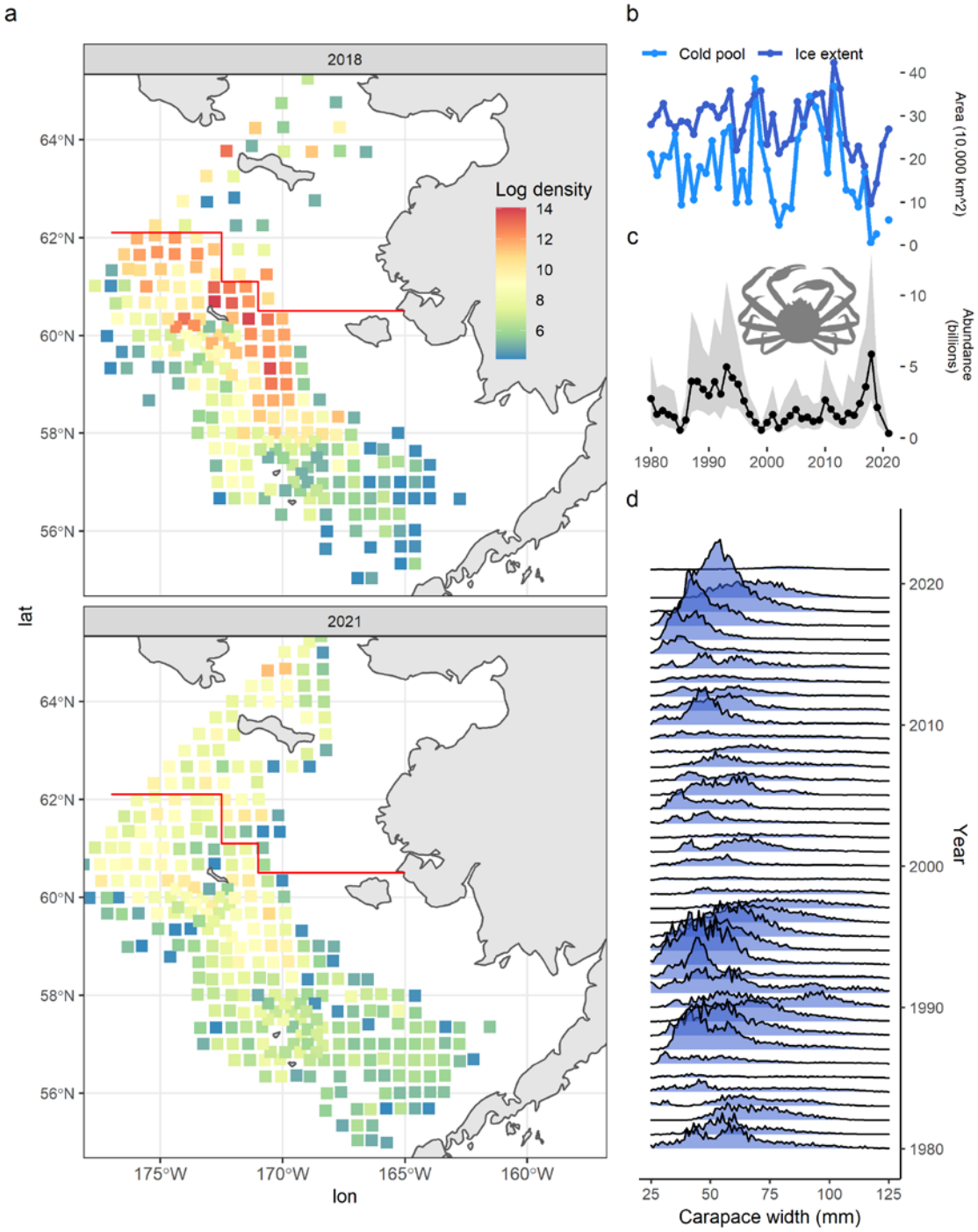
Cody Szuwalski

- Alaska Fishery Science Center (NOAA)
- Research Biologist
- Crab Plan Team
- Stock assessments for crab in the Bering Sea
- Alaska Climate Linked Modeling Project (ACLIM)
- University of Washington affiliate faculty
- Resource management, climate change, uncertainty, marine ecology, simulations, and management strategy evaluation



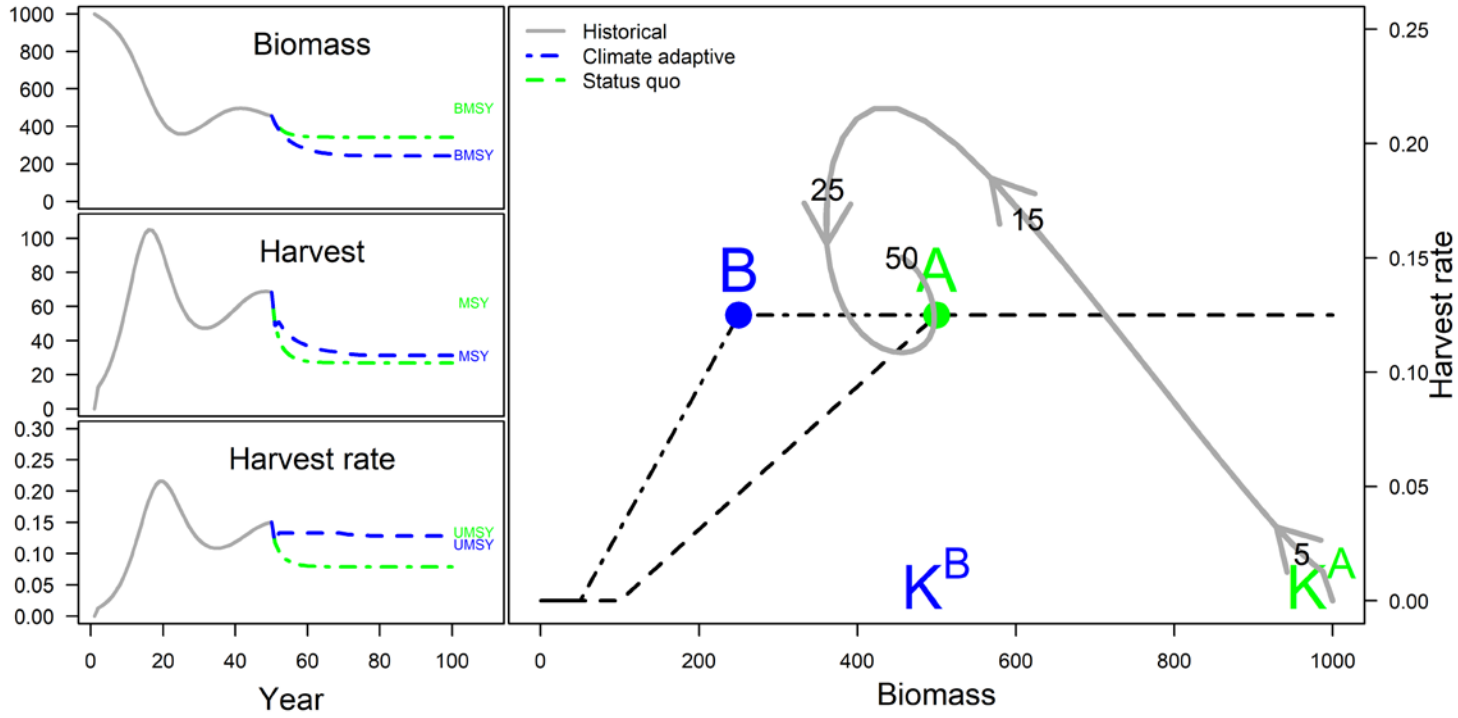
Collapse of snow crab

- More crab than ever in 2018, fewer crab than ever in 2021 (a, c)
- Cold pool was the smallest on record in 2018 and barely larger in 2019 (b)
- The stock was declared overfished, the fishery was closed in 2022, and a rebuilding plan is underway
- Considered hypotheses include:
  - Temperature
  - Disease
  - Discards
  - Bycatch
  - Cannibalism
  - Population density
  - Predation
- Temperature and population density were important variables, suggesting this is one of the largest losses of motile marine macrofauna to a marine heatwave

Szuwalski, C.S. et al. Canaries of the Arctic: the collapse of the eastern Bering Sea snow crab. In review.

What if we knew the environmental drivers of productivity perfectly?

- Management targets in harvest control rules are important and useful
- NS1 says targets should reflect current environmental conditions
- Should we change our targets under climate change?
- Adjusting management targets to reflect decreased productivity results in higher exploitation rates on populations under stress.



Szuwalski, C.S. et al. Unintended consequences of climate adaptive fisheries management targets. Fish and Fisheries.

Looking forward

- Widespread changes in productivity will be the central challenge
- Fishers uniting on climate change
- Rethinking of single species quota system
  - Diverse portfolios to spread risk and reward
  - What if I had perfectly predicted the snow crab collapse…
- Surveys are the most important thing NMFS does
- Better scientific infrastructure for considering tradeoffs and fishery interactions (a cross plan team plan team)