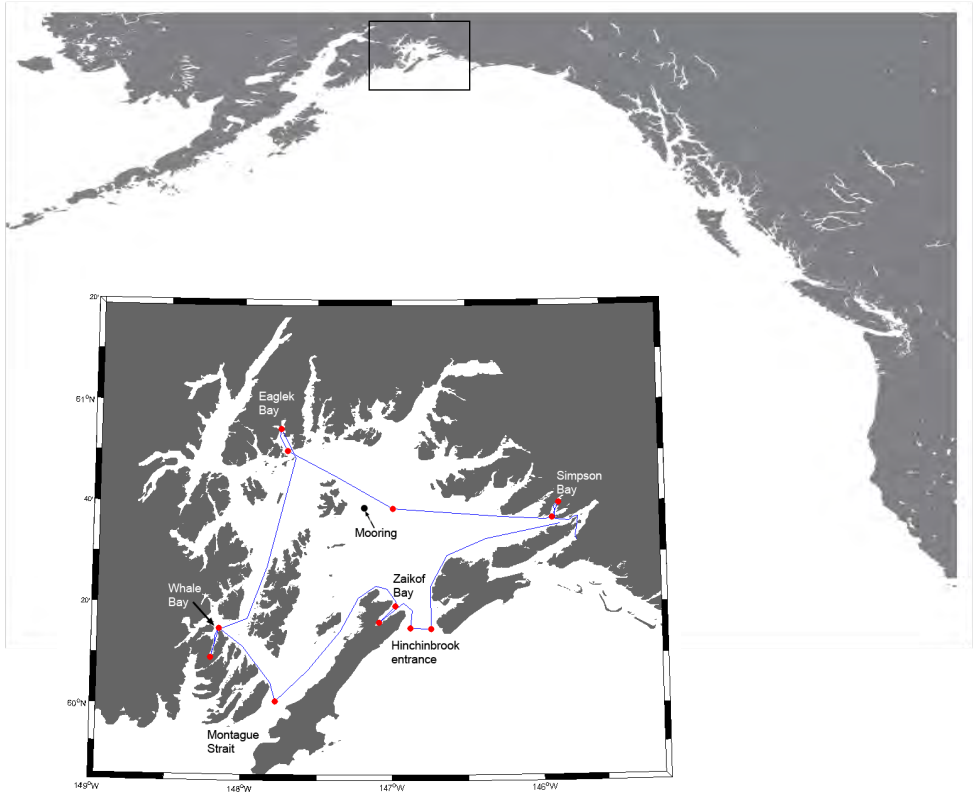
Fisheries Research Overview

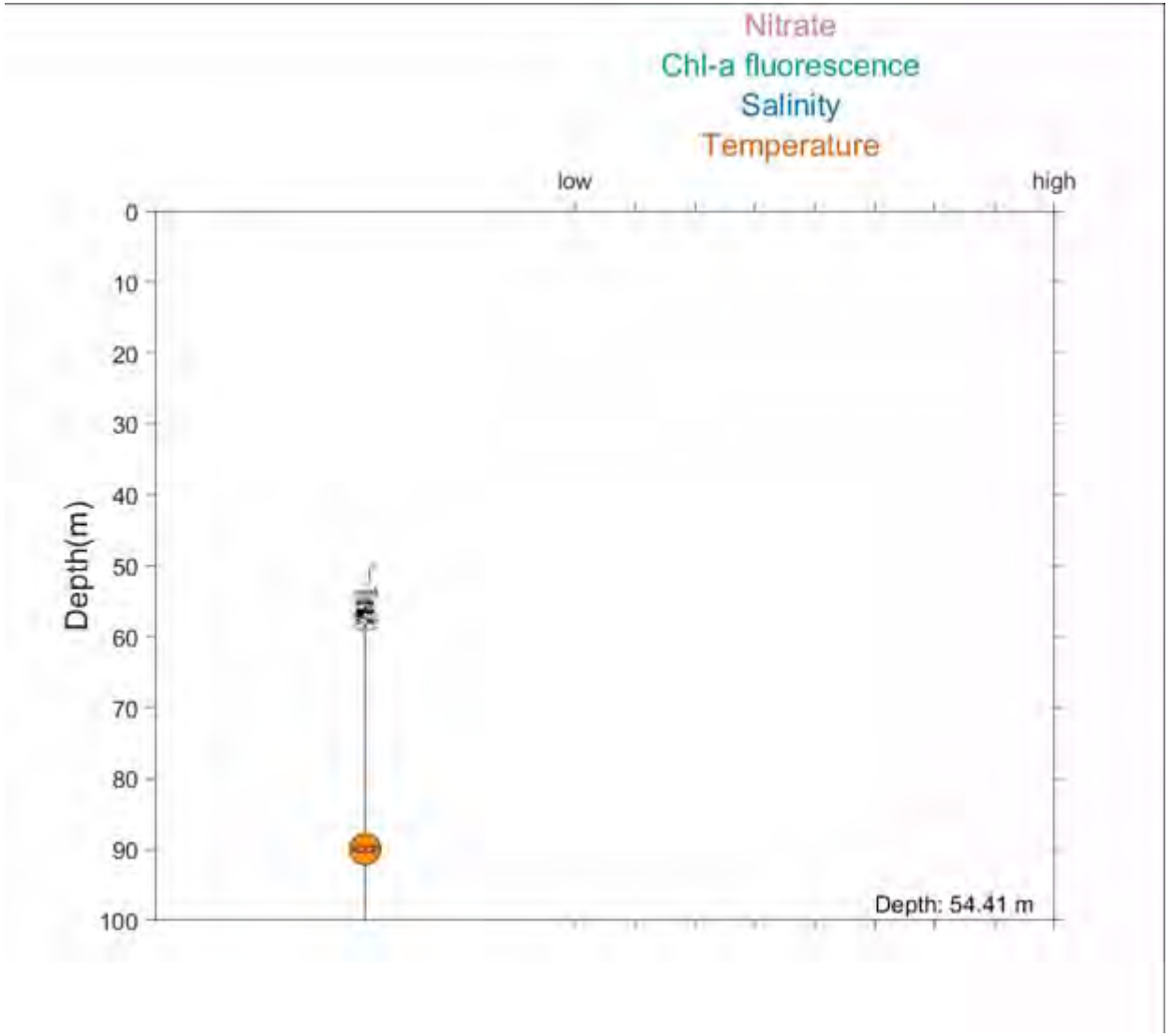
Rob Campbell

PWS Science Center

- 501c3
- ~30 staff
- Research
- Outreach
- Education

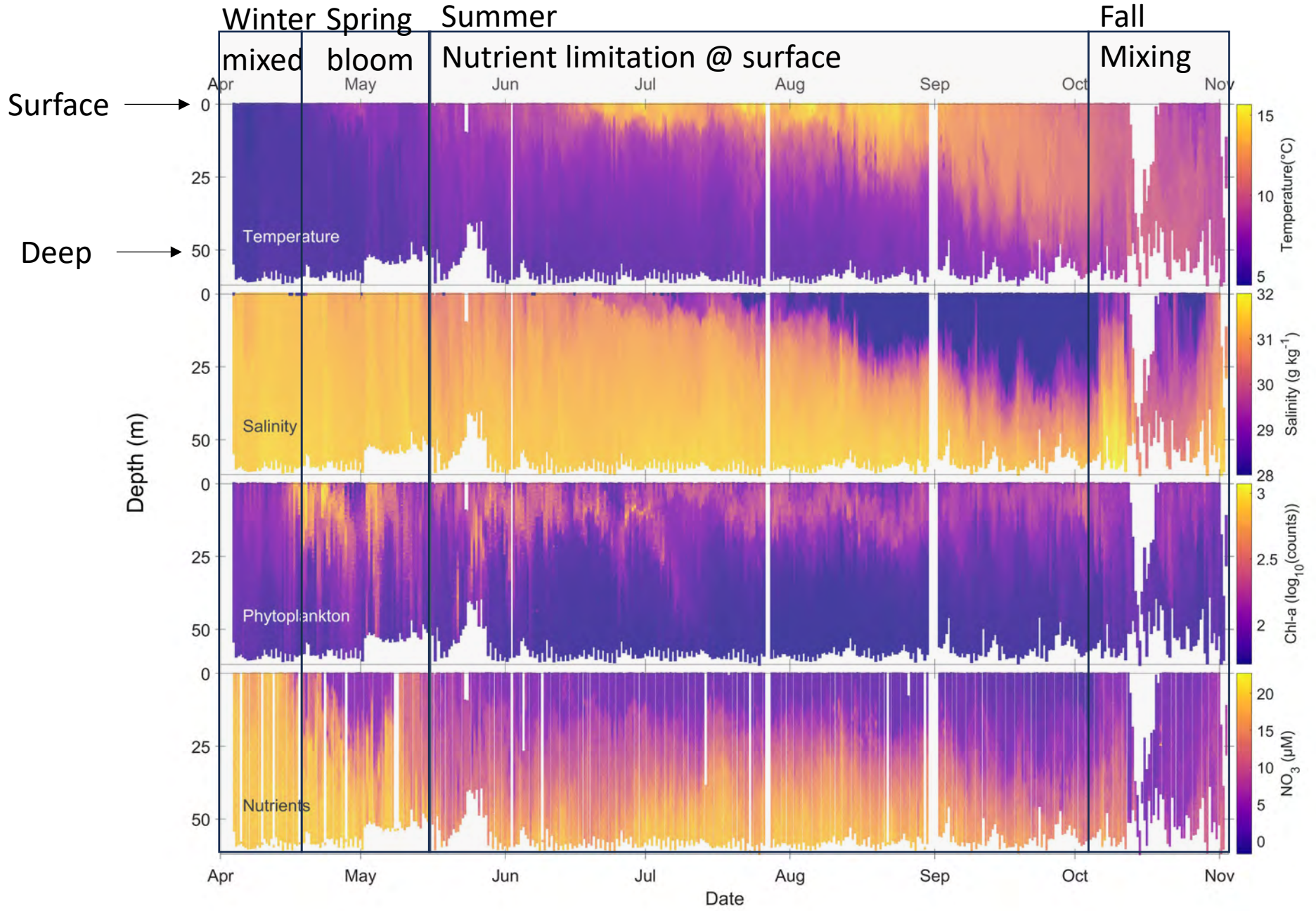
Rob Campbell – Ocean observing - PWS





Vessel Surveys
6x / year
Temperature, Salinity,
Turbidity, O2, Nutrients
Phytoplankton &
Zooplankton biomass

PWS surface oceanography 2024

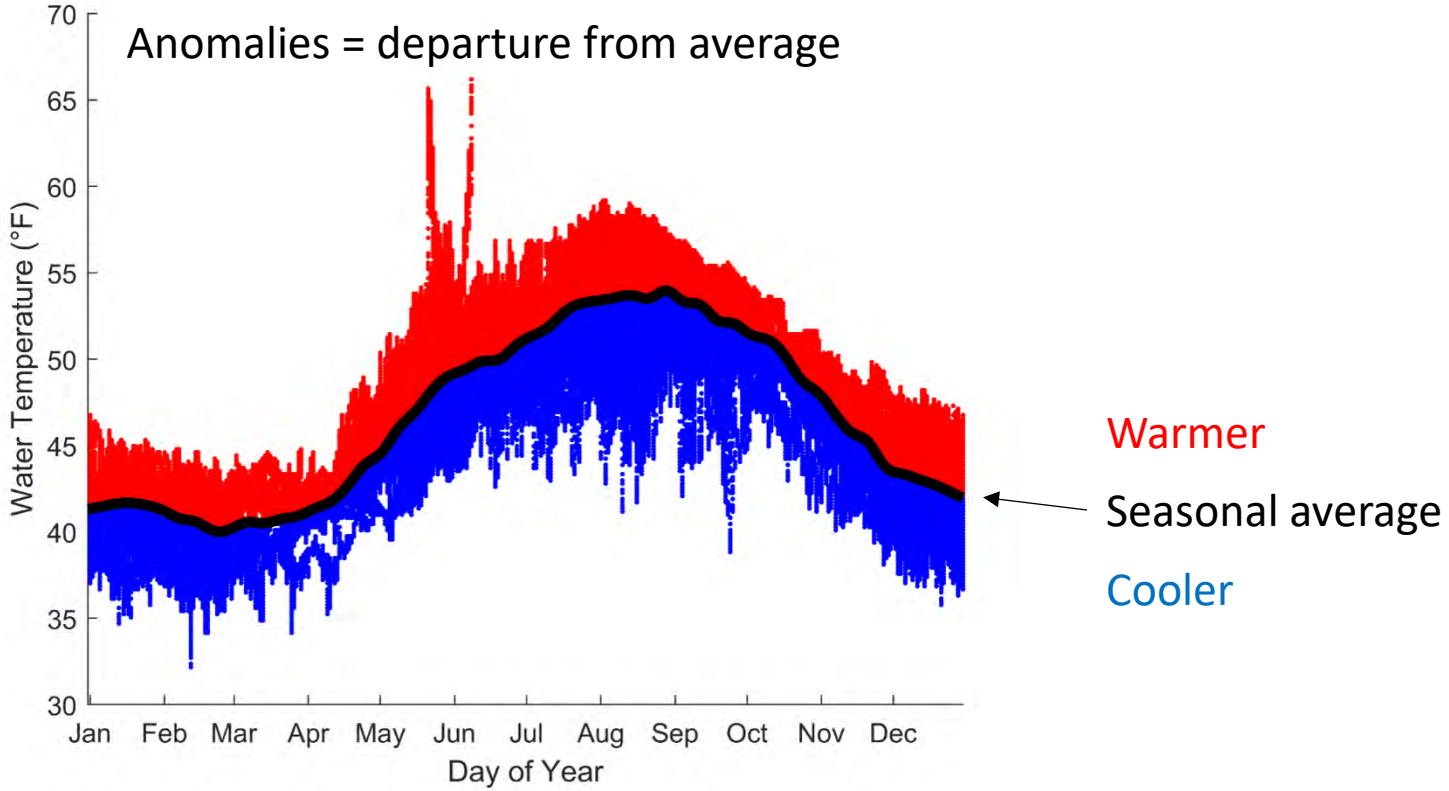


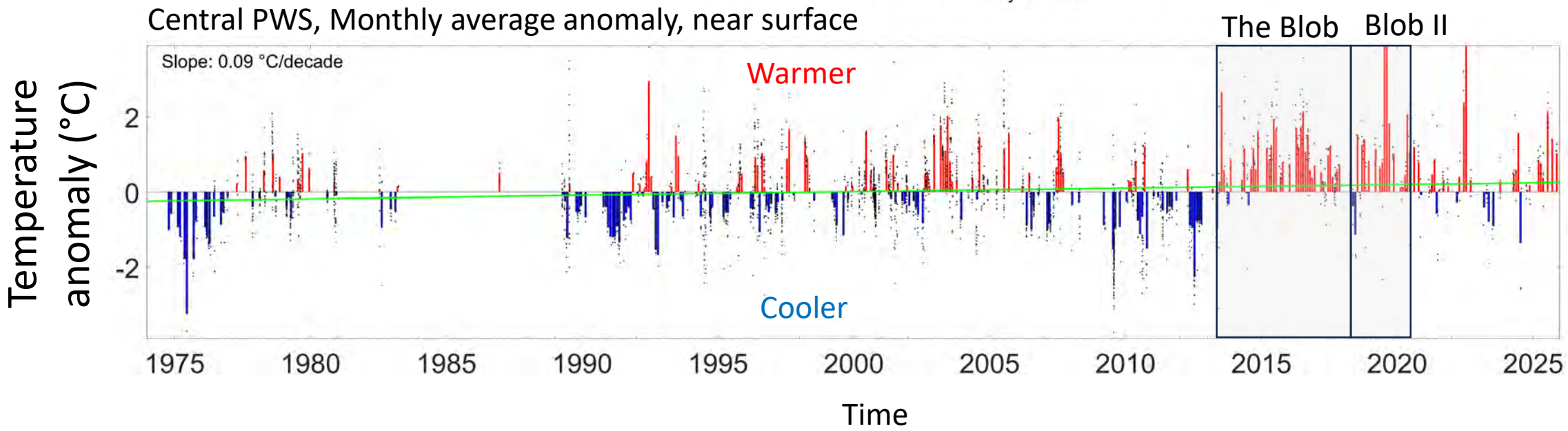
2016: Plankton camera

Automatic identification of 43 classes of plankton

Goal: realtime ecosystem assessment

State of the Sound



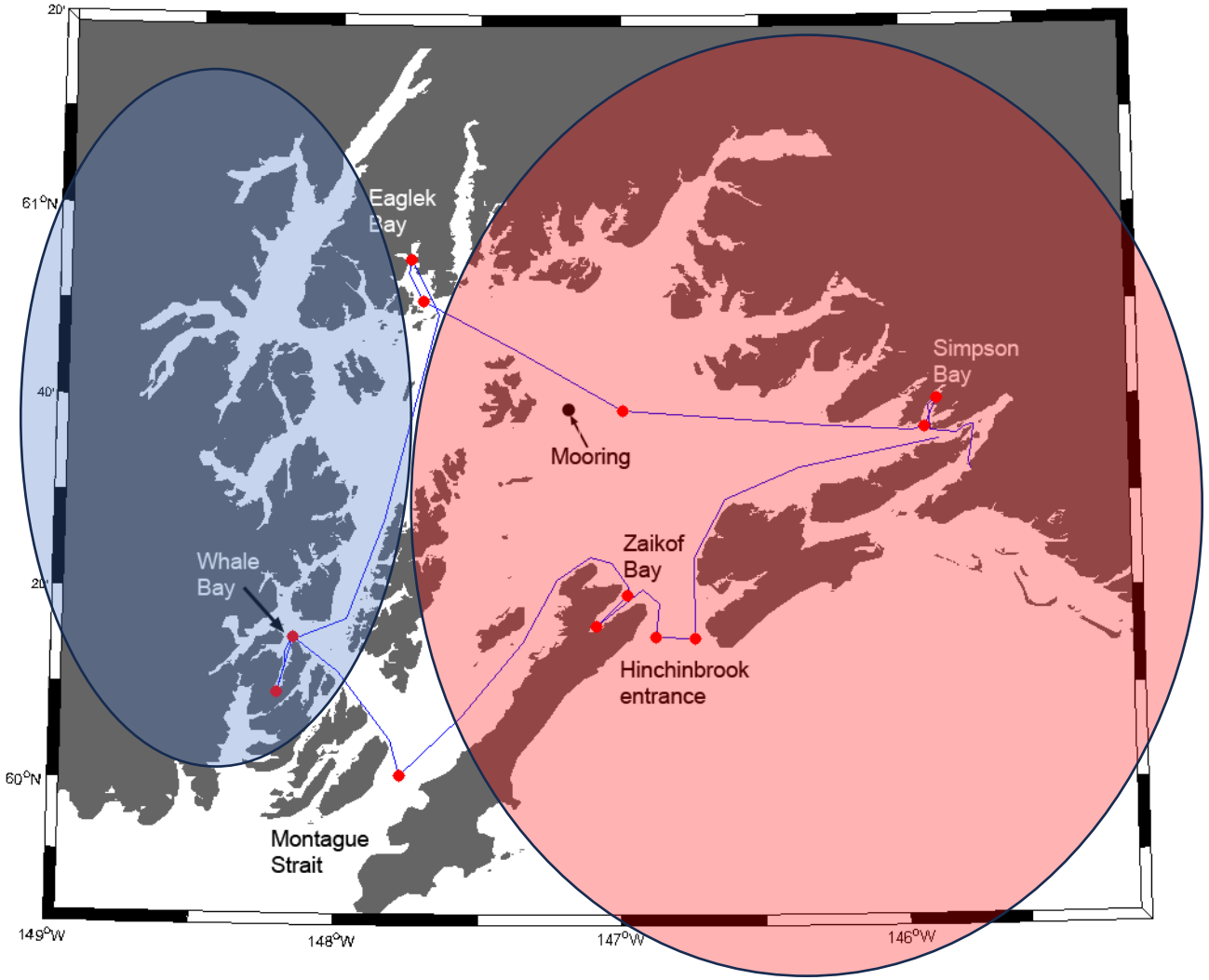


Heat Wave impacts

- Change in plankton
- Forage fish: reduced growth
- Fisheries recruitment failures
  e.g. P. cod, crab
- Seabird wracks
- Whale mortality

State of the Sound

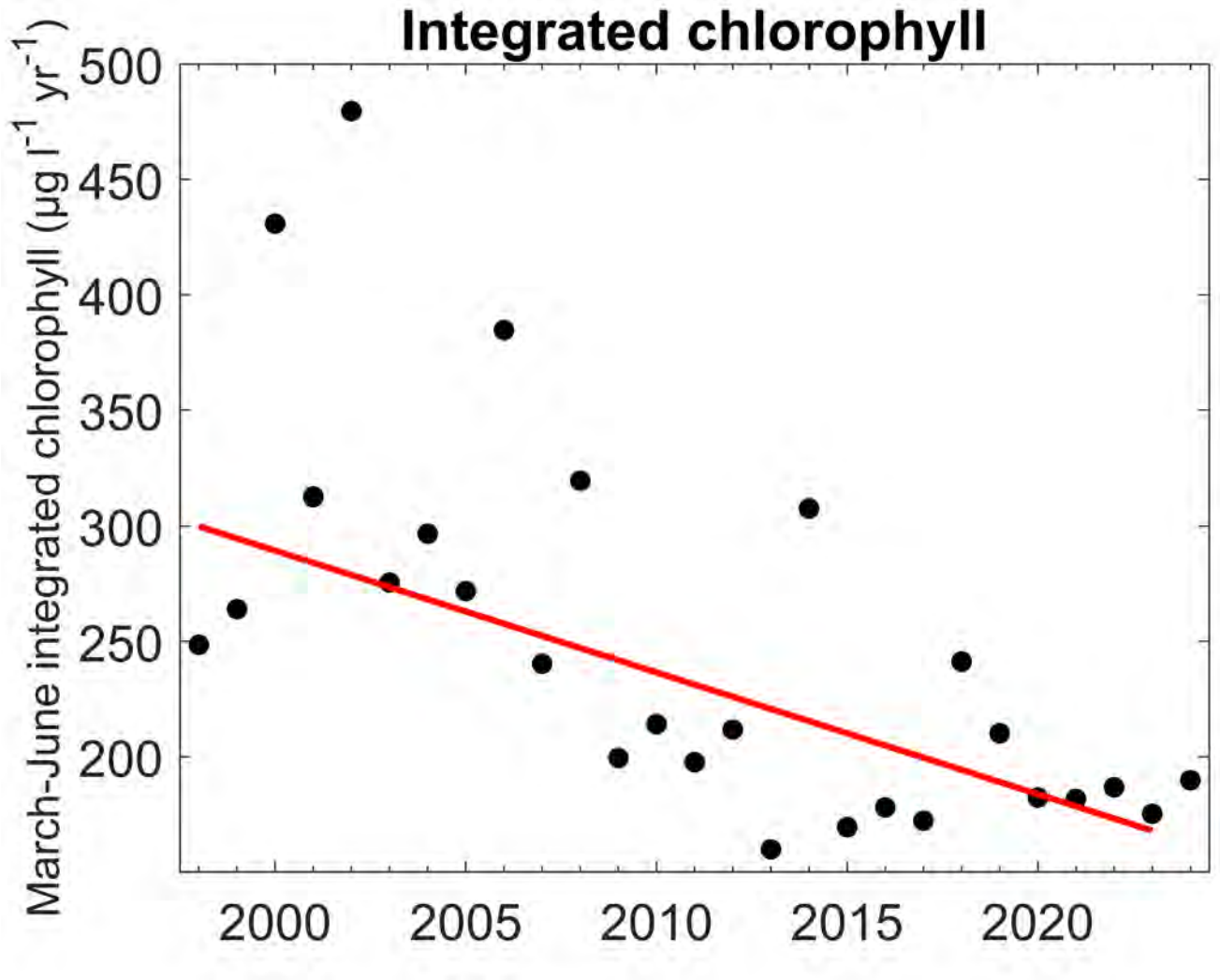
Cooling,
Freshening



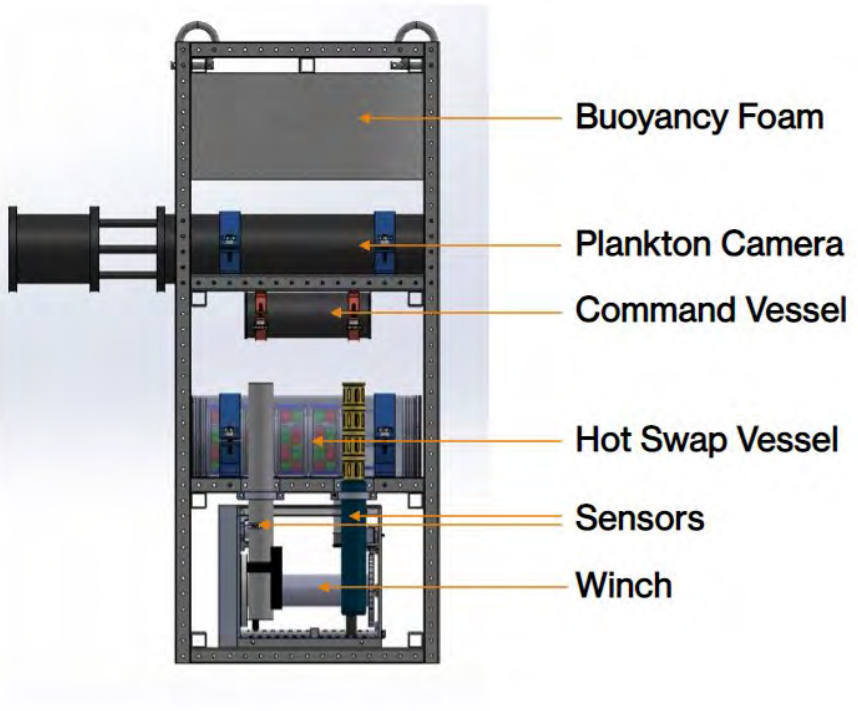
Warming

Thinning surface layer = ~30% decline in productivity

"Greenness of the ocean observed from satellite"

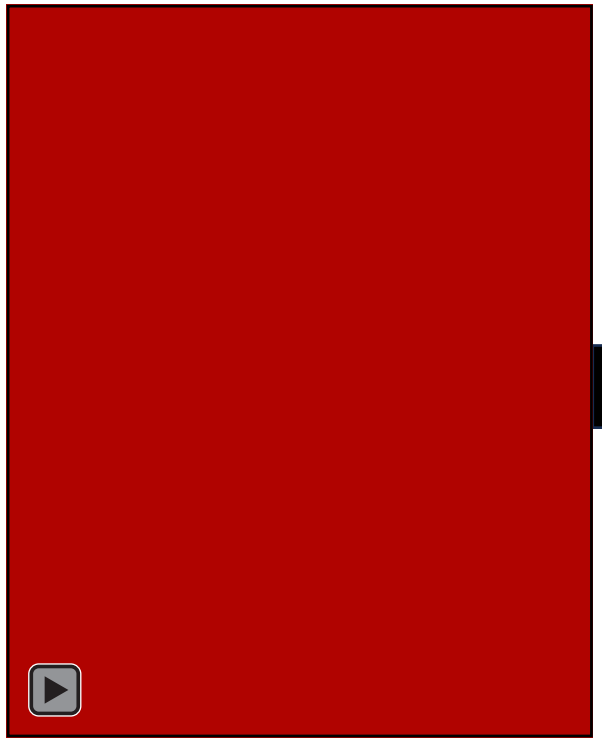


Next step: PAMPR 2.0



Automating salmon scale aging w/ AI

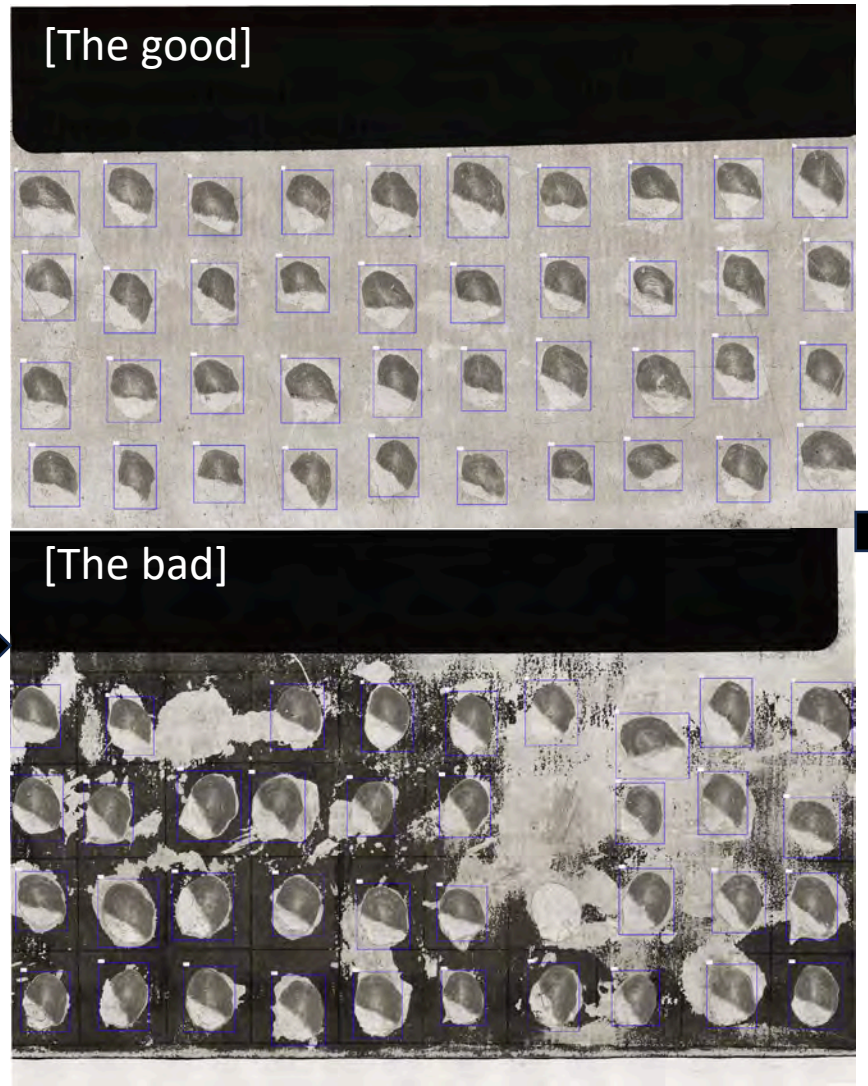
- Sockeye salmon (*O. nerka*)
- ADF&G Area E
  - Copper River & PWS
  - 2006 – 2020



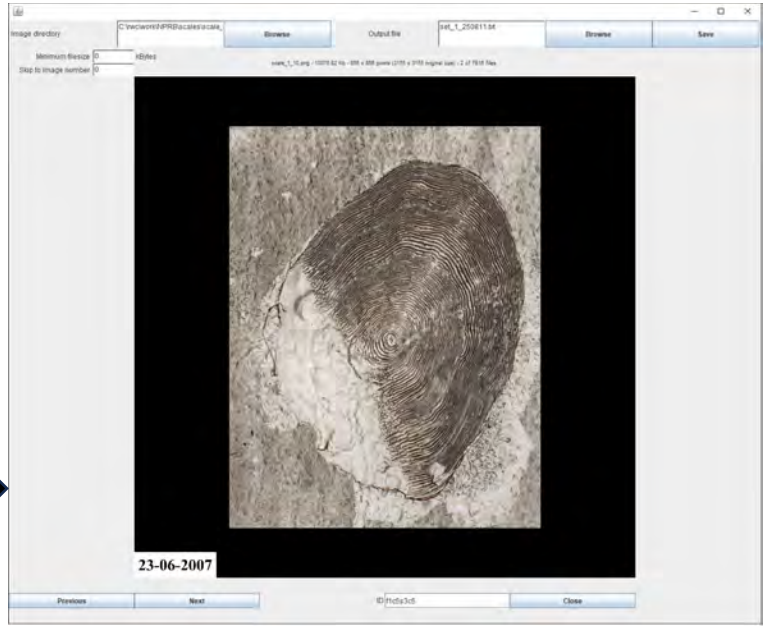
Axioscope 7; 2.5X objective

YOLOv5

~1 GB/image



IDGUI 2.0



- 14985 scales
- 5 Expert Readers (4 + production)

  https://mtalab.adfg.alaska.gov/
- FW & SW age, confidence

The machines can “learn” from individual humans

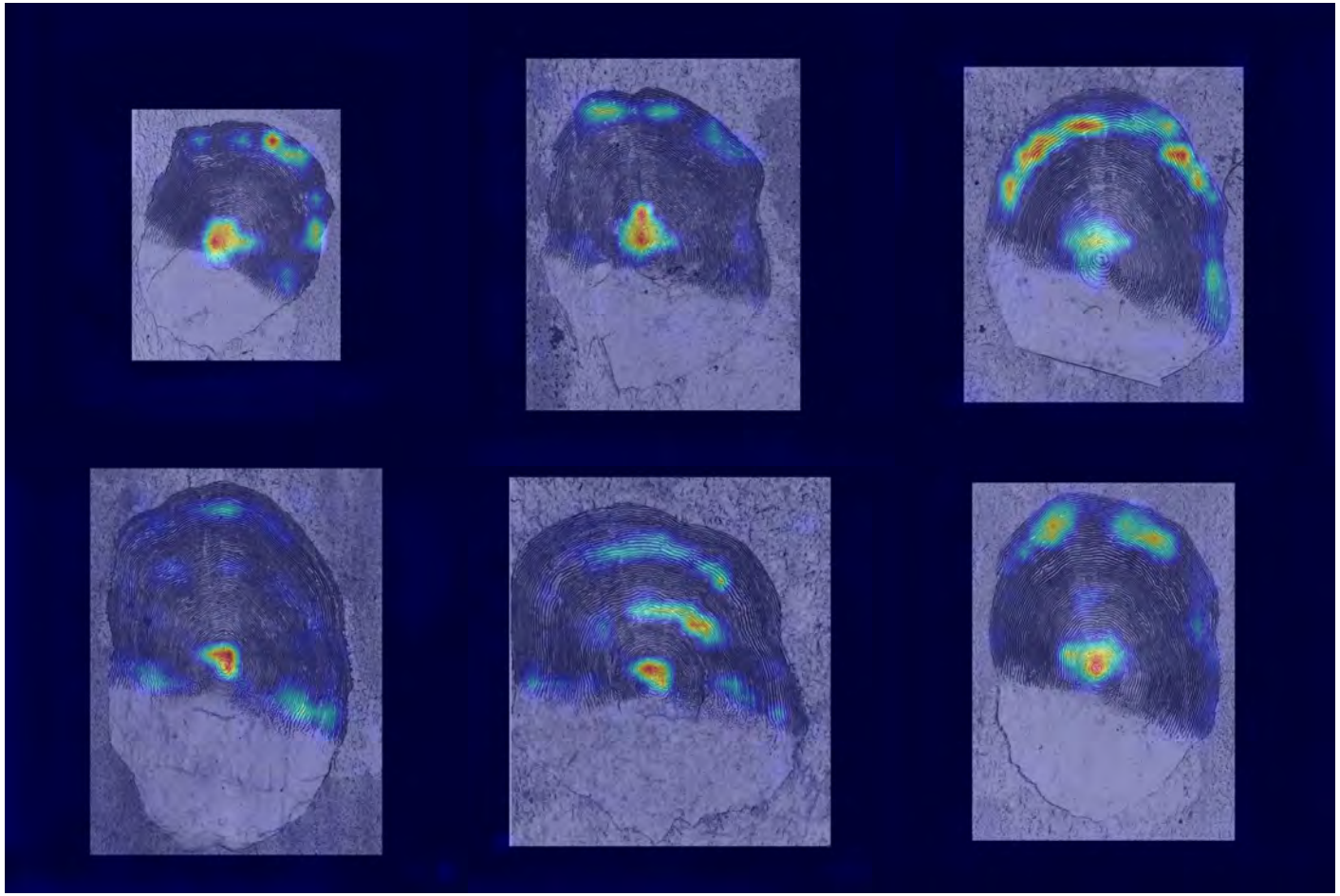
All accuracies:

Human
Machine

92
85
82
81
81
81
80
77
77
77
76
75
73
73
72
70

Gradient-weighted Class Activation Mapping

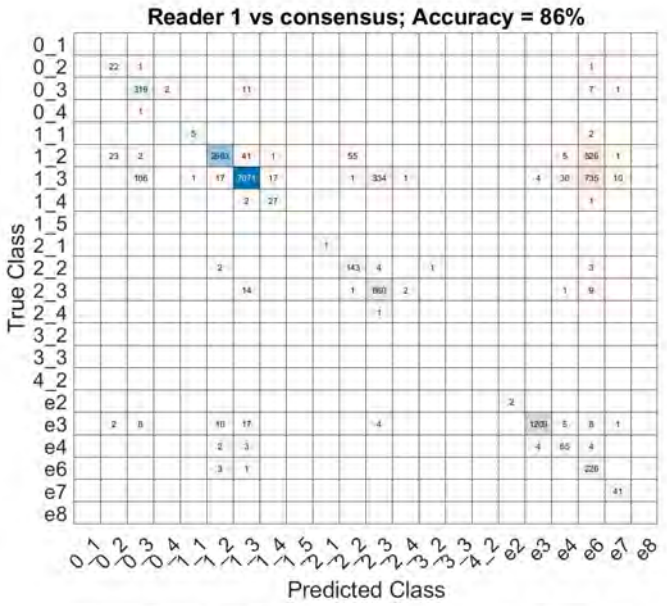
[Last convolutional feature map after Efficientnet and attention blocks]

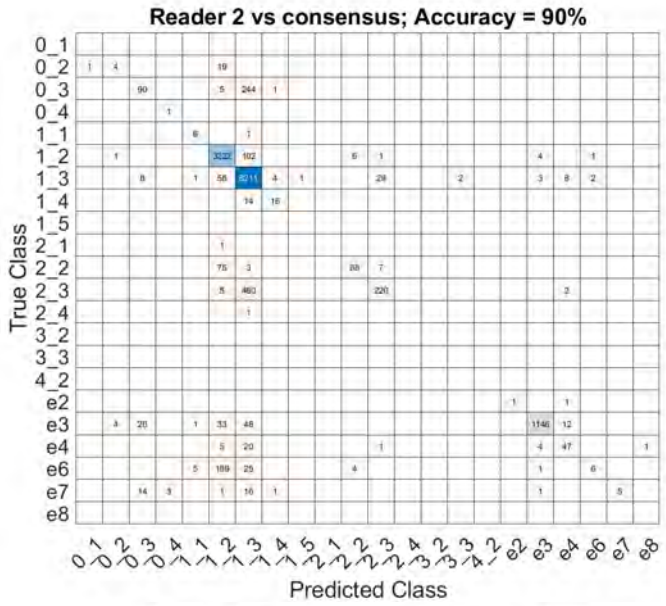


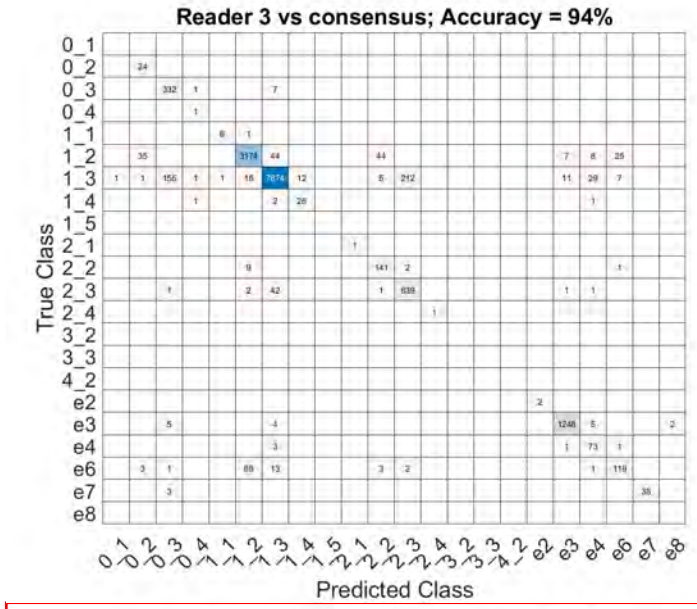
Humans vs Machines

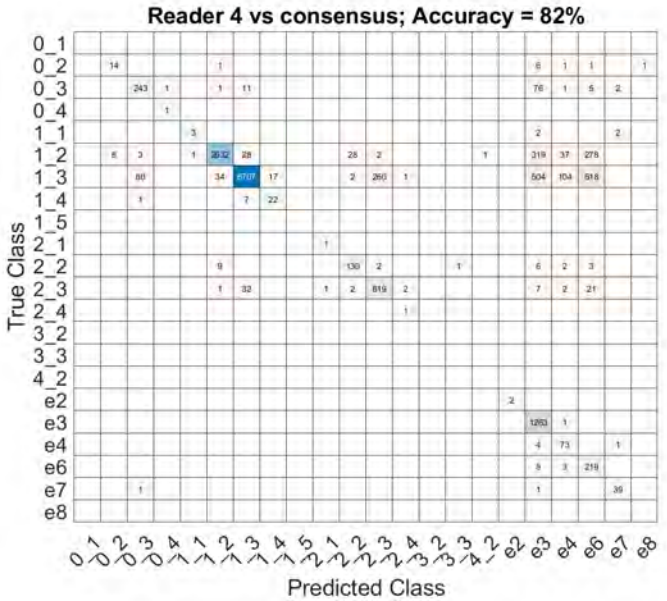
More blue = good

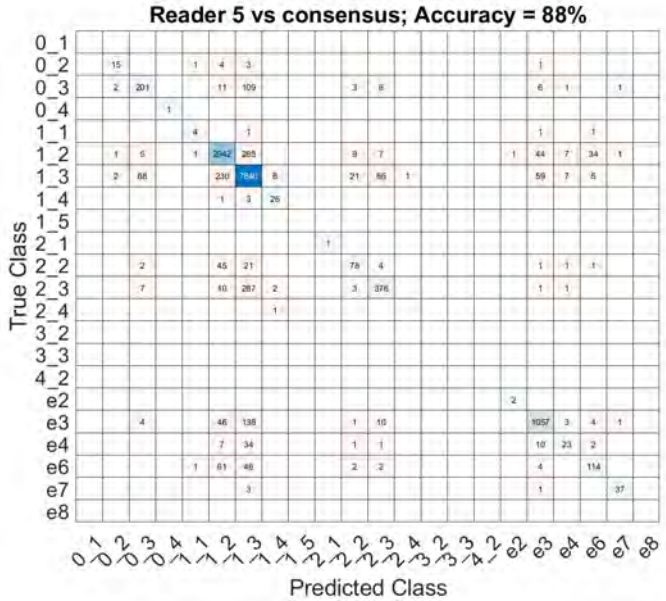
More red = bad

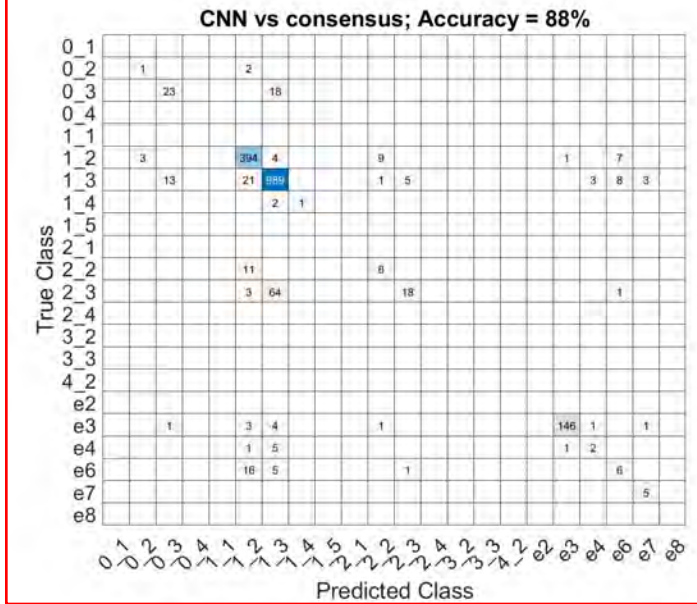




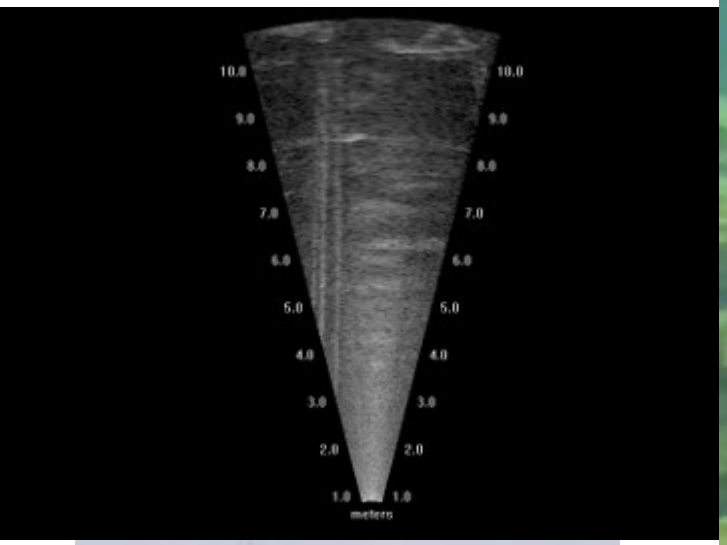




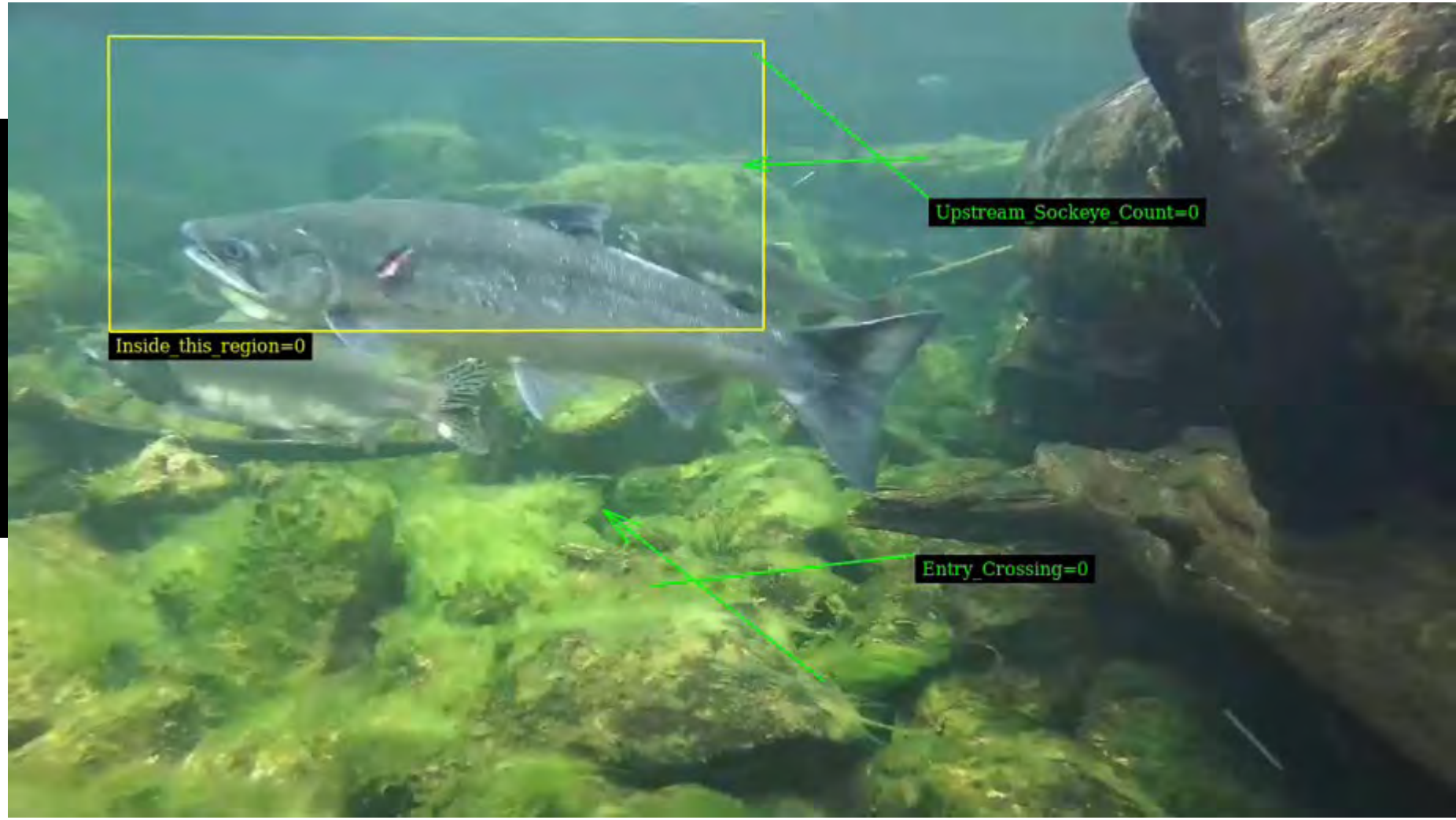




Fish passage work – Sonar & StreamCam



“one more opener”



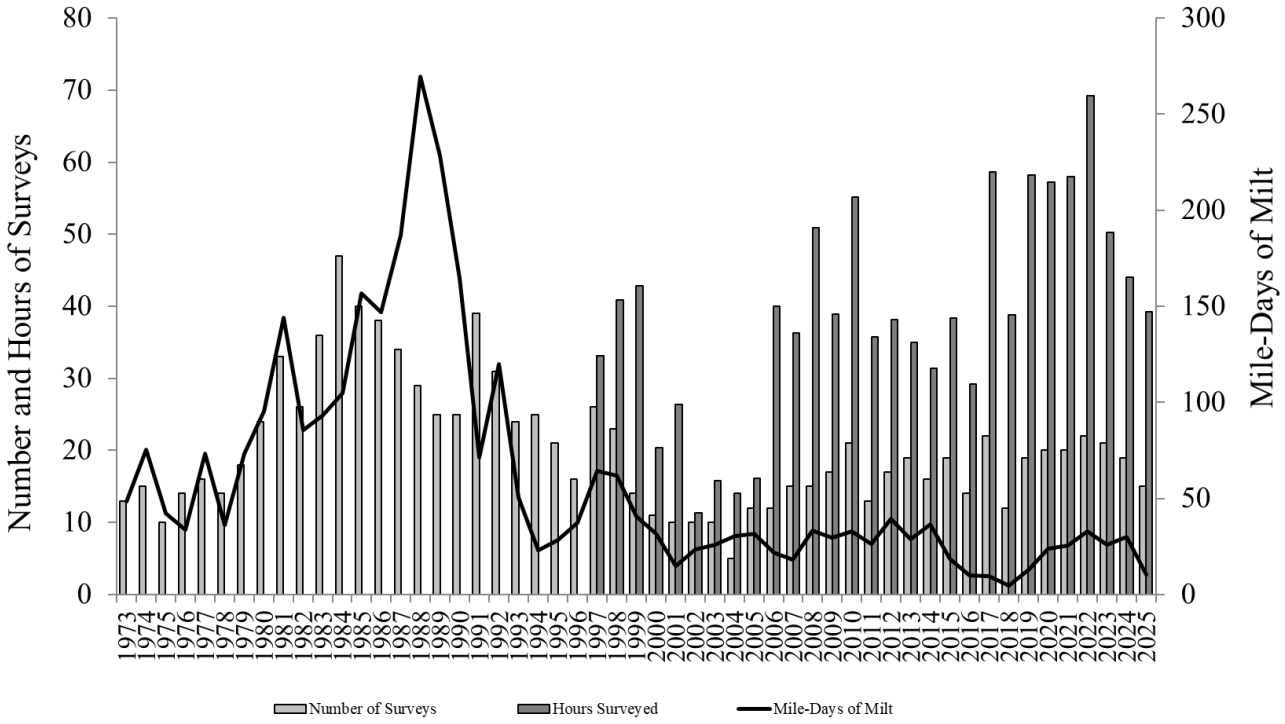
Weir replacement

Scott Pegau

Herring Research and Monitoring Program

Herring Research and Monitoring Program

- Integrated research efforts
- Evolved to address different aspects of the population
- Work has application to other herring populations

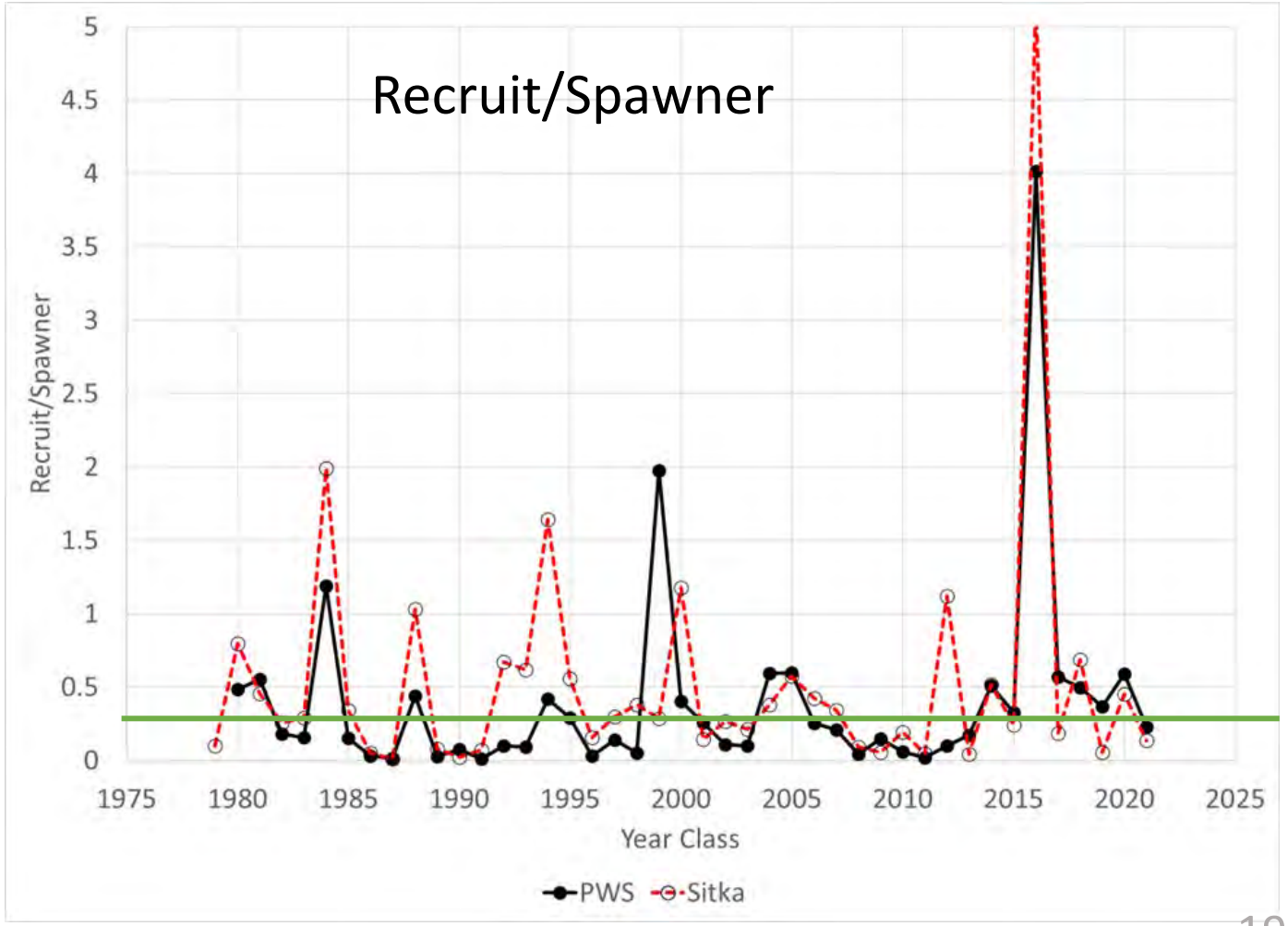


PWSSC Herring Research and Monitoring

- Acoustic biomass estimates
- Juvenile aerial surveys
- Spawn surveys
- Juvenile energetics
- Tagging
- Herring-salmon interaction
- Disease prevalence

Herring Recovery

- Recovery requires more recruitment than mortality
- Mortality
- Recruitment
- Restoration



Pete Rand

Fish ecology

Salmon / Herring interactions project

Streams

Hatcheries

May
This study in PWS, nearshore, shallow water

Juvenile and adult herring

Pink salmon fry

June & July
This study in PWS, offshore, deeper water

Larval herring

Pink salmon smolts

September
This study in PWS, herring nursery bays

Juvenile and adult herring

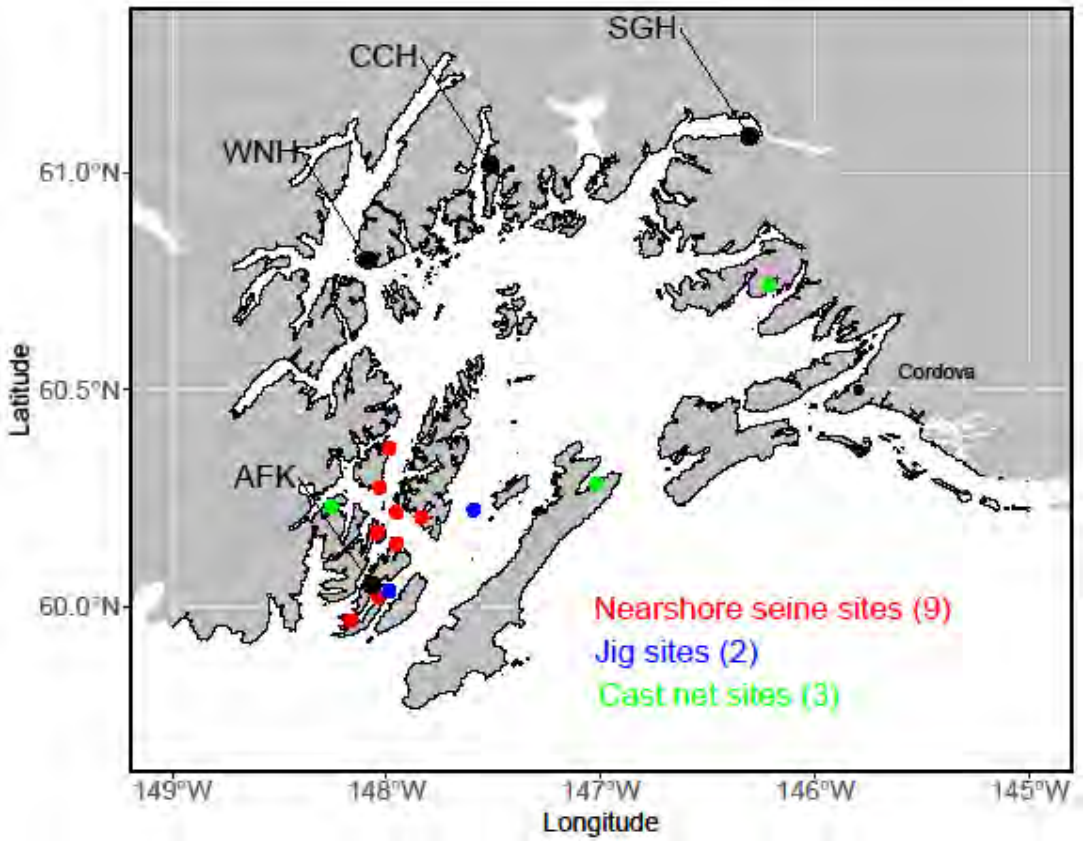
Shared plankton prey

July-August
Allied research efforts in the Gulf of Alaska, ADF&G Western GOA Trawl Survey, Ocean Bight LLC Middleton Island Sampling, ACOR Western GOA Seine Survey)

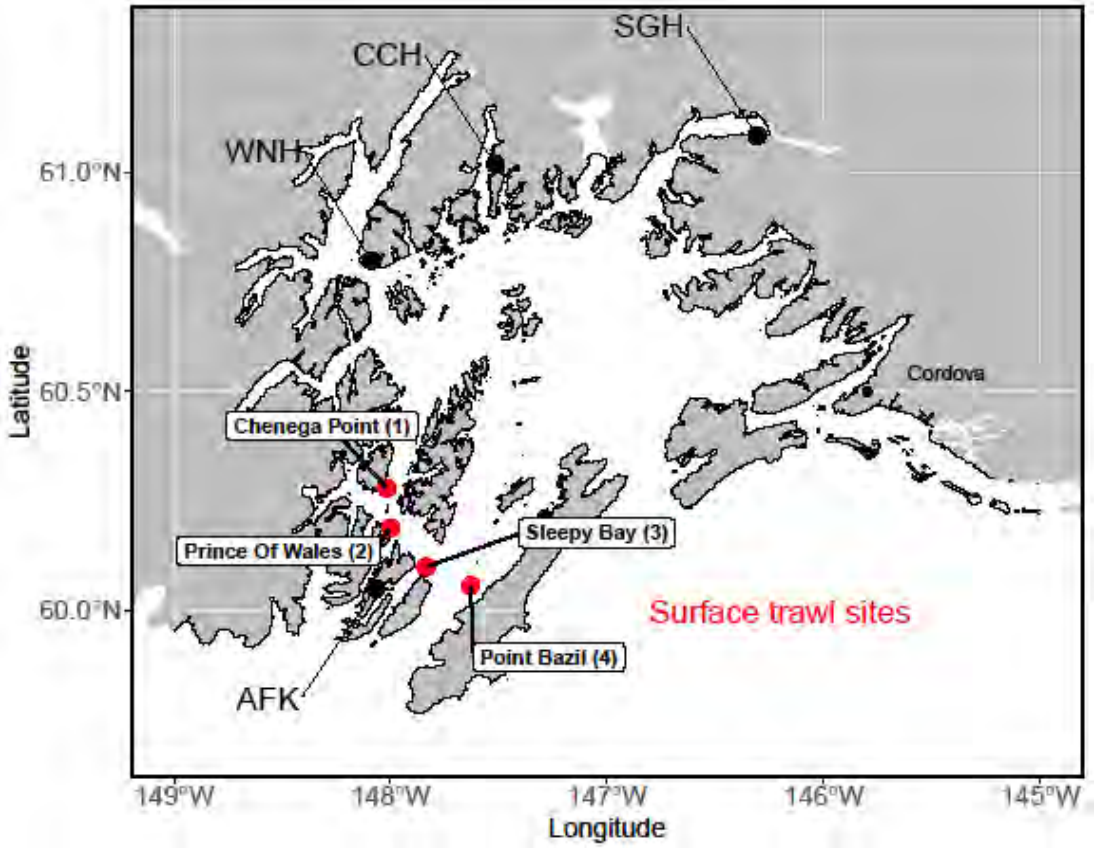
Surviving pink salmon

Sampling Sites

May and September

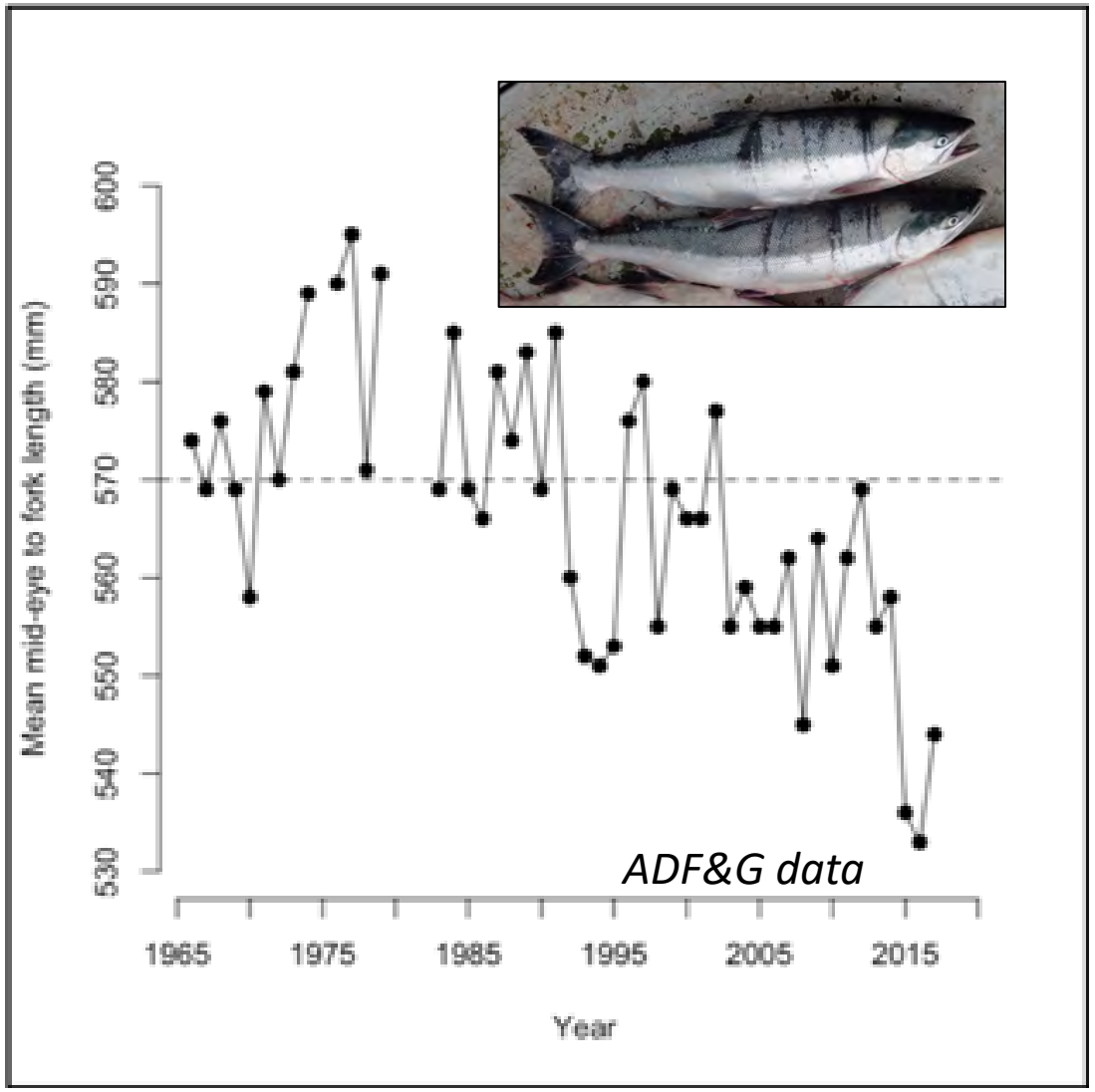


June and July



Body Size of Copper River Sockeye is Changing

Image: Copper River Marketing Assoc.



Copper River Salmon 2125 – What does the future look like for salmon?

Next Workshop Details
Dates: February 10–11, 2026
Location: Cordova, Alaska

Data Rescue Effort

- Recovering data on **80,000 sockeye salmon** from **1967–1972**
- Goal: Compare **size, sex, and migration timing** to modern data
- Investigating **size-selective mortality** using historical data
- **Special thanks to:**
  - **Ken Roberson** – Collecting data, will be presenting digitally scanned early salmon photos from his 30+ year career!
  - **Lindsay Turner** – Compiling and analyzing historical data

Travel Assistance

- Limited funding available
- Contact the **Science Center** if interested

Workshop Focus

- Convene experts from diverse research disciplines
- Explore current state of salmon populations
- Assess projected impacts from climate change and shifting ocean conditions

Radio Tagging

Study Overview:

- Over **1,000 adult fish tagged per year** – NVE fish wheel
- **Biological data collected** on each individual, including size and energy reserves
  - A **handheld microwave "fat meter"** is used to estimate fat content in live fish
  - Measured fat content ranges from **<1% to 16%**
- **Objective:** Understand how **body characteristics** (size, fat content) relate to **migration success** in the Copper River

Research Goal:

- Investigate the relationship between **size**, **energy reserves**, and **survival/migration success**

Investigating new approaches to describing freshwater habitat and tracking the smolt migration of Chinook salmon in the Copper River

P. Rand and R. Chaganti, PWSSC, Dan Gorze, AITRC

Tagging trials of sockeye salmon smolts, spring 2025

- Sample juvenile Chinook and their habitat in Copper River tributaries (2026-2028)
- Measure fitness-related traits (body size, condition, gene expression, pathogens)
- Track fish during spring smolt migration
- Address knowledge gaps about smolt outmigration patterns
- Identify mortality hotspots

Alaska Sustainable Salmon Fund

Rao Chaganti

‘Omics

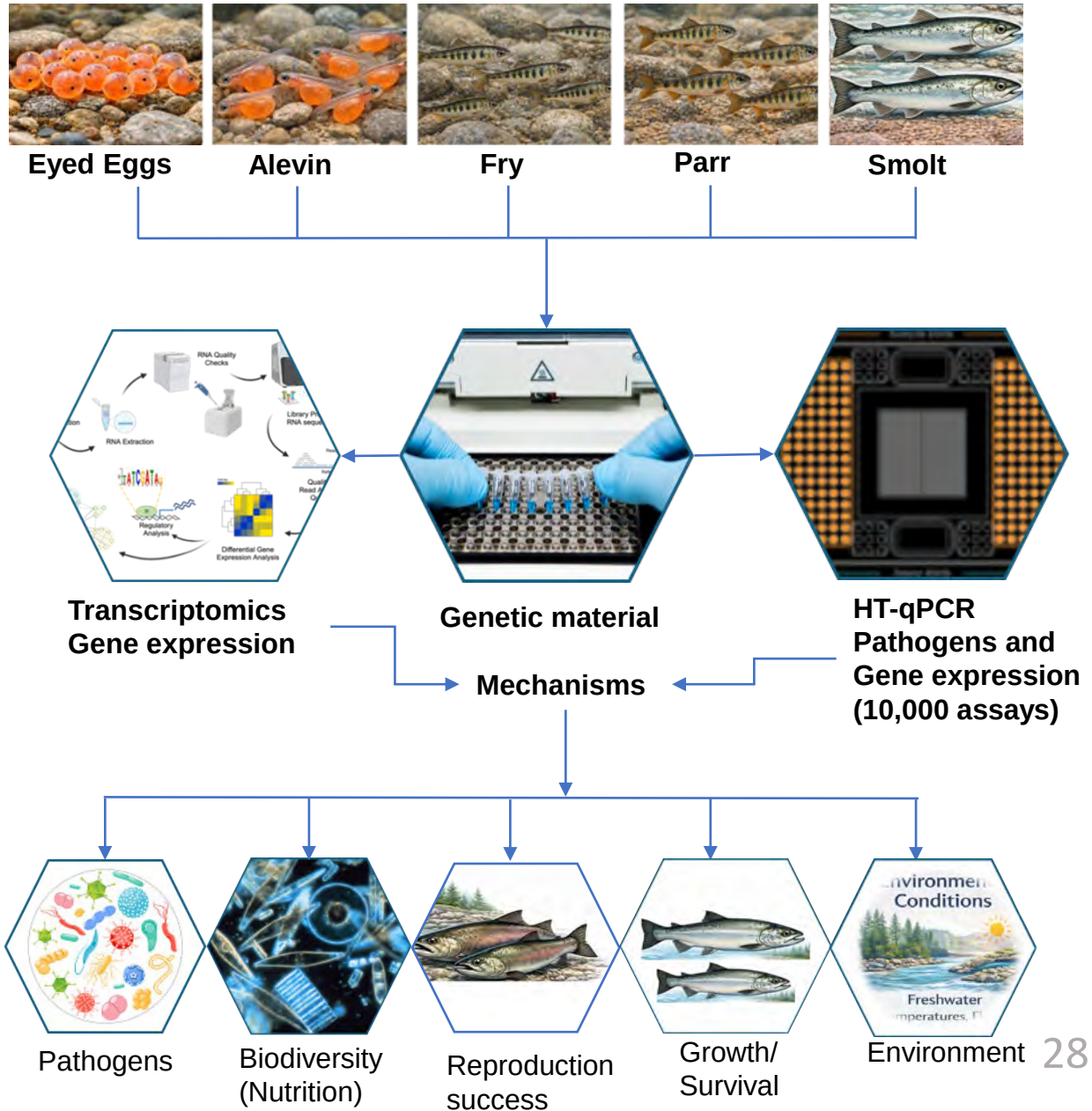
What's causing smaller and fewer returning salmon?

(Rao Chaganti)

- **Why it matters**?
  - Food security, local economies at risk
  - Traditional monitoring show decline but not cause
  - Mechanism driving reduced early survival is uncertain

- **What we do**
  - Sample life stages from eggs to Smolts
  - Screen >50 pathogens
  - Measure stress and immune responses Track biodiversity shifts

- **What decision makers get**
  - Hotspots by life stage and place for pathogens and stress
  - An early warning of hidden problems
  - Risk map

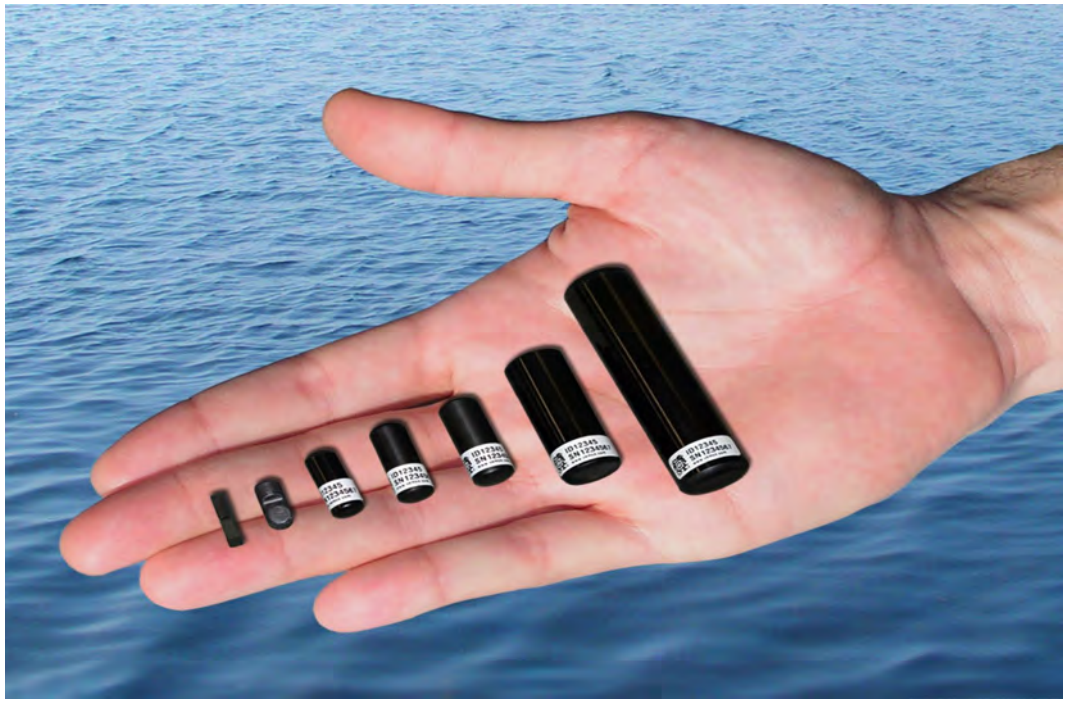


Mary Anne Bishop

Bird & Fish ecology

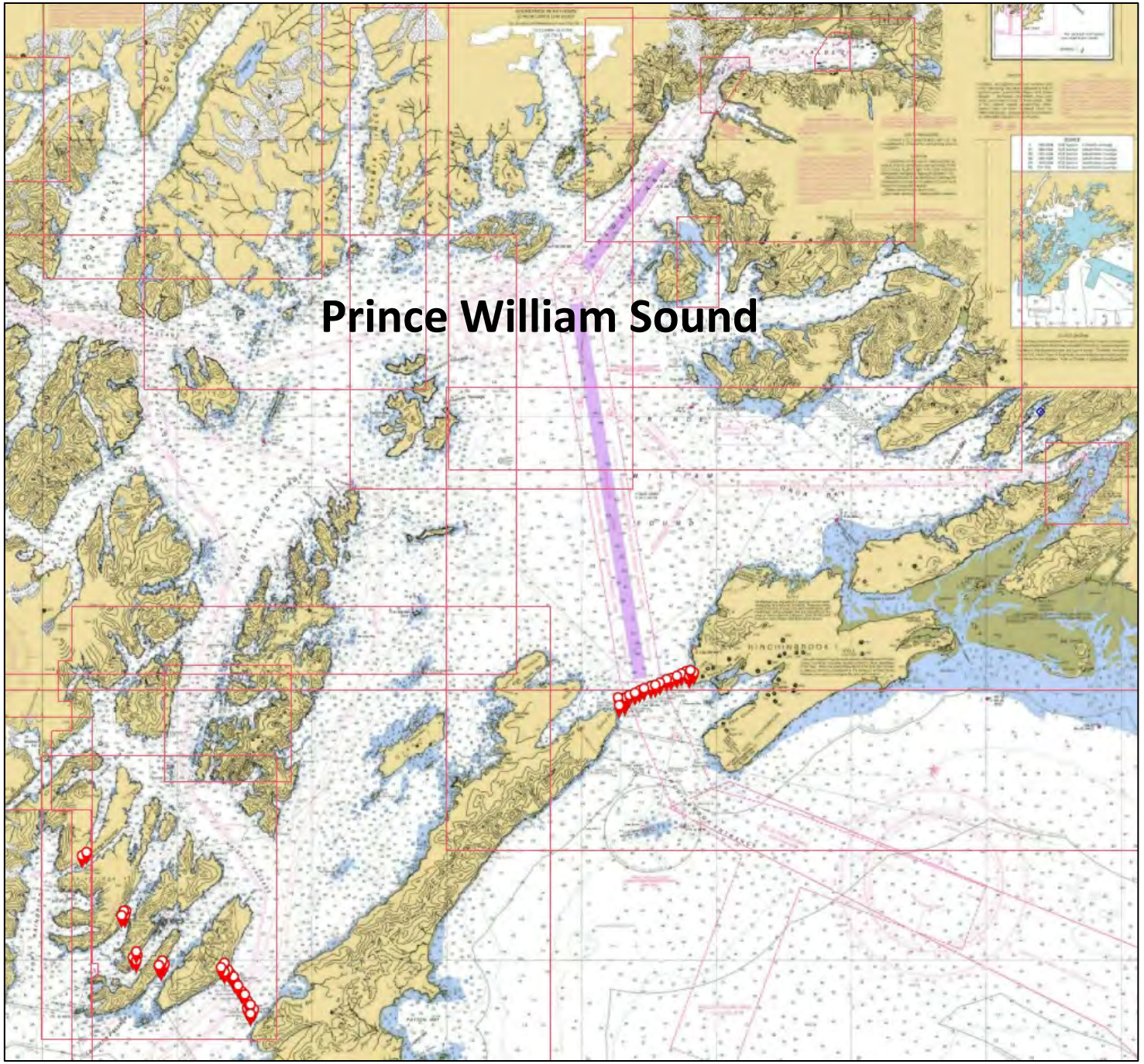
TRACKING ACOUSTIC-TAGGED FISH IN PRINCE WILLIAM SOUND

VR2AR Receiver with built-in release



Acoustic tags sizes

Surgically inserted tags



Six Acoustic Arrays since 2014

at Entrances Connecting PWS to the Gulf of Alaska

Funded by:

- Canada's Ocean Tracking Network (OTN)
- Alaska Ocean Observing System

Data Sharing thru:

- OTN & N-PAcT (NE Pacific acoustic telemetry node)

Fish Movements Investigated by PWS Science Center

Lingcod

Pacific cod

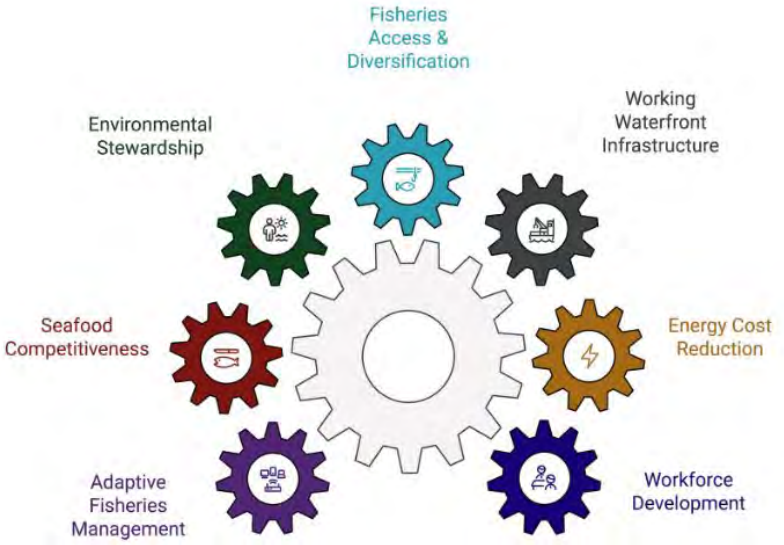
Rockfish

Pacific Herring

Marysia Szymkowiak

Director of Coastal Resilience

Seafood Energy and Innovation



Gulf-wide Fisheries Planning Work

- The PWSSC hired a Director of Coastal Resilience in January, Marysia Szymkowiak.
  - She comes to us after 10 years as a Research Social Scientist with NOAA's Alaska Fisheries Science Center

- Marysia's work focuses on developing and implementing resilience initiatives in fishing communities
  - Grounded in a Gulf-wide effort to understand vulnerabilities and develop fisheries resilience plans
  - Centered on: adaptive fisheries management, fisheries access and diversification, seafood competitiveness, environmental stewardship, working waterfront infrastructure, energy cost reduction, and workforce development

- She is currently leading projects focused on:
  - Seafood Energy and Innovation with the Alaska Longline Fishermen's Association
  - The Innovate Cordova 2026 Summit
  - A Capital Valuation Study of Prince William Sound
  - And developing a portfolio of work that builds the frameworks, partnerships, policies, and funding strategies that help fishing communities lead their own economic futures.

Thank you