Sonoma Water

Work Group: Salmon & Steelhead Survival Studies

Public Policy Facilitating Committee

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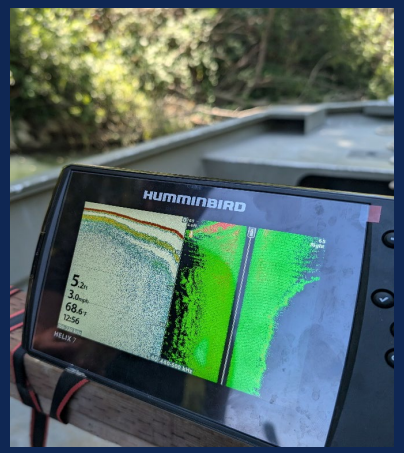

Work Group Goal & Membership

- Characterize survival and sources of mortality for salmon and steelhead in the Russian River
- Led by Sonoma Water
- Multiple Entities
  - *National Marine Fisheries Service*
  - *CA Department of Fish and Wildlife*
  - *US Army Corps of Engineers*
  - *UC Berkeley Researchers*

Salmon & Steelhead Survival Studies

Study Element 1: Salmon and Steelhead Smolt Migration Survival and Travel Time

Study Element 2: Predatory Fish: Distribution, Relative Abundance and Small-Scale Movement

Study Element 3: Predatory Fish Habitat Characterization

Coho Salmon Smolt Survival (acoustic telemetry)

*Study Element 1: **Salmon** and Steelhead Smolt Migration Survival and Travel Time*

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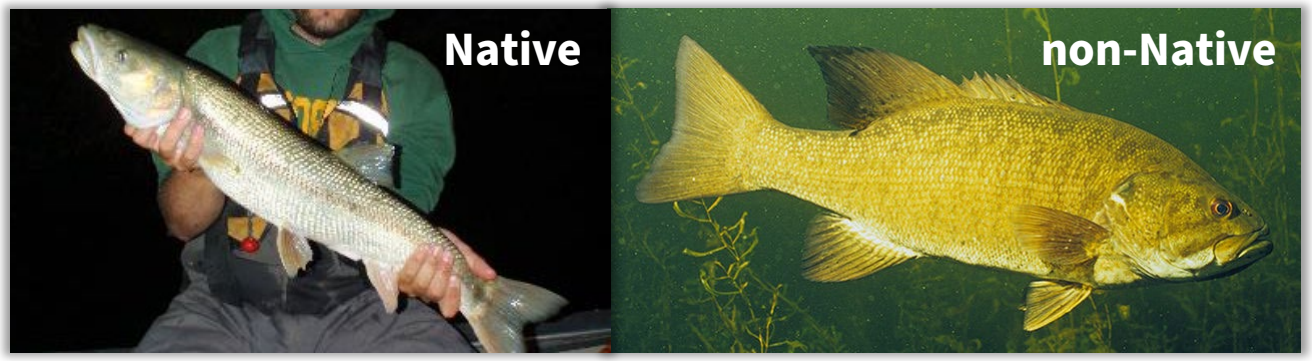
Study Element 3: Predatory Fish Habitat Characterization

Coho Salmon Smolt Survival (acoustic telemetry)



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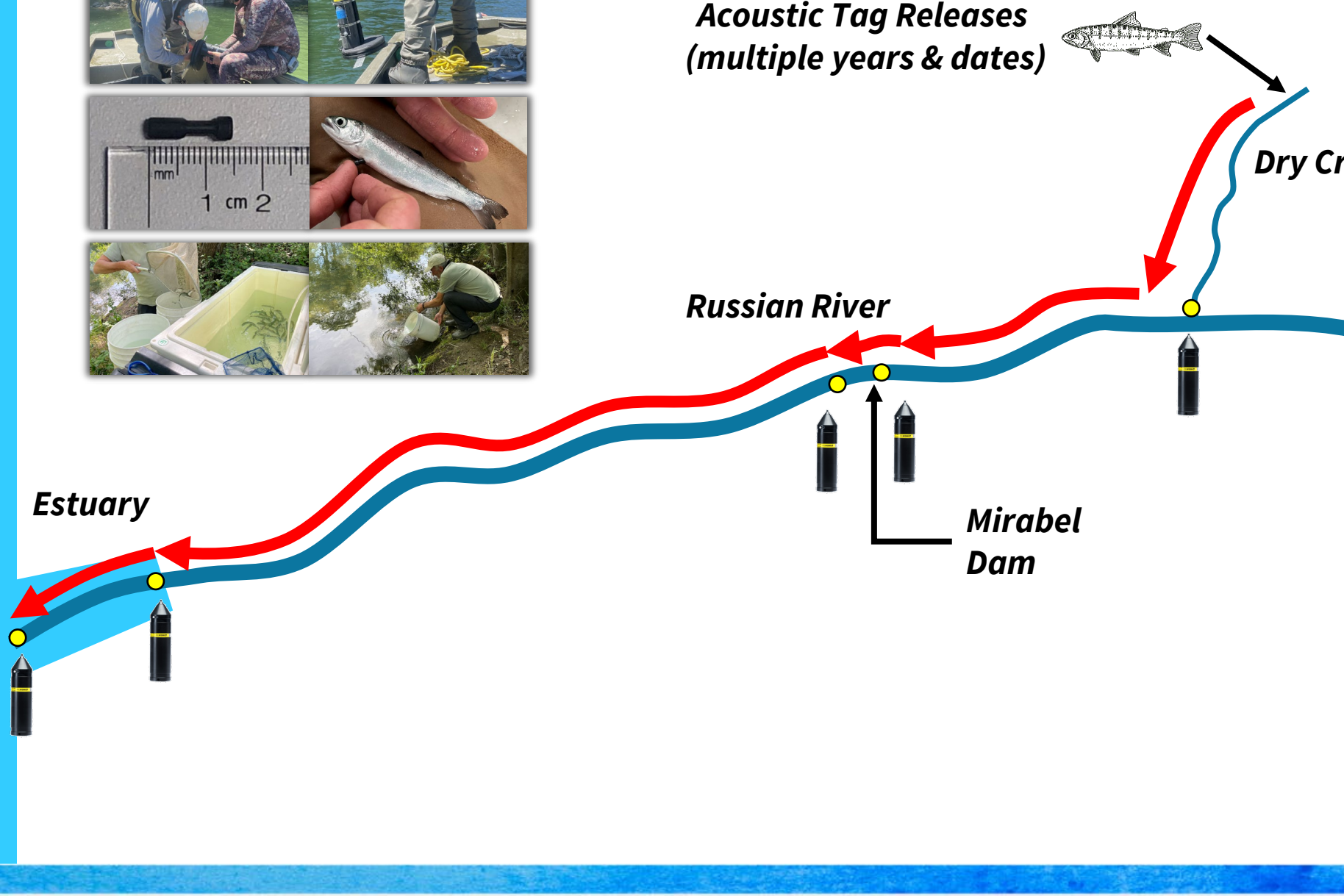
ENVIRONMENTAL RESOURCES

Mark Recapture Model (reach-specific)



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Mark Recapture Model (reach-specific)

Acoustic Tag Releases
(multiple years & dates)

Dry Creek
Avg Survival = 0.90
(range: 0.80-0.95)

Russian River
Avg Survival = 0.45
(range: 0.13-0.73)

Estuary
Avg Survival = 0.89
(range: 0.75-0.99)

Mirabel
Dam

Ocean

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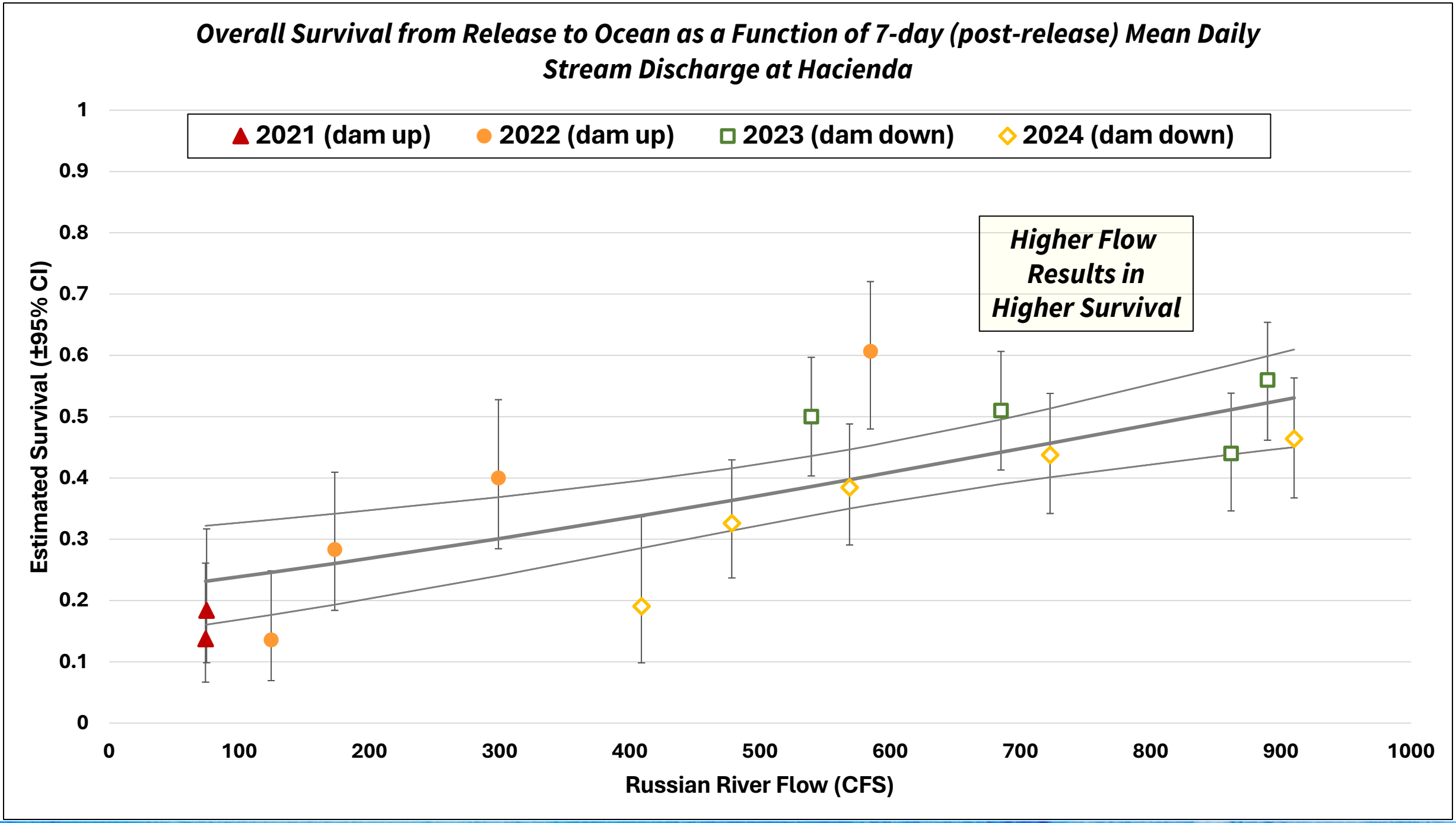
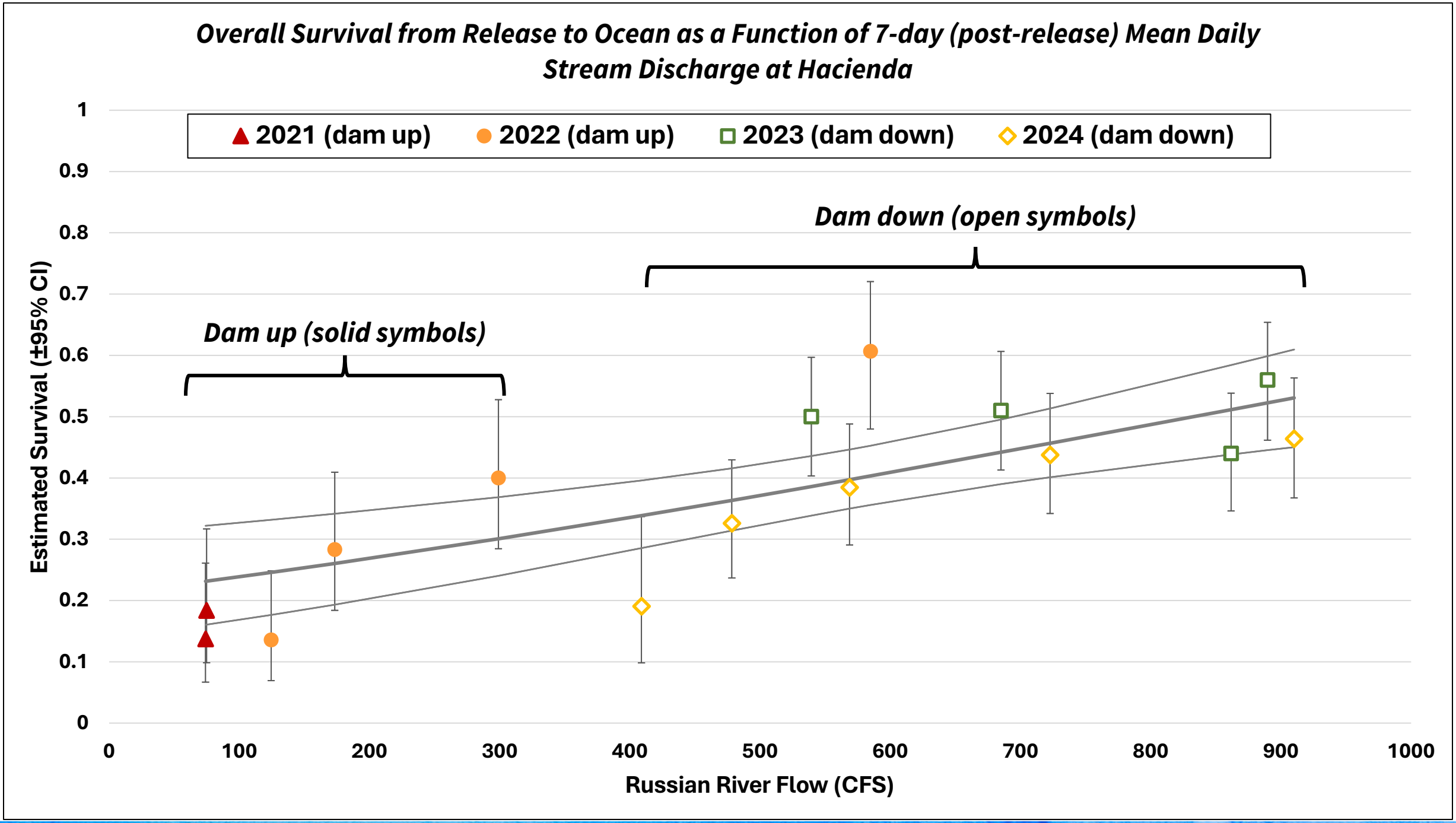
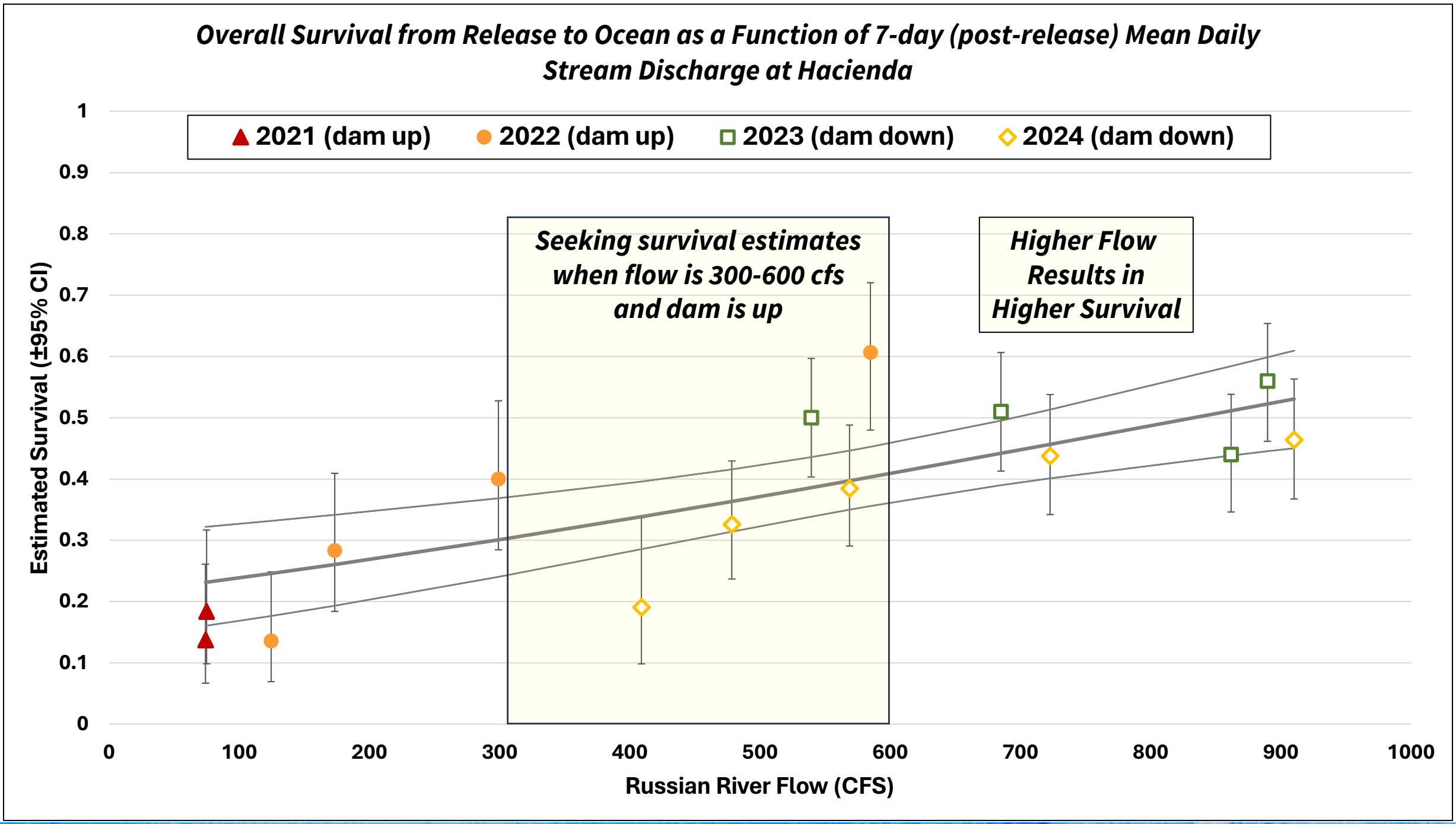
ENVIRONMENTAL RESOURCES


Overall Survival from Release to Ocean as a Function of 7-day (post-release) Mean Daily Stream Discharge at Hacienda
2021 (dam up)
2022 (dam up)
2023 (dam down)
2024 (dam down)
Higher Flow Results in Higher Survival
Estimated Survival (±95% CI)
Russian River Flow (CFS)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
100
200
300
400
500
600
700
800
900
1000


Overall Survival from Release to Ocean as a Function of 7-day (post-release) Mean Daily Stream Discharge at Hacienda
2021 (dam up)
2022 (dam up)
2023 (dam down)
2024 (dam down)
Dam down (open symbols)
Dam up (solid symbols)
Estimated Survival (±95% CI)
Russian River Flow (CFS)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
100
200
300
400
500
600
700
800
900
1000


Overall Survival from Release to Ocean as a Function of 7-day (post-release) Mean Daily Stream Discharge at Hacienda
2021 (dam up)
2022 (dam up)
2023 (dam down)
2024 (dam down)
Seeking survival estimates when flow is 300-600 cfs and dam is up
Higher Flow Results in Higher Survival
Estimated Survival (±95% CI)
Russian River Flow (CFS)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
100
200
300
400
500
600
700
800
900
1000

Steelhead Smolt Survival (radio telemetry)

*Study Element 1: Salmon and **Steelhead** Smolt Migration Survival and Travel Time*

Study Element 2: Predatory Fish: Distribution, Relative Abundance and Small-Scale Movement

Study Element 3: Predatory Fish Habitat Characterization

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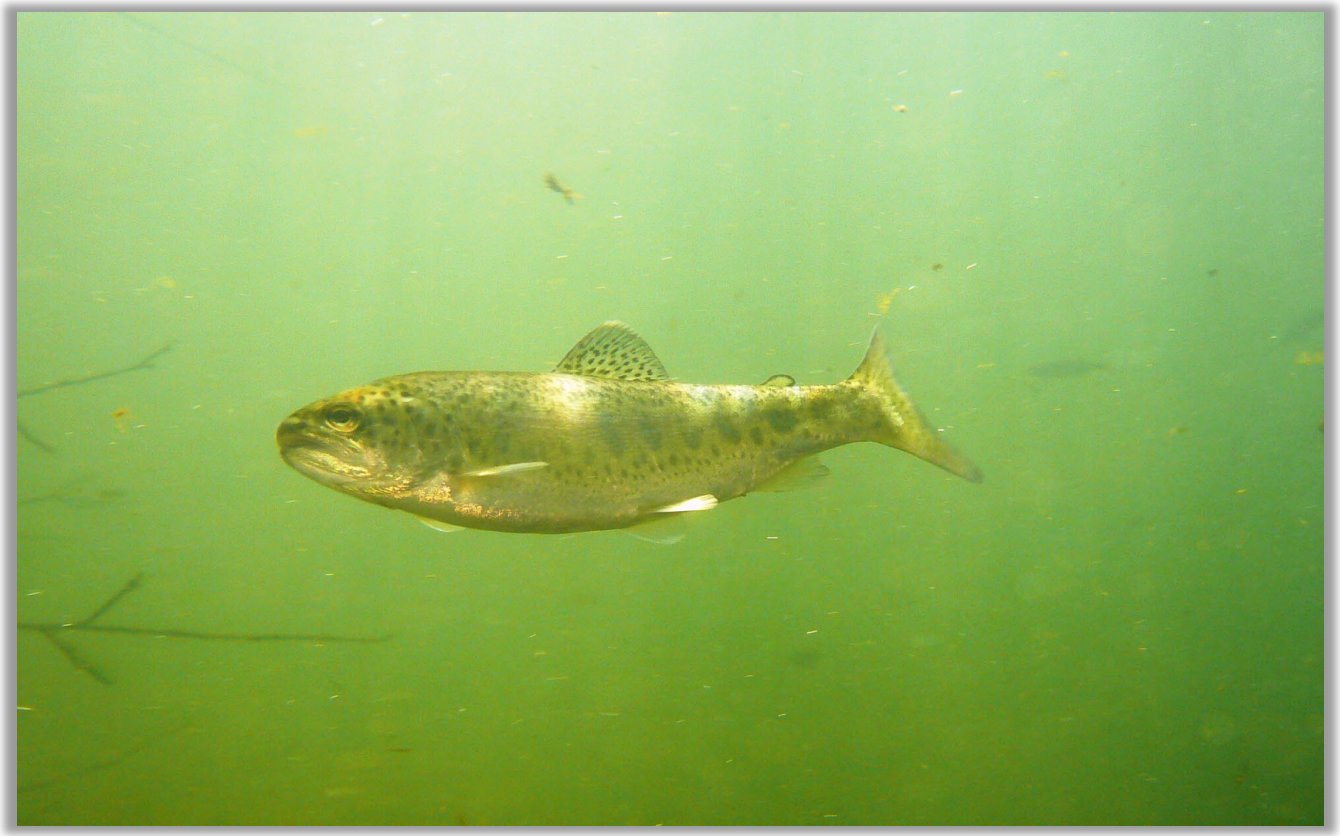
Overall Objectives

- Estimate survival and travel time for steelhead smolts
  - Through the mainstem Russian River
  - At a variety of flows

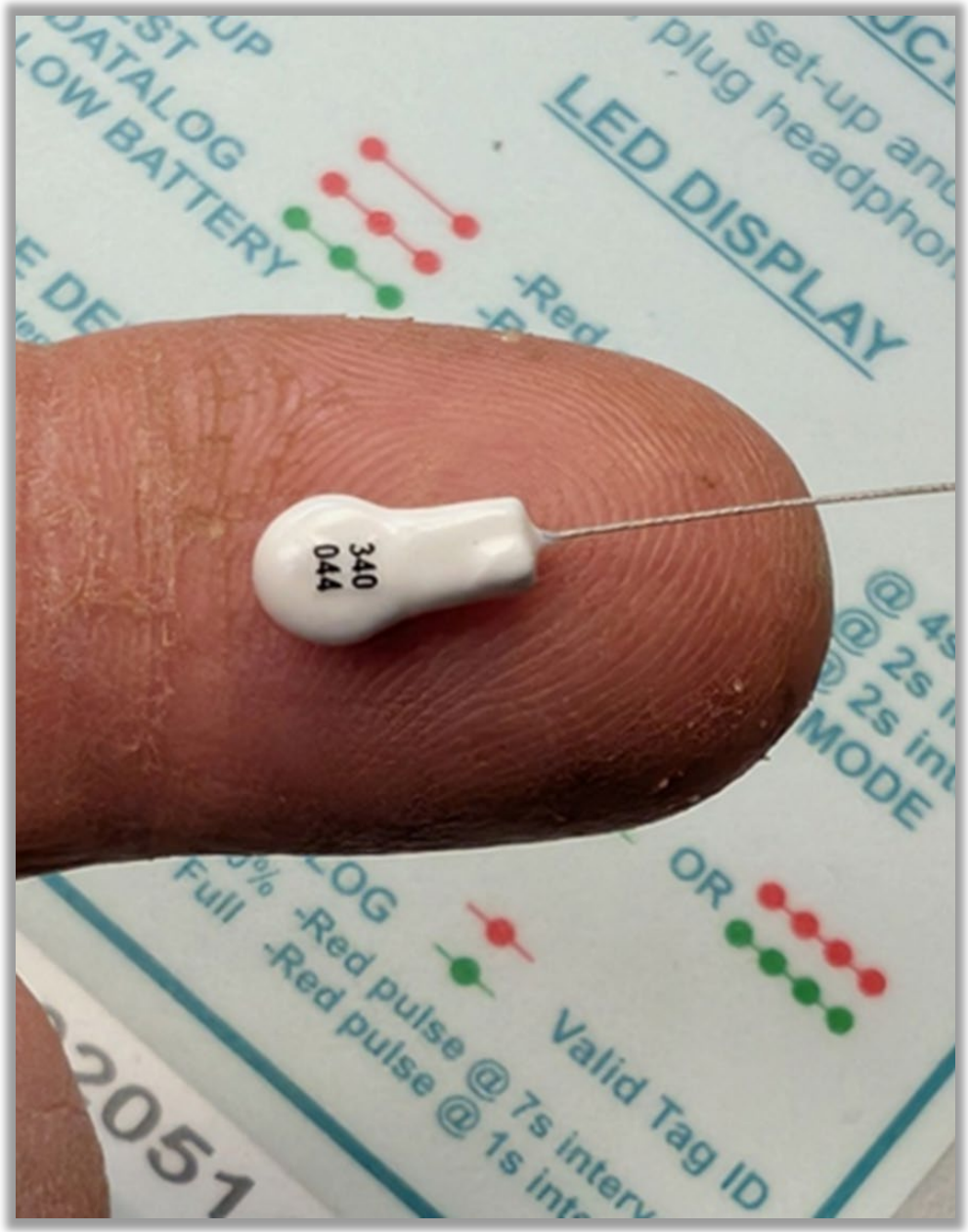
- Evaluate relationships between smolt migration survival and:
  - Flow
  - Temperature
  - Turbidity



Pilot Year: 2025

- Methods tested
  - No tag loss
  - No tagging mortality

- Detection sites functioned well
  - Ukiah
  - Hopland
  - Alexander valley
  - Healdsburg
  - Mirabel (Forestville)



Pilot Year: 2025

- High tag retention and tag scar healed well
- High detection efficiency at all sites
- Emigration rates slower than expected
- Tag life too short (46 days)

Next Steps: 2026

- Longer tag life
  - 155 day tag life
- Larger sample size
  - 150 tags
- 2 release groups
  - 1st group in February
  - 2nd group at 350 cfs or mid-March, whichever occurs first
- Additional detection sites
  - Alexander Valley Road
  - Duncan's Mills

Predatory Fish Distribution and Habitat

Study Element 1: Salmon and Steelhead Smolt Migration Survival and Travel Time

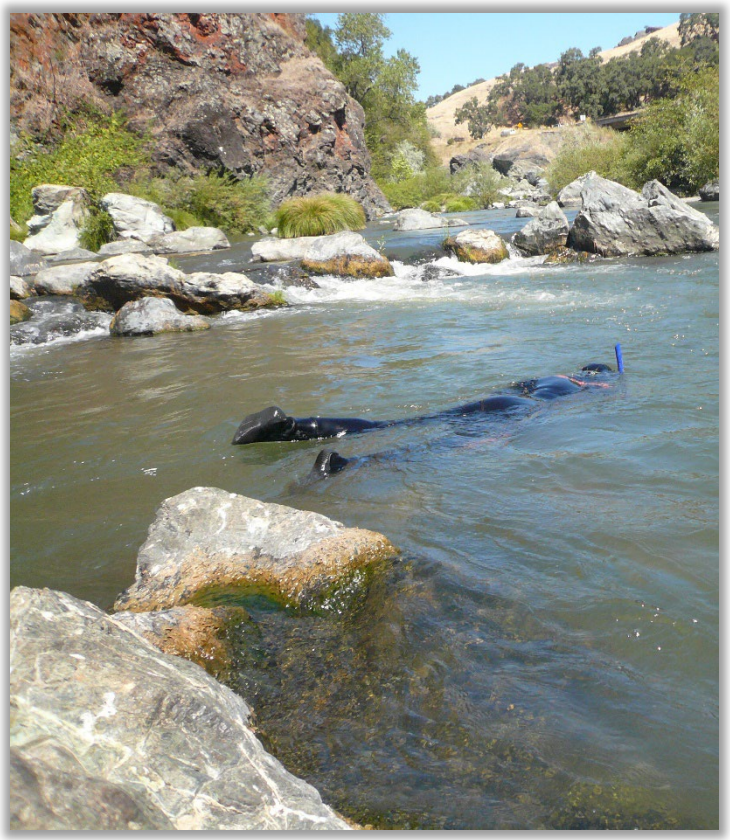
Study Element 2: Predatory Fish: Distribution, Relative Abundance and Small-Scale Movement

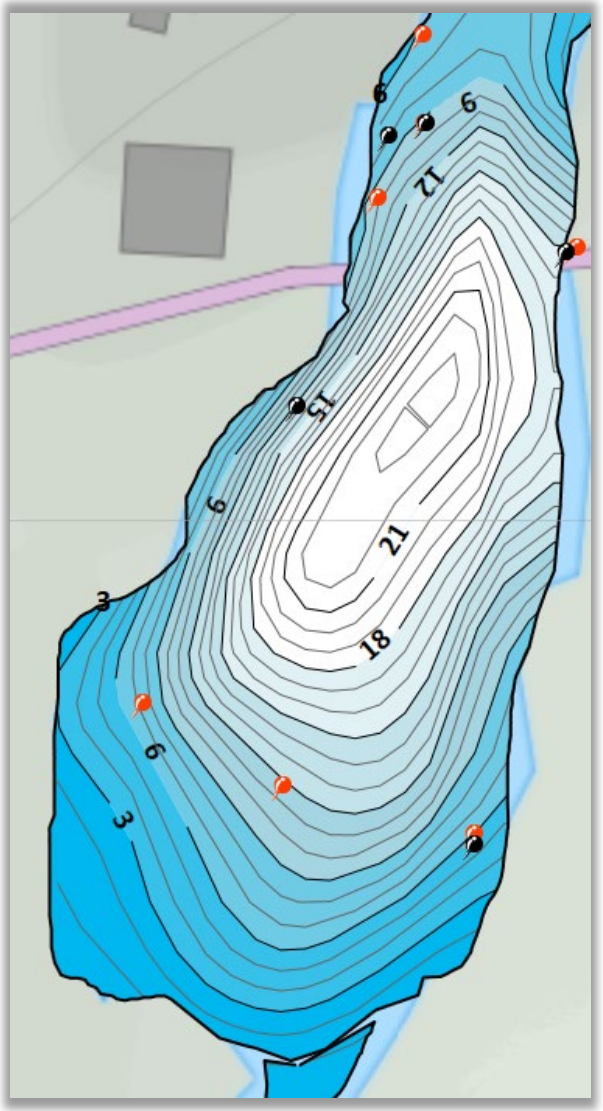
Study Element 3: Predatory Fish Habitat Characterization

Overall Objectives

- Conduct snorkel surveys to count large-bodied predatory fish

- Relate predatory fish distribution to habitat

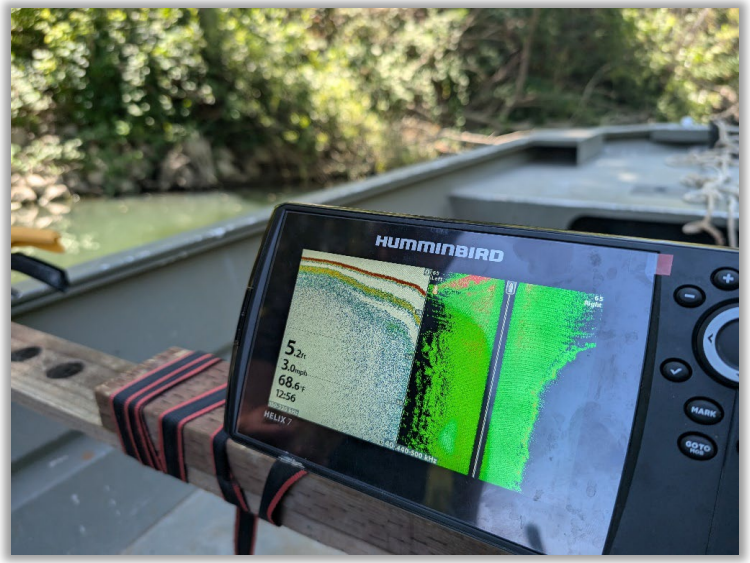


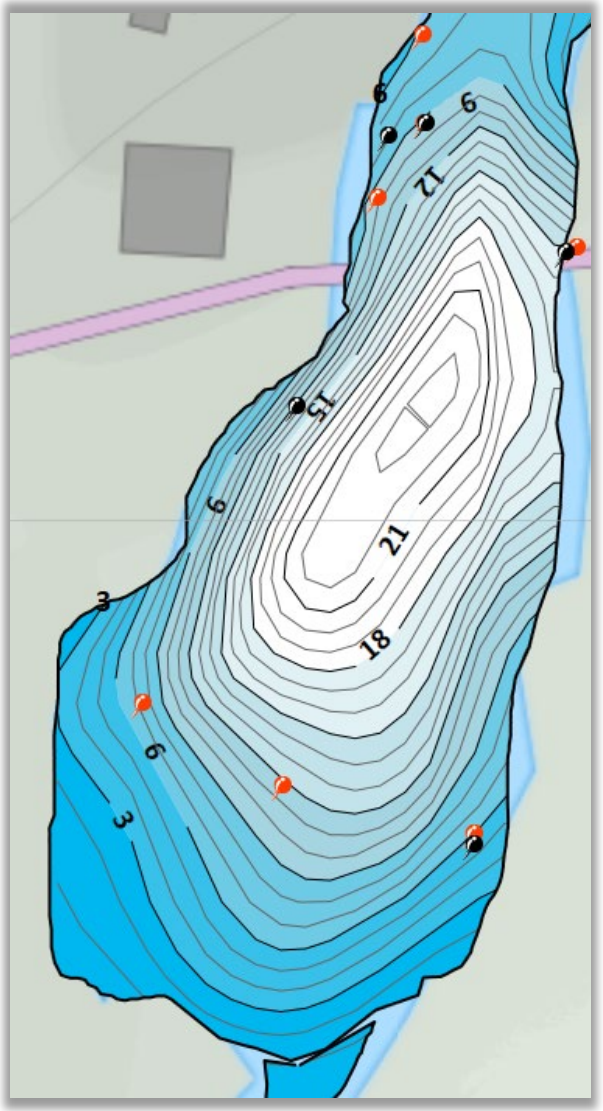


Overall Objectives

- Quantify predatory fish habitat and distribution in the mainstem Russian River

- Compare predatory fish habitat between
  - The headpond (Wohler Pool) created when the dam is inflated
  - Reaches outside of Wohler Pool





Summary & Acknowledgements

- **Study Element 1 (coho salmon smolts):** We have been successful in estimating reach-specific migration survival over multiple years in Dry Creek and through the lower mainstem Russian River and Estuary

- **Study Element 1 (steelhead smolts):** We have successfully developed and evaluated methods for future study years and preliminary results show that emigration was slower than expected but that survival was similar to coho.

- **Study Elements 2 & 3 (predatory fish):** We have successfully developed and evaluated methods and begun characterizing habitat in the mainstem Russian River.

Sonoma Water
ENVIRONMENTAL RESOURCES
Sea Grant
CALIFORNIA
Sonoma Valley Fish & Wildlife Club EST. 1945
US Army Corps of Engineers
Engineer Research and Development Center
INNOVASEA
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sonoma
NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
CALIFORNIA
Department of Fish & Wildlife