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2026 PMEP Process-Based Restoration Symposium

Love Letters to Salmon: Stori f Process-based Restoration in the Stillaguamish Delta

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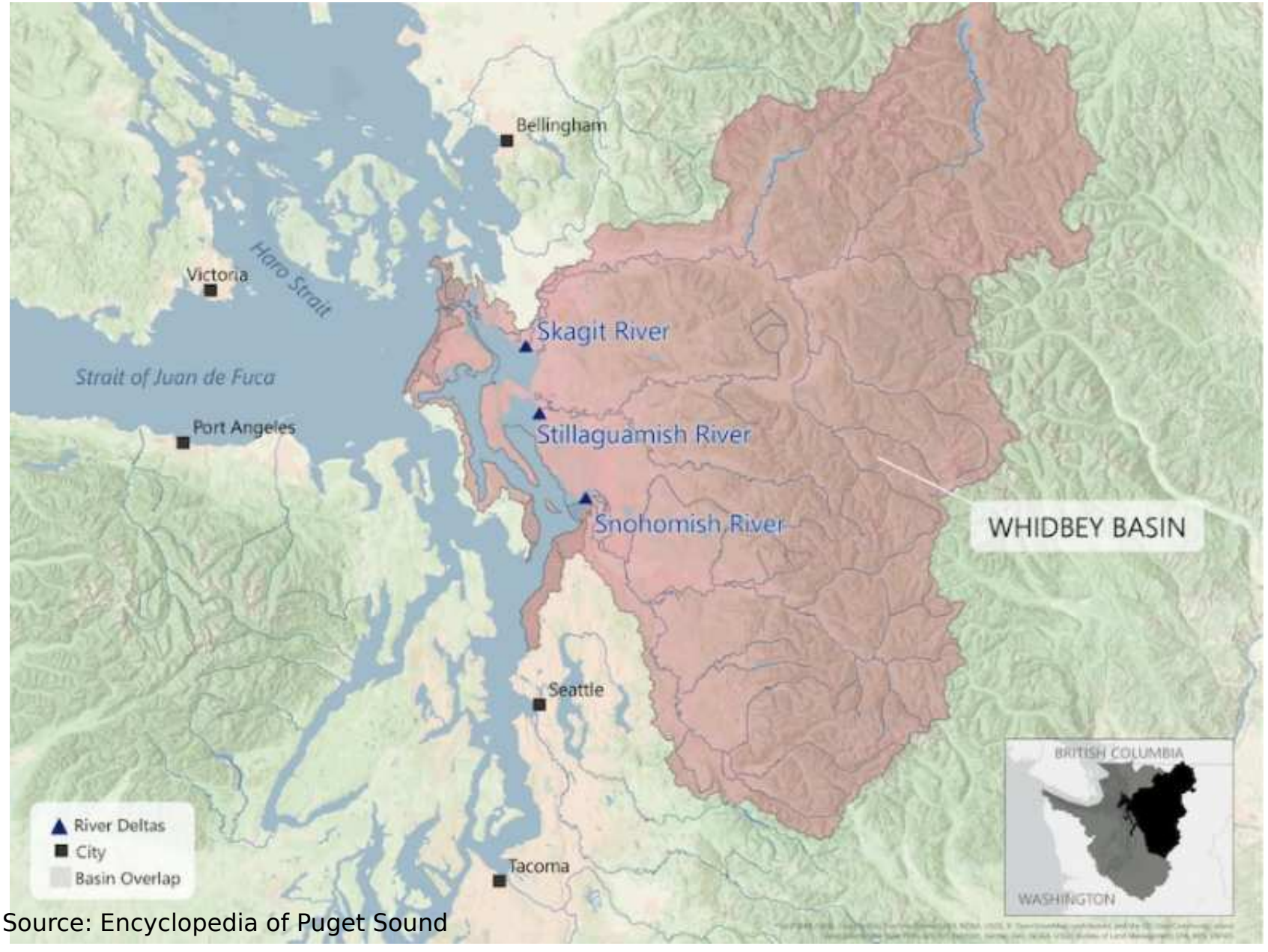
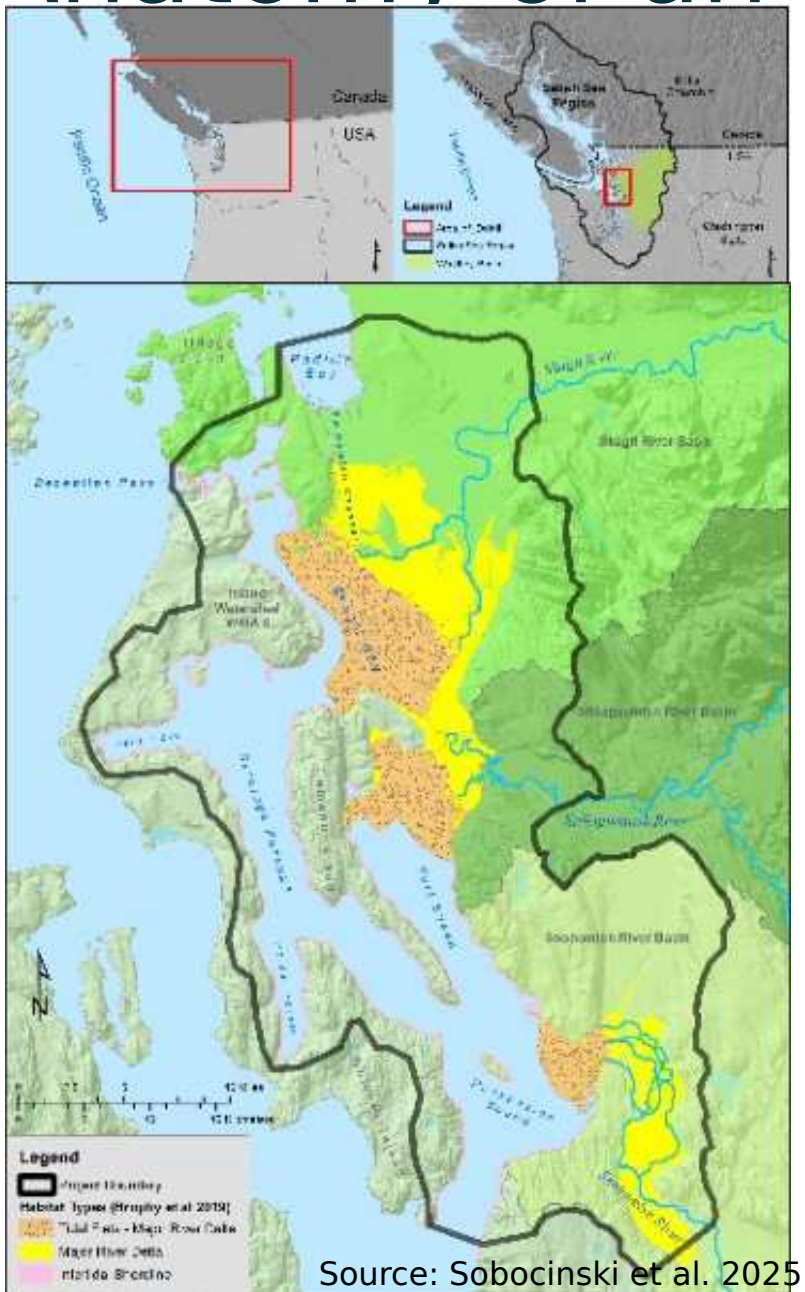
TNC: Randi Shaw, Molly Bogeberg, Amber Parmenter, Jamie Roberts
Stillaguamish Tribe: Jason Griffith & Charlotte Scofield
SRSC: Mike LeMoine, Brian Henrichs, Correigh Greene, Catherine Au
WDFW: Michaela Lowe
WWU: John Rybczyk
UW: Anne Beaudreau, Jason Toft, Molly Bidwell

Whidbey Basin Deltas



Source: Encyclopedia of Puget Sound

Anatomy of an Estuary



Source: Sobocinski et al. 2025

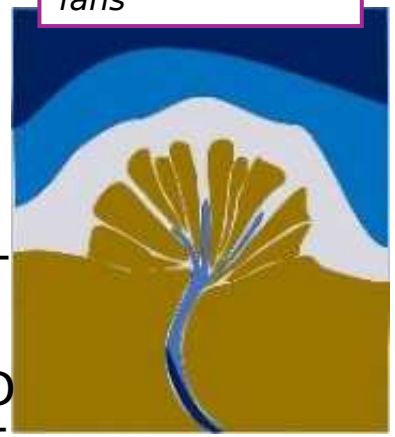
Skagit

Stillaguamish

Snohomish

TIDE

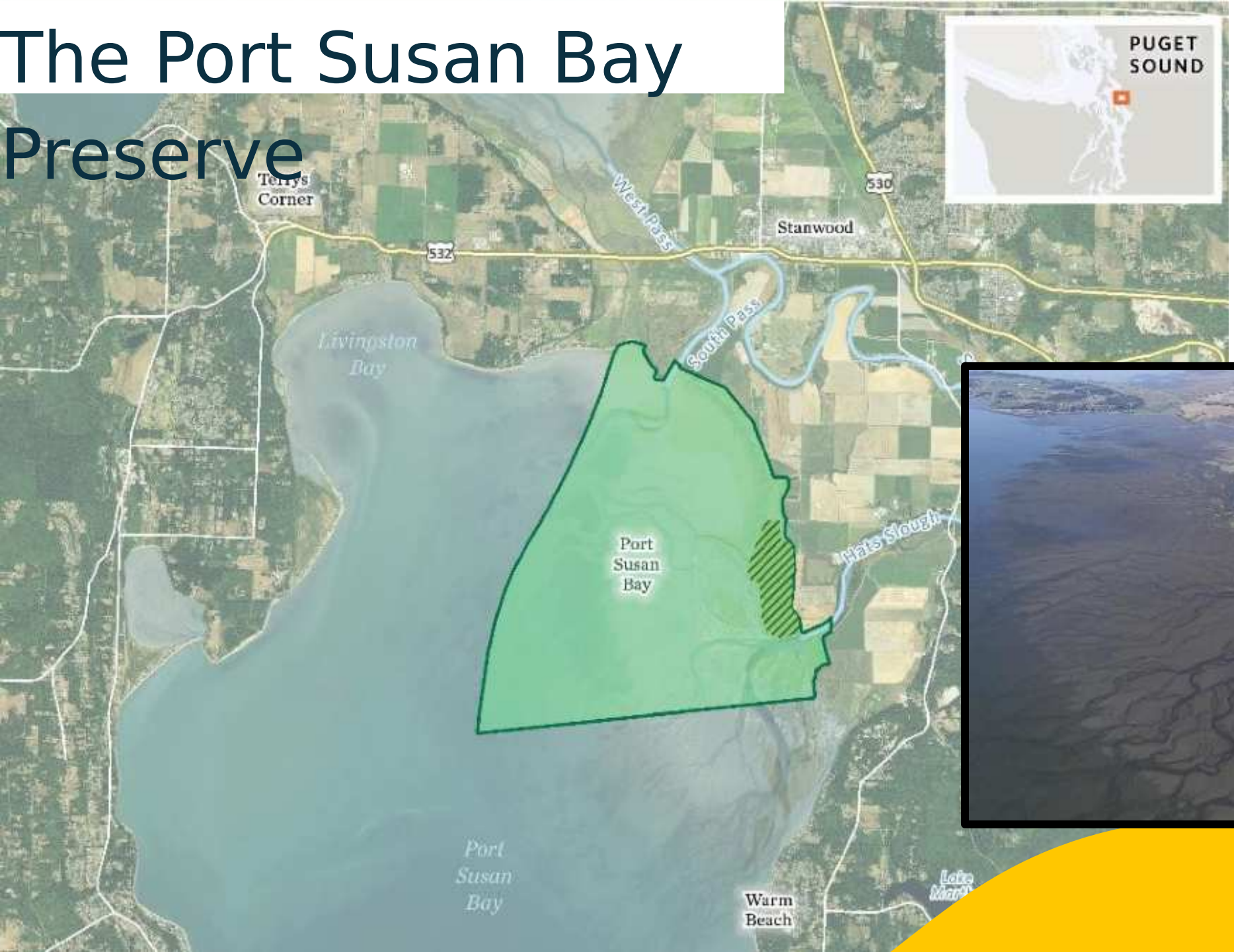
River – dominated: Delta fans



Tide- River Balance

Tide-dominated: Drowned river-valley

The Port Susan Bay Preserve



- **2001**- TNC purchased the land and tidelands at Port Susan Bay
- **2012**- Initial Restoration took place, reconnecting the farmland back to the river and sea.
- **2012- 2017-** 5 years of itoring

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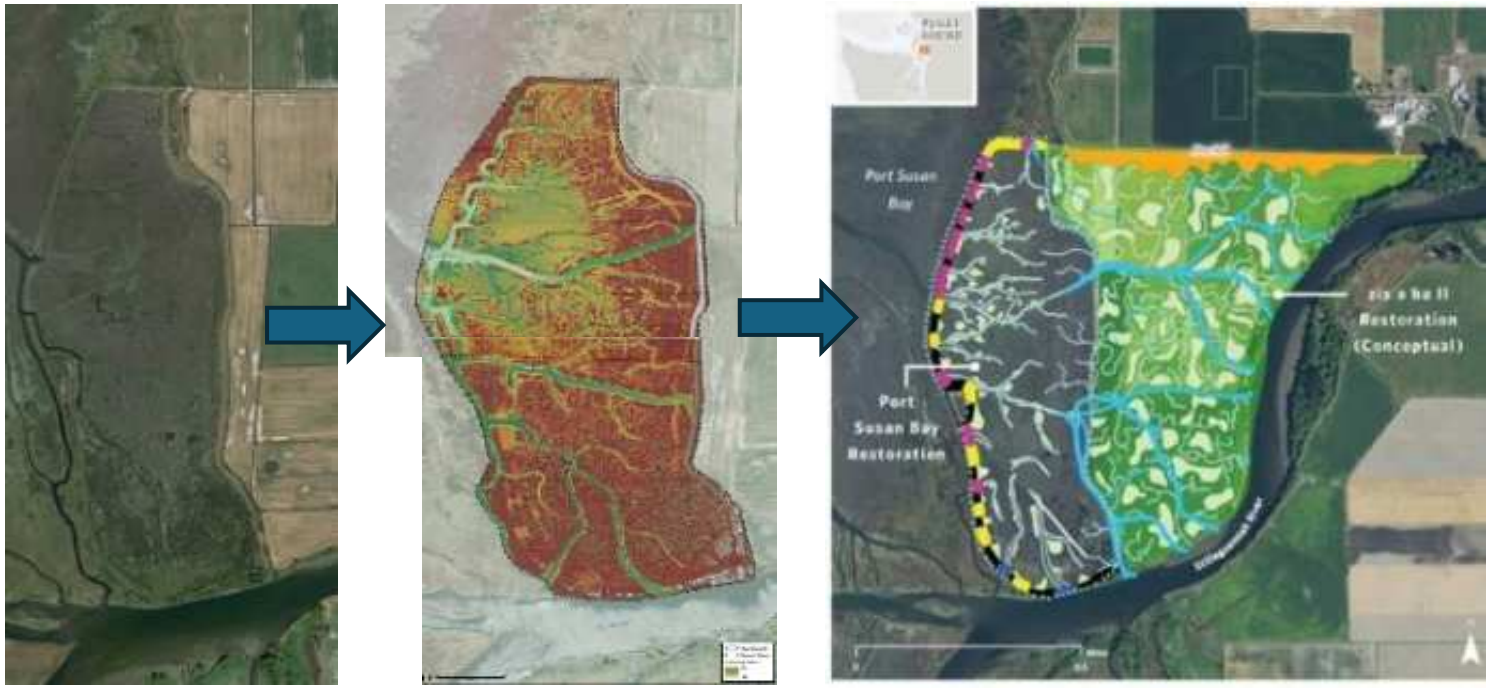
Adaptive Management at Port Susan Bay

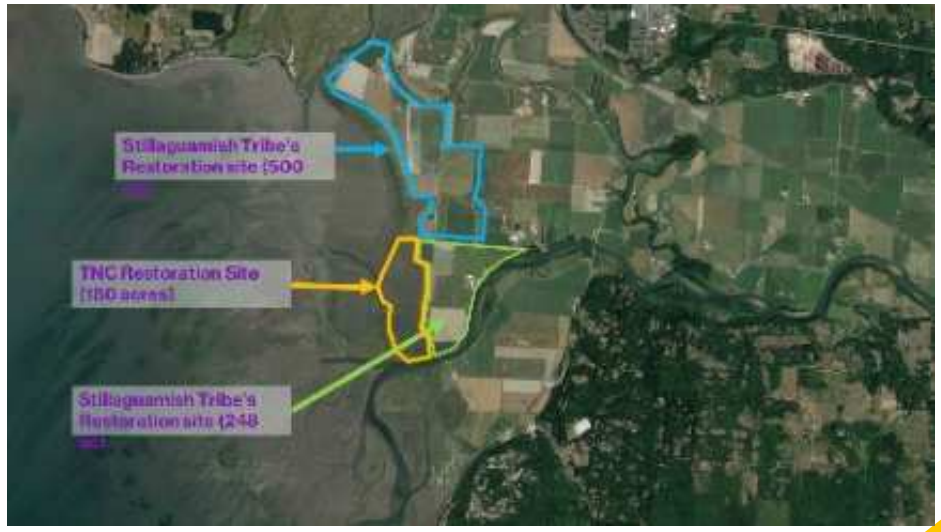


- **2017-2018**- Monitoring results and new science indicated more work needed to be done to restore functioning estuary habitat for salmon.
- **2017- 2022-** Fundraising and building support for design, permitting, and construction
- **2023-** Phase 2 restoration of PSB estuary & preparing for connection to the Stillaguamish Tribe’s zis a ba II property
- **2025**- Stillaguamish Tribe completes zis a ba II restoration

Photos: Hannah Letinich

Sequencing of Restoration in the Stillaguamish Delta

Sewing together a quilt of restoration efforts, led by many partners, to reconnect salmon habitat across the delta.



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2025- Stillaguamish Tribe Restores zis a ba

Summer- interior channel excavation

Drone orthomosaic- Brad McMillan (ECY)

Fall- reconnection to the river & tides

Drone imagery- Stillaguamish Tribe

“Breach Day”- removing the river levee

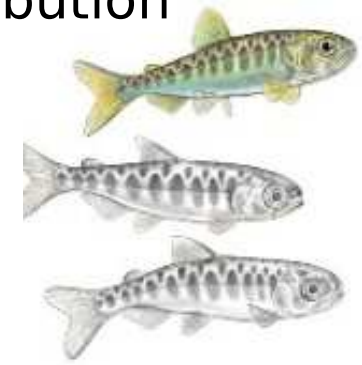
Photos: Molly Bogeberg

2026- After the First Flood

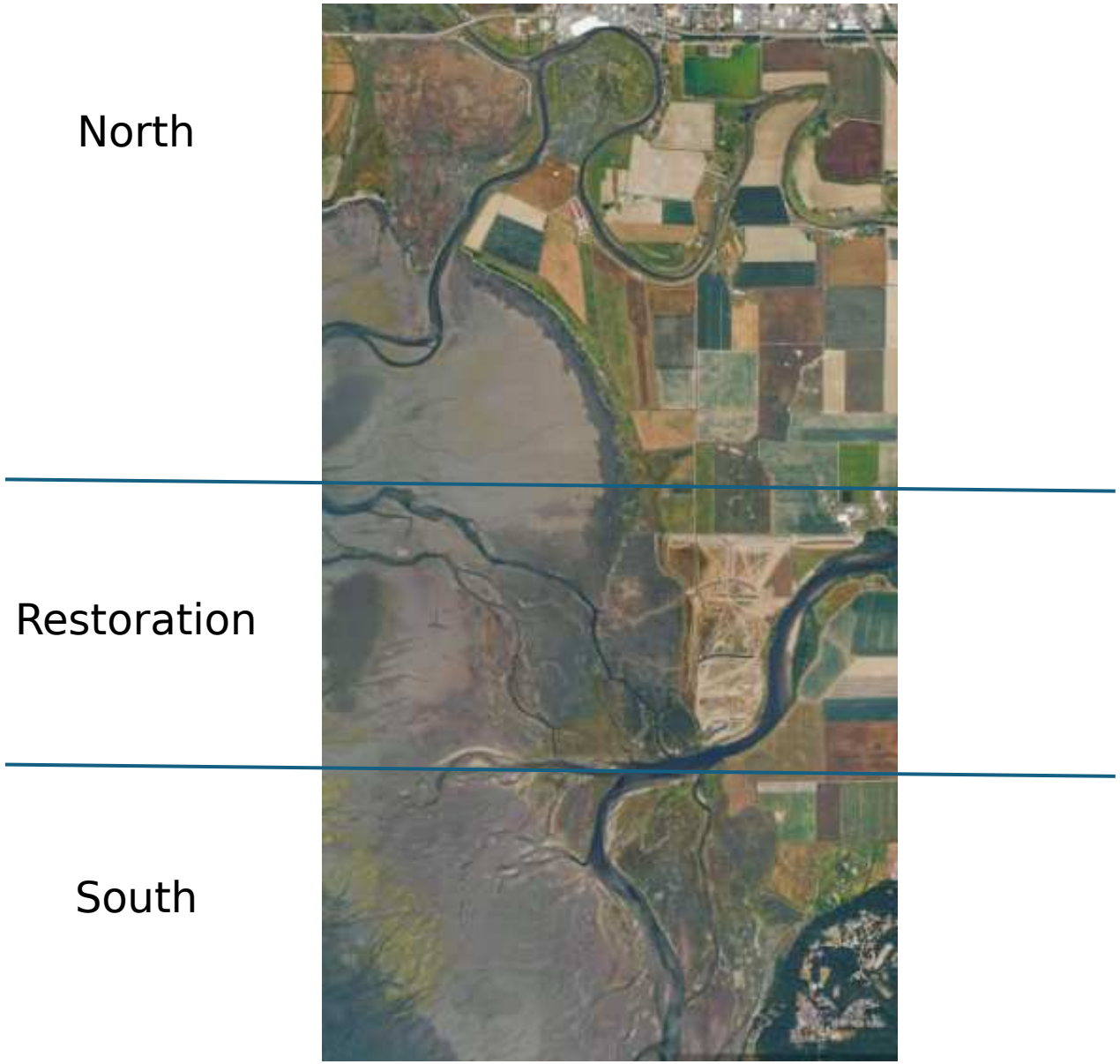
Courtesy of Stillaguamish Tribe of Indians

Early Science and Monitoring Trends

- Physical Characteristics: Landscape Connectivity, Salinity & Temperature
- Sediment Accretion and Sea Level Rise/Climate Resilience
- Salmon Abundance & Distribution
- Salmon Growth Potential

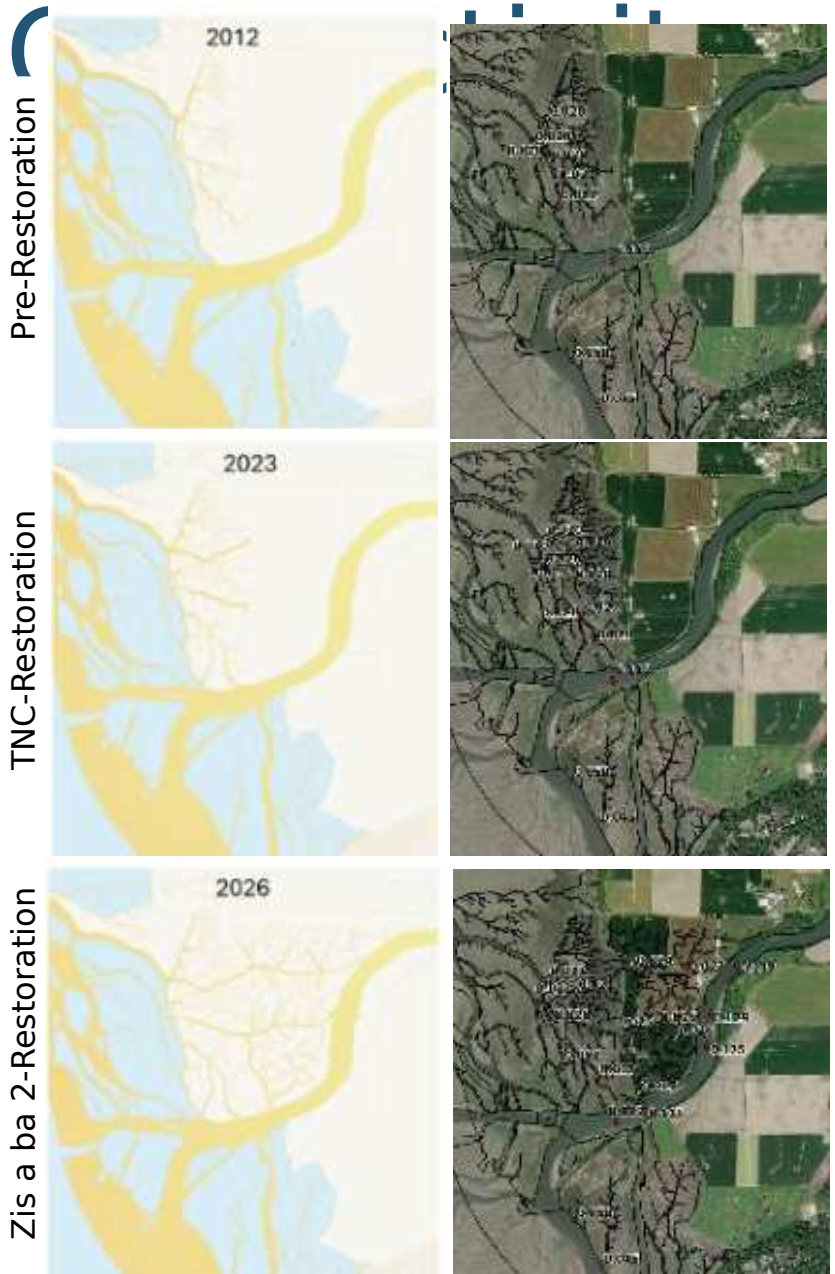


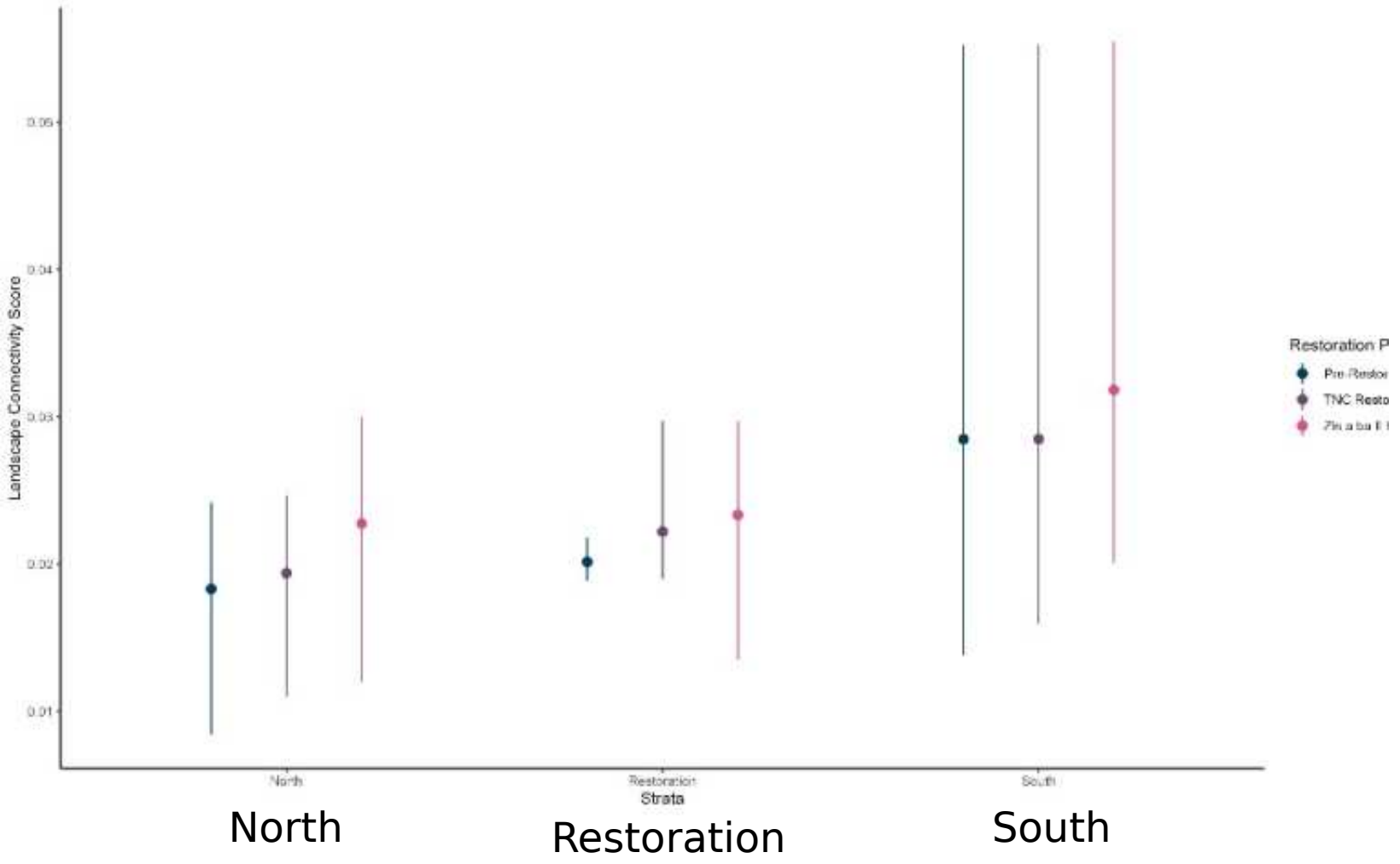
Stillaguamish Delta Analysis Strata:



Physical Characteristics: Landscape (

Research Leads: Brian Henrichs- SRSC & Jamie Robertson- TNC

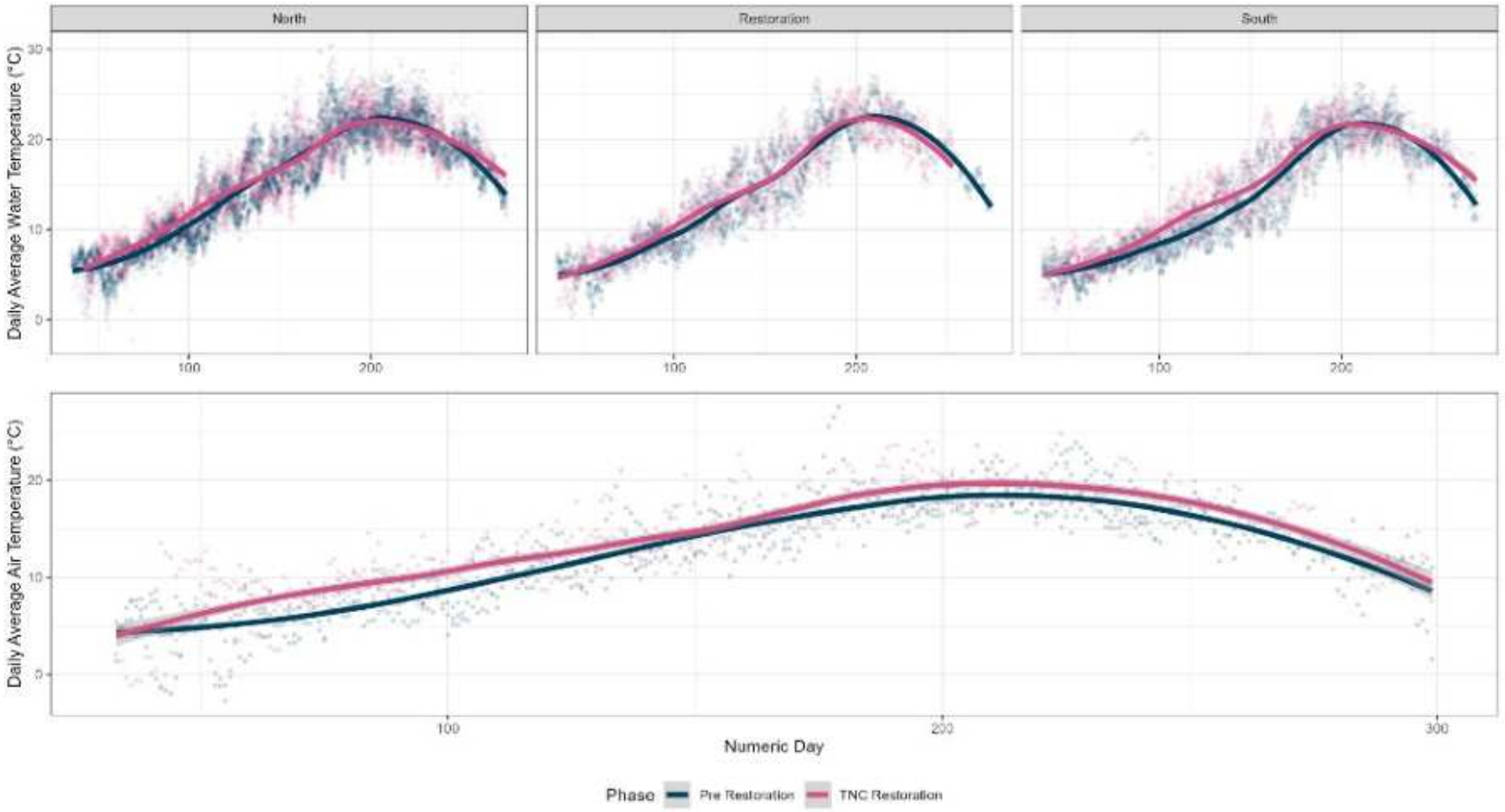




North Restoration South

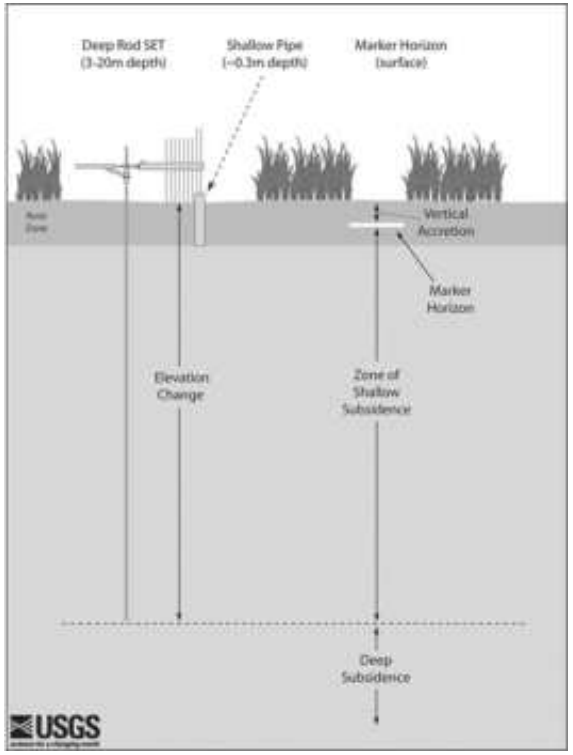
Physical Characteristics: Temperature

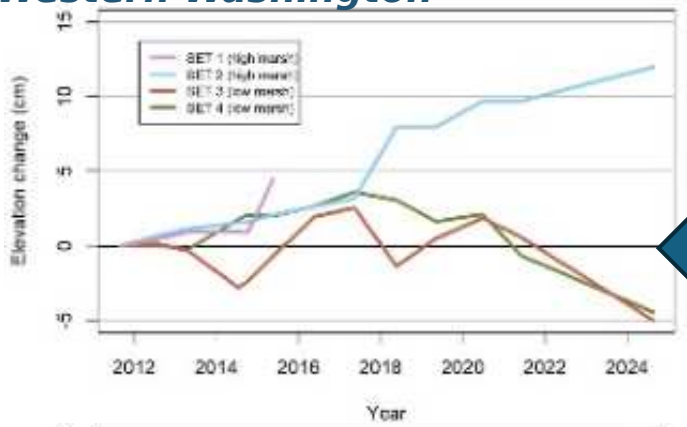
Research Lead: Brian Henrichs- SRSC



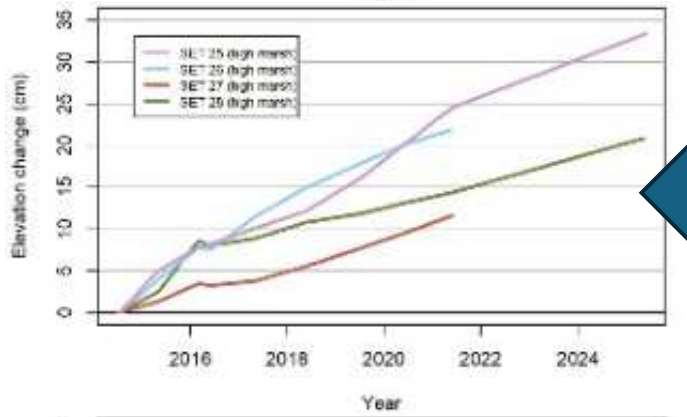
Sediment Accretion & Sea Level Rise

Research Lead: John Rybczyk – Western Washington University

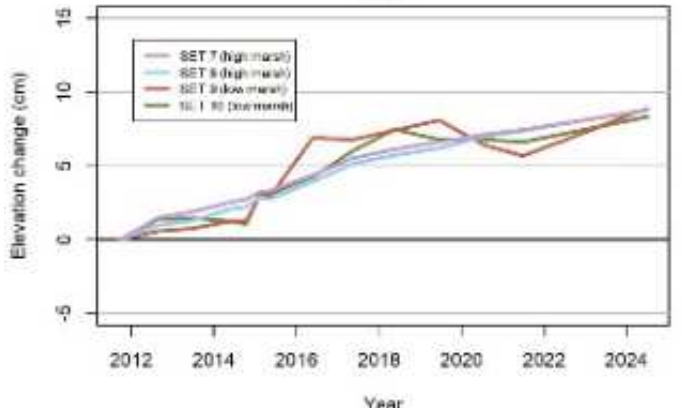




NOT KEEPING PACE W/ SLR



KEEPING PACE W/ SLR



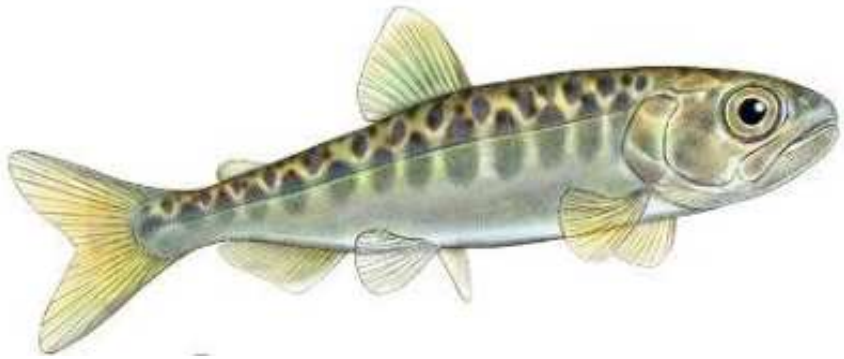
KEEPING PACE W/ SLR

Salmon Recovery Stories: Abundance and Growth

Genetic Fin Clips
(Research Leads: SRSC, WDFW, Stillaguamish Tribe)

Otoliths
(Research Leads: SRSC, WDFW, WWU, TNC)

Muscle Tissue for Toxics
(Research Leads: WDFW, USGS)



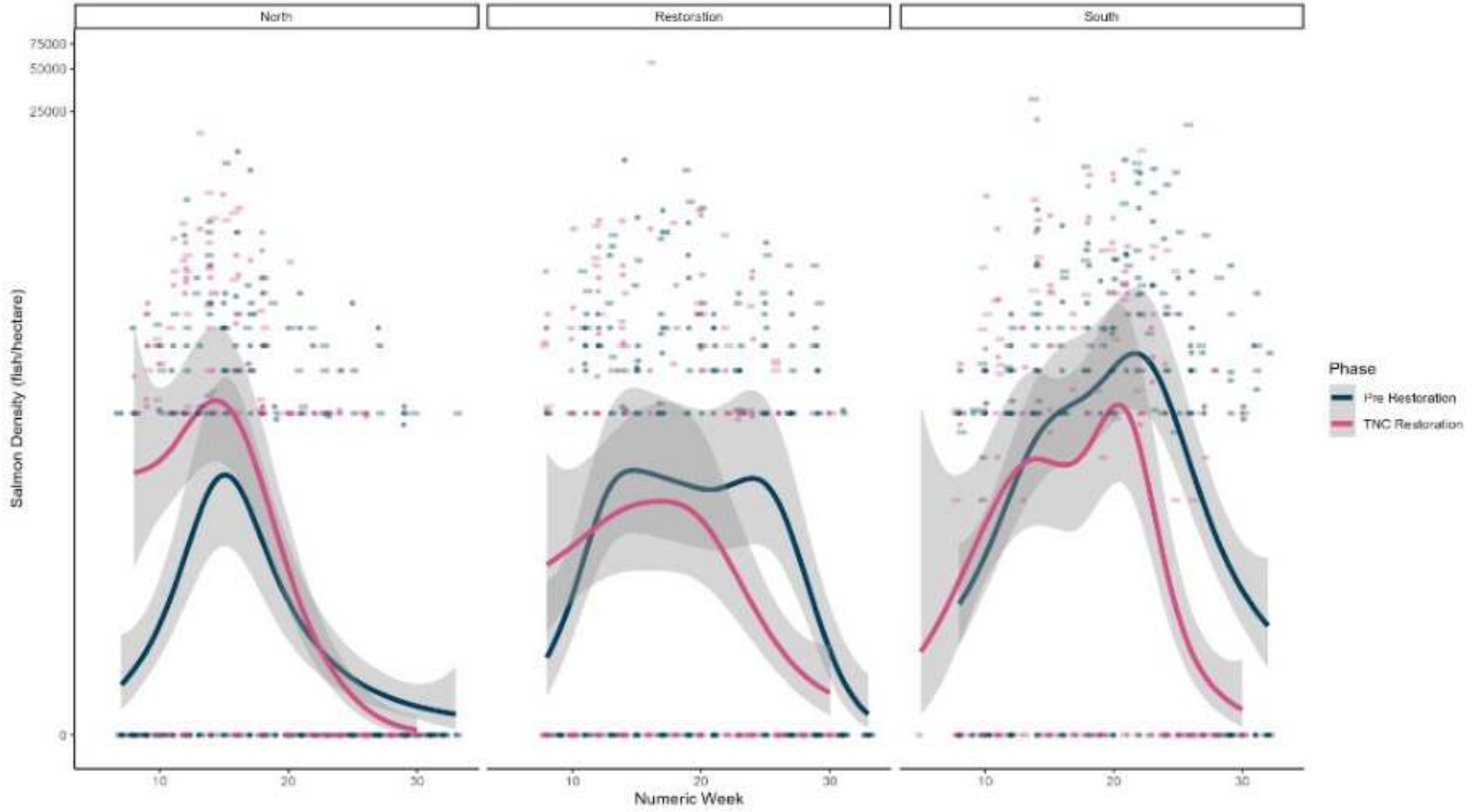
Fish Abundance
(Research Leads: SRSC, TNC)

Whole Body-Caloric Content
(Research Leads: TNC, UW)

Diets
(Research Leads: TNC, UW, SRSC)

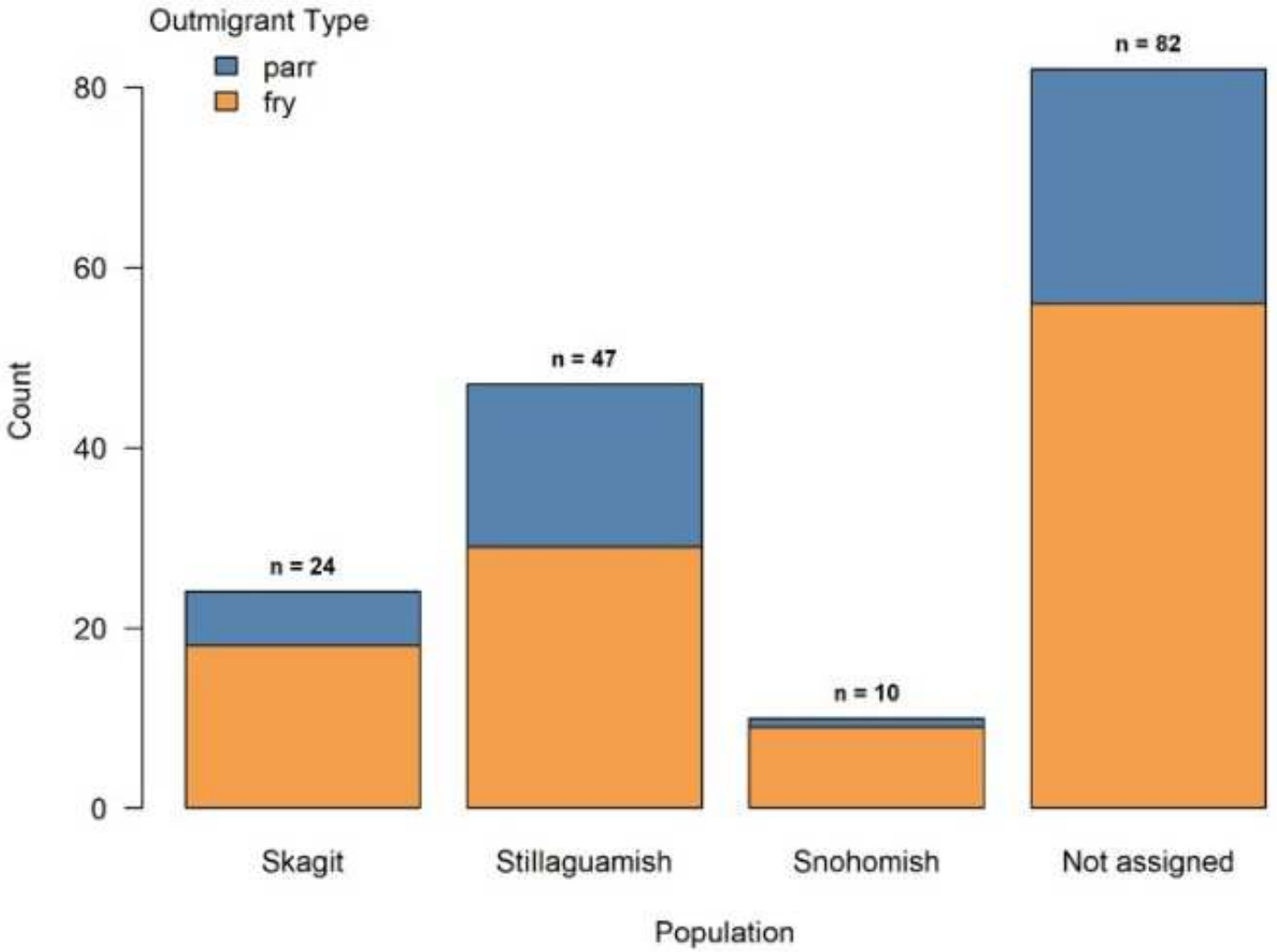
Total Salmon Density:

Research Leads: Brian Henrichs, Correigh Greene, Mike LeMoine- SRSC

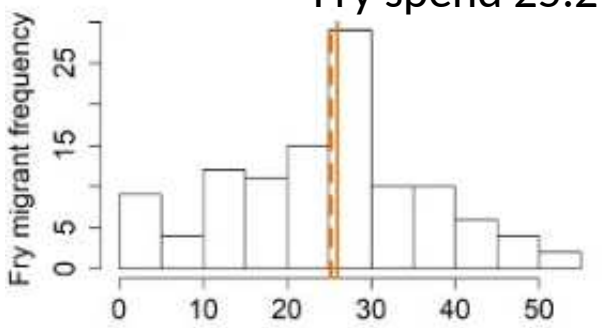


Salmon Residency Time & Growth

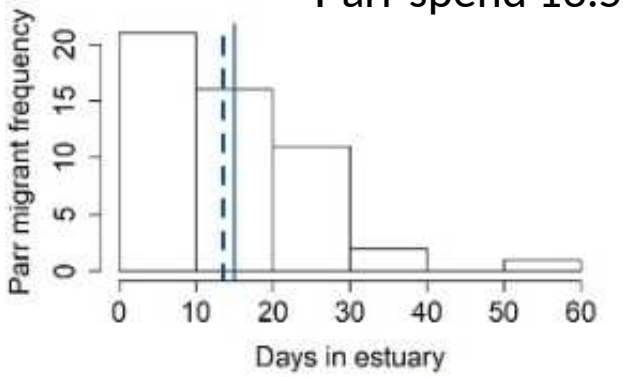
Research Lead: Catherine Austin- SRSC, Michaela Lowe-MPFW

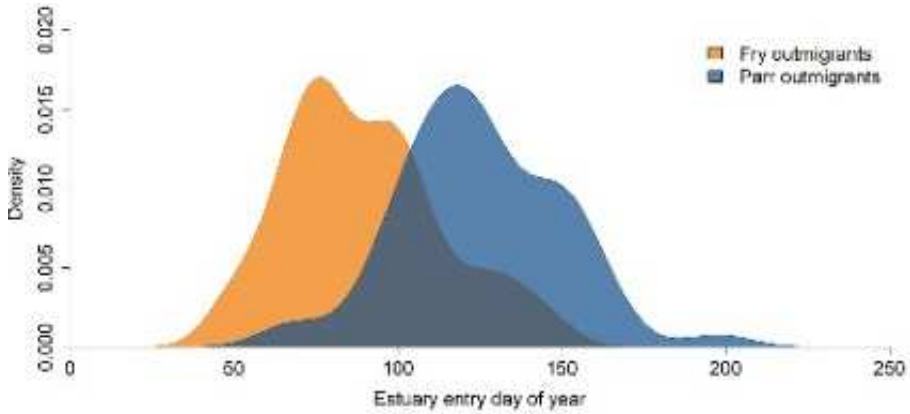


Fry spend 25.2 ± 12.1 days



Parr spend 13.5 ± 12.0 days

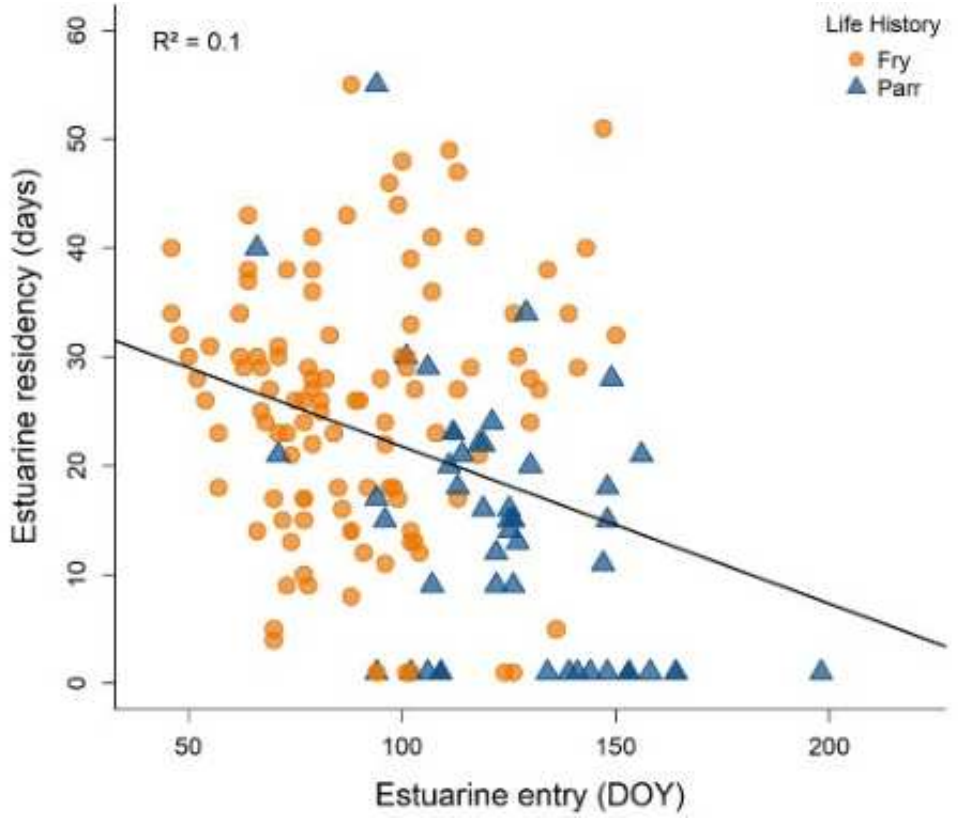




By life history: Fry March 31 ± 24 days Parr May 5 ± 25 days

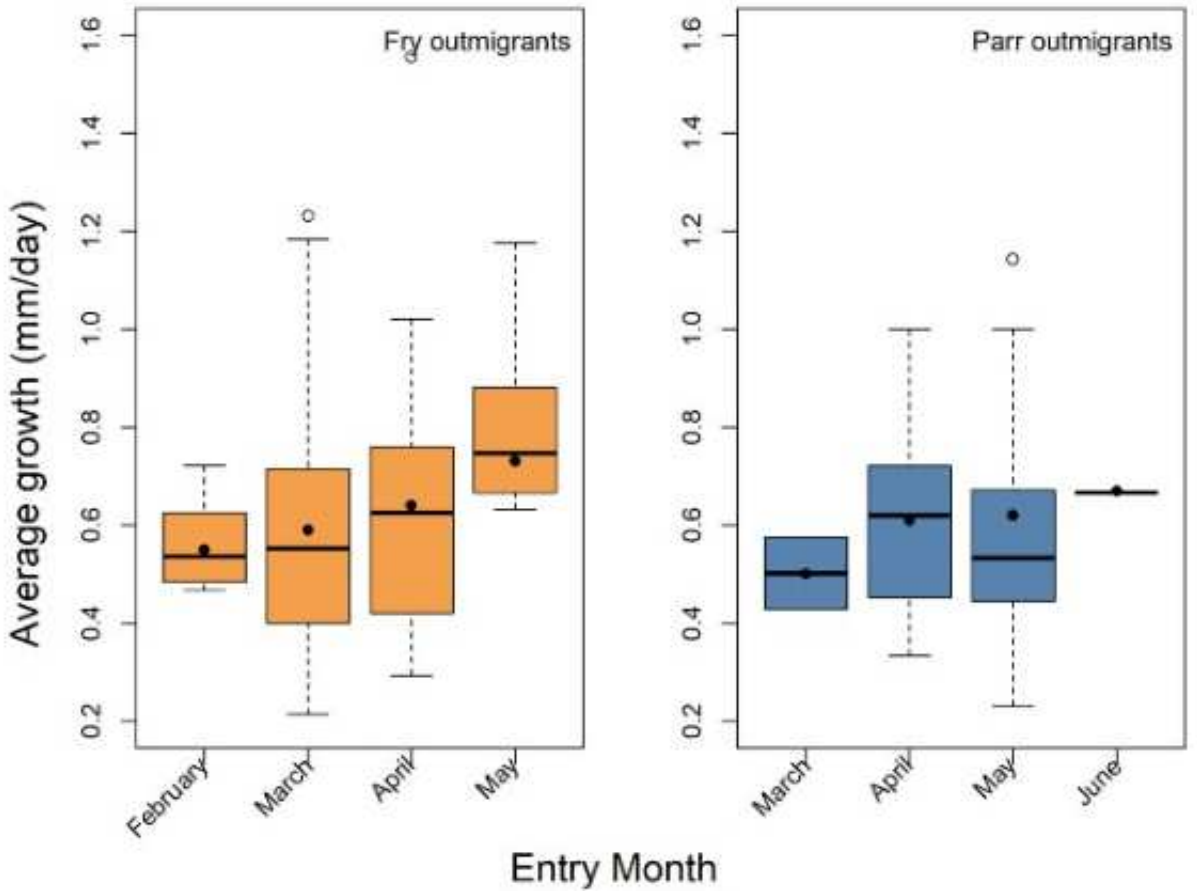
Salmon Residency Time & Growth

Research Lead: Catherine Austin- SRSC, Michaela Lowe- MPEW



Fry growth 0.62 ± 0.24 mm/day

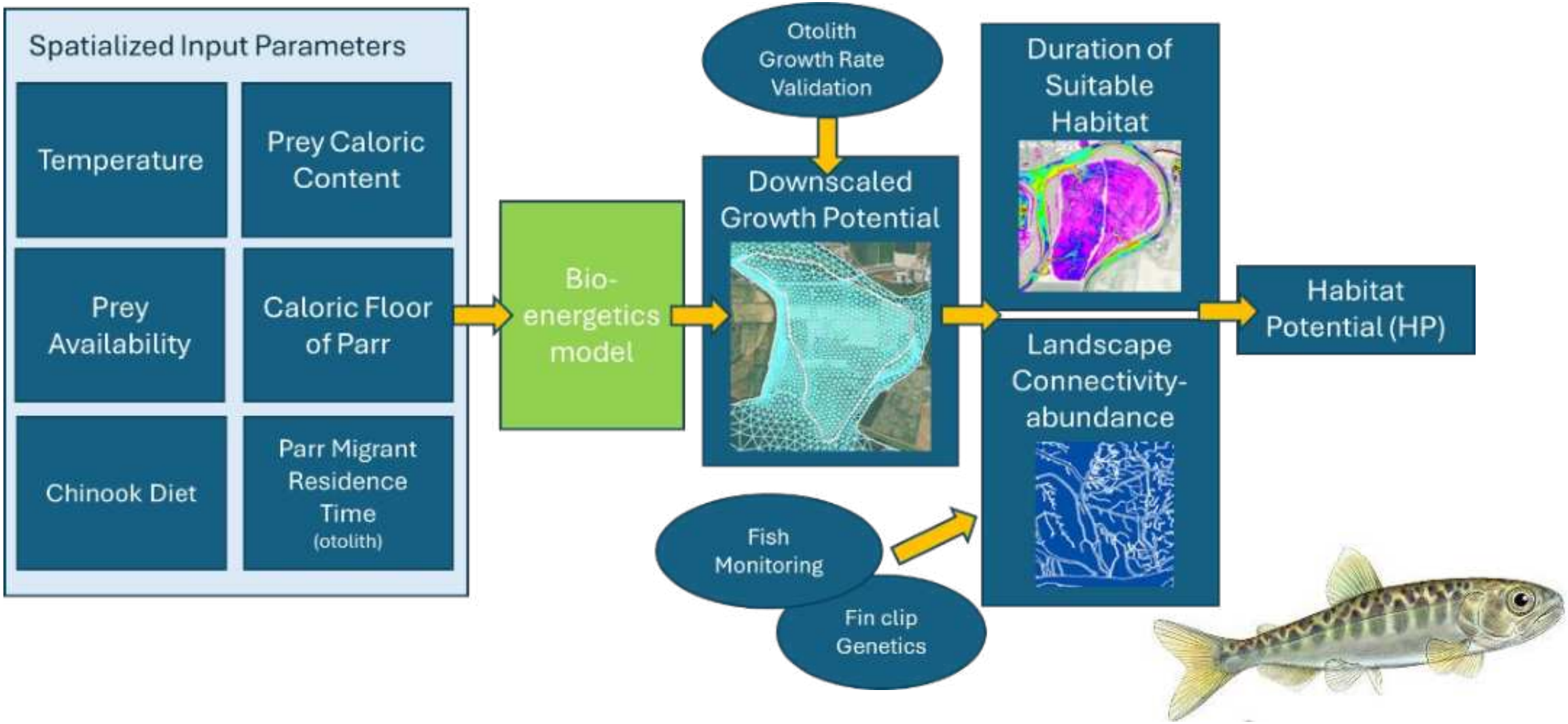
Parr growth 0.61 ± 0.21 mm/day



Weak relationship between entry date and residency

Bioenergetics & Landscape Connectivity: Evaluating Restoration Design Plans

Research Leads: Emily Howe- TNC & Mike LeMoine - SRSC



Salmon Recovery Stories: Abundance and Growth

Salmon Abundance and Growth Potential:

Research Leads: Emily Howe- TNC & Mike LeMoine - SRSC

NO NEAR-TERM GROWTH RATE BENEFIT from restoration

LANDSCAPE CONSTRAINS GROWTH MODELS

Deep, high velocity areas, and the marsh plain can reduce predicted growth rates by an order of magnitude compared to non-spatialized bioenergetics models (0.021 g/g/day vs 0.004 g/g/d).

HOTSPOTS of Growth

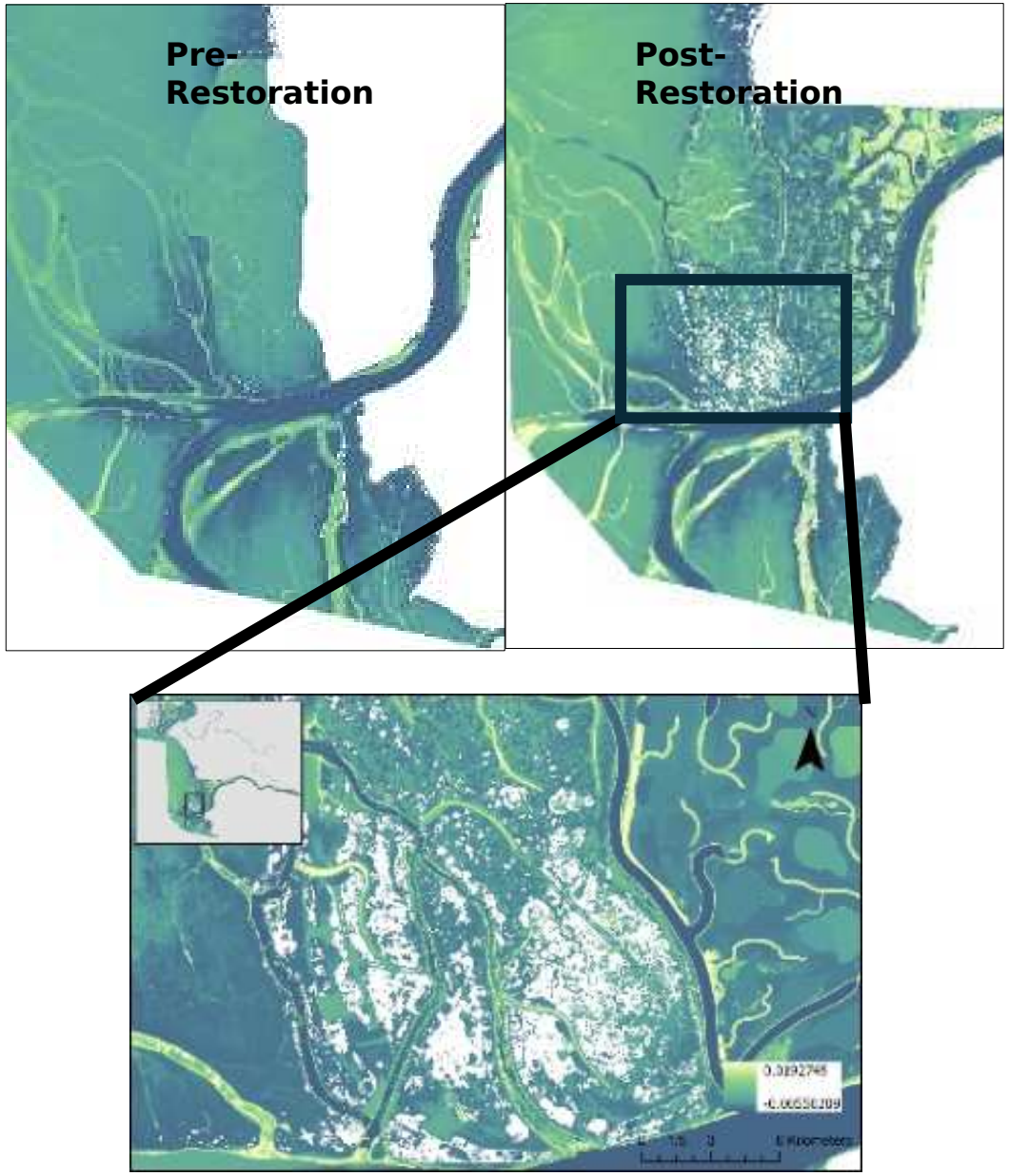
Minimum growth rates between restored and non-restored w/in 3% of each other; max growth rates 271% higher in restored model.

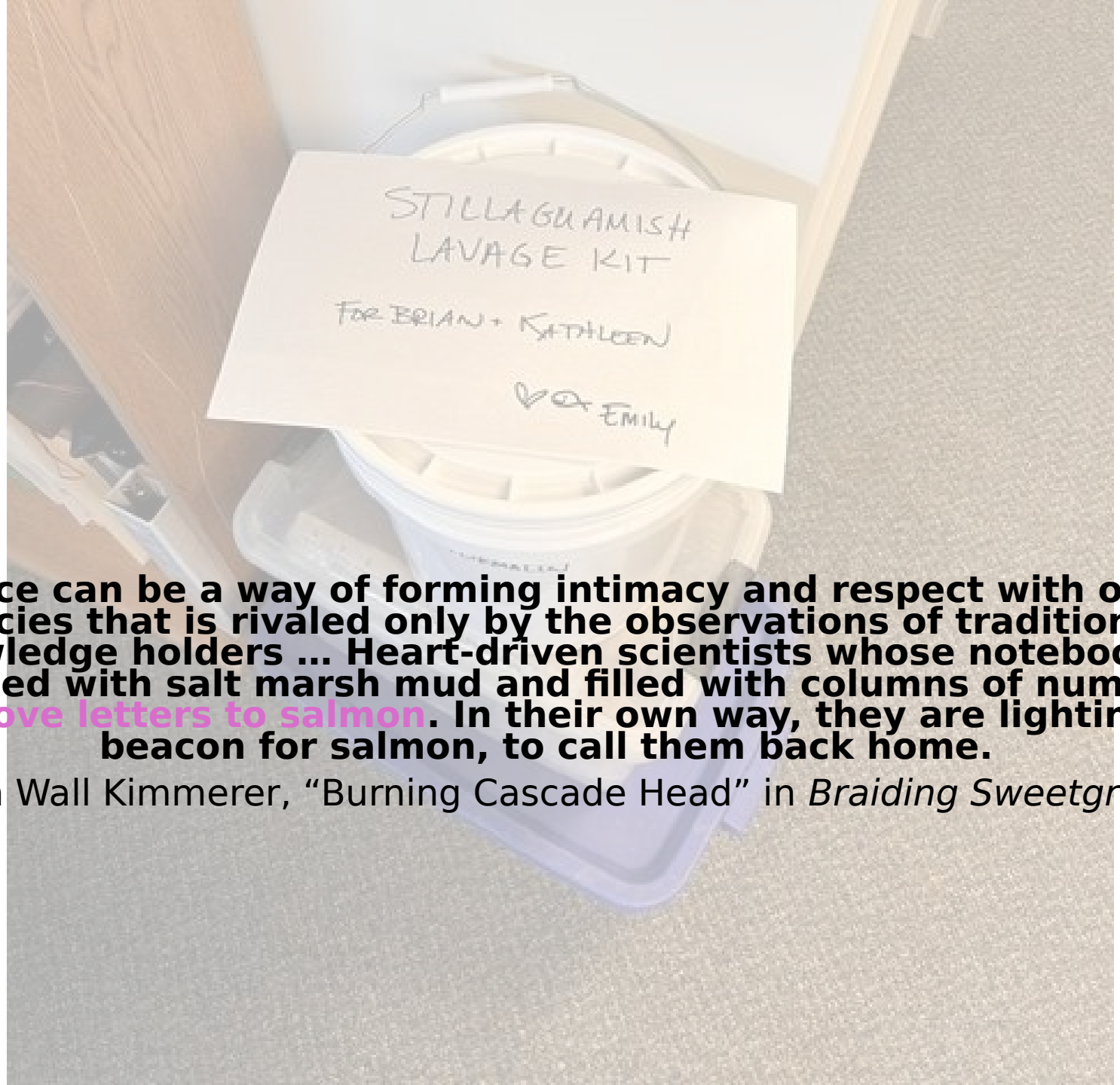
BUFFER FOR CLIMATE CHANGE

Restoration provides a 12.1% buffer against climate change for growth potential

CLIMATE CHANGE WILL SWAMP RESTORATION BENEFITS BY 2080

Realized change (no restoration compared to restoration with climate change) is expected to realize a 28% decrease in overall habitat suitability index





Science can be a way of forming intimacy and respect with other species that is rivaled only by the observations of traditional knowledge holders … Heart-driven scientists whose notebooks, smudged with salt marsh mud and filled with columns of numbers, are love letters to salmon. In their own way, they are lighting a beacon for salmon, to call them back home.

Robin Wall Kimmerer, “Burning Cascade Head” in *Braiding Sweetgrass*.

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