Warming in the Gulf of Maine

Dave Reidmiller, Ph.D.

30 June 2022

NOAA Eastern Region Climate Services webinar

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Research Institute
Science. Education. Community.

Setting the Scene

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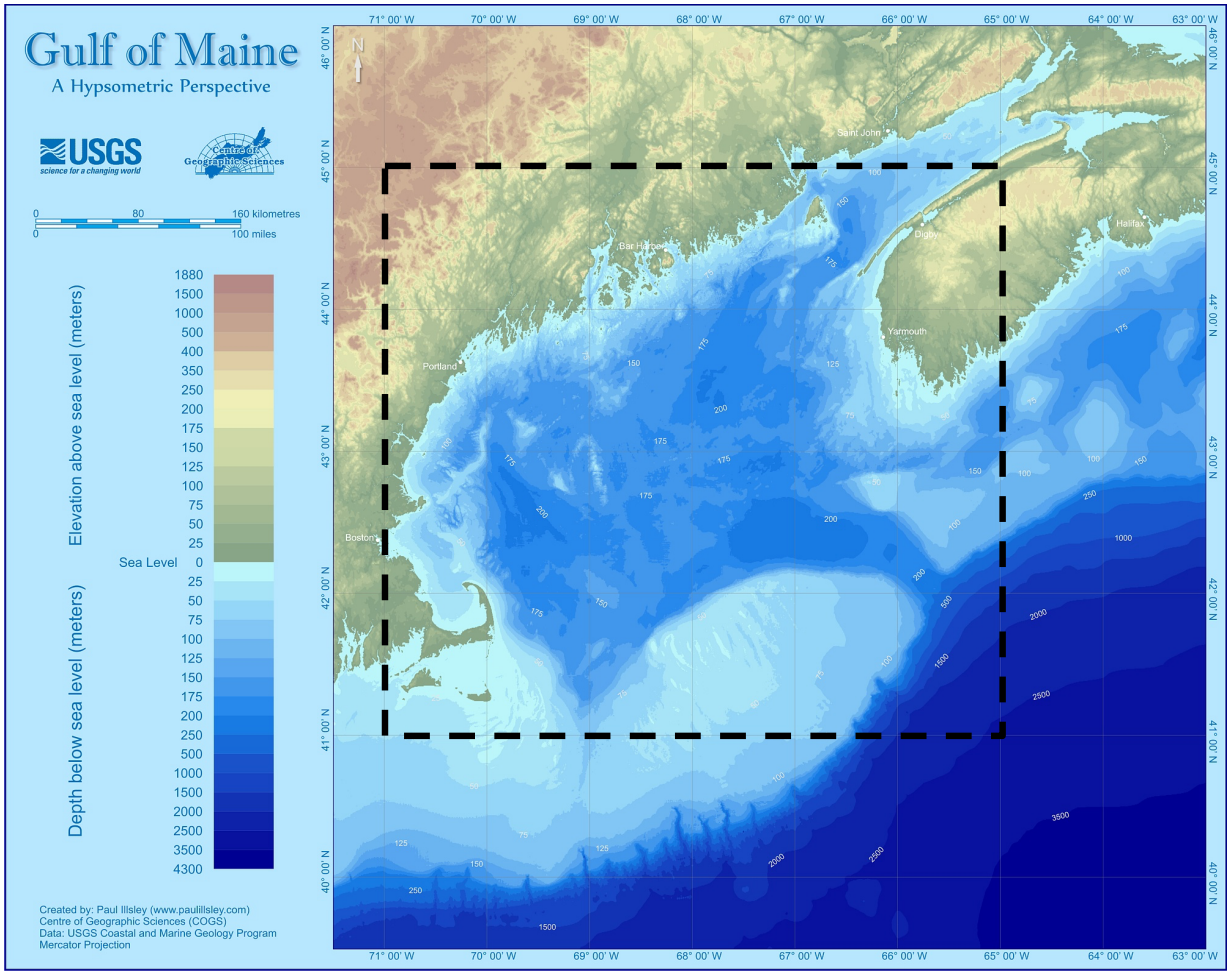

Data Source

- NOAA High Resolution SST data provided by the NOAA/OAR/ESRL PSL, Boulder, CO.

Contributors

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Quantitative Research Technician

Dr. Kathy Mills

Research Scientist, Integrated Systems Ecology Lab

What's Happening: *Rapid Warming in the Gulf of Maine*

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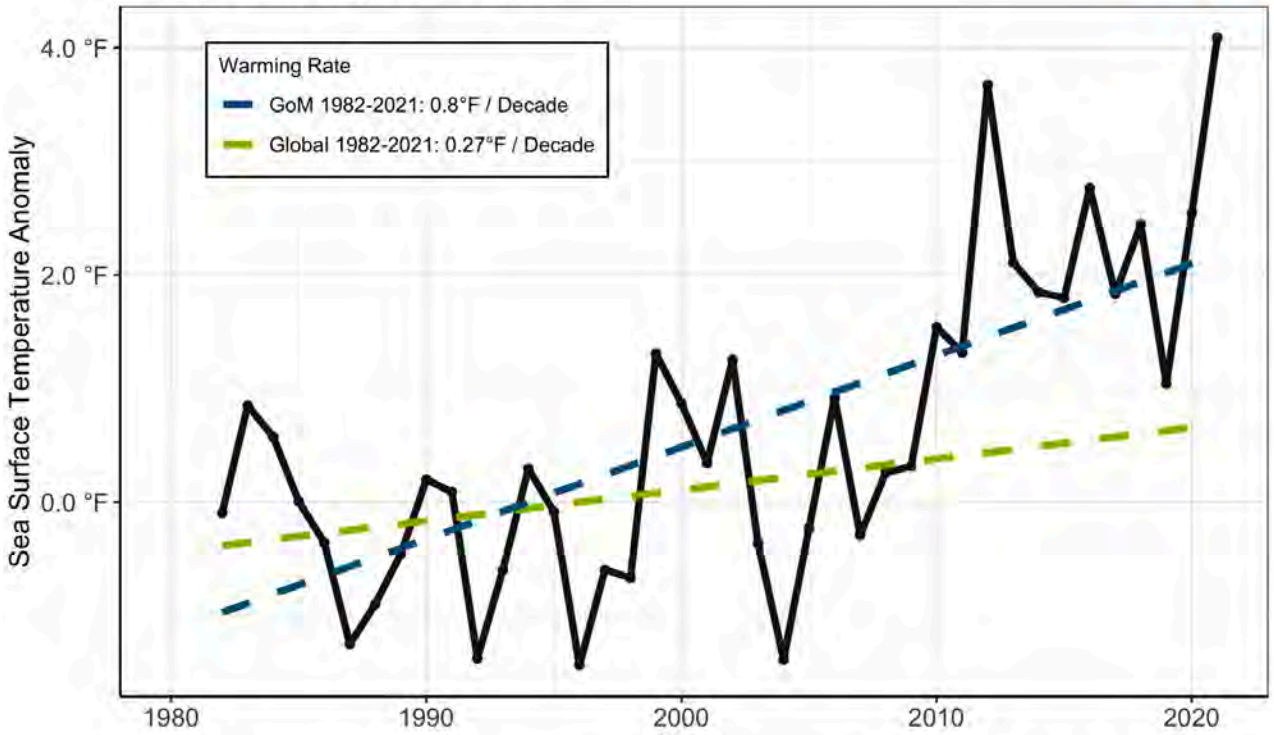

- Annual average SST in the Gulf of Maine was 54.1°F in 2021
  (>4 °F above the long-term average)
- The Gulf of Maine is warming ~3x faster than the global ocean average

Record Hot Days in 2021

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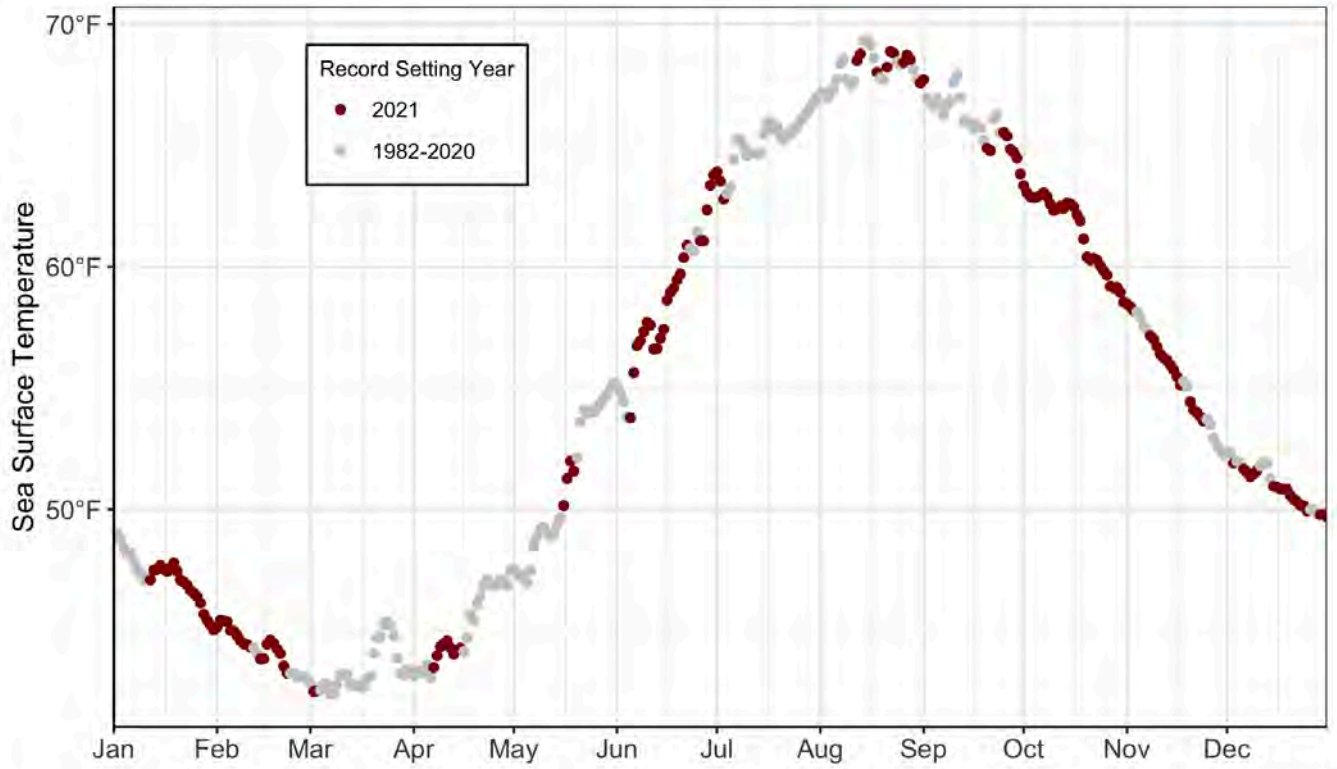

Seasonal Differences?

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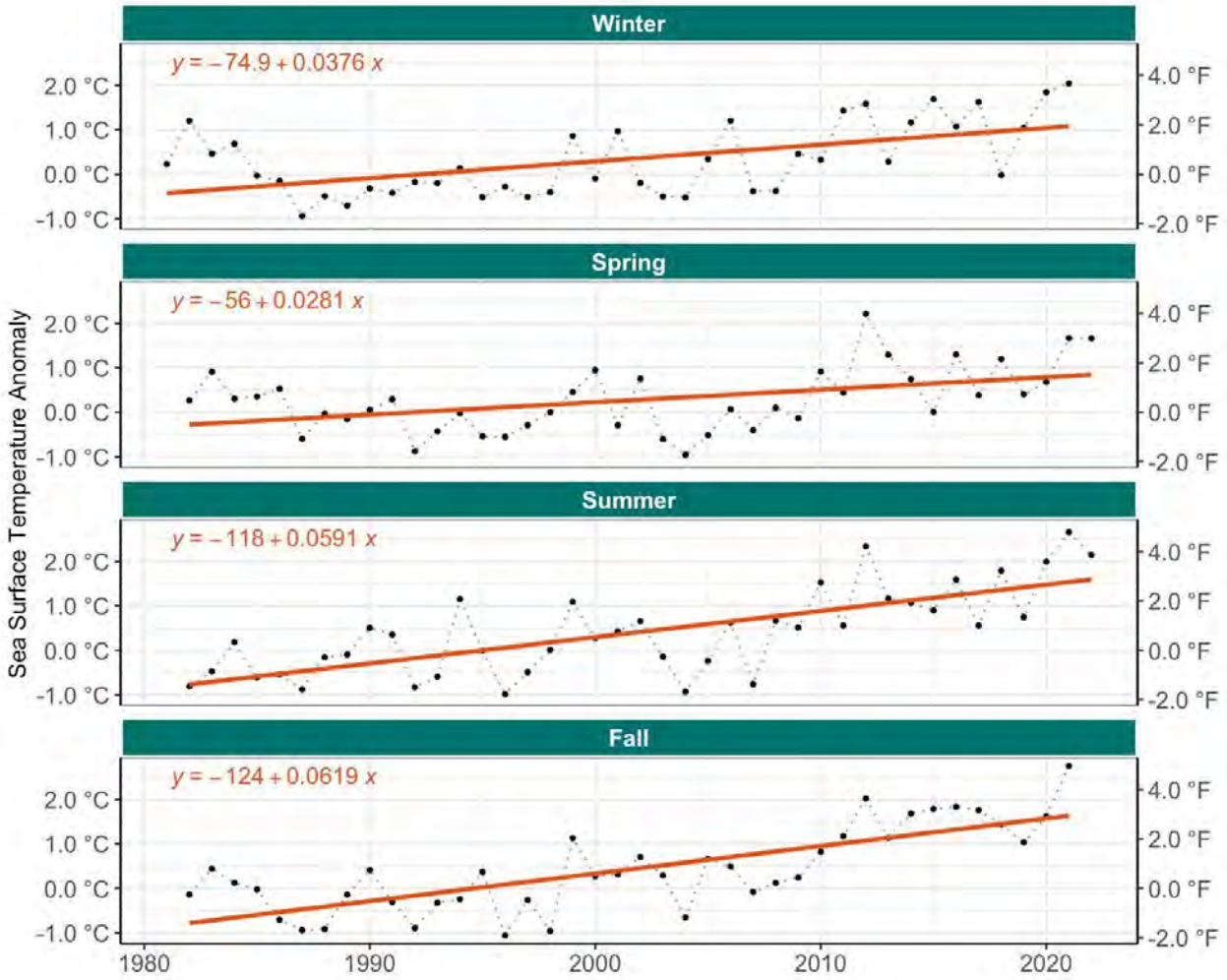

DJF = 0.038 °C/yr

MAM = 0.028 °C/yr

JJA = 0.059 °C/yr

SON = 0.062 °C/yr

Summer & Fall trends are 50-100% larger than Winter & Spring

2021 in a Global Context

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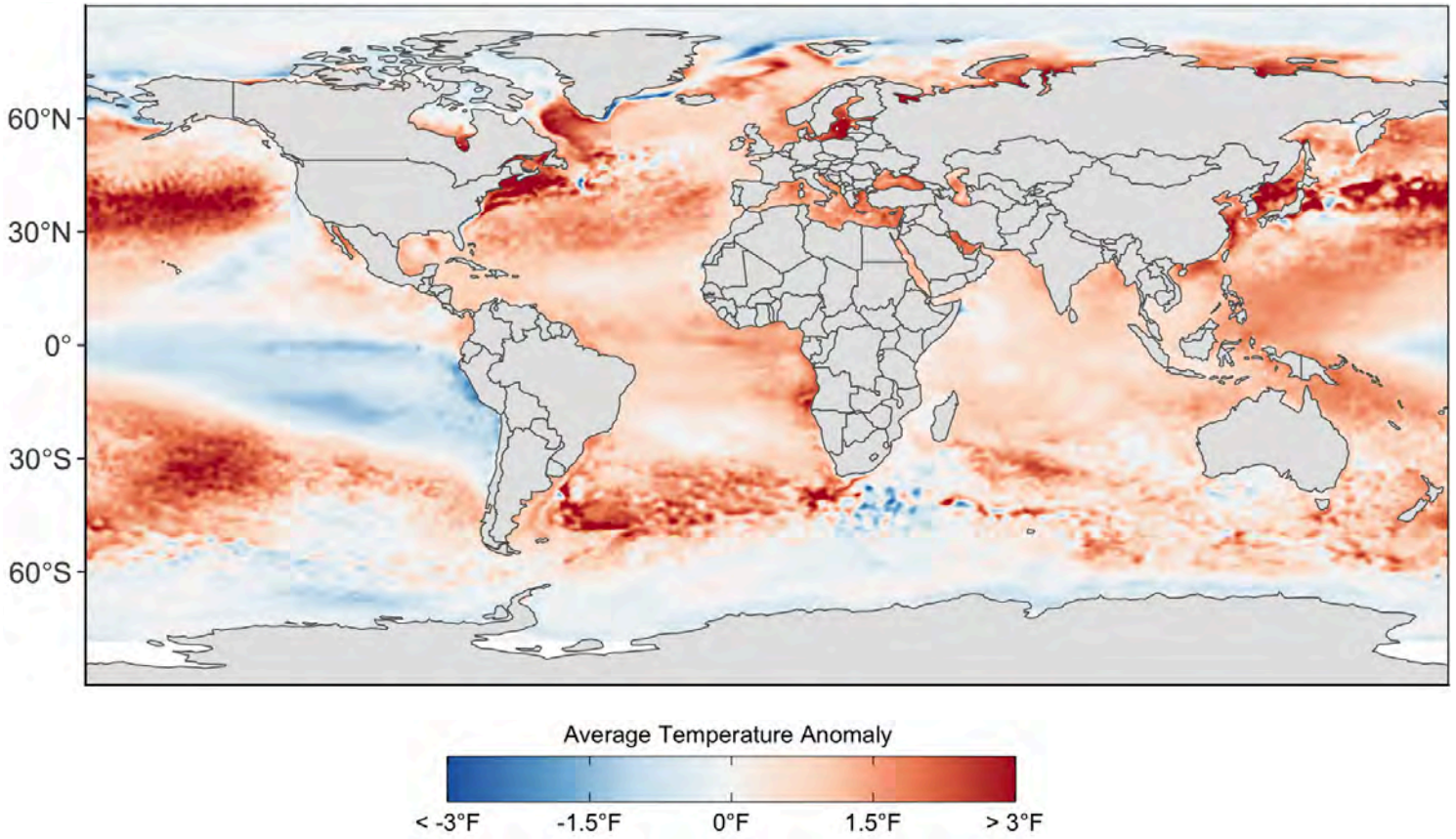

Rate of Warming in a Global Context

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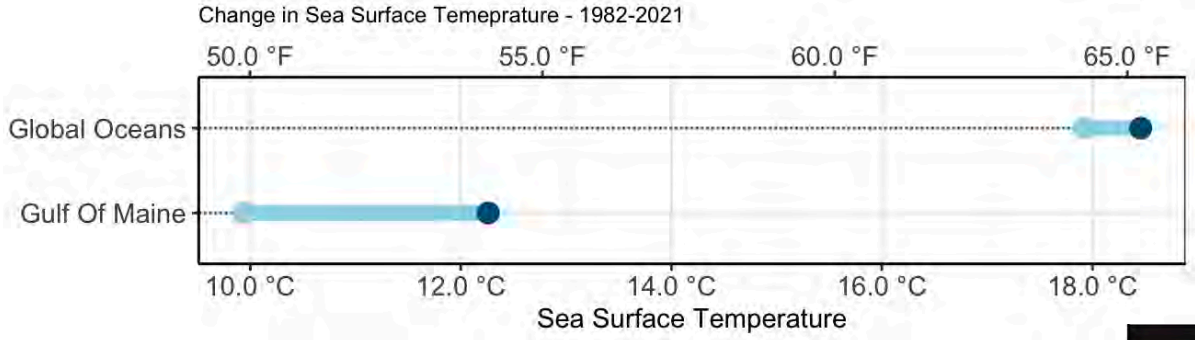
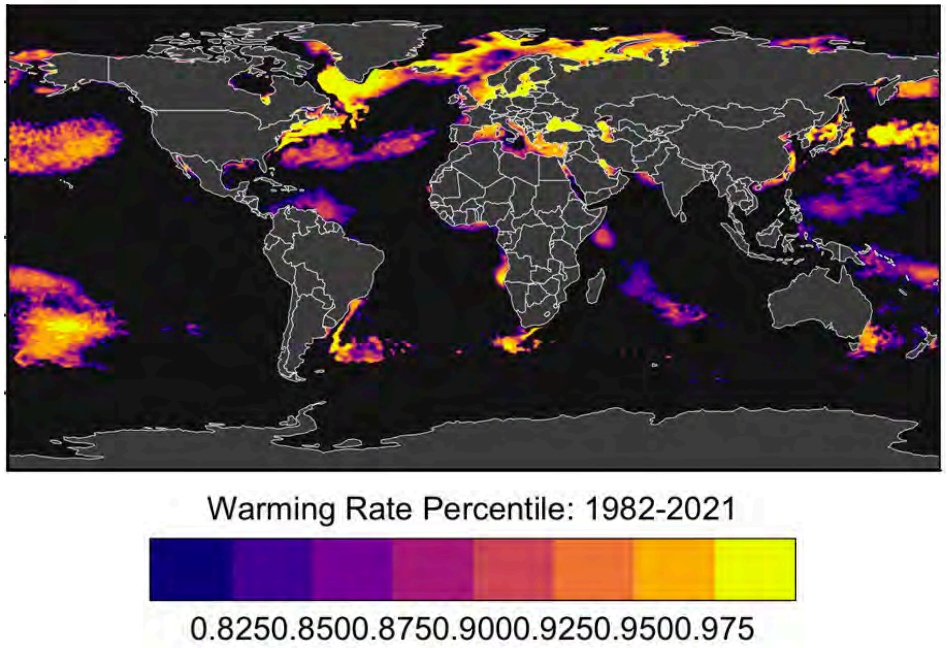


The Gulf of Maine is warming faster than >95% of the world's ocean



Persistent Marine Heatwave = Thermal Regime Shift?

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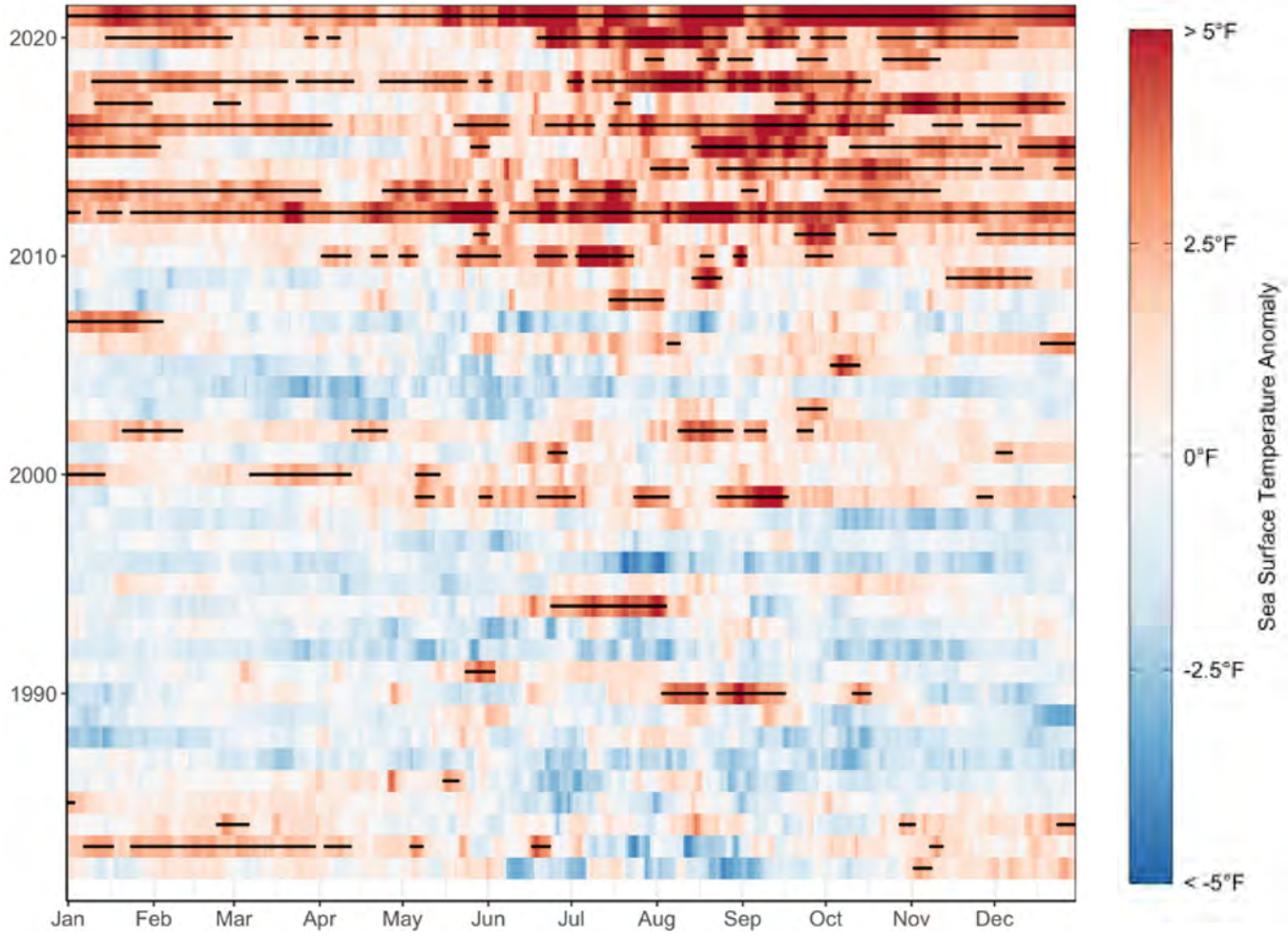
MHW = 5+ days w/ SST >90th percentile of 30-yr avg

——— = Heatwave events



… and what about 2022 so far?

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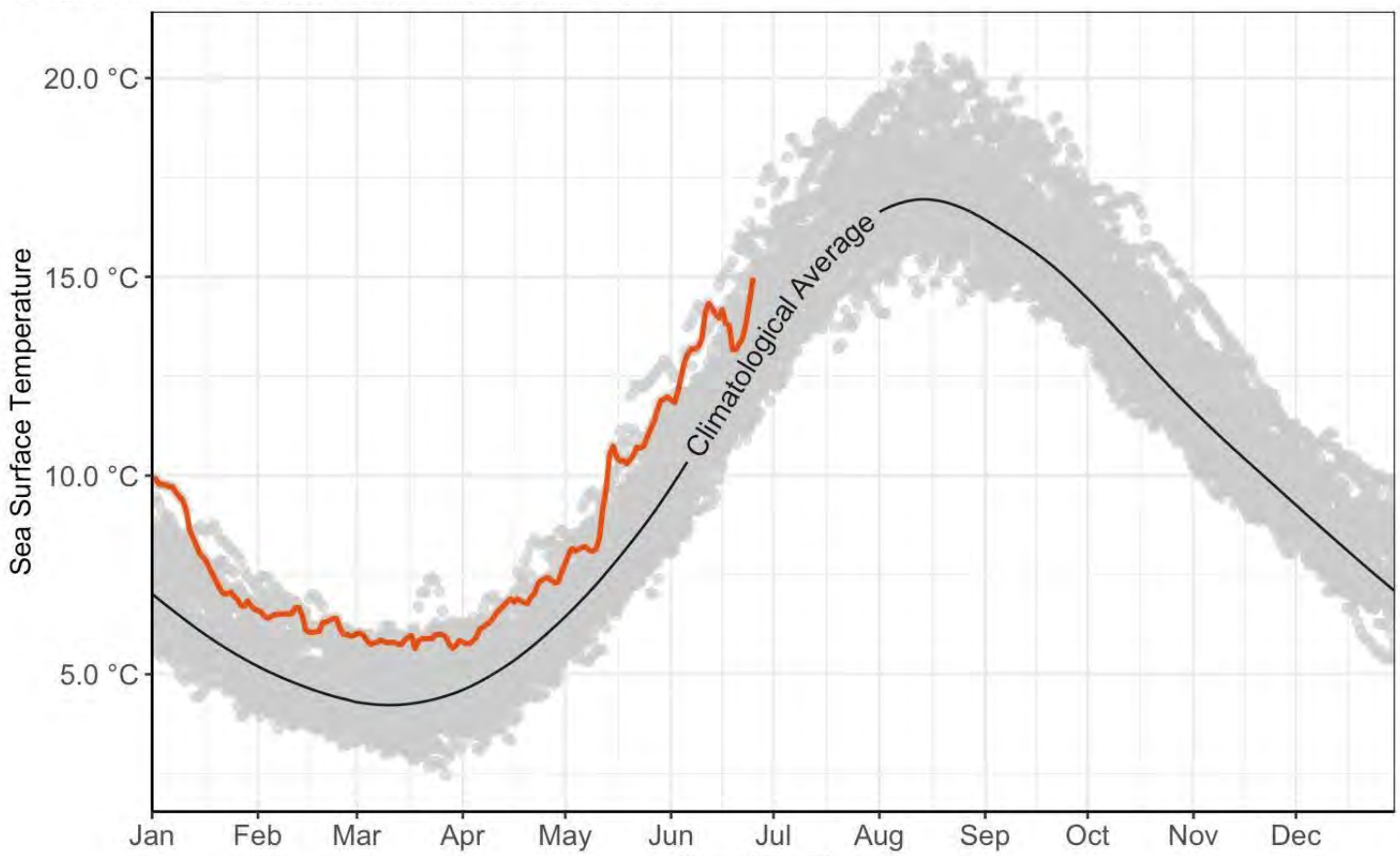

Primer in Physical Oceanography of NW Atlantic

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Why is This Happening: *Natural & Anthropogenic Causes*

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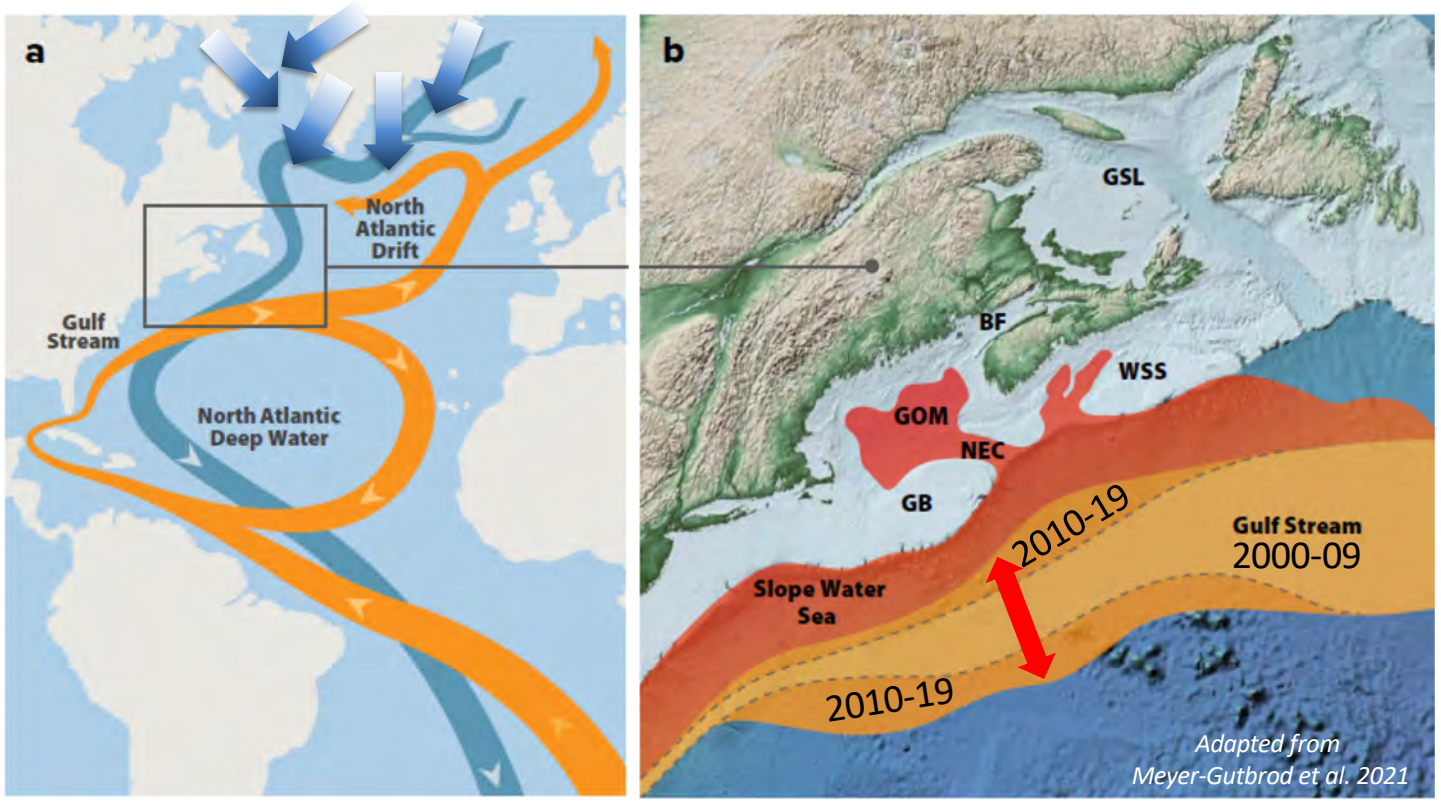

Leading Hypotheses

- Widening of the Gulf Stream ocean current
  - Role of Greenland Ice Sheet & Arctic glacier melt
- More persistent (+) phase of the North Atlantic Oscillation
- Anthropogenic forcing of the midlatitude jet stream

Why is This Happening: *Natural & Anthropogenic Causes*

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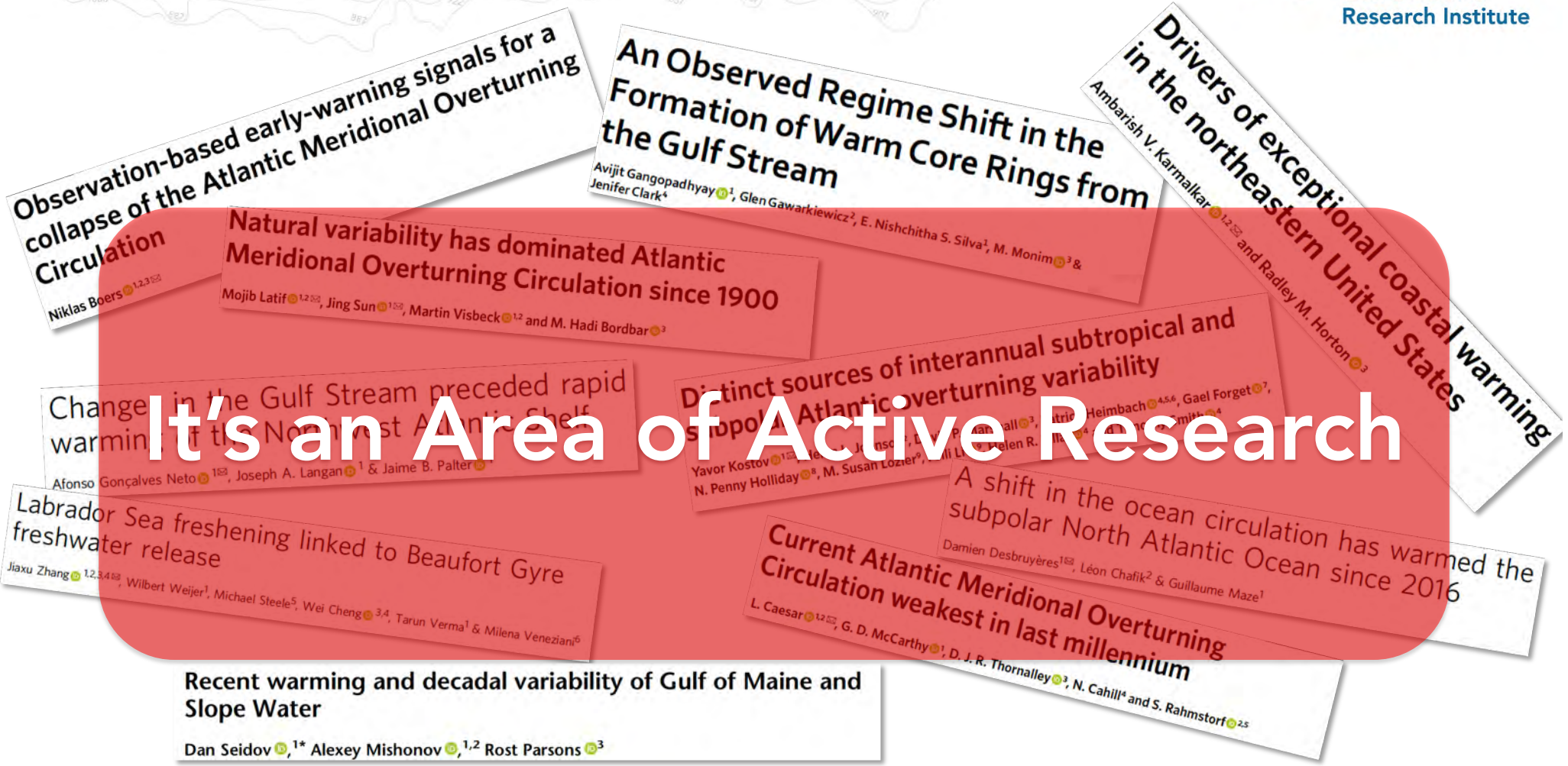

It's an Area of Active Research

Why Does It Matter:
Productivity Declines & Shifting Species

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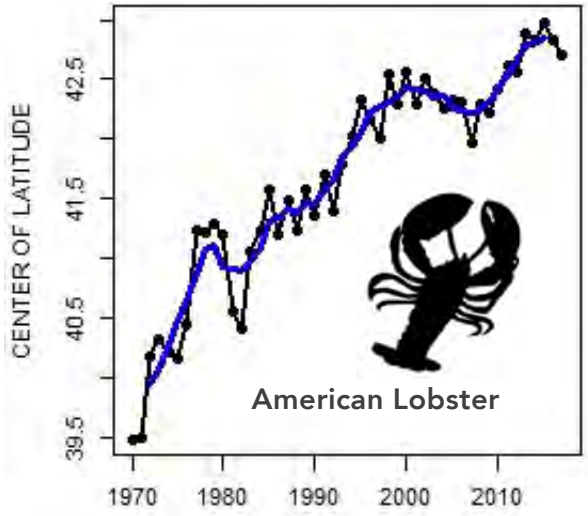
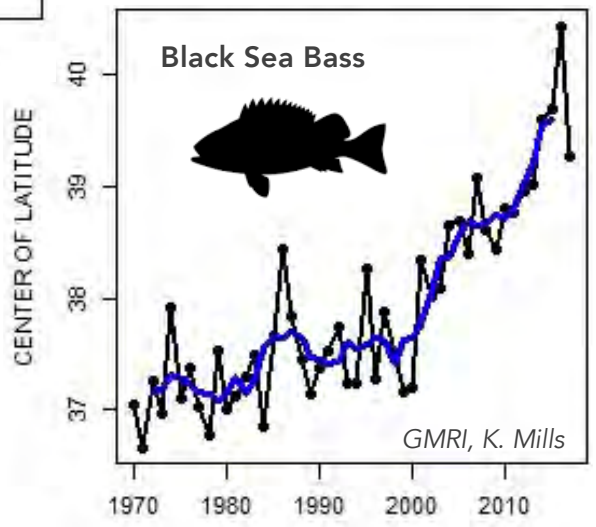
Decreases in cod and lobster productivity have been linked to increases in temperature

Pershing et al., 2015, 2016



The hospitability of this region to various species (farmed and wild harvest) is changing



Why Does It Matter: *Supply Chain Disruptions*

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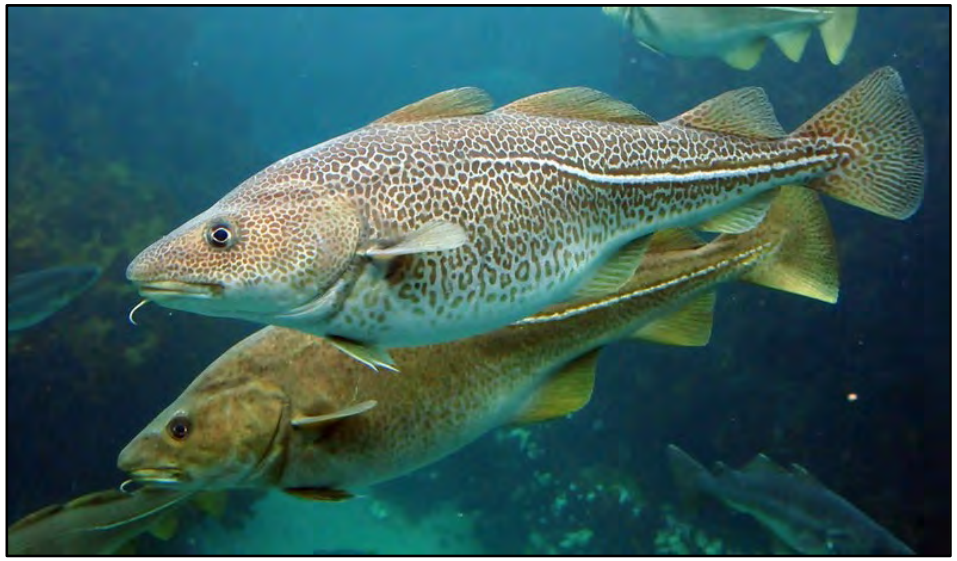
- Fluctuations in supply
- More frequent surprise events
- Loss of certifications (temporary or long-term)



- Additional Costs (e.g., risk / insurance)
- Increased competition for ocean space (wind, cargo, fisheries, etc.)

Photos: Alaska Dept. Fish & Game; Joachim Muller

Responding to (Capitalizing Upon?) Change

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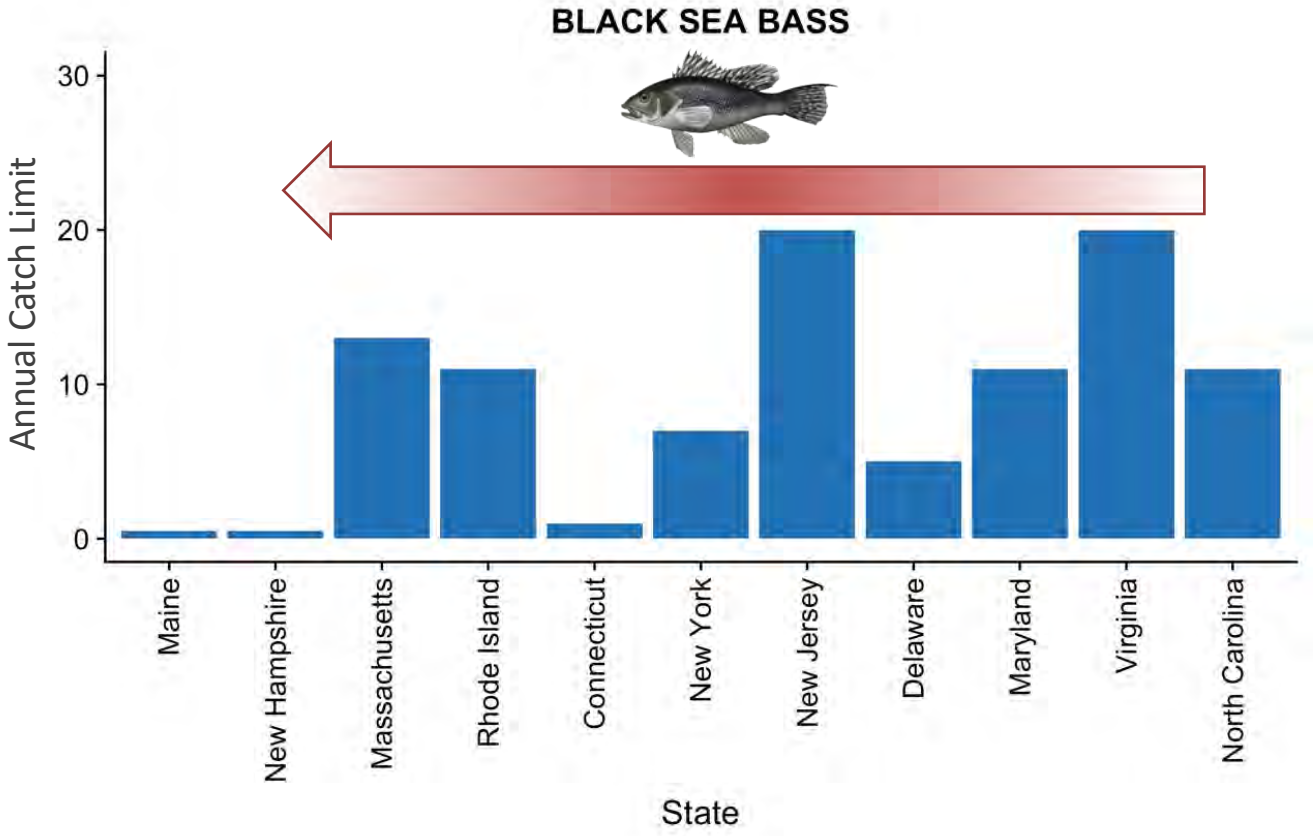

There's a need for a more dynamic regulatory & management regime

GMRI, K. Mills


Thank You!
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gmri.org/climate
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Climate Action Strategies for Seafood Businesses

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- Measure and reduce GHG emissions throughout supply chain
- Pursue vulnerability assessments and implement risk reduction strategies (diversify sources, create new markets, etc.)
- Support, fund, and partner on research and information development
- Advocate for climate considerations in aquaculture management
- Participate in networks and collaborations to integrate climate change into seafood sustainability efforts

Hiddenfjord slashes its carbon emissions by ceasing air freight use

Faroe Is.-based Atlantic salmon farming firm reduces CO_2 emissions from exporting activity by 94% by switching to sea freight