Geography and life history mediate Pacific salmon responses to a warming, crowded ocean







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BACKGROUND

Pacific salmon



Pink salmon

Oncorhynchus gorbuscha



Sockeye salmon

Oncorhynchus nerka



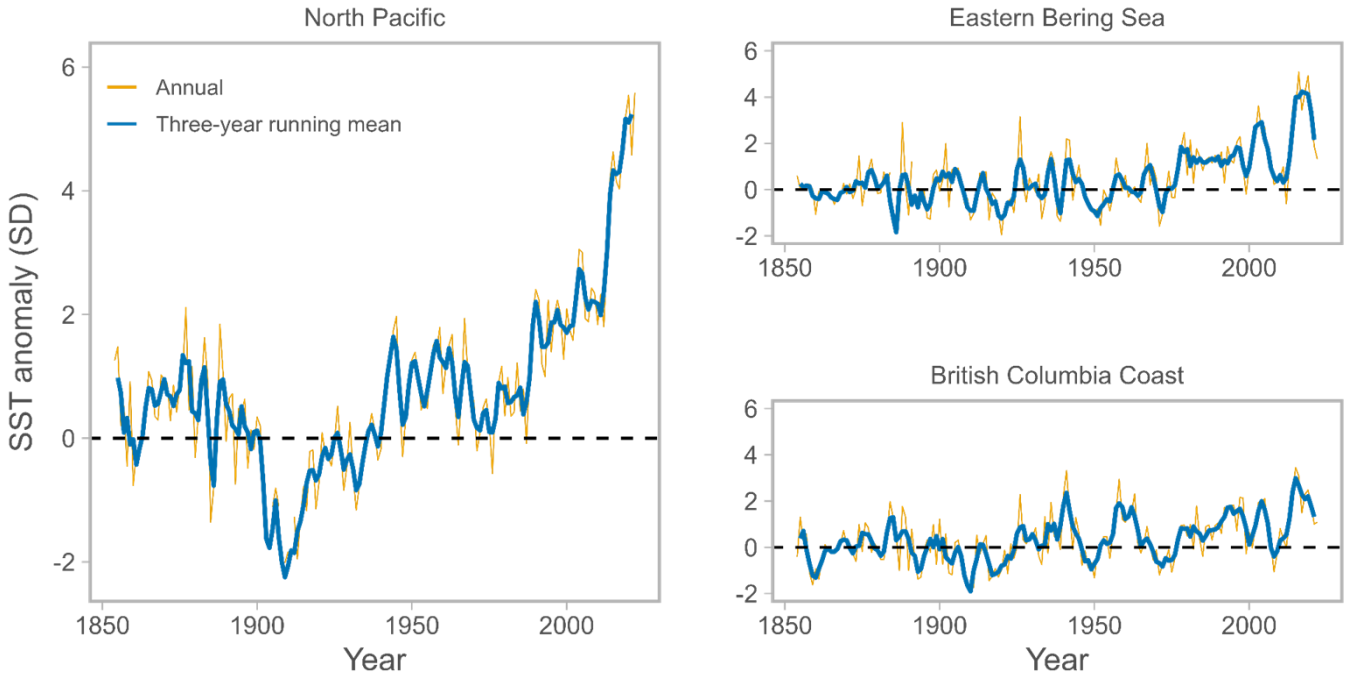
Chum salmon

Oncorhynchus keta



BACKGROUND

Accelerating climate change

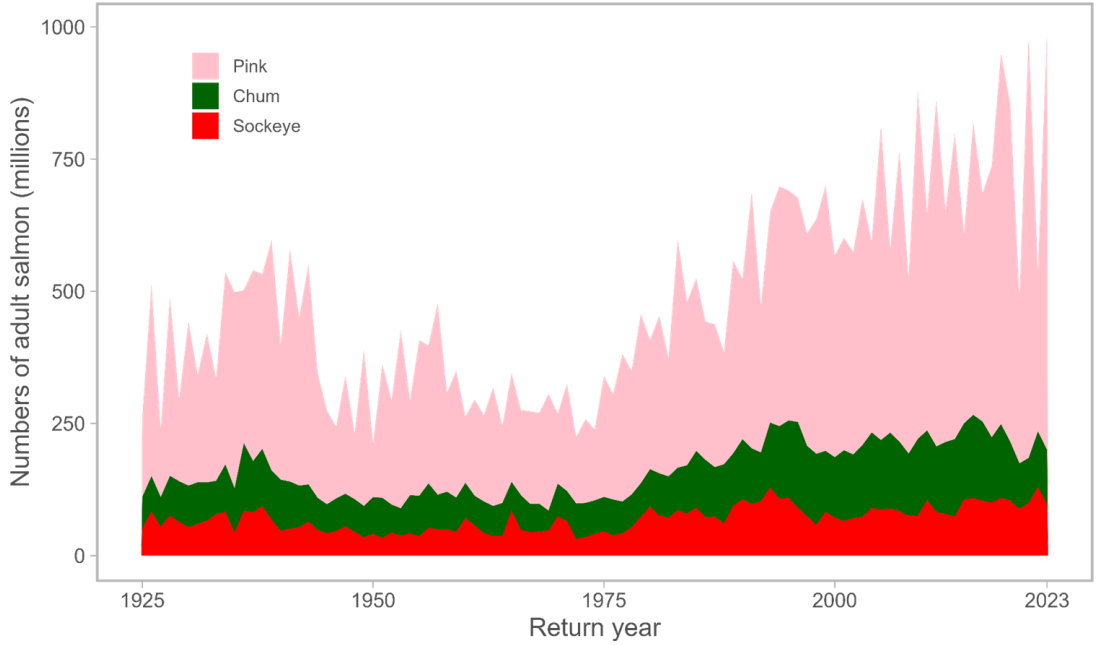


NOAA ERSST v5

BACKGROUND

A crowded ocean





~25%

hatchery origin

Connors et al. 2024

How is **warming** and **competition** in the marine environment affecting salmon productivity…



Across species?



Throughout their Eastern North Pacific range?



Through time?

APPROACH

Estimating shared productivity trends

1. Assembled a R/S dataset for pink, chum, and sockeye salmon

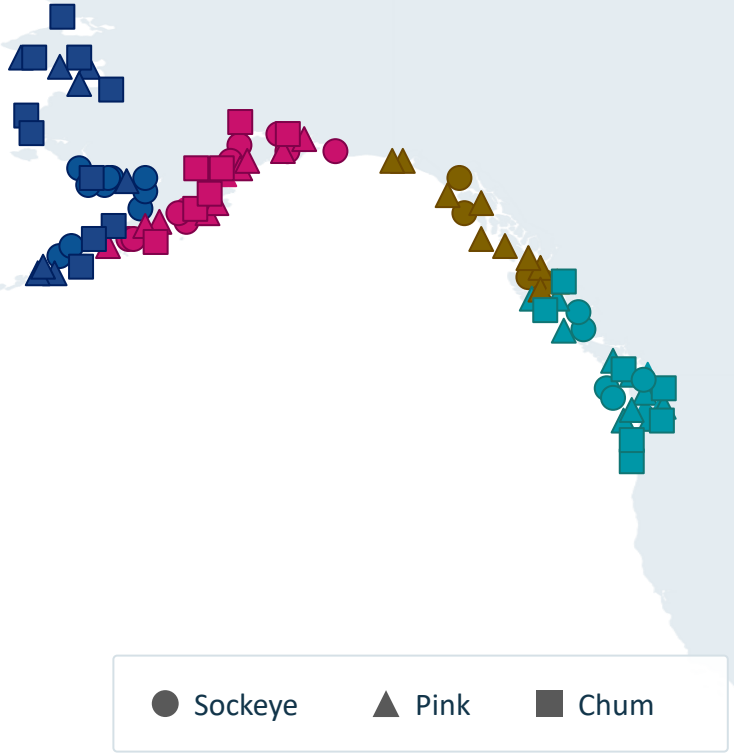
N = 127



2. Assembled data on climate (SST) when salmon entered the marine environment

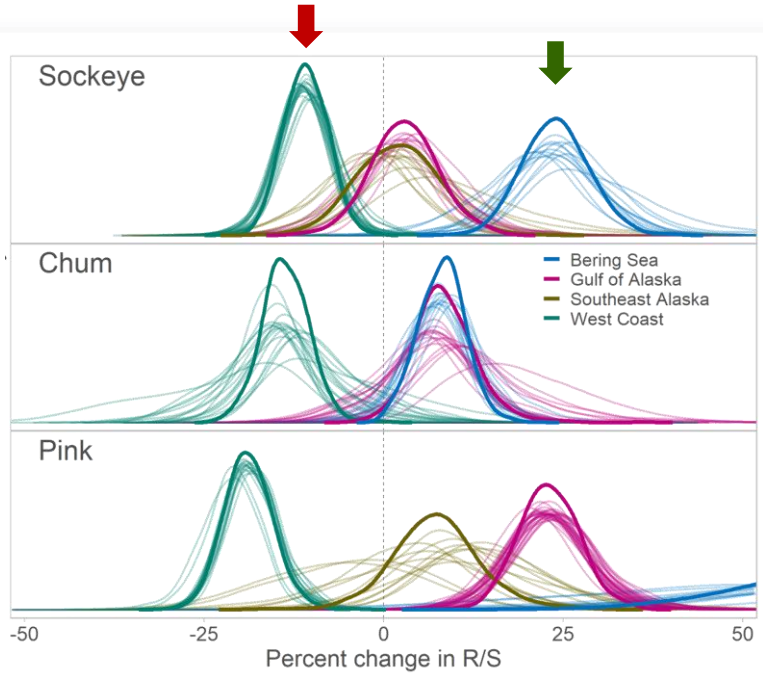
3. Assembled data on total adult salmon in the North Pacific environment

4. Analyze shared trends



FINDING 1

Northern salmon have coped with warming better than southern populations



SOUTHERN POPULATIONS

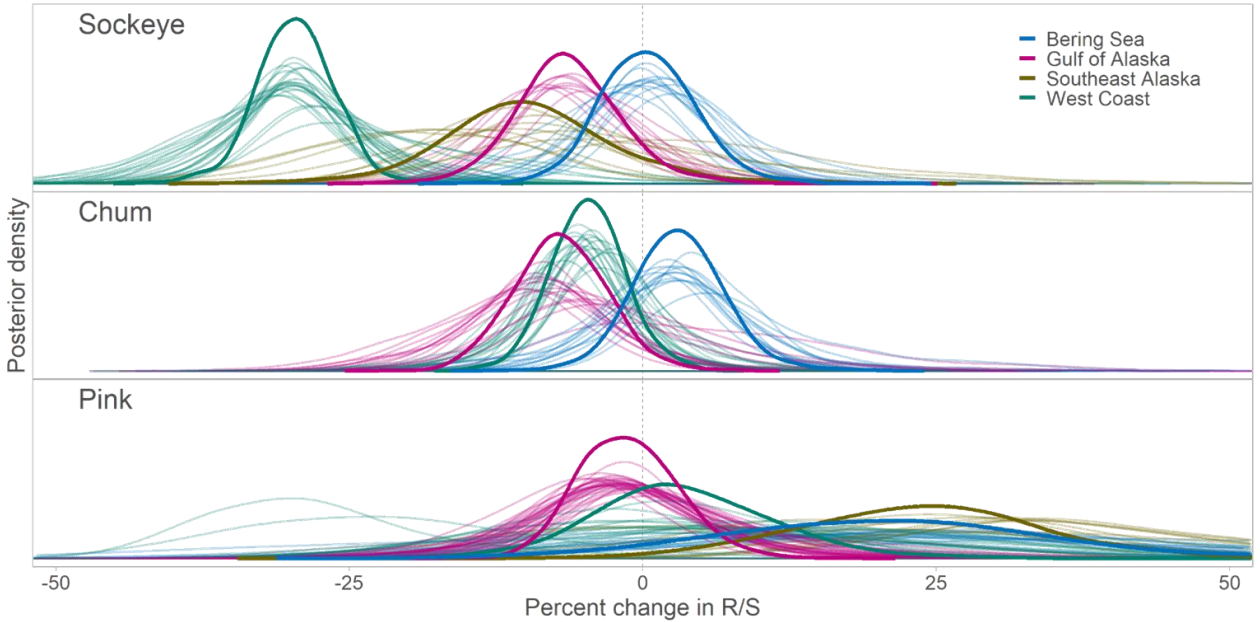
−10% productivity per °C of warming

NORTHERN POPULATIONS

+23% productivity per °C of warming

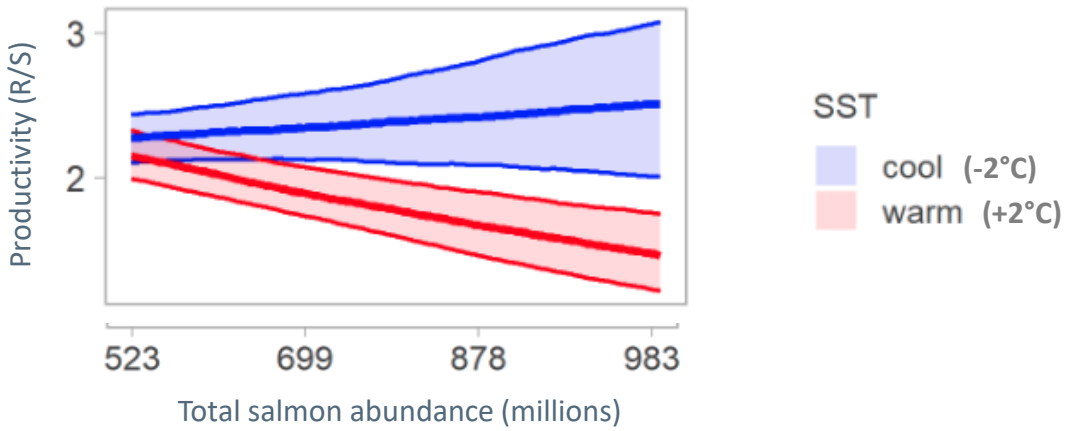
FINDING 2

The effects of competition at sea vary, but southern sockeye are most affected



FINDING 3

Warming exacerbates competition impacts



FINDING 4

Salmon responses to warming have changed over time

Contemporary temperature-salmon productivity relationships tend to be more negative

ALL YEARS

-5%

2011–2024

–25%

Change in Northern BC & Southeast Alaska sockeye productivity per °C warming

TAKEAWAYS

Adapting to a warming, crowded ocean

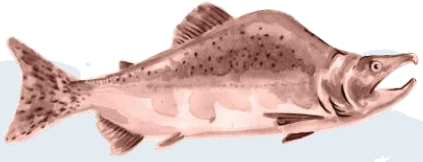
CLIMATE CHANGE AND COMPETITION AT SEA

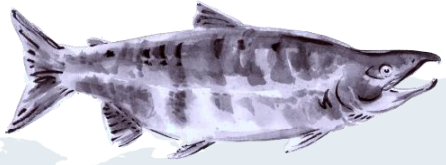
Both can only be addressed on the world stage

HATCHERY SALMON PRODUCTION

Most reachable management lever

Thanks







NOAA FISHERIES

Washington Department of Fish and Wildlife

PACIFIC SALMON FOUNDATION

Alaska Department of Fish and Game

Fisheries and Oceans Canada

Pêches et Océans Canada