

# Northward Bound? How Community Science is Helping Researchers Understand if Climate Change is Causing the Atlantic Blue Crab to Expand its Range

By: Rafeed Hussain



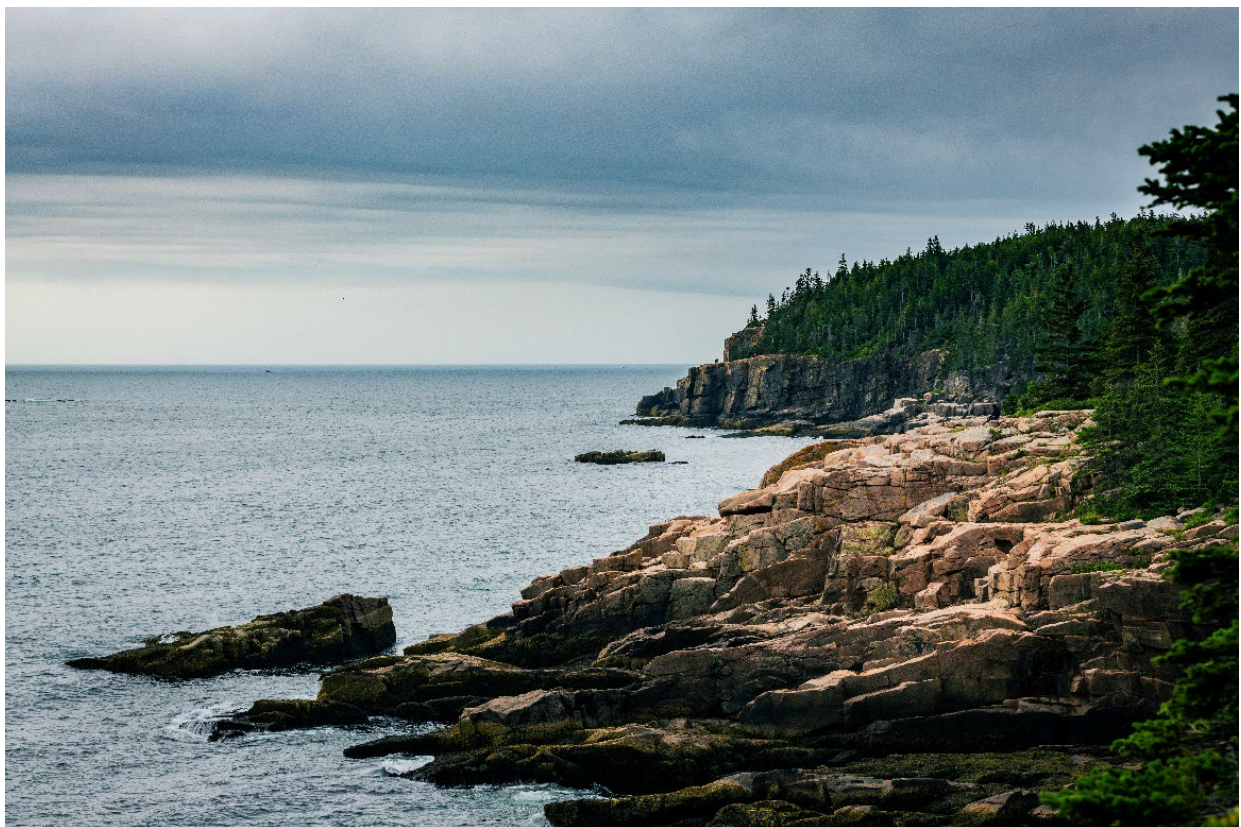
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## Introduction

Beautiful. Savory. Swimmer. That's what the scientific name for Atlantic blue crabs (*Callinectes sapidus*) aptly translates to. These delectable decapod delicacies are quintessential to the fabric of the Mid-Atlantic seafood scene, culture, and economy. In fact, about half of all blue crabs sold in the U.S. come from Chesapeake Bay. That could slowly be changing, however.

In the summer of 2021, Maine fishermen and harvesters alerted researchers at Manomet, based in Massachusetts, about the growing prevalence of blue crabs in their traps. At the same time, researchers at the Wells National Estuarine Reserve, Northeastern University, and the University of New Hampshire also started finding blue crabs in their traps while monitoring for invasive and other range-expanding species like green crabs and black seabass respectively. Most surprisingly, local oyster growers in New Hampshire's Great Bay Estuary informed University of New Hampshire researchers that they observed a pair of mating blue crabs—the first instance this was ever reported in the area. This suggests that the conditions are ripe for blue crab population growth, New Hampshire Sea Grant and the University of New Hampshire Cooperative Extension's fisheries and aquaculture specialist, Dr. Gabriela Bradt, explains. "This is not a one-off [occurrence]," she says, "They're coming. They're here."

This string of uncommon sightings prompted all four institutions to pool their resources and work together to better study and understand the impacts of the potentially burgeoning population. With the help of community science data—data collected and shared by members of the public (often people who make their living working on the water)—Manomet and partners are establishing a baseline dataset. Dr. Marissa McMahan, Manomet’s director of fisheries, explains, “When you have a species that is rapidly expanding its range, in order to really fully understand that, you start broad with just distribution and abundance. Where are they? How many are there? That’s the first thing you try to tackle.” This will help inform what potential ecosystem impacts there may be, how that might impact people, and strategies that could help drive sustainable management of the species in the future. One thing is all but certain: climate change-induced ocean warming is causing the blue crab to expand its range.



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### **Climate Change in the Gulf of Maine**

“The Gulf of Maine is warming faster than almost any other body of water on Earth,” Dr. McMahan explains. It grew about 3.2 degrees Fahrenheit warmer over the last four decades—about three times higher than the rest of the world. In addition, three of the four warmest summers ever recorded in Gulf of Maine waters occurred in 2020, 2021, and 2022. These high temperatures, once anomalies, are slowly becoming the new normal.

Like many species, the blue crab's lifecycle and habitat are temperature-dependent. The warming waters of the Gulf of Maine are more hospitable for the species than in years past, causing their northward expansion. As Dr. Bradt puts it, "environments that were previously inhospitable, or would not support them... are becoming very much lovely places to set up shop." Though blue crabs have been seen along the Western Atlantic coast from Nova Scotia to Argentina and the Gulf of Mexico, until recently, it was uncommon to find them north of Cape Cod, Massachusetts. They are so unusual that "in Maine and New Hampshire, there are currently no regulations regarding [harvesting] blue crabs," according to Jessie Batchelder, Manomet's fisheries project manager. With the blue crabs' potential range expansion and resulting ecosystem impacts, that may soon change as well.

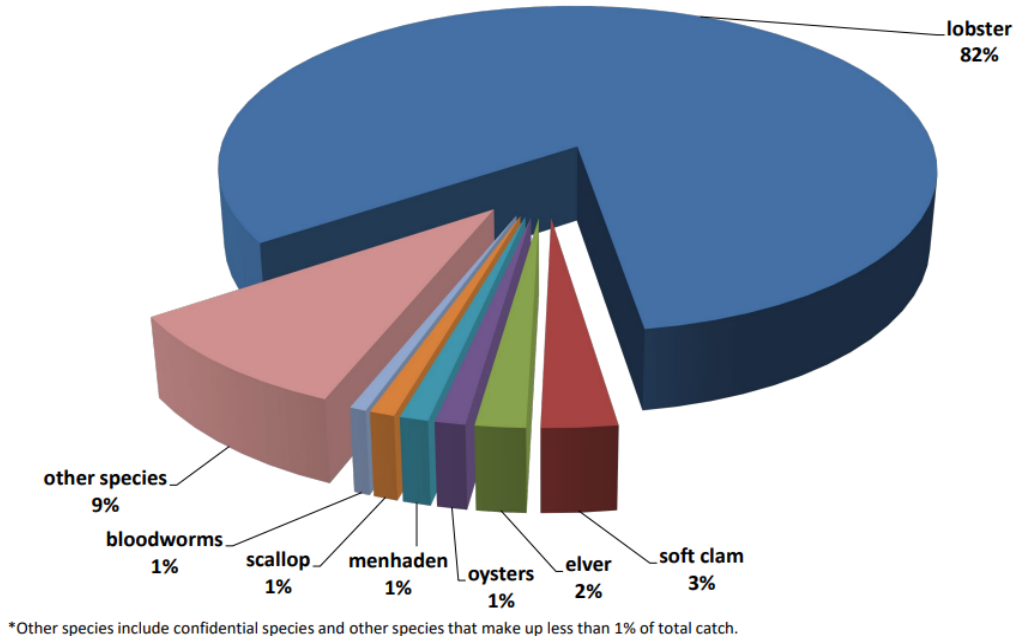


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### **Environmental and Socioeconomic Impacts**

One reason researchers are paying close attention to the growing frequency of blue crab sightings in northern New England is the potential cascading ecosystem impacts a population may have in the Gulf of Maine. Blue crabs are voracious predators and scavengers, eating almost anything they can get their claws on, including oysters, clams, mussels, other crabs, and even juvenile American lobsters. Since blue crabs and lobsters typically inhabit the same spaces and depend on the same food sources, there are concerns that blue crabs will blunt the lobster population as well as other economically, environmentally, and culturally important shellfish species.

**Preliminary 2021 Commercial Maine Landings By Ex-vessel Value**  
**Total: \$890,668,873 as of 3/31/2022**



Maine Department of Marine Resources

In a place like Maine, where seafood is so central to the state’s identity, maintaining a healthy marine ecosystem is paramount. The American lobster fishery is the lifeblood of Maine’s seafood industry, and the commercial fishing and aquaculture industries, in general, are a critical part of Maine’s economy. In 2021, lobsters comprised 82% of Maine’s \$890.6 million 2021 commercial catch. Soft-shell clams comprised 3% of total landings, and scallop and oyster species made up 1% each. They are all on the blue crab’s menu. Optimistically speaking, it is indeed possible that blue crabs themselves could eventually create a new commercial fishery in the region. Batchelder says, “Blue crabs are great because they market themselves. It’s [already] a delicacy in a lot of places along the Atlantic coast”. A blue crab fishery could hypothetically offset some of the species’ potentially detrimental financial impacts, but it’s just too early to tell.

Even if blue crabs become commercially viable, there would be questions to answer on how to best manage the species. Those are some of the other questions researchers are hoping to be able to help address and inform through their monitoring work. “Our goal is to inform the people in charge of making policy and give them the best, up-to-date, data that they can then hopefully formulate into policy that is agreeable for everyone,” Dr. Bradt says. One thing is for sure though, the people who rely on the ocean’s bounty to make ends meet will be the first to feel the blue crab’s pinch. Whether that’s a pinch to see if they’re dreaming or one to force them to pinch their pockets is still a mystery. Either way,

the community members working on the water daily will likely have the best insight into what's to come. Researchers at Manomet, Wells National Estuarine Reserve, Northeastern University, and the University of New Hampshire are counting on that.



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### **Community Scientists**

The interinstitutional research team relies on a trapping methodology developed by the Wells National Estuarine Reserves with crab traps placed in several New Hampshire and Maine locations. The problem is, even amongst all four institutions, there simply are not enough resources to effectively collect the necessary data from across the Gulf of Maine. “Because these changes are happening so rapidly, we really don’t have, as scientists, as fisheries managers... the tools in our toolbox to monitor and react in real-time. It’s been really challenging in terms of trying to get a grasp on what’s happening”, Dr. McMahan explains. This is especially true when considering that a single blue crab could lay up to as many as 2 million eggs! As a result, the groups created the first-ever Gulf of Maine Blue Crab Network to help foster collaboration among all relevant organizations associated with Gulf of Maine fisheries to get the most detailed picture possible of potential blue crab proliferation.

The lynchpin of this data collection strategy is the reliance on community science. This is data collected and shared by members of the public who aren’t necessarily academically trained researchers. In this case, they are community members who acquired a treasure trove of relevant knowledge by working on the ocean and coasts to make a living. They are lobstermen, shellfish growers, or any other individual who may encounter blue crabs in the Gulf of Maine. Each institution reached out to its stakeholders who

work on the water to be the eyes and ears for everyone who depends on the Gulf of Maine's vast resources to put food on the table. Without them, none of this work would be possible, and the people most vulnerable to changes in the Gulf's ecosystem would be left in the dark.



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## Conclusion

Generally, scientists don't automatically have all the answers and aren't necessarily the most knowledgeable on a given topic. They are simply people who are adept at analyzing and interpreting data. In the case of blue crabs in the Gulf of Maine, members of the community who are on the water day in and day out, relying on their blood, sweat, tears, grit, and gumption to make a living, will always have a more robust first-hand perspective on what's happening in *their* place of business versus some researcher who parachutes in when funding allows. As Dr. McMahan puts it, "Fishermen are on the water every single day. They're on the front lines of climate change and observing these changes, and they possess knowledge that is unparalleled in terms of just the scale at which they are seeing this happen. Certainly, [at] finer scale[s] than we can ever hope to replicate with a scientific study because we're never going to be able to be on the water every single day." They are the experts. They are the ones who will be primarily impacted by changes in the ecosystem. They are the ones who will be primarily impacted by potential subsequent management measures to address those ecosystem changes. Therefore, they should be the ones primarily consulted when trying to understand and evaluate what's happening with the blue crab population.

Scientists are the most impactful, and their conclusions are the most accurate when they collaborate *with* the communities they're surrounded by, incorporating all their hard-earned knowledge in the data

collection process. “We’re not out there just telling everyone how things should be...It takes everyone, and it takes a community. And that’s how the most impactful changes happen”, says Batchelder. The work being done by Manomet, Wells National Estuarine Reserve, Northeastern University, and the University of New Hampshire exemplifies just that.

**Want to Contribute?**

With the Gulf of Maine Blue Crab Network now up and running, the data collected this year through community scientists will help paint the clearest picture yet regarding the crab’s northward habitat expansion. If you live in the area or are visiting and would like to contribute, you can submit any of your sightings directly to the researchers through their public survey [here](#).