

Assessing Policy Measures for Managing Climate Induced Fish Habitat Shifts

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Fish are Shifting Habitat as Ocean Temperatures Increase from Climate Change



Introduction

- Fish is a collective term that refers to any aquatic animal that can be harvested (Deepananda and Macusi 2012)
- Fish contributes to over 50% of animal protein intake in small islands (Deepananda and Macusi 2012)
- Fisheries are important for economic growth especially in rural and remote areas (Deepananda and Macusi 2012)
- Anthropogenic climate change has been pressuring critical fish species to shift their habitats due to rising ocean temperatures. Climate change is also having physiological effects on fish species.
- This puts pressure on American fisheries to adapt to climate induced fishery shifts.
- The Magnuson-Stevens Act is the primary federal law that governs fisheries in the United States. The goal of this research was to analyze if the federal policies of the United States are adapted to accommodate the shifting habitat of fish which is necessary for maintaining the integrity of fisheries

Effects on Fishing Industry

- Collapsed fisheries (Szuwalski et al. 2023)
- Fish migrating to cooler locations and in the United States shifting their range north
 - Atlantic Salmon used occupy ranges as south as the Hudson River, now they are present in 8 of Maine's historical salmon rivers (Henderson et al. 2023)
- Transboundary maximum catch potential fish stock sharing ratios, even in the lowest affected models, will show a shift in the fish stock sharing ratios (Palacios-Abrantes et al. 2020)
- Socioeconomic consequences

Footnotes

Deepananda, K. A., & Macusi, E. D. (2012). The changing climate and its implications to capture fisheries: a review. *Journal of Nature Studies*, 11(1&2), 71-87.

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Johnson, J. E., & Welch, D. J. (2009). Marine fisheries management in a changing climate: a review of vulnerability and future options. *Reviews in Fisheries Science*, 18(1), 106-124.

McClenachan, L., Grabowski, J. H., Marra, M., McKeon, C. S., Neal, B. P., Record, N. R., & Scyphers, S. B. (2019). Shifting perceptions of rapid temperature changes' effects on marine fisheries, 1945-2017. *Fish and Fisheries*, 20(6), 1111-1123.

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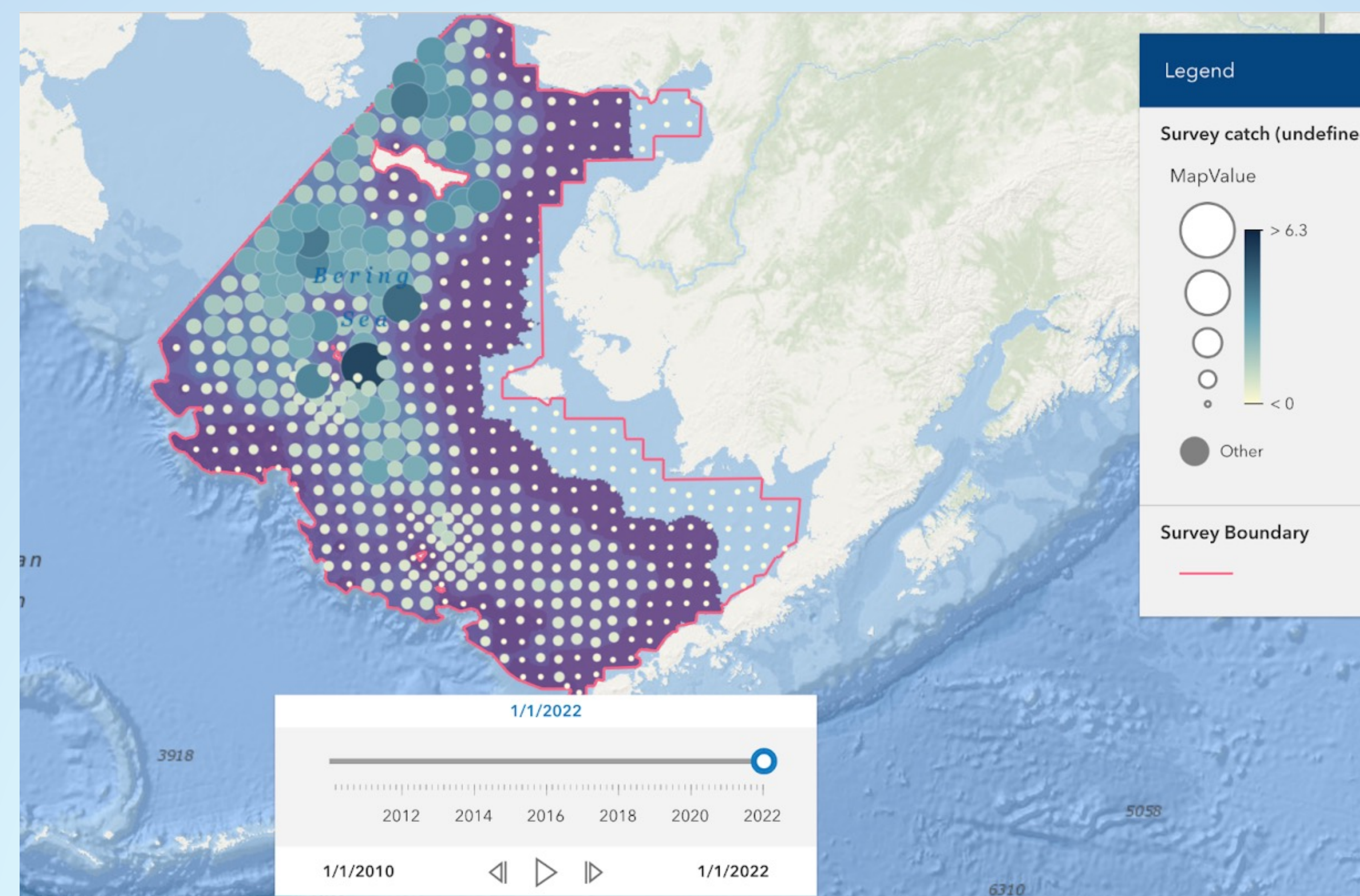
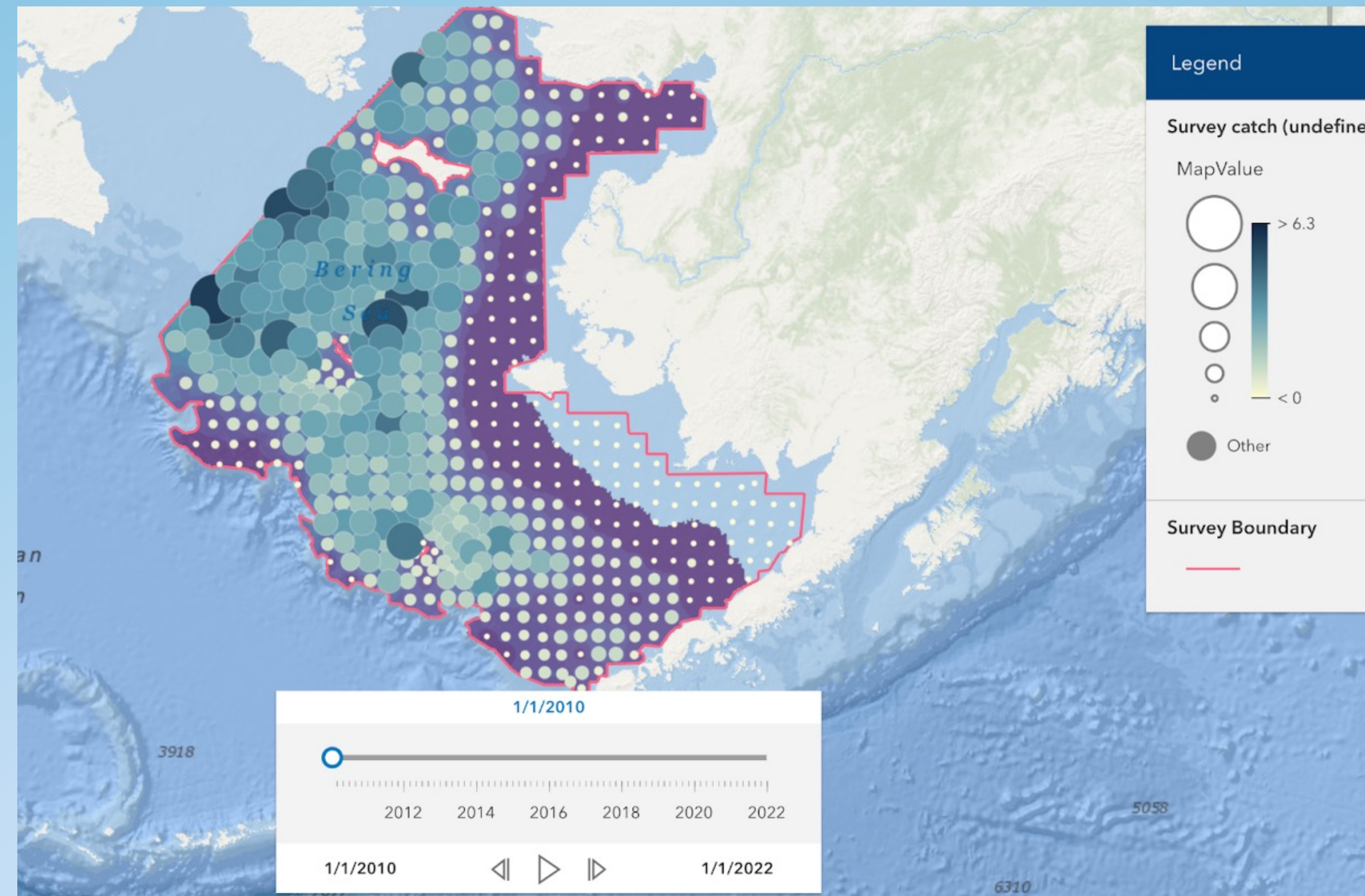


Figure 1. The distribution of snow crabs (*Chionoecetes opilio*) from 2010 (top) compared to 2022 (bottom)

Results

- Federal policies have not been amended in the United States to include climate change
- The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2007 amended The High Seas Driftnet Fishing Moratorium Protection Act
- IN 2018, the Magnuson-Stevens Act was amended by the Modernizing Recreational Fisheries Management Act.
- Climate change is not directly mentioned in The Magnuson-Stevens Act or The High Seas Driftnet Fishing Moratorium Protection Act
- Regional groups have made progress mitigating climate change in their fisheries

Methods

- Employed a policy analysis methodology to evaluate if policies include climate change in recent updates
- Try to determine the best course of action with the best result

Conclusions

- Federal policies, especially the Magnuson-Stevens Act, need to be amended to include climate change
- Regional groups have been making more progress compared to federal policies
- Many communities are finding adaption to be difficult (McClenachan et al. 2019)
- Climate change will further exacerbate already existing pressures acting on marine fisheries including overfishing (Johnson and Welch 2009)



Snow Crab

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