Status of salmon

Perspectives from the Pacific

A.R. Munro*, S. Grant, A. Vélez-Espino

Fisheries and Oceans Canada

Pêches et Océans Canada

ALASKA DEPARTMENT OF FISH AND GAME

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NPAFC

Working Group on Stock Assessment

Introduction

Salmon important shared resource

Environment (pasture) changing / more variable

Monitoring & understanding status is critical

What does the future look like?

How do we prepare and respond?

Pacific Salmon

Asia

North America

- 7 species
- 4 major basins

Chukchi Sea

Sea of Okhotsk

Bering Sea

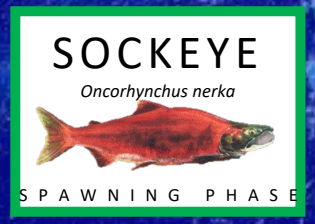
Gulf of Alaska

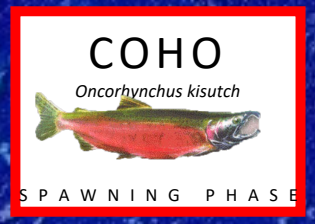
Sea of Japan

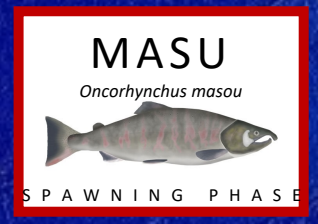
North Pacific

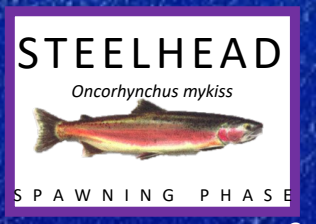
Hatchery releases

- ~5 billion/yr
- Chum and pink
- US, Japan, Russia









Enforcement (ENFO)

- Ban on high seas fishing

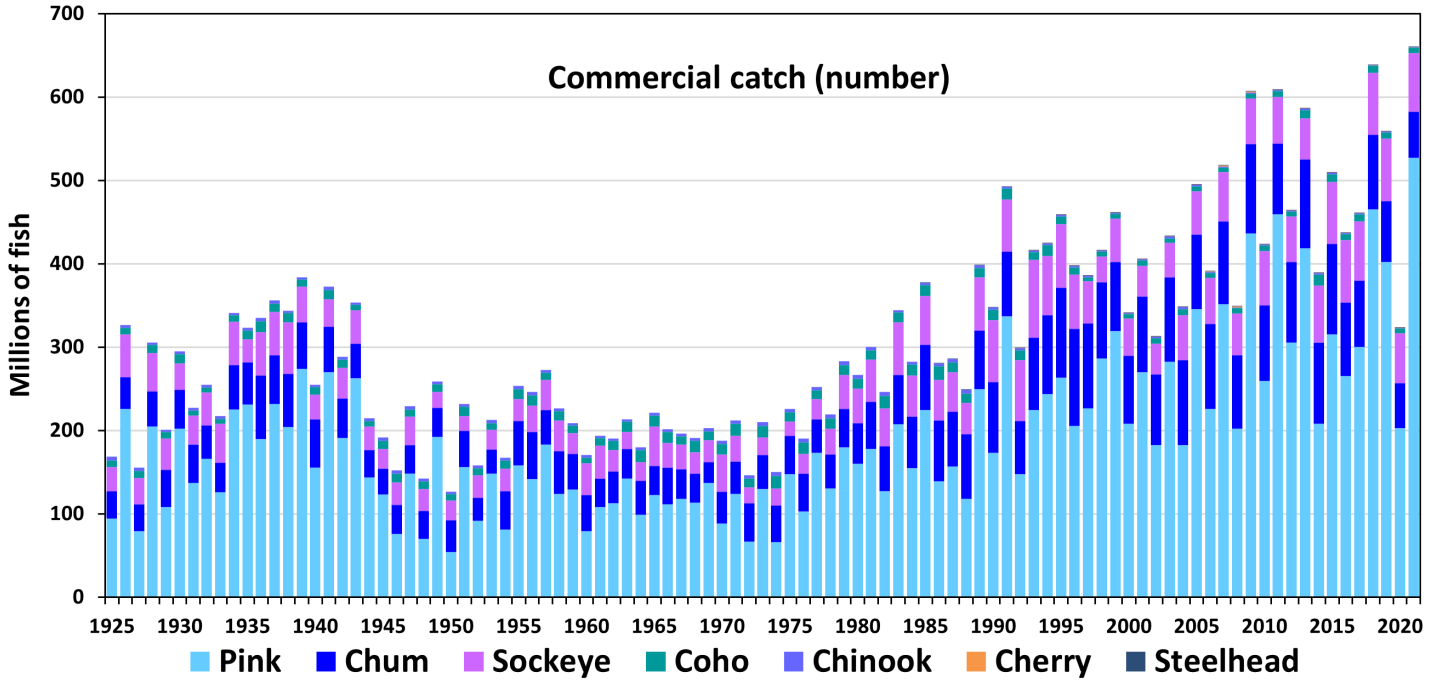
Science (CSRS)

- Develop and implement science plan
- Working groups

Assessing Status of Pacific Salmon

Many challenges

- Various metrics & methods
- Data availability
- Jurisdictional policies & interests
- Coordination of data and information

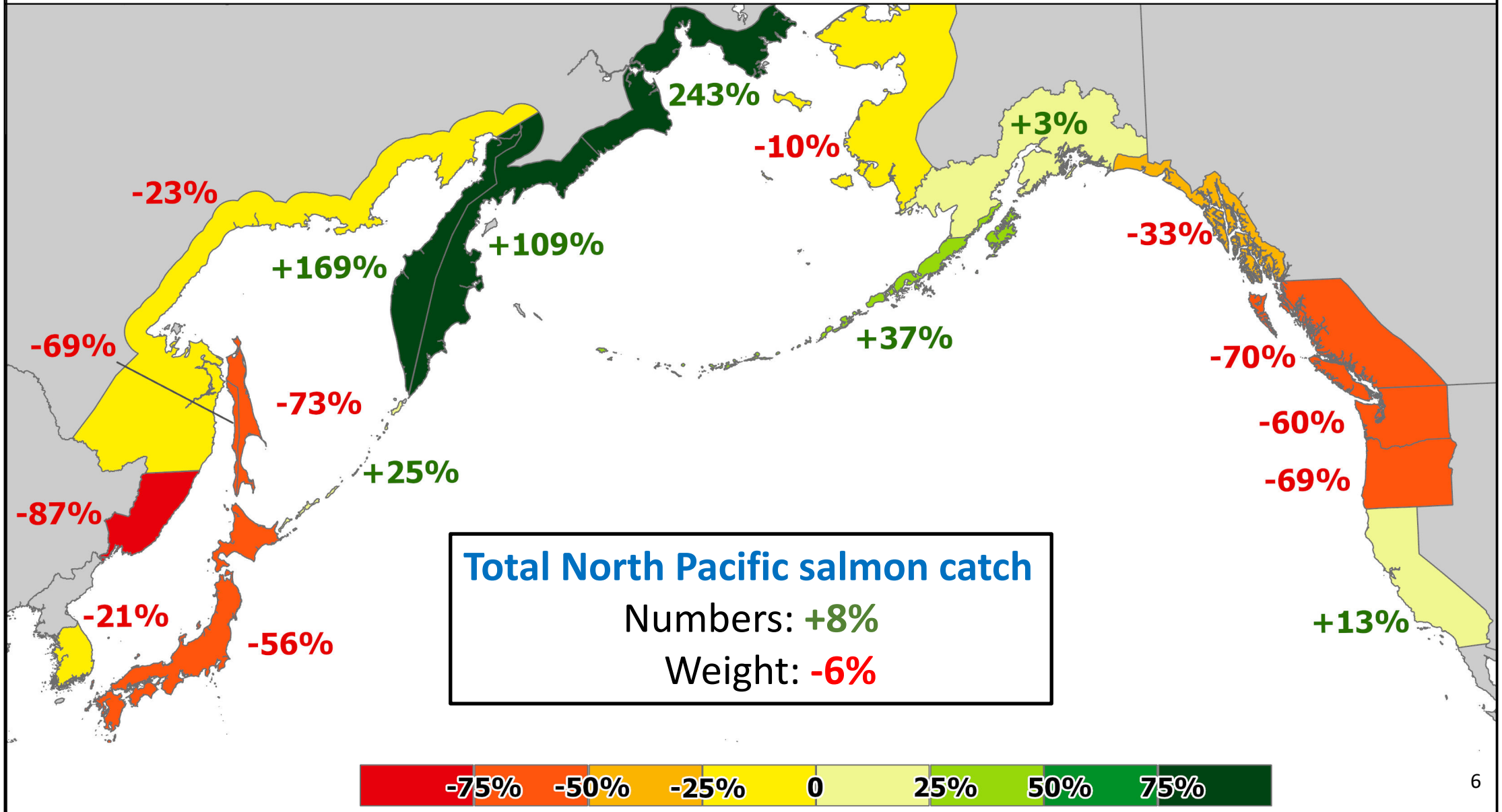


Data Source: North Pacific Anadromous Fish Commission (NPAFC). 2022. NPAFC Pacific salmonid catch statistics (updated June 2022). North Pacific Anadromous Fish Commission, Vancouver. Accessed June, 2022. Available: https://npafc.org

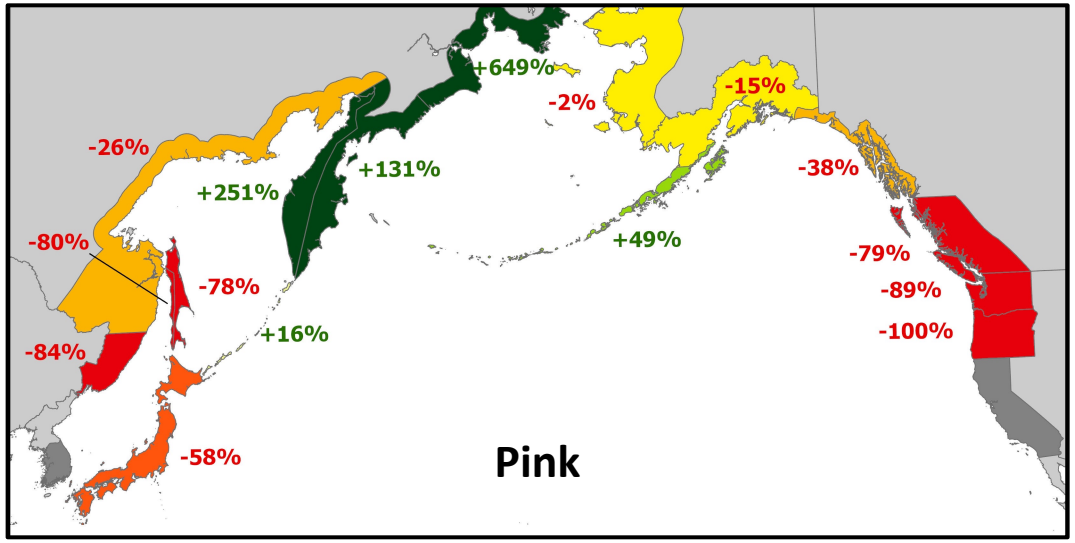
	Numbers	Weight
Pink	70%	55%
Chum	13%	24%

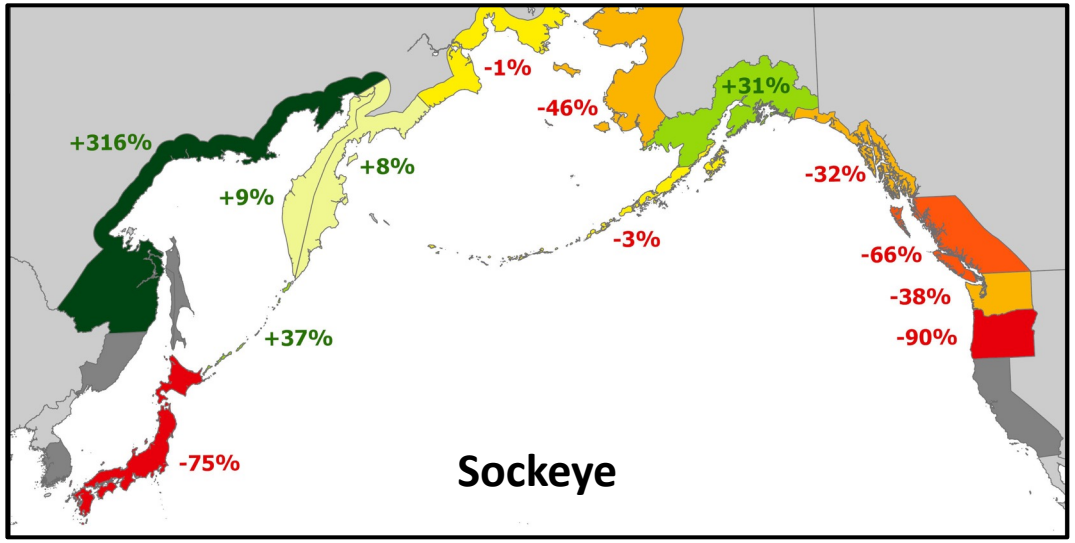
Common metric: catch/harvest data

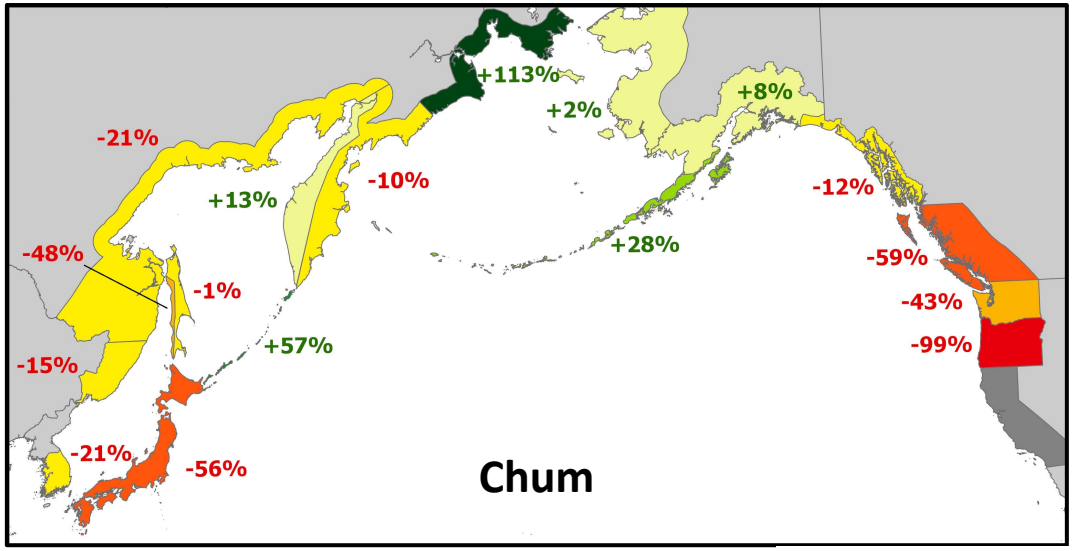
Comparison of average annual Pacific salmon catch by statistical region 2017-2021 vs. 2007-2016

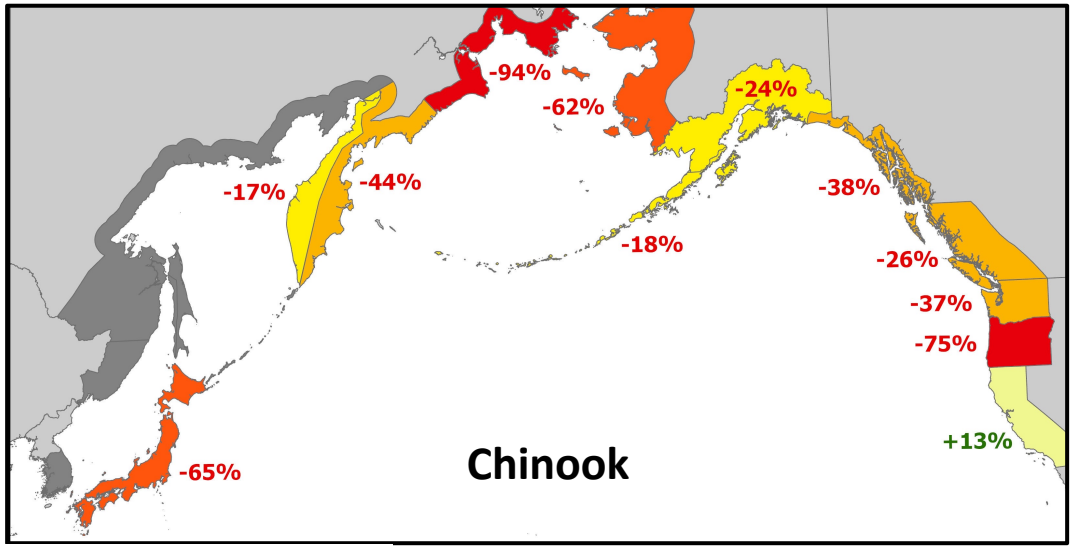


Comparison of average annual Pacific salmon catch by species & region 2017-2021 vs. 2007-2016







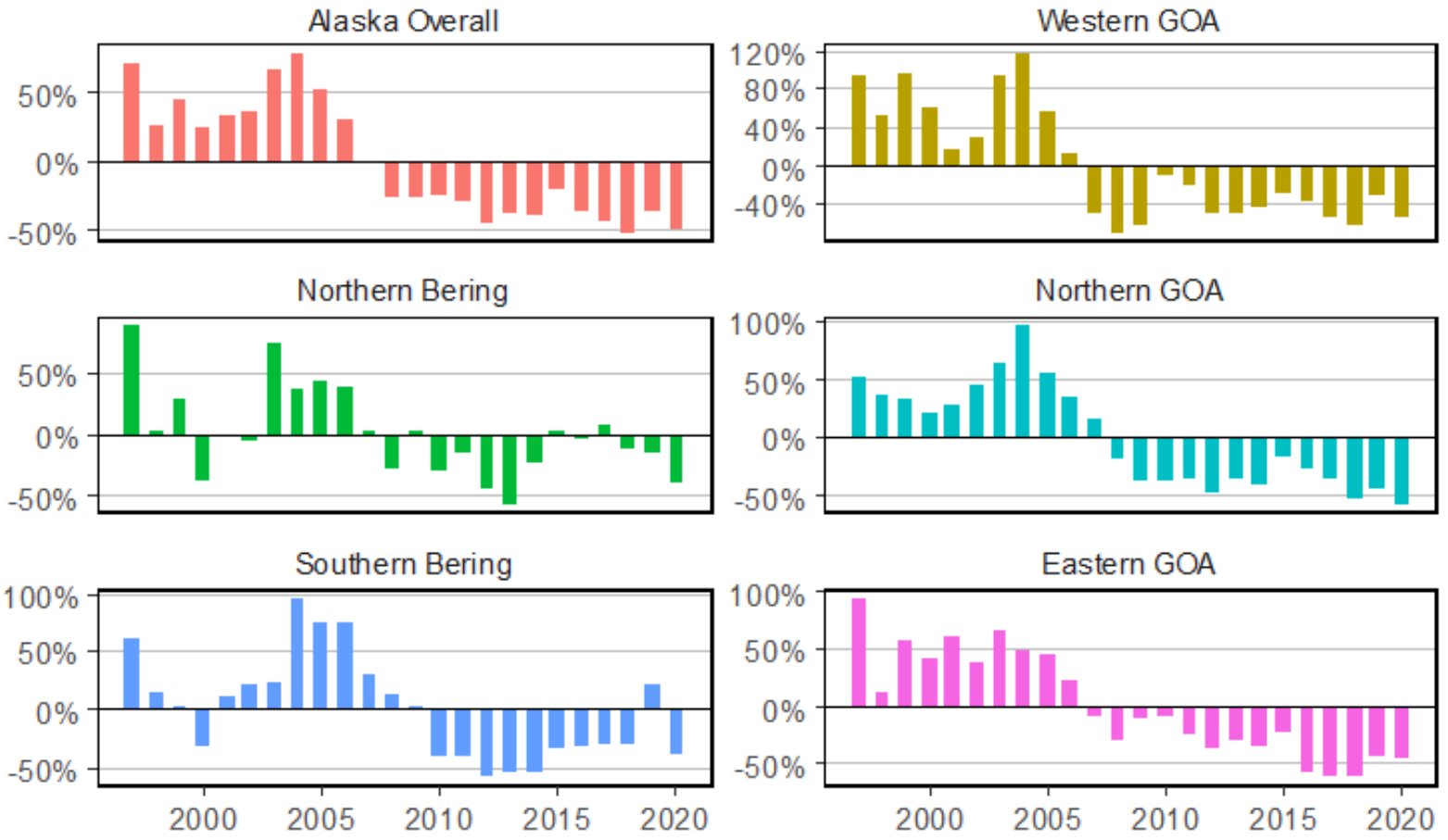


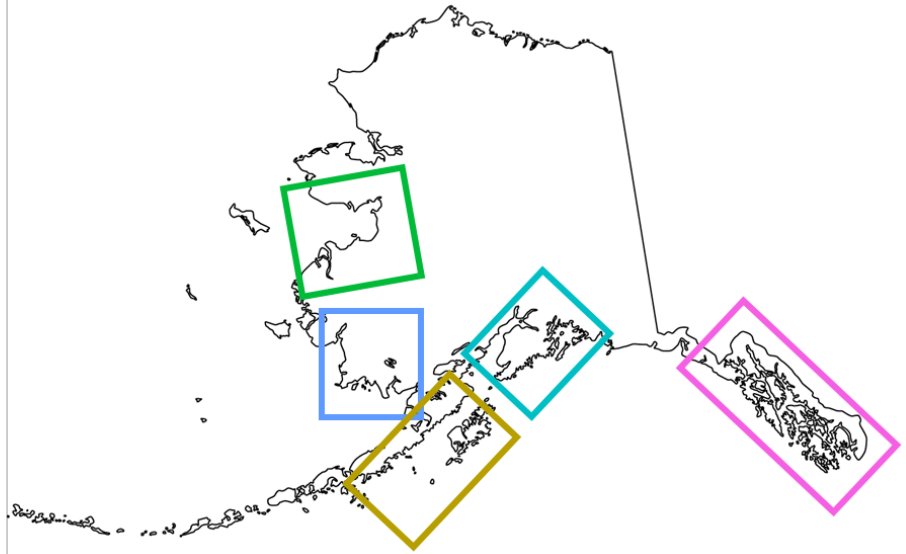
Many concerning trends in recent abundance (3-5 yrs.)

	Pink	Chum	Sockeye	Coho	Chinook	Masu	Steelhead
							
Canada	↔	↓	↓	↔	↓	NA	NA
Japan	↓	↓	NA	NA	↓	↔	NA
Russia	S↓ N↑	↓	↓	↔	↓	↓	NA
Korea	NA	↓	NA	NA	NA	NA	NA
USA – AK	S↓ N↑	↓	S↓ N↑	↔	↓	NA	↔
USA – WA/OR/CA	↔	↓	↓	↔	↓	NA	↓

Example: Alaska Chinook Run Sizes – deviation from average (1997-2020)

Shift in productivity around 2007



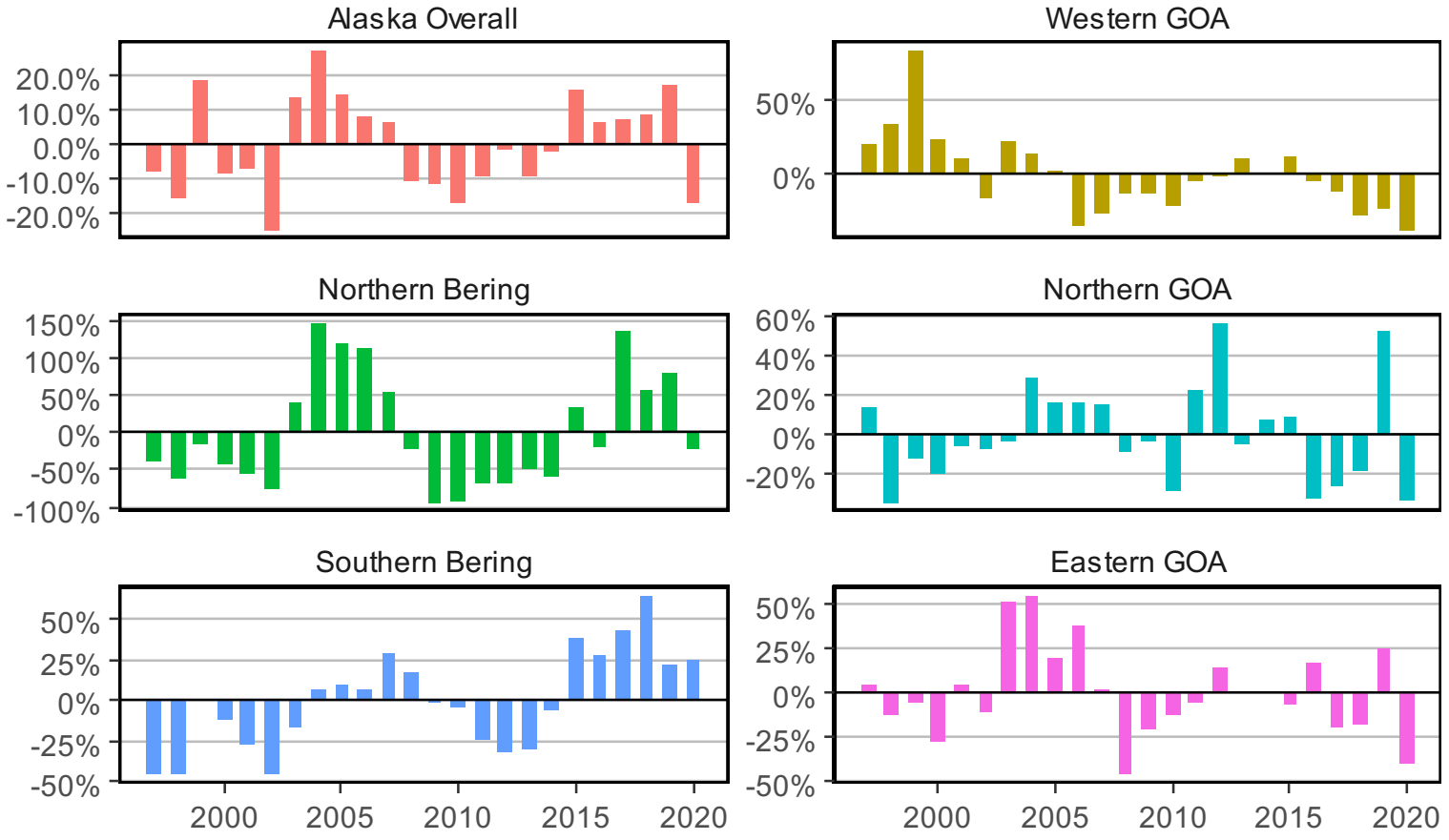


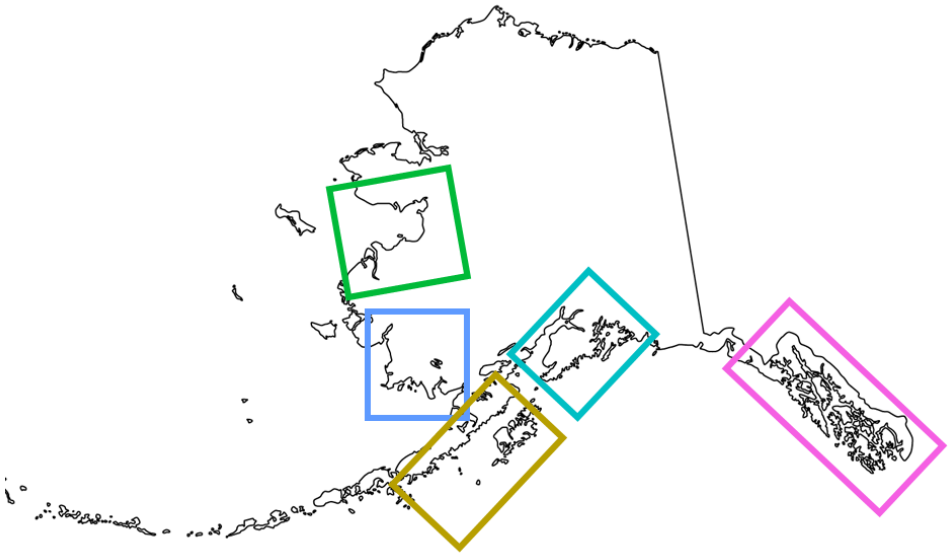
N = 15 stocks

Increase synchrony in productivity among stocks in NE Pacific (Dorner et al. 2017, CJFAS)

Example: Alaska Sockeye Run Sizes

Bering Sea ↑ **Gulf of Alaska** ↓



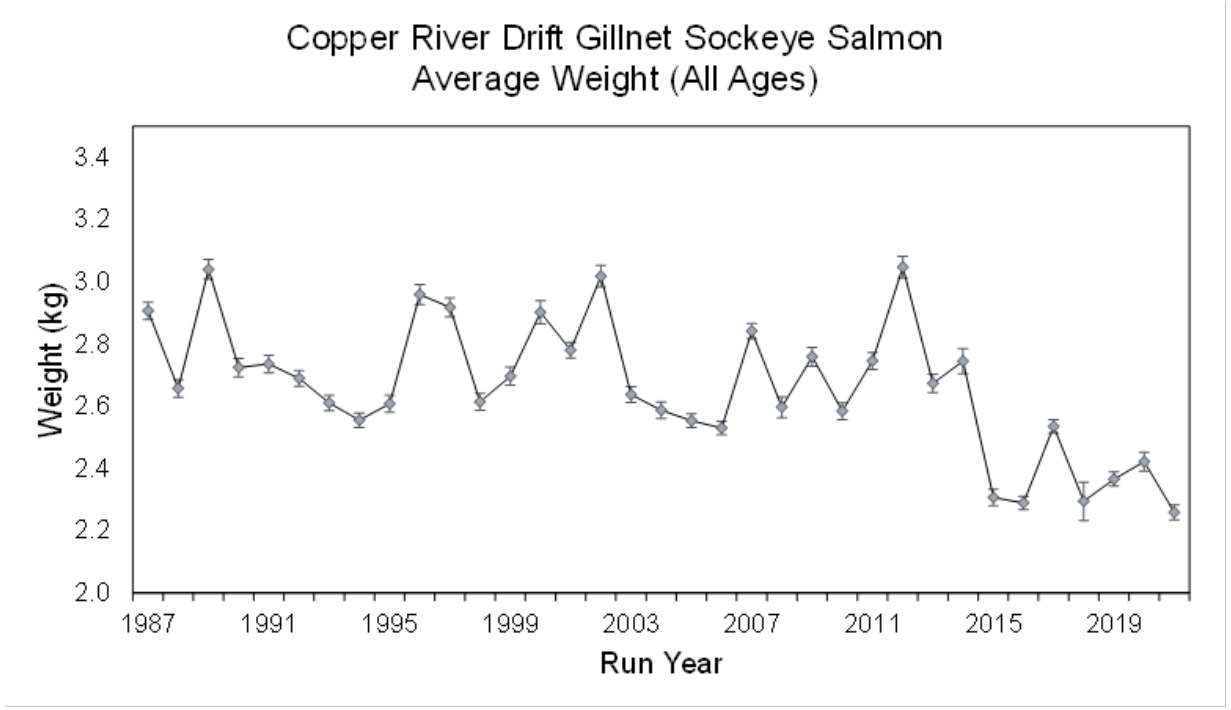


N = 34 stocks

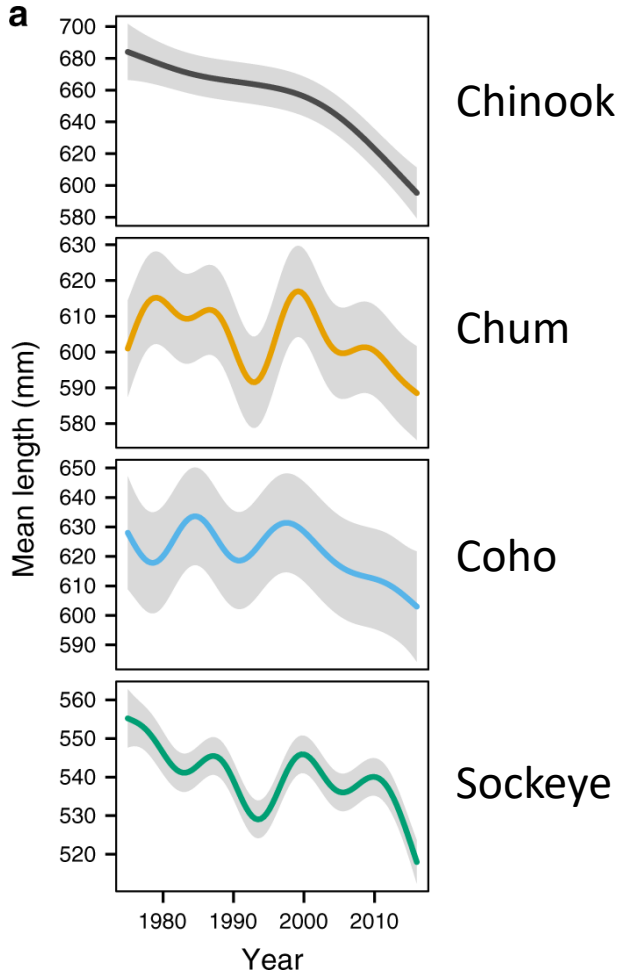
Inverse relationship between northern and southern stocks (Dorner et al. 2012, CJFAS)

Changes in demographic & biological traits

- shift to younger age at maturity
- decrease in length-at-age
- decrease in average weight



Alaska Salmon (Oke et al. 2020)



Ecosystem Changes & Impacts on Salmon – a complex story

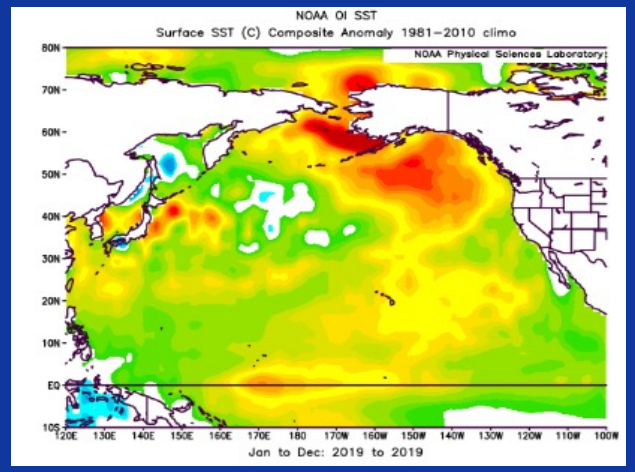
Highlights

Marine Ecosystem

- Marine heatwaves increase frequency
- Changing distribution of salmon and prey
- Thiamine deficiency (first identified in Baltic)

Freshwater Habitat

- Warming river temperatures
- Increased stress and risk of infection & disease
- > 18-20°C decreased survival migrating adults



Marine Heatwaves

Extreme Temperatures

Drought

What does this mean for management?

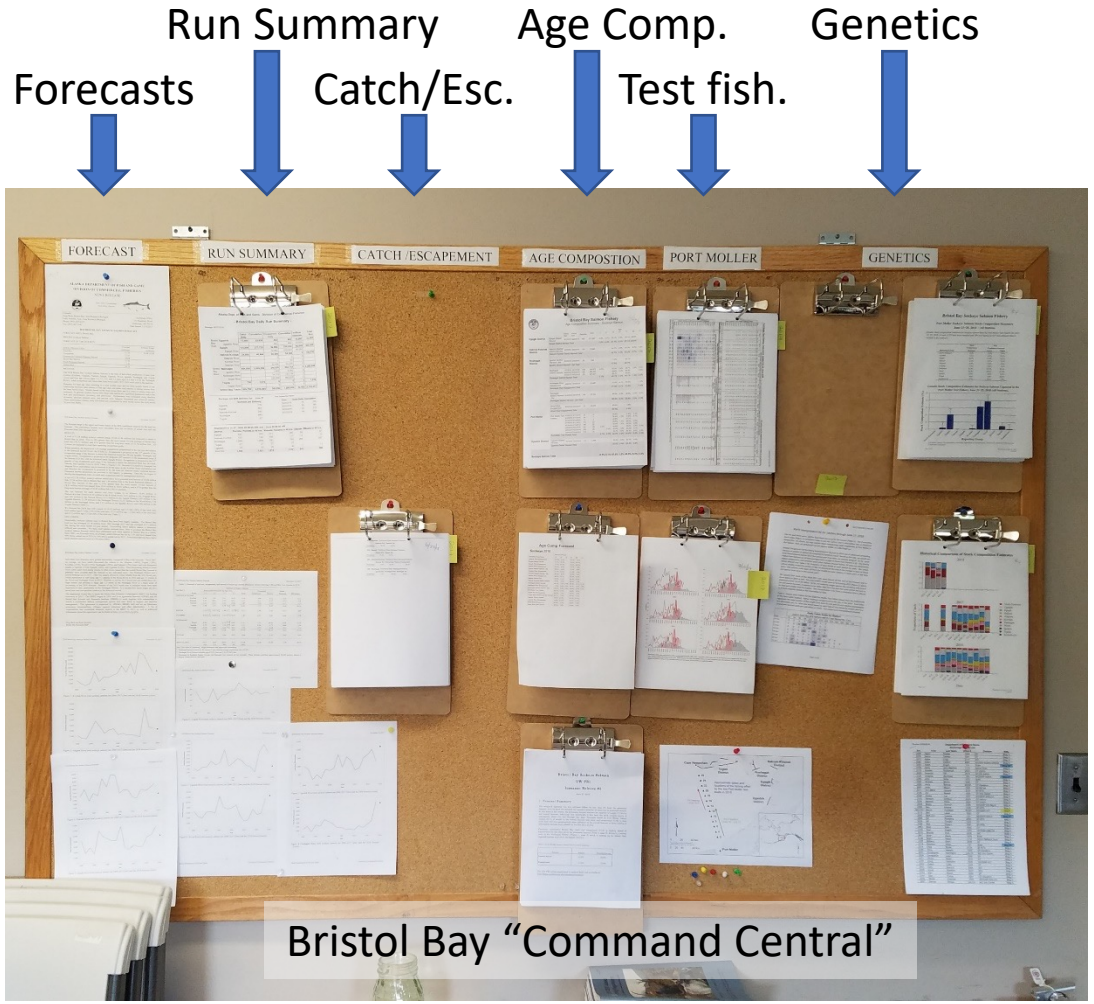
Managers and stakeholders face increasingly uncertain future

Reliable information is critical

- potential effects?
- species responses?

Good information allows

- resilient strategies
- nimble and proactive



Bristol Bay "Command Central"

Next Steps

- Continue investment in monitoring and assessment tools
  - Careful and consistent measurements
- Mobilize data (FAIR principles) & integrate environmental information
- Investigate mechanisms that drive changes
  - Consider what changes mean to salmon stocks (present & future)
    - Integration of knowledge systems including local and traditional knowledge and science
  - Predict how stocks respond to changing “pasture”
    - future scenario planning

Improving integration of our salmon science and stories

Looking forward to future

What do we do with the Science?

- What is our role with these salmon & ecosystem stories?
- How do we motivate need for action? (e.g., need for greenhouse gas mitigation)
- How do we use our science to adapt salmon management systems to future climate change? (many talks at this Symposium)