



# Managing Salmon Fisheries in a Rapidly Changing Salmosphere:

## The Future of Management

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Emerging Trends/Issues in Salmon  
Management to focus on through to 2030



# Trends Regarding Challenges for Salmon:

## Growing uncertainty with respect to:

- Climate change – influences all phases of life cycle including marine food production & migration patterns - influencing growth, survival, vulnerability to fisheries not factored into current management regimes
- Freshwater Habitat Changes – driven by human uses and climate change
  - Watershed destabilization – direct loss of habitat (scouring, sedimentation)
  - Changing hydrology, water temperatures
  - Food production – implications for rearing juveniles
  - Invasive species (plant & animal)

**Key consideration:** time of tremendous instability; data and management models we have may not be as predictive/reliable as in the past.



# Considering These Trends in Management Context (non-harvest)

- An integrated and holistic approach to managing for salmon (e.g. land use, water use, hatchery production, and harvest etc.) is critical.
  - Requires collaboration across and within ALL levels of government (Indigenous, federal, provincial, local) and diverse expertise.
- Continued education of the public is key to gaining support for management approaches, and for stewardship initiatives.
  - Governments must provide leadership but cannot achieve protection and recovery without broad support.
- Need to consider cumulative effects (including historic) and implications for ecosystem function
  - Risk of bias due to “shifting baseline syndrome” i.e. relatively short-term data sets, career timeframes, etc.



# Considering These Trends in Management Context (harvest)

- Science will continue to be critical
- Cross-border collaboration is essential – and more DNA work is key to understanding migration patterns (vulnerability to fisheries – current approaches based on old patterns)
- Fisheries Management: Databases and models are integral to informing management but unlikely to keep pace with “real world” –
  - MUST take a precautionary approach in fisheries management
  - Actively consider recent risks and challenges as part of in-season management (e.g. rock slides, widespread flooding impacts, etc) and environmental conditions e.g. high river temperatures affecting adult migration, etc.



# Managing Atlantic Salmon in Rapidly Changing Socio-ecological Systems

Emerging trends and issues in salmon management out to 2030

A NASCO and U.S. Perspective





# International Perspective





# Managing the Atlantic Salmon in a Rapidly Changing Environment – Management Challenges and Possible Responses



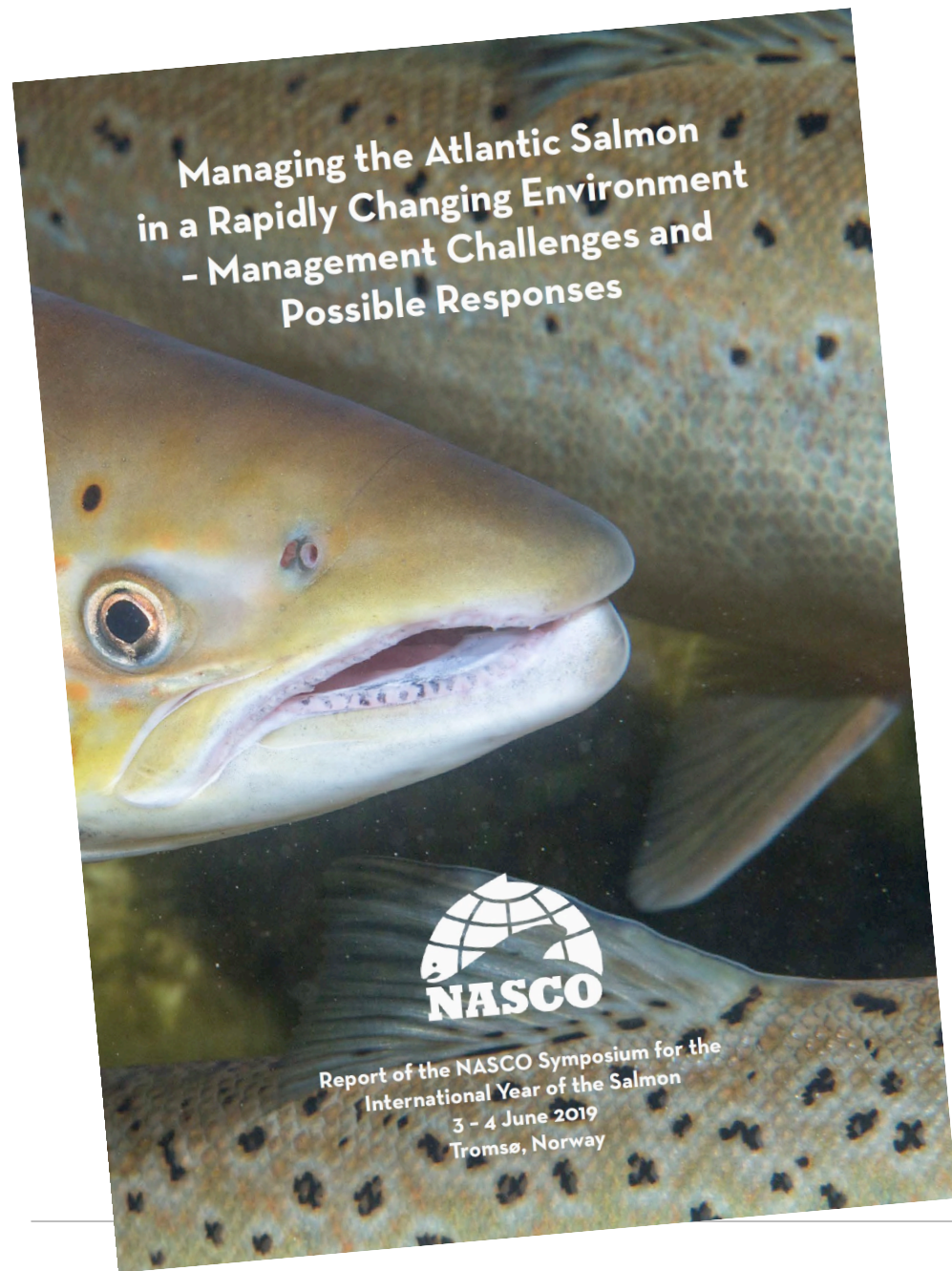
## Aims:

- allow for the identification of the main management challenges for the Atlantic salmon;
- assist in clarifying the role NASCO can play in addressing them in the future; and
- provide a basis for a major outreach initiative to increase public and political awareness of these challenges



- 1) **Climate change**
- 2) **Fish farming**
- 3) **Stocking**
- 4) **Invasive alien species**
- 5) **Freshwater habitat and water quality**
- 6) **Marine phase**
- 7) **Biological reference points in management**
- 8) **Human dimensions**





# Symposium Report

- 9 Recommendations regarding advice to organizations and agencies
- 11 Recommendations to NASCO

# NASCO Progress - 2022

Making progress on several recommendations:

- Held a theme based special session on aquaculture in 2021;
- Adopted a statement regarding salmon farming urging the development of innovative salmon farming techniques;
- Adopted a statement from NASCO to the Parties/jurisdictions holding them accountable for making sustained progress towards meeting the international goals of 100 % containment of farmed fish, and for 100 % of farms to have effective sea lice management;
- Agreed to hold a theme based special session on climate at the 2023 annual meeting;
- Updating the Stocking Guidelines;
- Holding a Special Session on indigenous perspectives on Atlantic salmon at the 2023 Annual Meeting;
- Council issued a statement regarding pink salmon and established a pink salmon working group.





# U.S. Perspective





# Primary Threats in the U.S.

- Dams and road stream crossings
- Climate change
- Low marine survival
- Loss of genetic diversity



# Key Priority Actions

Aimed at identifying measures to improve survival and increase population resiliency

- Reconnect the Gulf of Maine with Headwater Streams
- Improve Habitat Productivity to Increase the Number of Fish Successfully Entering the Marine Environment
- Increase Our Understanding and Ability to Improve Survival in the Marine Environment



# Managing Salmon Fisheries in a Rapidly Changing Salmosphere: The Future of Management

## A View from Alaska

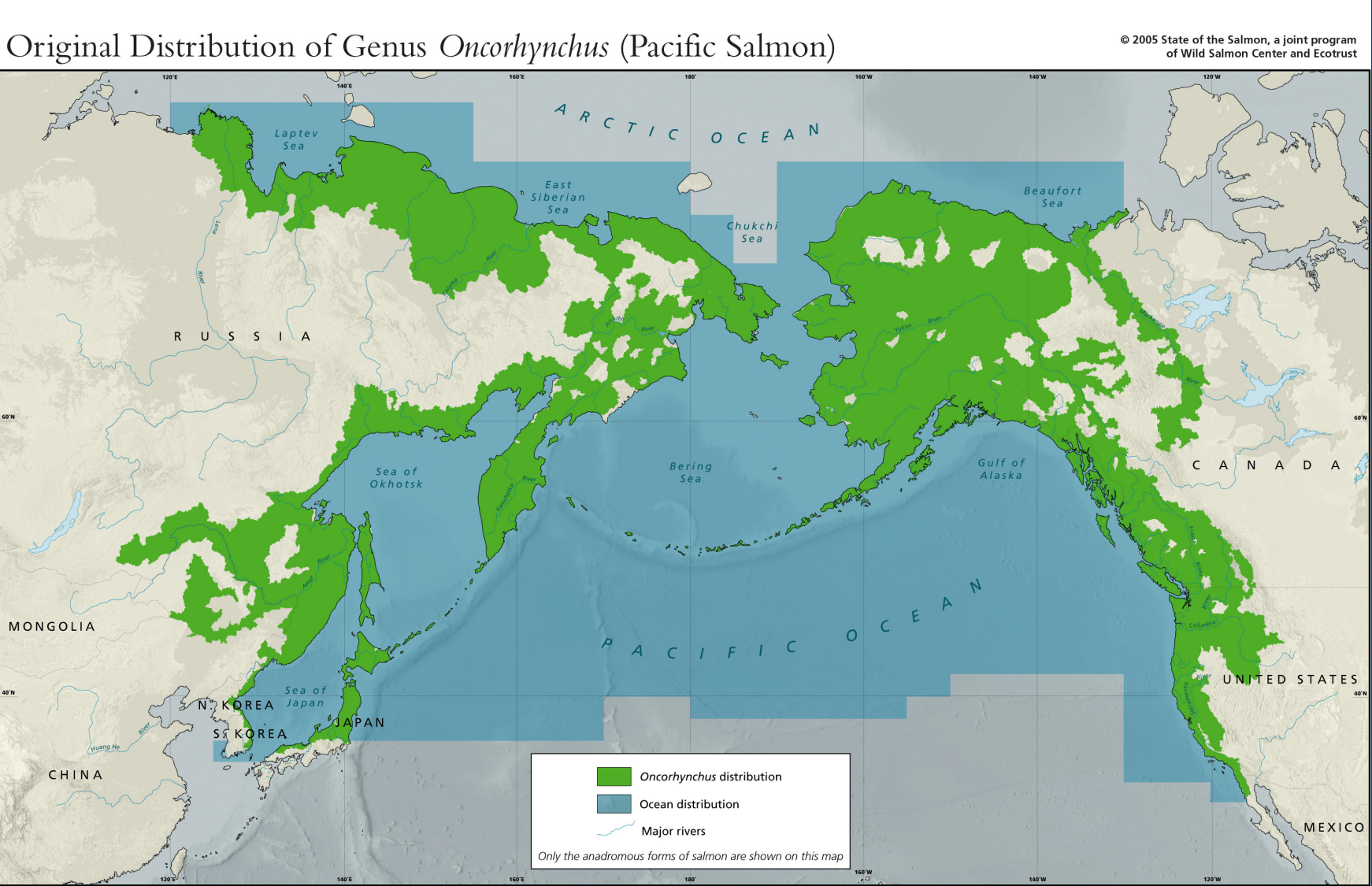
### Synthesis Panel Discussion



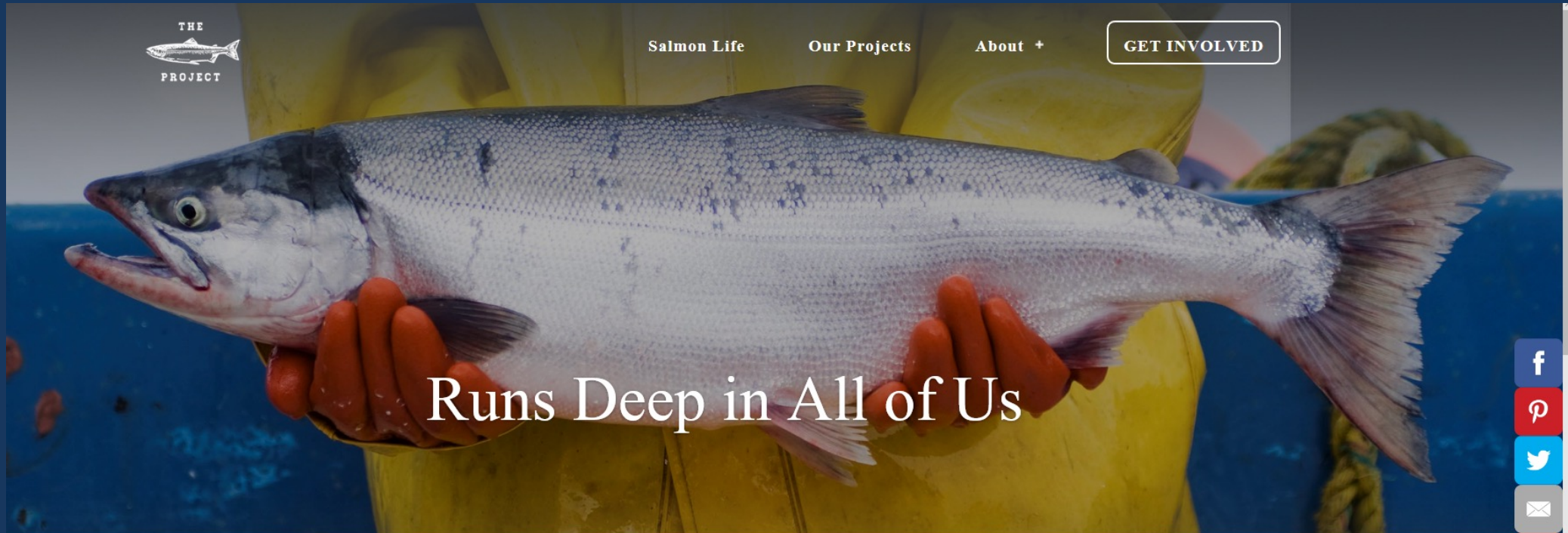
Bill Templin  
Chief Fisheries Scientist for Salmon  
Division of Commercial Fisheries  
Alaska Department of Fish and Game



# Alaska the Heart of the Pacific Salmon World



# Salmon at the Heart of Alaska



Salmon Life

Our Projects

About +

GET INVOLVED

Runs Deep in All of Us



Salmon aren't just another fish in Alaska.  
They are our lifeblood.



The Salmon Project gives voice to Alaskans' deep relationships with salmon  
to ensure that Alaskans' lives will always be salmon lives.



# Principles

## Constitutional Provisions for Resource Management



Section 1. It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum benefit of its people.

Section 2. The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.

Section 3. Wherever occurring in the natural state, fish, wildlife, and waters are reserved to the people for common use.

Section 4. Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.

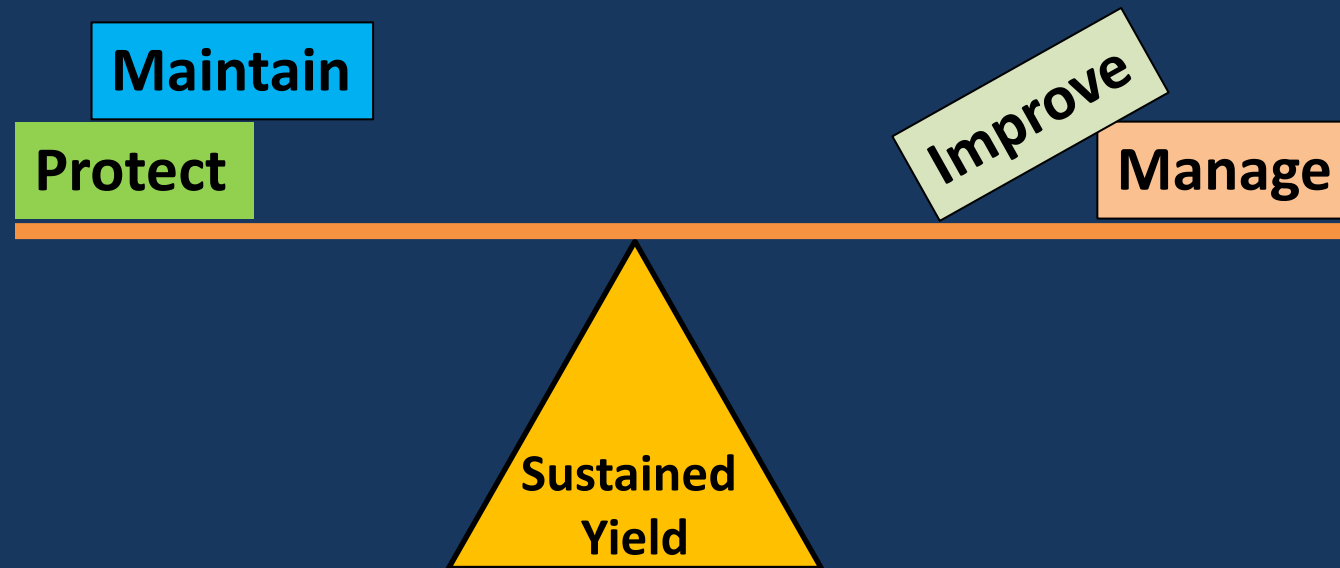
Section 15. No exclusive right or special privilege of fishery shall be created or authorized in the natural waters of the State.



# Alaska Department of Fish and Game

## Mission Statement

To **protect**, **maintain**, and **improve** the fish, game, and aquatic plant resources of the state, and **manage** their use and development in the best interest of the economy and the well-being of the people of the state, consistent with the **sustained yield principle**.



# Policy

## Sustainable Salmon Fisheries Management Policy

- Protect wild salmon and habitat
- Manage for escapement ranges that sustain production & consider uncertainty in production
- Develop effective management systems
- Precautionary approach to human activities
- Encourage public support and involvement
- Manage conservatively commensurate with uncertainty

# Process

## Board of Fisheries

**Ensures public access and local input**

- Management plans
- Stock of Concern
- Escapement goals
- Research /Data collection
- Analysis
- Expert opinion

- Proposed changes
- Recommendations
- User viewpoint
- Resource needs/desires
- Expert opinion

**Alaska Dept.  
Fish and Game**

**Board of  
Fisheries**

**Stakeholders  
[Public, Fishers,  
Industry]**

- Fishing seasons, quotas, bag limits
- Fishing means and methods
- Management plans
- Policies
- Regulations



# Escapement Goals as Management Targets

- The **escapement** is the number of fish that make it to the spawning grounds to spawn.
- Goals for escapement are set to provide yield (harvest and other uses).
- Harvest decisions and regulations are determined based on the escapement goals.
- These goals are well above levels that cause conservation concern.
- Thus actions (and concern) happens early in the process.

# Salmon are Affected by Changes in the Ocean

www.nature.com/scientificreports

SCIENTIFIC  
REPORTS

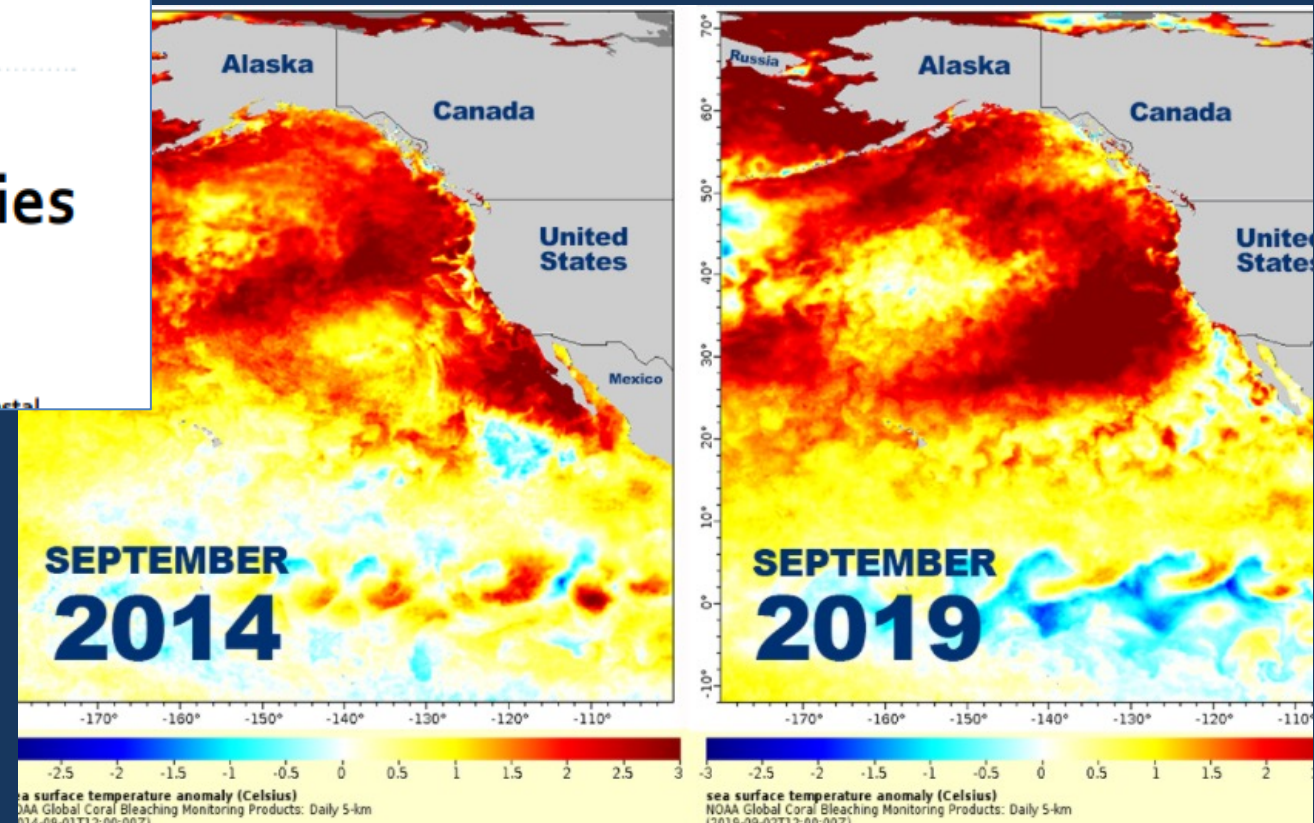
nature research

OPEN

## Marine heatwaves exacerbate climate change impacts for fisheries in the northeast Pacific

William W. L. Cheung<sup>1\*</sup> & Thomas L. Frölicher<sup>2,3</sup>

Marine heatwaves (MHWs) have occurred in all ocean basins with severe negative impacts on coastal

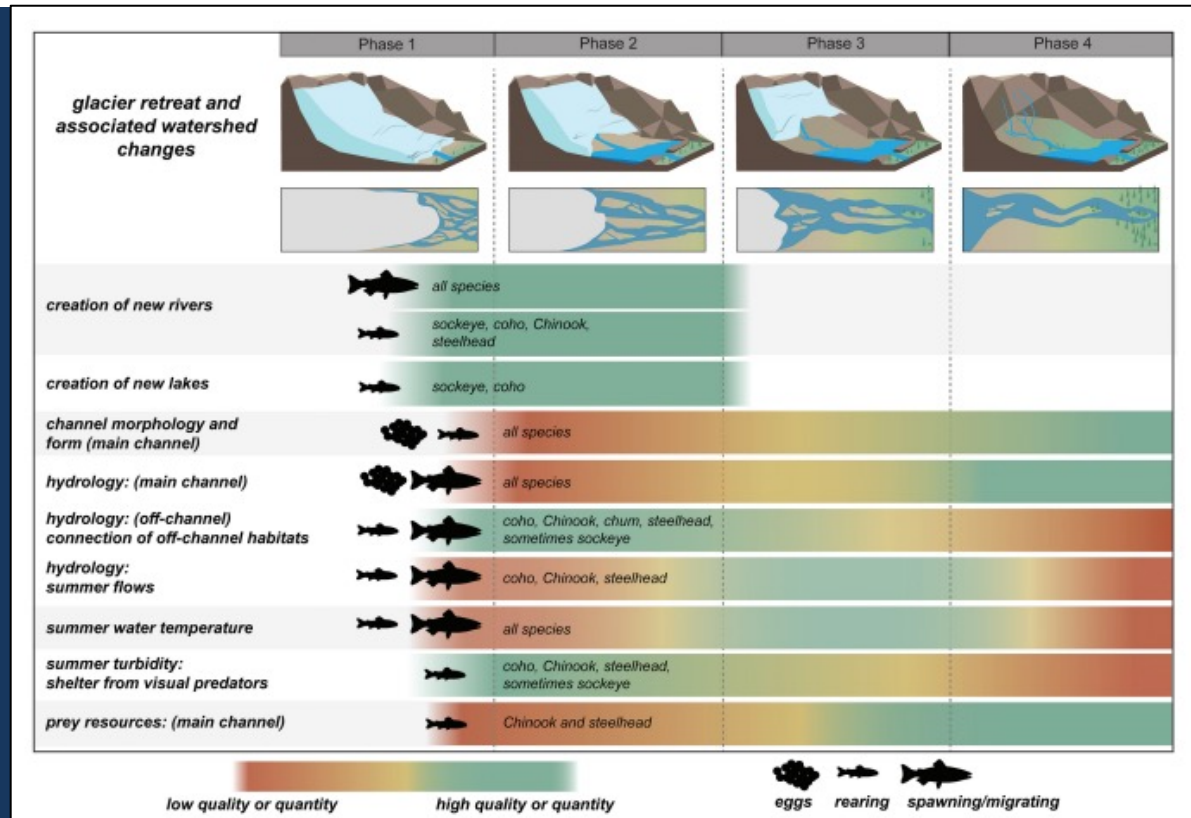


Cheung, W.W.L., Frölicher, T.L. Marine heatwaves exacerbate climate change impacts for fisheries in the northeast Pacific. *Sci Rep* **10**, 6678 (2020). <https://doi.org/10.1038/s41598-020-63650-z>

# Mixed Effects of Changes in the Environment

## Glacier Retreat and Pacific Salmon

KARA J. PITMAN, JONATHAN W. MOORE, MATTHEW R. SLOAT, ANNE H. BEAUDREAU, ALLISON L. BIDLACK, RICHARD E. BRENNER, ERAN W. HOOD, GEORGE R. PESS, NATHAN J. MANTUA, ALEXANDER M. MILNER, VALENTINA RADIĆ, GORDON H. REEVES, DANIEL E. SCHINDLER, AND DIANE C. WHITED







**Thank you**