Apr 21st, 9:00 AM - Apr 22nd, 4:45 PM

Coastal Stream and Embayment Restoration Priorities along the BNSF Railroad: Results and Future Action

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Coastal Streams and Embayments Prioritization along Puget Sound Shores with a Railroad

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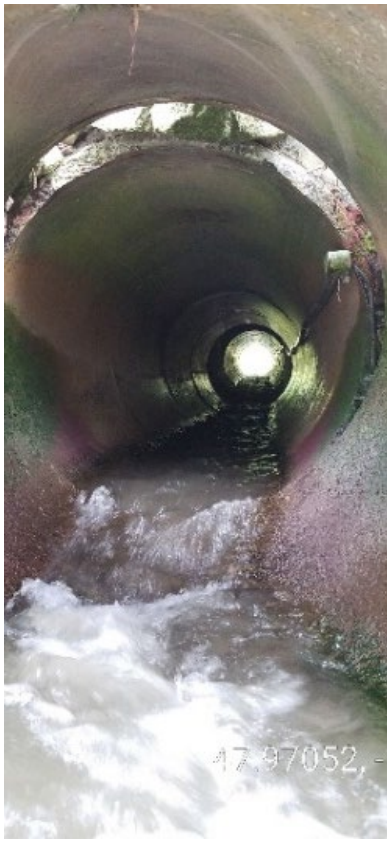
Paul Schlenger, Environmental Science Associates

Salish Sea Ecosystem Digital Conference
April 20, 2020

OVERVIEW OF THE ISSUE

- Today, there are 52 miles with railroad on shoreline
- Another 21 miles with railroad within 200 feet of shoreline

IMPACTS TO STREAM MOUTHS



- Restricts fish access
- Bisects and truncates estuaries
- Impedes delivery of sediments and large wood to nearshore

CREATES AND/OR IMPACTS EMBAYMENTS

- In some cases, connection of historic embayments to Puget Sound are altered by the railroad
- In other areas, the railroad cut straight across a complex part of shoreline and formed embayment
- Limits or entirely restricts connectivity to Puget Sound

PROJECT GOAL

- Develop prioritization of coastal stream mouths and embayments impacted by railroad crossings based on potential ecological benefits

PROJECT APPROACH

1. Convene Advisory Group of experts familiar with issues of the railroad along the shoreline
2. Compile existing data and collect new data for all sites
3. Develop and apply prioritization framework

ADVISORY GROUP

- Dava Kaitala, BNSF
- Courtney Wallace, BNSF
- Hugh Shipman, Ecology
- Doris Small, WDFW
- Pad Smith, WDFW
- Jay Krienitz, WDFW ESRP
- Tish Conway-Cranos, WDFW ESRP
- Kathleen Pozarycki, Snohomish Co.
- Kristin Williamson, South Puget Sound Salmon Enhancement Group

FIELD DATA COLLECTION

Site information

- GPS location
- Time of visit

Downstream habitat

- Distance to Salish Sea
- Slope
- Stream bankfull width
- Notable features

Crossing Characteristics

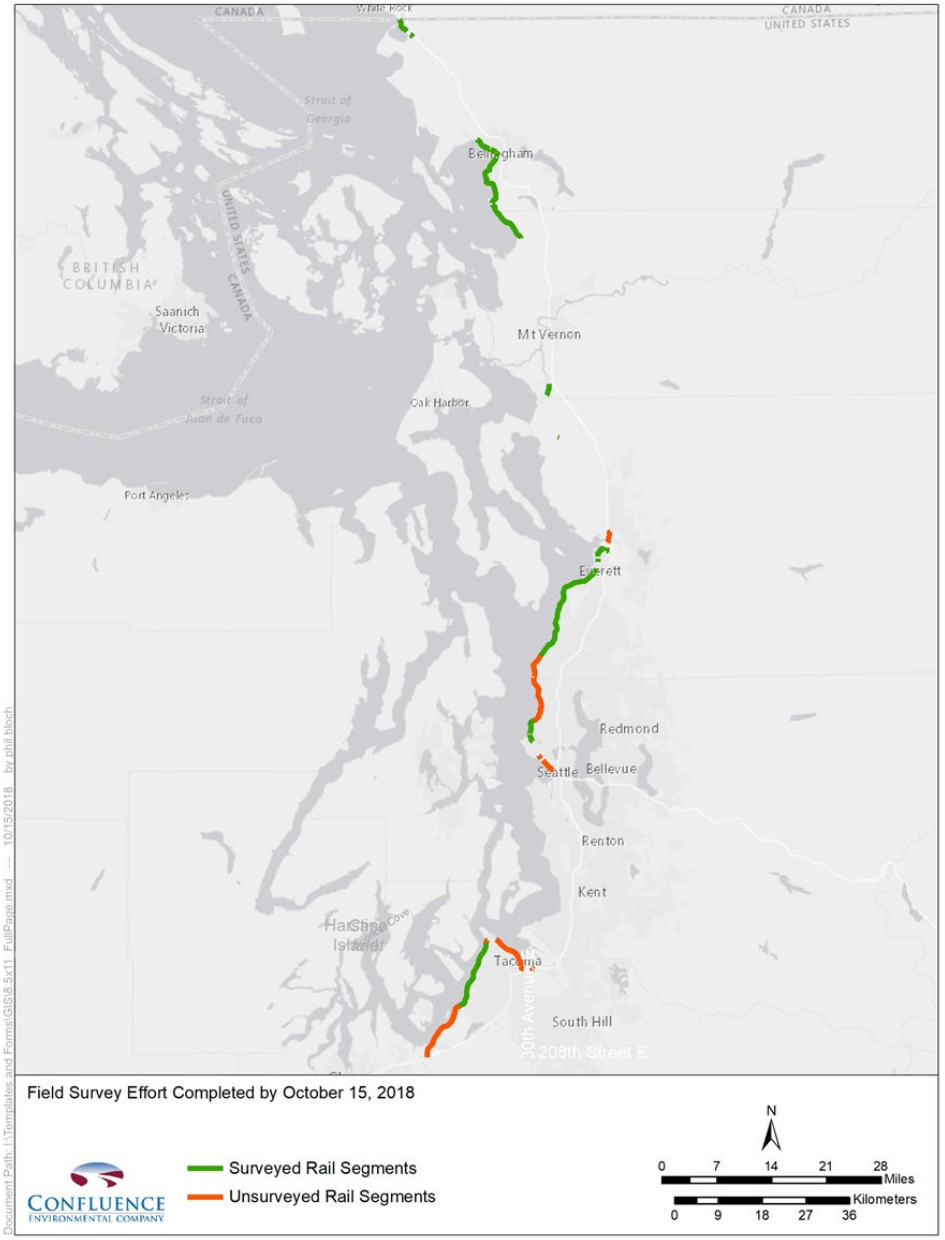
- Type of structure
- Size of structure
- Presence of streambed materials
- Inlet and outlet water depth
- Outlet tidal elevation

Upstream Habitat

- Stream bankfull width
- Stream slope (200')
- Riparian habitat
- LWD
- Alignment relative to RR
- Open channel or piped
- Notable features

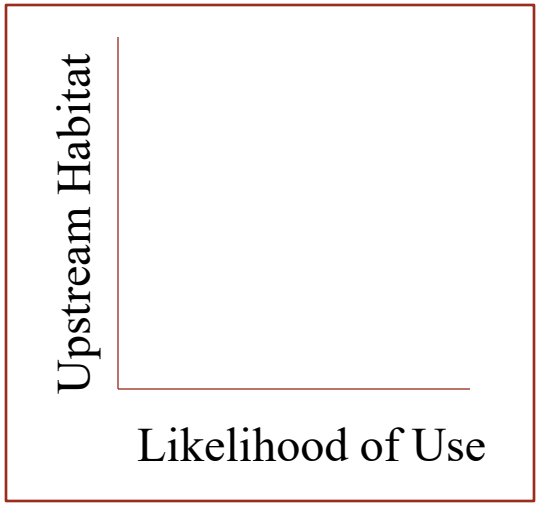
FIELD DATA COLLECTION

- 12 Field Days
- 45 miles surveyed
- ~195 stream crossings
- ~100 structures
- 3 reaches unsurveyed
  - Urban Seattle-Edmonds
  - Urban Tacoma
  - Sequalitchew Creek to Nisqually



PRIORITIZATION FRAMEWORK

- Field data was combined with existing data to create a framework to prioritize stream crossings for restoration
- Framework had two components
  - Likelihood of use by juvenile chinook salmon
    - Informed by Beamer et al. (2013)
    - e.g., proximity to major chinook river, presence of pocket estuary/delta
  - Upstream habitat
    - e.g., length of accessible stream, water quality, habitat conditions



PARAMETERS TO CHARACTERIZE LIKELIHOOD OF STREAM USE BY JUVENILE CHINOOK

Parameter	Score Range
Proximity to major chinook river	0 – 5
Presence of pocket estuary, stream delta, or from PSNERP (barrier beach [BAB] or barrier estuary [BE])	0 – 5
Watershed size	0 – 5
Documented salmon spawning or intrinsic potential	0 – 4
Stream gradient	0 – 3
Tidal inundation extends upstream of culvert (i.e., culvert backwaters)	0 – 3

PARAMETERS TO CHARACTERIZE UPSTREAM ACCESS & HABITAT QUALITY

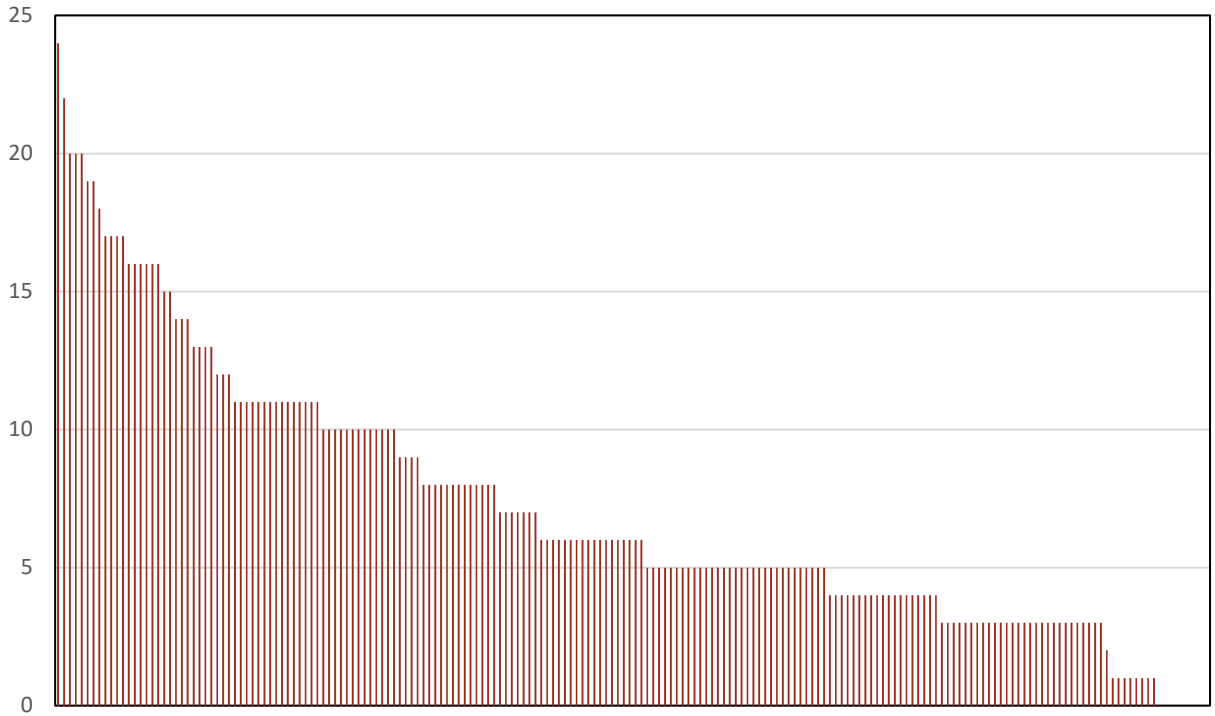
Parameter	Score Range
Water quality	0 – 5
Riparian vegetation	0 – 4
Presence of another culvert or modification affecting access	0 – 3
Large wood	0 – 2
Bank armoring	0 – 2

PRIORITIZATION FRAMEWORK TIERS

- Bins assigned to each prioritization category based on expected benefit to juvenile chinook salmon

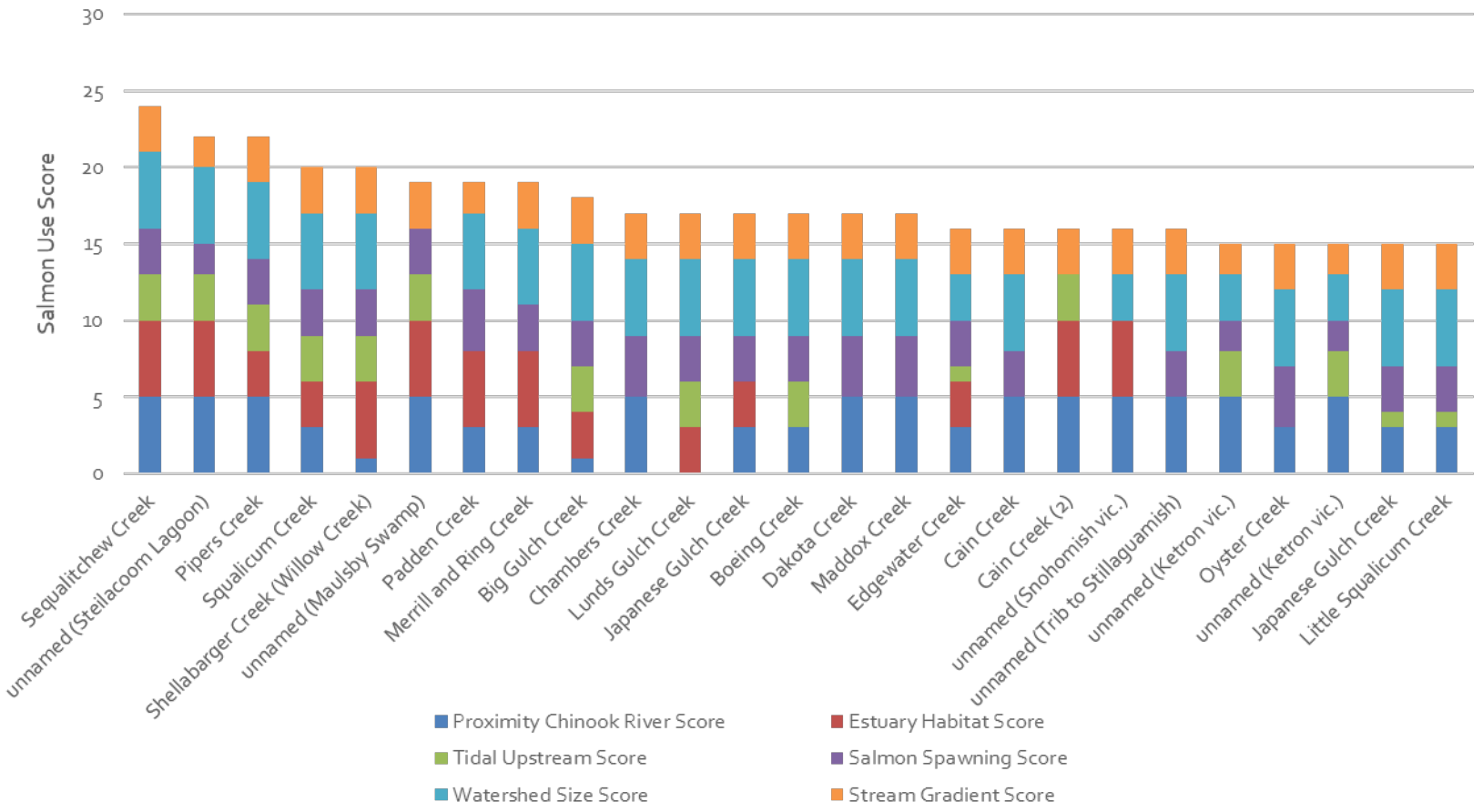
		Likelihood of Stream Use by Juvenile Chinook		
		Low (0-6)	Moderate (7-13)	High (14-24)
Upstream Habitat Access and Quality	High (8-14)	Moderate	High	Highest
	Moderate (5-7)	Low	Moderate	Highest
	Low (0-4)	Low	Moderate	High

RESULTS: LIKELIHOOD OF STREAM USE BY JUVENILE CHINOOK SALMON

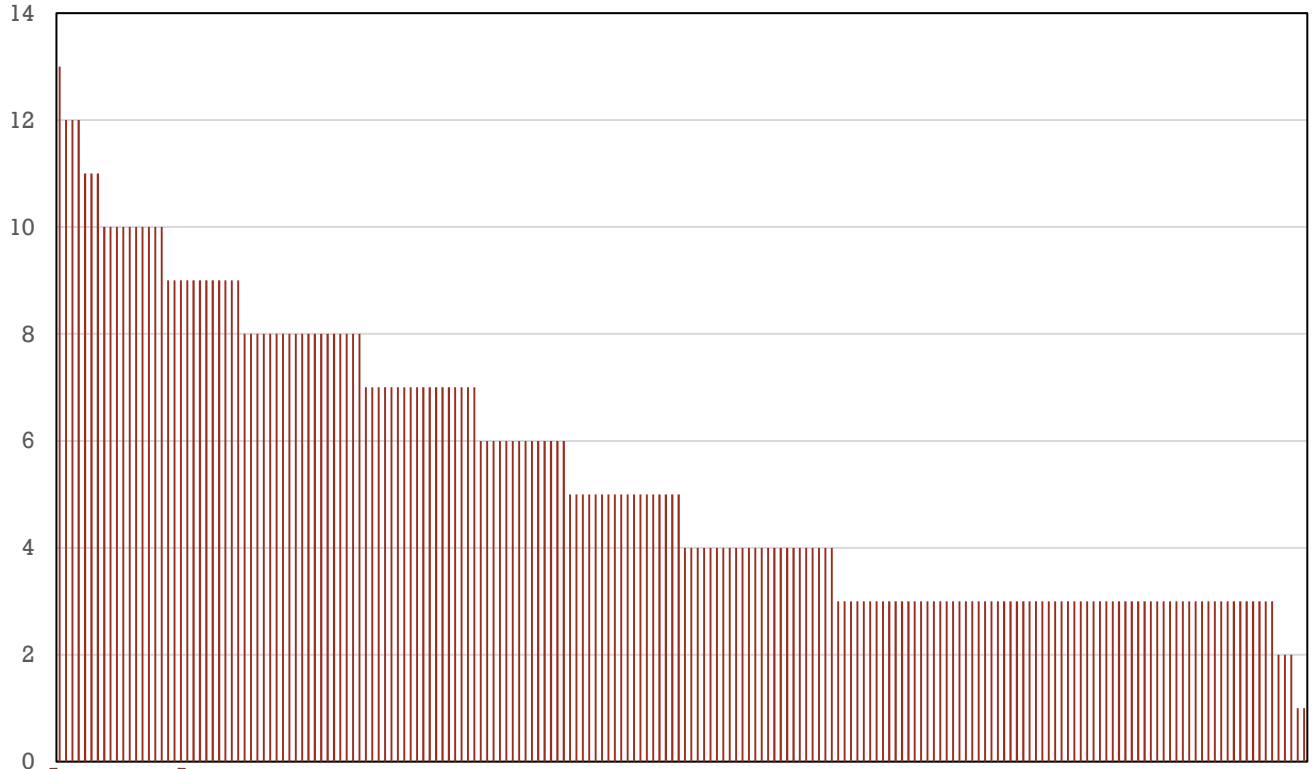


- Range 0 - 24
- Mean = 7.2
- Median = 6.0
- Maximum Possible = 25

TOP 25: LIKELIHOOD OF STREAM USE BY JUVENILE CHINOOK SALMON

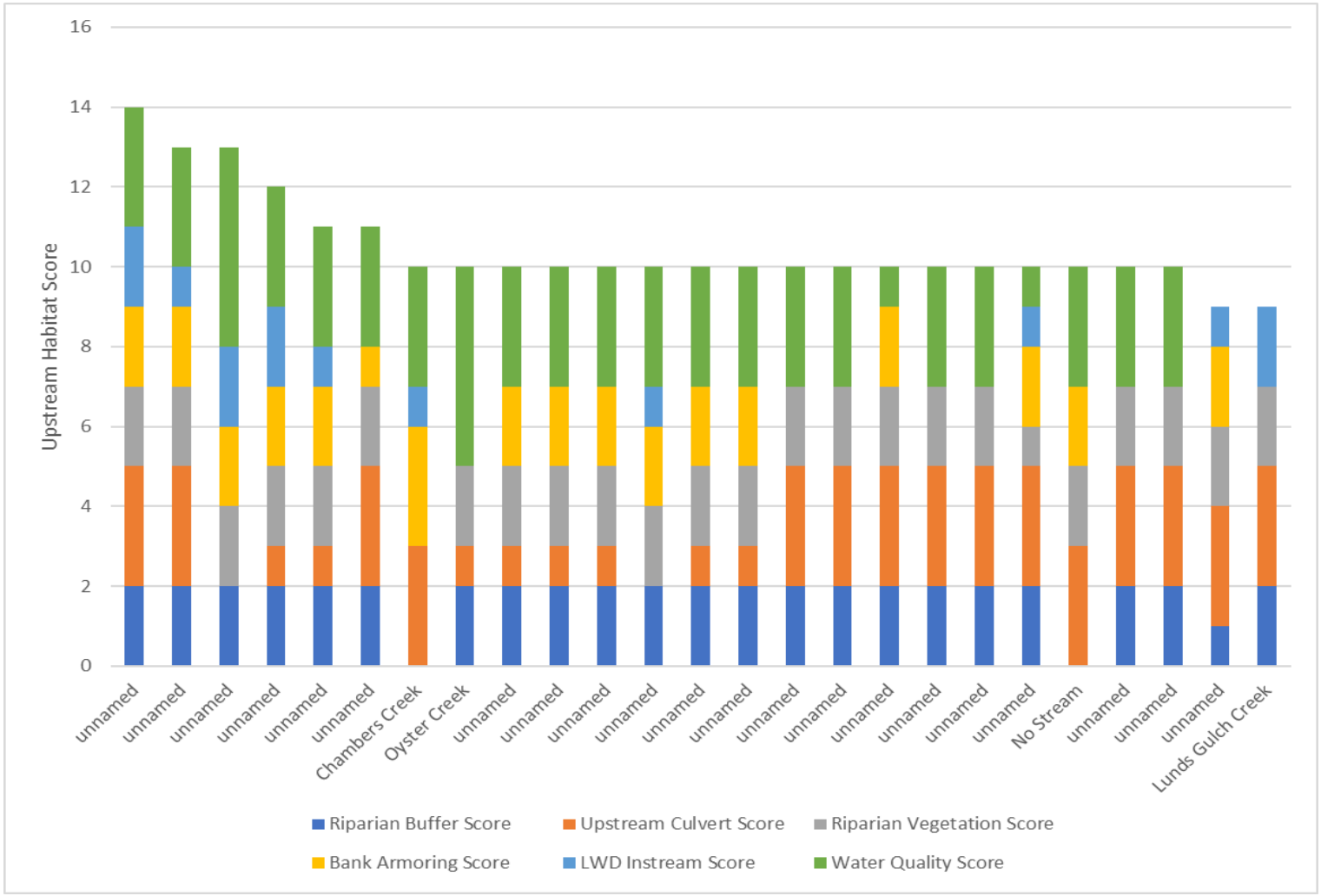


RESULTS:
UPSTREAM HABITAT ACCESS & QUALITY

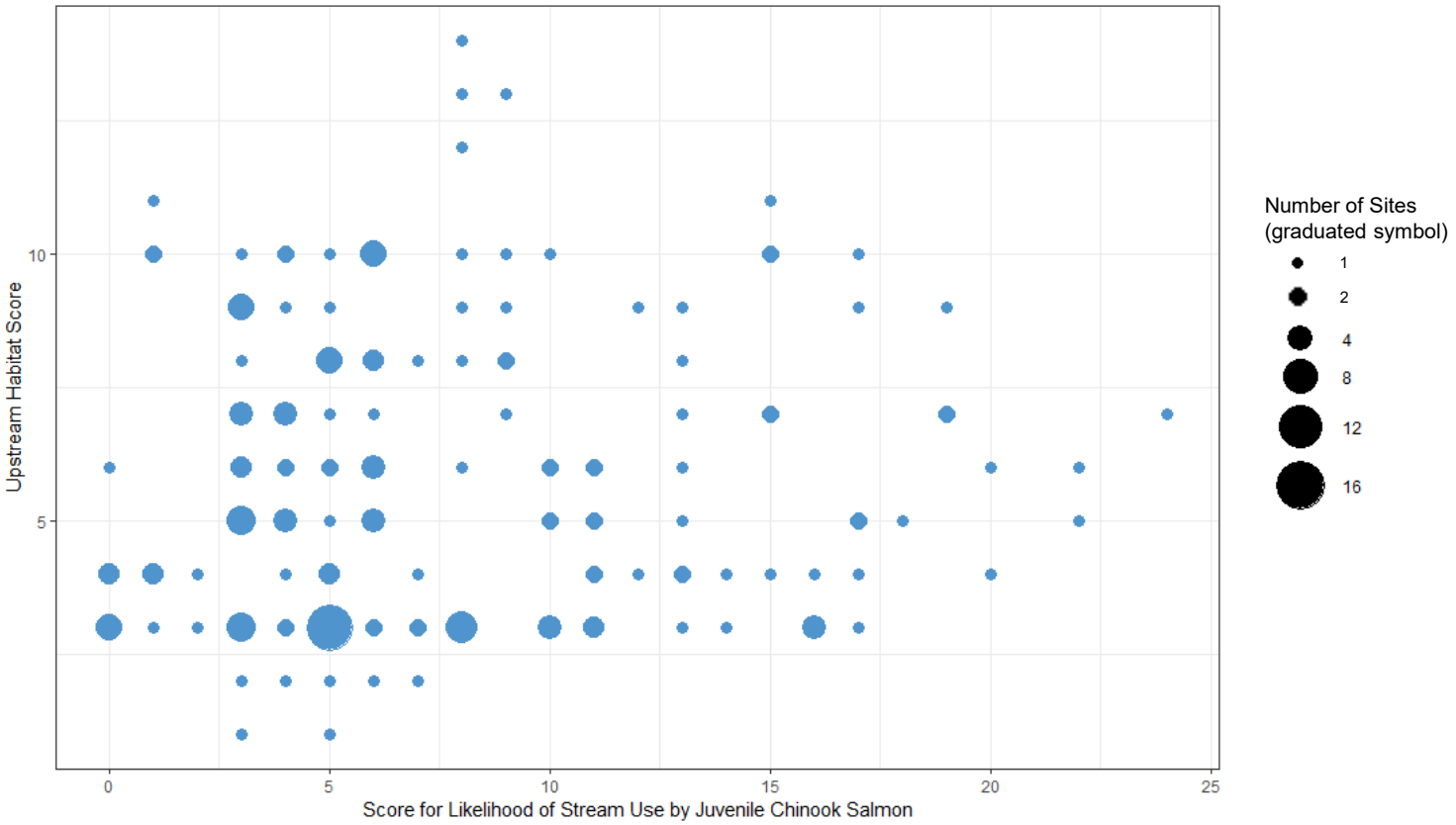


- Range 1 – 13
- Mean = 5.4
- Median = 4.5
- Maximum Possible = 16

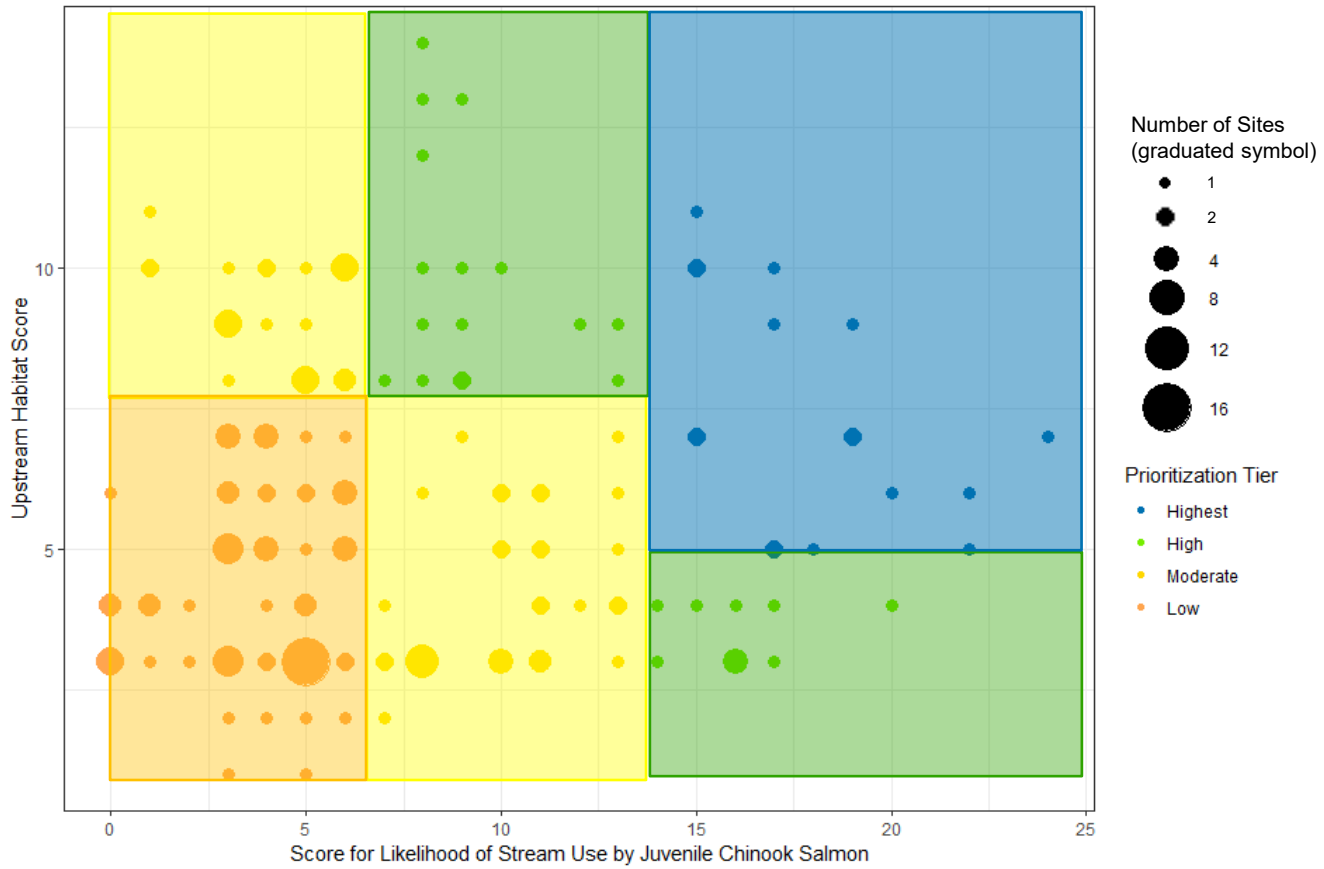
TOP 25:
UPSTREAM HABITAT ACCESS & QUALITY



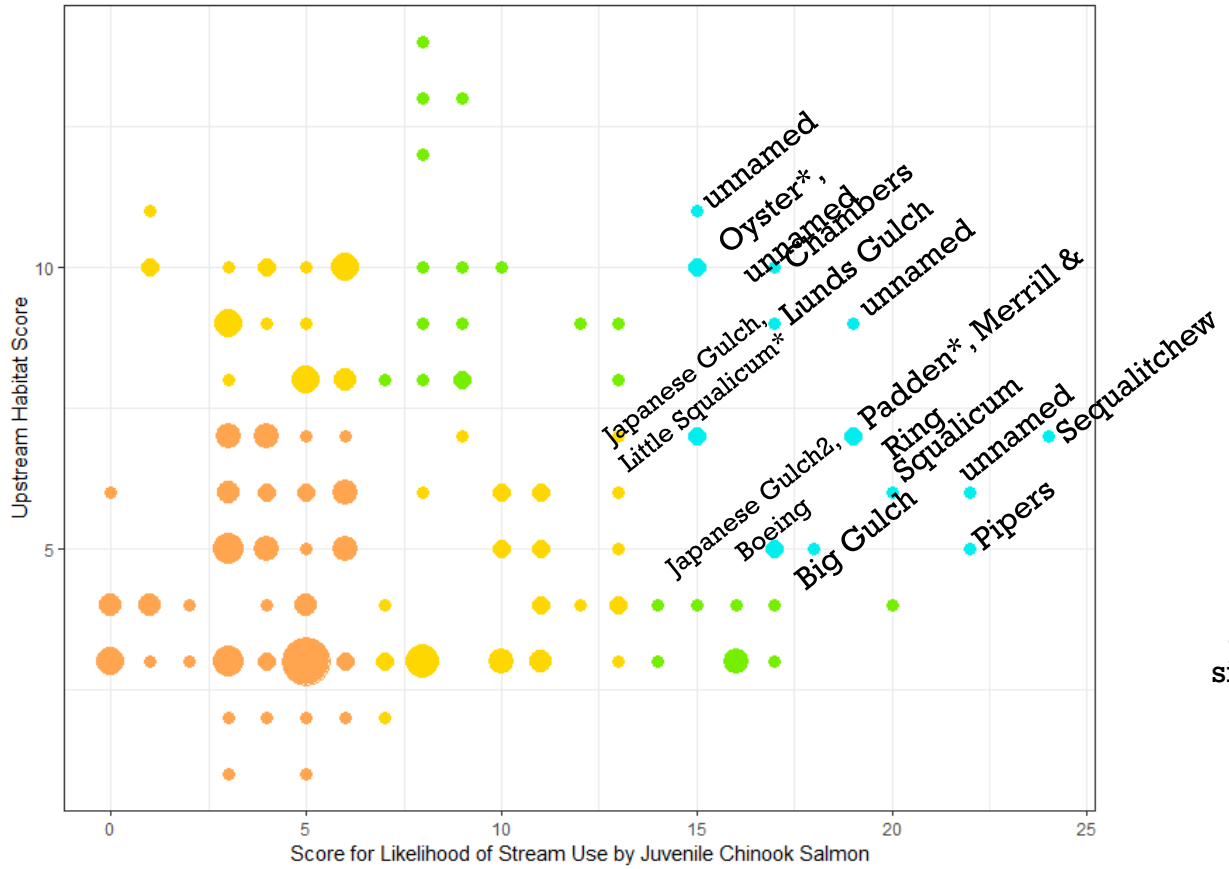
COASTAL STREAM SCORING RESULTS



COASTAL STREAM PRIORITIZATION TIERS



COASTAL STREAM PRIORITIZATION TIERS



Asterisk indicates site has a multi-span trestle, therefore may be less of a priority of restoration

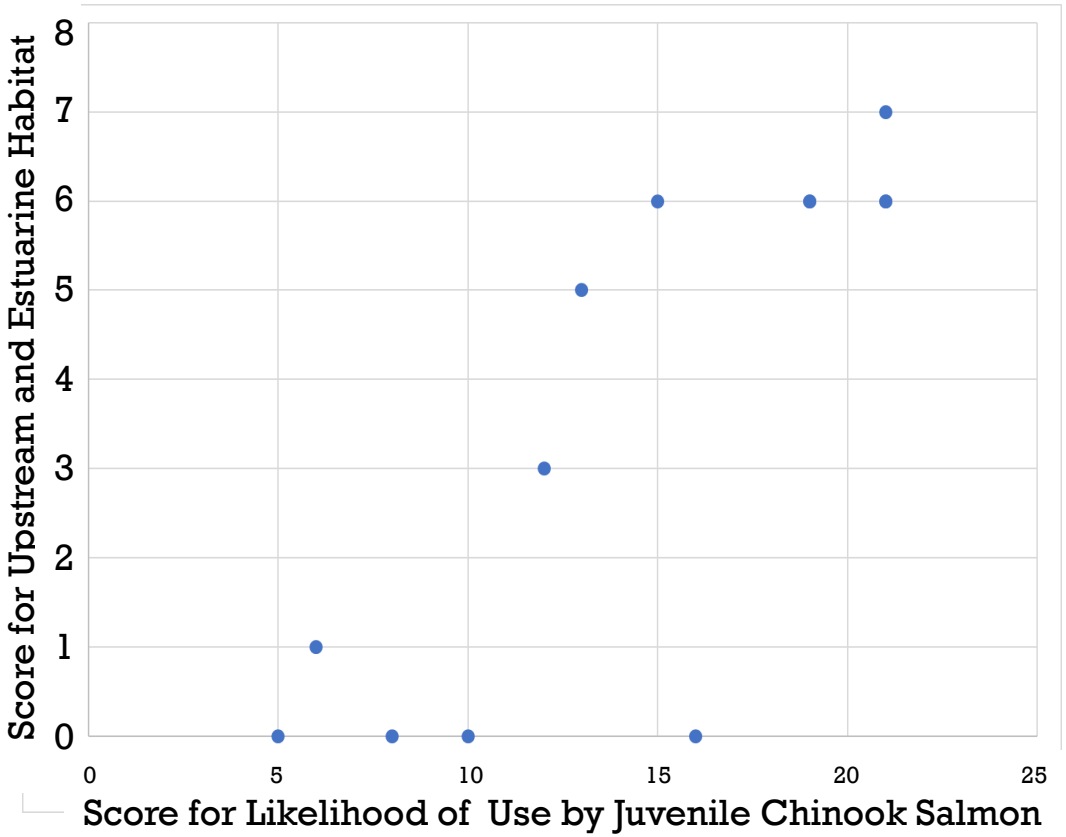
PARAMETERS TO CHARACTERIZE LIKELIHOOD OF USE BY JUVENILE CHINOOK

Parameter	Score Range
Proximity to major chinook river	0 – 5
Site historically was an Embayment (PSNERP BE, BL, CLM, OCI)	0 – 5
Stream is present	0 – 5
Documented presence of spawning salmon in creek	0 – 5
Size of impoundment	1 – 3

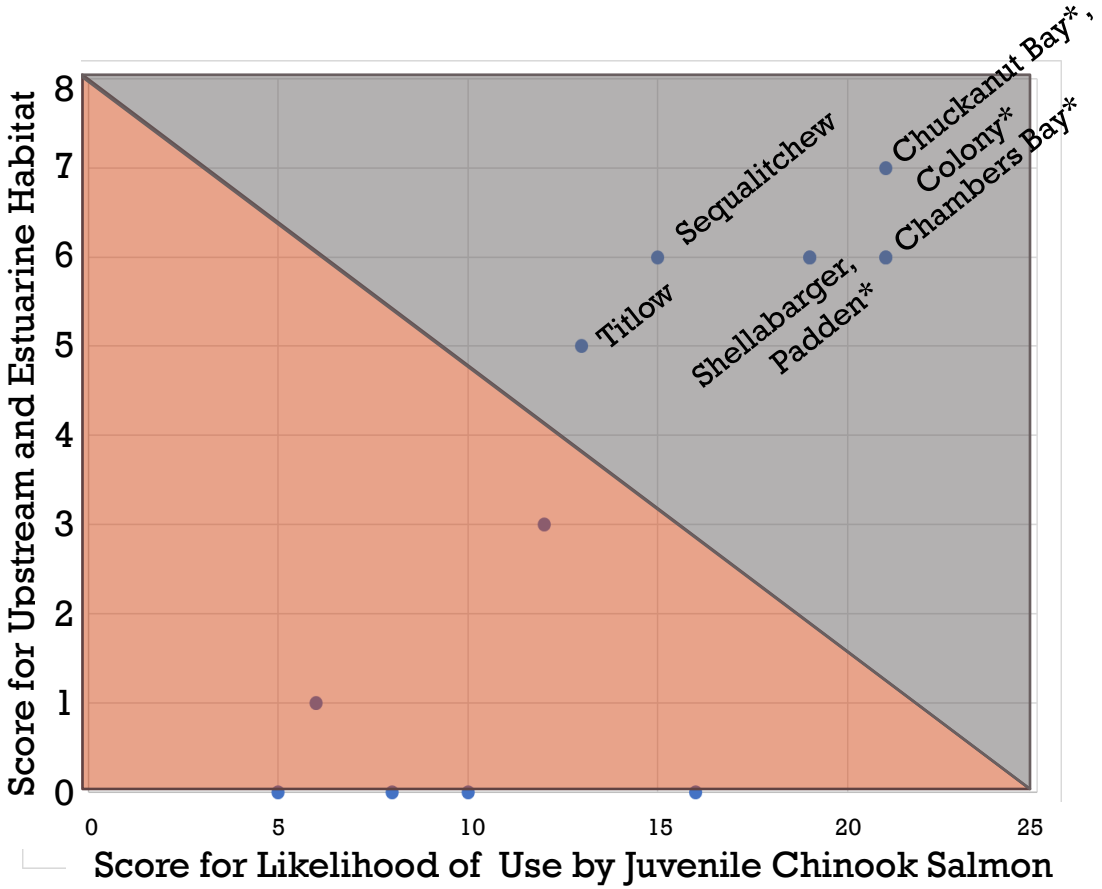
PARAMETERS TO CHARACTERIZE UPSTREAM ACCESS & HABITAT QUALITY

Parameter	Score Range
Water quality	0 – 5
Length of accessible stream (<6.5% slope)	0 – 3
Watershed size	0 – 3

EMBAYMENTS RESULTS



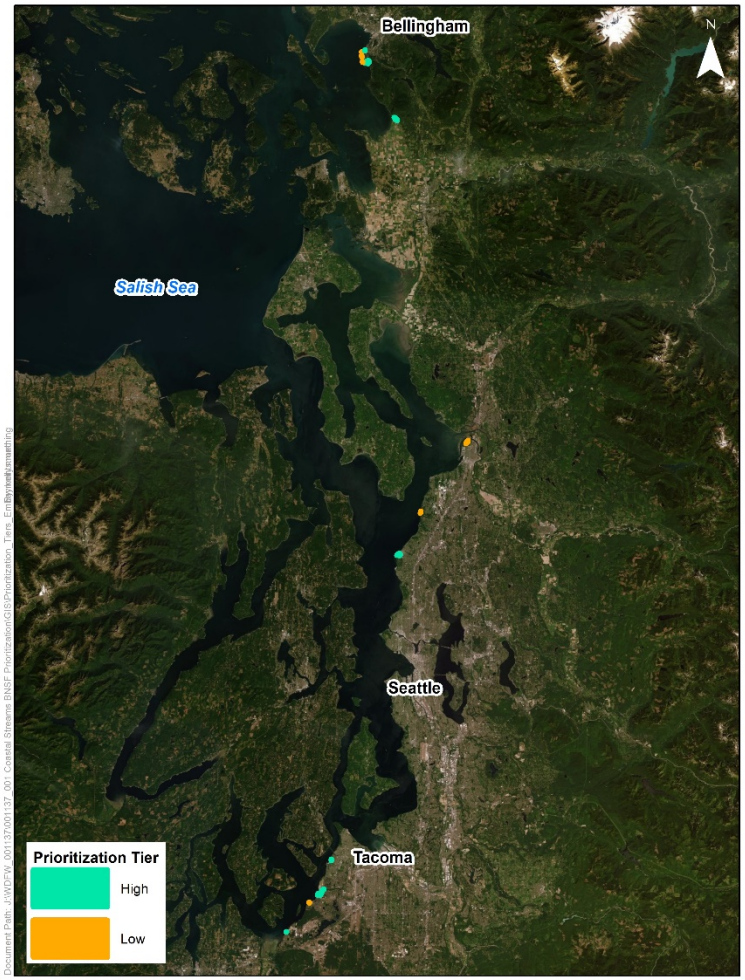
EMBAYMENTS RESULTS



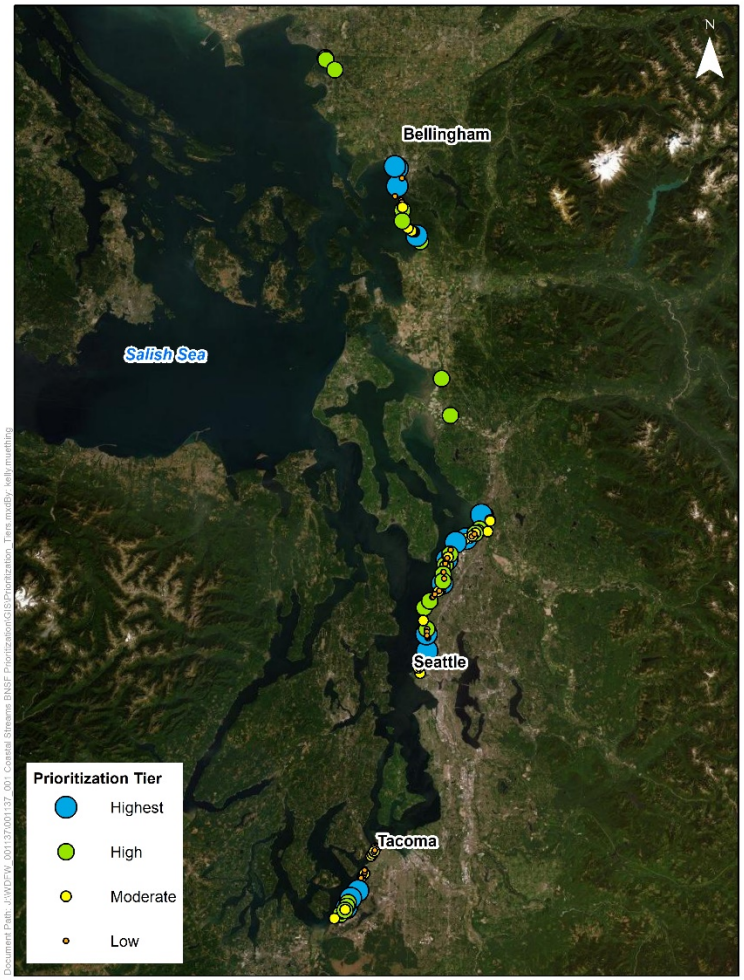
Colors represent High (gray) and Low (orange) prioritization tiers

Asterisk indicates site has a multi-span trestle, therefore may be less of a priority of restoration

RESTORATION SITE PRIORITIES



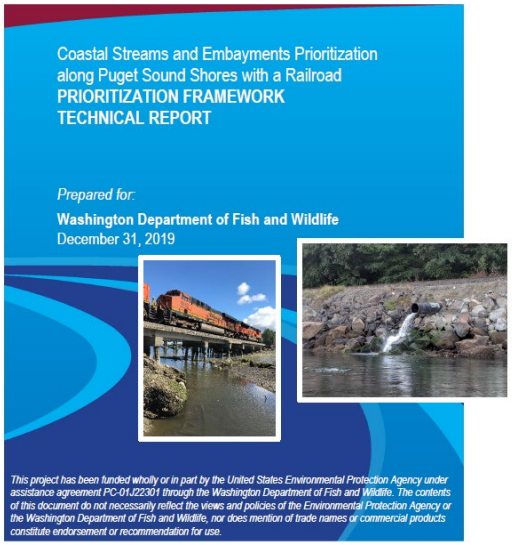
EMBAYMENTS



STREAM CROSSINGS

RESOURCES AVAILABLE

- Report finalized at end of 2019



- Project summary, report and data are available or will be through WDFW website at:

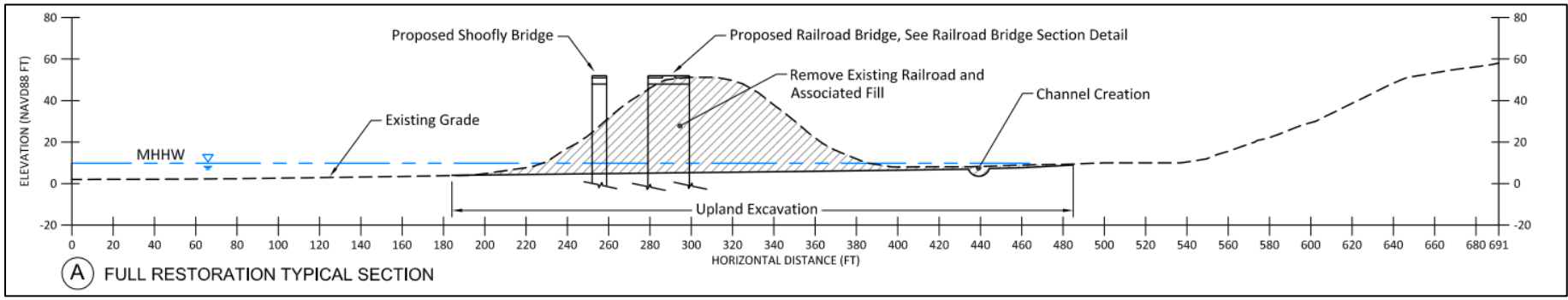
https://pugetsoundestuary.wa.gov/what-we-do/projects/habitat-projects/

(Project title: "Stream Crossing Prioritization Along Puget Sound Shores with a Railroad")

FUTURE WORK

- Near-Term Action in 2018 for Phase 2
- Develop Communication and Engagement Plan
- Create Restoration Project Budgets for top priorities
- Develop Implementation Plan
  - Describe and evaluates recommended structural replacements, habitat value, and implementation benefits for top priority sites

Conceptual Restoration Example at Sequalitchew Creek:
Conversion of culvert to railroad bridge would allow tidal access landward of the railroad.



Source: PSNERP 2012

CONTACT INFORMATION

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- Paul Schlenger (PSchlenger@esassoc.com)