Northwest **Power** and **Conservation** Council

August 4, 2026

MEMORANDUM

TO: **Council Members**

FROM: **Patty O'Toole**

SUBJECT: **Briefing on the Northwest Fisheries Science Center**

BACKGROUND:

Presenter: Scott Hecht, Ph.D. (Fish Ecology Division Director, Northwest Fisheries Science Center)

Summary: Scott will present an overview of the Columbia River basin research conducted by the Northwest Fisheries Science Center. NWFSC is the research arm of NOAA Fisheries.

Relevance: The 2026 Fish and Wildlife Program outlines a variety of research, monitoring, and evaluation needs across Program topics. As one of the research entities in the basin, the work of the NWFSC contributes to the scientific foundation of the Program, helps to address key critical uncertainties regarding ecosystem function and response to restoration actions, and implements Program measures, particularly in the Plume and Nearshore Ocean Strategy and the Habitat Restoration and Protection Strategy.

Background: The Northwest Fisheries Science Center, located in Seattle, WA, is the research arm of NOAA Fisheries. The Science Center is comprised of four divisions- Conservation Biology, Environmental and Fisheries Science, Fish Ecology, and Fishery Resource Analysis and Monitoring. NWFSC scientists work on a range of topics informative to implementation of the Council's Fish and Wildlife Program,

including research, monitoring, and evaluation related to endangered species and habitat restoration, along with direct implementation of the Program's Plume and Nearshore Ocean strategy.

Dr. Scott Hecht serves as the director of the Fish Ecology Division, with staff located in Seattle and Pasco, in Washington, and Point Adams and Newport, in Oregon. As described on the NWFSC website, the division strives "to help resource managers and the public understand ecological links between fish and their Pacific Northwest habitats. We focus on understanding the migratory behavior of fish in the river, estuary, and ocean along with the ecosystem processes that affect growth and survival in these contrasting environments. A major area of interest is the Columbia River estuary, where we study physical, chemical, and biological interactions that affect fish populations." Dr. Hecht will provide an overview of the portfolio of the center's research and priorities related to the Columbia River.

More info:

https://www.fisheries.noaa.gov/about/fish-ecology-division-northwest-fisheries-science-center

Northwest Fisheries Science Center

Northwest Power and Conservation Council

August 12, 2026

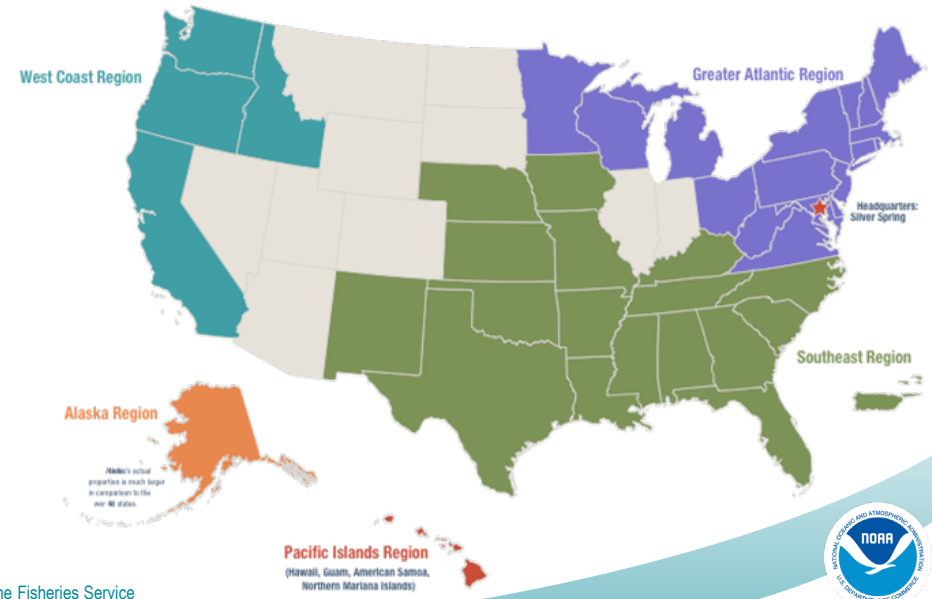
Jeremy Rusin

NWFSC Science Director

NOAA Organizational Structure

National Marine Fisheries Service or NOAA Fisheries

- HQ in Silver Spring, MD
- Five Regions
  - Greater Atlantic
  - Southeast
  - West Coast
  - Alaska
  - Pacific Islands



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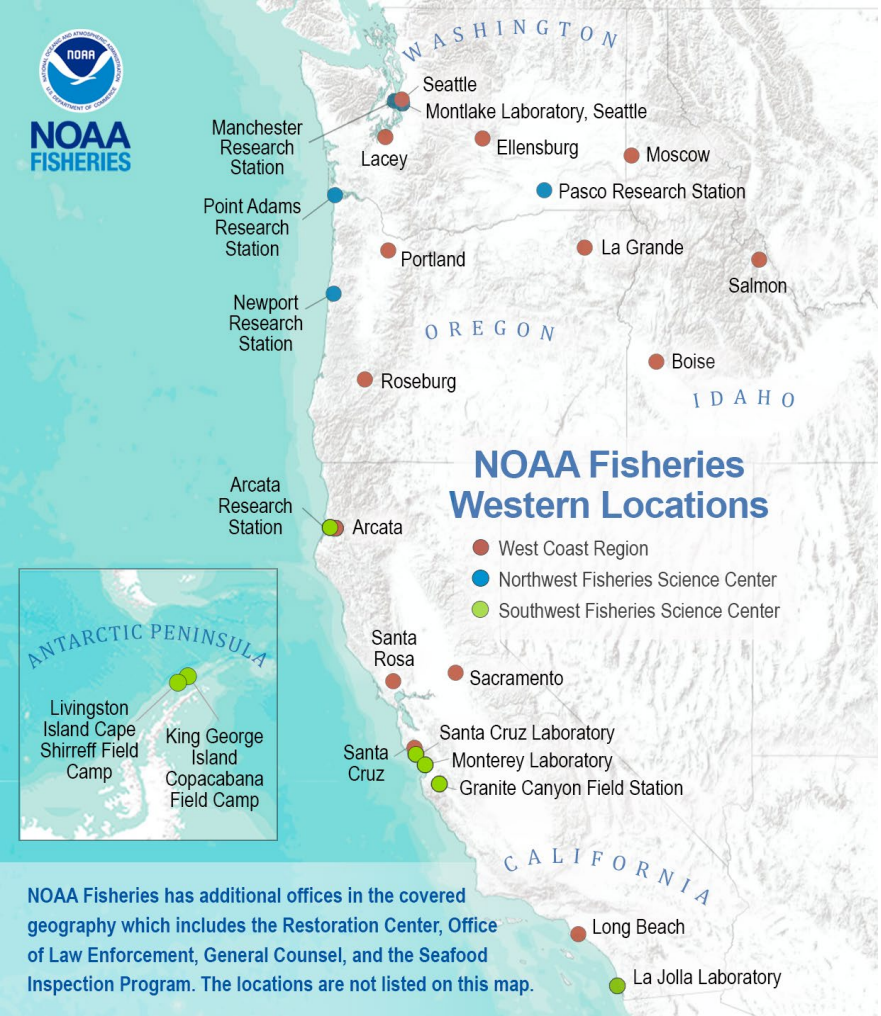
NOAA Fisheries on the West Coast

- West Coast Regional Office
- Northwest Fisheries Science Center
- Southwest Fisheries Science Center



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NWFSC locations

Montlake serves as the Center's Headquarters, fostering innovative and integrated solutions to the complex issues facing our fisheries, protected resources, and oceans.

The Manchester Research Station is NOAA's premier marine aquaculture and Pacific salmon hatchery research station.

The Pasco Research Station supports research on anadromous fish migrations and safe salmon passage through major hydroelectric dams.

The Point Adams Research Station focuses on salmon ocean survival and impacts of pinniped predation on salmonids.

The Newport Research Station is the only ocean-port research facility, and conducts critical research on groundfish, salmon, and marine ecosystems.

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NWFSC's 5 interconnected divisions

CB	EFS	FE	FRAM	OMI
Conservation Biology Division	**Environmental & Fisheries Sciences Division**	**Fish Ecology Division**	**Fishery Resource Analysis & Monitoring Division**	**Operations, Management & Information Division**
Ecosystem Science	Aquaculture & Marine Finfish & Shellfish Biology	Ecosystem Analysis	Economic & Social Science Research	Administrative Services
Genetics & Evolution	Environmental Chemistry	Estuarine & Ocean Ecology	Fisheries Observation Science	Facilities Management
Mathematical Biology & Systems Monitoring	Environmental Physiology	Watershed	Groundfish Ecology	Financial Services
	Fisheries Enhancement & Conservation		Population Ecology	Information Technology

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NWFSC Mission

The Center's mission is to conduct the science necessary to conserve marine and anadromous species and their habitats off the Washington, Oregon, and northern California coasts and in the freshwater rivers of Washington, Oregon, and Idaho.

Our research provides reliable, relevant, and credible information to help decision-makers and natural resource managers build sustainable fisheries, recover endangered and threatened species, maintain healthy ecosystems, and protect human health.

The Center is also dedicated to enhancing public awareness, education, and stewardship of our marine resources.

NWFSC science & innovation - Montlake hub

Research & Analytical Modeling

Population dynamics & stock assessments

Ecosystem-based fisheries management models

Integrated ecosystem assessments

Artificial intelligence & machine learning (AI/ML)

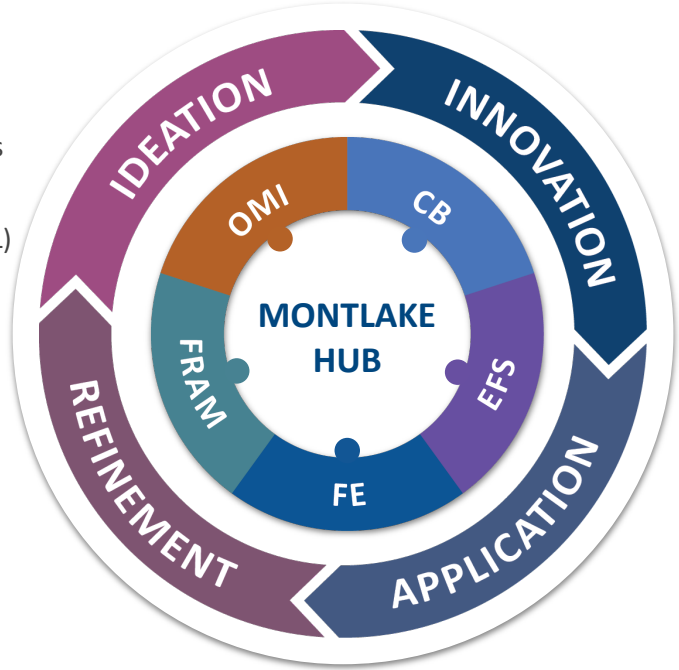
Field Data Collection & Observation

Groundfish, ecosystem, & salmon surveys

At-sea observing and Electronic monitoring

PIT tag & acoustic tracking

UxS, Autonomous, In-situ platforms



Management & Policy Applications

Regional fishery management council and treaty input

ESA listing status & recovery planning

Regulatory framework development

Scientific advice for sustainable harvest

Recreational & commercial fishing

Applied Innovation

Aquaculture technology development

NMFS Strategic Initiatives and Advanced Technology Investments

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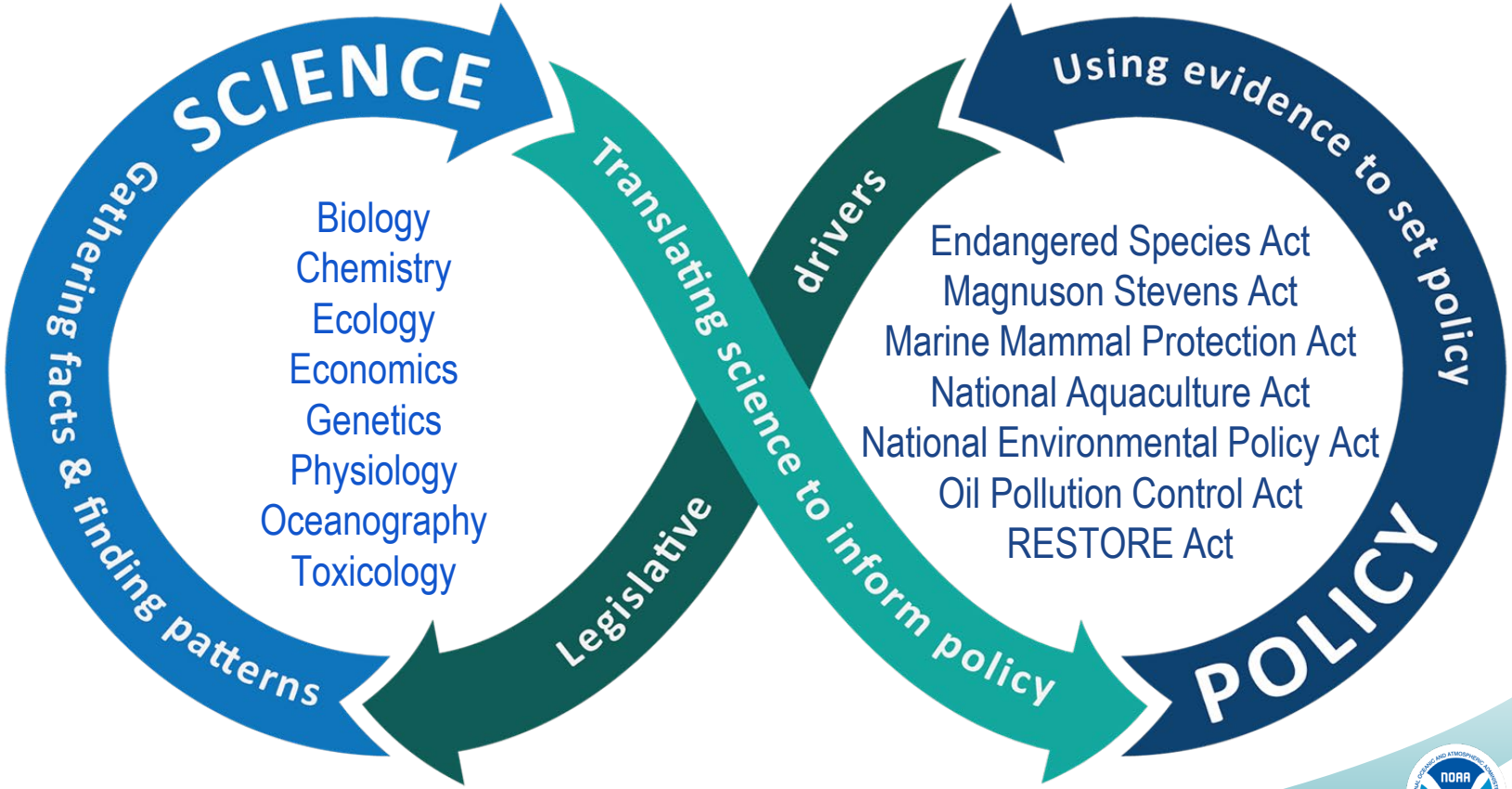
Science informed decision-making



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What we do

- We use science to improve people's lives, save species, and protect ecosystems in the Pacific Northwest and beyond.

- Our research supports NOAA's broader stewardship mission by providing the science to help resource managers
  - build sustainable fisheries,
  - recover endangered and threatened species,
  - maintain healthy ecosystems, and
  - support safe seafood and environmentally-sound aquaculture.

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NWFSC Roadmap: 5 Core Science Priorities for FY26

- Modernize Assessments
- Reimagine Data Collection
- Lean into ‘Omics
- Refocus Protected Resource Science
- Lead Aquaculture & Hatchery Innovation

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Hatchery innovation to support ESA-listed steelhead populations

Barry Berejikian & Chris Tatara
Environmental & Fisheries Sciences Division (EFS)
Fisheries Enhancement & Conservation Program

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Recovering ESA-listed Upper Columbia Steelhead

Hatchery scale research

- Evaluate innovative rearing strategies at the Winthrop National Fish Hatchery
  - Increase smoltification rate
  - Improve survival
  - Reduce precocious maturation rate
- Pre- and post -release smolt assessment
- Survival & migration of PIT tagged fish
- Reproductive behavior and success

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Can we improve the fitness of hatchery steelhead?

Wells Hatchery

Hatchery adults from age-1 smolt program

Methow River

Natural-origin adults

Winthrop National Fish Hatchery

Hatchery adults from age-2 smolt program

NWFSC Manchester Research Station

Social science to support salmon conservation and recovery planning

Robby Fonner
Economic and Social Science Research Program

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Where can social science help with conservation planning?

Evaluating & prioritizing alternatives

- Quantifying tradeoffs and allocating resources – *Return-on-investment analysis*
- Deciding whether to undertake an action or policy – *Cost-benefit analysis*

Identifying and designing candidate interventions

- Accounting for preferences and behaviors – *Behavioral models, surveys, participatory processes*
- Estimating the causal effects of policies – *Causal inference methods*

Estimating the value of conservation co-benefits

- Ecosystem services valuation – *Revealed and stated preference non-market valuation methods*

Reducing institutional and governance challenges

- Evaluative frameworks and solutions – *Transaction costs, collective action, Coasian bargaining*

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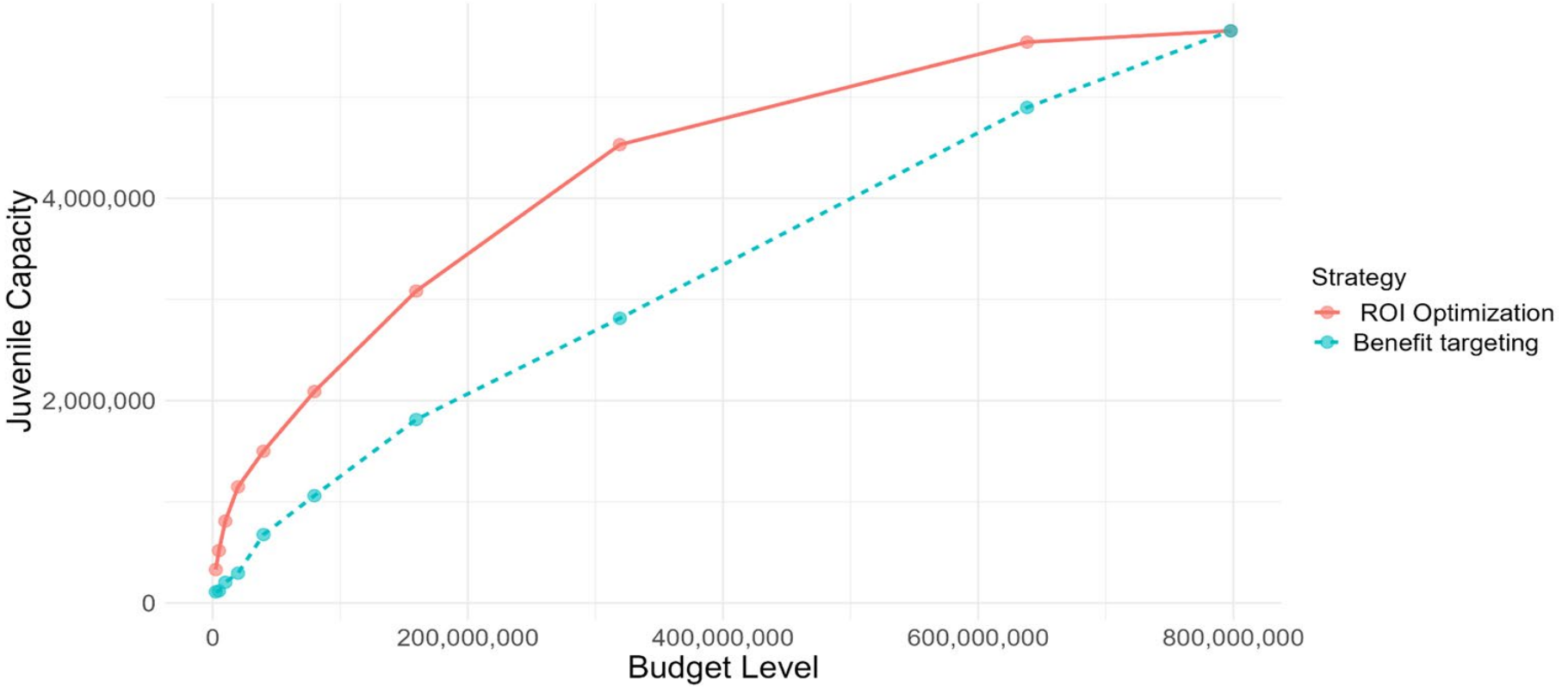
ROI-based planning delivers more conservation benefits per dollar spent



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Long-term research assessing freshwater survival of Columbia basin salmon & steelhead

Aimee Fullerton
Fish Ecology Division
Ecosystem Analysis Program

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Long-term research assessing survival of Columbia Basin salmon and steelhead

1. Tag wild salmon in natal tributaries
2. Monitor migration & survival through the hydropower system
3. Evaluate survival through the estuary

Major findings from 30+ years of research

- Wild Chinook parr **survival** to Lower Granite Dam~ 15%, **varies by year and population**, depends on **ecosystem drivers**
- Smolt survival to estuary **depends on migration pathway through hydrosystem** (generally: transported > bypassed and spilled)
- **New PIT technology** at dams and in estuary **improving detection** which has been really low due to high spill regimes
- New research evaluating **walleye predation** on smolts and effect of **pinniped predation** on spawner success
- Results inform **Biological Opinions, life cycle models, hydrosystem operations, hatchery management**

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Columbia River Pinniped Predation

Michelle Rub
Conservation Biology Division
Math/Bio. Program

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Assessing Natural Mortality Blind Spots: Pinniped Predation on At-Risk Columbia River Salmon & Steelhead

PIT tag arrays for detecting tags at major sea lion haul-outs

PIT tag scanning at a major harbor seal haul-out

Adult salmon tagging studies

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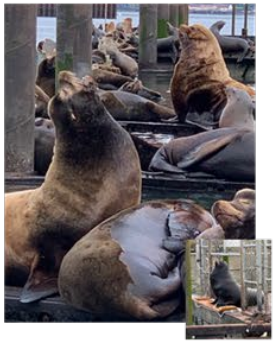

2025 Sea Lion Predation Pilot Study

44 fish tags detected within sea lions on 18 dates during spring

Species: 15 Chinook salmon, 28 Steelhead, & 1 UK

Life stage: 1 adult Chinook salmon & 42 juveniles (outmigration year 2025)

2026 Harbor Seal Predation Pilot Study

62 unique tags detected on 5/7/26 between 11:02am and 12:11pm

Species: Chinook salmon (19), Coho (1), Steelhead (41), & Unknown (1)

Out migration year: 2000 (1), 2022 (2), 2023 (5), 2024 (14), 2025 (12), 2026 (27), & UK (1)

2010-2021 Adult Salmon Pinniped Predation

>2500 CR adult spring Chinook salmon were implanted with PIT tags from 2010 – 2021

Survival estimates: ranged from 46% – 74% annually

Pinniped predation estimates: ranged from 20% – 44% of the upriver adult return annually

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30 Years of Salmon Ocean Ecology

Brian Burke
Fish Ecology Division
Estuary and Ocean Ecology Program

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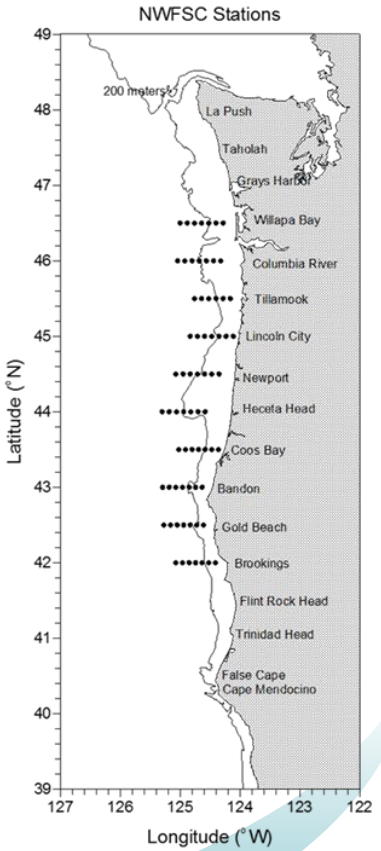
Newport Hydrographic Line and Northern California Current Survey

Newport Line: Sampled biweekly for 30 years

NCC Survey: Seasonal (2-4 times per year)



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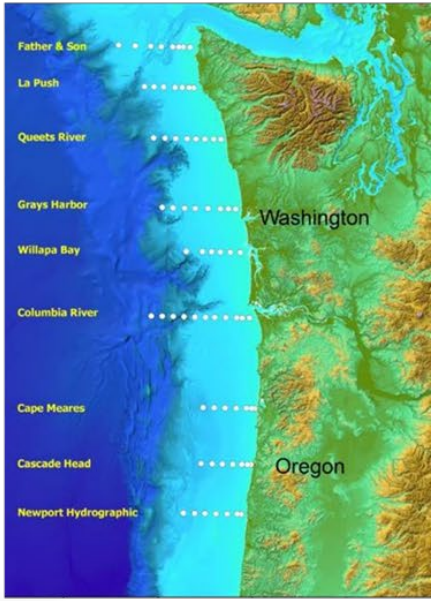
Juvenile Salmon and Ocean Ecosystem Survey (JSOES)

BONNEVILLE POWER ADMINISTRATION

- May (2006 – 2012, 2015 - present)
- June (1998 – present)
- September (1998 – 2012)



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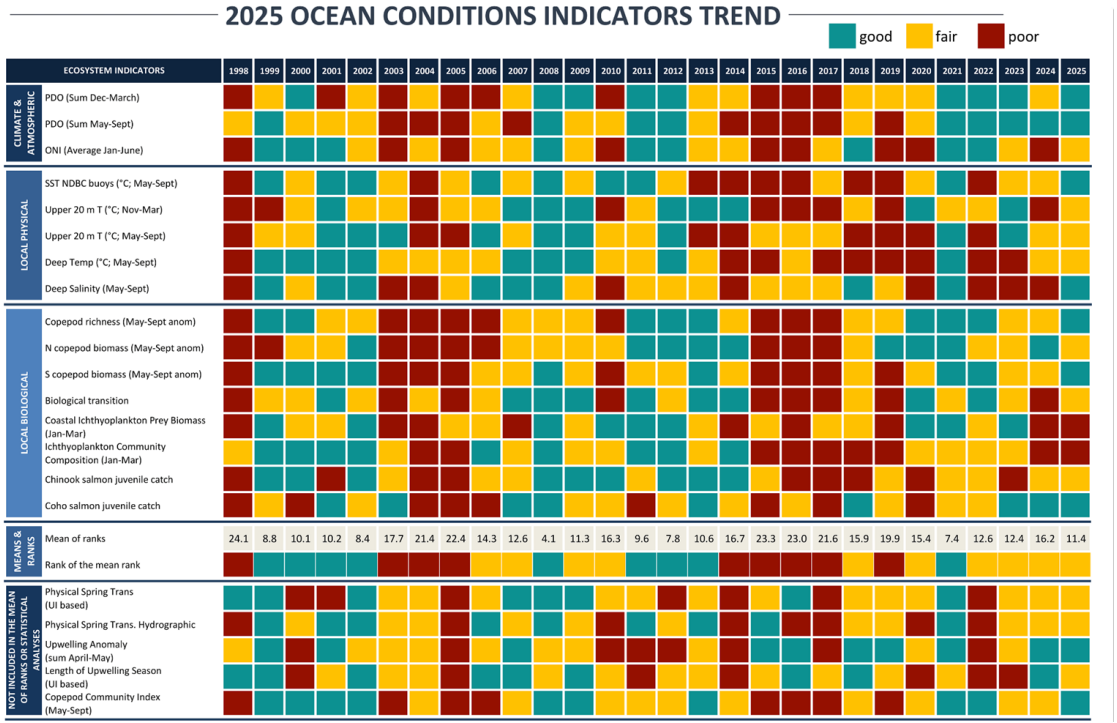
NOAA's 'Stoplight Chart'

https://www.fisheries.noaa.gov/west-coast/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern

Basin Scale

Local Physical Conditions

Local Biological Conditions



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Integration of Impacts on Upper Columbia and Snake River salmon

Lisa Crozier

Relative vulnerability to climate impacts

Population viability assessment

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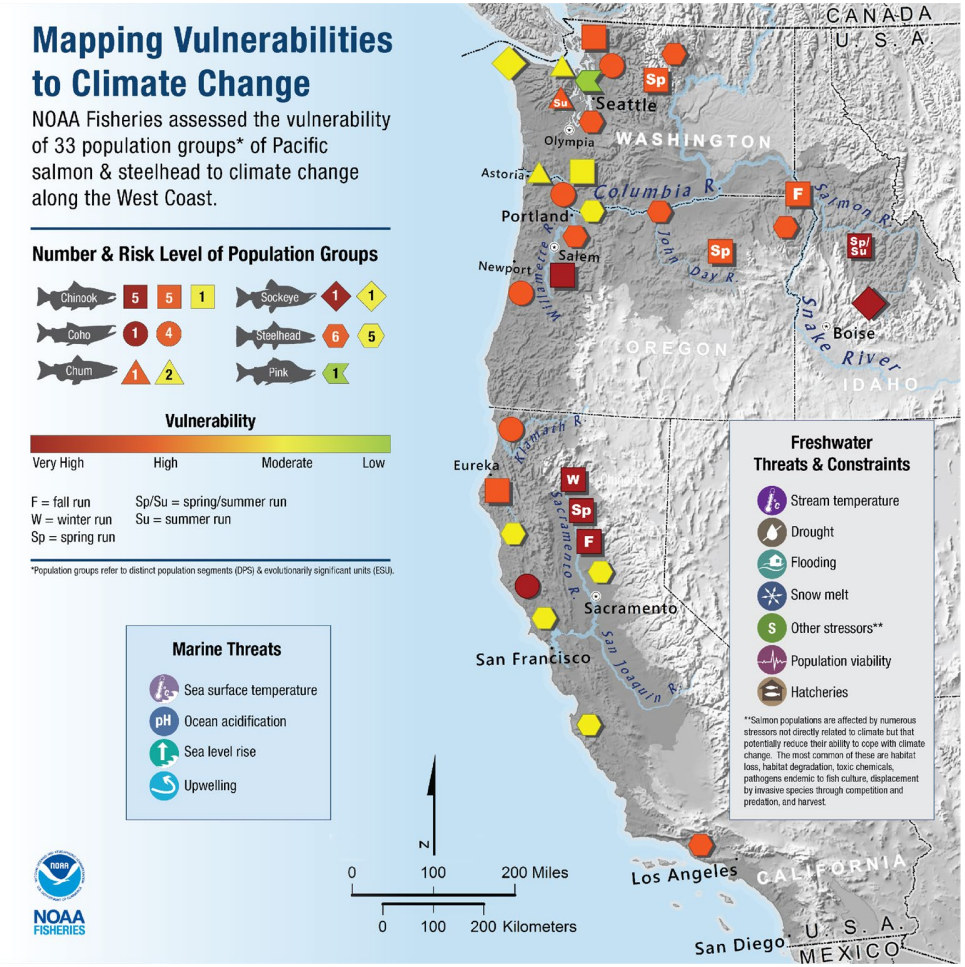

ESU/DPS Score Sheet

Snake River fall-run Chinook

Overall vulnerability—High (35% Moderate, 65% High)
Biological sensitivity—High (35% Moderate, 65% High)
Climate exposure—High (100% High)
Adaptive capacity—High (2.3)

	Snake River fall-run Chinook	Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Early life history	1.3	3	
	Juvenile freshwater stage	1.5	3	
	Estuary stage	2.1	2	
	Marine stage	2.6	2	
	Adult freshwater stage	2.9	2.8	
	Cumulative life-cycle effects	2.5	2.3	
	Hatchery influence	3.7	2.8	
	Other stressors	3	3	
	Population viability	2.3	2.8	
	Ocean acidification sensitivity	2	1.8	
	Sensitivity Score	High		
Exposure variables	Stream temperature	3.5	2.3	
	Summer water deficit	2	1.8	
	Flooding	2.4	2	
	Hydrologic regime	2.1	2.5	
	Sea level rise	2.4	2.3	
	Sea surface temperature	3	2	
	Ocean acidification exposure	3.8	2.5	
	Upwelling	2.3	1.8	
	Ocean currents	1.9	1.3	
	Exposure Score	High		
Overall Vulnerability Rank		High		

Low
Moderate
High
Very High

Crozier *et al.* 2019. Climate vulnerability assessment for Pacific salmon and steelhead in the California Current Large Marine Ecosystem. Plos One, 14(7), e0217711, doi: 10.1371/journal.pone.0217711

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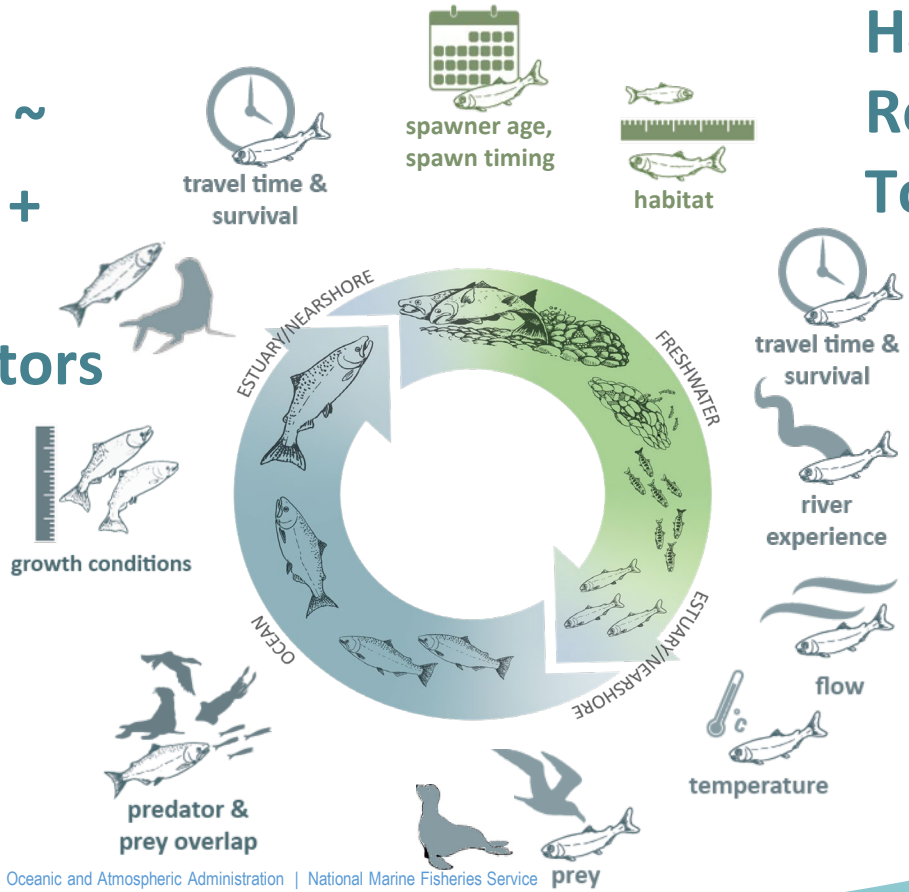
New Components for life cycle models

SAR & Age at return ~ FW + estuary + NCC + BC/AK prey & predators



Habitat Assessment & Restoration Planning Tool (HARP)

Spatially explicit habitat actions affect freshwater water carrying capacity and productivity

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Thank you

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