The Spatial Distribution of Bluefish (*Pomatomus saltatrix*): Insights from MRIP Data

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Abstract

Stakeholders have reported that the distribution of bluefish along the coast has shifted, with large bluefish especially being more abundant offshore and less abundant inshore in recent years. MRIP recreational catch and effort data was examined to see if there was any evidence of this at a coastwide or regional level. There was no clear evidence of this in the MRIP data. The proportion of harvest and releases of bluefish from state waters has increased in recent years, compared to trends in coastwide effort, but not in federal waters (i.e., greater than 3 miles from shore). However, this trend was likely driven by increasing bluefish catch from the south Atlantic region, where the majority of catch comes from state waters, as opposed to the north and mid-Atlantic regions, where more catch comes from inshore and federal waters. Trends at the statewide level in total catch, CPUE, and mean length were variable, but a few states did show both increases in federal waters and a decline in state and/or inshore waters, so anecdotal reports from stakeholders may represent more localized phenomena. If this is occurring on a larger scale, MRIP data may be too coarse to identify it.

Methods

MRIP data were queried for total effort and bluefish harvest, mean length, and live releases by area fished at the coastwide and state level.

MRIP determines area fished by asking anglers where they fished when they are intercepted as part of the Access Point Angler Intercept Survey (APAIS). Area fished is broken down into three main categories: inland (inshore bodies of saltwater or brackish water like bays, estuaries, and sounds, including areas like Chesapeake Bay, Long Island Sound, and Albemarle Sound), state territorial seas (ocean waters from the shore out to three miles), and the federal Exclusive Economic Zone (EEZ; ocean waters from more than 3 miles to 200 miles out from the shore). Trips and the associated catch are assigned only one area fished, even if the anglers may have fished in more than one area.

Results

At the coastwide level, the proportion of harvest and live releases from state waters (ocean waters 3 miles or less from the shore) has increased while the proportion from federal waters and inshore waters has decreased over the time series (Figure 1). Meanwhile, total coastwide recreational effort in each area has remained roughly constant over time (Figure 2). However, this trend was likely driven by changes in the proportion of total catch coming from different regions: the proportion of total catch coming from south Atlantic states has increased in over the time series (Figure 3), and the majority of total catch in the south Atlantic region comes from state waters, while inshore and federal waters make up a larger proportion of the catch in the mid- and north Atlantic regions (Figure 4).

At a finer scale, the proportion of effort and bluefish total catch by area has varied over time from state to state, with different states showing different patterns (Figure 5 - Figure 7). Some states showed a pattern similar to the coatwide pattern of increasing catch from state waters, while others showed an increasing proportion from inshore waters. Federal waters accounted for a very small proportion of both total catch and total effort for most states, so changes in catch in the furthest offshore waters would be difficult to detect. Trends in CPUE (total catch divided by total angler-trips; Figure 8 - Figure 10) and

mean length of harvested fish (Figure 11 - Figure 13) also varied from state to state. Virginia and Georgia saw an increase in ocean CPUE while inshore water CPUE declined in the most recent few years; New York, North Carolina, and Florida saw a small increase in federal water CPUE, but state and inshore waters CPUE either increased as well or stayed flat. Other states generally varied without trend. For mean length, Connecticut saw an increase in mean length in ocean waters and a decline in inshore waters in the most recent few years, but other states did not see different trends in mean size across area fished (either flat across years or trending together across areas).

Discussion

There was no strong evidence in the MRIP data for the trends reported by stakeholders. There was an overall increase in the proportion of harvest and live releases coming from state ocean waters, which did not match the trend in total effort on the coast, but this was likely driven by changes in the distribution of bluefish catches from north to south, where the south Atlantic has been making up a larger proportion of bluefish catch overall.

Trends at the state level were variable, with no clear signal of increasing catch in federal waters; some states did see an increase in total catch and/or CPUE in recent years in ocean waters (state or federal). Mean length across areas was also variable by state in recent years. Patterns noted by stakeholders may reflect more localized changes.

It should also be noted that the MRIP data is relatively coarse and relies on angler-reported data to assign area fished. MRIP data may not be detailed enough to detect shifts in inshore-offshore abundance, especially if they occur near the 3-mile state/federal water boundary. In addition, interannual variability at the state level may obscure patterns if the distribution shift has occurred recently, or only at certain times of year.

Figures

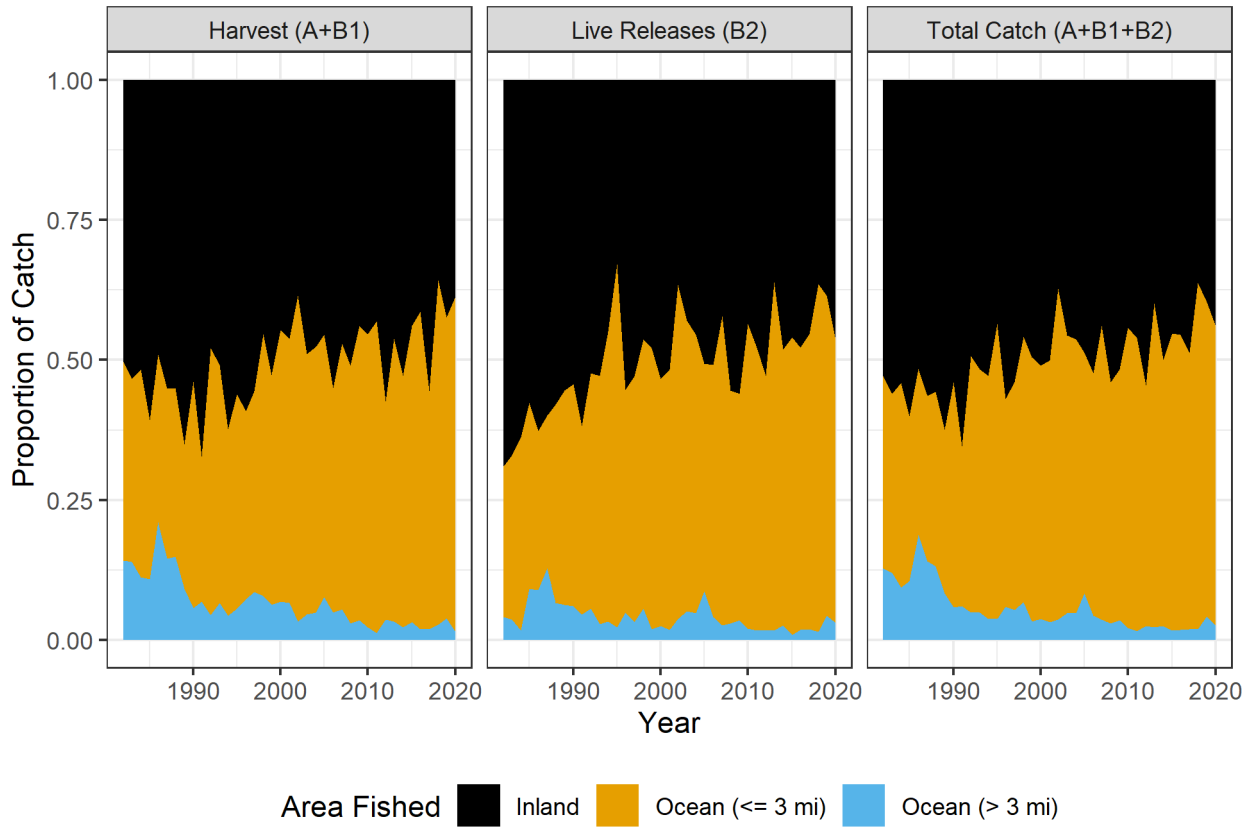

Figure 1: Annual proportion of bluefish recreational harvest, live releases, and total catch by area fished for the Atlantic coast.

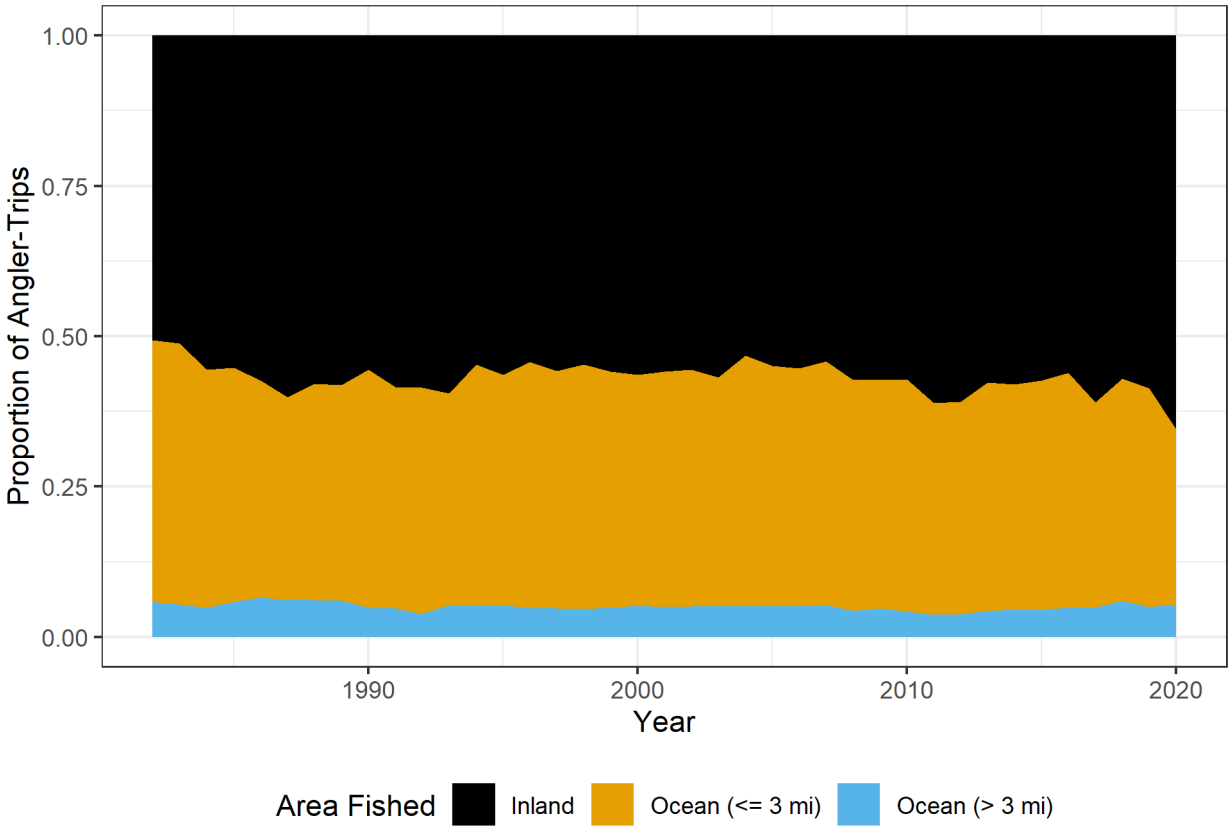

Figure 2: Annual proportion of total recreational effort by area fished for the Atlantic coast.

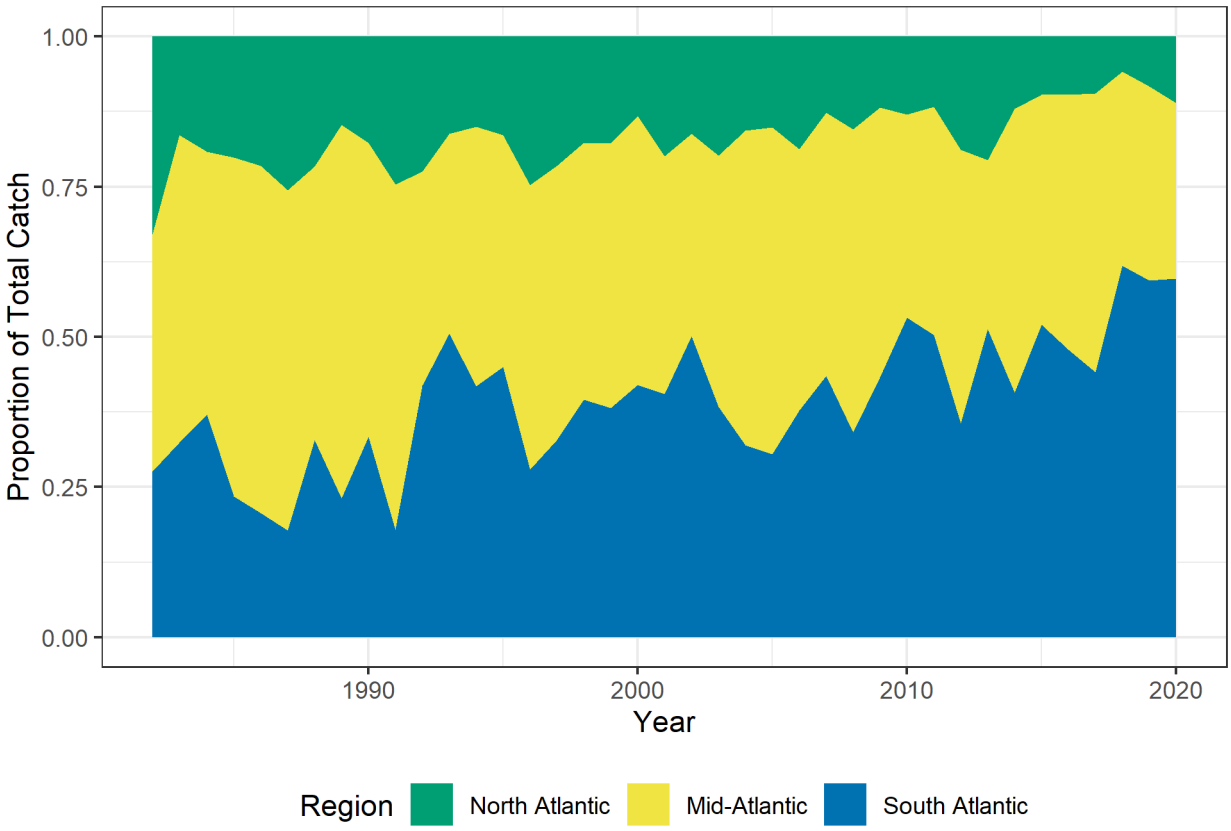

Figure 3: Annual proportion of total bluefish recreational catch by region for the Atlantic coast.

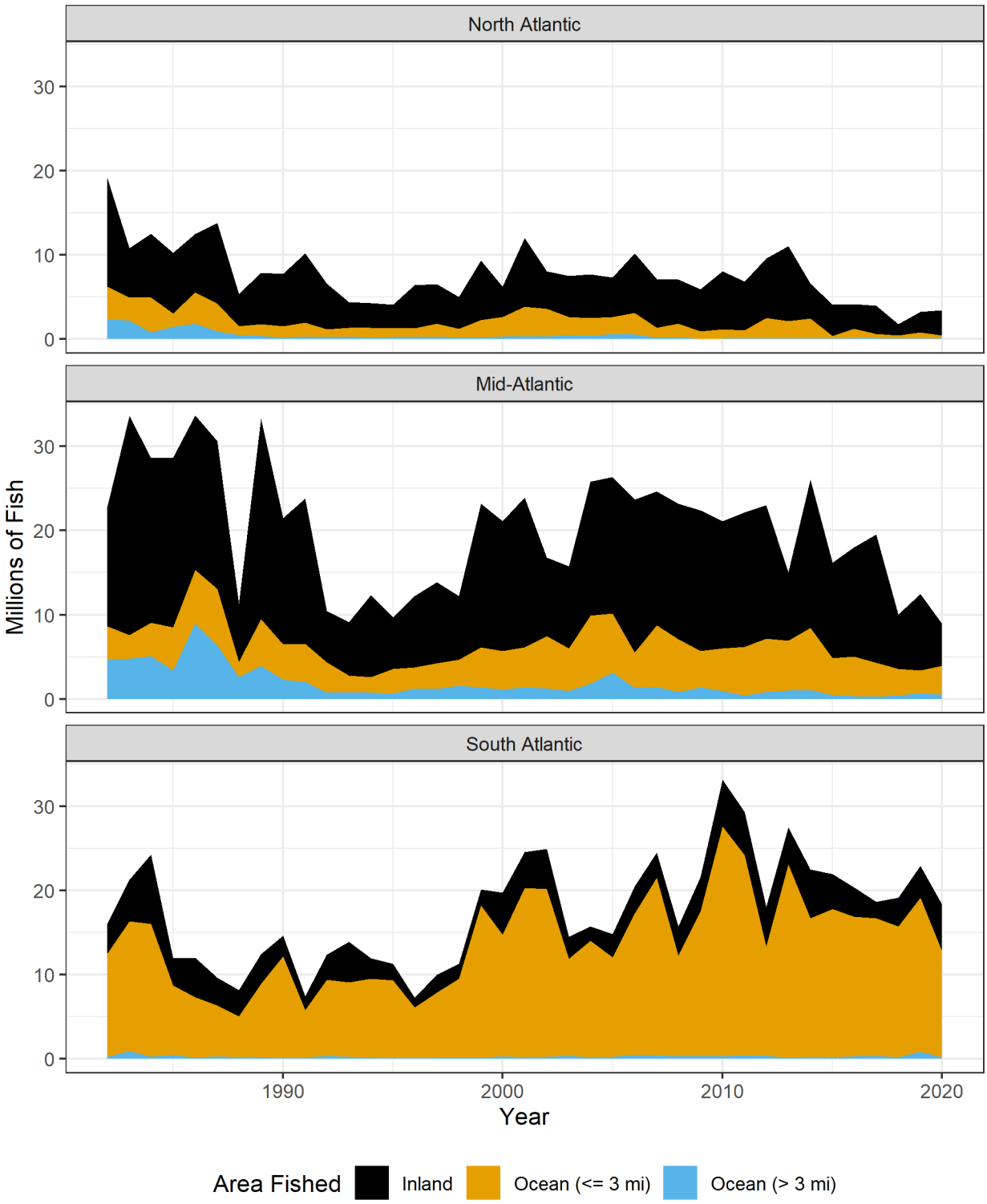

Figure 4: Annual total recreational bluefish catch by region and area fished for the Atlantic coast.

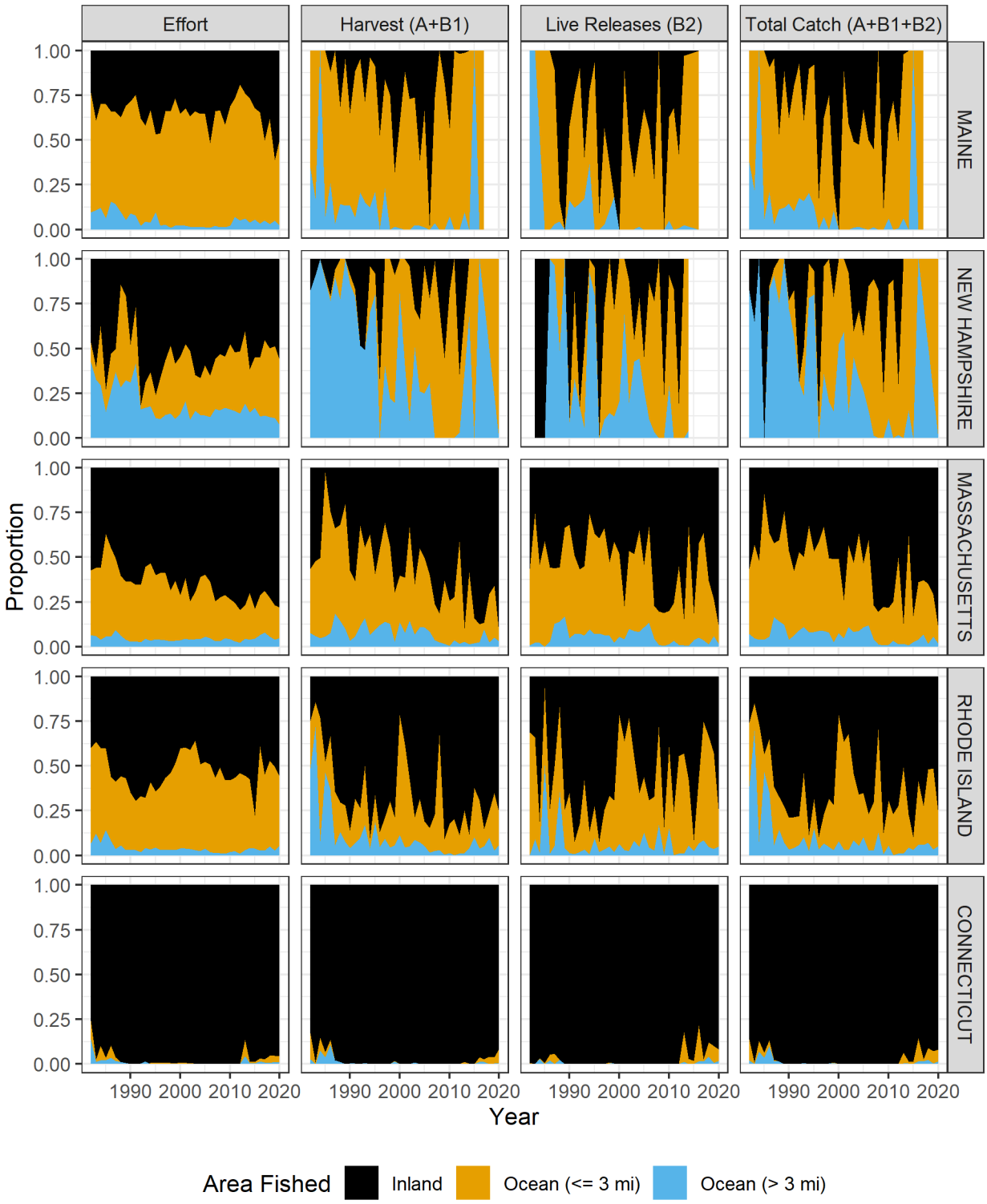

Figure 5: Annual proportion of total recreational effort, and bluefish recreational harvest, live releases, and total catch by state and area fished for the north Atlantic region.

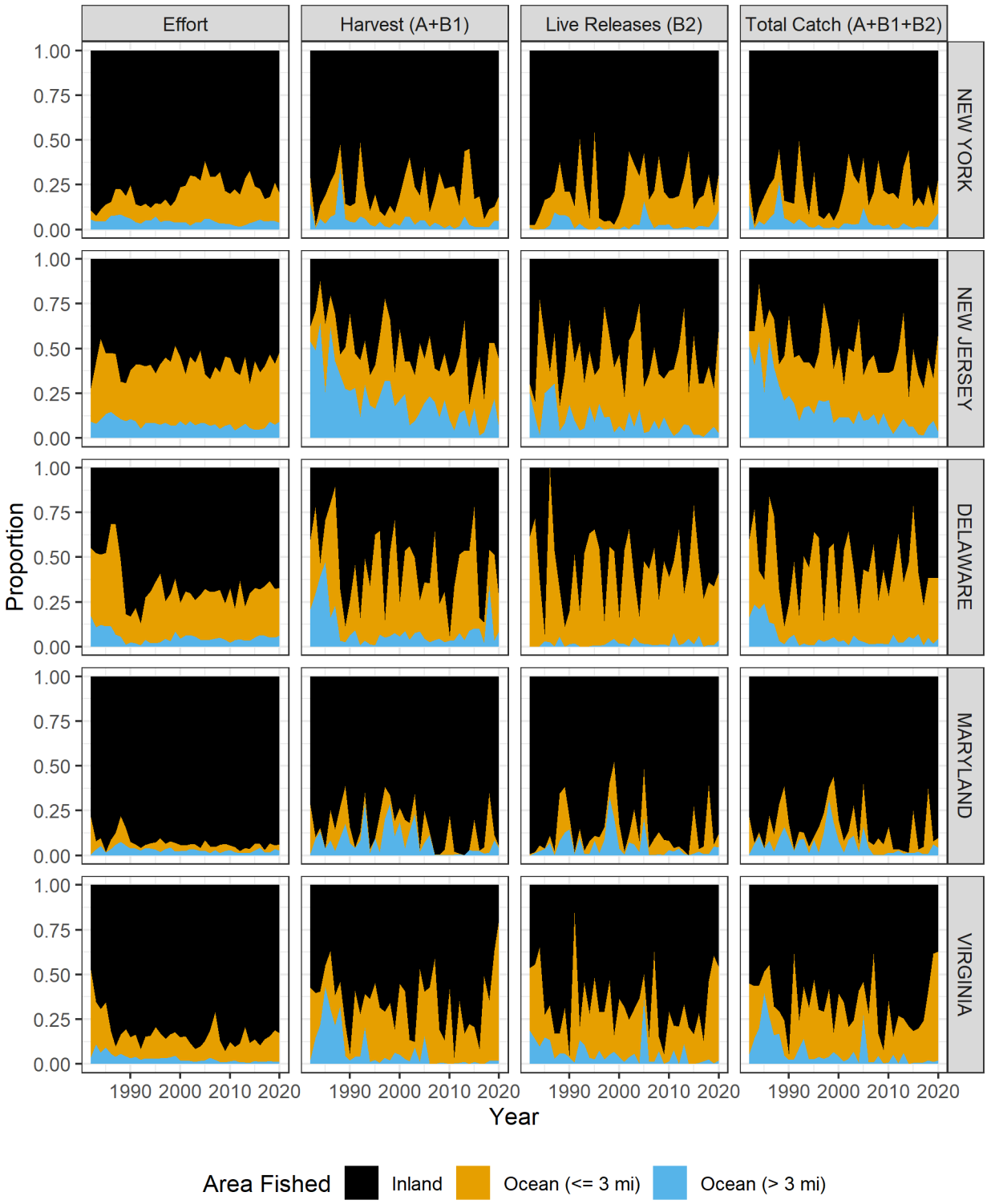

Figure 6: Annual proportion of total recreational effort, and bluefish recreational harvest, live releases, and total catch by state and area fished for the mid-Atlantic region.

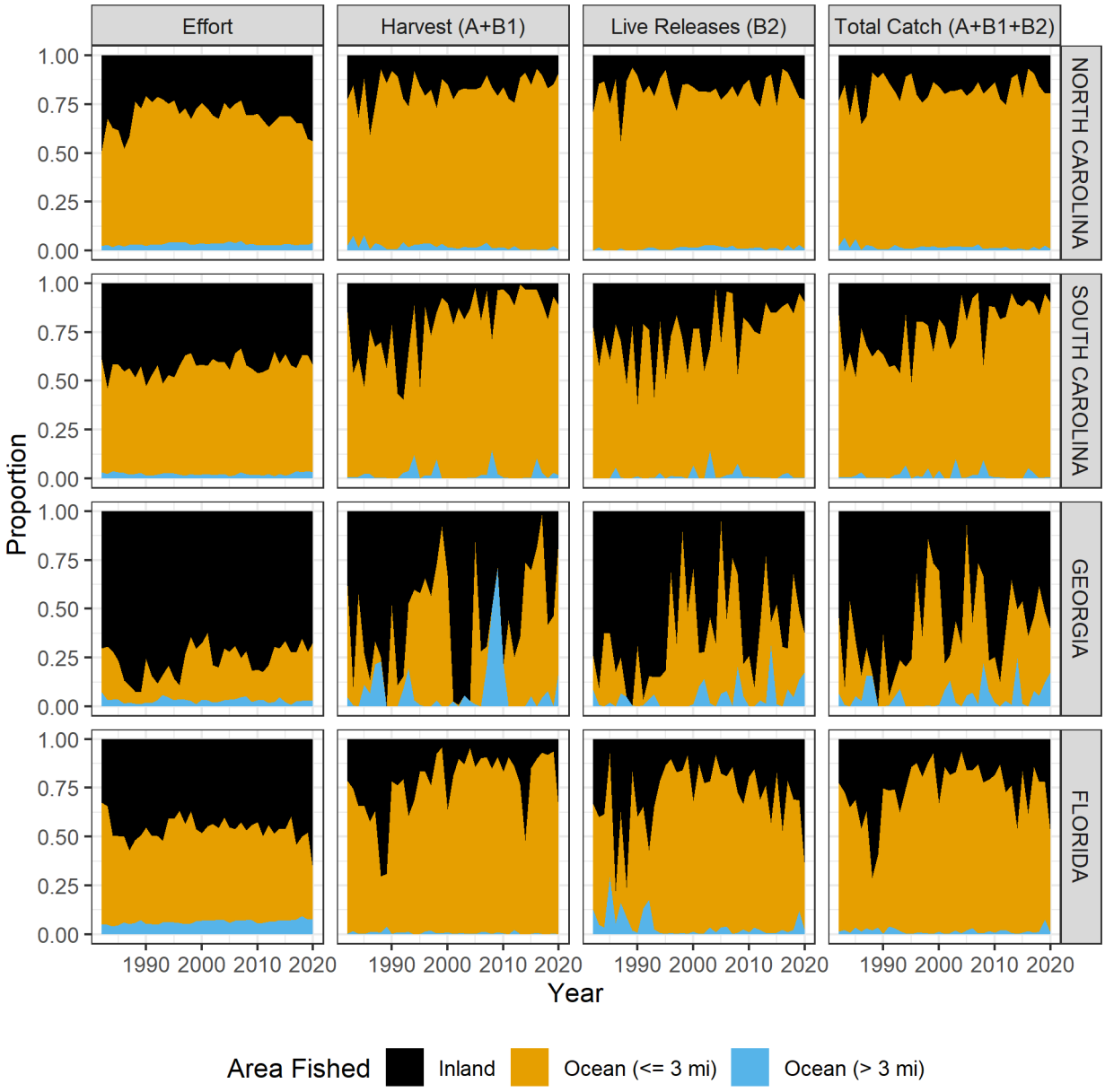

Figure 7: Annual proportion of total recreational effort, and bluefish recreational harvest, live releases, and total catch by state and area fished for the south Atlantic region.

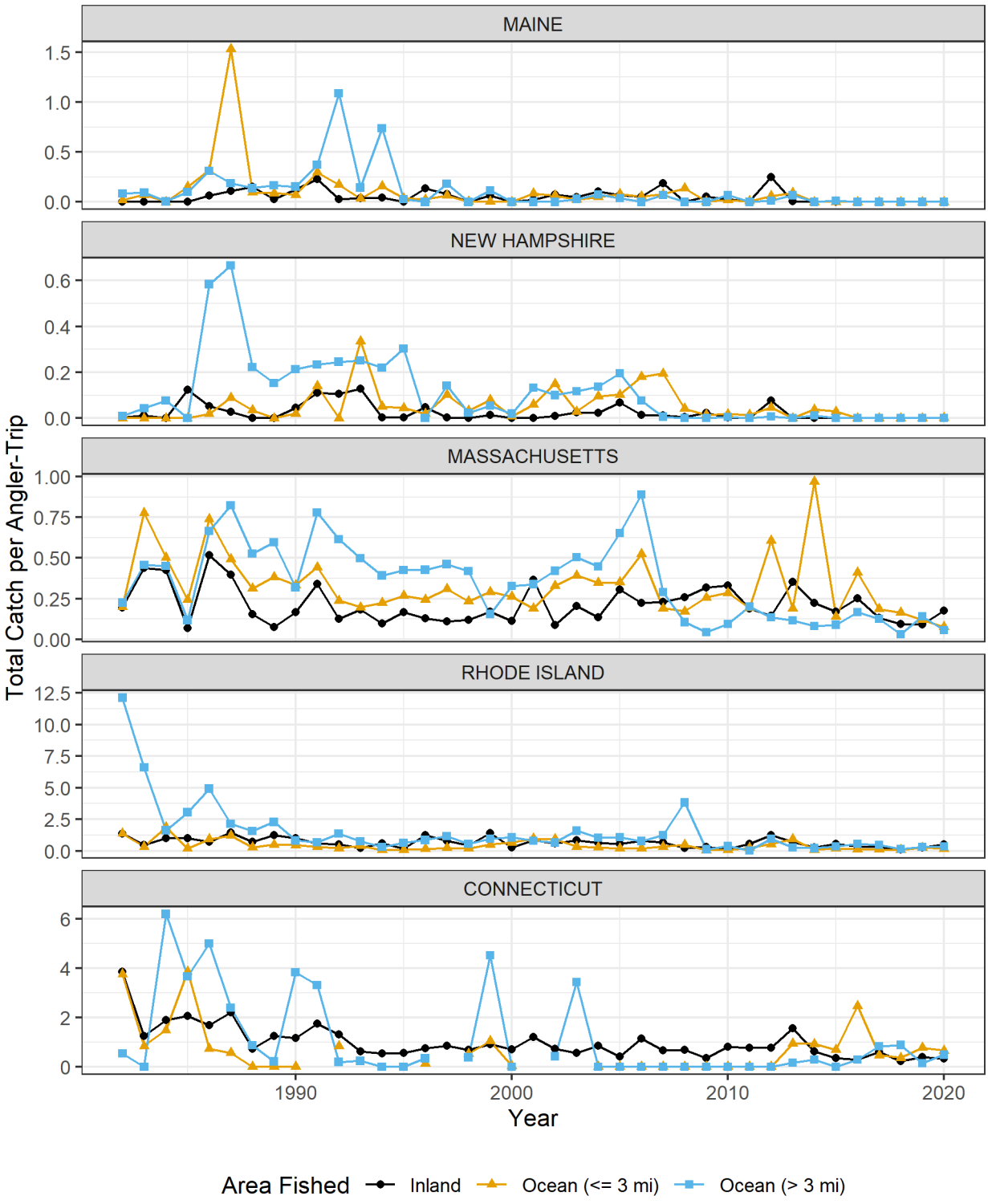

Figure 8: Annual recreational catch per trip of bluefish by state and area fished for the north Atlantic region.

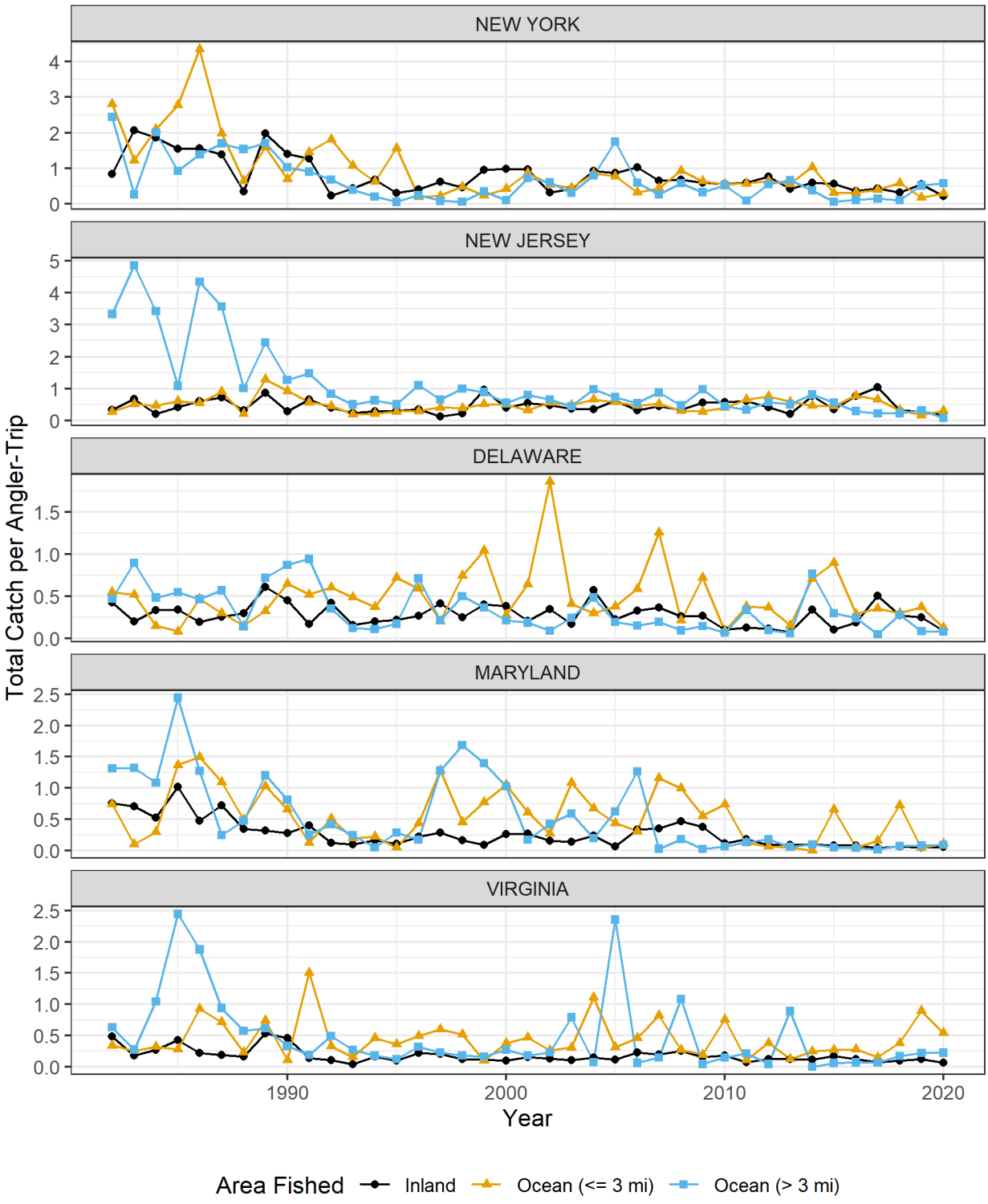

Figure 9: Annual recreational catch per trip of bluefish by state and area fished for the mid-Atlantic region.

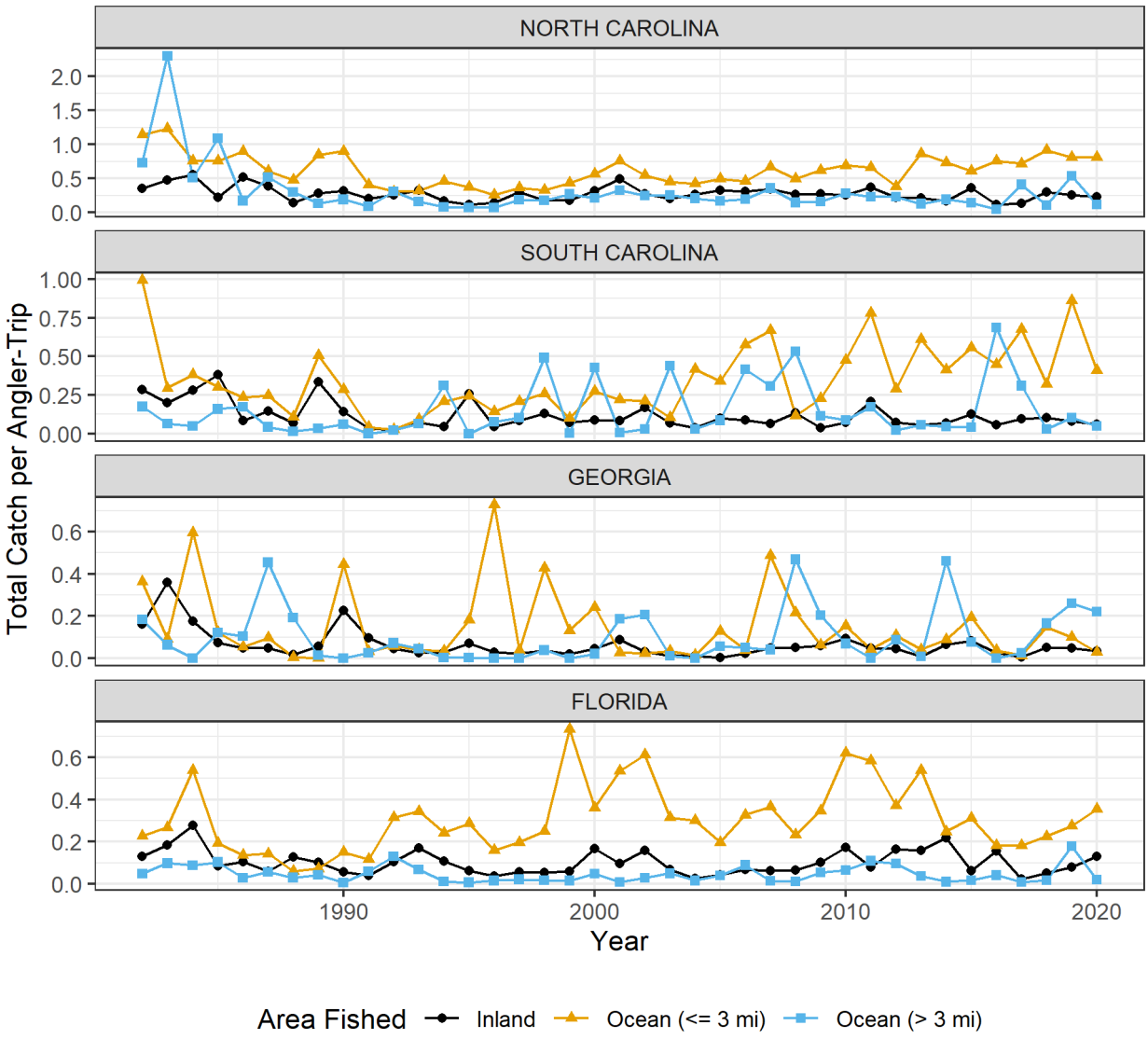

Figure 10: Annual recreational catch per trip of bluefish by state and area fished for the south Atlantic region.

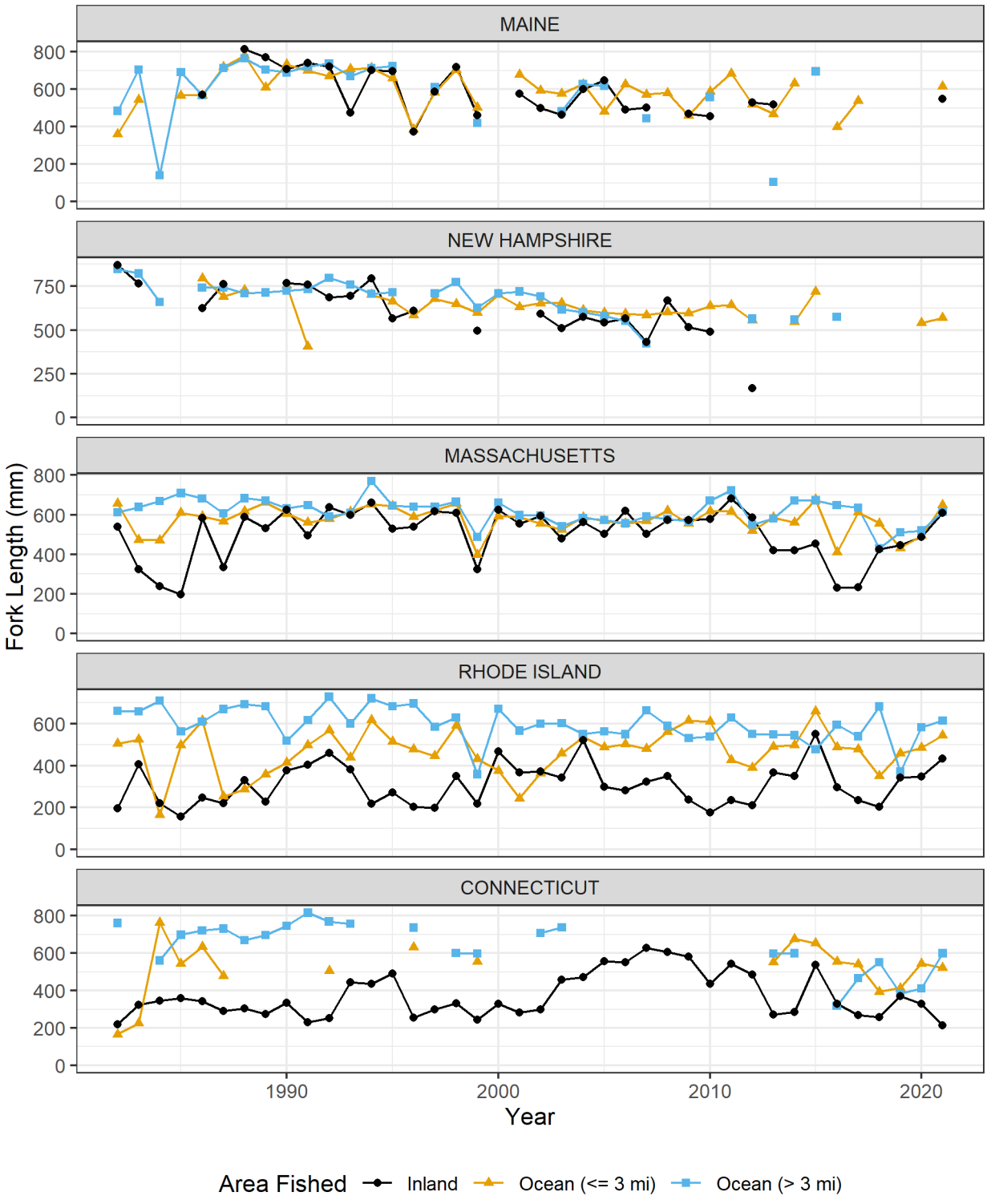

Figure 11: Annual mean length of harvested bluefish by state and area fished for the north Atlantic region.

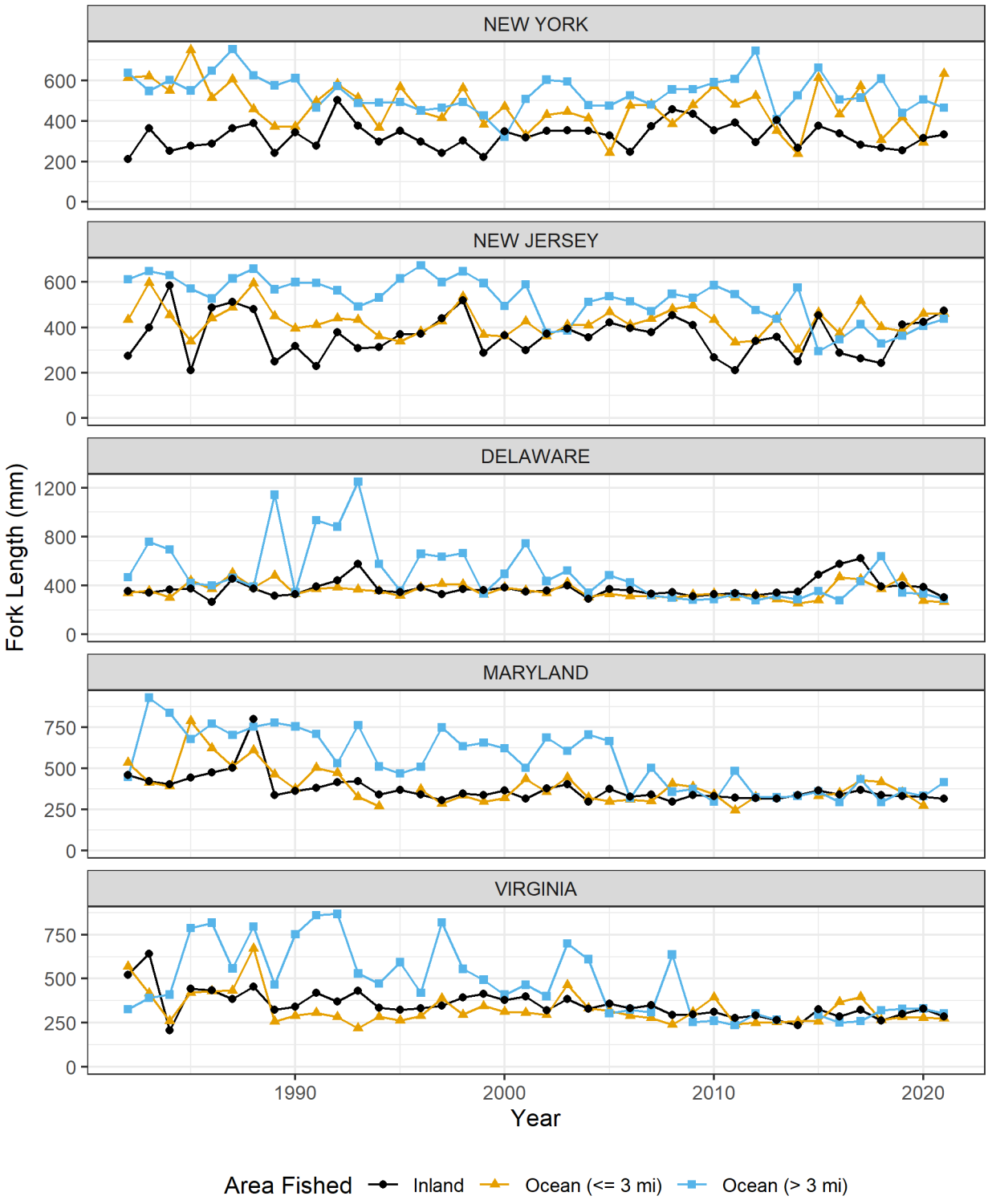

Figure 12: Annual mean length of harvested bluefish by state and area fished for the mid-Atlantic region.

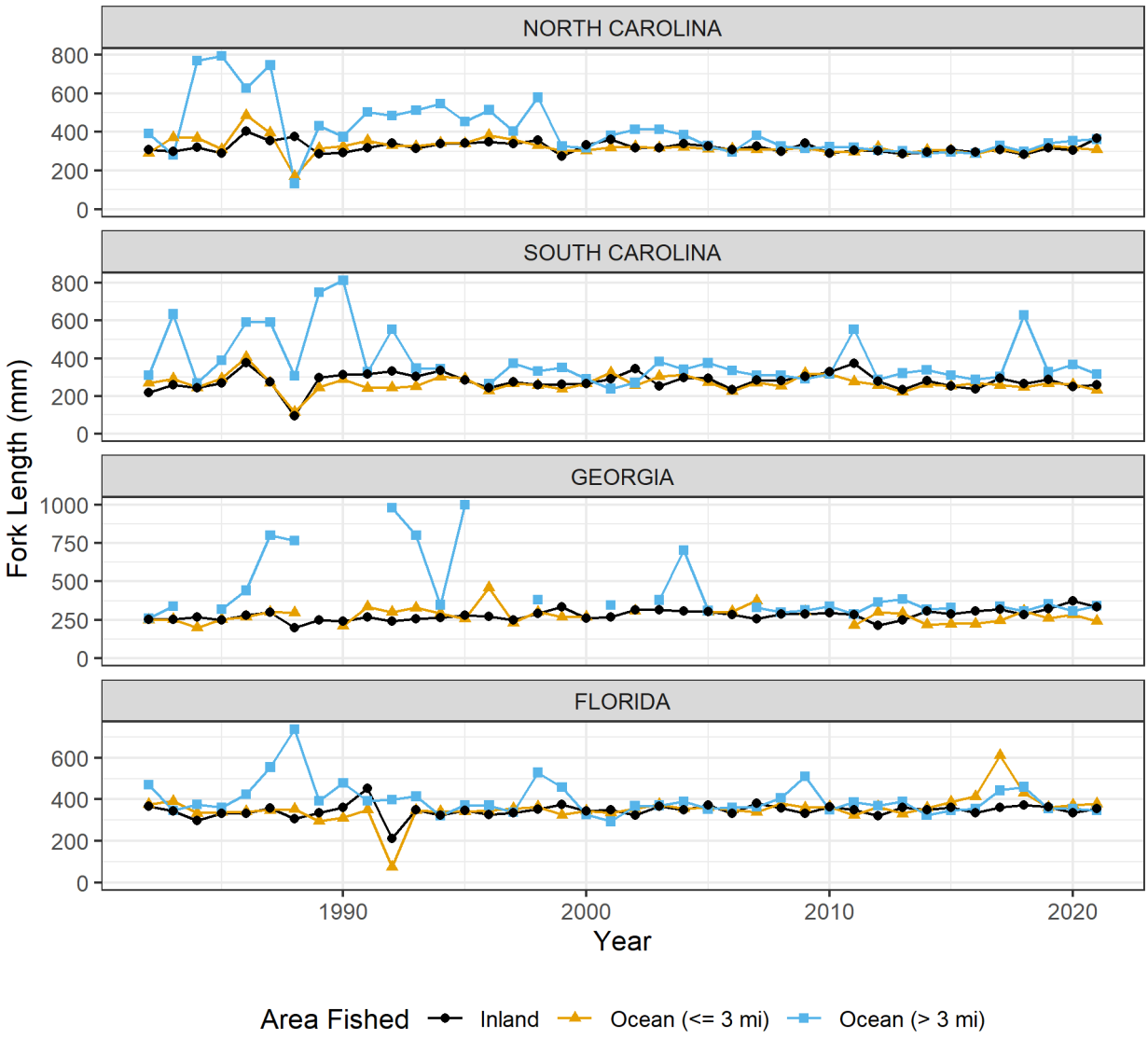

Figure 13: Annual mean length of harvested bluefish by state and area fished for the south Atlantic region.

Appendix 1: Investigation into Gulf of Mexico bluefish migration and potential contribution to the Atlantic coastal migratory stock from MRIP and other data

M Celestino

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Introduction

The bluefish Working Group was interested in knowing whether Gulf of Mexico bluefish were part of the unit stock being assessed for the 2022 research track assessment. While studies have looked at genetics of global populations (Miralles et al. 2014), there appear to be no genetic studies focused on distinguishing Gulf of Mexico and Atlantic coast populations. It is worth noting that Miralles et al. (2014a) provide indirect evidence of trans-Atlantic migration of bluefish, though Miralles et al. (2014b) suggests a more complicated history.

A google scholar search turned up no information supporting or refuting a joint unit stock. Barger (1990) suggested differences in age-length relationships for Gulf of Mexico vs Atlantic coast bluefish populations, with notable differences in growth coefficients; Juanes et al. (1996) suggested that such differences could be related to genetic or environmental differences.

The WG:

- reached out to Gulf States Fishery Management Council staff,
- contacted biologists in each Gulf coast state,
- queried recreational catch (in numbers of fish),
- queried recreational length frequencies, and
- queried commercial landings (in weight).

Results

Gulf Council and Gulf state agency staff indicated they were aware of no genetic studies and no systematic tagging (acoustic or otherwise) to demonstrate bluefish migrations in the Gulf of Mexico. Council staff did note a Louisiana Seagrant article that indicated; “Gulf of Mexico bluefish are of an entirely different stock than Atlantic fish. Louisiana fishermen largely ignore bluefish, or curse them as a nuisance when they chop fishing tackle to bits or devour everything but the heads of more desirable fish on their hooks.”

FL Fish and Wildlife reported no known detections of bluefish in the Gulf of Mexico that would have been acoustically tagged on the Atlantic coast. Gulf Council staff indicated that bluefish is not a species that they routinely deal with in the Gulf of Mexico. Other Gulf Coast state agency staff indicated they were not aware of any tagging or studies on bluefish, and that bluefish management is not a priority for them due to no known substantive fishery (see below). It appears that bluefish may be unmanaged in US Gulf of Mexico waters.

A review of the American Littoral Society citizen science tagging database indicated that of all fish tagged on the Atlantic coast, there were no recaptures within the Gulf of Mexico.

Querying MRIP recreational data, Atlantic coast versus Gulf of Mexico, showed that, on average, the Gulf of Mexico accounts for 4% of total recreational removals (Gulf of Mexico + Atl coast), median = 3%. A query of commercial landings indicated similar values for commercial harvest (Figure 1). From this, the working group concluded that even if there was perfect mixing between the two areas, not accounting for Gulf of Mexico recreational or commercial removals would omit a trivial amount of removals.

The WG considered the idea that perhaps recreational removals in the Gulf were not Gulf removals at all, and instead were due to misreporting in Monroe County, Florida (e.g., Florida Keys). That is, anglers may have caught fish to the south or east of Monroe County, but reported them as Gulf of Mexico fish. The WG looked at county level removals between 2010 and 2014 for illustrative purposes, and found that the percentage of removals attributable to Monroe County (compared to all of the Gulf of Mexico) was an average of 2% (range = 0-5%), and so the WG concluded that removals attributed to the Gulf of Mexico were bona fide Gulf removals.

A query of recreational total length frequency (harvest only) suggested similarities between the two regions – one hypothesis posited by the WG was that missing lengths in the valley between periodic bimodal length frequency distributions might reside in the Gulf of Mexico. Analysis of length frequency data did not generally support this hypothesis (Figures 2 and 3).

Conclusion

Based on this review of information, the WG elected to omit Gulf of Mexico bluefish from the assessment, consistent with past practice in the absence of any data to suggest they are part of the Atlantic coastal migratory stock. This view was bolstered by the idea that even if this was an erroneous decision, very little catch occurs in the Gulf of Mexico, relative to the Atlantic coast (Figure 1), and so the impact to the assessment is expected to be minimal. The WG identified exploring Gulf of Mexico migration as a low to moderate level priority.

Literature Cited

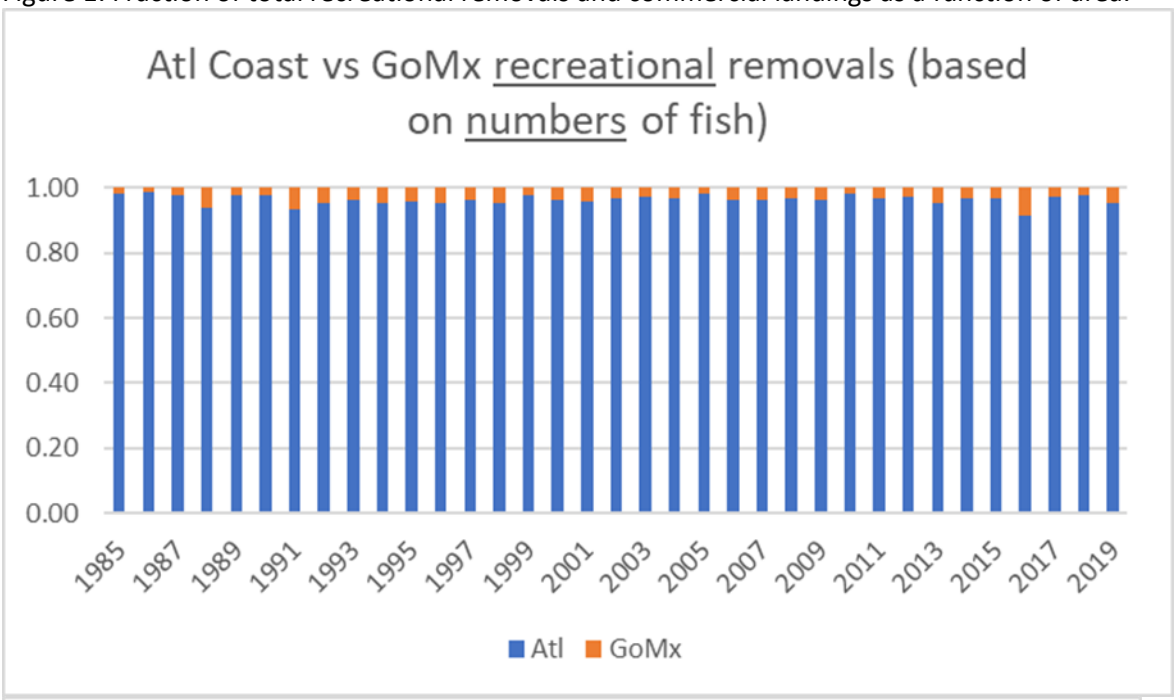
Miralles, L, F Juanes, and E Garcia-Vazquez. 2014a. Interoceanic sex-based migration in bluefish. Transactions of the American Fisheries Society 143:1308-1315.

Miralles, L, F Juanes, AF Pardinas, and E Garcia-Vazquez. 2014b. Paleoclimate shaped bluefish structure in the northern hemisphere. Fisheries 39(12) 578-586.

Barger, LE. 1990 Age and growth of bluefish Pomatomus saltatrix from northern Gulf of Mexico and US South Altantic coast. Fishery Bulletin 88:805-809.

Juanes, F, JA Hare, AG Miskiewicz. 1996. Comparing early life history strategies of Pomatomus saltatrix: a global approach. Marine and Freshwater Research 47:365-379.

Figure 1. Fraction of total recreational removals and commercial landings as a function of area.



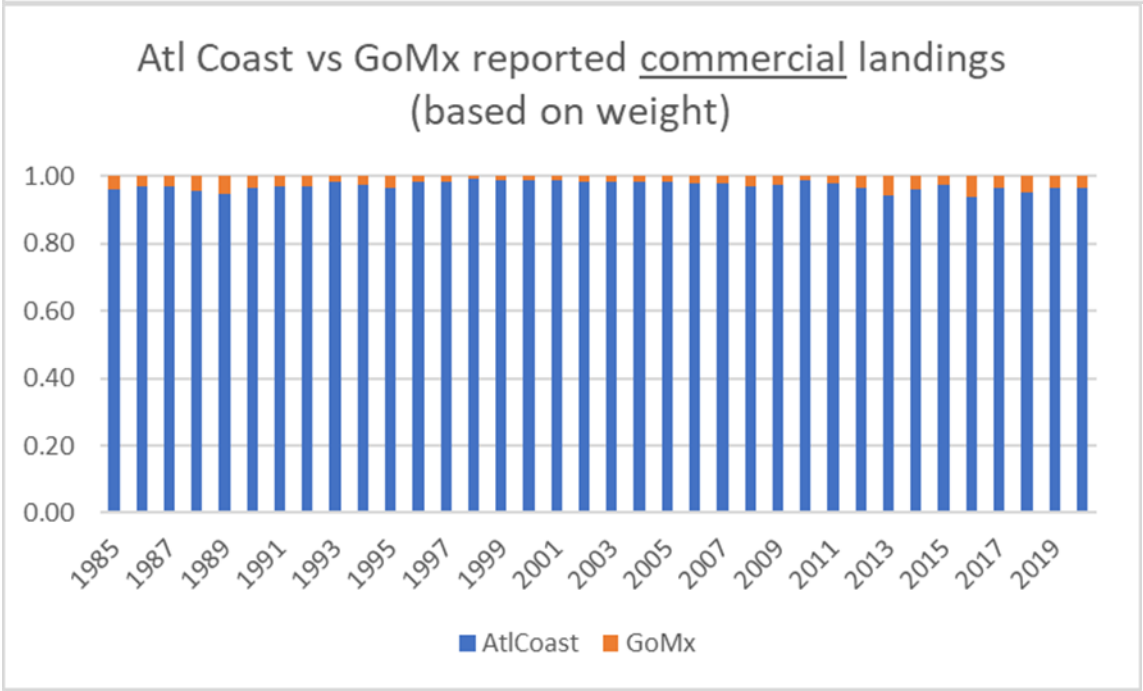


Figure 2. Length frequency of harvested bluefish from the Gulf of Mexico (blue) and Atlantic coast (orange): 1985-2002. X-axis is fork length, centimeters.

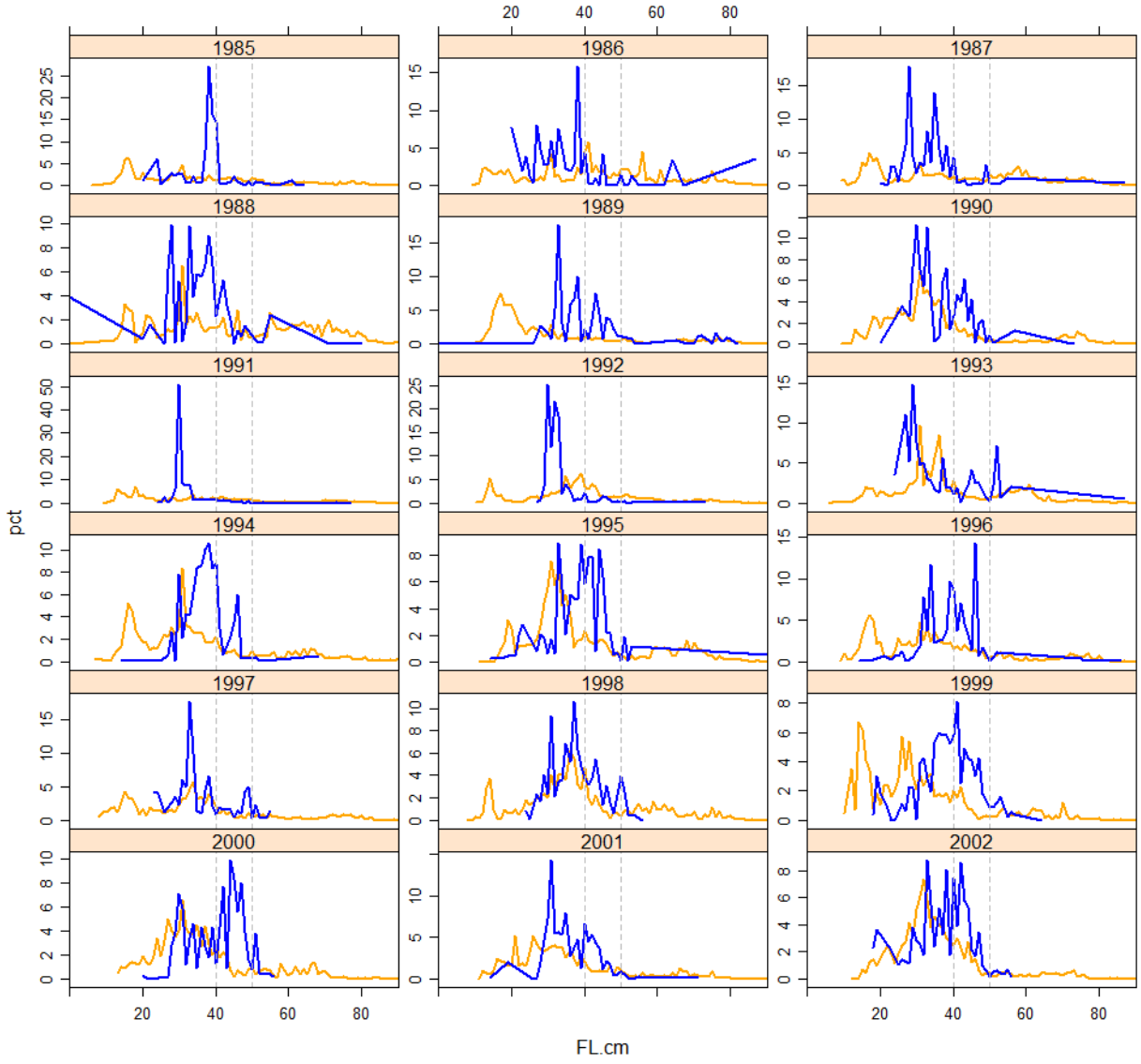


Figure 3. Length frequency of harvested bluefish from the Gulf of Mexico (blue) and Atlantic coast (orange): 2003-2020. X-axis is fork length, centimeters.