

# Research reveals strongest predictors of menhaden growth in the Gulf of Mexico and the Atlantic

April 8 2020

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Menhaden being fished in the Gulf of Mexico. Credit: Louisiana Sea Grant

New research suggests that large-scale environmental factors influence the size of one of the ocean's most abundant forage species. Recently,

scientists from LSU, NOAA, the University of Southern Mississippi and the University of Maryland Center for Environmental Science evaluated large-scale ecosystem dynamics influencing growth of menhaden in the Gulf of Mexico and the Atlantic Ocean. They found that anthropogenic influences affected menhaden in the Atlantic more than in the Gulf, where environmental factors were the more dominant predictors of growth.

Menhaden are used primarily for the production of fishmeal and [fish oil](#), and small quantities are used for bait. According to NOAA's 2018 Fisheries of the United States report, menhaden ranked number two by volume, after Alaska pollock, on the list of major U.S. domestic species "landed," or caught and brought to port. More than 1.5 billion pounds of menhaden were landed in that year. Menhaden ranked number 10 by value of the landings, totaling more than \$160 million. In addition to their commercial value, menhaden are critically important components of their food webs.

According to Steve Midway, lead author and assistant professor in LSU's Department of Oceanography & Coastal Sciences, "They're sort of the classic forage species—meaning they provide a really important link in marine food webs. They are not exerting any kind of population pressure on any other fish species because they're not eating any other fish species. But, other fish species eat them. So, they support the higher levels of the food web and ecosystem."

The scientists evaluated the coast-wide annual growth of Atlantic menhaden (*Brevoortia tyrannus*) and Gulf menhaden (*Brevoortia patronus*) during the past 50-60 years. They found that, in the Atlantic, fishing pressure was the primary influence on the length-at-age (used to determine how rapidly a fish grows in a given period) at the time of harvest. By contrast, Gulf menhaden growth was influenced primarily by [environmental conditions](#): a combination of wind and the Atlantic Multi-

Decadal Oscillation, or AMO—a climate cycle that affects the [sea surface temperature](#).

In the Atlantic, they found that easterly winds correlated positively with menhaden growth in the northern portion of the East Coast; however, while wind and AMO significantly influenced menhaden growth, the primary influence was fishing pressure. The more menhaden that were landed, the more likely they were to grow larger and faster. From this data, the scientists hypothesize that the population reduction caused by commercial fishing may reduce competition among menhaden and allow individual fishes to have access to more resources that would allow them to grow larger at a faster rate.

In the Gulf, the researchers found that northerly winds reduced the growth of menhaden. They think the reason for this may be that the northerly winds interacted with freshwater from the Mississippi and Atchafalaya Rivers and displaced that water further offshore, negatively affecting the saltwater-preferring menhaden.

Currently, these [environmental factors](#) are not taken into account when determining fisheries assessment outcomes, according to Amy Schueller, co-author of the paper and research [fish](#) biologist in NOAA's Southeast Fisheries Science Center; however, this research could be used as predictive tool by fisheries management agencies to forecast menhaden growth each season and determine management strategies in the future.

"[T]his study allowed us to get a better handle on the way the menhaden population responds to landings vs environmental conditions which should feed into managers' thinking about how much effect their regulations can have on these stocks and how these stocks might respond," said Geneviève Nessler, co-author and assistant research professor at the University of Maryland Center for Environmental Science.

**More information:** Stephen R. Midway et al, Macroscale drivers of Atlantic and Gulf Menhaden growth, *Fisheries Oceanography* (2020).  
[DOI: 10.1111/fog.12468](https://doi.org/10.1111/fog.12468)

Provided by Louisiana State University

Citation: Research reveals strongest predictors of menhaden growth in the Gulf of Mexico and the Atlantic (2020, April 8) retrieved 27 April 2024 from <https://phys.org/news/2020-04-reveals-strongest-predictors-menhaden-growth.html>

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