

South Sound Coho Salmon *Oncorhynchus kisutch* Barging Study

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Background

- Juvenile salmonid survival rates in Puget Sound/Salish Sea are depressed from a historical perspective (Figure 1).
- Anecdotal evidence and results from recent and on-going Salish Sea Marine Survival Project studies (marinesurvivalproject.com) indicate potential areas with increased mortality on juvenile salmonids, among other factors result in decreased numbers of returning adult salmonids, including Coho Salmon.
- Coded-wire tags (CWT) are used coast-wide to determine contribution to state and tribal fisheries and estimate survival rates used by fishery managers to evaluate hatchery programs and fisheries.
- Squaxin Island (Tribal) Net Pen hatchery provides a high value opportunity to fishers for both state and tribes as greater than 80% of adults are caught within Puget Sound. Its location is conducive to fishing as returning Coho Salmon must swim through numerous fisheries and a variety of natural and intentional variables to entice residency so that year-round harvest opportunities exist.
- Very little is understood on the impact of barging juvenile salmon in marine environments while on the contrary, there is ample literature on riverine barging.

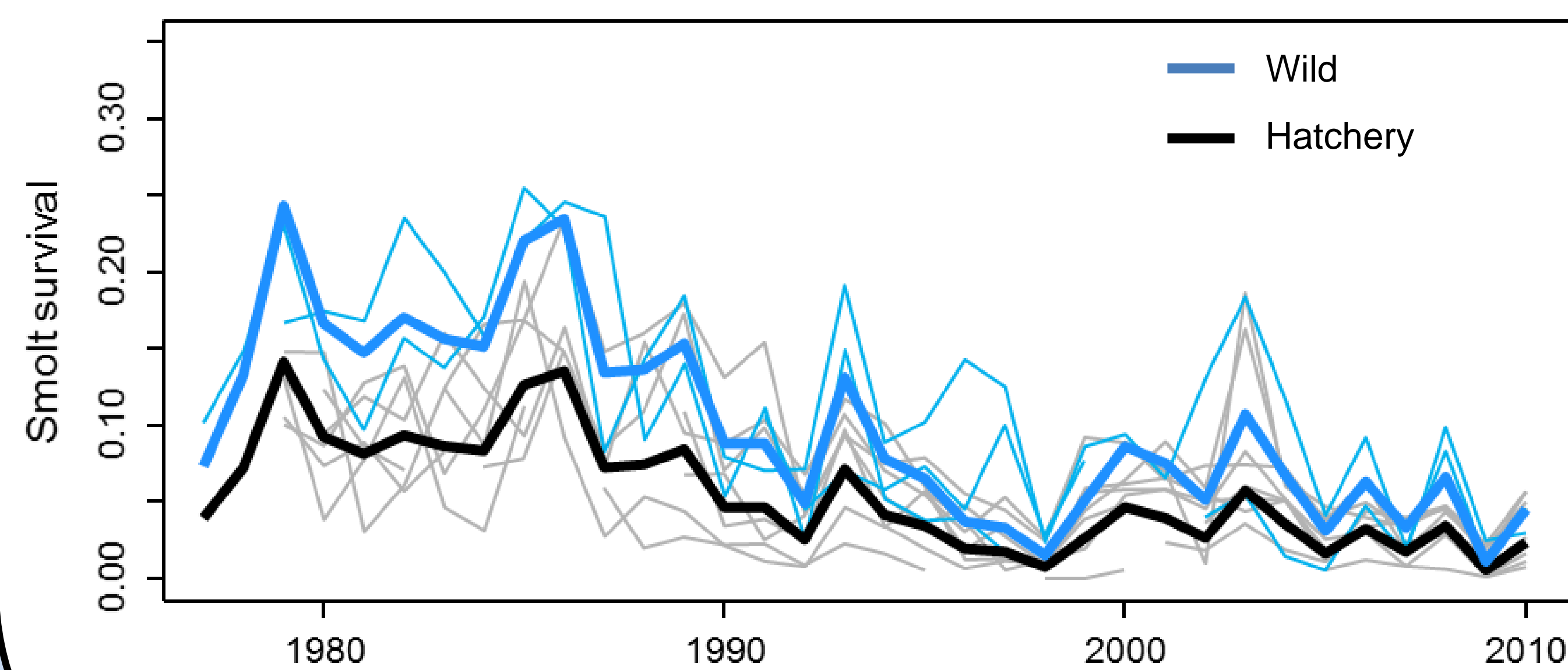


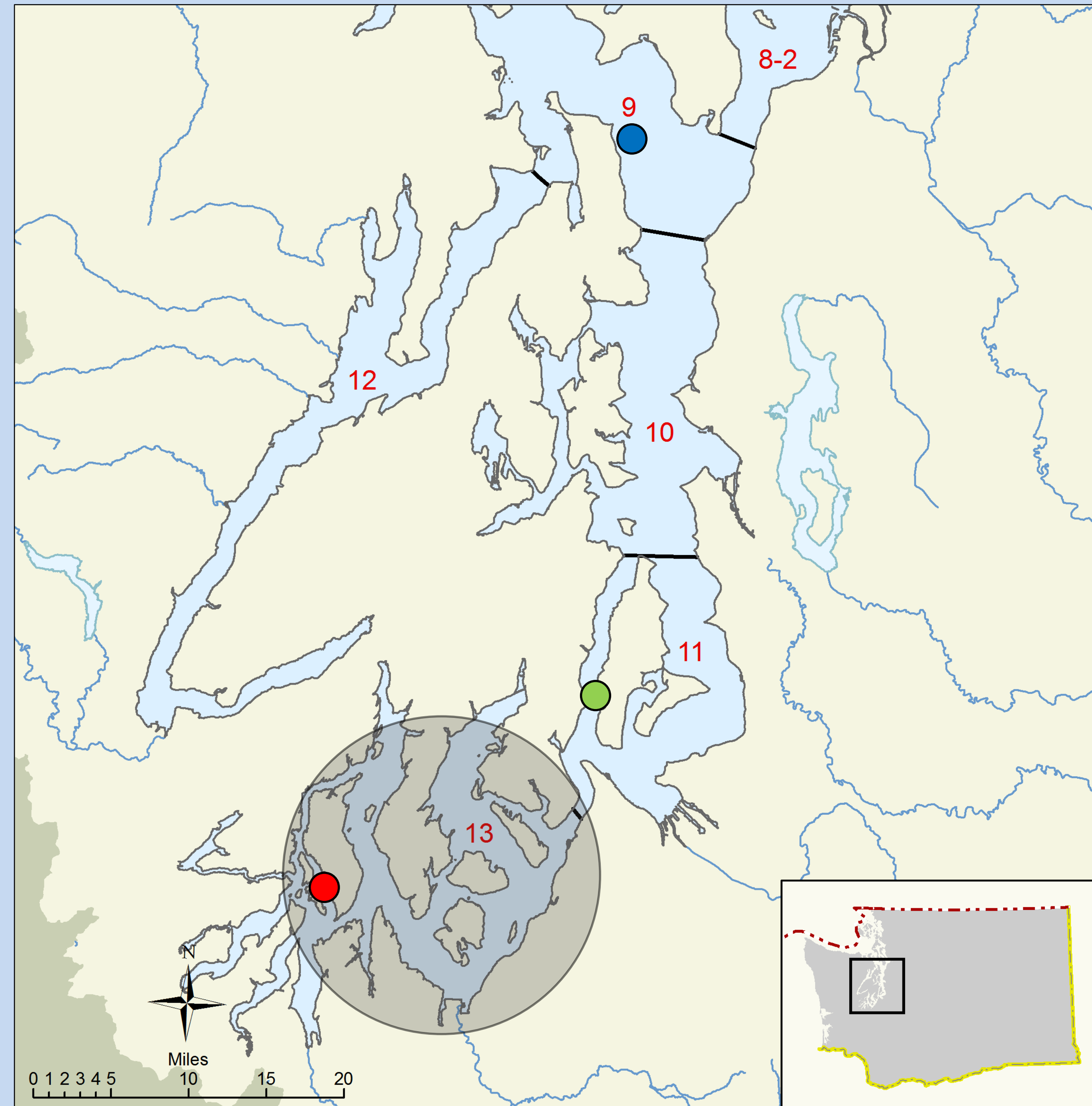
Figure 1. Smolt to adult survival rate of Puget Sound Coho Salmon. (Zimmerman et al. 2015)

Study Questions

- How does transporting out-migrating Coho Salmon past areas with higher mortality affect survival?
 - Stray rates?
 - Contribution to state and tribal fisheries?
 - Residency?
- What effect does barging have on out-migrating coho salmon in marine waters?
- Can this approach among other innovative release strategies be incorporated into the slate of release strategies to maximize cost-efficiency for agencies?

Methodology

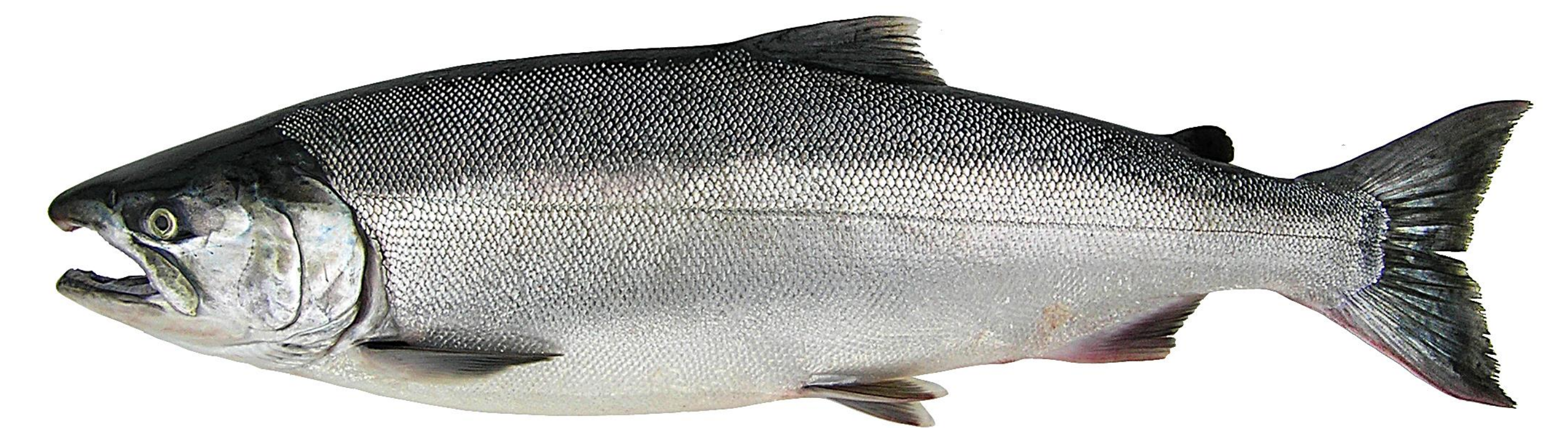
- Study is on-going with releases occurring 2016-18. WDFW provides juvenile Coho Salmon to be reared at the net pen for approximately 4 months. Four groups are reared in a separate net pens with a unique CWT code (45k tags each).
- Areas with increased mortality were determined from previous Coho Salmon and Steelhead acoustic tag studies. Squaxin Tribe barges fish to pre-determined release sites and time to help fish avoid predation and continue migration out.
 - Control group A: Squaxin Island Net Pen; Marine Area 13
 - Control group B: Squaxin Island Barge Control; Marine Area 13
 - Release group 1: Vashon; Marine Area 11
 - Release group 2: Point-No-Point; Marine Area 9
- One additional control release group to act as a barging control group that will be released at Squaxin Island Net Pen prior to the conclusion of the study.
- CWT recoveries and analysis to occur as typically performed by state and tribal staff.



- Squaxin Island Net Pen – control group(s)
- Release group 1
- Release group 2
- Highest mortality (Moore et al., in review)



Anticipated Results



Future study adjustments

- Acoustic tag study (Salish Sea Marine Survival Project) results from Coho Salmon released from Squaxin Island Net Pen (May 2016) may result in an adjustment of future barging release sites.

CWT results – run reconstruction

- CWT release and recovery information will be available through RMIS (rmpc.org).

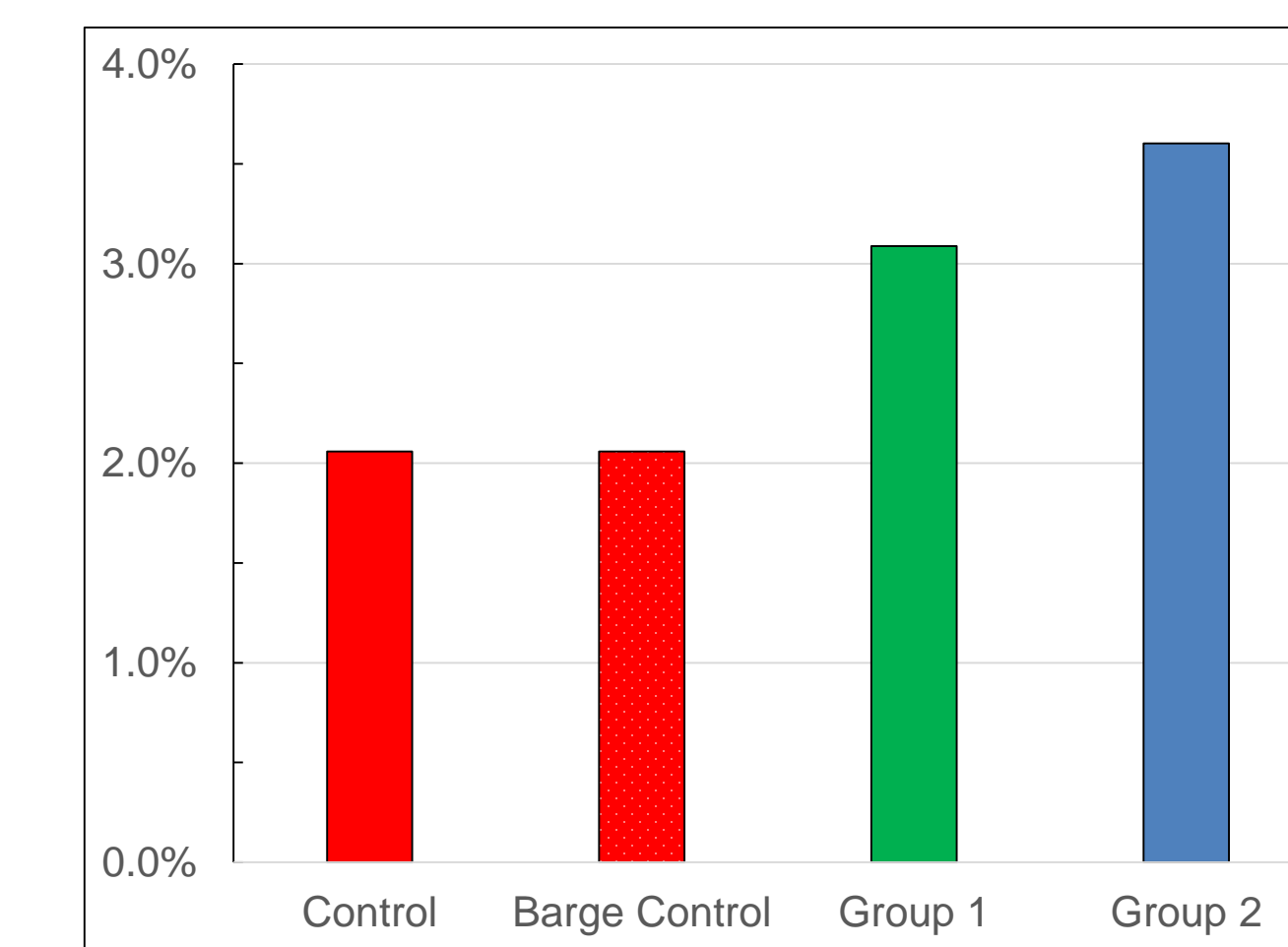


Figure 2. Hypothetical smolt to adult survival of Squaxin Island Net Pen Coho Salmon release groups.

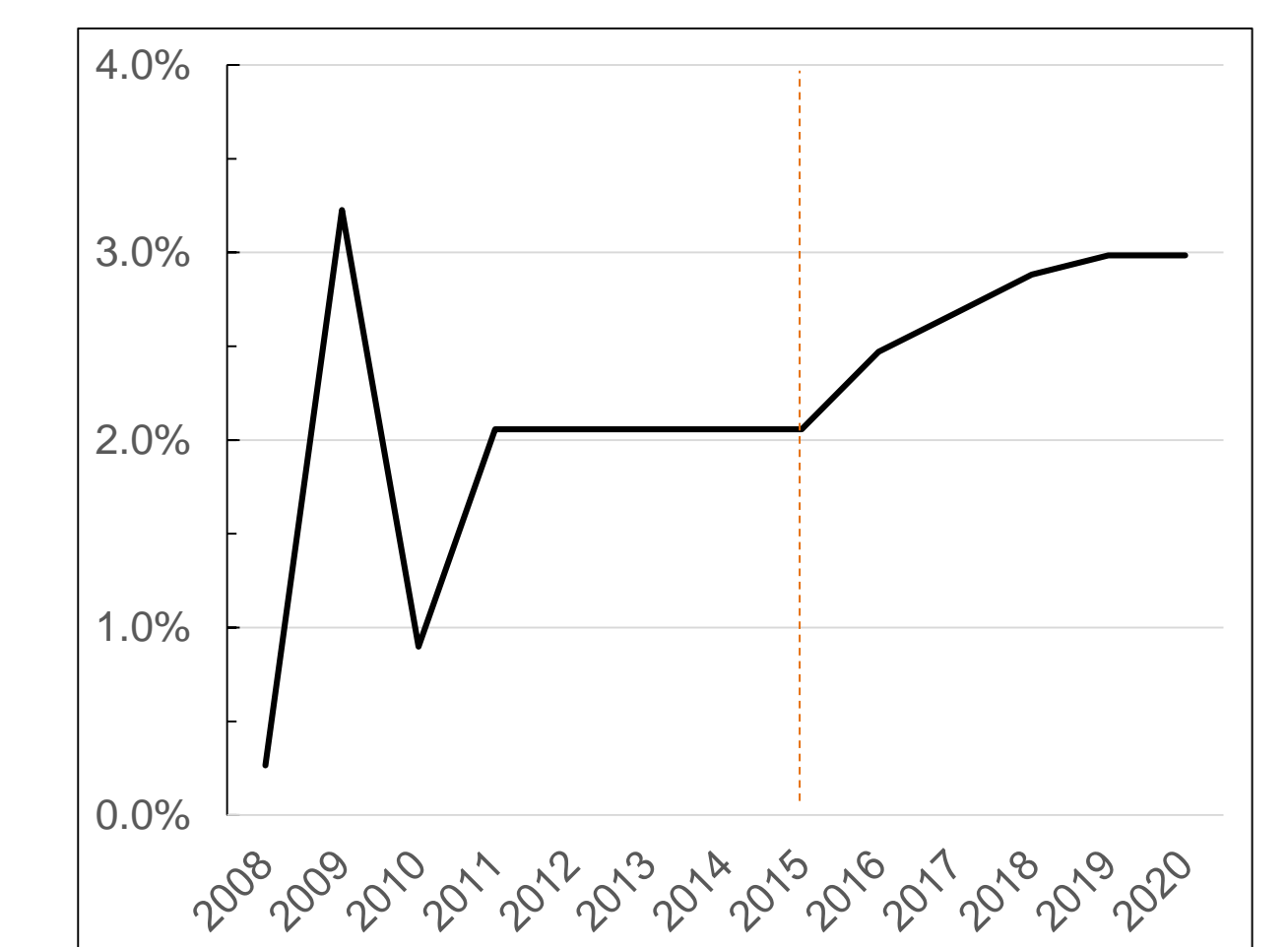


Figure 3. Hypothetical increase in smolt to adult survival of future Coho Salmon releases.

Potential recommendations to fishery managers and scientists

- Coho Salmon are likely to have increased survival and contribution rates to fisheries due to bypassing areas with increased mortality.
- Stray rates are likely to remain low and within the standards of the Hatchery and Genetic Management Plans.
- Increased knowledge of limitations and applications of barging fish past known areas with increased mortality could provide additional means to promote survival for other salmonids, including both hatchery and wild stocks.
- Information gathered from on-going study will be incorporated into the Salish Sea Marine Survival Project to better understand why survival rates are depressed.
- Continued and/or increase hatchery production out of South Puget Sound to provide a cost-effective approach to maximize sustainable fisheries.



Collaborators

- Puget Sound Recreational Fishery Enhancement Fund Oversight Committee – Washington Department of Fish and Wildlife, Squaxin Island Tribe, Long Live the Kings, NOAA, Northwest Indian Fisheries Commission