

Juvenile Pacific Salmon Winter Habitats in Large Glacial Rivers

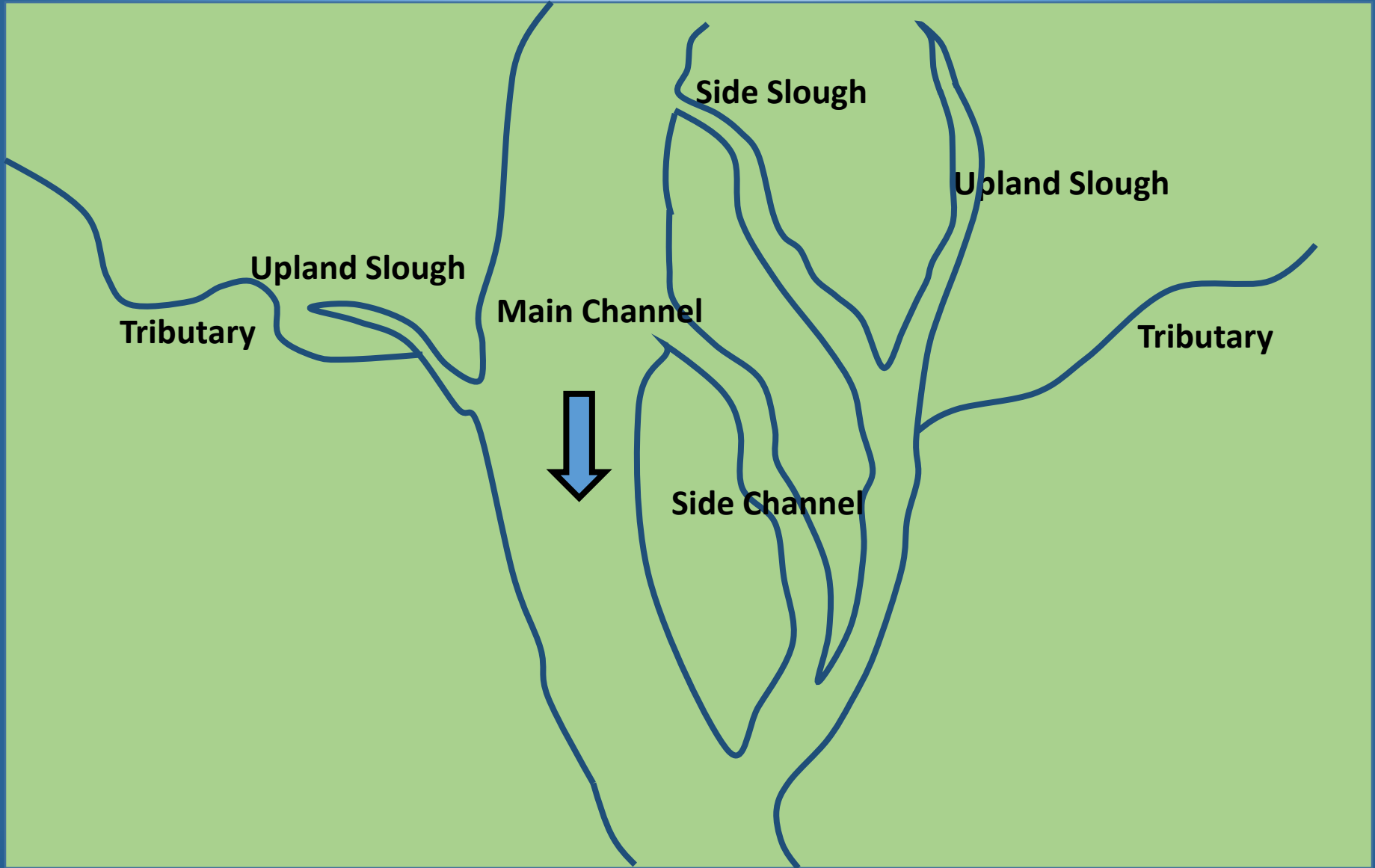
National Marine Fisheries Service



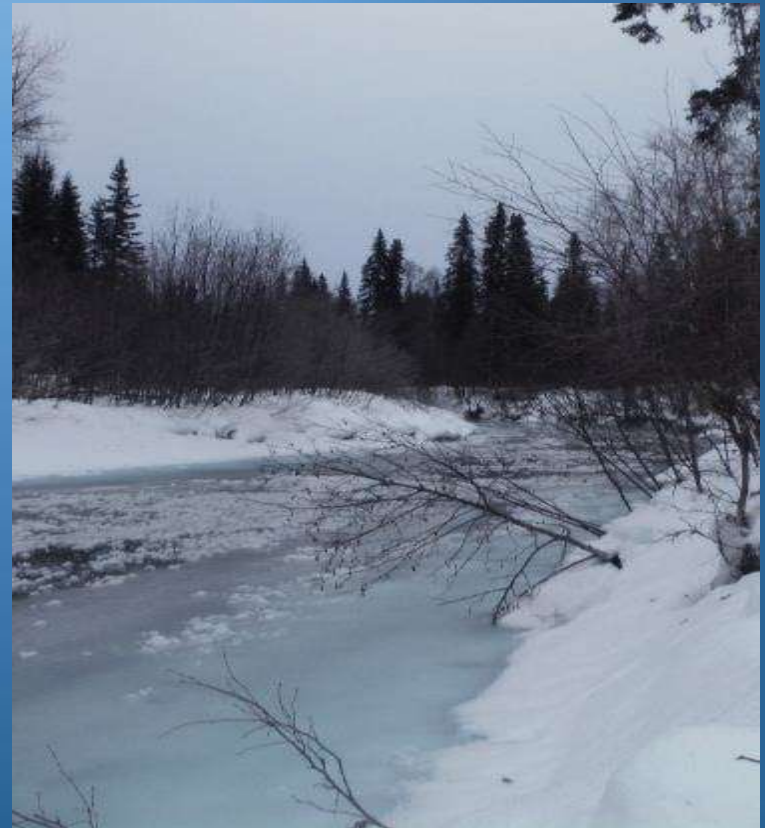
Study Objectives

- Test for relationships between habitat characteristics and overwintering juvenile coho and Chinook salmon distribution and relative abundance.
- Test for significant small-scale localized (m^2) correlations between fish and habitat characteristics and determine if those relationships can be used to characterize overwintering habitat at higher spatial scales: sampling sites ($\sim 1,000 m^2$) and macrohabitat classes.

Glacial River Macrohabitats



Side Slough Macrohabitat



Tributary Mouth Macrohabitat



Upland Slough Macrohabitat



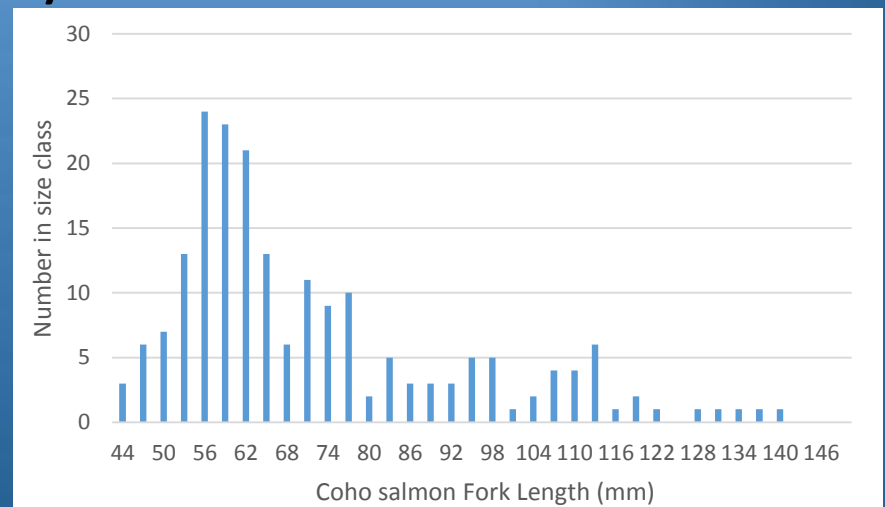


Methods



Results

- 208 coho salmon captured, present at all sampling locations.
- 11 Chinook salmon captured and present in tributary mouths and the confluence of mainstem and upland slough habitats.
- 2 sockeye salmon captured in side slough and upland slough habitats.
- 4 rainbow trout in a tributary mouth.
- 6 threespine stickleback.
- 14 sculpin.



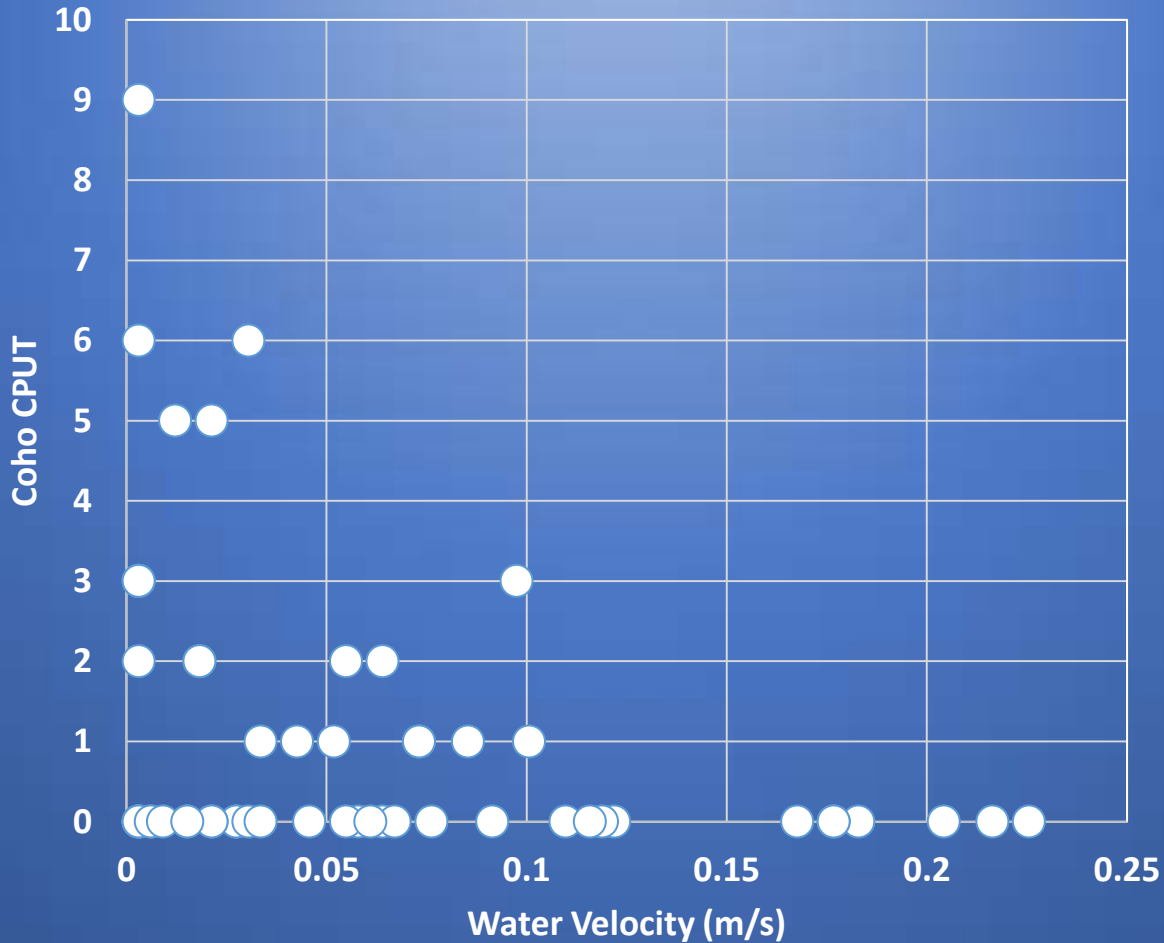
Results

- pH 6.5 to 7.8
- Conductivity 20 to 120 μS
- Water temperature 0.03 to 2.11 $^{\circ}\text{C}$
- D.O. 50 to 100% Saturation, 7 to 14 mg/L
- Ice thickness 0 to 0.4 m
- Water velocity 0 to 29 cm/s
- Substrate 40 to 100% fines
- Woody debris 0 to 70%

Small Scale Habitat Characteristics

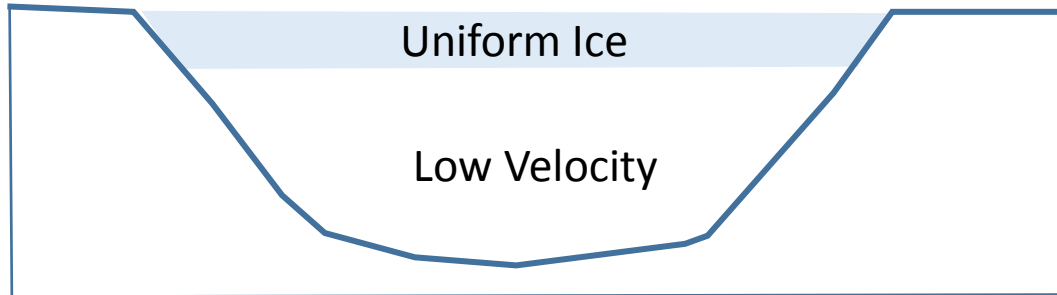
- **2013/2014 analyses limited to coho salmon due to low numbers of Chinook.**
- **Coho salmon abundance higher at sites with wood; 3.0 CPUT with wood and 1.1 CPUT without.**
- **Coho salmon abundance was related to velocity in the absence of woody debris; water velocity lower when coho present (3.6 cm/s), than when absent (7.0 cm/s).**
- **Positive relationship between % D.O. and coho relative abundance.**
- **No relationship between coho salmon abundance and water temperature.**

Water velocity wood absent

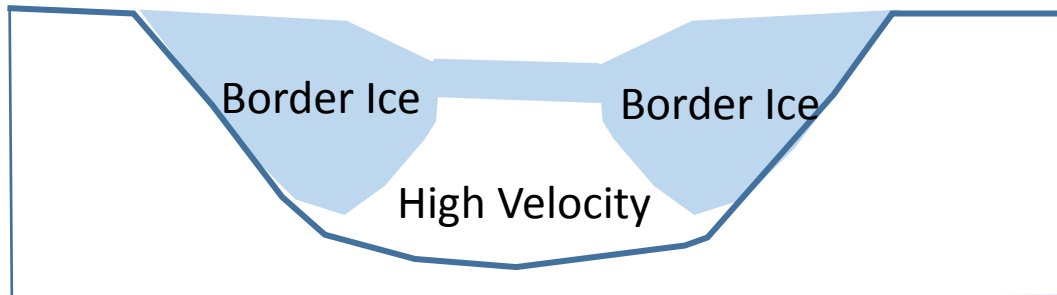


Velocity Differences due to Mainstem Water Surface Elevation

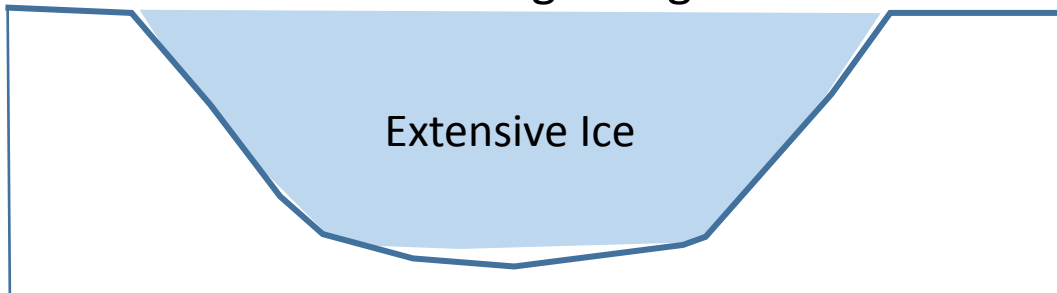
High Mainstem Stage Height: Backwater

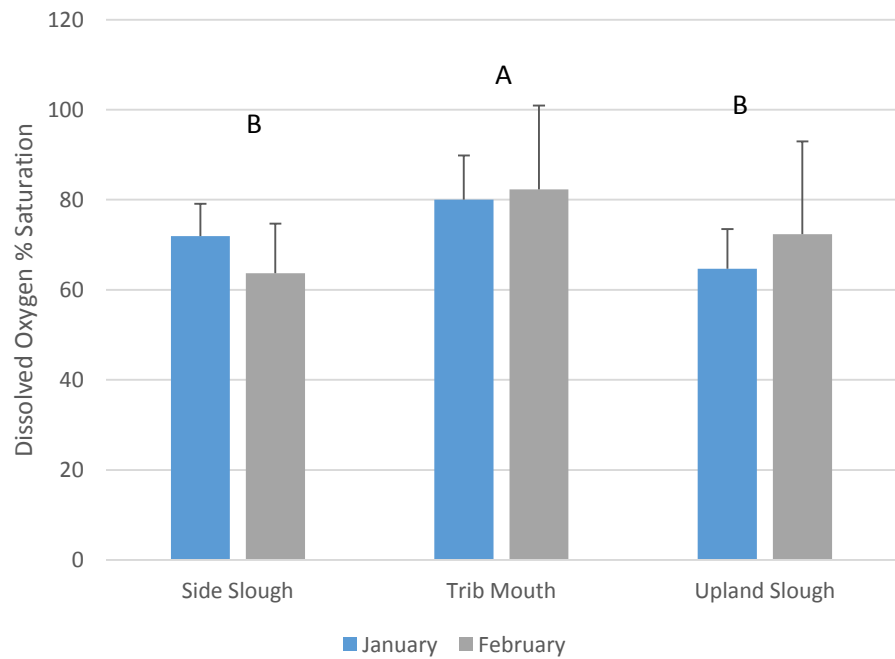
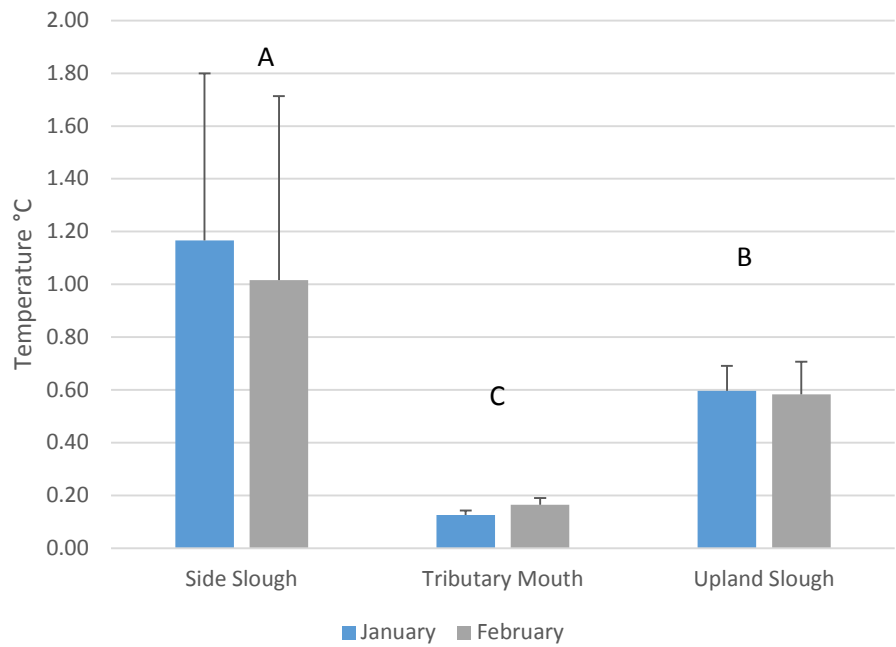


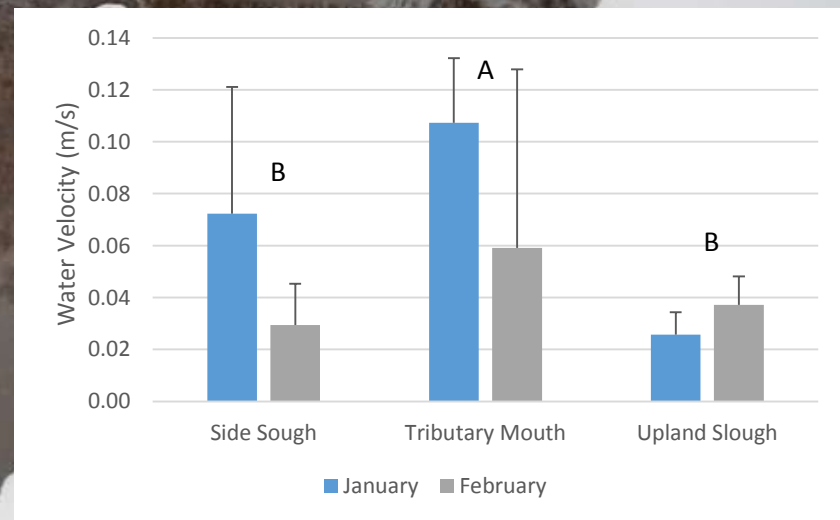
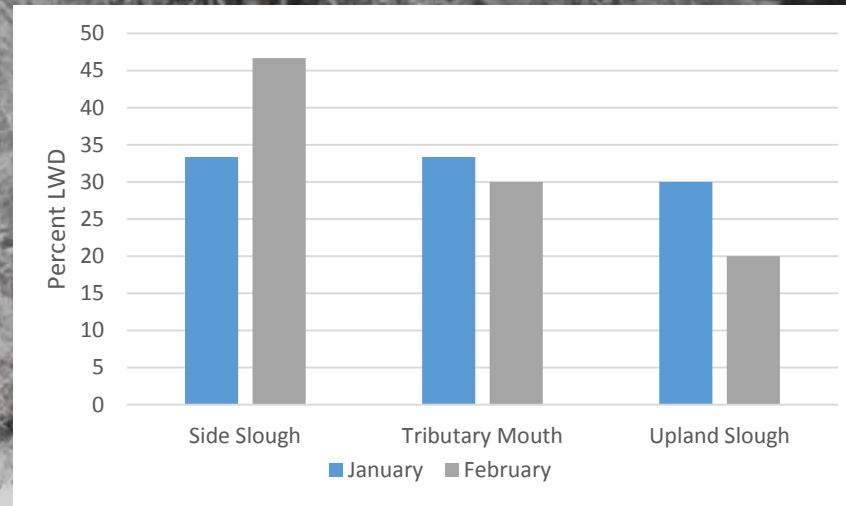
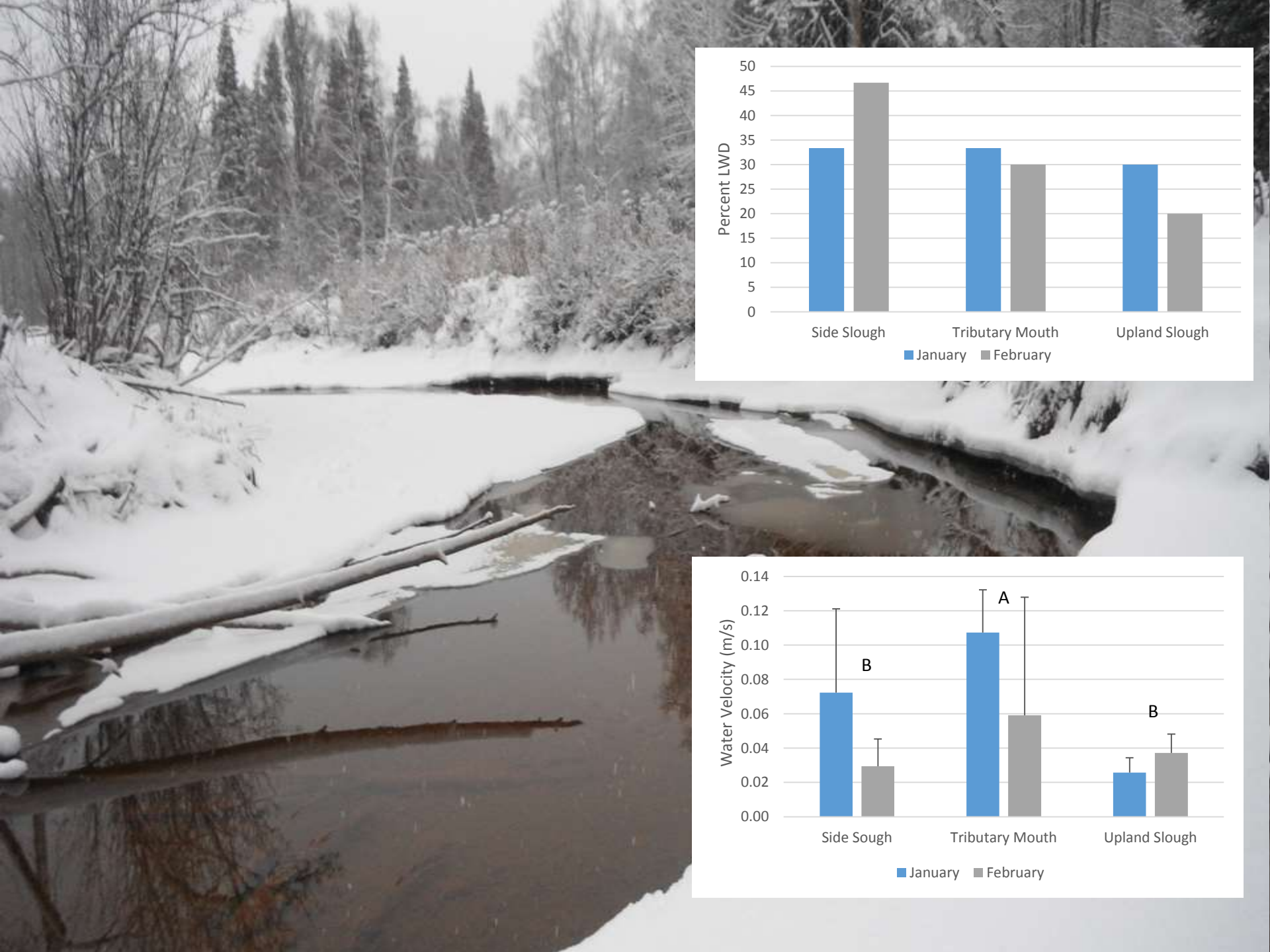
Low Mainstem Stage Height: No Backwater



Low Mainstem Stage Height: No Flow

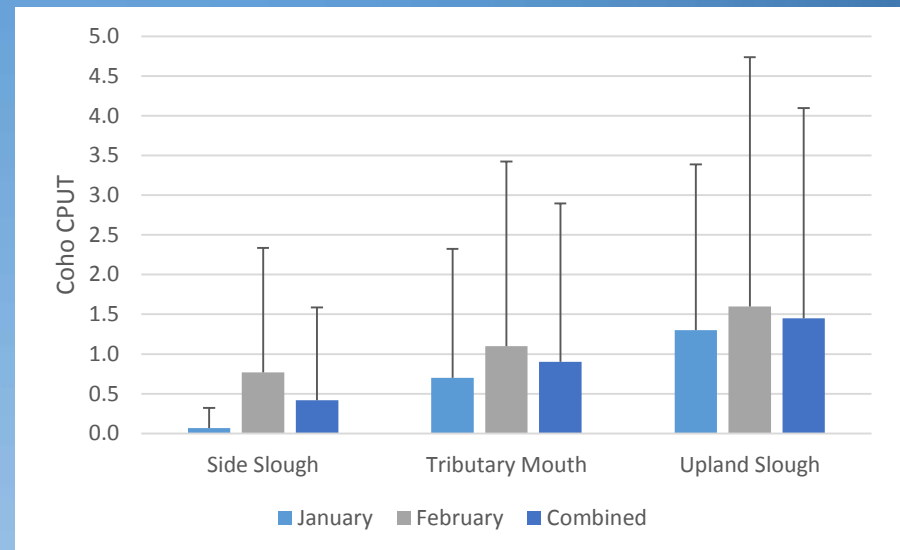






Macrohabitat Differences

- Coho abundance greater in upland sloughs than in side sloughs.
- Habitat characteristic favored by coho salmon (woody debris, low velocity) were more abundant in side sloughs.
- Side sloughs had high velocity during ice formation?



Summary

- **Woody debris, low water velocity and dissolved oxygen were important habitat characteristics for coho salmon.**
- **Site habitat characteristics could not be used to estimate coho salmon winter habitat as conditions during ice formation may displace salmon or inhibit habitat selection.**
- **Mainstem channel location and stage height can have a large influence on tributary mouth and side slough depth and velocity.**