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Responsibility

Are mid-depth waters off the United States East Coast getting saltier from ocean warming?

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By Responsible Seafood Advocate

Salinity intrusion frequency in Middle Atlantic Bight has increased over 20 years

According to a new study led by Woods Hole Oceanographic Institution (WHOI), mid-depth waters off the United States East Coast are getting saltier – and it could be a result of ocean warming and the effects of climate change.

The study, which was recently published in the *Journal of Geophysical Research: Oceans* (<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021JC018233>), shows a significant increase in the frequency of warm saltwater intrusions from the deep ocean to the continental shelf along the Middle Atlantic Bight, which extends from the Gulf of Maine to Cape Hatteras, North Carolina.

“The reason the paper is so important is because it quantifies an ocean process changing, potentially as a direct result of ocean warming and more stratification,” said Glen Gawarkiewicz, WHOI senior scientist and the paper’s corresponding author. “These findings could also have major shelf ecosystem implications.”

An intrusion occurs when warm, salty seawater moves toward the edge of the continental shelf, “intruding” on cold, fresh continental shelf water. The findings indicate that more intrusions are moving in at mid-depth and reaching up to 60 miles on shore, carrying the warm offshore water large distances.



Fishers from the Commercial Fisheries Research Foundation/WHOI Shelf Research Fleet prepare to collect data using an instrument that measures temperature and salinity. This work gives rise to WHOI-led study that shows an increase in warm water intrusions along the Mid-Atlantic Bight. Photo courtesy of Woods Hole Oceanographic Institution (WHOI)/Jim Violet.

An advertisement banner for Oceanonland Technology. On the left is the logo for 'OCEANONLAND ON LAND TECHNOLOGY'. The center features three vertical cylindrical containers filled with different colored liquids (green, brown, yellow) and topped with mesh screens. On the right, the text reads 'ALGAE IN A BOX' in large blue letters, followed by 'Grow multiple algal species simultaneously' in smaller blue text.

(https://oceanonland.com/our-systems/?utm_source=gsa&utm_medium=landscapebanner+&utm_campaign=algae_in_a_box&utm_id=AIB+&utm_content=gif)

“Water in this region is becoming less like the Arctic and more like the tropical Atlantic,” said Gawarkiewicz.

Using data collected from **NOAA’s National Marine Fisheries Service Ecosystem Monitoring program** (<https://www.fisheries.noaa.gov/contact/ecosystem-monitoring-assessment-program>), as well as data collected from the fishing industry, the study’s results show that ocean exchange processes have greatly changed over the past 20 years in this region. Despite the profiles of salinity being scattered in space and time, the data showed evidence of numerous mid-depth salinity maximum intrusions, which greatly increased since 1998. A 2003 paper showed how the intrusions were occurring about 10 percent of the time, and this new study finds it occurs 18 percent of the time.

“There is more and more evidence that conditions are changing rapidly across the entire ecosystem, with offshore waters influencing the shelf more frequently and on very different timescales than we have seen in the past,” said Paula Fratanoni, Chief of the Oceans and Climate Branch at the Northeast Fisheries Science Center within the National Marine Fisheries Service, and paper co-author. “It’s imperative that we work to better understand these processes and any potential impacts they might have on critical shelf habitats.”

Gawarkiewicz said these findings are not only important for physical oceanography and climatology research, but for the commercial fishing industry as well.

“This is a tremendous opportunity for dialogue with the fishing community, helping them recognize these mid-depth intrusions once they log a profile,” he said. “Then, they can use it to decide where to fish and focus the bulk of their work.”

Read the full study (<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021JC018233>).

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