Lower Bridge River Salmon and Steelhead Enumeration Program

BRGMON-3

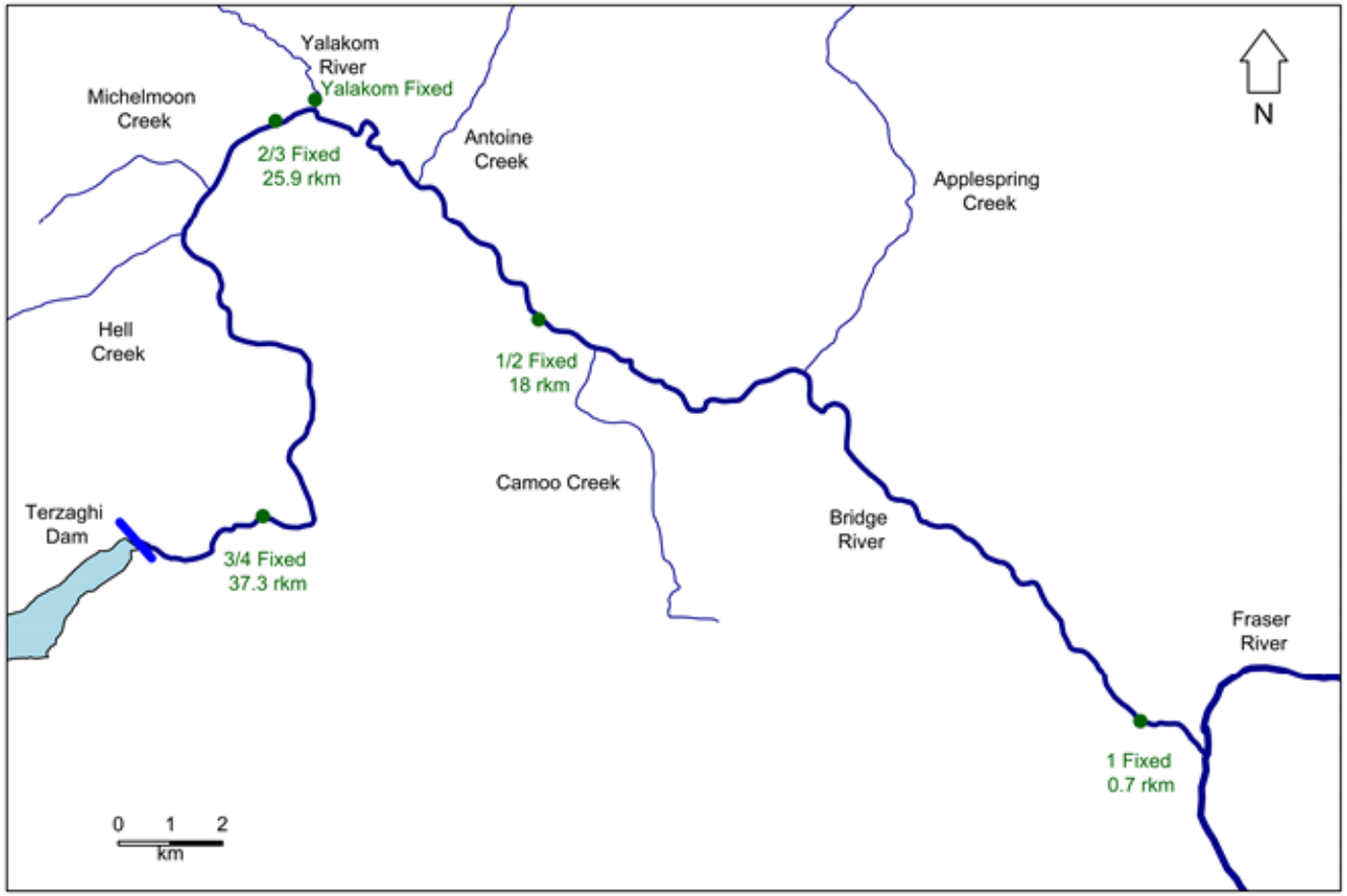
Acknowledgements

BC Hydro

ST'ÁT'IMC

XWÍSTEN

Study Sections



BRGMON-3 Management Questions

1. What is the abundance, timing, and distribution of adult salmon and steelhead spawning in the LBR and are these aspects affected by instream flow?

2. What is the quality and quantity of spawning habitat in the LBR and how is it affected by instream flow?

3. Have releases from Terzaghi Dam under the modified flow regime affected the quality and quantity of spawning habitat in the LBR? If so, what are the potential effects on fish and what mitigation options are available?

4. Have releases from Terzaghi Dam under the modified flow regime affected spawning distributions in the LBR? If so, what are the potential effects on spawning success and what mitigation options are available?

WUP VS. MOD Tasks

Water Use Plan (WUP) Operations	Modified (MOD) Operation Additions
Adult Salmon and Steelhead abundance estimates • Stream walks and Area-Under-the-Curve (AUC) in Reach 3 and 4 • Resistivity Counter	Sonar counting technology added Stream walks and radio telemetry extended to Reach 1 and 2
Radio Telemetry (Reach 3 and 4)	Habitat Suitability Index (HSI) surveys in Reach 1-4
Redd Surveys	
Scale Ageing and Analysis	

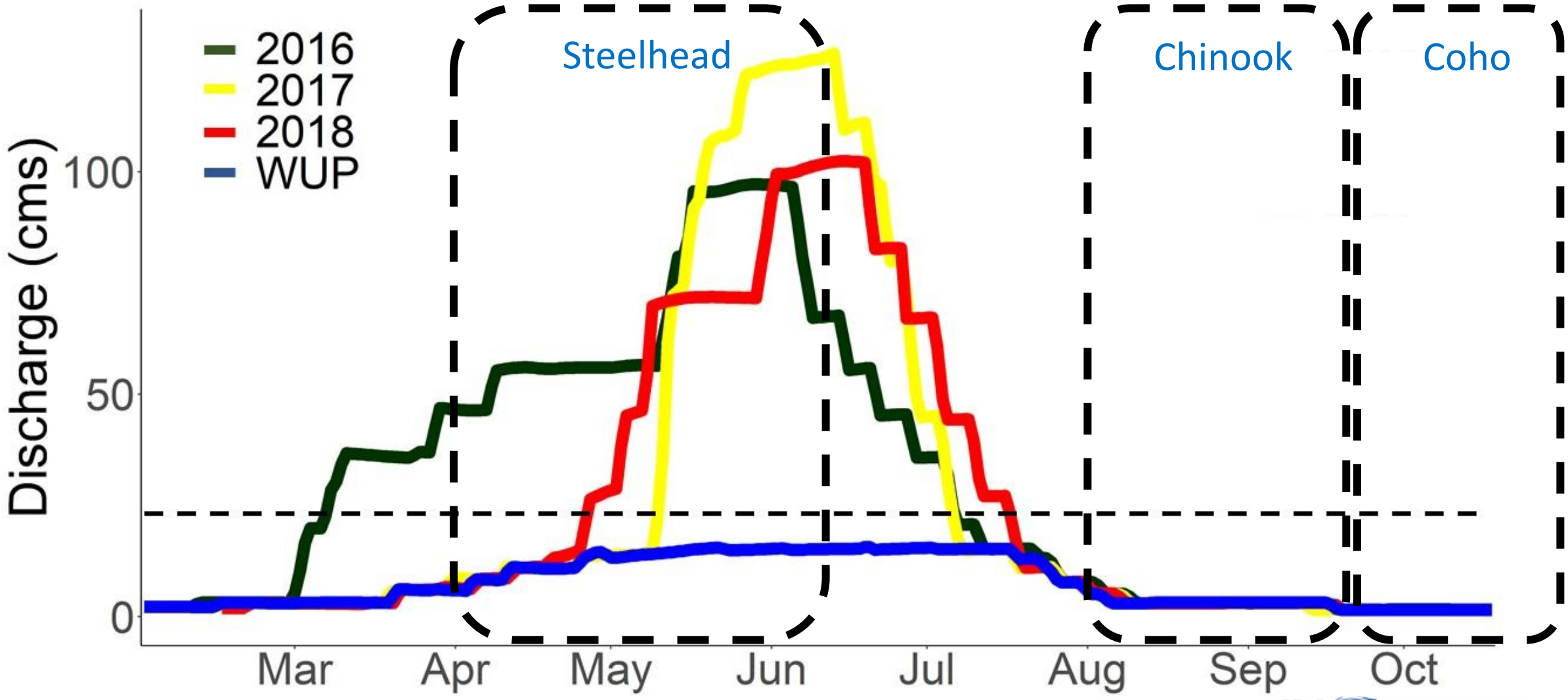
Fish Fence Installation - 2018 to 2020

- Fence installed upstream of the counter during Chinook migration to collect broodstock (2018 - 2020).
- Affected all aspects of data collection for Chinook Salmon (streamwalks, counter, telemetry, redd surveys)

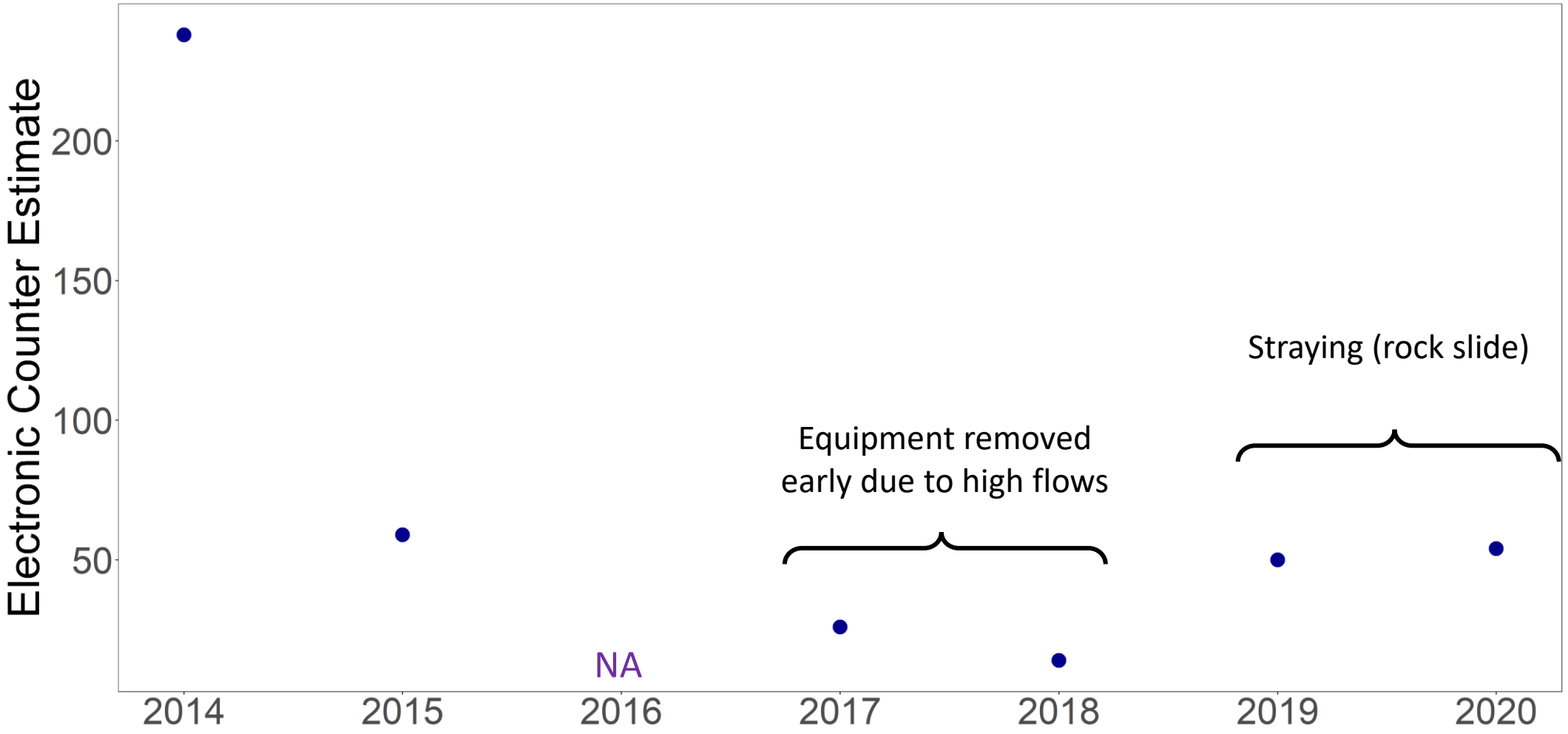
Big Bar Rockslide Impacts

- The Big Bar Rockslide delayed or prevented the migration of all species of salmon and steelhead
- Milling or searching behavior apparent in Steelhead telemetry data
- Higher than expected returns of all species into the LBR

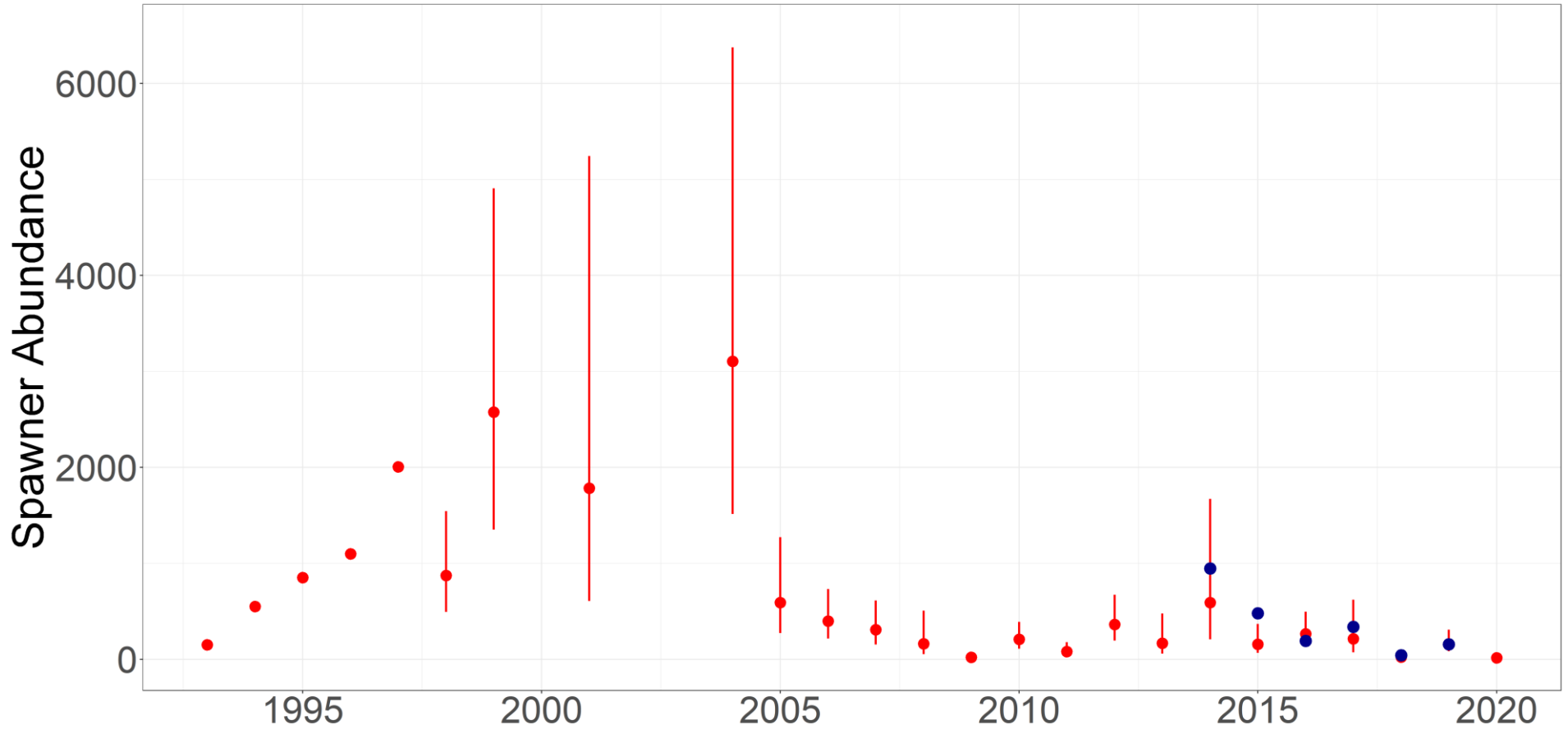
Lower Bridge River Hydrograph



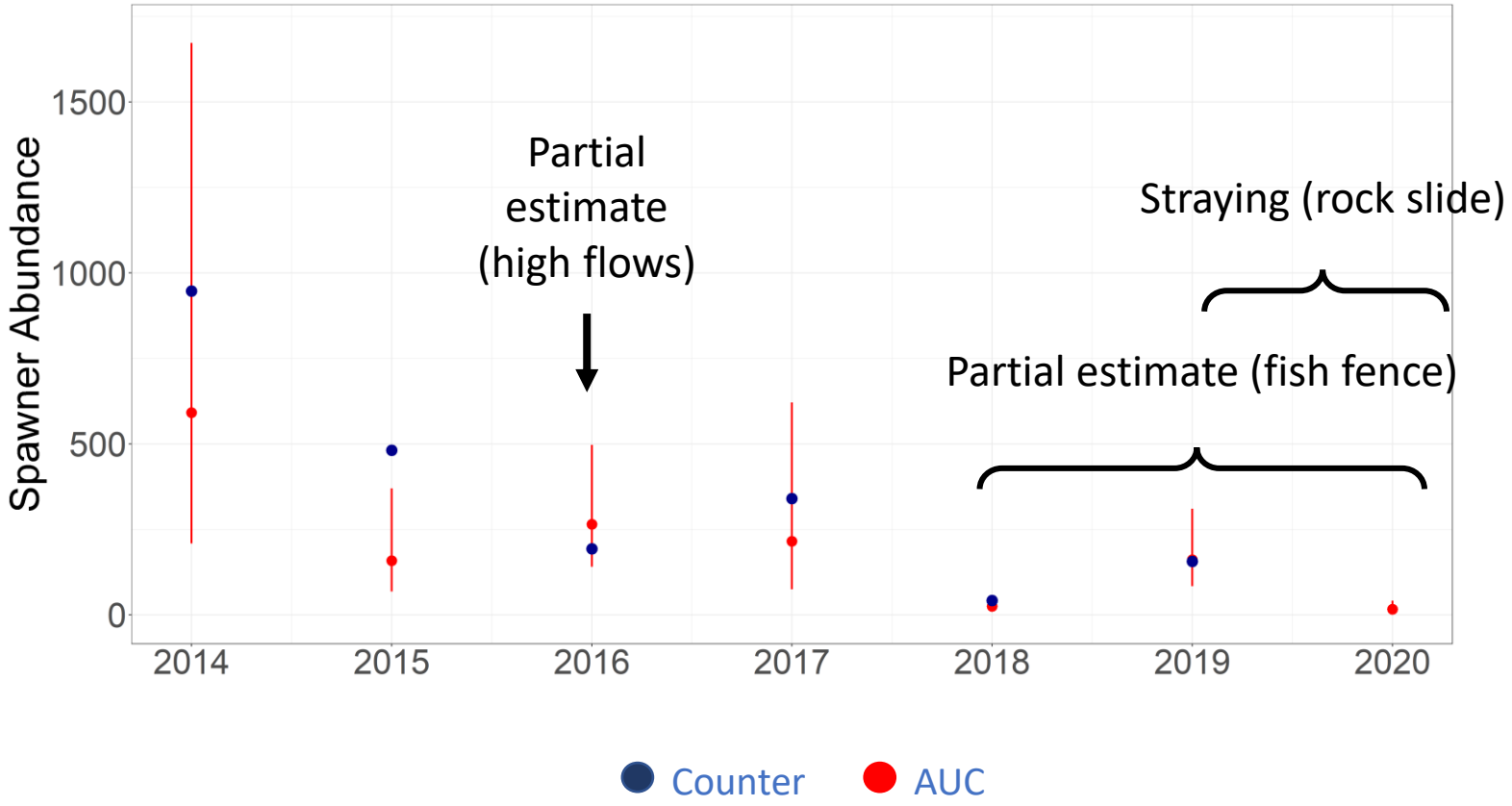
Steelhead Trout Abundance

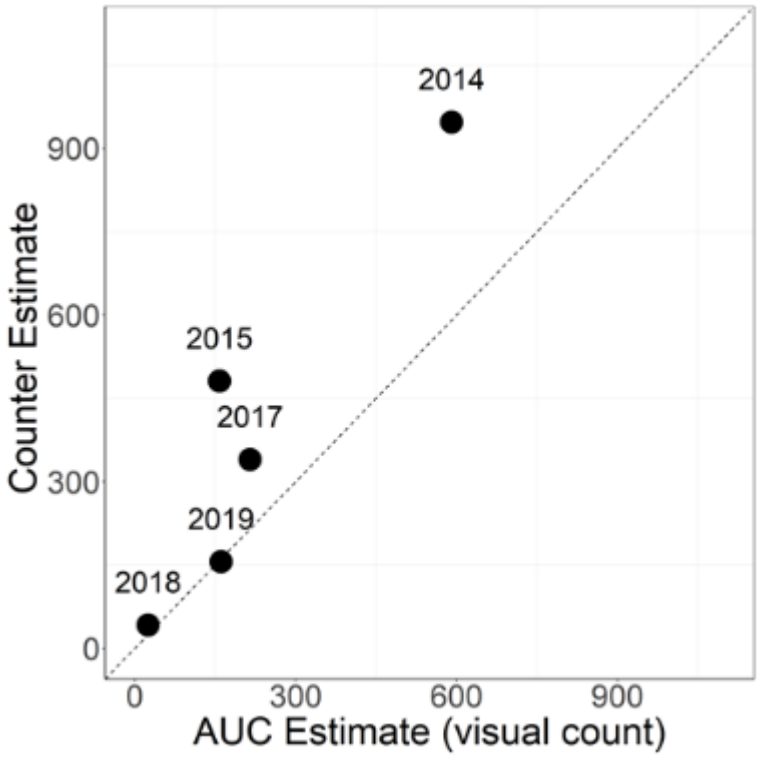


Chinook Salmon Abundance

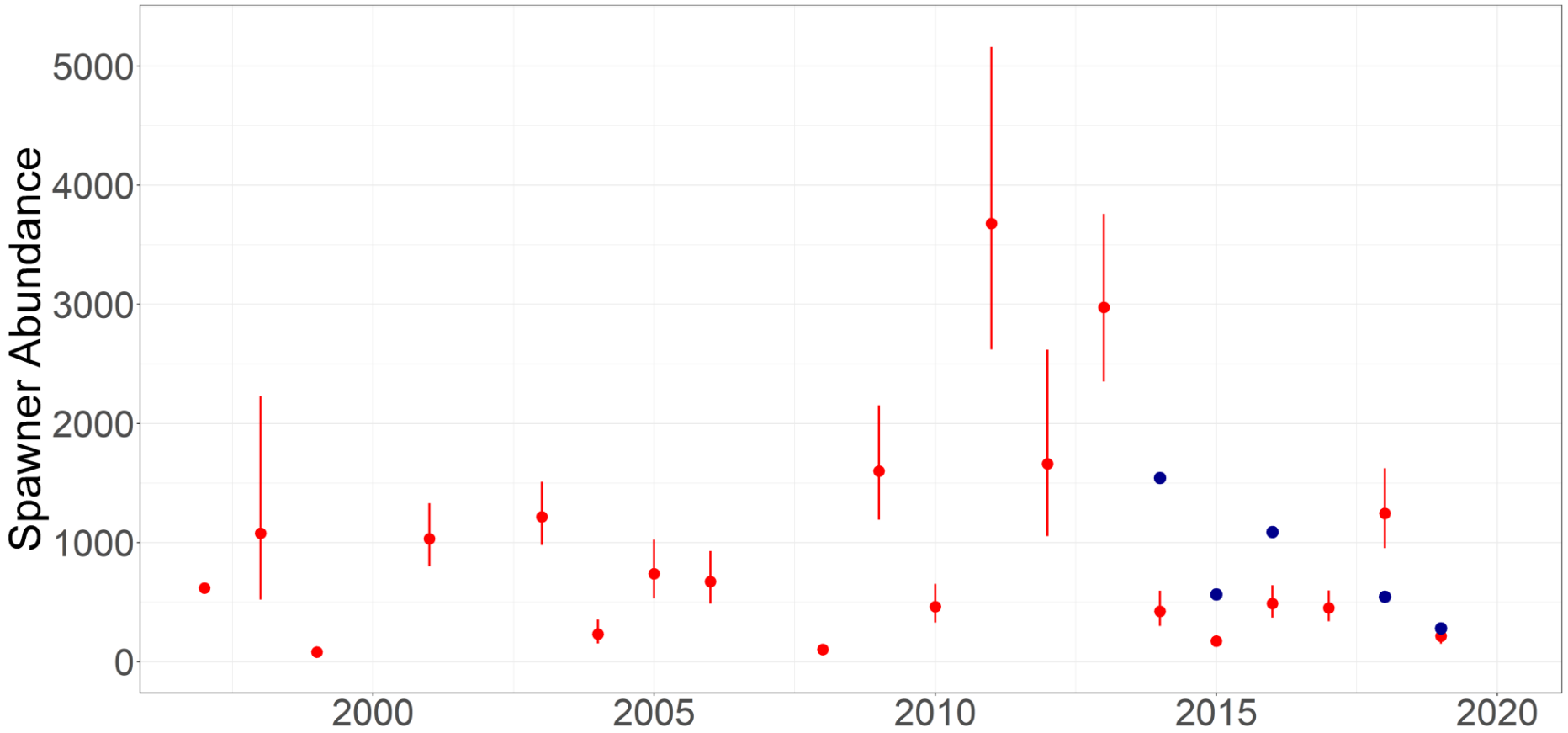


Chinook Salmon Abundance

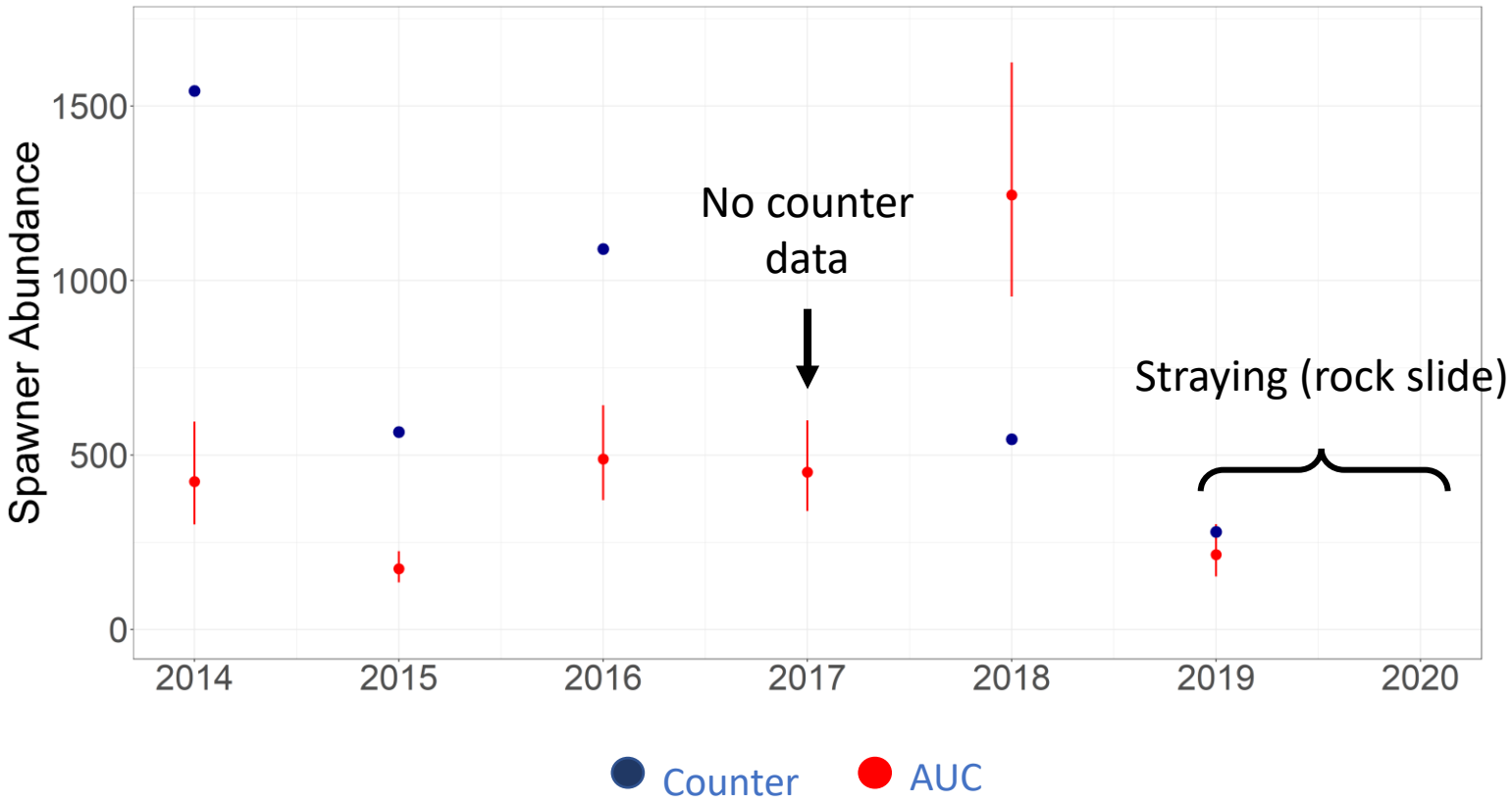


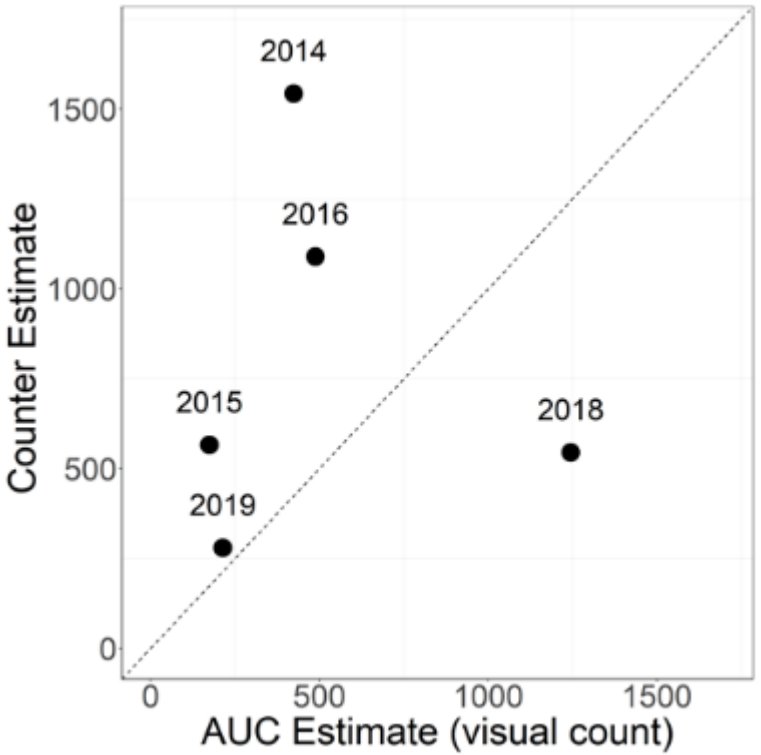


Coho Salmon Abundance



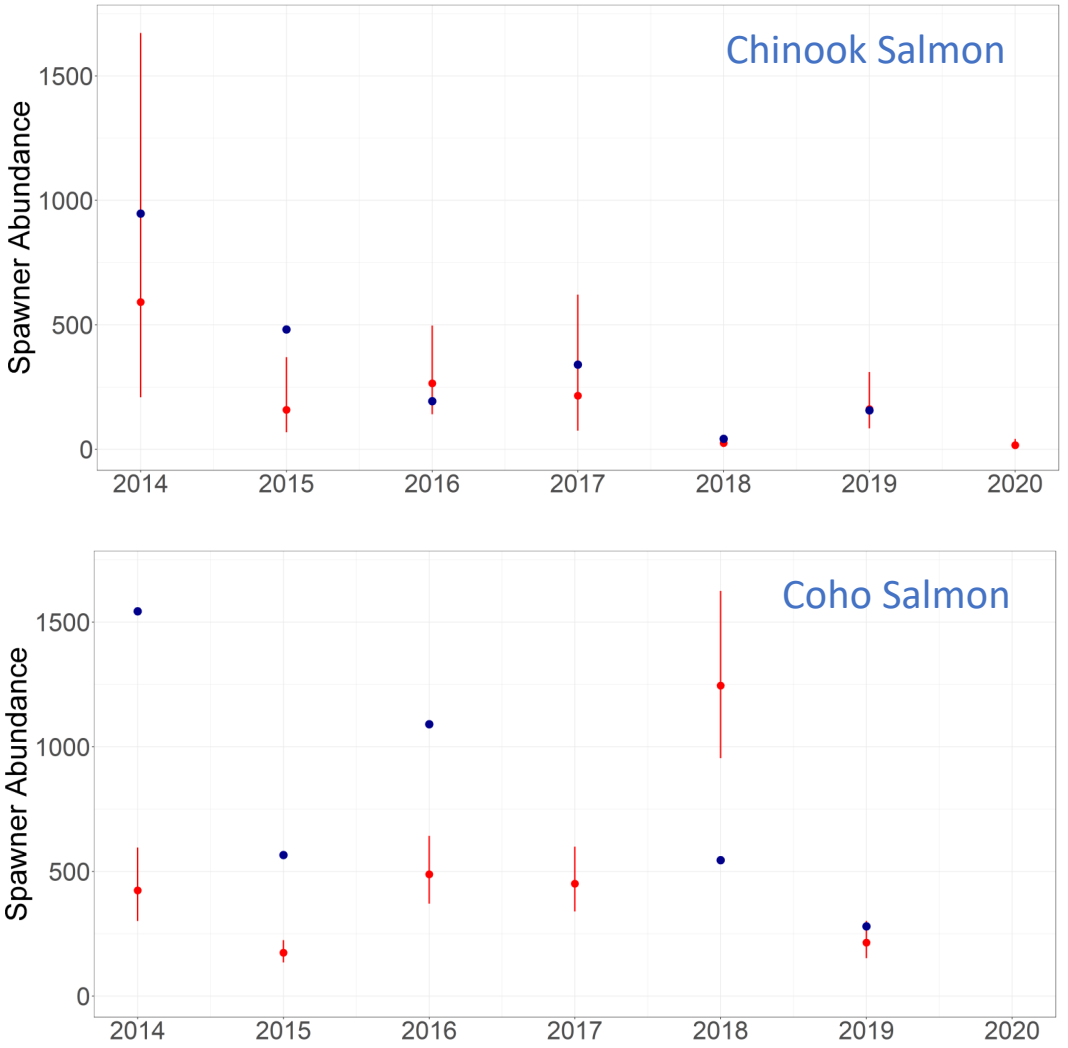
Coho Salmon Abundance



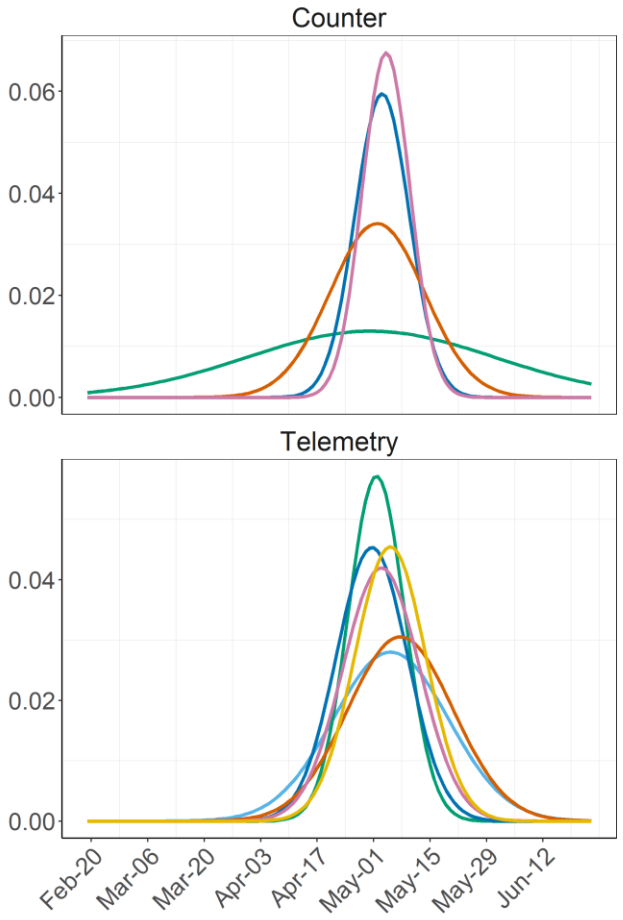


Uncertainties with AUC Estimates

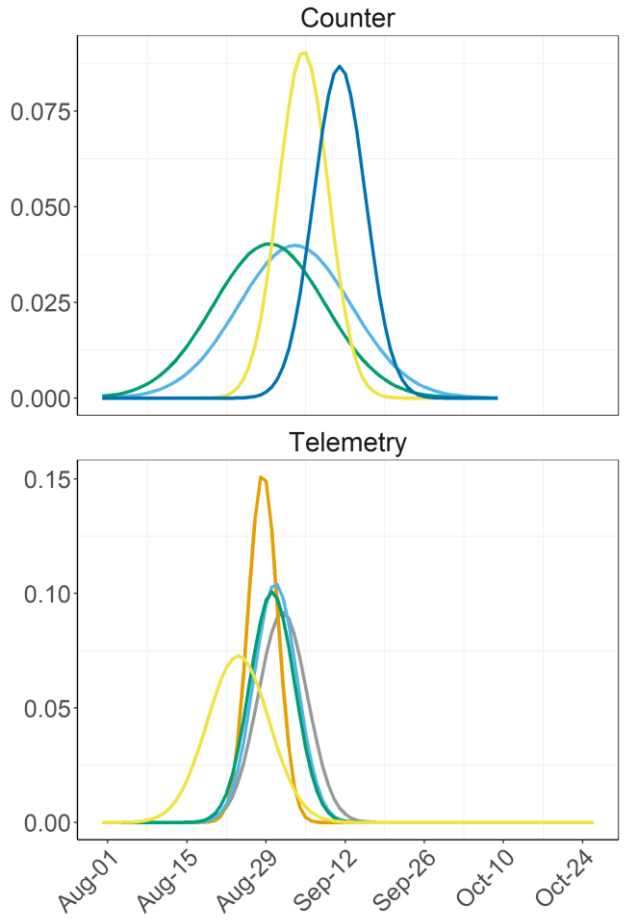
- Visual estimates are subject to observer experience and river conditions
- Observer Efficiency and Survey Life are calculated based on the number of tagged fish in Reach 3 and 4
- The fish fence and low tag deployment have limited the success of calculations in recent years



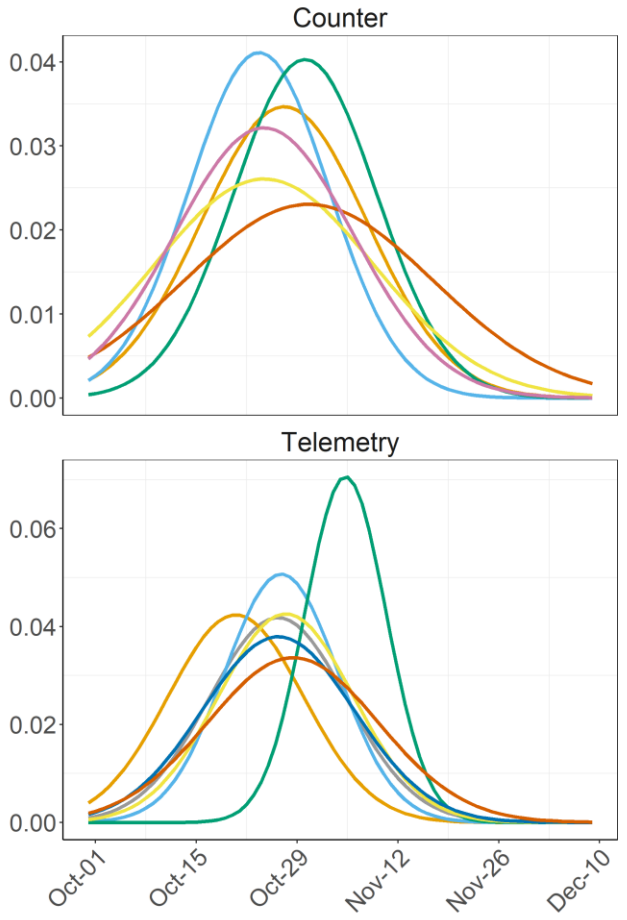
Migration Timing – Counter and Telemetry



Steelhead Trout



Chinook Salmon



Coho Salmon

www.instream.net

2020 counter data not included

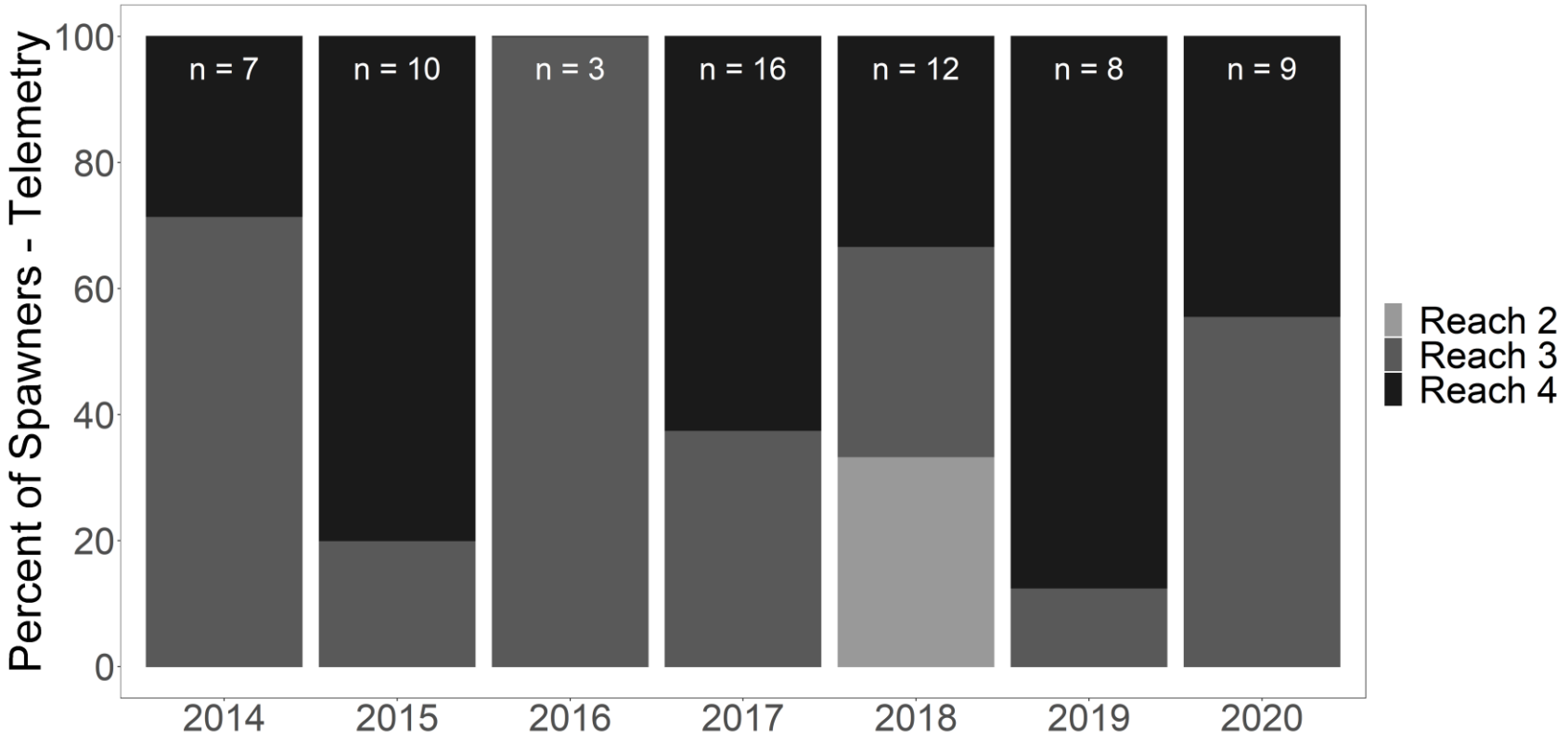
INSTREAM

Migration Timing – Steelhead Scale Analysis

Year	Age	Brood Year	Smolt Year	High Flow Exposure (years)	Sample Size
2018	2.1	2015	2017	2016	0
	2.2	2014	2016	NA	2
	2.3	2013	2015	NA	7
	3.1	2014	2017	2016, 2017	0
	3.2	2013	2016	NA	2
	3.3	2012	2015	NA	5
2019	2.1	2016	2018	2017	0
	2.2	2015	2017	2016	0
	2.3	2014	2016	NA	1
	3.1	2015	2018	2016, 2017	0
	3.2	2014	2017	2016	2
	3.3	2013	2016	NA	6

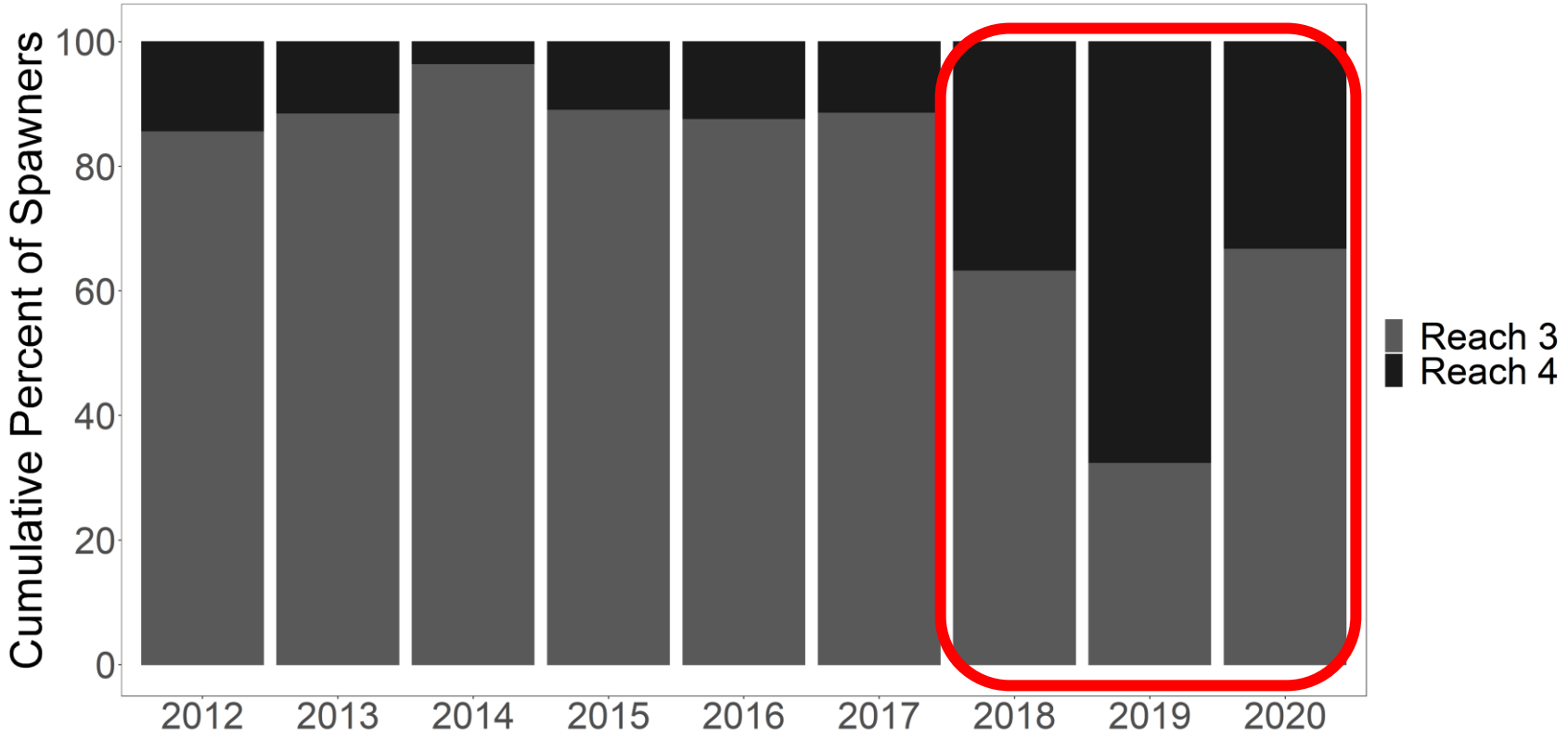
Steelhead Distribution

- Data limited to radio telemetry
- Reduced sample sizes
- No clear reach preference



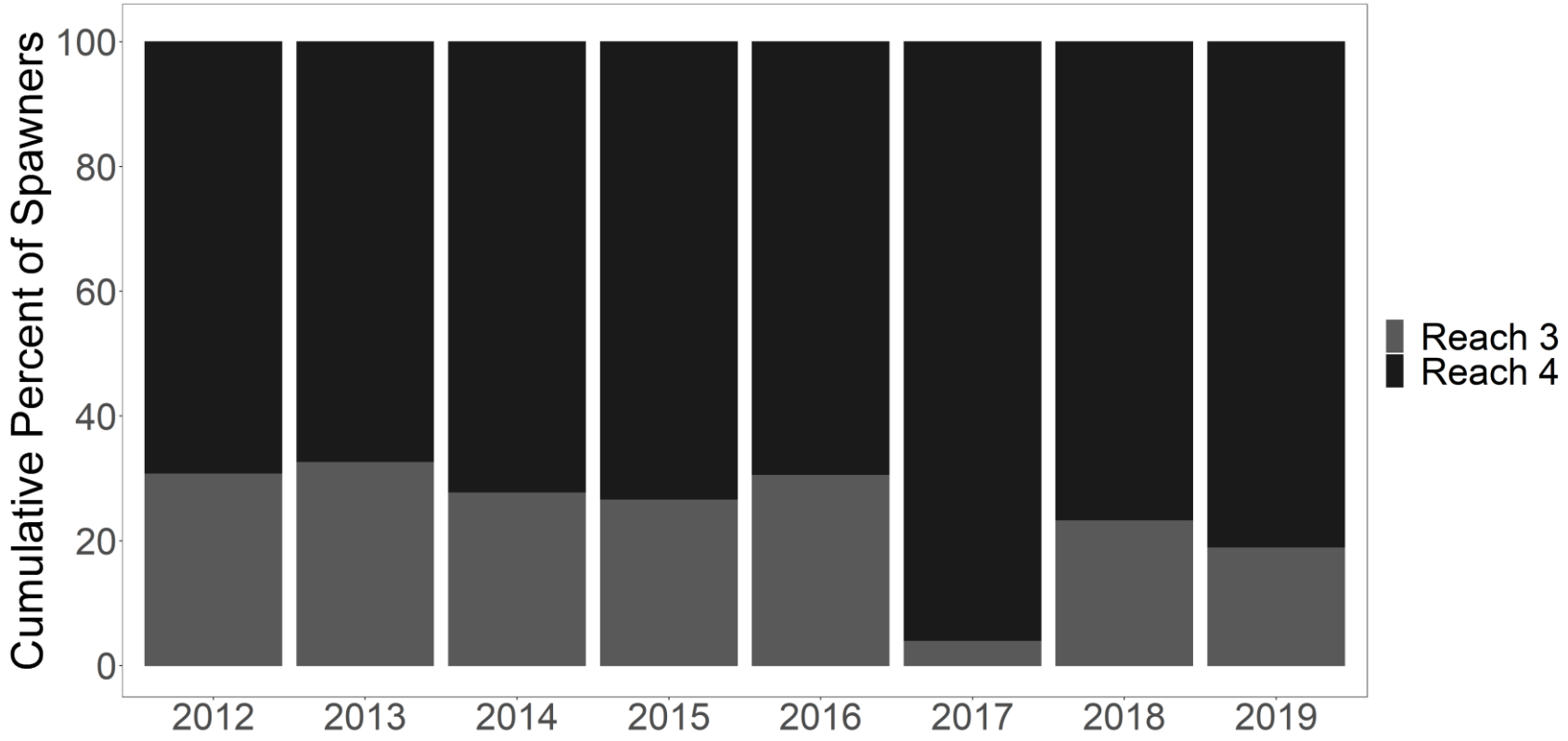
Chinook Distribution

- Increased preference towards Reach 4 since 2018
- Coincides with fish fence operation



Coho Distribution

- Consistent preference for Reach 4



Habitat Quantity and Quality

- Reach 2 has the highest area of spawning habitat
- Substrate size has decreased in Reach 3 and 4 since 2017 high flows
- Habitat is not limiting to spawners in the LBR

Reach	Habitat Units Sampled	Area Surveyed (m^2)	Weighted Useable Area (m^2)
1	3	5964.5	2676.9
2	9	17890.0	7999.0
3	13	15949.8	2422.0
4	4	5336.5	880.6
Total	29	45140.8	13978.4

MQ1: What is the annual abundance, timing, and distribution of adult salmon and steelhead spawning in the LBR and are these aspects of spawning affected by the instream flow regime?

Annual Abundance

- Steelhead Trout have decreased since 2014
- Chinook Salmon have been low since 2005
- Coho Salmon have been variable
- No evidence of an effect of instream flow regime
    - Juvenile Steelhead exposed to high flows returned in relatively lower abundances

Migration Timing

- Consistent for all species
- No evidence of an effect of instream flow regime

Spawner Distributions

- All species primarily spawn in Reach 3/4
- No evidence of an effect of instream flow regime

INSTREAM

MQ2: What is the quality and quantity of spawning habitat in the Lower Bridge River and how is spawning habitat affected by the instream flow regime?

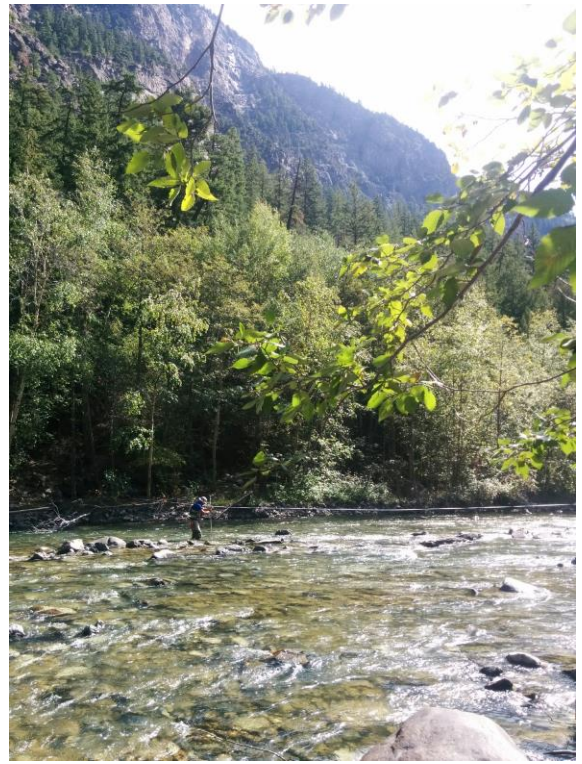
Spawning Habitat Quantity and Quality

- Redd surveys are the only habitat measure that span both the WUP and MOD flow regimes
- Depth, velocity and substrate measured at redds are within Chinook and Coho Salmon preference
- No evidence that the instream flow regime has affected the quantity or quality of spawning habitat

MQ3: Have flow releases from Terzaghi Dam under the modified flow regime affected the quality and quantity of spawning habitat available in the Lower Bridge River? If so, what are the potential effects on fish and what mitigation options are available?

Spawning Habitat Quantity and Quality

- HSI surveys were implemented after the MOD flow regime took place
- The amount of available habitat has remained consistent following successive high flow events (2017 – 2018)
- Substrate size has been decreasing in Reach 3 and 4 since 2017 high flows



MQ4: Have flow releases from Terzaghi Dam under the modified flow regime affected the distribution of adult spawning in the Lower Bridge River? If so, what are the potential effects on spawning success and what mitigation options are available?

Spawner Distribution

- Since 2018, Chinook spawning distribution appears to be shifting closer to Terzaghi Dam
- Potential survival consequences for juvenile salmonids as a result of higher temperatures and early emergence

Future Sampling

- Sampling will continue in its current form in 2021
- Should flows exceed $20m^3s^{-1}$, HSI surveys will be conducted in Fall 2021
- Broodstock collection continues to disrupt the data collection for Chinook Salmon
- Management questions are on track to being answered