UCONN | COLLEGE OF LIBERAL ARTS AND SCIENCES

Department of Marine Sciences

Fall 2019 Newsletter

GREETINGS FROM THE DEPARTMENT HEAD

With the beginning of the fall semester, it is always good to reflect on the past year. A few highlights include: **1)** Our partnership with CT Sea Grant and CTDEEP to establish the site for Connecticut's first National Estuarine Research Reserve; **2)** Plans to develop an Ocean Engineering certificate program with the School of Engineering; and **3)** Opportunities to conduct environmental research at sites soon to be developed for offshore wind energy. We are excited about all of these initiatives and look forward to their fruitful continuation.

In this newsletter, you will find stories about graduate alumna **Michelle Fogarty**, the symposium honoring emeritus faculty member **Edward Monahan**, summer activities, and recent scholarly pursuits. Finally, I encourage everyone to further explore our cutting-edge research and educational initiatives by visiting our website. Also, you can keep informed about all of the great ongoing activities in marine sciences by joining the Partners of Marine Sciences.

Have a wonderful and productive remainder of 2019,

J. Evan Ward

PROFESSOR AND HEAD, DEPARTMENT OF MARINE SCIENCES

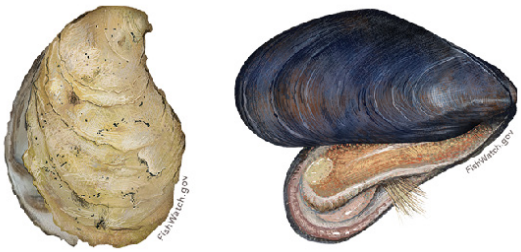
Plastic pollution needs a new bioindicator

POSTED ON OCTOBER 30, 2019 BY MOLLY JAMES

Stories about the impact of plastic pollution on marine organisms have been flooding the news with upsetting images of sea turtles with plastic straws stuck in their nostrils, and whales dying with tons of plastic in their stomachs. Besides large animals, plastic is potentially harming the creatures that wind up on our dinner plate, like bivalve shellfish. Bivalves filter ocean water to eat plankton, which suggests they are ingesting small plastic particles, called microplastics, every time they feed.

Researchers in UConn's Department of Marine Sciences recently conducted a study exploring how common, commercial bivalves interact with microplastics when filter feeding. Ph.D. students Kayla Mladinich and Tyler Griffin, working with Professor J. Evan Ward, collected eastern oysters and blue mussels from Long Island Sound for laboratory experiments, in which they were exposed to plastic spheres and/or plastic threads of different sizes.

For spheres, their findings show that both mussels and oysters always reject the largest-sized plastic spheres, but ingest and expel smaller ones. For threads, however, there was not a clear pattern



Eastern oyster (left) and blue mussel (right).

between rejection or ingestion, and length.

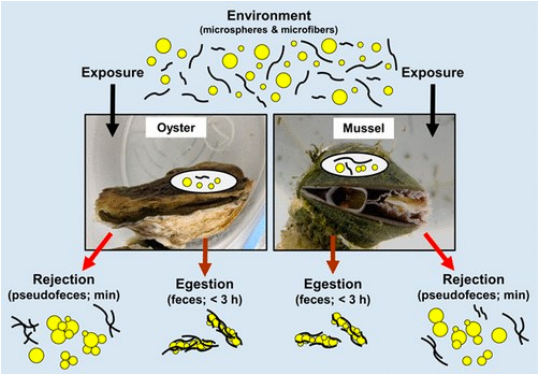
Mladinich explains, "Bivalves are selective feeders. While they can capture particles of various sizes and shapes on their gills, they will not eat everything they are exposed to. They can ingest or reject certain particles based on the size, shape, and surface properties."

Dr. Ward and his lab group have shown that bivalves are not passively ingesting all types of plastics, rather the size and shape of the plastic matter a lot. This finding has implications for using bivalves as bioindicators for plastic pollution in the ocean.

Bioindicators are species used to represent the concentrations of pollutants and contaminants in an environment. In the ocean, bivalves are already utilized to monitor and determine levels of persistent organic pollutants (POPs), which can cause a variety of diseases in humans.

According to the World Health Organization, the most commonly encountered POPs are pesticides, industrial chemicals, and unintentional by-products of many industrial processes, such as DDT, PCB and PCDD, respectively. Recently, some scientists suggest also using bivalves as bioindicators for plastics pollution in the ocean.

According to the Ward lab, the criteria for a good microplastics bioindicator species include (1) being ubiquitous and relatively easy to collect; (2) interacting significantly with the surrounding environment through particle-feeding processes; and (3) ingesting, without bias, the majority of plastic particles in the environment.



Difference between oysters and mussels feeding on microplastics (courtesy of publication).

Therefore, says Mladinich, "We should reconsider using bivalves as bioindicators for microplastics pollution, because as this study shows they capture, ingest, and reject plastic particles differentially. Bivalves are not consuming particles passively; they have selection mechanisms and bias."

"If you went out and opened up a mussel or oyster and counted all the types and sizes of microplastic particles, you would not be getting an accurate representation of the microplastic load in that area," added Griffin. "We should investigate other filter feeders that better satisfy our criteria."

Unfortunately, mussels and oysters do not follow these criteria because they selectively consume some microplastics over others. Additional studies suggest that most plastics do not accumulate in shellfish tissues because they are readily eliminated on short timescales. "Our study supports the idea that many plastic particles encountered by bivalves are either rejected prior to ingestion or rapidly egested in feces, so the instantaneous microplastic body burden of the animals is low," explains Dr. Ward. Nonetheless, long-term effects of a low microplastic body burden in bivalves are not yet known.

More experiments are being conducted by Dr. Ward and his students that explore the impacts of microplastics on the gut microbiome of mussels, the selection of microscopic fibers depending on size and polymer type, and other topics.

Colleagues, family, and friends celebrated Dr. Monahan.

Honoring the achievements of emeritus faculty Dr. Edward C. Monahan

POSTED ON OCTOBER 30, 2019 BY MOLLY JAMES

DEPARTMENT NEWS

In the old-world tradition of a *Festschrift*, i.e., a celebration and book honoring the life and achievements of outstanding academics, the Department of Marine Sciences celebrated Dr. Edward C. Monahan in a full day symposium. Colleagues from Ed's many years at UConn and Connecticut Sea Grant recounted entertaining anecdotes and his many accolades. Outside of academia, friends shared stories about his intense love for rowing crew and his involvement in local politics. One of the shining moments of the day included a photo montage of Ed's facial hair throughout the years. Two beautiful quilts, crafted by Ed's wife Elizabeth, were displayed throughout the festivities. One quilt captured rolling waves, the pattern being different shapes for different words for white caps. The other quilt displayed every institutional emblem in chronological order at which Dr. Monahan worked.

Dr. Monahan studied at Cornell University as an undergraduate in Engineering Physics, and continued onto his Ph.D. in Oceanography at the Massachusetts Institute of Technology, where he focused on the correlation between sea spray, whitecap coverage, and wind speed. His career brought him across the world to Ireland, where he completed another Doctorate of Science at the National University of Ireland. For two decades, he led the Connecticut Sea Grant program at UConn as its Director and initiated international marine sciences exchanges. In his retirement, Ed has not slowed down his scholarly productivity. He continues to publish scientific journal articles, remains active in the department, and stays abreast of all things oceanography by attending weekly seminars and brown bag presentations.

Dr. Penny Vlahos, chair of the symposium organizing committee, commented, "Ed and I have collaborated since I started as junior faculty. I thought it was appropriate to honor him and recognize his achievements and contributions. His work is still being cited today, especially by climate scientists in IPCC [Intergovernmental Panel on Climate Change] reports."

Some wonderful words come from Peg Van Patten, retired communications director for Connecticut Sea Grant, "Ed Monahan was my supervisor as Director of Connecticut Sea Grant for two decades, but he was really more than that. Ed became my mentor, and friend, and sometimes my co-author. I learned so much from his experience that I was delighted when Professor Vlahos asked me to help organize a symposium in his honor. The day was a perfect tribute to Ed's remarkable career and many accomplishments."

Throughout the symposium, selected guests gave scientific talks on topics related to Ed's research interests: sea spray, white caps, and air-sea interaction. Other speakers included grant recipients from Connecticut Sea Grant, collaborators, rowing partners, and students. In his retirement, Ed helped organize Coastsweek Regatta, a local rowing competition in Mystic, with 2019 marking the 28th consecutive year. At the closing of the day, attendees, family and friends enjoyed celebratory beverages and birthday cake appropriately decorated with a large wave. Allison Staniec, a current Ph.D. student who works directly with Ed, summarized the day quite well: "The Monahan Symposium (Twixt Wind and Waves) was an enjoyable celebration of Ed's past and ongoing career with plenty of time for ground breaking science and entertaining anecdotes. And cake!"

The *Festschrift* book, "Recent Advances in the Study of Oceanic Whitecaps," edited by P. Vlahos and E. C. Monahan (Honorary Editor) will be published by Springer Nature shortly.

Summer ’19 Synopsis

POSTED ON OCTOBER 30, 2019 BY MOLLY JAMES

Although the academic year is over by mid-May, the Department of Marine Sciences does not take a summer vacation. Outreach, research trips, summer interns, and more activities keep Marine Sciences bustling during the summertime. Included here are just a few of the programs from summer 2019.

MARINE SCIENCES AND MYSTIC AQUARIUM REU PROGRAM

This year marked the last class in the inaugural cycle of our new NSF funded Research Experience for Undergraduate (REU) program with the Mystic Aquarium. Our REU students came from all corners of the country: California, Florida, Iowa, and Maine. Eight REU students were paired with Marine Sciences Faculty or Mystic Aquarium researchers on projects that spanned all levels of the marine food web. The program provides students with housing, a stipend for working full-time in a lab and for food, and all transportation. The students just focus on conducting science! This year featured new collaborative projects between DMS and the Aquarium, such as the first ever documentation of ciliate diversity and population dynamics of Beluga Whale blowhole spit. The Marine Sciences Graduate Student Organization also integrated itself into the REU program by providing invaluable peer support for oral and poster presentation experience. After a laudatory site visit by the NSF program manager, we were encouraged to apply for another four years of funding and to increase the number of students to 10. Our fingers are crossed we can continue this exciting and rewarding program.

REU students explain their summer research to the public at the Mystic Aquarium.

STEM SUCCESS AND STUDENT SUPPORT SERVICES

STEM Success, the undergraduate retention program for incoming Science Technology Engineering Mathematics (STEM) students, returned this summer! Fourteen in-coming undergraduate students enrolled, who are either first-generation college students, from low-income households, part of underrepresented populations within UConn, or in need of some extra academic support.

For four weeks, students participated in eight workshops, twice-a-week, that were designed to promote discussion amongst peers and with graduate students on STEM subjects and life at Avery Point. Activities ranged from performing titrations, carrying out plankton tows, introducing programming, and learning how to use a microscope. This enabled the incoming undergraduates to become familiar with basic scientific concepts and laboratory etiquette, readying them for their science classes this Fall. The primary goal was to add another layer of support for these students by fostering connections with their peers and their future teaching assistants.

For the second year in a row, the STEM Success program occurred alongside the intensive five-week Student Support Services summer program directed by Aaron Collins. Twice as many marine sciences graduate students got involved this year to lead the workshops. STEM Success has been designed and coordinated by Dr. Emma Cross the previous two years and she is now handing over the reins to Dr. Lisa Nigro. Our graduate students were super enthusiastic and all the incoming first-years enjoyed and found the program useful.

PRE-COLLEGE AT AVERY POINT

The Department of Marine Sciences participated in UConn's pre-college summer program for the second time. The program, titled "marine biology and oceanography" enrolled 17 students from Connecticut, Massachusetts, New York and Saudi Arabia (by way of New Hampshire). The students stayed in Storrs and were transported to Avery Point during the week. Students' favorite activities included taking water quality measurements around Pine Island off the R/V Lowell Weicker, exploring invertebrate ecology from settling plates, going on a behind the scenes tour of the Aquarium, and dissecting dogfish. Instructors were Claudia Koerting and John Hamilton. The program ran the last full week of July.

UCONN SUMMER UNDERGRADUATE RESEARCH FUND (SURF) AWARDS

Each summer, UConn awards close to 50 undergraduates with financial support to explore a research project of their own device through the Summer Undergraduate Research Fund (SURF). Over the last few years, Marine Sciences undergraduate students have consistently received recognition. This year, seniors Mackenzie Blanusa and Annalee Mears were fully funded for summer research. Mackenzie combined atmospheric science and chemical analysis in her project entitled, *"The Effect of Storm Type and Source Region on the Chemical Composition of Precipitation along the Long Island Sound Coastline."* Dr. Kelly Lombardo and Dr. Zofia Baumann mentored and guided her research. Annalee worked with Dr. Catherine Matassa on a project about predator-prey interactions called, *"Stoichiometry of Fear: Do Predators Affect the Balance of Carbon and Nitrogen in their Prey?"* Previous SURF recipients include Clare Schlink (2018), Sarah McCart (2017) and Jessica Hinckley (2019). We are proud of our undergraduates for their great contributions!

WHERE ARE THEY NOW?

Alumni Spotlight – Michelle Fogarty

POSTED ON OCTOBER 30, 2019 BY MOLLY JAMES

ALUMNI SPOTLIGHT

Despite the 2-hour time difference, **Michelle Fogarty** answers my Skype call with enthusiasm at 8:30am MDT. Michelle is a recent Marine Sciences alumna, who is now based in Boulder, Colorado working at the National Renewable Energy Laboratory (NREL). While at UConn, she studied air-sea interactions with Dr. Melanie Fewings. She graduated with her PhD in 2018, and her dissertation is available online for those interested in learning more. We spoke about her job search process, her current position, and advice she has for current graduate students.

MOLLY: WHAT IS YOUR CURRENT POSITION?

MICHELLE: I am a Postdoctoral Researcher in Marine Energy Resource Characterization at the National Renewable Energy Laboratory, Flatirons Campus, in Boulder, CO. I've been there for 8 months, since February 2019. NREL is a DOE-owned, contractor operated national lab, and we work with industry and academic partners to accelerate the commercialization of renewable energy technologies and diversify the US's energy portfolio.

Q: HOW DID YOU HEAR ABOUT IT?

MICHELLE: I remember seeing the posting online somewhere — probably on LinkedIn, the Coastal List listserv or the MPOWIR jobs board. But, I didn't apply based on the posting because there was no contact information for the principal investigator (PI), only instructions for submitting an application through the online portal. Without being able to research more about the group I'd be working with, I didn't pursue it further. Later when I attended the Mid-Atlantic Bight Physical Oceanography and Meteorology (MABPOM) conference, I spoke with an acquaintance who knew about the NREL position and offered to send an introductory email to the PI. After a phone call with the PI, I decided to apply.

Q: WHAT WAS THE HIRING PROCESS LIKE?

MICHELLE: Over the course of three months, October to December 2018, I submitted my cover letter and CV, had a phone interview with Human Resources, and visited Boulder for an in-person interview. During the in-person visit, I gave a 15-minute presentation and fielded questions from a group of about 10 people, which was followed by a 1-hour Q&A session with a smaller interview committee that covered a larger range of topics and allowed me to ask questions of them as well. A few weeks later, I was offered the job. I drove from CT to CO and reported for work at the beginning of February [2019]. I think it's worth pointing out that from a hiring standpoint, there's a difference between being brought on as a researcher or as a

postdoc. As a postdoc, the main focus is on building your professional capacity, and NREL is committed to providing opportunities and mentorship along the way.

Q: WHAT ARE YOU RESEARCHING?

MICHELLE: As a member of the Marine Hydrokinetic Energy (MHK) group within the Water Power team, I am working on tidal energy resource characterization. My first project is to calculate characteristic flow and turbulence statistics from data collected at the Western Passage site near Eastport, Maine and write a journal article describing the results. That data was collected before I began at NREL. I'm also working on preparations for another tidal energy site resource characterization field campaign in Cook Inlet, Alaska. The results of both projects will document relevant flow conditions at potential tidal energy sites, to be used to validate regional circulation models, and will help device simulation tools estimate realistic loads on tidal turbines. More recently, I've started to coordinate with outside partners to get two new wave buoys deployed in 2020 to increase our wave resource characterization efforts. I am motivated by knowing that the results of my research will be used to help solve real-world problems.

Q: WHAT IS YOUR WORK LIFE LIKE AND HOW DOES IT DIFFER FROM YOUR EXPERIENCE DURING GRAD SCHOOL?

MICHELLE: There is little obvious hierarchy at NREL on a day to day basis like there was in grad school (undergraduate students/graduate students/postdocs/staff/faculty, etc.). While I still do a lot of work independently, we work in teams. On a weekly basis I participate in more collaborative efforts than I typically did during grad school. I work with people at all stages in their careers, and the tasks I'm given are based on my skills, my willingness to participate, and my availability.

I work a 40-hour week and complete a time sheet that accounts for each hour of work and which project the work was associated with, so that's quite a bit different than the grad school structure. It feels more like a consulting job, where you are required to bill out your hours to a specific project. I have a cubical, and most of my time is spent working independently at my desk, with various project-based and MHK or Water Power group meetings throughout the week. I will continue to attend conferences like Ocean Sciences to keep in touch with the network of people I developed during grad school, and will get to know a new community of people at marine energy related conferences, too.

Q: WHAT ADVICE DO YOU HAVE FOR CURRENT GRADUATE STUDENTS?

MICHELLE: Talk to as many people as possible, you never know which connection will turn out to be useful. Keep notes of those interactions. Start doing this as early in your graduate school career as possible so 1) you get comfortable with it and 2) you develop relationships out of genuine interest and aren't making the initial attempt to network at the moment you need something. Talk with people who have jobs like the one you think you want and to people who have jobs you're "sure" you have no interest in. Do this through informal conversations at conferences, at events that have nothing to do with work, and invite people you've met in person or found online to participate in informational interviews with you on the phone or in person. I highly recommend sending hand-written thank you notes after those informational interviews, too. I have always been impressed at how willing people are to give their time and sending a thank you card is a small way to show how much you appreciate the kindness.

Achievement Highlights

STUDENT PUBLICATION

A recent research article by Ph.D. candidate **Matthew Sasaki** and professor **Hans Dam**, titled “Integrating patterns of thermal tolerance and phenotypic plasticity with population genetics to improve understanding of vulnerability to warming in a widespread copepod,” was published in the journal *Global Change Biology*.

FACULTY AWARD

Professor **Ann Bucklin** received the Outstanding Achievement Award at the International Council for the Exploration of the Sea Annual Science Conference.

STUDENT ACHIEVEMENT

Abigail Kwiat ‘20 (CLAS) spent her summer at the Plum Island Ecosystem Long Term Ecological Research site as a part of the NSF Research Experience for Undergraduates program at the University of Chicago Marine Biological Laboratory.

marinesciences.uconn.edu/partners-of-marine-sciences/