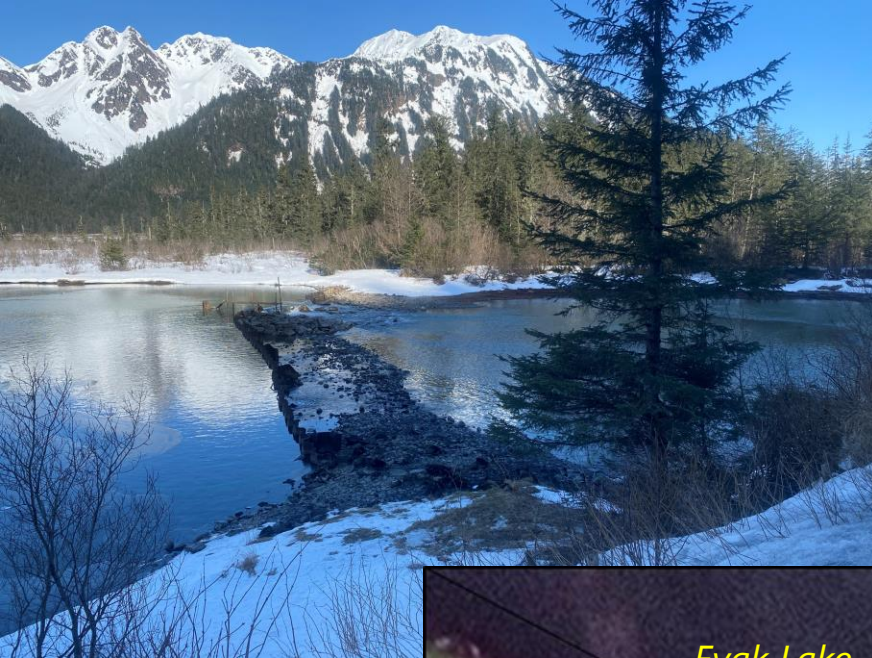


Eyak Lake Weir Assessment

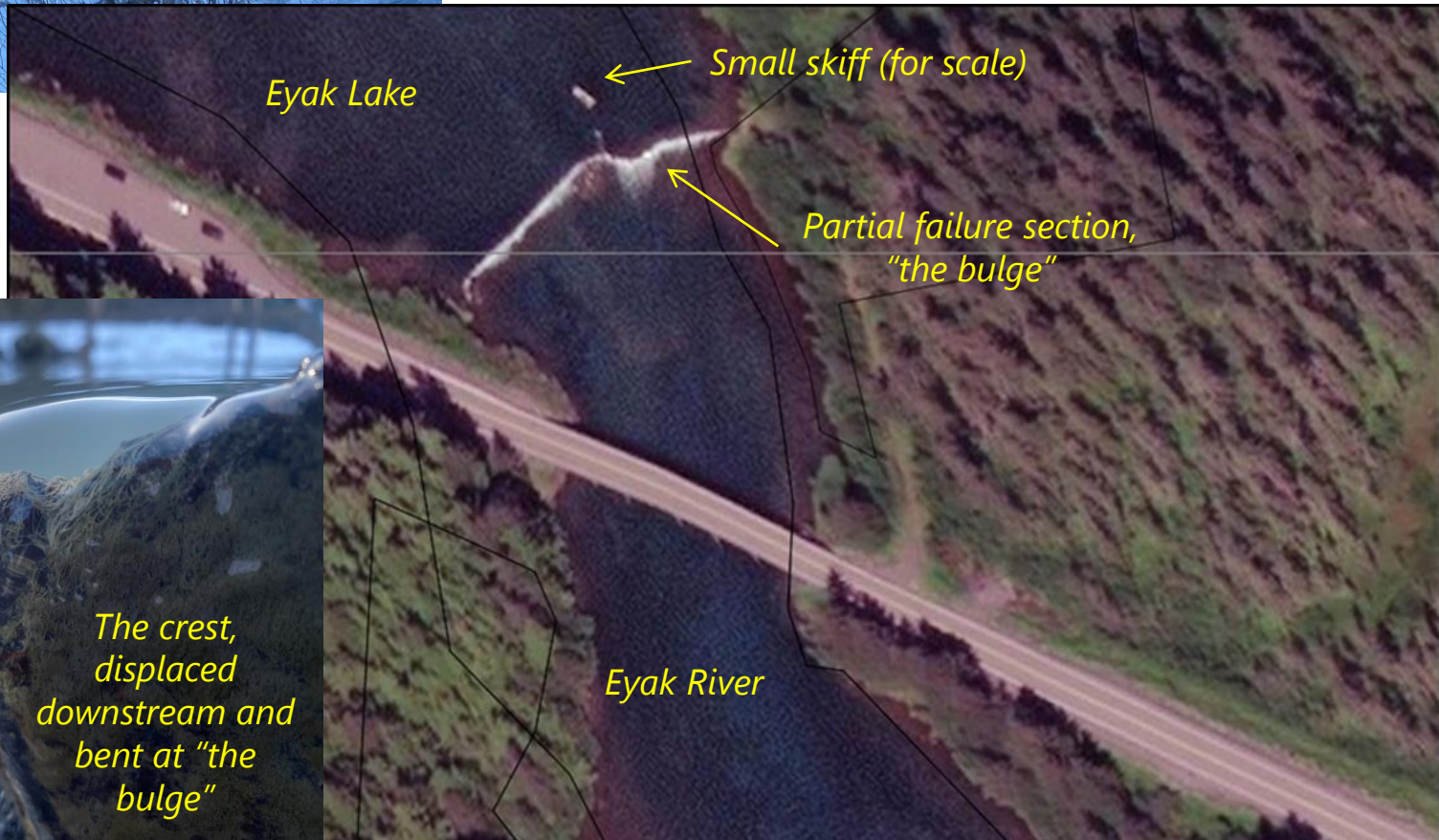
We assessed the condition of the weir on 2 April 2020 during low water conditions. Most of the weir's crest was 8" above the water level at the time of survey. This picture shows the damaged section of the weir that has been displaced downstream, lowering the level of the lake during low water conditions.



The weir was constructed in 1972 to re-establish the 1963 (pre-earthquake) water level at Eyak Lake. Maintaining the lake level is important for water quality and health, salmon production, municipal water supply, and recreation.



The v-shaped, 3/8" steel sheet pile weir spans 365 feet at the outlet of Eyak Lake (State of Alaska 1985). The crest of the weir was designed to be 17.5' above MLLW. The weir is ~275 feet upstream from the highway bridge. The weir maintains lake level at lower water stages only. At higher stages, the river channel downstream has lower conveyance than the broad weir, so the structure has no impact on upstream flooding (State of Alaska and see images on next slide). The weir is considered a "class 3" structure due to low risk of downstream flooding in the event of sudden failure (State of Alaska 2012). In 1985, the storage volume of the weir was estimated at 13,000 acre-feet.



Here is an example of the shifting control on discharge at different water stages. Note how the weir has nominal effects on water level at high water (left). The low water photo was taken one month later, demonstrating how lake surface level and juvenile fish passage are insufficient after just a few weeks of dry weather without snowmelt.



20 Aug 2018



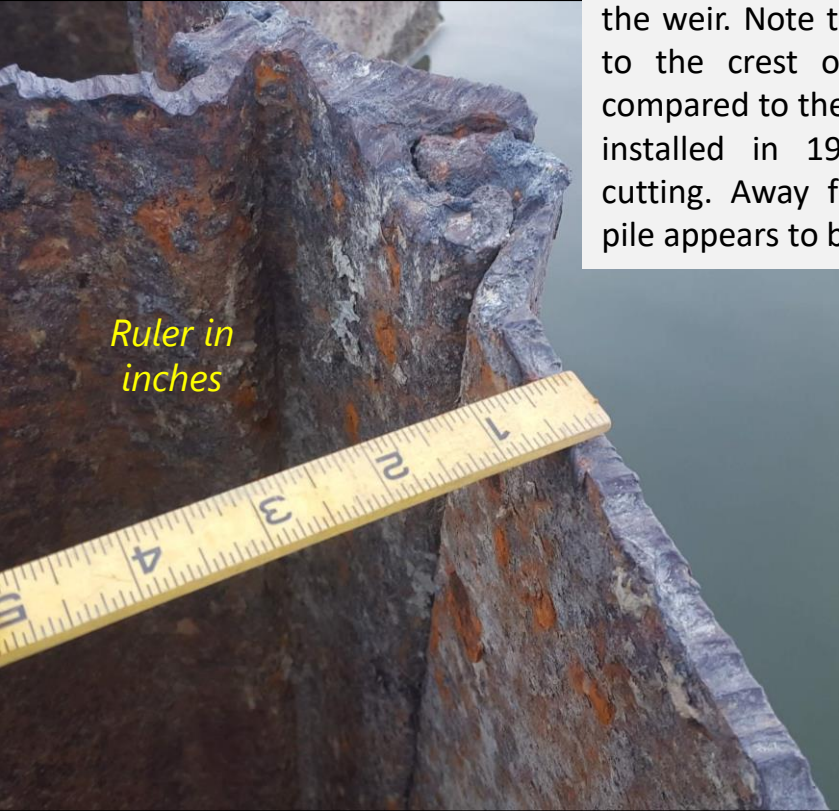
20 Sept 2018



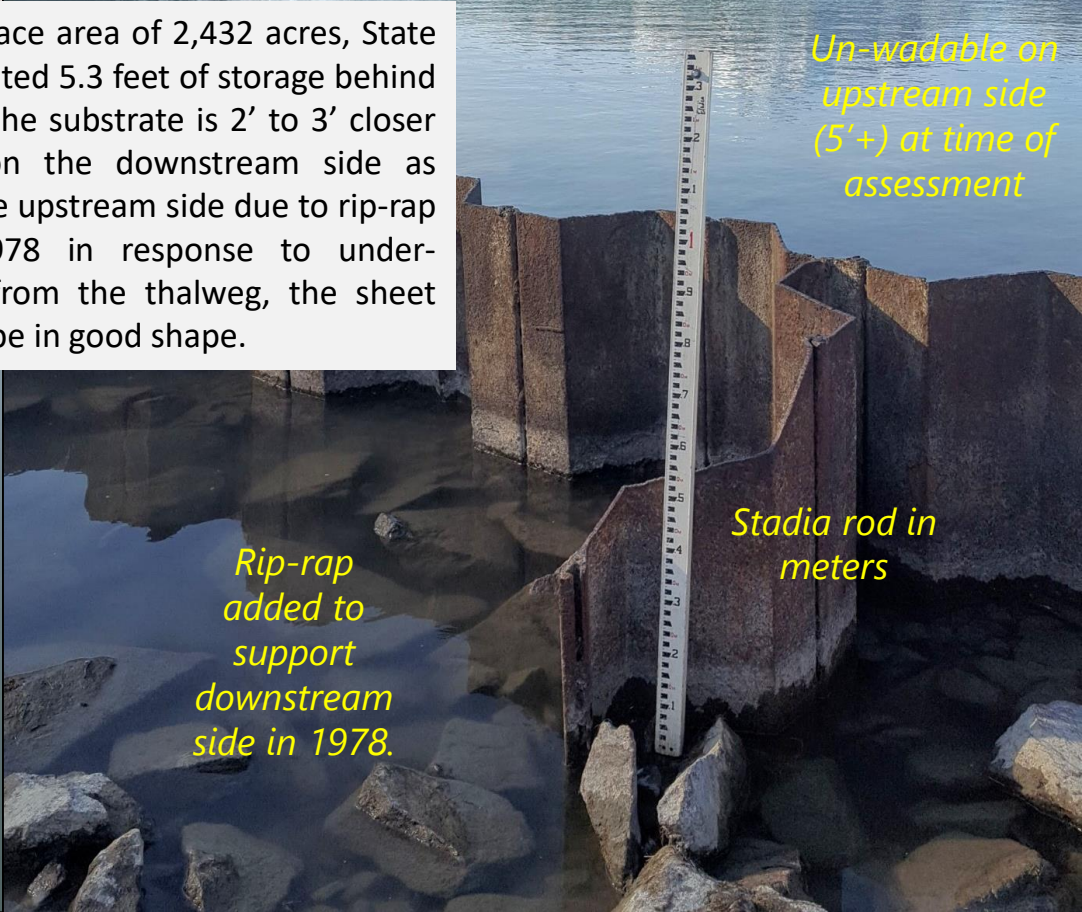
lake



Based on a surface area of 2,432 acres, State of Alaska estimated 5.3 feet of storage behind the weir. Note the substrate is 2' to 3' closer to the crest on the downstream side as compared to the upstream side due to rip-rap installed in 1978 in response to undercutting. Away from the thalweg, the sheet pile appears to be in good shape.



Ruler in inches



Un-wadable on upstream side (5'+) at time of assessment

Rip-rap added to support downstream side in 1978.

Stadia rod in meters

The weir was designed to provide a 1.5' deep, 12' wide boat passage slot with an adjacent platform. Small boat operators could walk the platform, dragging their skiff up and down this slot with the motor tilted up. Two large square timbers, possibly old railroad ties, are mounted onto the weir crest to protect boat hulls. The large rip-rap installed in 1978 appeared to render the boat passage feature largely inoperable, but nonetheless, this slot captured the thalweg and remains important for upstream adult salmon passage. The platform, also damaged by ice, is now a popular, albeit unsafe, perch for sport fisherman.

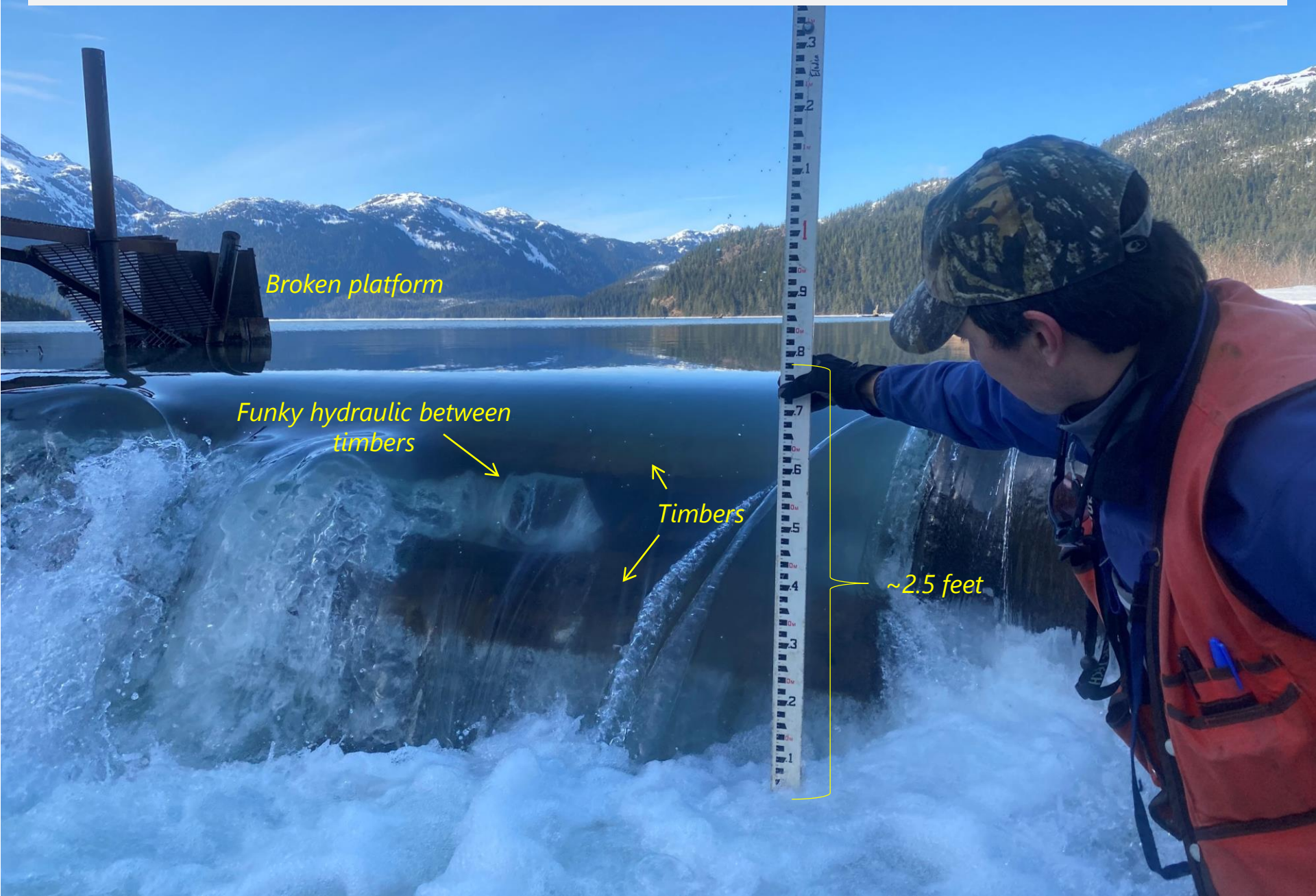


2 Apr 2020



Damage at the boat slot and the sheet pile to the east, likely caused by ice (J. Stevenson, personal communication), has displaced the weir downstream by an estimated 5' to 6' (State of Alaska 2012). Although this section was deformed before the State of Alaska's 2011 survey, the damage may have been exacerbated by a dramatic ice-out event during a large rain-on-snow event in January 2014, further lowering the lake level (working to confirm). During our assessment, we observed the sheet pile at this "bulge" is leaning against large rip-rap. We measured the damaged section to be 41 feet wide.

A close up of the boat slot. Note the timbers have been displaced and skewed downstream (We haven't confirmed yet, but we suspect the timbers were likely originally installed horizontal relative to the water's surface).



Eyak River

*Original
alignment*

Eyak Lake

7 Apr 2020



Action needed:

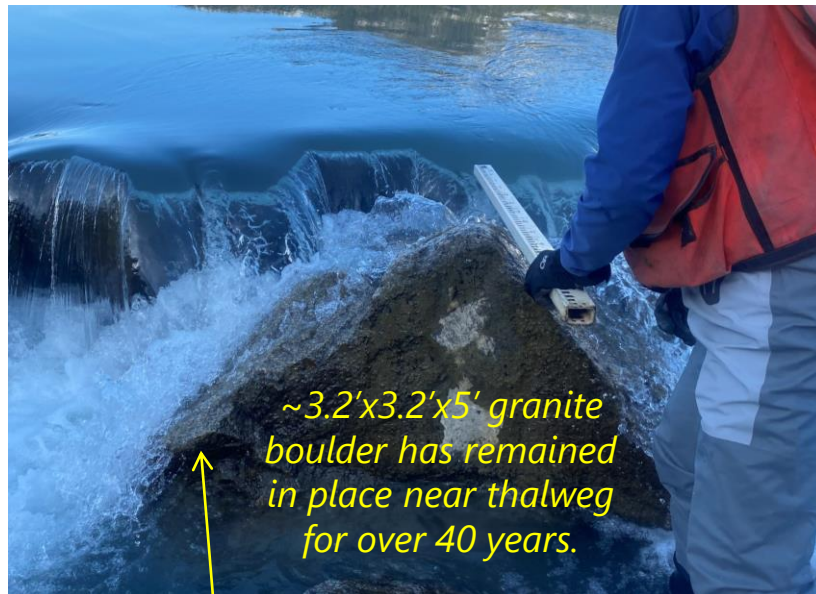
Repair “the bulge” and the boat slot to restore the target crest elevation at 17.5’ above MLLW. This action would raise the lake level during low flow conditions, benefitting salmon, recreation, and watershed health.

Establish a step-pool sequence immediately downstream from the weir to improve juvenile fish passage by dividing the 3.5’ of elevation change into three steps.

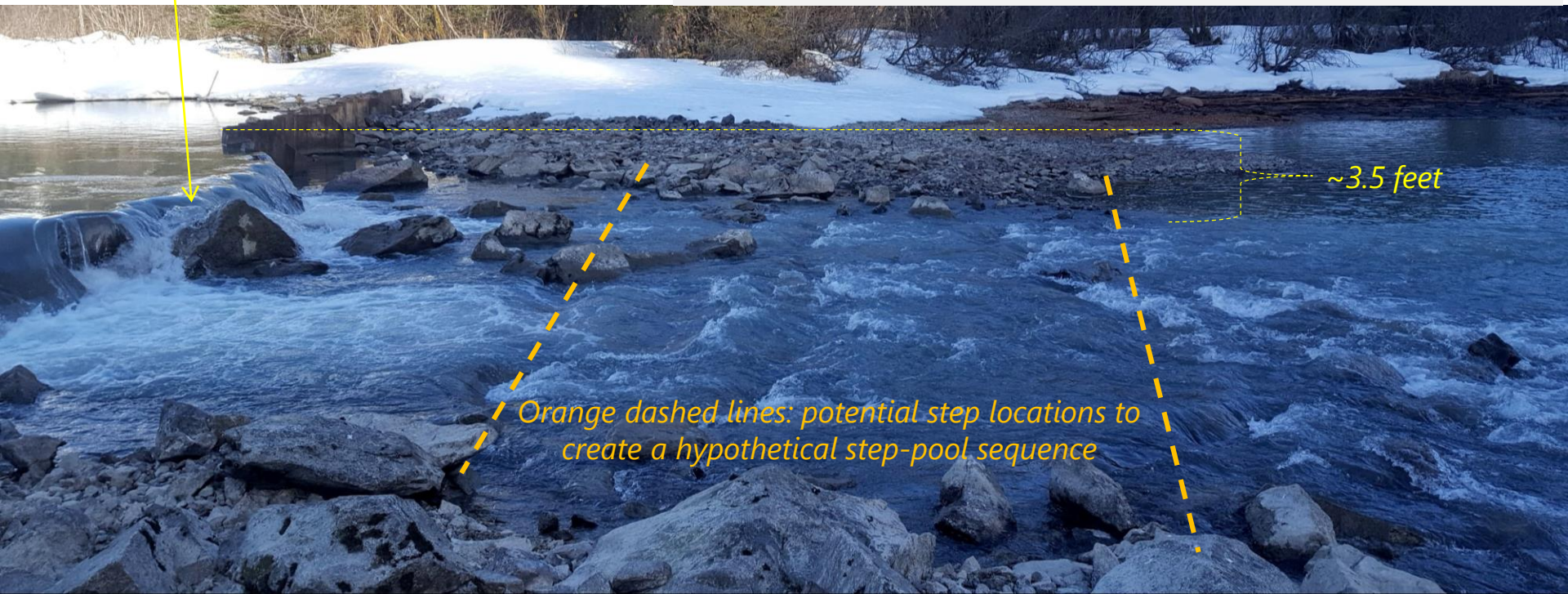
Next steps:

Determine through cost-benefit analysis if the weir should be repaired and modified to improve fish passage or if the weir should be replaced with a new structure.

Develop conceptual design options and cost estimates.



~3.2'x3.2'x5' granite boulder has remained in place near thalweg for over 40 years.



~3.5 feet

Orange dashed lines: potential step locations to create a hypothetical step-pool sequence



Version 1.

This photo report was prepared by Luca Adelfio, Hydrologist, and Will Schreck, Hydrology Technician, on April 8, 2020.

This is a “living document” and a work-in-progress. Please contact Luca with questions and comments at: Luca.Adelfio@usda.gov.