



Evaluation of Foster Dam and Green Peter Dam Spillway Operations for Juvenile Fish Passage Year 2

April 3, 2024

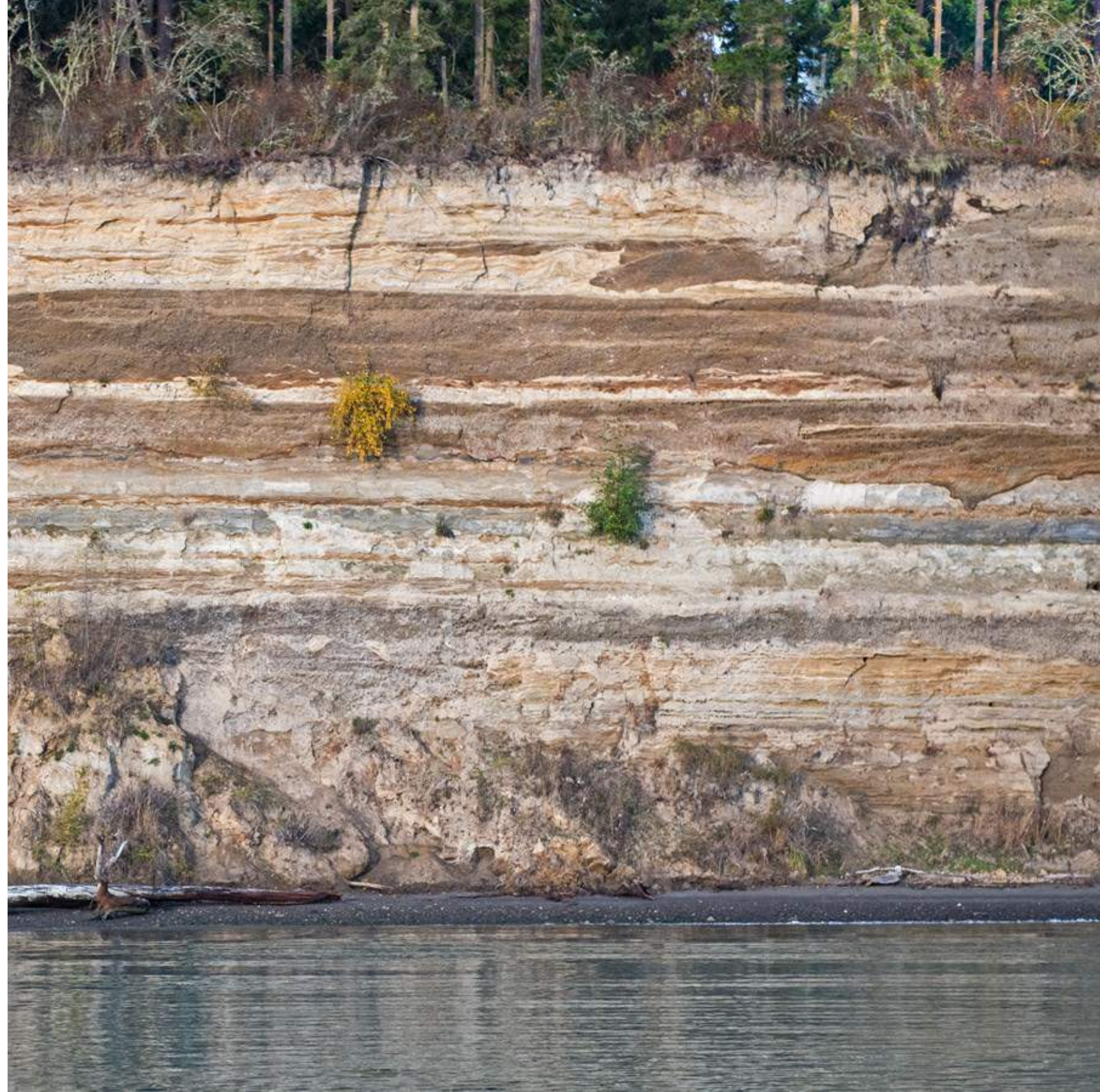
Willamette Fisheries Science Review

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Spillway Operations Evaluated

- Foster Dam
 - Nighttime spillway and daytime turbine operations
- ~~Green Peter Dam~~
 - Nighttime spillway and 24/7 spillway operations
- 2023
 - Fish health issues



Foster Dam

Features

- 4 spill bays
- 2 turbine units



Upper Willamette River Spring Chinook Salmon



Upper Willamette River Winter Steelhead



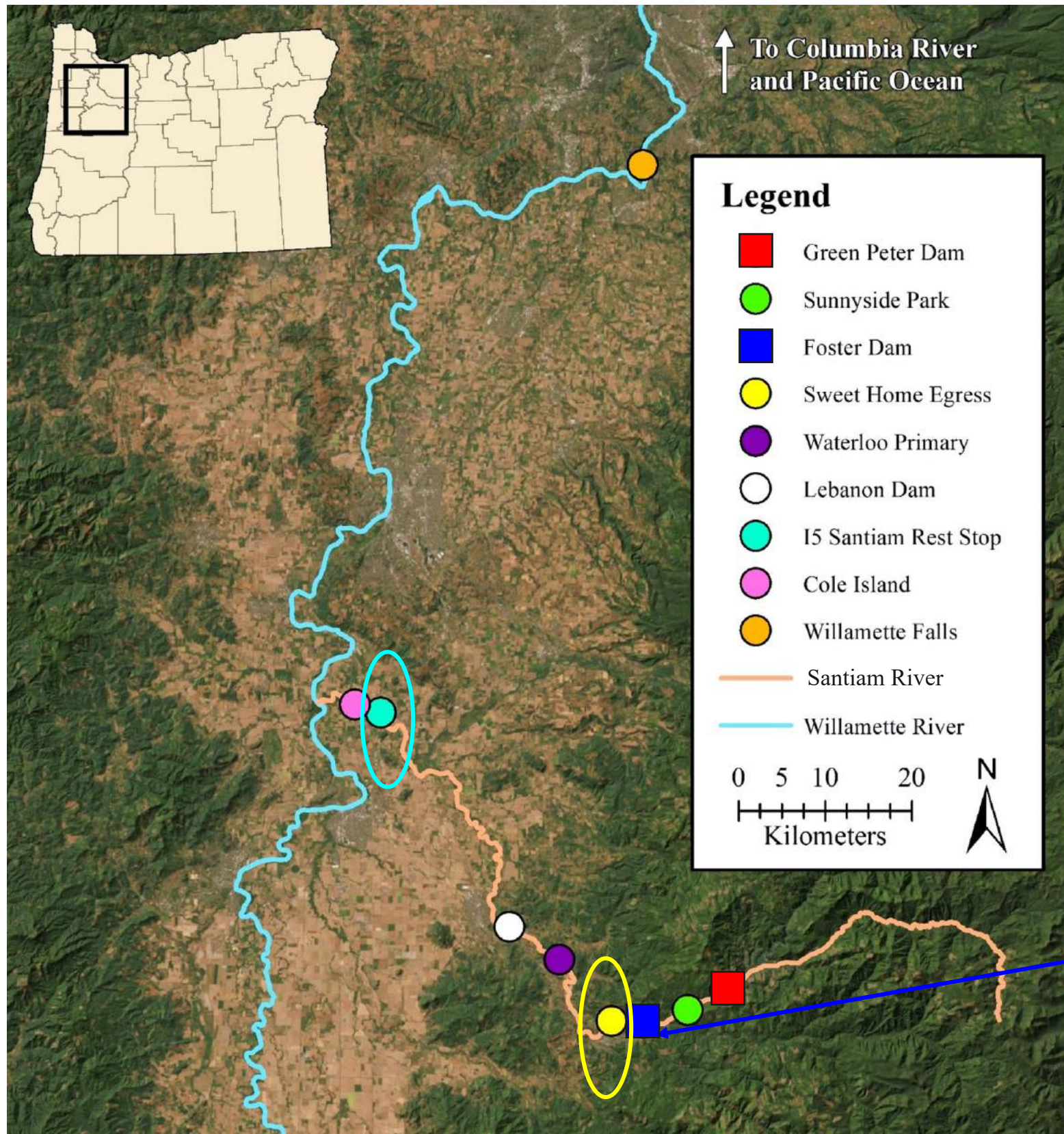
Objectives

- Green Peter Dam (GPR)

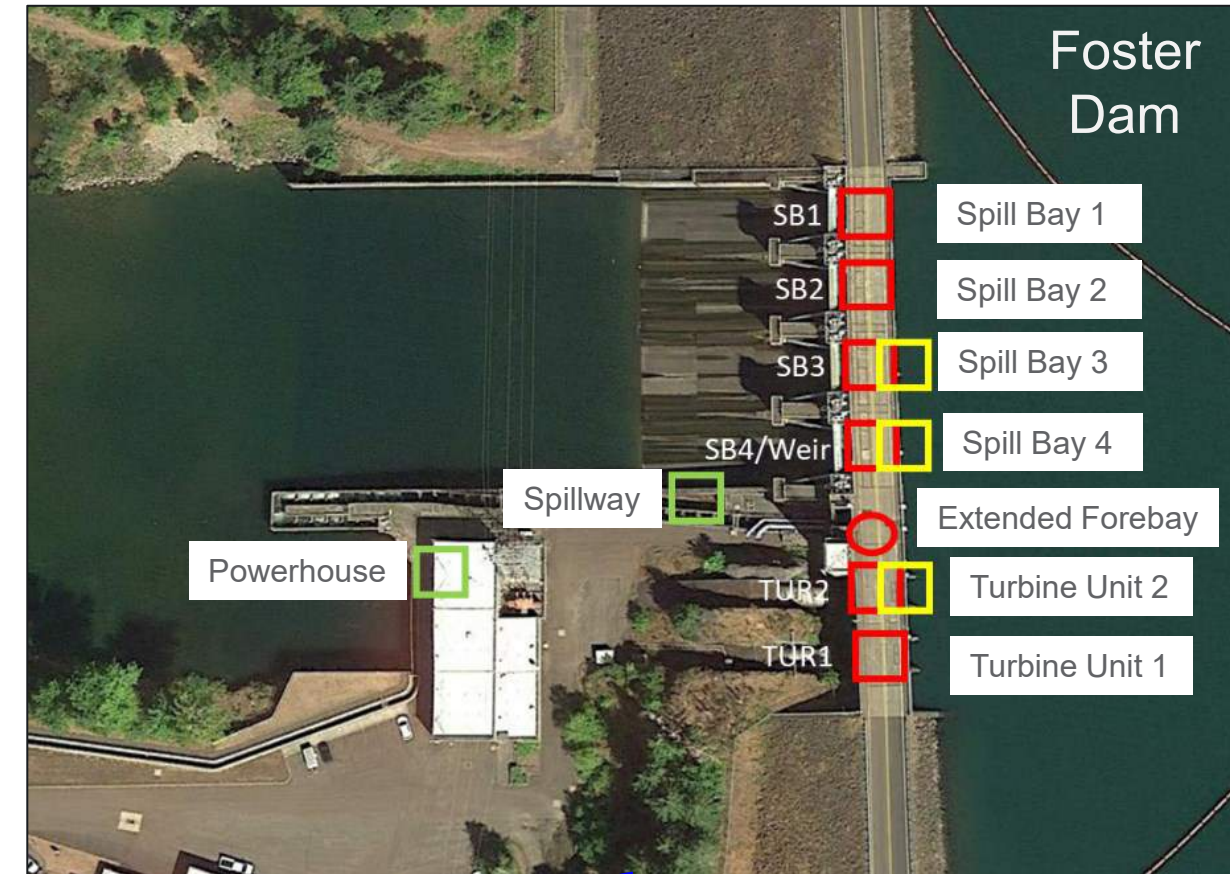
- Chinook salmon diseased
 - ✓ No tagging for spring 2023
- Fall 2023 deep drawdown evaluation occurred
 - ✓ Analyses ongoing, results will not be discussed today

- Foster Dam (FOS)

- Chinook salmon diseased
 - ✓ No tagging after February for spring 2023
- Nighttime only spill compared to daytime turbine operations for age-1 winter steelhead
 - ✓ Downstream passage
 - Reservoir survival (immediate dam passage)
 - Forebay residency time
 - Dam passage efficiency
 - Reach survival (confluence of the Santiam and Willamette rivers)
 - ✓ Diel distribution, behavior, and movements into and within the FOS Forebay
 - ✓ Efficiency and effectiveness of nighttime spillway operation compared to turbine operation




Study Design

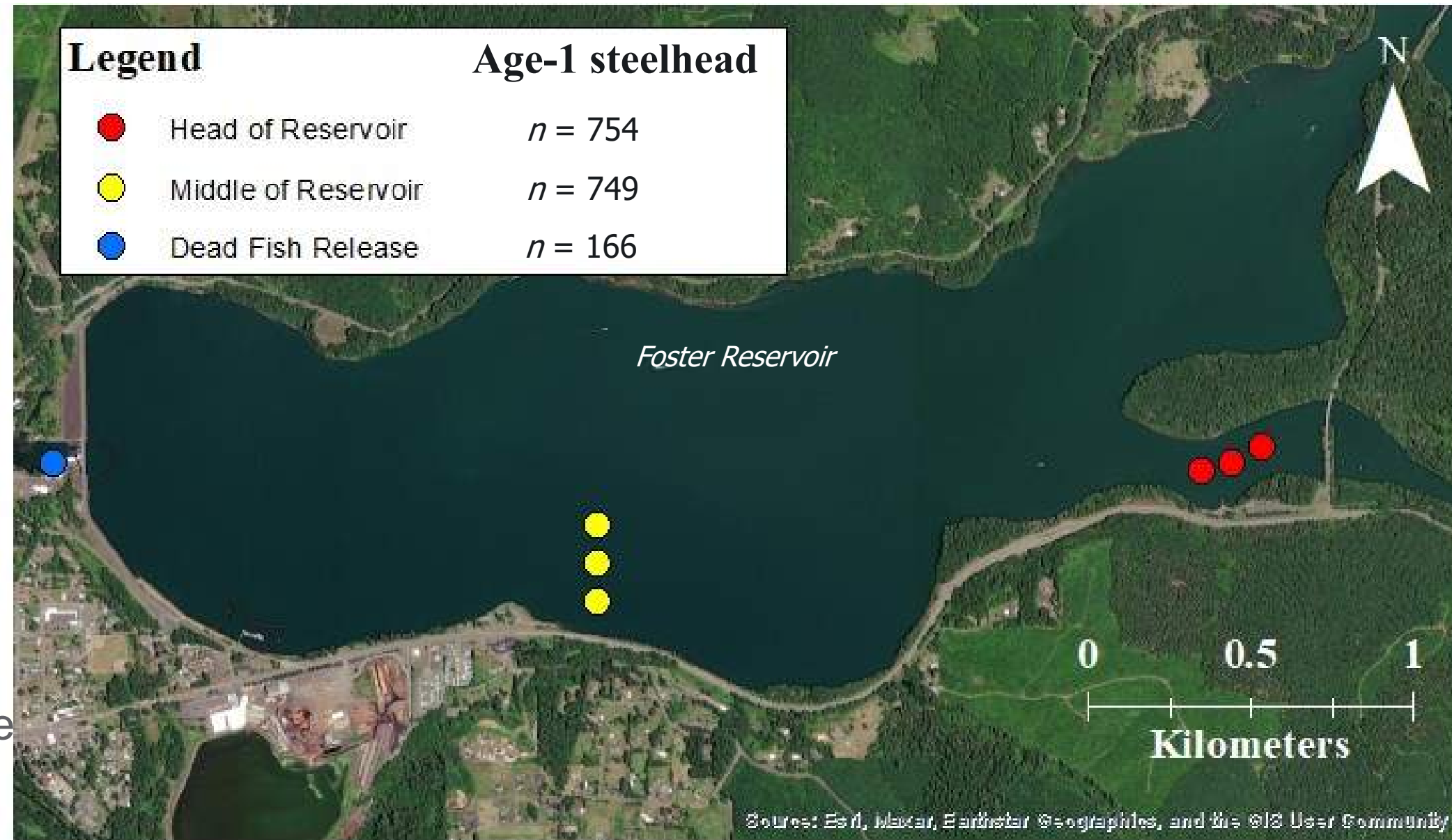


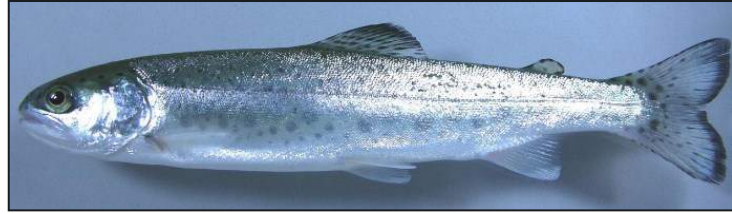
- Foster

- Dam Passage Survival = ViRDCt (yellow)
- Reach Survival = Cormack-Jolly-Seber (teal)

Foster Release Locations & Sample Sizes

- OSU Surrogates
 - Age-1 steelhead
- Tags
 - 
- Operations
 - Nighttime spillway
 - Daytime turbines
- Pool Elevations
 - Low: 1 Feb–15 May
✓ $n = 749$
 - High: 21 May–15 June
✓ $n = 920$

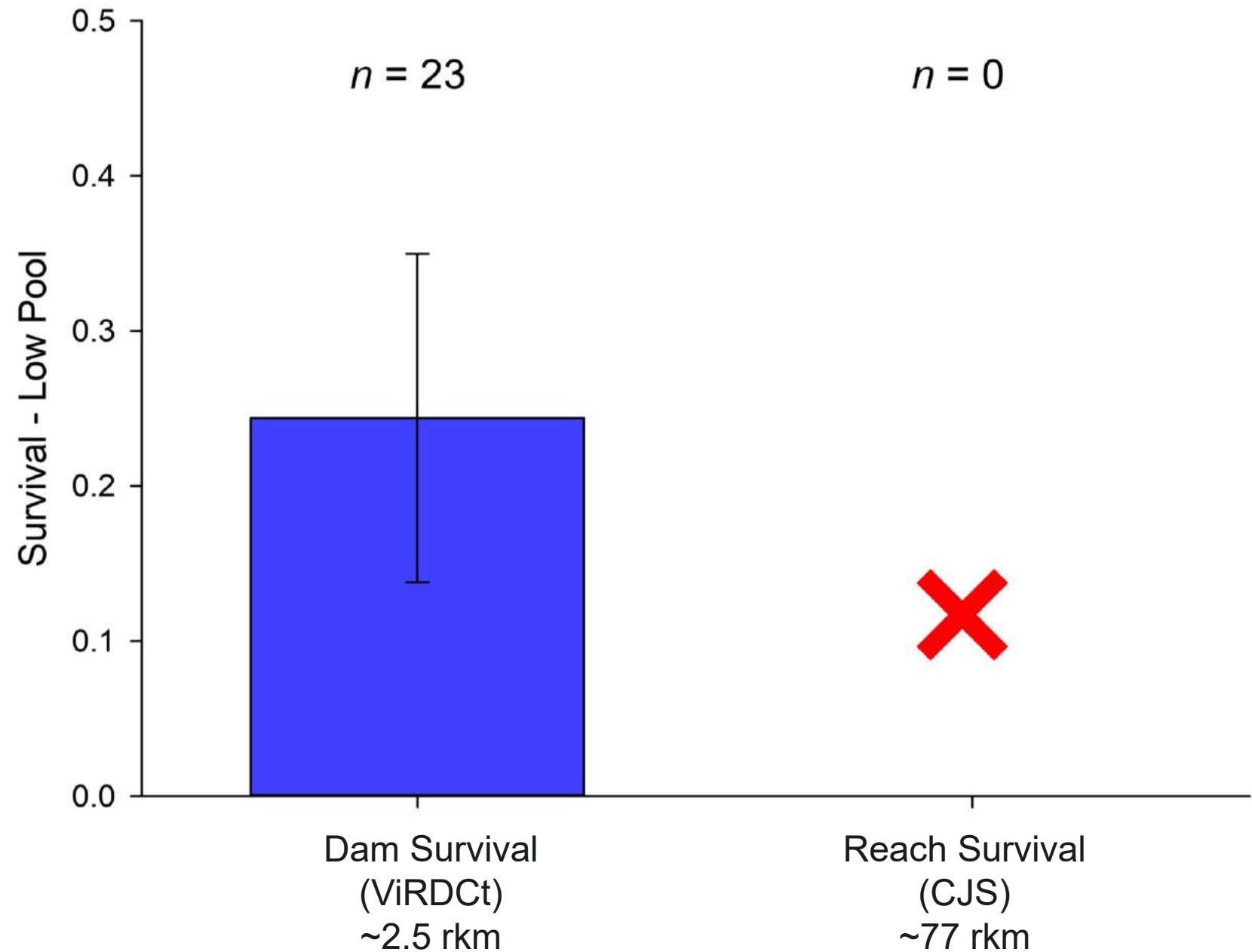


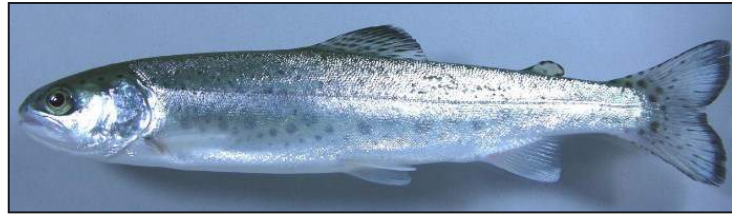


Age-1 Winter Steelhead

Foster Low Pool Dam Passage Survival

- Dam survival
 - $24.4 \pm 10.6\%$
- Reach survival
 - Unable to estimate

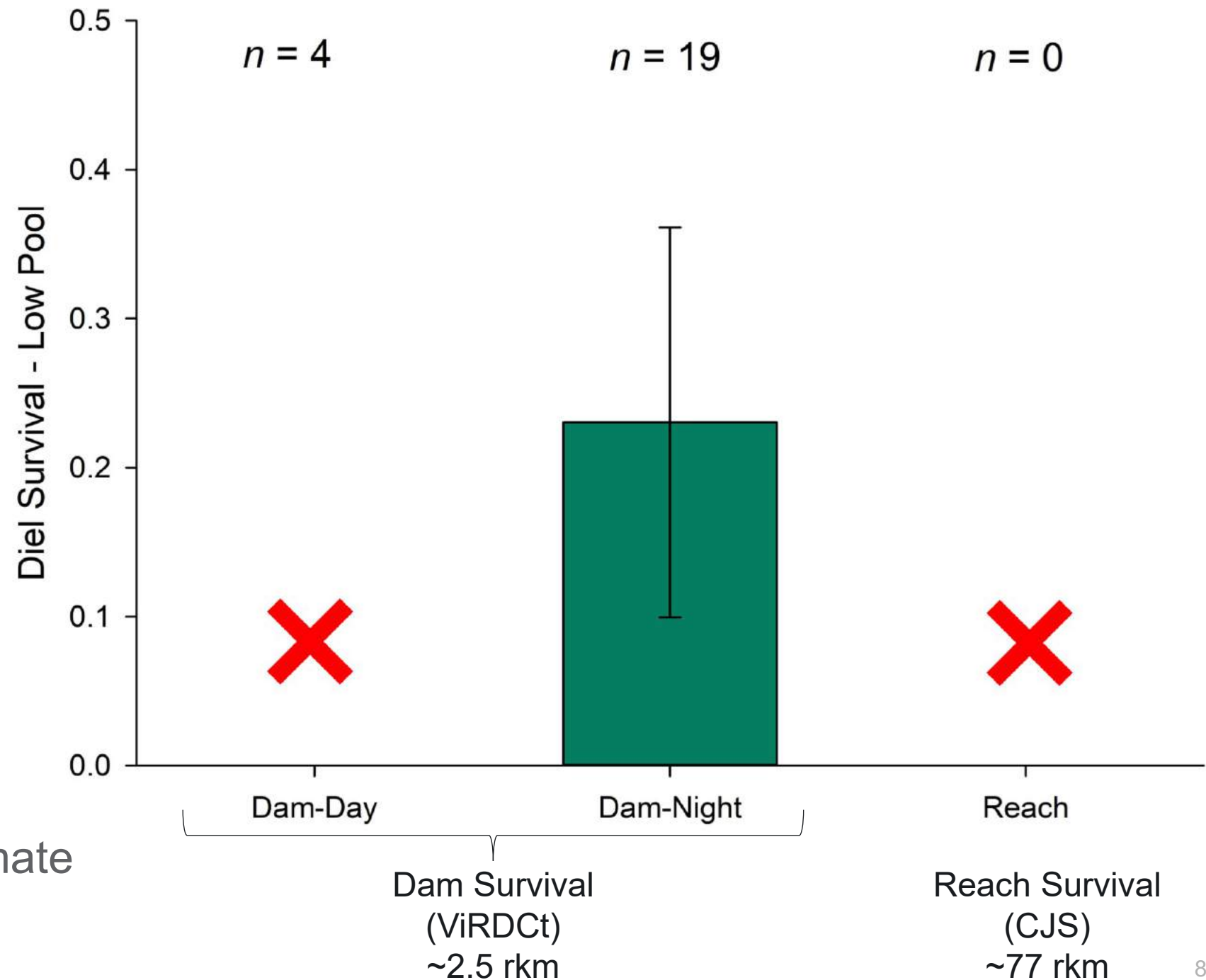


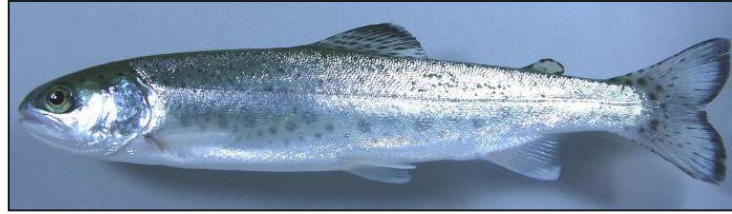


Age-1 Winter Steelhead

Foster Low Pool Diel Passage & Survival

- Dam
 - Day = Unable to estimate
 - Night = $23.0 \pm 13.1\%$
- Reach
 - Day & Night = Unable to estimate

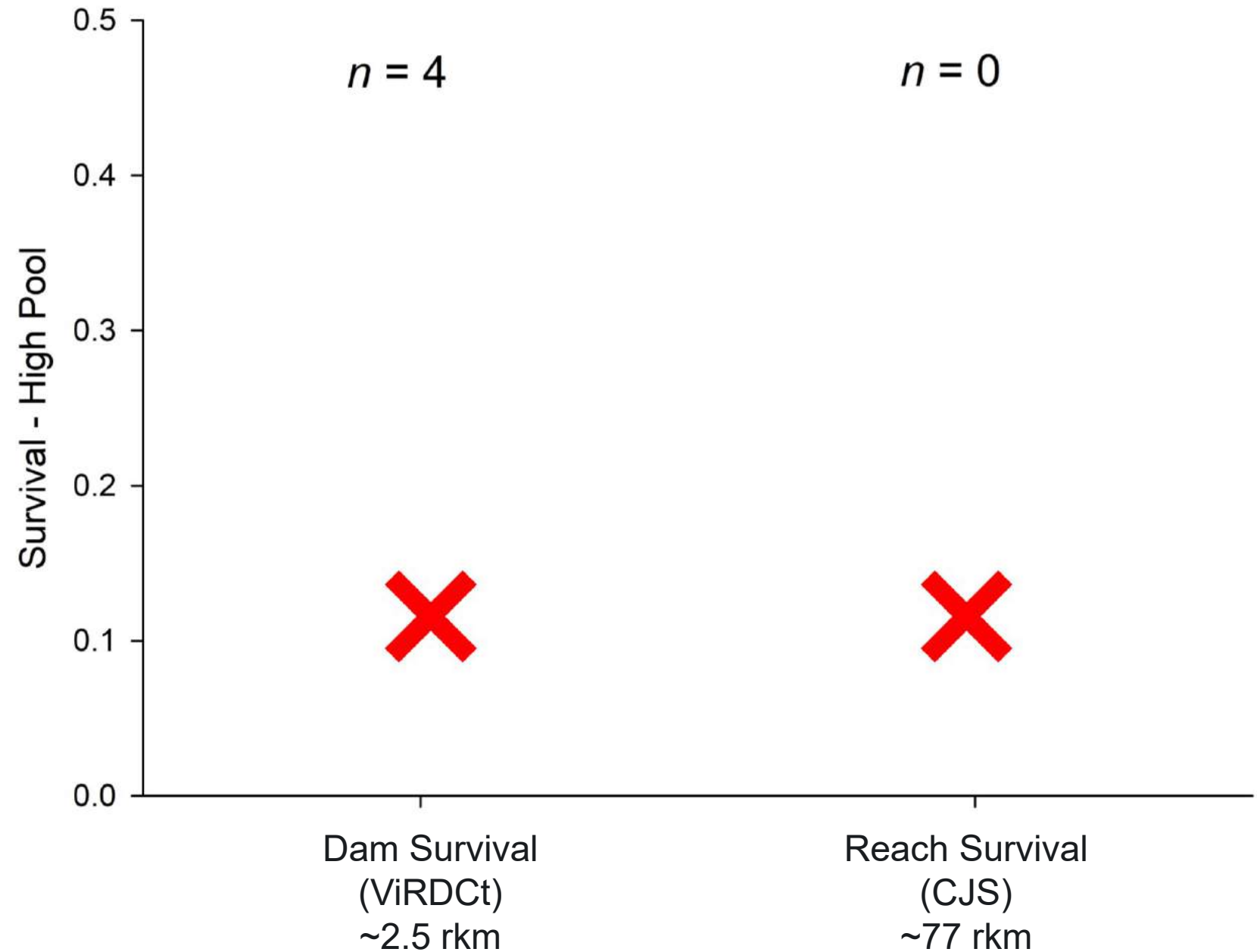


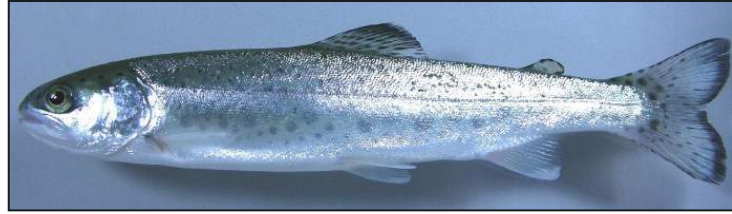


Age-1 Winter Steelhead

Foster High Pool Dam Passage Survival

- Dam survival
 - Unable to estimate
- Reach survival
 - Unable to estimate

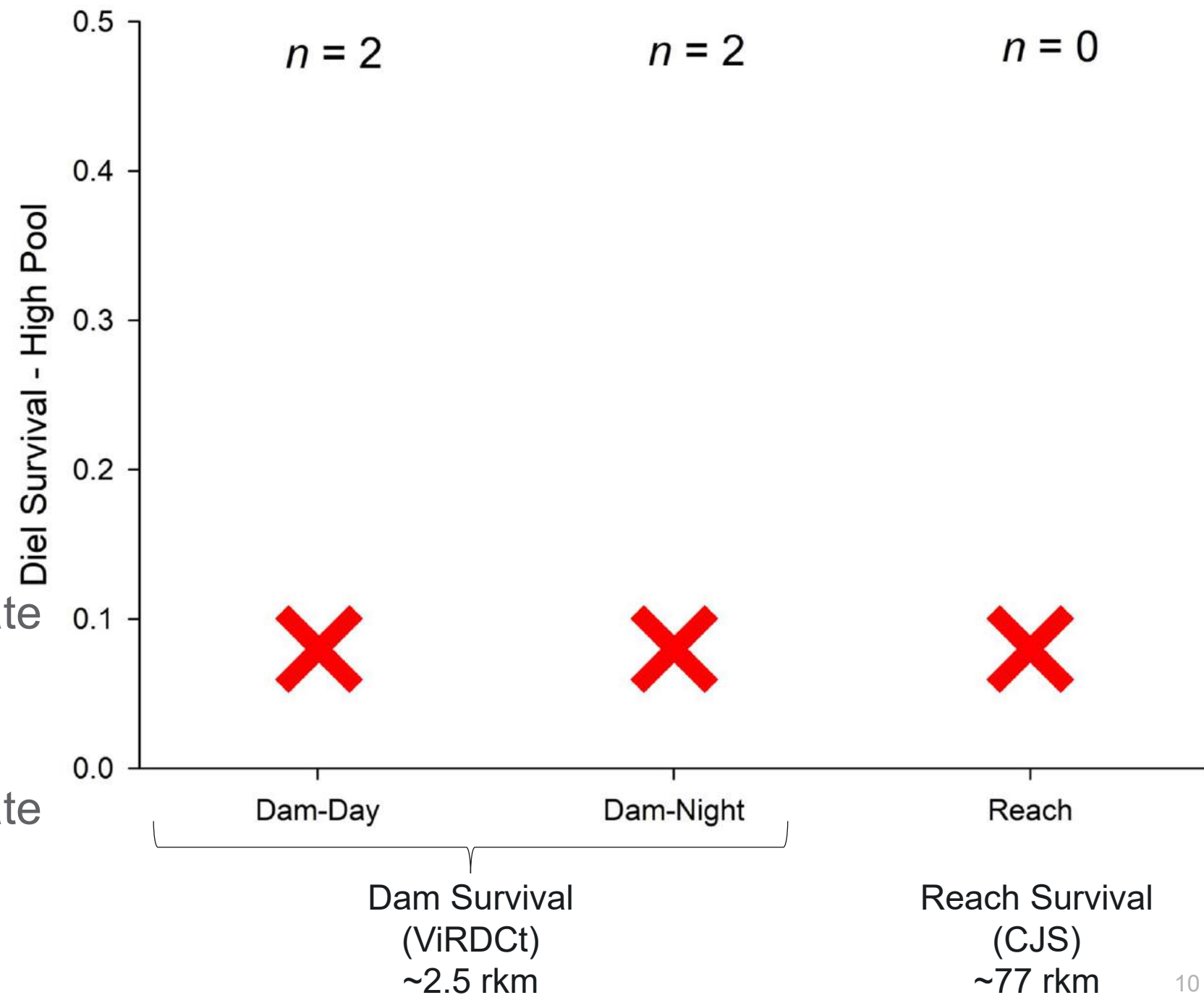




Age-1 Winter Steelhead

Foster High Pool Diel Passage & Survival

- Dam
 - Day & Night = Unable to estimate
- Reach
 - Day & Night = Unable to estimate



Conclusions

- Downstream Passage
 - Age-1 steelhead do not move
 - ✓ Concurs with previous research
 - Immediate dam passage survival > reach survival
 - ✓ On trend with previous studies
 - ✓ Poor survival overall
 - ✓ Small sample sizes
- Diel Passage
 - Low Pool
 - ✓ Night passage > day passage
 - On trend with previous studies
 - Small sample sizes
 - High Pool
 - ✓ Unable to estimate



Next Steps

- Finalize data analyses
 - Spring 2023
 - ✓ Factors contributing to poor survival?
 - ✓ Forebay residency
 - Sunnyside Array
 - ✓ Travel times
 - ✓ Survival by passage route
 - ✓ Efficiency and effectiveness
 - Fall 2023
 - ✓ Same metrics as spring 2023
 - ✓ Subyearling Chinook salmon
 - ✓ Full-scale studies
 - Foster – spillway evaluations
 - Green Peter – deep drawdown
- Year 3 study
 - Spring full-scale studies at Foster and Green Peter
 - Inter-annual variability
 - ✓ Environmental conditions
 - Discharge
 - Temperature
 - Operational conditions
 - ✓ Fish stock/genetics



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**Questions?
Thank you**



