

Dr. Daniel Tye Pettay

As a molecular ecologist, I use an interdisciplinary approach to reveal how environmental conditions cause changes in cellular processes that can then cascade to the whole organism and ecosystem and drive the evolution of populations and species. I investigate a wide range of algal groups with differing ecologies, including phytoplankton associated with salt marshes, harmful algal blooming species and symbiotic algae. I use genetic techniques to resolve algal diversity and better understand their population processes and evolution. By relating this diversity to its environmental distribution, I make and test hypotheses concerning their physiological ecology and acclimation to changing environmental conditions (e.g., temperature, light and nutrients) and, ultimately, their adaptation over longer timescales. In support of my algal research, I use *in situ* continuous monitoring instruments to gather physical, chemical and biological data to better understand the role of algae in biogeochemical cycling in coastal environments as well as how human activities like eutrophication can influence primary production, salt marsh respiration and acidification in these systems. As an extension of this monitoring, I am also interested in developing and building low-cost sensor packages both to increase the spatial resolution of water quality monitoring and for use as an outreach tool.

I enjoy mentoring students and have successfully secured funding to support both graduate and undergraduate student research. I participated in UD's REU and undergraduate Semester in Residence programs, overseeing undergraduate research on topics such as the genetic diversity, physiology and toxicity of harmful algae, environmental monitoring and analysis of long-term continuous water quality data, and the comparative photophysiology of sea anemones harboring different algal symbionts. The work on coral and anemones led to two publications with undergraduate coauthors, while the research on harmful algae was presented by the student researcher at the 2018 Ocean Sciences Meeting and a manuscript is currently underway. In addition to undergraduate students, I advised one master's level graduate student working on harmful algal diversity and ecology, and a previous master's student focusing on the same topic graduated in Fall 2018.

My involvement with the University of Delaware's Citizen Monitoring Program (CMP), where I assisted with volunteer training, field monitoring and database management, was a rewarding experience. This program uniquely uses citizen scientists to help monitor various water quality parameters at permanent sites within Delaware's Inland Bays. The CMP provides a strong connection to the community and the opportunity to educate the public. I often gave lectures related to local water quality and harmful algae to the CMP. I encouraged my students to do the same and to present the results of their research at semi annual meetings with the citizen scientists. I plan to continue this type of outreach and will collaborate with local organizations to expand water quality monitoring and education around coastal South Carolina.