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The Hood Canal Bridge Impedes Migration of Juvenile Salmonids

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The Hood Canal Bridge Impedes Migration of Juvenile Salmonids

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Q13 News Story

Introduction

Results from an acoustic study by Moore et al. (2013) indicated high mortality (up to 36%) of tagged outmigrating steelhead at the Hood Canal Bridge. Further tagging efforts in 2017 and 2018 found that **as many as 50.6% of tagged steelhead that made it to the bridge did not survive past the bridge** (Figure 1). Steelhead are listed as threatened under the Endangered Species Act, as are Chinook and Hood Canal Summer Chum. Impact of this scale could have major implications for these culturally and economically significant resources.

As part of the Hood Canal Bridge Assessment Team, Port Gamble S'Klallam Tribe (PGST) collected data to evaluate the effect of the bridge on associated biota. PGST used various methods to assess such parameters as fish distribution and abundance, zooplankton community composition, water quality, light levels, and predator presence around the Bridge.

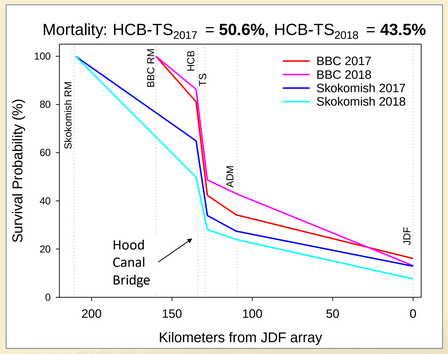

Figure 1. Steelhead survival probability with distance from the Strait of Juan de Fuca acoustic receiver array (Figure courtesy of M. Moore).

Methods

Methods used during the outmigration season April 1-June 1 in 2017, 2018, and 2019. Number indicates year sample method was used.

- DTX side scanning acoustics surveys[17,18]
- Stationary visual surveys[18,19]
- Visual predator surveys[18]
- BlueView visual acoustics data collection[17,18,19]
- GoPro remote underwater video deployment[18,19]
- Zooplankton vertical tows[17,18]
- CTD casts[17,18]

Results

While Moore et al. demonstrated steelhead mortality as an effect of the bridge, PGST finds that Chum and Chinook Salmon survival is also impacted by the structure.

Juvenile salmon are in high abundance near the bridge. Small (<100mm) salmon are present along the entire length (Figure 2).

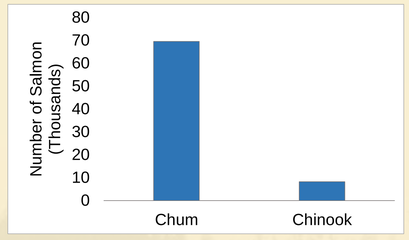

Figure 2. Number of total salmon observed during Stationary Visual Surveys at four stations, accounting for approximately 2% of the total bridge length. Number observed is based on estimates of school size multiplied by calculated average school density for each species at the bridge.

There is no trend of fish abundance/distribution greater than 15m from the bridge.

Predator species are present in higher densities near (<200m) vs far (200-400m) from the bridge and are foraging around the clock (Figure 3, QR codes 1 and 2).

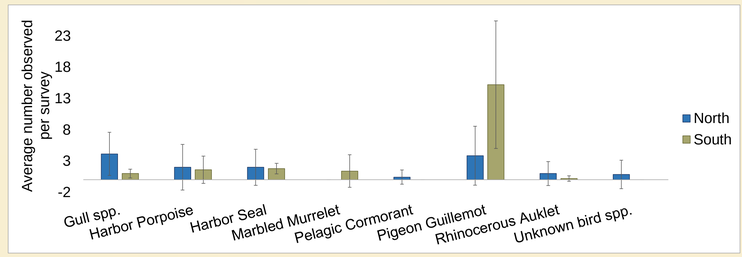

Figure 3. Average number of potential salmonid predators present per survey on the north and south sides of the Hood Canal Bridge.

Circulation is altered enough that water quality is measurably different north and south of the bridge.

Videos show salmonids actively transiting along the bridge and feeding in areas of dense plankton.

The zooplankton community is not different north or south of the bridge. While the density of euphausiids appeared to be elevated at the bridge, our sampling method did not characterize highly motile species (QR code 3).

Conclusions

Similar to a hydroelectric dam, fish must alter their natural course to get under or around the bridge, and the resulting delay in migration leaves them susceptible to predators.

High abundance of plankton and other juvenile fish species may also provide incentive for schools of salmon to pause migration.

High densities of fish provide the opportunity for birds, seals, and porpoises to feed. Fish that do not survive past the bridge have likely been eaten.

Preparing designs for a "fish friendly" bridge should be priority.

The bridge spans 85% of the width of the Hood Canal

Use your phone's camera app to scan the QR codes and watch videos captured around the bridge

1

2

3

Pontoons extend 5m underwater but fish outmigrate in the top 1m

Literature Cited

Moore, M., Berejikian, B.A., and Tezak, E.P. 2013. A floating bridge disrupts seaward migration and increases mortality of steelhead smolts in Hood Canal, Washington State. PLoS ONE 8(9): e73427.

Acknowledgements

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