

## The rules of the water

June 8 2015, by Greg St. Martin



Northeastern is leading an interdisciplinary research study this summer with the goal of identifying common rules governing community organization that can be scaled up to explain broad biogeographic variation across the Gulf of Maine. Credit: Brooks Canaday/Northeastern University

This summer an interdisciplinary research team led by Northeastern professor Geoff Trussell will study community organization and



connectivity of rocky intertidal habitats throughout the Gulf of Maine. The project is intended to help inform the development of predictive ecological models that can be used to improve how these ecosystems are managed and preserved.

The study's goal is to identify common rules governing community organization that can be scaled up to explain broad biogeographic variation across the Gulf of Maine. The gulf spans 36,000 square miles, including the shores of Northeastern's Marine Science Center and extending as far north as the Canadian provinces of Nova Scotia and New Brunswick.

"Until you get a general understanding of rules that may apply across all communities, it's going to be very difficult to understand how to manage them," said Trussell, who is director of Northeastern's Marine Science Center in Nahant, Massachusetts, and chair of the Department of Marine and Environmental Sciences.

The research study—which is supported by a \$1.7 million award from the National Science Foundation's Biological Oceanography program—has broad implications: According to Trussell, waters in the Gulf of Maine are warming at a faster rate than nearly all of the world's other saltwater ocean basins. Plus, he said, they're being increasingly invaded by non-native species.





The lead principal investigator on the project is Geoff Trussell, who is director of Northeastern's Marine Science Center in Nahant, Massachusetts, and professor and chair of the Department of Marine and Environmental Sciences. Credit: Brooks Canaday/Northeastern University

The researchers will survey 22 sites throughout the Gulf of Maine to evaluate the variation in factors such as species composition, food availability, wave energy, and other environmental stressors and analyze what is driving the differences between these coastal marine communities. Trussell noted that past studies have historically focused on the southern Gulf of Maine. Theirs, he said, will be the first to focus on the entire Gulf in order to better understand the various factors driving individual community dynamics.



Trussell is the lead principal investigator on the project, which brings together experts in ecology, predictive modeling, and marine community connectivity. The team includes co-principal investigator Tarik Gouhier, an assistant professor whose lab in Nahant focuses on developing dynamical models to understand ecological and environmental processes; student researchers from the Marine Science Center; and researchers from the University of Massachusetts Boston, the Downeast Institute, and the University of Maine.

Trussell noted that his former doctoral student, Elizabeth Bryson, played a key role in research published last year in the journal Ecological Monographs showing distinct differences in how marine communities are structured in the northern Gulf compared to the south. These findings, he added, provided compelling evidence that more work needed to be done to inform adequate scaling of local rules that pertain to the entire Gulf of Maine.

"Here you have communities that superficially look similar," Trussell said. "They contain the same species and so on, but they have different processes operating to determine how they recover from disturbance and how they are ultimately organized."

These differing community dynamics are vast and complex. For many communities, coastal oceanography is a major factor, as it influences the delivery of species from one community to another. The abundance of certain species is also dictated by water temperature. Another factor is seaweed—in the northern Gulf it is a critical marine resource for harvesters and in the south it plays a key role in buffering many species from the heat stress.

Trussell added that invasive species—and how warming waters enhance their establishment—play a huge role in how these communities are organized.



"If we're going to be able to predict those impacts, we really need to understand how these communities work across this broad scale," he said.

## Provided by Northeastern University

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