

How fishing communities are responding to climate change

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Larger fishing trawlers are seen in Point Judith, Rhode Island. Communities of vessels have varying responses to shift in species' distribution, based in part on the relative size of vessels. Credit: Courtesy of Eva Papaioannou

What happens when climate change affects the abundance and distribution of fish? Fishers and fishing communities in the Northeast United States have adapted to those changes in three specific ways, according to new research published in *Frontiers in Marine Science*.

Becca Selden, Wellesley College assistant professor of biological sciences, and a team of colleagues examined how fishing communities have responded to documented shifts in the location of fluke and of red and silver hake. The team found that fishers made three distinct changes to their approaches: following the [fish](#) to a new location; fishing for a different kind of fish; and bringing their catch to shore at another port of landing.

Selden began this research as a postdoctoral scholar at Rutgers University in New Jersey with Eva Papaioannou, now a scientist at GEOMAR. They combined quantitative data on fish availability from surveys conducted by the National Marine Fisheries Service at the Northeast Fisheries Science Center and a unique geographic information system database from fishing trip records developed for this project. The researchers then interviewed fishers in 10 ports from North Carolina to Maine.

They explored three dominant strategies, and found that fishers throughout the Northeast were more likely to shift their [target species](#). In interviews, the researchers learned that targeting a mix of species is a critical option for adaptation. Doing so can be complicated, however, because in many cases regulations and markets (or the lack of a market) constrain fishers' ability to take advantage of a changing mix of species in fishing grounds. For example, in Point Pleasant, N.J., fishers can't capitalize on an increase in dogfish in the region because of strict conservation measures that have been in place since 1988, when the species was declared over-fished, and the resulting absence of a market for those fish.

"Most communities tend to fish where they have fished for generations, and therefore, for any [fishery management plan](#) to be more climate-ready in the future, it needs to take that into account," Selden said.

"They're less likely to move where they fish, more likely to switch what they fish, but only if they can, and regulations play a big role in that being successful."

The researchers also learned about a previously undescribed strategy in which fishers change where they bring the fish ashore to sell. This is particularly common for vessels coming from northern fishing communities that sell fluke in Beaufort, N.C. "Had we not combined the quantitative data with the in-depth interviews with community members, we would have totally missed the phenomenon we saw come to light in Beaufort," Papaioannou said. "It made for such a powerful way of analyzing the data, so that we were really using it to influence the questions we would ask in each interview, and the interviews would drive what we would examine in the [quantitative data](#). I think that approach really made for a much more complete look at the impact of changes in species distribution and fishers' adaptations."

Of the fishing communities they studied, only the one in Beaufort used the tactic of following fish to new grounds. Unlike communities in the north, fishers in Beaufort have targeted fluke heavily in the past, and because the port is on the southern edge of the range for this species they are more vulnerable as the species shifts north. "Beaufort fishers have gone to tremendous lengths to keep fishing fluke," Selden said, "and following fish to new grounds brings its own constraints and concerns." These include the cost of increased fuel use, [safety issues](#) due to vessel size, and the local environmental knowledge needed to fish successfully in new locations.

All of these responses are intertwined, Selden said, so as we learn more about the effects of [climate change](#) on the future of fishing,

understanding, predicting, and planning for any one of them will require examining all three together.

The researchers focused on the Northeast because it has been a hotspot of recent ocean warming, especially in the Gulf of Maine, and in some ways it is a harbinger of what other areas might be experiencing soon, Selden said. Along the East Coast, she said, "you have species that have these state-by-state regulations, you're passing through different jurisdictions and three different fisheries management councils, and species are crossing boundaries all over the place. This all has an impact on fishers, their behavior, and their communities."

Selden plans to continue this work on the West Coast—where there are only three states and one fishery management council—to compare how stable their fishing grounds are and how much fishers are switching species versus shifting where they fish.

"Fisheries are really on the frontline of climate impacts," Selden said. "It's really a bipartisan issue, and there are stakeholders across party lines. That was my motivation to focus on how communities are adapting, how they've adapted to past change. We need to be able to understand how they might adapt to future change and potentially how we would need to change management to facilitate some of the adaptations that they are already demonstrating."

The team is building a website that [fishers](#) and communities can use to see some of these patterns and learn more about what their counterparts elsewhere are doing about them. Community leaders and fishery management officials could also use the information to promote a broader understanding of the issues and potentially prioritize fishery development projects or plan for where a [species](#) will go next.

More information: Eva A. Papaioannou et al, Not All Those Who

Wander Are Lost – Responses of Fishers' Communities to Shifts in the Distribution and Abundance of Fish, *Frontiers in Marine Science* (2021). DOI: [10.3389/fmars.2021.669094](https://doi.org/10.3389/fmars.2021.669094)

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