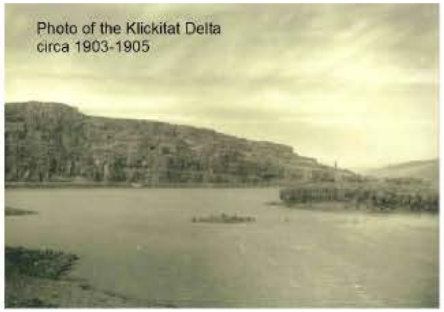
Concept Designs

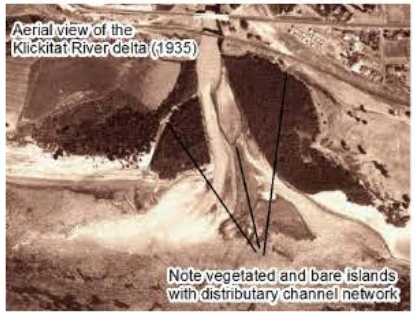
Existing Conditions

Plan View

Historical and Analog Conditions

Historical photos





Restored Conditions

Plan View

Concept Design

Restoration of Tributary Delta Form and Function

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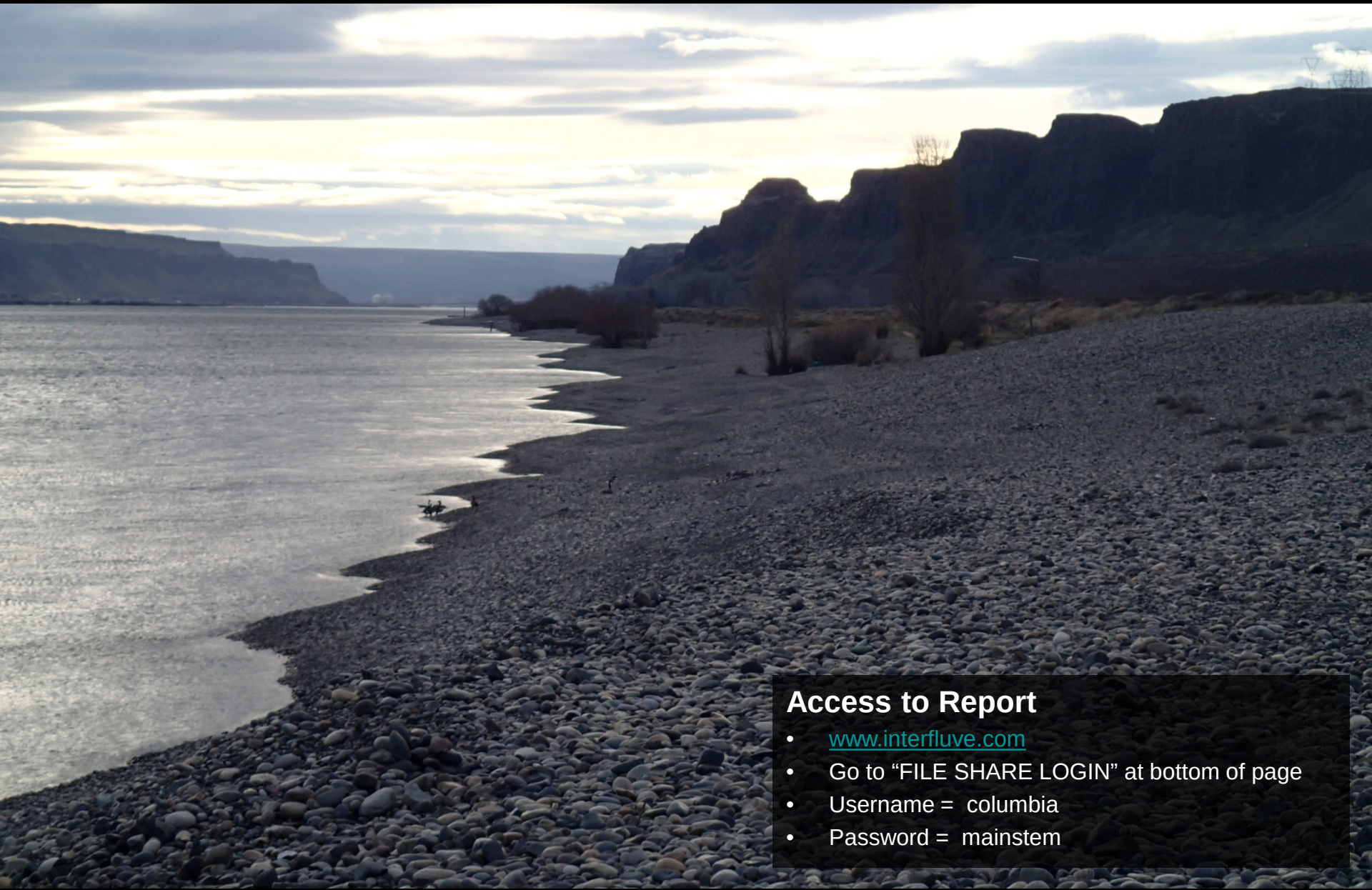
Project Prioritization

- **Based on collaboration with Technical Oversight Group**
- **Mostly qualitative but based on the research, experience, and knowledge of the TOG**

Priority Tier	Description	Project Types	Notes
1	**Highest priority**. Known potential benefits and high scientific support.	• Improved tributary fish passage and hydrologic connectivity	More information needed on degree of blockages and potential length of reconnected habitat.
2	**Second priority**. High potential benefits but need additional information with respect to location and project components.	• Creation of shallow nearshore habitat • Restoration of tributary delta form and function	Need to prioritize specific locations and begin to build partnerships to conduct pilot projects.
3	**Third priority**. Uncertain benefits. More information needed prior to moving projects forward.	• Improved fish passage and hydrologic connectivity to backwaters • Enhancement of backwater form and function • Enhancement of shoreline complexity and vegetation	An assessment of backwaters (use, predation) is viewed as high priority. Before/after studies could be conducted for experimental projects.

Next Steps and Questions



Access to Report

- www.interfluve.com
- Go to “FILE SHARE LOGIN” at bottom of page
- Username = columbia
- Password = mainstem