

**Committee on Natural Resources
Subcommittee on Water, Oceans, and Wildlife
Oversight Hearing
1324 Longworth House Office Building
May 1, 2019
2:00 pm**

**Oversight Hearing on
*The State of Fisheries***

Responses of Dr. Rebecca Selden to Questions for the Record

Questions from Rep. Van Drew for Dr. Rebecca Selden

Dr. Selden: No one understands the impacts of shifting fish stocks more than commercial and recreational fishermen in my district. Summer flounder and Atlantic croaker were historically fished off the coast of North Carolina in the late '90s and now are being fished 250 miles north, off the coast of New Jersey.

Why are scientists and managers particularly concerned about the impacts of climate change on fisheries?

Warming oceans are driving shifts in where we find fishery species, and in how productive those species are in their historical and new habitats. As waters warm, populations of species like Atlantic cod that are at the southern edge of their range in US waters are likely to be less productive, and may be locally extirpated from warm areas. Less productive stocks produce smaller fisheries yields overall, and levels of harvest that were sustainable under average conditions may result in overfishing. Further, fisheries losses for these species will not be uniform over space, with greater impacts in states near the southern range boundary. For these reasons, climate change is a major emerging issue for fisheries, and one that will create challenges for our management system. In response to your additional questions, I suggest some more specific ways that we can help make our fisheries more climate-ready.

What are the risks of doing nothing?

Ignoring the impact of climate on fisheries puts the future livelihoods of fishermen around the nation at risk. Extreme warm events like the “warm blob” along the West Coast from 2013-2016 foreshadow the magnitude of potential impacts that could occur with long-term warming. Species were found hundreds or even thousands of miles north of their typical ranges, with major changes in the mix of species of the tiny organisms called zooplankton that are important food for many fishery species. As a result, many important fisheries on the West Coast suffered fishery disasters, and adverse impacts on fisheries for long-lived species like Pacific cod emerged even after ocean conditions returned to normal.

Our research shows that a primary response for species dealing with long-term trends in changing ocean conditions is to shift their distributions. As such, it’s not a question of whether species will move but when. Many parts of our fisheries management system do not currently

have a strong mechanism for resolving allocation conflicts that arise as fish shift across political boundaries. Inaction on this issue sets up the potential for a race to fish between those parties that will be losing or gaining access, and this jeopardizes the long-term sustainability of those stocks.

The good news is that we have the science necessary to predict how species are likely to respond to long-term warming, and unlike sudden extreme events, we have advance notice of the impacts. This allows us to take proactive action now to ensure the continued sustainability of fisheries.

Can you describe some of the impacts you've seen?

Fishers along the east coast of the US have already had to deal with important fishery species like summer flounder and black sea bass shifting more than 200 miles northward. Some fishers from North Carolina travel 3 days north to catch summer flounder off the coast of New Jersey, and 3 days back home to land it. Fishers from northern states who have bought permits to land summer flounder in North Carolina do the reverse trip. The increased fuel and time expended is making fishing trips more expensive. Trap fishermen in the Mid-Atlantic have seen lobster disappear as warming waters fueled both a northward shift in suitable habitat and contributed to the transmission of shell disease [1]. Small trawlers in Point Pleasant, NJ have observed the loss of squid from inshore fishing grounds, demonstrating that fishers are vulnerable not only to northward shifts in species but also movements towards deeper waters. These examples highlight that climate change is absolutely a problem for the present, but we can take action now in a way that is proactive for future shifts in fish stocks.

Which fisheries are most at risk of adverse impacts from climate change?

Our research suggests that small vessels typically stay close to port and are unlikely to shift where they fish. However, even for fishers in large vessels that could move, the majority do not choose to leave those areas that have been important fishing grounds for generations. While my studies have not included an in-depth analysis of recreational fishers, anglers may also be quite limited in the degree to which they can or wish to shift where they fish.

Instead, we observed that the primary adaptation of commercial fishing communities in the northeast U.S. to shifting species distributions was to switch the species that they targeted. For example, as squid moved increasingly offshore, trawlers in Point Pleasant, NJ caught less squid as a fraction of the catch. At the same time, they began catching more fluke, and landing scup as a new species. Whether this type of species switching mitigates adverse impacts depends on whether the regulations allow for the new species to be landed in the new area, and whether there is a viable market. Catching a new mix of species will also incur costs as fishermen modify gear, boats, and acquire the necessary ecological knowledge to effectively target those species. Those fishers using more specialized gear, like traps, may be less able to do so.

What would you like to see NOAA or the Councils do to help support fishermen as the climate continues to change?

One of the best ways to facilitate resilient stocks in the face of climate change is to ensure that overfishing is not occurring. The challenge with climate change is that a harvest level that was sustainable under favorable conditions may be too intense under adverse environmental conditions. To the extent that this is feasible, managers can ensure that stocks are being assessed frequently and that the link between stock performance and environmental conditions is incorporated into stock assessments. In this way, we can make our fisheries more climate-ready, and design fisheries management to be robust to the effects of warming.

As species move in response to warming waters, they are becoming more available in some areas, and less available in others. As a result, some fishing communities may gain a new fishery species while others may lose a species that they have relied upon for decades. Instead of creating a race to fish, efforts can be made to proactively coordinate management of stocks that are predicted to be shared across jurisdictions, both domestically and internationally. The councils and fishery commissions have experience coordinating management for some stocks, and this could be applied more broadly. Where species are predicted to cross international boundaries, international agreements could be developed, as is currently done between the US and Canada for Pacific Halibut on the West Coast.

The issue of allocations for shifting fish stocks is one that has major consequences for fishers in those states that currently have quota and those that would like to have greater access to new fisheries. Using our knowledge of where species are likely to go in the future can help both fishers and managers prepare for this new mix of species, and allow stakeholders to participate in any discussion about future allocations. The ultimate choice in policy will likely balance the needs of both those parties while ensuring the continued sustainability of the stock as a whole.

While the U.S. situation is unique, successful measures implemented elsewhere may serve as inspiration. Examples of responsive allocations already exist--for instance, the Pacific Island states use the most recent seven year period of skipjack tuna landings to determine allocations, and allows for trading of allocation between nations [2]. This sort of combination approach might provide useful insight for the U.S. in developing policies and practices surrounding climate change and allocation.

References

1. Groner ML, Shields JD, Landers DF Jr, Swenarton J, Hoenig JM. Rising Temperatures, Molting Phenology, and Epizootic Shell Disease in the American Lobster. *Am Nat.* 2018;192: E163–E177.
2. Aqorau T, Bell J, Kittinger JN. Good governance for migratory species. *Science.* 2018;361: 1208–1209.