Monitoring habitat use & population structure of Pacific herring near Anderson Island & in Oro Bay

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LONG LIVE THE KINGS

Nisqually Indian Tribe

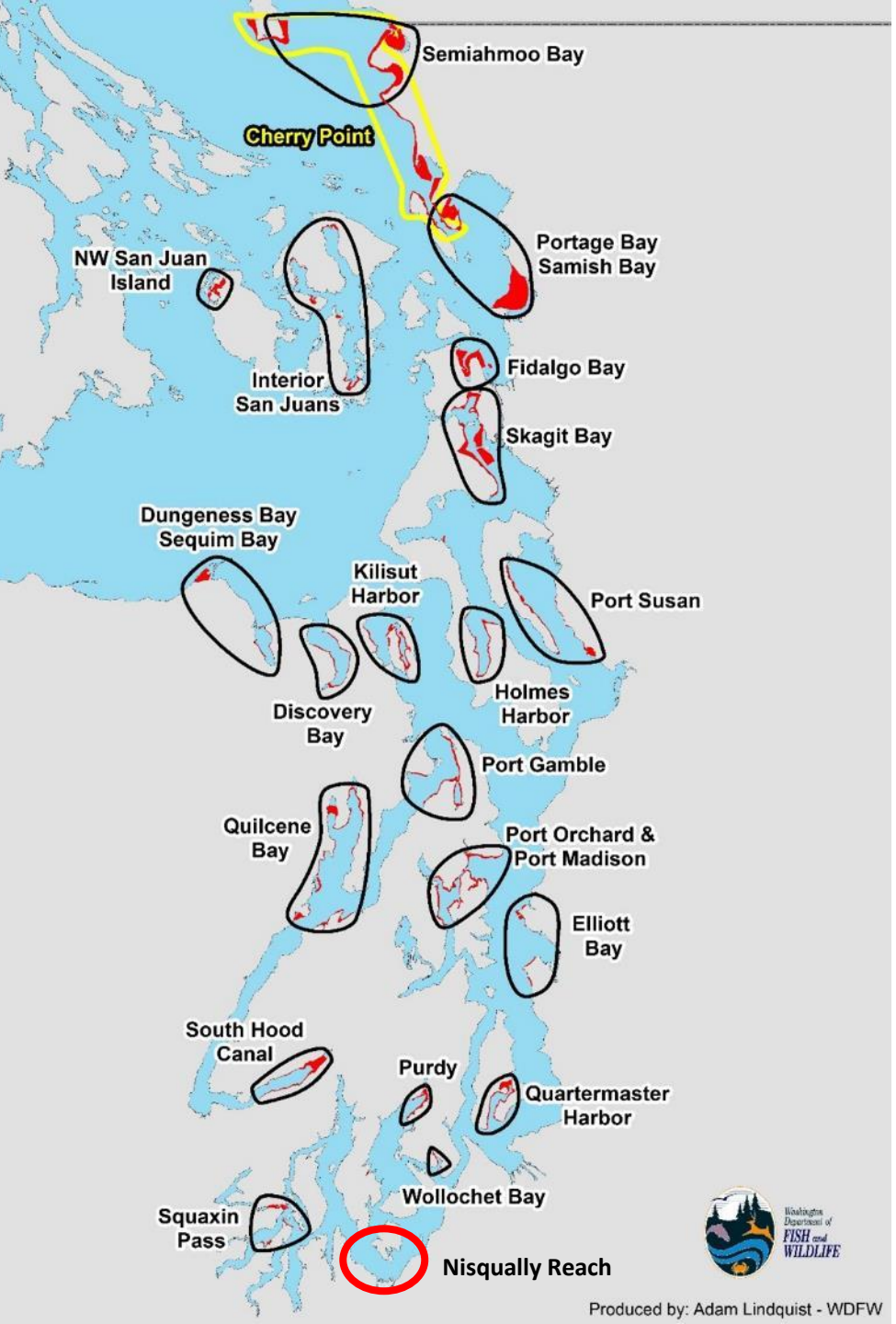
Presentation Outline

- Background
- Project Overview
- Methods
- Results
- Summary & Takeaways

Findings from the Salish Sea Marine Survival Project

- Reduced herring abundance identified as potential factor in poor early marine survival of salmon.
- Nisqually delta is a predation hotspot. (Berejikian et al. 2016)
- Abundant forage fish buffer predation on juvenile salmonids by shared predators. (Moore et al. 2021)
- Toxic contaminants impact the health and productivity of salmon and herring *(O'Neill et al. 2015)*

SALISH SEA
MARINE SURVIVAL PROJECT



WDFW's Herring Spawning Surveys

- Herring populations are tracked based on their spawning location
- Population trends have been variable in different regions
- Nisqually Indian Tribe has traditionally harvested eggs from a now absent local spawning population (Sequalitchew)
- Recent observations of mature herring holding in Nisqually Reach in spring

Washington Department of FISH and WILDLIFE

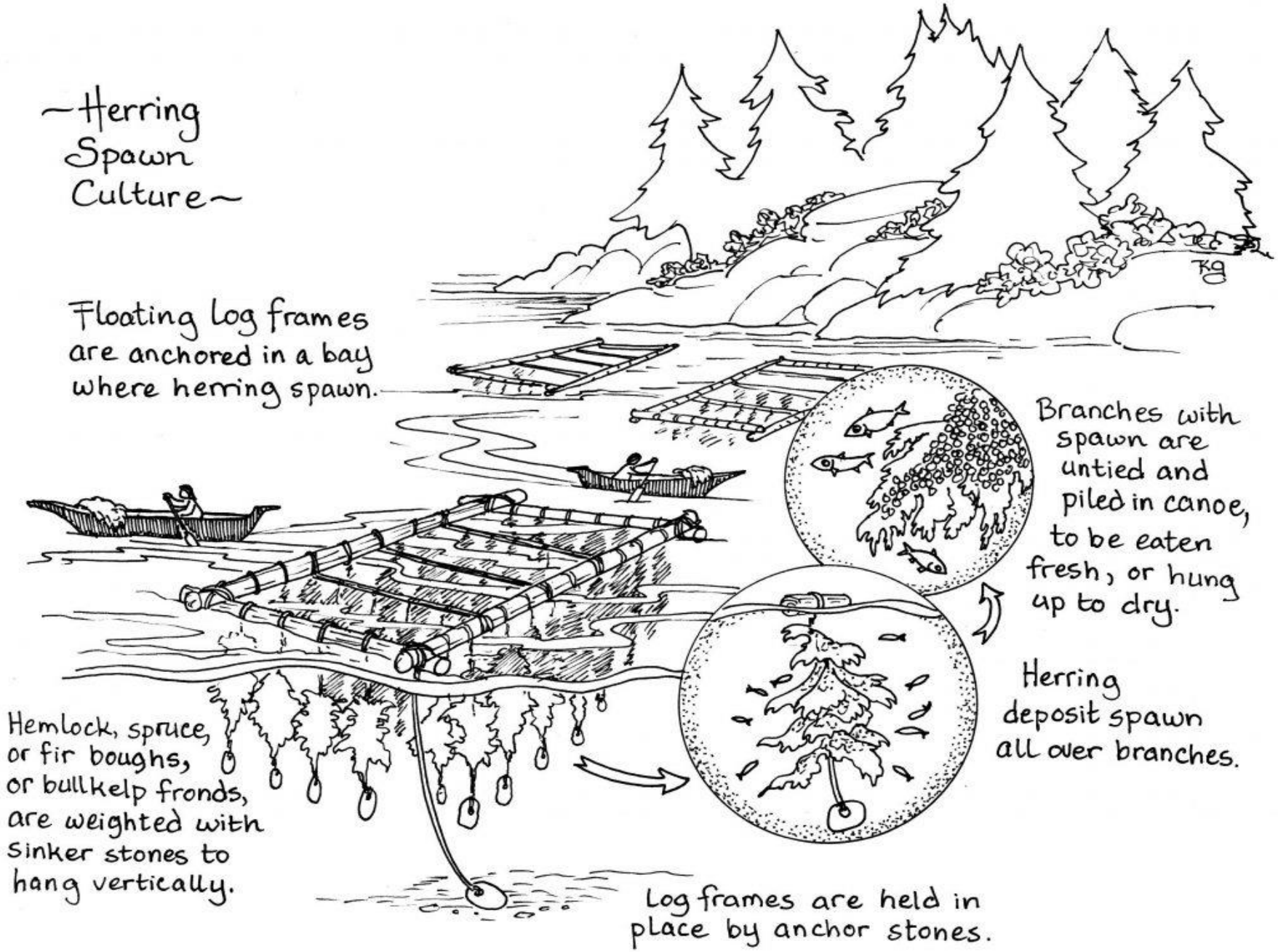


Illustration by Karen Gillmore (Snively & Williams 2016, p. 255)

Project Overview

Goal

- Understand herring abundance & use within Nisqually Reach to inform salmon & herring recovery actions

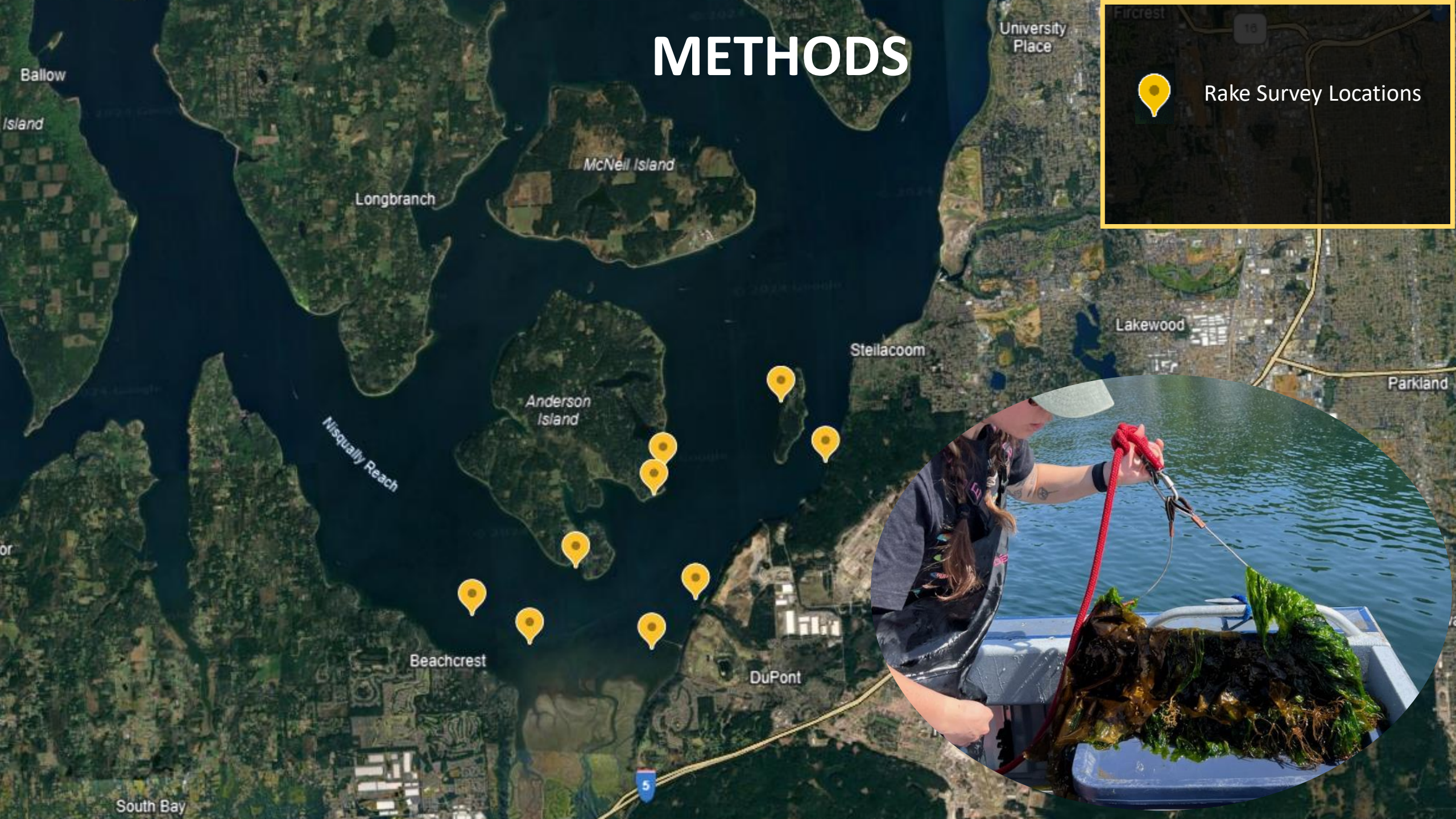
Objectives (2021-2026)

1. Identify potential spawning activity (aquatic vegetation surveys)
2. Test supplemental spawning substrate
3. Assess maturity & genetics of herring holding in Oro Bay
4. Examine diets & screen for contaminant exposure

METHODS


Jigging Zone
University Place
Ballow
Island
McNeil Island
Longbranch
Lakewood
Steilacoom
Parkland
Anderson Island
Nisqually Reach
Beachcrest
DuPont
South Bay
5

METHODS


Ballow
Island
McNeil Island
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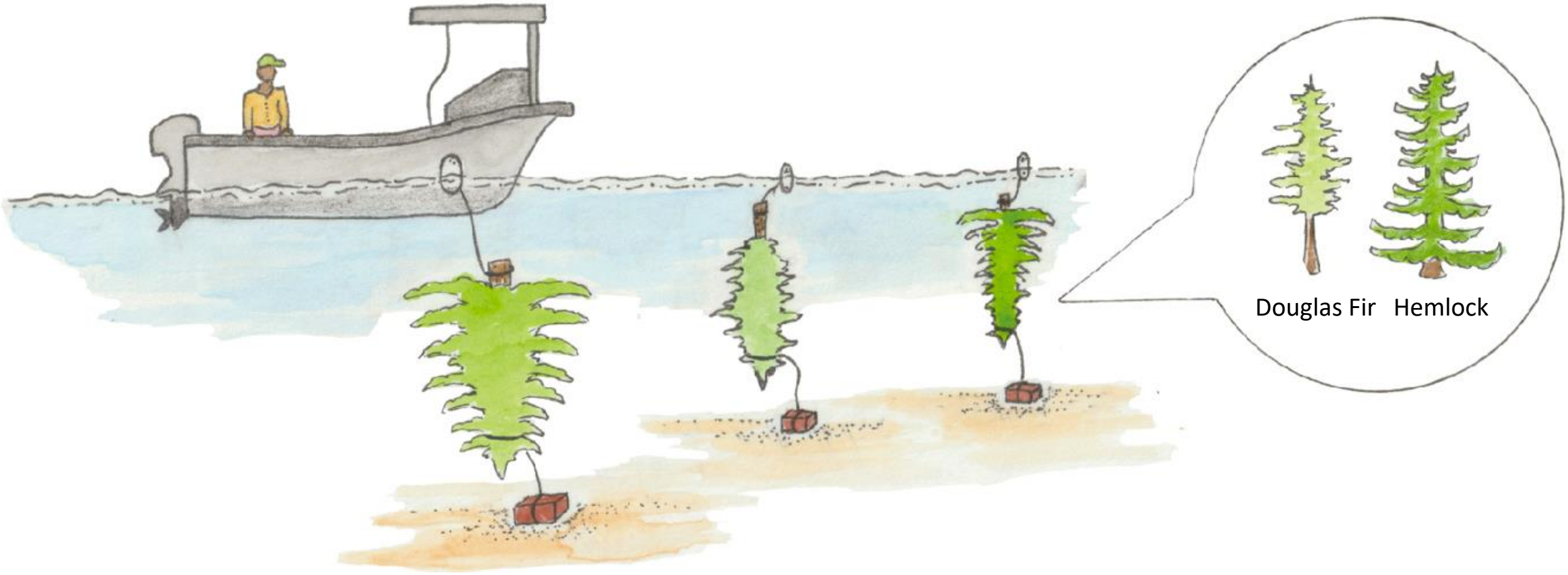
Nisqually Reach
Beachcrest
DuPont
South Bay
5
Rake Survey Locations

METHODS


Ballow
Island
McNeil Island
Longbranch
University Place
Steilacoom
Anderson Island
Nisqually Reach
Beachcrest
DuPont
Fort Lewis
South Bay
Supplemental Spawning Substrate Locations

METHODS: Supplemental Spawning Substrate

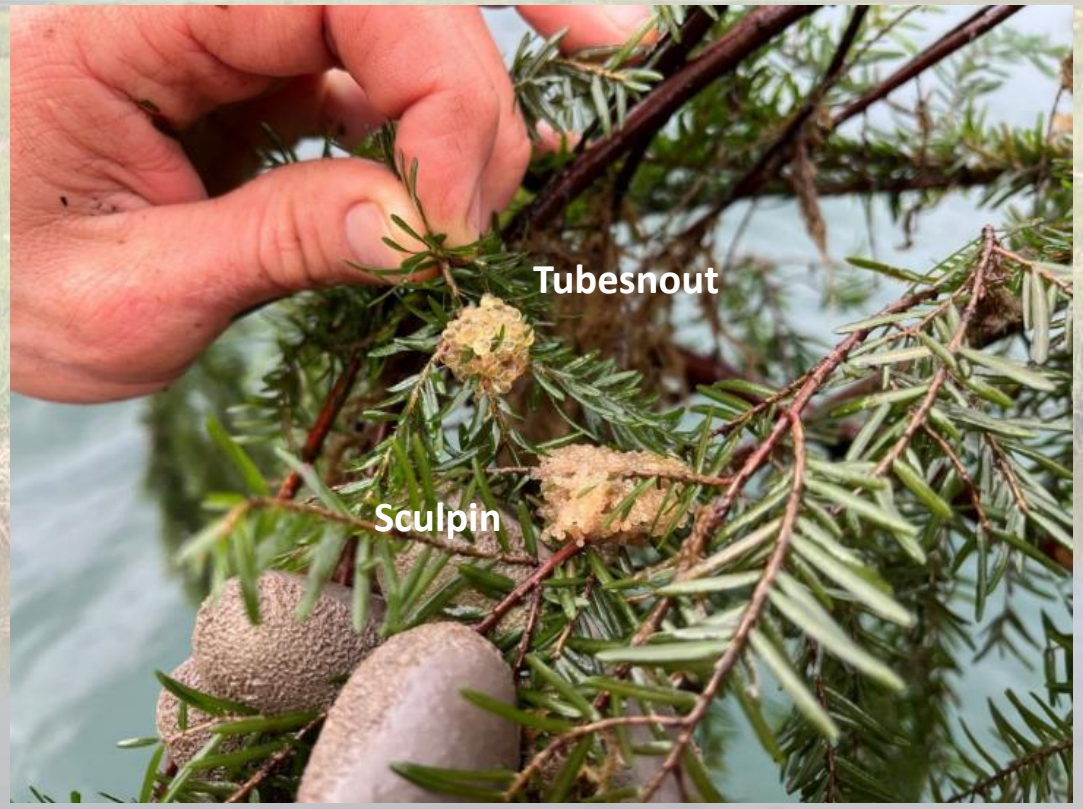


Illustrated by Connelli Designs

RESULTS: 2021-2024 Spawning Surveys

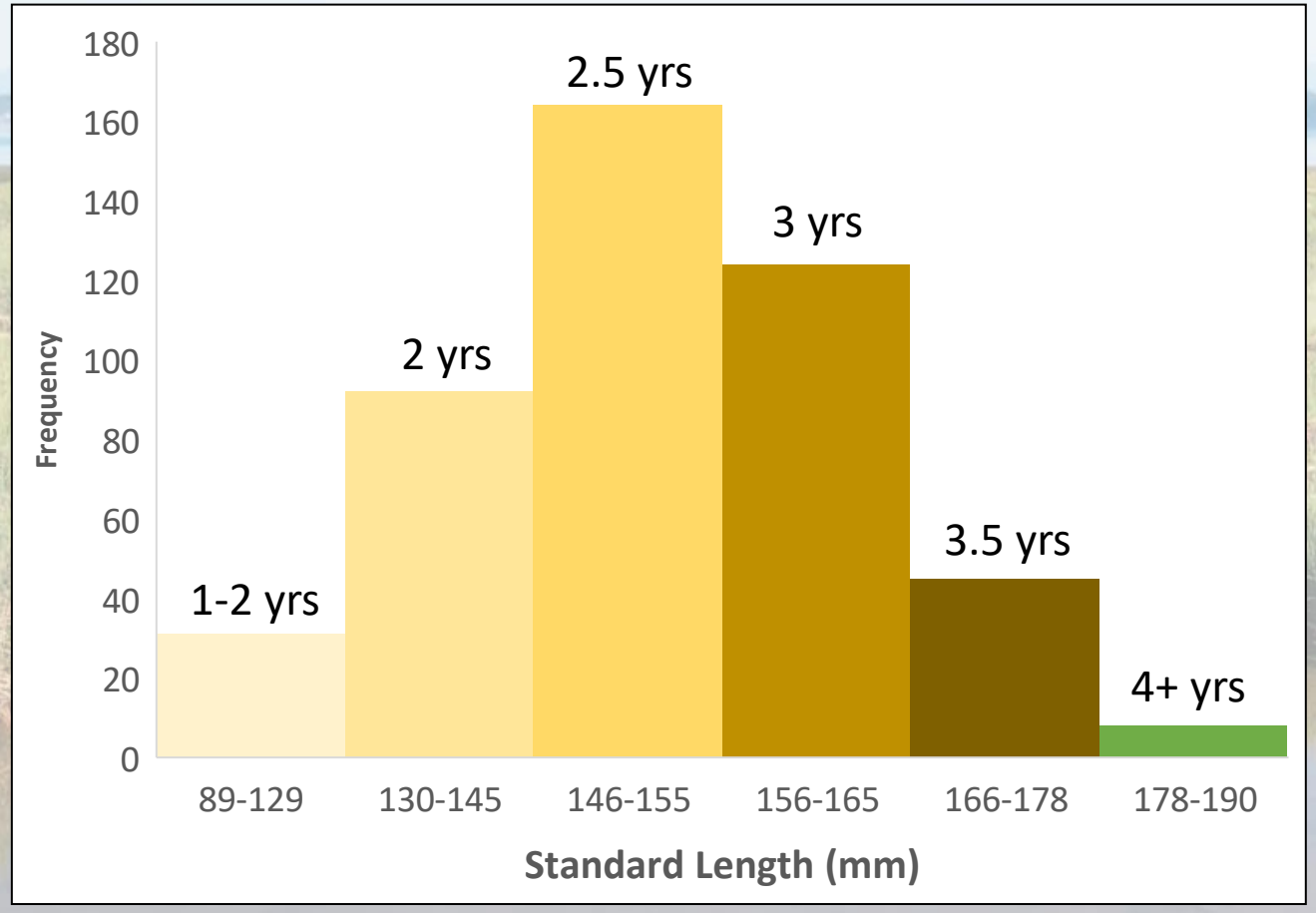
- No observed ***herring*** spawn on <u>supplemental substrate</u> or <u>existing vegetation</u>

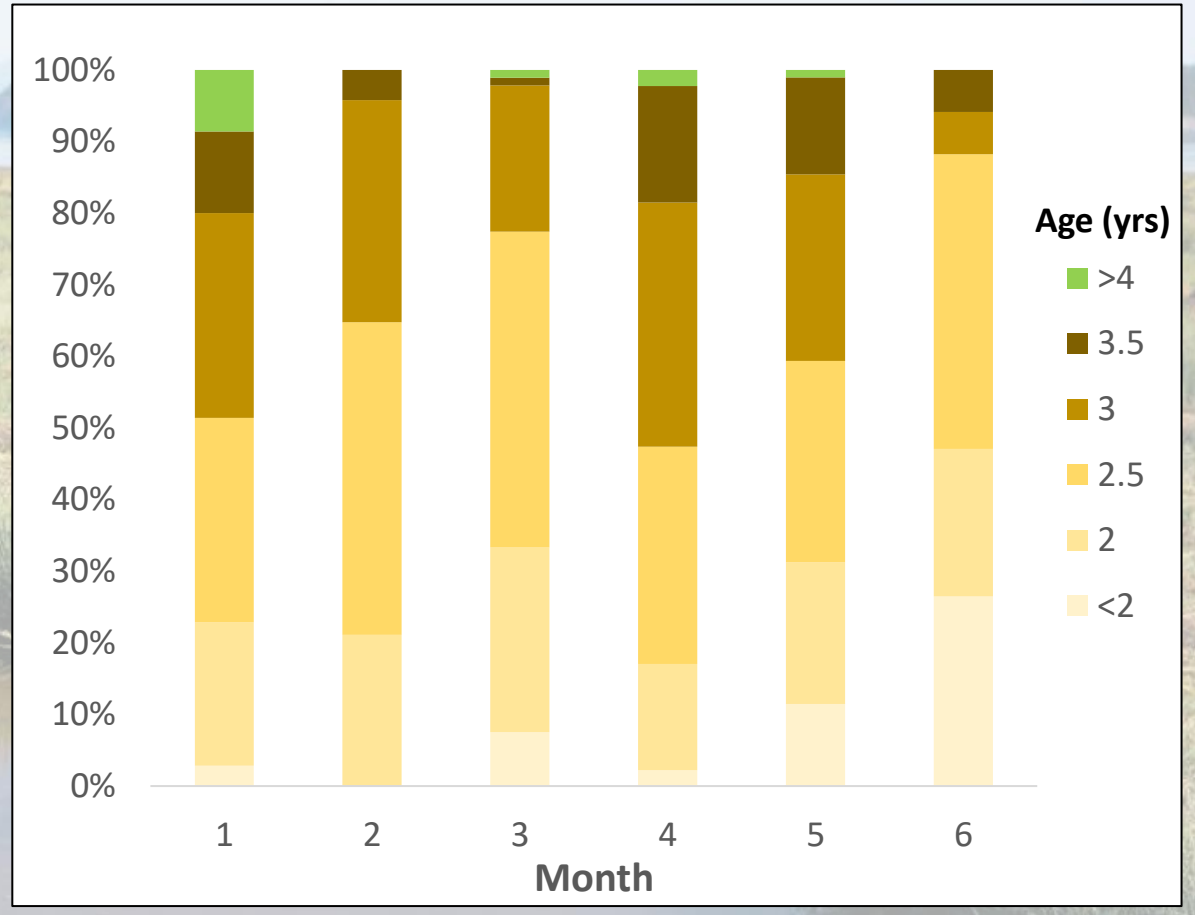
- Most common vegetation present are 1) eelgrass and 2) *Ulva*



RESULTS: Herring Age Composition

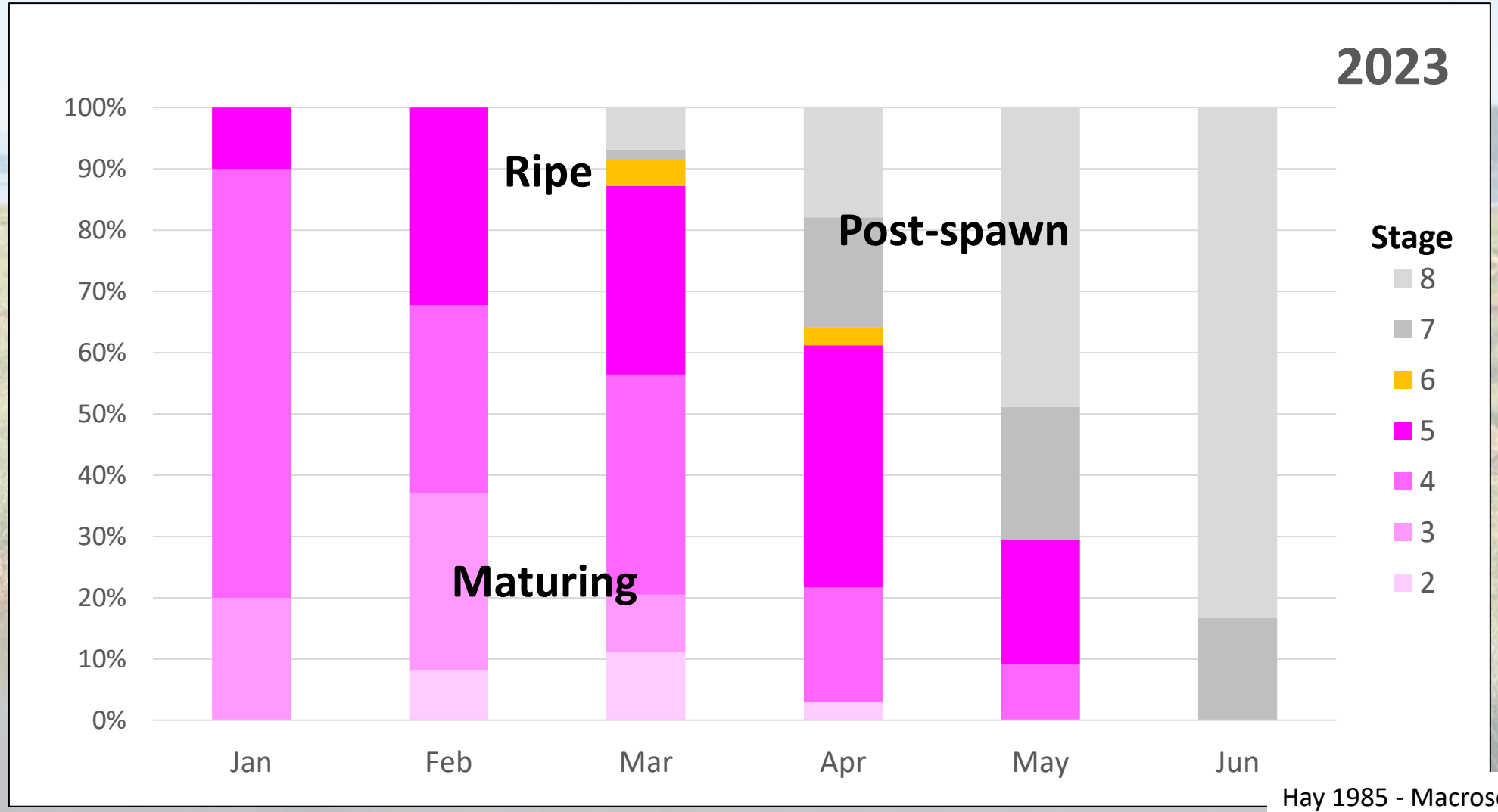
2023





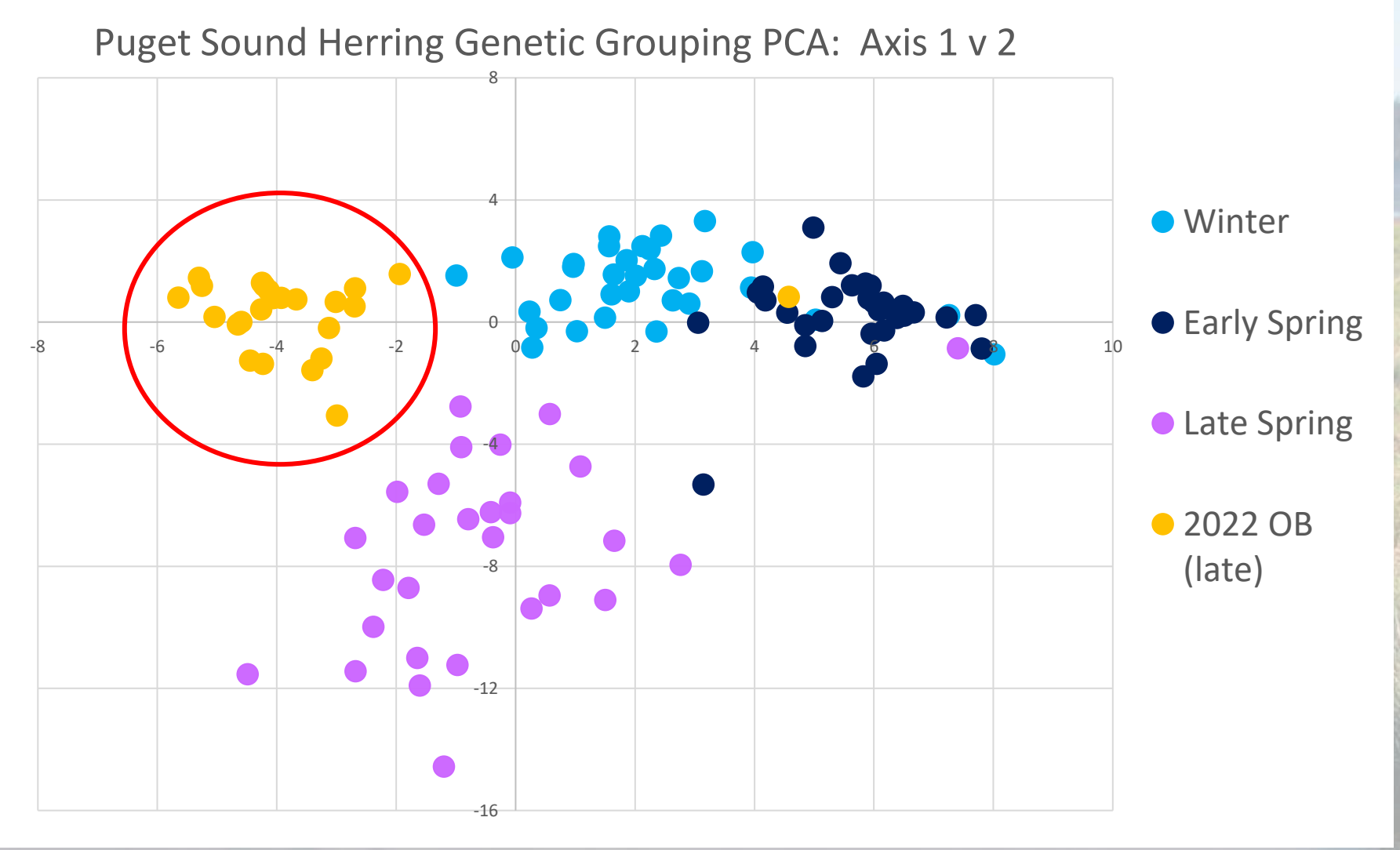
Age estimates from Burger et al. 2020.

RESULTS: Herring Maturation Timing



Hay 1985 - Macroscopic stages

RESULTS: Herring Genetics



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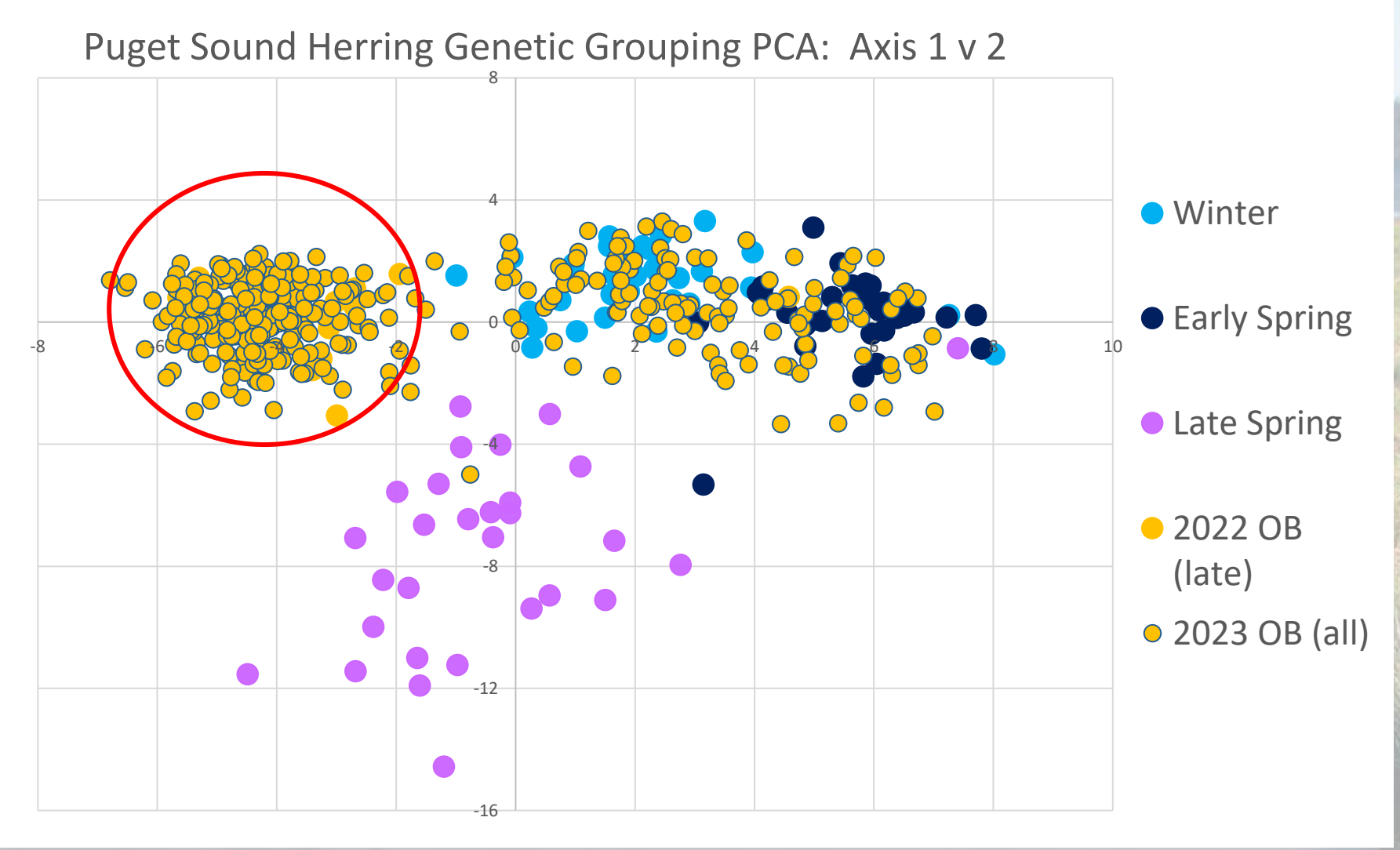
RESULTS: Herring Genetics



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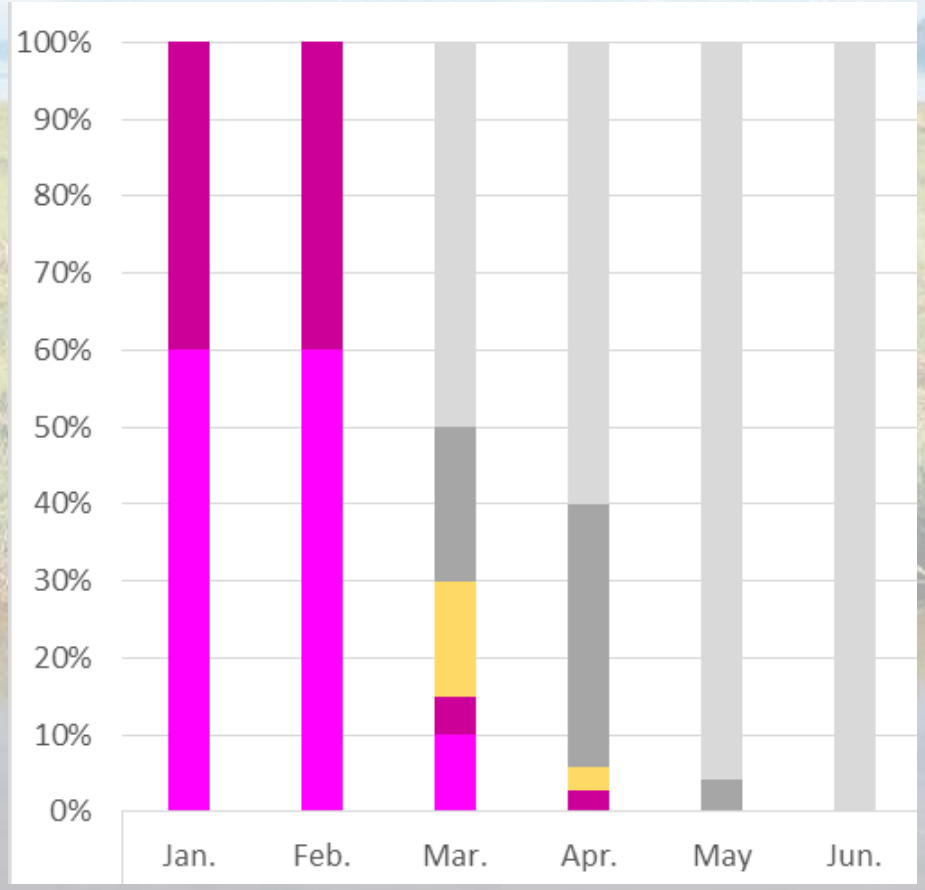
RESULTS: Herring Genetics & Spawn Timing

Winter/Early Spring
(n = 106)

2023

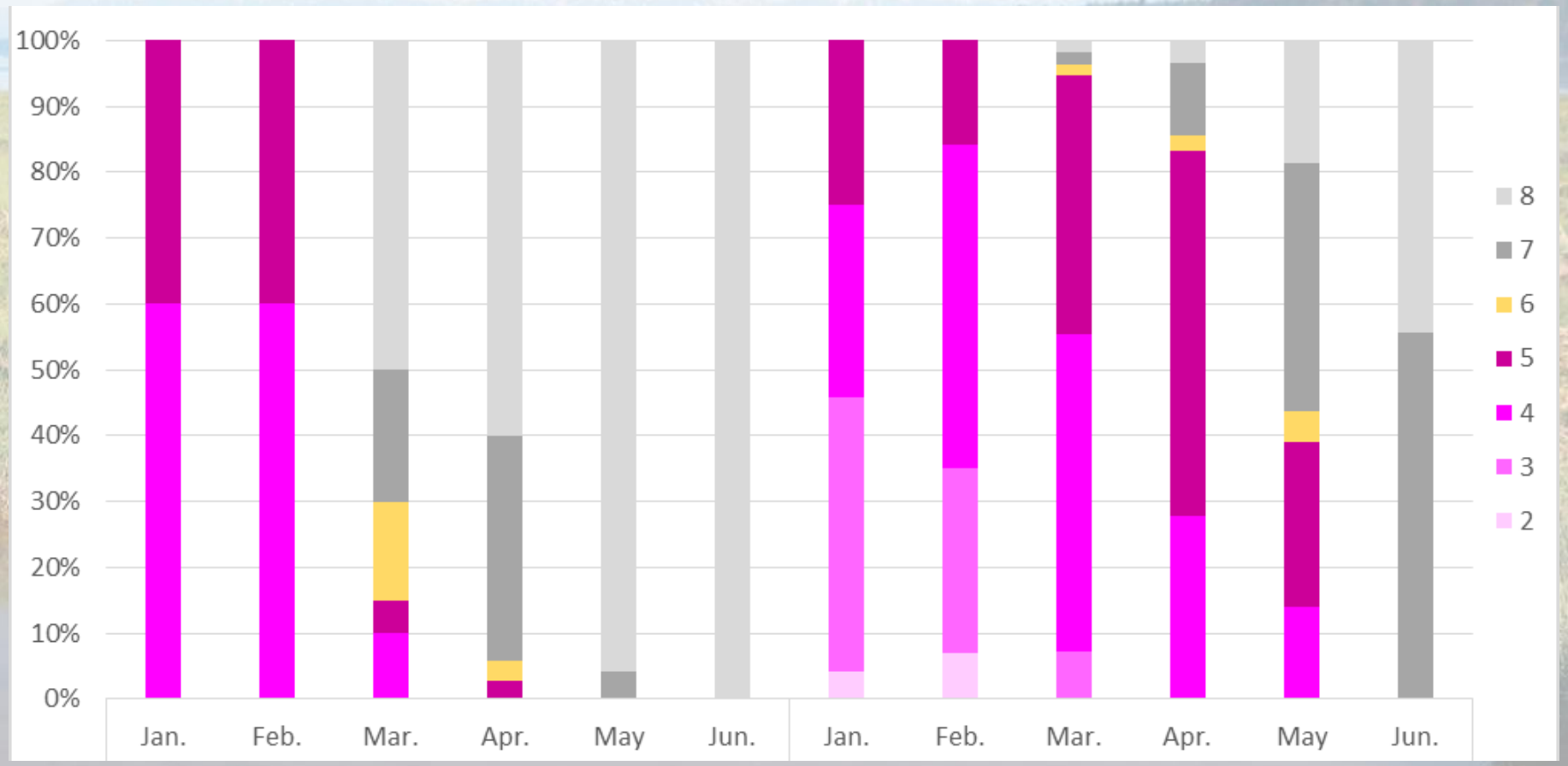


RESULTS: Herring Genetics & Spawn Timing

Winter/Early Spring
(n = 106)

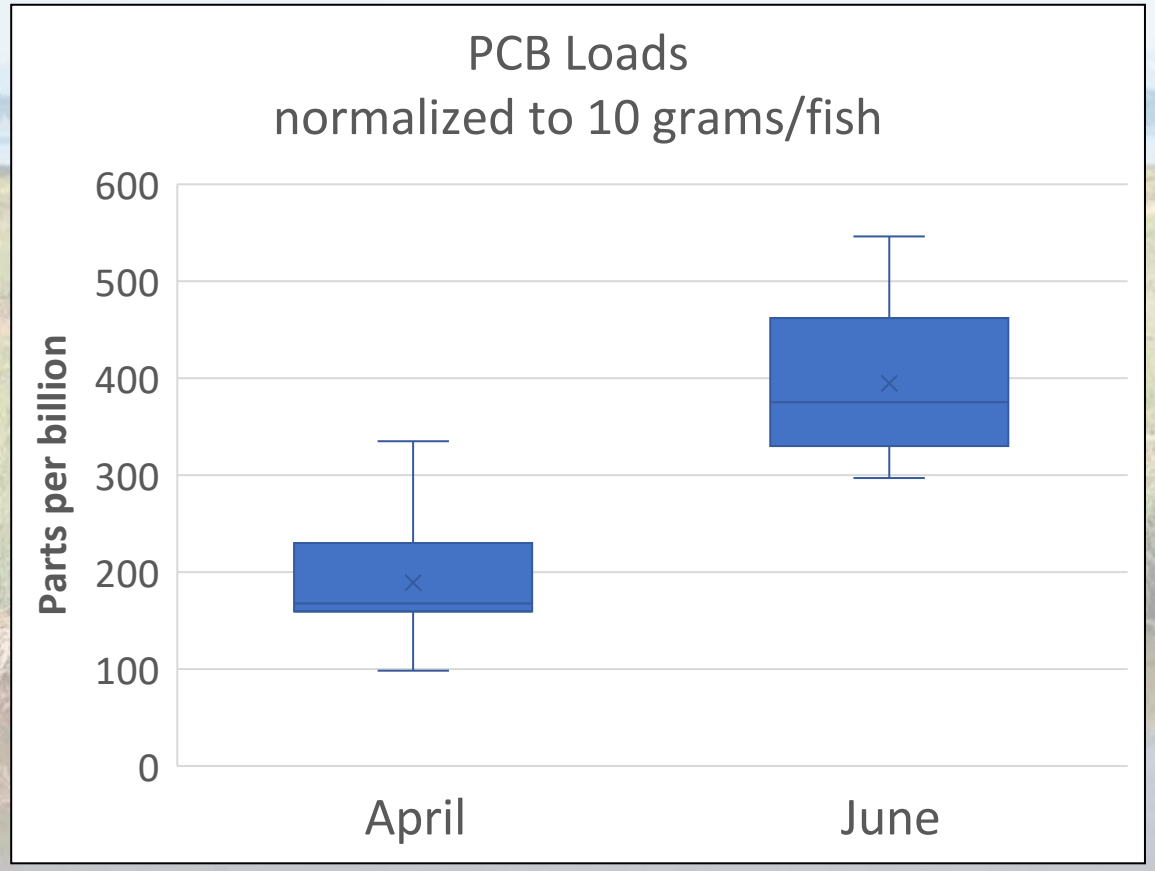
Oro Bay
(n = 300)

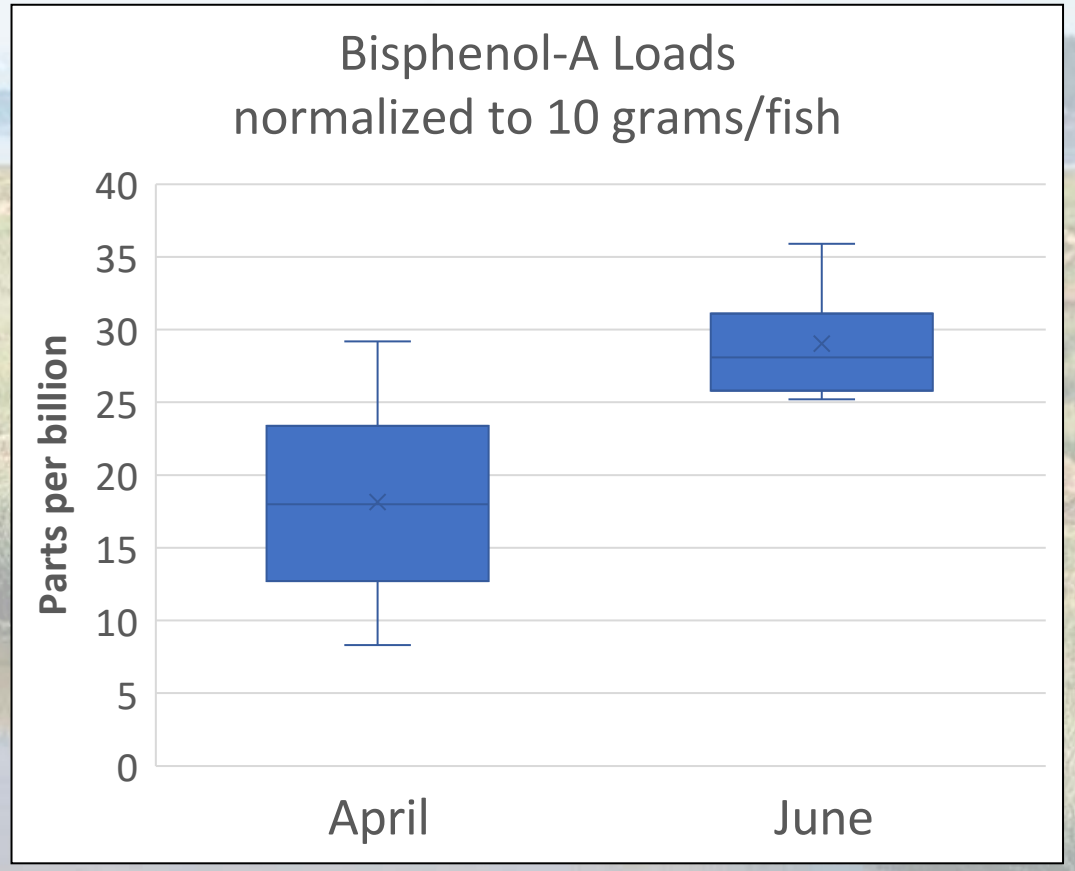
2023



RESULTS: Herring Contaminant Loads

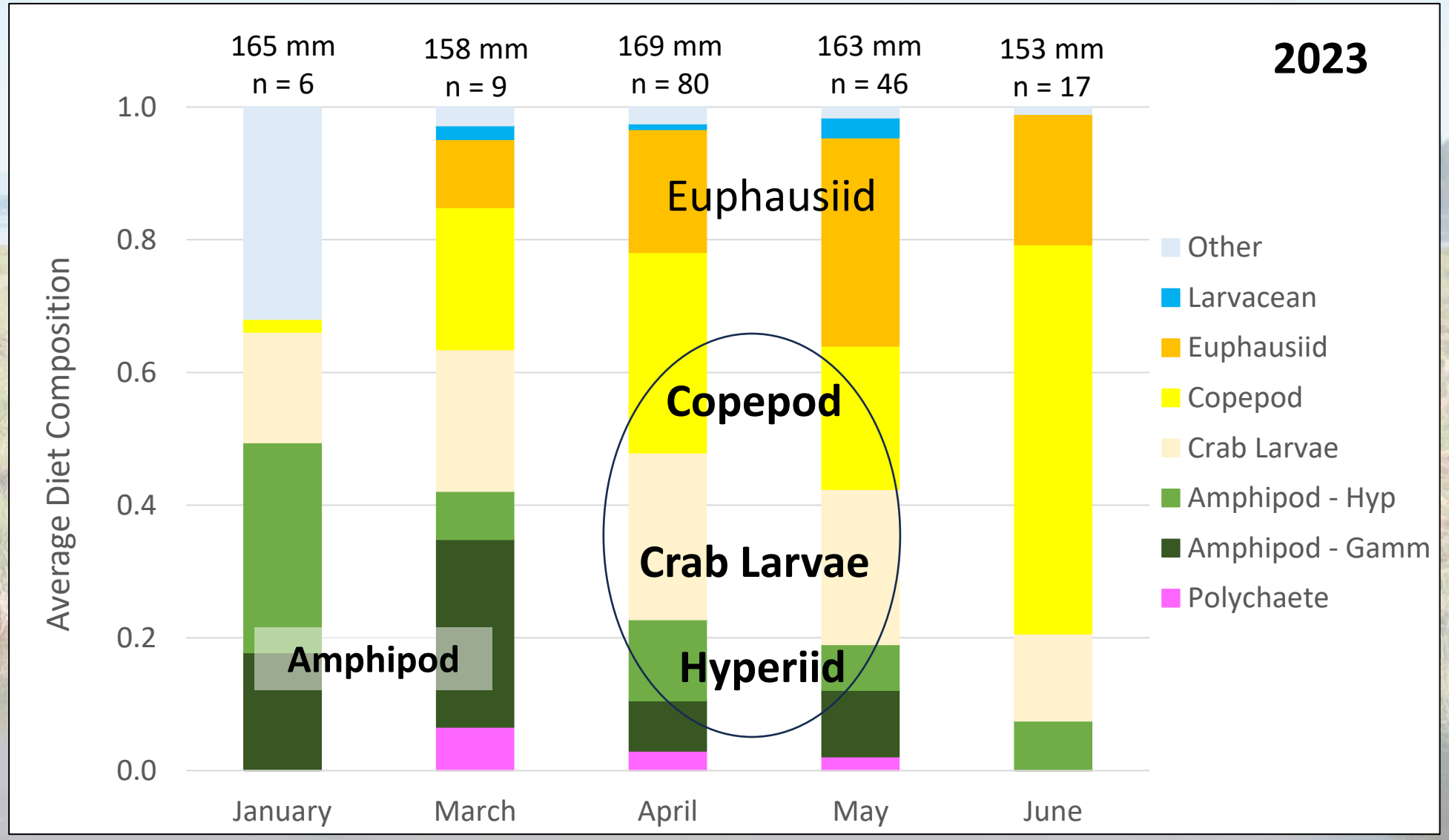
2024





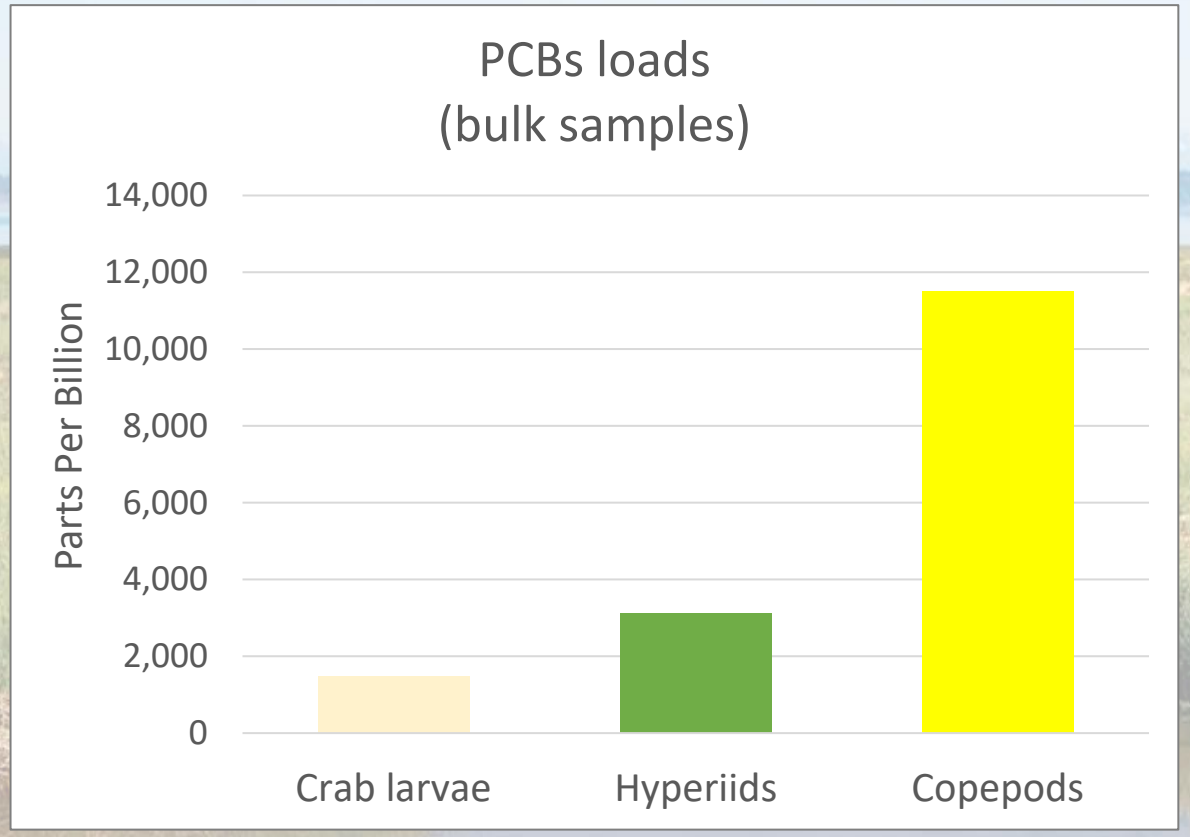
Contaminant loads measured using ELISA antibody kits

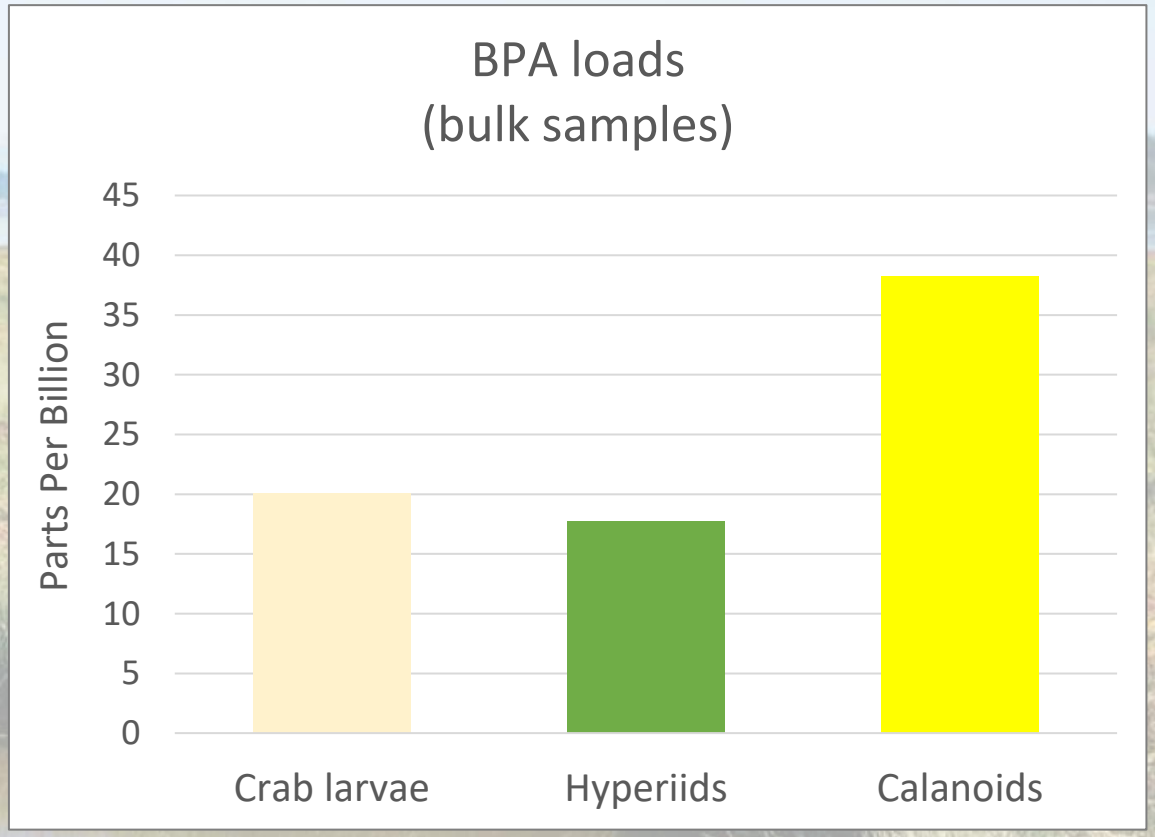
RESULTS: Herring Diets



RESULTS: Zooplankton Contaminant Loads

2024





Contaminant loads measured through ELISA antibody kits

ROSE

KWIÁHT

Summary

Genetically distinct herring population holding in Oro Bay

- Where are they spawning?
- Later spawning herring population in S Sound?

High contaminant loads in Oro Bay herring *(preliminary finding)*

- Pathway through food web (zooplankton)
- Implications for marine species and human health
- Sources? Contaminated sediments, sewage outfall…

Suitable spawning habitat is (appears to be) **present**

- Why no observed spawning?

Indigenous knowledge and practices were instrumental to this work

Takeaways

- Supports Nisqually Indian Tribe's ecosystem-based management and stewardship of natural resources
- Puget Sound Partnership's Pacific Herring Vital Sign
- Model for incorporating traditional practices into salmon and herring recovery actions

Questions?

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Thank You, Partners and Funders!

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