Atlantic Estuarine Research Society

AERS

Est. 1948

Coastal and Estuarine Science in a Changing Climate

March 23-25, 2023

Monmouth University, West Long Branch, NJ

Governing Board

Shelley Katsuki
President

-vacant-
President Elect

Ben Fertig
Past President

Elizabeth Lacey
Treasurer

Roberto Llanso
Treasurer Elect

James Vasslides
Secretary

Tom Wazniak, Paul Salib, Robert Isdell
Members-at-Large

Treda Grayson, LeeAnn Haaf, Anthony Himes
Program Committee

Gulnihal Ozbay
Membership

Ben Fertig
Nominations

-vacant-
Constitution

Anji Cooper, Frank Reilly
Parliamentarian

Danielle Kreeger
Historian

Jessie Jarvis
Honorary Members

Joseph Luczkovich
Student Endowment

LeeAnn Haaf, Emily Pirl, Sarah Bouboulis
Communications

Emily Coleman
Student Affairs

Gulnihal Ozbay, Maizer Sparkman, Juan Ramos
JEDI Committee

President's Remarks

Welcome back to what is sure to be another fantastic AERS meeting. I am thrilled that we have over 100 attendees registered for this meeting and over 50 scientific presentations. As always we aim to have a nice balance of cutting edge science mixed with time for socializing and networking. Our program committee, local planning committee and other volunteers have all been hard at work behind the scenes to make sure that this conference is enjoyable for everyone.

AERS is actually celebrating 75 years since its inception this year. Founded in 1948 by "the brackish boys", Nelson Marshall, Willard Van Engle and Eugene Cronin over breakfast, the society was conceived to bring estuarine scientists together around their research. Today we continue to celebrate their early work in chartering the AERS we know and love, which still values the enthusiasm, informality and active participation of its members. We will continue to celebrate our long history throughout this year and into the next. The first AERS meeting occurred in April 1949 in Morehead City , NC. Thus in the spring of 2024 we will celebrate the 75th anniversary of the first AERS meeting as well.

75 years of the Atlantic Estuarine Research Society is quite impressive and wouldn't be possible without all of the people working behind the scenes to keep us going, and of course all of our valued members! For this meeting in particular, I would like to thank our Local Hosts at Monmouth, Jason Adolf and Aliya Satku, who have been invaluable in organizing everything you will experience this weekend. I would also like to thank Ann Peterson and Pete Straub, who round out the Local planning committee and have helped to secure speakers, sponsors, and attendees. From the AERS board, our program committee consisting of Treda Smith Grayson, LeeAnn Haaf, and Anthony Himes, have perhaps the hardest job of all in coordinating all of our presenters and ensuring a smooth running and scientifically relevant program. There are many other members of the AERS board and our membership that have contributed to the success of this meeting and I wish to thank all of you as well, but there are too many to name individually. A knuckle salute to everyone involved!

Please take some time while here at Monmouth University to enjoy the campus, visit some local sites, and check out a field trip or two. Don't forget that our meetings would not be possible without the generous support of our sponsors, do be sure to join me in thanking them when you see them around the meeting.

I hope the next few days are enjoyable for you as you absorb new scientific information, catch up with old friends, and make some new ones. Thank you for joining us at Monmouth and here's to another 75 years of AERS!

Shelley Sullivan Katsuki

AERS President 2022-2024

Local Planning Committee

Jason Adolf, Aliya Satku, Pete Straub, Ann Petersen, & Joe Luczkovich

On behalf of the local hosts from Monmouth University, Stockton University, and the NOAA JJ Howard Marine Lab, welcome to our beloved Jersey Shore! Coasts and estuaries embody the best of what NJ has to offer and we are proud to host this important gathering of people who are dedicating their lives to understanding these essential environments. We hope you have a productive and enjoyable meeting!

Sponsors

YSI a xylem brand

Monmouth University | Urban Coast Institute

Sea Grant NJ Sea Grant Consortium

Old Dominion University

Leading Light Wind

Monmouth University

Jenkinsons Aquarium

Barnegat Bay Partnership

Effingham Manor Winery

Kane Brewing Company

Field trip sponsors:

Monmouth University Urban Coast Institute

American Littoral Society

NOAA Fisheries

Schedule

THURSDAY

3:00-5:30 - Sandy Hook Tours: bird hike & JJ Howard Marine Lab

4:00-6:00 - Board meeting- E119

6:00-9:00 - Registration and Welcome social

7:00 - John Tiedemann's keynote

9:00-11:00 - Past presidents party at the boardwalk - Silverball arcade.

FRIDAY

8:00-8:45 - Registration and light breakfast

8:45- 9:00 - President's Welcome and Land Acknowledgement

9:00-9:30 - Danielle Kreeger's keynote

•9:30-10:15 - Benthics
- 9:30 – Pete Straub
- 9:45 – Gulnihal Ozbay
- 10:00 – Jessica Klinkam

10:30- 12:00 - Benthics & Fish
- 10:30 – Quinn Whiteshall (M)
- 10:45 – Shane Godshall (*ignite*)
- 10:53 – Taylor Beck (*ignite*)
- 11:00 – James Treshock (HS)
- 11:15 – Dylan Garrabrant
- 11:30 – Jessica Maguire (U)
- 11:45 – Jason Adolf

LUNCH ON YOUR OWN

Download the mobile ordering app and place an order at Monmouth University's Dinning Hall or The Food Court. A wide variety of options are available

You can even order early and specify a pick up time! Utilize this option to be sure you will be back for the start of the afternoon sessions

1:00-2:00 - Fish & Restoration
- 1:00 - Carl Alderson
- 1:15 - Joe Luczkovich (*ignite*)
- 1:23 - Zack Royle (*ignite*)
- 1:30 – Paul Salib (*ignite*)(M)
- 1:38 – Philip Orton (*ignite*)
- 1:45 – Meredith Comi

P = PhD student M= Masters student
U= Undergraduate student HS = High school student

•2:15-3:00 Restoration & Farming
- 2:15 – Alek Modjeski
- 2:30 –Toni Rose Tablante
- 2:45 – Frank Reilly

3:00-4:00 - Business Meeting

4:30-6:30 - Poster Session

6:30-9:30 – Banquet

SATURDAY

8:00-9:00 - Registration and light breakfast

9:00-10:15 - Fauna and ChatGPT
- 9:00 – Darby Pochtar (P)
- 9:15 – Sarah Greenburg (M)
- 9:30 – Paul Bologna
- 9:45 – Alexander Mott (P)
- 10:00 - Christopher Meehan (*ignite*) (U)
- 10:08 – Ben Fertig (*ignite*)

10:30-11:45 Salt March and Wind
- 10:30 – Amber Hatter (U)
- 10:45 – Kriish Hate (U)
- 11:00 – Drew McQuade
- 11:15 – Megan Fielding (M)
- 11:30 – Elizabeth Fuchs (*ignite*)(U)

•11:45-12:30 - Awards & closing remarks

•1:00 - Afternoon field trips
- Living shoreline Restoration
- Atlantic Highlands Boat trip

Keynote Speakers

John A. Tiedemann

Assistant Dean, Monmouth University School of Science & Director, Monmouth University Marine and Environmental Biology and Policy Program

Reflections on shifting baselines in the New York Bight: a 50 year retrospective

Keeping pace with resource management needs in an era of dynamic change can seem like an ominous task. One of the obstacles to addressing the wide range of current environmental issues is the absence of an historical perspective on past environmental conditions. Since the 'Decade of the Environment' a variety of natural and anthropogenic happenings have caused the New York Bight's environmental baseline to shift. With so many challenges ahead, a review of the of the Bight's environmental history over the past 50 years offers a unique view of the relationship and interaction of society and the oceans. Putting past environmental conditions in perspective is critical to developing contemporary environmental conservation, restoration, and management goals.

Danielle Kreeger, Ph.D.

Partnership for the Delaware Estuary & Drexel University

Nature-Based Investments for Climate Resilience: the Ecological Manhattan Project

Tidal wetlands, submerged vegetation and shellfish beds furnish vital ecosystem services, promoting clean water, carbon capture, essential fish habitat, and flood protection. Unfortunately, the abundance and condition of these estuarine habitats are in decline and increasingly threatened by climate change in most areas. Innovative tactics and management approaches offer hope that losses of the most service-rich estuarine habitats can be partially averted. However, implementation of these ideas is hampered by entrenched viewpoints and regulatory constraints. Traditional management goals are still focused on preserving native species and restoring habitats to past conditions, rather than sustaining ecosystem services. Nature-based tactics such as living shorelines are still more difficult to get permitted than bulkheads and riprap. Habitat restoration is typically approved only at locations where that habitat type existed previously. Most funding is still directed at rare species conservation and non-native species eradication, rather than foundational species. Assisted migration of species to back-fill vacated service niches is deemed sacrilegious. Despite barriers, we may be on the cusp of a paradigm shift that is driven by the increasing pace of climate change and associated threats. Increasingly, ecosystem services are being quantified, monetized, and factored into climate adaptation plans. Similar to beach replenishment, investments in other types of "natural capital" and nature-based tech are increasingly being justified by economic ROI and benefits to coastal communities. However, the scale of the investment need is daunting, and there are risks of unintended ecological consequences, market exploitation, or misguided projects undermining confidence. Nevertheless, the future condition of estuarine ecosystems hinges on bold, creative and sustained investments in natural infrastructure that can deliver the greatest ecosystem service uplift, quantified and guided by science, rather than politics.

Field Trips

Saturday boat trip out of Atlantic Highlands

Get on board Monmouth University's 50' R/V Heidi Lynn Sculthorpe for a tour of the lower Hudson-Raritan Estuary and waters around Sandy Hook. We'll leave the dock 1pm and be out for about 3h. Limited to 20 passengers.

Hands-on living shoreline restoration

Join the Littoral Society and other volunteers in planting 15,000 culms along our newest living shoreline centrally located at 411 S. Riverside Drive in Neptune NJ. This community-driven restoration project will help to protect the local area from storm erosion, coastal flooding and other climate-driven impacts while also providing crucial habitat for living organisms. This is a sill, marsh, beach, and berm restoration site, but only planting the berm for now. We will supply gloves and dibbles but attendees should dress to get dirty. We also hope to see the fiddler crabs emerge from their winter burrows! Read more about this project here: https://www.littoralsociety.org/blog/shark-river-living-shoreline-project

When: 1-3 pm Saturday March 25th

Where: 411 S. Riverside Drive in Neptune NJ.

Cost: Cash donations to the Littoral Society will be encouraged.

Sandy Hook Tours: bird hike & JJ Howard Marine Lab

Nature and bird tour hike at Gateway National Recreation Area Sandy Hook Unit with American Littoral Society, plus tour of NOAA's finfish research facility - the JJ Howard Marine Lab.

When: 3-5:30 pm Thursday March 23rd

Where: we will transport in vans from Monmouth to Sandy Hook or people can meet us there. Vans will be back in time to attend the welcome social and keynote address

Cost: Cash donations to the Littoral Society will be encouraged.

About our guide: Join "bird nerd" and Director of Development, Membership and Outreach for the American Littoral Society Lindsay McNamara for a private bird walk. She has been birding since she was nine years old when she saw her first Great Blue Heron along the Raritan River. She's worked as a communications and fundraising specialist in the environmental nonprofit and higher education sectors for a decade. She holds a B.A. in Environmental Studies from the University of Delaware and an M.A. in Public and Organizational Relations from Montclair State University. Lindsay has led bird walks for Raritan Headwaters Association, Bergen County Audubon Society, New Jersey Emerging Conservation Professionals, and her former coworkers at National Audubon Society both in New York City and throughout New Jersey. She's taught virtual birding classes and has even led a virtual bird-based book club through Hog Island Audubon Camp called "Tern the Page." She is always looking to engage new birders in her lifelong passion and her favorite bird is the one she's looking at.

Campus Map

AERS SPRING 2023 MONMOUTH UNIVERSITY

1 Pozycki Hall

- Thursday Social and keynote
- Friday Poster Session /Banquet

2 The Great Hall

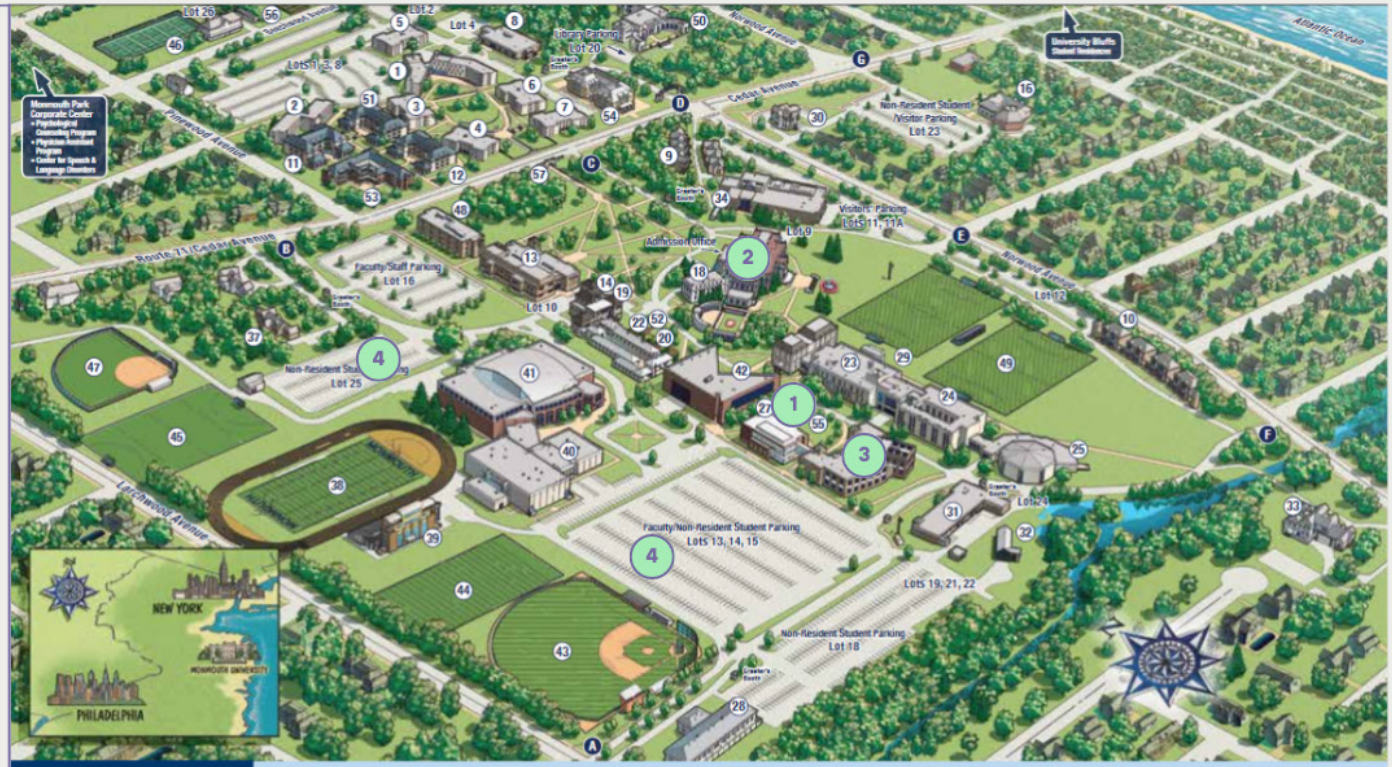
- Friday Scientific program

3 Bey Young Hall

- Saturday Scientific Program

4 Parking

- Lots 13, 14 and 25
- Enter off of Larchwood or Cedar Avenues
- Please stop at the Greeter's Booth to be issued a visitor parking hang tag



MONMOUTH UNIVERSITY CAMPUS MAP

VEHICULAR ENTRANCES
A,B Students & Employees
A,C,E Visitors
D Students & Library
A,F Pollak Theatre Guests
F Students & Employees
G Lauren K. Woods Theatre & Students

STUDENT RESIDENCES
1 Elmwood Hall
2 Pinewood Hall
3 Willow Hall
4 Laurel Hall
5 Beechwood Hall
6 Spruce Hall
7 Cedar Hall
8 Health Center/Birch Hall
9 Garden Apartments
10 Great Lawn Apartments
11 Oakwood Hall
12 Redwood Hall
51 Maplewood Hall
53 Mullaney Hall
54 Hesse Hall

ADMINISTRATION AND ACADEMIC BUILDINGS
13 Plangere Center for Communication
14 Joan and Robert Rechnitz Hall – Art Gallery
16 Lauren K. Woods Theatre Complex
17 Woodrow Wilson Hall & Auditorium
- Admission
- Academic Registration & Records
- President's Office
- Human Resources
- Financial Aid
- Controller's Office
- External Affairs

18 Woodrow Wilson Annex
19 Rotary Ice House Gallery
20 Art Workshop
22 600 Art Building
23 Thomas A. Edison Science Hall
24 James and Marlene Howard Hall
25 Pollak Theatre and Art Gallery
26 Leon Hess Business School in Samuel E. and Mollie Bey Hall
27 Pozycki Hall
28 Athletic Department Offices
29 Center for Rapid Response
30 University Police
31 Facilities Management
32 Greenhouse
33 Doherty House
37 Alumni House
48 Robert E. McAllan Hall
50 Monmouth University Library
56 Community Garden
57 Pedestrian Underpass

RECREATION/FOOD SERVICE
34 Samuel Hays Magill Commons, The Club, Dining Hall
38 Kessler Field
39 Press Box
40 William T. Boylan Gymnasium and Richard E. Steadman Natatorium
41 OceanFirst Bank Center
- University Store
- Kessler Blue/White Club
- Fitness Center
- Arena
- Box Office

42 Rebecca Stafford Student Center
43 Baseball Field
44 Practice Field
45 "So Sweet A Cat" Field Hockey Field
46 Tennis Complex
47 Women's Softball Field
49 Great Lawn Fields
52 Lois Blonder Sculpture Garden
55 Torcivia Common

Abstracts - Talks

Environmental DNA surveys of coastal and estuarine fish in the context of environmental change and offshore wind development

Adolf, Jason[1*], Keith J. Dunton[2], Shannon J. O'Leary[3]

1. Monmouth University, 2. Monmouth University, 3. Saint Anselm College

The fish community composition of NJ coastal waters and the economic benefits provided by the fisheries they support result from the current state of the regional continental shelf ecosystem. Environmental DNA (eDNA) has been investigated as a non-extractive methodology for use with traditional capture techniques that continue to be employed to monitor fish community composition in the face of shifting environmental conditions related to climate change, and potential changes related to future construction of offshore wind farms. Here, approaches to using eDNA for these purposes will be discussed and illustrated with data from NJ estuaries and coastal ocean.

*jadolf@monmouth.edu

Impacts and Implications of a Free and Open Raritan River to Migratory and Residential Fish Passage

Alderson, Carl[1*], David Bean[2]

1. National Oceanic and Atmospheric Administration, 2. New Jersey Department of Environmental Protection

The Raritan River Fish Passage Initiative is a coordinated effort by federal agencies, NJDEP, NGO's and academia to plan and implement fish passage projects in the 1000 square mile watershed. Understanding the need of marine migratory diadromous species to live out critical life stages in river systems has led to six dam removals and planning for nine additional barrier removals. Now in its fifteenth year, the Initiative has leveraged funds including state and federal NRDA settlements and community-based grants and other partner contributions in support of these projects. The discussion will focus on the potential impacts and implications of a free and open Raritan River.

*carl.alderson@noaa.gov

Salinity induced changes to dynamic critical thermal maxima in Eastern oysters from Barataria Bay, Louisiana.

Beck, Taylor[1]

1. Delaware Department Natural Resources and Environmental Control - Delaware Coastal Programs

Eastern oysters (*Crassostrea virginica*) are eurytropic, evidenced by their broad latitudinal range but have optimal temperature and salinity conditions threatened by climate change and anthropogenic factors. To examine salinity's effect on thermal tolerance, I conducted a dynamic critical thermal maximum (CTmax) study on Eastern oysters from Barataria Bay, Louisiana. Mean CTmax was 40-44 C with low salinity (5 ppt) significantly lowering CTmax. Barataria Bay tends to be fresher and warmer relative to other Eastern oyster inhabited estuaries. Local adaptation and acclimation influence CTmax results, therefore including different Eastern oyster populations is necessary to anticipate the future of the species.

*taylor.beck@delaware.gov

Impacts of the Closure of Oyster Creek Nuclear Generating Station on Zooplankton Communities in Barnegat Bay, NJ

Bologna, Paul[1*], Jack Gaynor[1], Rob Meredith[1], Matthew Schuler[1]

1. Montclair State Unversity,

In the fall of 2018, the Oyster Creek Nuclear Generating Station was shut down. We monitored zooplankton community structure before and after the closure. Most taxa responded positively to the closure with some groups showing significant increases in density by 2021. For gelatinous zooplankton, lift net sampling demonstrated an increase in density of the two major gelatinous zooplankton in the bay, the comb jelly Mnemiopsis leidyi and the scyphozoan, Chrysaora chesapeakei. Despite the increase in these predators, significant increases in fish eggs, calanoid copepods, and Menidia menidia occurred and demonstrate a relatively rapid recovery for some taxa.

*bolognap@montclair.edu

Using Innovative Partnerships to Advance Coastal Resilience Efforts Along the Raritan Bayshore of NJ

Comi, Meredith[1*]

1. NY/ NJ Baykeeper

The challenges and opportunities of coastal restoration in an urban estuary are many, but through innovative and interdisciplinary partnerships and sound science NY/ NJ Baykeeper is advancing work along the NJ Raritan Bayshore. Projects located at Naval Weapons Station Earle are a leading example for how DoD and regional communities can implement nature-based solutions to blend resilience and ecological restoration objectives. An interdisciplinary approach to projects allows more robust data collection, resulting in more successful and better-informed projects. To take advantage of funding for coastal resilience projects, coordination from the local level through the national level will be a must.

*meredith@nynjbaykeeper.org

ChatGPT Wrote This Abstract About Integrating AI Into Research on Climate Change Effects on Estuaries and Coasts

Fertig, Ben*, ChatGPT

The integration of artificial intelligence (AI) into scientific research has the potential to revolutionize our understanding of climate change impacts on estuaries and coasts, including the Chesapeake Bay. AI tools like ChatGPT can process and analyze vast amounts of data, helping researchers identify patterns and relationships that would be difficult to discern through traditional analysis methods. Furthermore, AI can aid in predicting future climate scenarios and projecting the potential impacts on estuaries and coasts. This technology also enables researchers to develop more accurate models and predictions, allowing policymakers and stakeholders to make informed decisions. As AI continues to evolve, it holds immense promise for advancing our understanding of the complex and multifaceted impacts of climate change on estuaries and coasts.

*benfertig@gmail.com

eDNA Diet Analysis of Harbor Seals in Southern New Jersey

Fielding, Megan[1*], Jacalyn Toth[1], Tara Luke[1], Mark Sullivan[1], David Ambrose[1]

1. Stockton University

Plans for installation of a 1,100 MW offshore wind farm are underway in southern New Jersey (Orsted Ocean Wind 1). Beginning Fall 2021, harbor seal (*Phoca vitulina*) scat samples were collected from a haul-out site within nearby Great Bay to examine variability in harbor seal food habits as the wind project proceeds with construction, installation, and operation. Analysis includes determination of fish prey using 1) DNA from scat and 2) the identification of recovered prey otoliths. From 33 collected scats, 289 otoliths have been identified to Family level, while DNA extraction/amplification is in progress.

Masters Student

*megan.fielding@stockton.edu

Possible vertical and lateral impacts of NJ offshore wind farms on migratory birds

Fuchs, Elizabeth[1*]

1. Rowan University

This research addresses possible impacts of NJ offshore wind farms, including lateral translation of traditional flyways of migratory birds, vertical turbulence impacts, and bird strikes. First, flyway records were reviewed from the National Audubon Society. Second, migratory species data was collected from Bird Cast. Finally, we relate with European research, anticipating possible interactions between birds and turbines. European data shows birds choose to avoid turbines, going around or over them, imposing extra flight costs. The 2022 State of the Birds Report shows NJ birds face multiple pressures. This research seeks to assess pressures on migration from offshore wind farms.

Undergraduate Student

*fuchse25@students.rowan.edu

Predicting Water Temperature Using Reference Data Within a Given Watershed

Garrabrant, Dylan[1*], Ernie Atkinson[2]

1. Stockton Univeristy, 2. Maine Department of Marine Resources

Water temperature is a critical factor when evaluating rearing habitat for Juvenile Atlantic Salmon. In 2021-2022, 33 temperature loggers were placed throughout the Downeast Salmon Habitat Restoration Unit in coastal Downeast, Maine. Given the challenge of balancing personnel resources with the need for meaningful data, sites were compared for relatability using simple linear modeling. All but three relationships were predictable ($p<0.05$, r-squared<0.8). This statistical model will allow us to place fewer loggers or place them in new locations to further refine the model to improve its efficiency. This allows personnel to collect valuable data in a shorter time frame.

Undergraduate Student

*garrabrd@go.stockton.edu

Restoring Ecologically Beneficial and Resilient Infrastructure at the Mouth of the Maurice River

Godshall, Shane[1*]

1. American Littoral Society

The American Littoral Society and its partners are working to protect the inlet of the Maurice River using living shoreline methods. Erosion throughout the river mouth has made it unsafe and ecologically damaged while impeding economic growth. Our project provides improved resilience and ecological value to the mouth of the Maurice River by protecting the marsh vulnerable to erosion while creating new intertidal habitat. By employing a combination of hybrid breakwaters and oyster reef/ribbed mussel beds along with salt marsh restoration, this project will achieve storm protection of fragile and rapidly eroding shorelines that shelter the port and surrounding communities.

*shane@littoralsociety.org

Is there a lesser of two evils? Castrating parasites of an estuarine crab host along a salinity gradient

Greenberg, Sarah[1*], Amy Fowler[1]

1. George Mason University

Estuarine organisms can utilize salinity extremes to evade threats such as parasitic infection but with the cost of osmotic stress. We examined whether a salinity refuge for a Chesapeake Bay mud crab host (*Rhithropanopeus harrisii* - Rh) exists against two castrating parasites, the rhizocephalan barnacle *Loxothylacus panopaei* (Lp) and newfound isopods of *Cancrion* sp. The degree of *Cancrion*'s castration is unknown. This refuge was theorized from Lp's intolerance to salinities <10ppt, but *Cancrion* exists in these regions. Preliminary data suggests higher Lp prevalence >10ppt and higher *Cancrion* prevalence <10ppt, and both infections result in individual and reproductive stress to Rh.

Masters Student

*sarah.greenberg56@gmail.com

Assessing salt marsh health through soil and pore water chemistry

Hate, Kriish[1*], Brittany Wilburn[2], Metthea Yepsen[2], Kirk Raper[2], Charles Schutte[1]

1. Rowan University, 2. New Jersey Department of Environmental Protection

Salt marshes are invaluable to coastal communities due to ecosystem services they provide, such as shoreline protection and water filtration. New Jersey salt marshes are threatened by sea-level rise, highlighting the need for preservation and restoration. However, restoration is expensive and should be targeted to areas with the greatest need, which is difficult to assess. Here, we report initial findings from a project to develop new methods for salt marsh health assessment using drone-based multispectral imaging and on-the-ground measurements. We show that soil and porewater chemistry vary between plant species and between plots qualitatively grouped into healthy and unhealthy categories.

Undergraduate Student

*hatekr12@students.rowan.edu

Recovery of salt marsh soil nitrogen cycling process rates following thin layer placement of dredged material

Hatter, Amber[1*], Metthea Yepsen[2], Veronica Lucchese[2], Charles Schutte[1]

1. Rowan University, 2. New Jersey Department of Environmental Protection

Thin layer placement of dredged sediment is a restoration practice that artificially increases salt marsh elevation to prevent marsh loss due to ongoing sea-level rise. However, thin layer placement is also a substantial disturbance of the ecosystem, and it is an open question how quickly ecosystem services like nitrogen removal recover. We measured net potential nitrogen cycling process rates (denitrification, nitrification, and ammonification) at 3 salt marsh sites ~6 years following thin layer placement. We found that net potential denitrification rates were much higher in reference sites than in unvegetated placement sites, but not significantly different from revegetated placement sites.

Undergraduate Student

*hatter67@students.rowan.edu

Partnership for the Delaware Estuary Philadelphia Shell Recycling Program: A Year in Review

Klinkam, Jessica[1*], Sarah Bouboulis[1], Danielle Kreeger[1]

1. Partnership for the Delaware Estuary

The eastern oyster, Crassostea virginica, is a commercially and ecologically important species in Delaware Bay. The removal of oyster shell contributes to a negative "shell budget" in Delaware Bay. Dwindling available shell directly affects oyster stocks as recruitment depends on shell availability. In areas that are amenable to oyster colonization, recycled shell is quickly colonized, leading to formation of resilient reef structures that filter water and provide wave attenuation, among other benefits. Since 2016, the Delaware Estuary Shell Recycling Program (DESRP) has been alleviating this negative "shell budget" by recycling shell from area restaurants. The program has recently expanded to Philadelphia. Program. Progress, and future directions will be presented.

*jklinkam@delawareestuary.org

The effect of hypoxia on the soniferous fishes and the estuarine soundscape in Pamlico Sound, Pamlico River, and Neuse River estuaries

Luczkovich, Joseph[1*], Mark W. Sprague[2], Hans Paerl[3]

1. East Carolina University, 2. Department of Physics, East Carolina University, 3. Institute of Marine Science, University of North Carolina

Red drum Sciaenops ocellatus (*Sciaenidae*), use sounds to communicate while mating at night in turbid estuarine waters, which are critical spawning habitats. But, low oxygen (hypoxia) regularly occurs in the Pamlico Sound when they spawn, limiting the spawning habitat with a risk of recruitment failure. Therefore, we used passive acoustic recording and water quality monitoring programs to map the hypoxic conditions and simultaneously monitor the soundscape. We saw a dramatic decline in the power spectral bands associated with red drum mating sounds during hypoxic events. Hypoxia is limiting the critical spawning habitat of the Sciaenidae fishes like the red drum.

*luczkovichj@ecu.edu

Spatial and temporal patters of the prohibited Atlantic Angel shark, *Squatina dumeril* within the Mid-Atlantic Bight

Maguire, Jessica[1*], Keith J. Dunton[1],Gregory Hinks[2], Stacy M.VanMorter[2], Linda Barry[2]

1. Monmouth University, 2. New Jersey Department of Environmental Protection

Globally, Angel sharks (*Squatina* spp.), are one of the most threatened genus of sharks with more than half of the 22 extant species current classified as Threatened on the IUCN red list. Within the US, Atlantic angel sharks (*Squatina dumeril*) are federally prohibited from being harvested, but are classified as "data deficient", which prohibits proper evaluation due to lack of information. The purpose of this study was to assess spatial and temporal distribution of Atlantic angel sharks within the Mid-Atlantic Bight through a long-term coast wide bottom trawl surveys, as well as gain insight on behavior through acoustic telemetry.

Undergraduate Student

*s1302928@monmouth.edu

Restoring the New Jersey Meadowlands - Understanding the Role of Sawmill Creek's Tidal Wetlands in Minimizing Climate Change Vulnerability

McQuade, Drew[1*], Teresa Doss[1]

1. Meadowlands Research and Restoration Institute

Sawmill Creek is a vital brackish marsh resource to both the New Jersey Meadowlands and the surrounding Harbor Estuary. Sawmill has undergone significant ecological change due to climate change, resulting in the loss of hundreds of acres of vegetated marsh. Current data indicates that Sawmill's remaining marshes are effective carbon sinks, but how much potential could there be for carbon storage if the marshes were restored? The Meadowlands Research & Restoration Institute is working under an EPA-funded study to answer these questions and gather the information needed to determine the possibility of restoring the marsh to its former functionality amid climate change.

*dmcquade@njsea.com

Descriptive Ecology of Turtle Assemblages in Suburban Coastal Lakes

Meehan, Christopher[1*], Richard Robinson[1], Adriana Simancas[1], Sean C. Sterrett[1]

1. Monmouth University

The coastal lakes of New Jersey are artificial wetlands which were historically connected to estuarine habitat. We studied freshwater turtle assemblages in 8 coastal lakes using rapid survey methods and intensive capture mark recapture in Lake Takanassee. We detected four common turtle species, but not all were present in every lake. Several lakes were dominated by non-native red-eared sliders (*Trachemys scripta elegans*), which pose a threat to the persistence of native turtle species due to competition. Our study highlights the need for explicit wildlife management strategies in coastal lakes to protect habitats and promote the survival of native species.

Undergraduate Student

*s1297901@monmouth.edu

10 Years After Superstorm Sandy: The Evolution of Ecological Habitat Restoration in New Jersey

Modjeski, Alek[1*]

1. American Littoral Society

This presentation, given by Capt. Alek Modjeski of the American Littoral Society, provides a dynamic overview of littoral estuarine habitat restoration since Superstorm Sandy emphasizing the importance of community engagement and involvement/evolution of the restoration process. The presentation will discuss the importance of public/private partnerships, and includes a number of case studies of projects conducted throughout the New Jersey coastal area focusing on the application of living shoreline restoration practices. Project goals extend beyond just repairing impacted subtidal, intertidal, and coastal/riparian habitats, to include integration of elements that increase the ecosystem's resilience to future impairments while expanding ecosystem services and functions. A unique feature of the case studies presented in this lecture is the extensive involvement of a workforce consisting of military veterans and volunteers.

*alek@littoralsociety.org

Is Macroinvertebrate Settlement Preference Driven by Predatory Polychaete Presence or Algal Species in Salt Marshes?

Mott, Alexander[1*], April Blakeslee[2], Stacy Krueger-Hadfield[3], Amy Fowler[1]

1. George Mason University, 2. East Carolina University, 3. University of Alabama at Birmingham

The establishment of a non-native organism can have dramatic consequences for native biodiversity, though this is not always straightforward. The predatory marine worm *Diopatra cuprea* anchors shells, algae, and plant matter to its tube in Mid-Atlantic salt marshes. This anchoring behavior has assisted the persistence and spread of the red alga *Gracilaria vermiculophylla* in soft-sediment habitats. In our ongoing studies, we examine invertebrate communities which settle on algae in the field and test invertebrate settlement preference in the laboratory. Preliminary analysis suggests higher macroinvertebrate richness and diversity on algae not associated with *D. cuprea*, though this varies by site.

PhD Student

*amott3@gmu.edu

Increased Utilization of Storm Surge Barriers: A Research Agenda on Estuary Impacts

Orton, Philip[1*], David Ralston[2], David Secor[3], Neil Ganju[4], Sarah Fernald[5]

1. Stevens Institute of Technology, 2. Woods Hole Oceanographic Institution, 3. University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, 4. U.S. Geological Survey, 5. Hudson River National Estuary Research Reserve, New York State Department of Environmental Conservation

Rising coastal flood risk and recent disasters are driving interest in the construction of gated storm surge barriers worldwide. Surge barriers partially block estuary-ocean exchange with infrastructure across an estuary or its inlet and include gated areas that are closed only during flood events. They can alter the stratification and salt intrusion, change sedimentary systems, and curtail animal migration and ecosystem connectivity, with impacts growing larger with increases in gate closure duration or frequency, both of which can occur due to sea level rise. Here, we review existing knowledge and present an interdisciplinary research agenda on surge barrier estuary effects.

*porton@stevens.edu

Investigating Interactions Between Shellfish and Seagrass Beds to Promote Sustainable Aquaculture in the Delaware Inland Bays

Ozbay, Gulnihal[1*], Tahera Attarwala[1], Ali Parsaeimehr[1]

1. Delaware State University

Seagrass is an important keystone species in the Delaware Inland Bays. Seagrass helps to maintain populations of fish and invertebrate species by providing permanent habitat, feeding areas for various life stages, nursery areas for successful development of juveniles, and protection from predators (Jackson et al. 2001). Seagrass also plays a fundamental role in mitigating climate change through its potential for carbon sequestration and mitigation of ocean acidification (Ramesh et al. 2019). Due to its high importance in coastal environments, understanding the interactions between shellfish and seagrass productivity can be a determinant of aquatic environment health and can promote sustainable aquaculture. An in-depth literature review was conducted to identify the interactions between shellfish and seagrass beds and macroalgae and to determine the impact these two factors have on aquaculture practices. As a complementary method, underwater cameras were deployed during the months of June to October for real-time monitoring of oyster reefs and aquaculture sites to get a visualization of vegetation and species diversity at oyster locations. Through these combined efforts, it was identified that seagrass has a beneficial impact on oyster productivity and can help promote sustainable aquaculture. Based on the assessment, seagrass does seem to be more present at small oyster reefs and shellfish aquaculture farms.

*gozbay@desu.edu

Does invasion history of parasitic castrators influence low salinity tolerance in an estuarine host

Pochtar, Darby[1*], Gregory M. Ruiz[2], Carolyn K. Tepolt[3], April M. H. Blakeslee[4], Amy E. Fowler[1]

1. George Mason University, 2. Marine Invasions Research Laboratory, Smithsonian Environmental Research Center, 3. Department of Biology, Woods Hole Oceanographic Institution, 4. Biology Department, East Carolina University

The length of coexistence between hosts and parasites may influence the host's ability to use environmental refuges to escape parasitism. We examined the low salinity tolerance of a crab host (*Rhithropanopeus harrisii* - Rh) that differ in invasion history with a barnacle parasite (*Loxothylacus panopaei* - Lp). Despite low salinity being stressful to Rh, it may act as an environmental refuge against Lp infection. Therefore, Rh low salinity tolerance may be related to the length of Lp's invasion history. Rh low salinity tolerance declined with length of coexistence with Lp, where populations with no coexistence had the best low salinity tolerance.

PhD Student

*dpochtar@gmu.edu

Farming Conservation and Mitigation

Reilly, Francis (Frank)[1*]

1. Logistics Management Institute, LLC

The use of in lieu fees, conservation and mitigation banking, and nutrient trading can generate enough revenue to be considered a viable "crop" for a farming venture. Many regulations do not allow credit stacking but allowing the additive revenue of multiple conservation and mitigation and trading practices can allow establishment of a farm and ongoing revenue for an owner that rivals or surpasses the financial gain from traditional agriculture such as commodity crops farming. Allowing stacking as a practice can preserve green space, establish a credit structure that ensures availability of conservation and mitigation and enhances overall habitat values.

*freilly@lmi.org

Restoring Wreck Pond Inlet

Royle, Zack[1*]

1. American Littoral Society

Wreck Pond is a 73-acre tidally influenced coastal pond located in Monmouth County, NJ. In 2016, the American Littoral Society (Society) helped build a 600-foot-long culvert connecting Wreck Pond to the Atlantic Ocean. The goals of the culvert were to improve fish passage, reduce flooding, and improve water quality. From 2014 to 2022, the Society monitored river herring presence and movement using fyke and seine surveys and passive integrated transponder (PIT) tags. Changes in tidal extent and water quality were also investigated. In this presentation, I will provide an overview of the project, highlight monitoring results, and discuss lessons learned.

*zack@littoralsociety.org

Further Parameterization of a Coral Reef Food Web Model for Ciguatoxin Bioaccumulation using Fisheries Landings on the Island of Puerto Rico

Salib, Paul[1*], Joseph Luczkovich[1]

1. East Carolina University

Ciguatoxin is a neurotoxic compound produced by the dinoflagellate genera *Gambierdiscus* and *Fukuyoa*. The chemical compound is responsible for the most widely reported food-borne illness in the world; known as Ciguatera Fish Poisoning (CFP). Annually, it affects between 10,000 - 50,000 people who either reside in or visit tropical or subtropical regions. Dinoflagellates that biosynthesize the toxin often inhabit marine algae beds. Omnivorous and herbivorous fish inadvertently consume the dinoflagellates, which are then consumed by predatory fish, thus leading to the bioaccumulation of ciguatoxin in the fish's tissues. Humans that eat fish tissues that have accumulated ciguatoxin may experience nausea, vomiting, diarrhea, headaches, metallic taste of food, tingling in the oral region, the sensation of loose teeth, numbness in extremities, pruritis, paresthesia, and potentially even die. The problem persists on the island of Puerto Rico - with 7% of the population having reported that at least one person in their family had experienced CFP. The health costs per episode in the US is $26,610. Efficient surveillance for fish contaminated with ciguatoxin is often prohibitively expensive due to the nature of the neurotoxin - being that is colorless, tasteless, has no smell, and is not visible to the naked eye. Current prevention methods are largely carried out on an individual scale and consist of ineffective and restrictive methods like total avoidance of certain species or sizes of fish. Thus, it is crucial to work to develop better and more inexpensive prevention methods. I propose using fisheries landings data from the island to further parameterize an already validated predictive coral reef food web model built in Ecopath.

Masters Student

*pjsalib7@gmail.com

Artificial reef studies in New Jersey

Straub, Peter[1*], Steven Evert[1], Mark Sullivan[1], Tara Luke[1], Adam Aguiar[1]

1. Stockton University

This study documents the deployment and colonization of artificial reef materials over two seasons (2021/2022). In January 2021, several vessels were deployed to the Little Egg Reef by the NJDEP Artificial Reef Program. The site was initially mapped by side scan sonar. A Multibeam echosounder (MBES) was then used to construct a 3-D site model. Utilization data were collected by video with a remotely operated vehicle. Water quality data was logged with an EXO (YSI) sonde. The site was colonized within 4 months of deployment with a rich cover of attached and mobile fauna.

*peter.straub@stockton.edu

Delaware Bay Habitat Restoration Project Monitoring

Tablante, Toni Rose[1]

1. American Littoral Society

The American Littoral Society has restored beaches in New Jersey for the past ten years to create ideal horseshoe crab spawning and shorebird foraging habitat. Our team conducts several research and monitoring studies designed to track population recovery metrics in response to our habitat restoration and conservation actions. These efforts include horseshoe crab, shorebird, fish, reef, and physical studies.

*tonirose@littoralsociety.org

Assessing the relationship between Striped Bass *Morone saxatilis* and urbanization along the Hudson River

Treshock, James[1*], Emily McGuckin[2], Liza Baskin[1]

1. Marine Academy of Science and Technology, 2. American Littoral Society

Striped Bass, *Morone saxatalis* are anadromous fish that are ecologically and economically important with complex migratory patterns, such as NY Bay/Hudson River area. To determine the relationship between urbanization and fish number/size American Littoral Society fish tagging data was analyzed along with USCensus data. Initial findings indicate a weak negative correlation ($r= 0.638$. $p<0.05$) between population density/number of tagged fish. Differences in tagged fish size were seen between locations, throughout areas, but there was no significance between size and population density. Findings may be useful when determining areas to study further, and inform policymakers.

High School Student

*jatreshock@ctemc.org

From Shell Bags to Hybrid Breakwaters: Future Strategies for Intertidal Reefs

Whitesall, Quinn[1]

1. American Littoral Society

For almost 10 years, the Littoral Society has been installing intertidal reefs in New Jersey to reduce the impact of erosion, provide habitat for benthic organisms and juvenile fish, improve water quality, and create a more resilient shoreline. During this time, we have learned a lot about our reefs in these dynamic environments - what materials work best, optimal height and angle of the breakwaters, whether the shell should be seeded with spat, and shorebird and horseshoe crab interactions. Project site-specific monitoring programs evaluating similar metrics have been put into place to gauge the success of each and compare these structures across various sites in Delaware Bay and Barnegat Bay. A more robust bay-wide monitoring plan has been proposed looking through a landscape lens to better evaluate restoration as a whole and to identify future restoration needs. This presentation will focus on a few case studies in New Jersey to include shell bag reefs, HESCO units, and rock hybrid breakwaters. The case studies will include the pros and cons of each strategy, materials, alternatives to polyethylene netting, permitting, implementation, monitoring, community support, and lessons learned. As the Society moves into the next 10 years of our beach restoration endeavors, we will explore future strategies for intertidal reefs.

Masters Student

*quinn@littoralsociety.org

Abstracts - Posters

Ecological Assessment of On-bottom and Off-bottom Oyster Culture Techniques and Environmental Health

Andrade, Emily[1*]

1. Delaware State University

Oyster aquaculture returned to the Delaware Inland Bays with issued shellfish leasing areas in 2018, boosting local economies, improving water quality, and providing important habitat for fish and invertebrates. Efforts to monitor and identify relationships between cage depth, oyster condition, and water nutrient levels and the pathogenic bacteria *Vibrio coralliilyticus* and *Vibrio tubiashii* responsible for the high larval oyster mortality are vital for successful management of oyster farming and restoration in Rehoboth Bay, DE.

Masters Student

*eandrade21@students.desu.edu

Assessing Eastern Oyster (*Crassostrea virginica*) Predation Utilizing Real-Time Monitoring and eDNA Analysis in Delaware Inland Bays

Attarwala, Tahera[1*], Juan Ramos[1], Zachary Riggi[1], Ali Parsaeimehr[1], Gulnihal Ozbay[1]

1. Delaware State University

Eastern Oysters, *Crassostrea virginica*, are a keystone species that provide vital ecosystem services such as water filtration and providing habitation and food for many aquatic species. Underwater cameras were used to assess oyster predation and species diversity at five different oyster sites around Rehoboth Bay. The five sites used in this study include artificial reefs, aquaculture farms, and one control site. All documented aquatic species are identified and recorded for comparisons between sampling sites. Environmental DNA (eDNA) is also performed as a complimentary tool for species identification. This study will help to promote oyster restoration efforts in Rehoboth Bay, Delaware.

Masters Student

*tattarwala17@students.desu.edu

Eco-evolutionary changes in *Phragmites* inflorescence morphology over a decade of exposure to elevated nitrogen and CO_2

Argueta-Roman, Adelma[1*], Sean Lee[2], Melissa McCormick[3], Mike Blum[3], Thomas J Mozdzer[4]

1. Haverford College, 2. University of Connecticut, 3. Smithsonian Environmental Research Center, 4. Bryn Mawr College

It is known that global change factors can alter coastal marsh ecosystems. However, it is still undetermined whether a species' fitness varies in response to global change, and whether shifts in fitness can alter ecosystem functioning. To investigate the fitness variation in *Phragmites australis*, we measured reproductive output traits collected over a decade of exposure to factorial treatments of elevated CO_2 and nitrogen We found that exposure to N enrichment increased fitness by increasing reproductive output, with the effect strengthening over time. The effects of CO_2 were less consistent, showing considerable interannual variation. These findings provide further evidence that ecologically important plants can respond rapidly via eco- evolutionary mechanisms.

Undergraduate Student

*aarguetaro@haverford.edu

Analysis of New Jersey Migrant Fishes and Shelf-Estuary Connectivity using Acoustic Telemetry

Bates, Kiernan[1*], Thomas Grothues[1],Ryan Scully[1],Keith Dunton[2],Chase Wunder[3]

1. Rutgers University Marine Field Station, 2. Monmouth University, 3. NOAA Fisheries Research and Monitoring Division

Numerous inlets connect seasonal estuarine and coastal fish habitat in New Jersey. The relative contribution of these to residence in this region has not been quantified. Stakeholders posit that connections may be impacted by infrastructure from offshore wind farms. Fixed telemetry hydrophones monitor all estuarine inlets from Belmar to Cape May for passage of tagged fish. Mobile hydrophones on vessels, deployed traps, and submersible gliders episodically monitor coastal waters. All hydrophones have detected fish passage, including those tagged by our own program (primarily summer flounder *Paralichthys dentatus* and smooth dogfish *Mustelus canis*) and many tagged by other researchers and programs.

*kiernan.bates@marine.rutgers.edu

Coastal Lakes Observing Network (CLONet)

Conlon, Erin[1*], Thomas Herrington[1], Jason Adolf[1]

1. Monmouth University

New Jersey's coastal lakes are found directly adjacent to, and connected with, the Atlantic Ocean in urbanized watersheds. These waterbodies are valued in surrounding communities, but historically have degraded water quality. Past monitoring efforts were done on a lake-by-lake basis, with little inter-lake communication, leading to a disjointed understanding of coastal lakes overall. The Coastal Lakes Observing Network (CLONet) was created to mend this disjointed approach to lake monitoring by engaging citizen scientists in community based, participatory research. Citizen scientists can use CLONet data collected over the past three years to observe changes in water quality as restoration projects proceed.

*econlon@monmouth.edu

Assessing the impacts of sea-level rise on bird and mammal populations in Monmouth and Ocean County coastal forests

Cusano, Emma[1*], Emma Gould[1], Pedram Daneshgar[1]

1. Monmouth University

The goal of this project is to assess the differences in wildlife composition and ecosystem services between healthy coastal forests and dead ghost forests in New Jersey. This research hypothesized that there is a significant decline in wildlife biodiversity and mammal abundance in ghost forests compared to healthy forests because of climate change-induced sea level rise. It was found that wildlife presence and their use of the environment were vastly different. Bird species, such as the osprey, *Pandion haliaetus*, were observed within ghost forests where they mainly utilized dead trees as spots to perch, but no mammals were seen in this ecosystem.

Undergraduate Student

*s1258939@monmouth.edu

Classifying Subaqueous Bed Formations in a Naturally Channelized Inlet

Davis, Taylor[1*], Anna S. Pfeiffer-Herbert[1]

1. Stockton University

Classifying subaqueous bed formations in a tidal inlet comes with a unique set of challenges due to reversal of current direction and fluctuations in velocities through complex channel morphology. High resolution bathymetric data were collected in the Little Egg Inlet, a confluence of two bar-built estuaries. We will present measurements of individual 2-D bedform geometry along with observations of 3-D bed form orientation at varying locations along a tidal channel. Studying the relationship between tidal inlet bedforms and complex bathymetry can provide information on the estuary's hydrodynamics.

Undergraduate Student

*davist33@go.stockton.edu

Evaluating change in marsh condition pre and post-restoration in two National Wildlife Refuges along the Delaware Bay

Faller, Kelly[1*], LeeAnn Haaf[1],Danielle Kreeger[1],Heidi Hanlon[2]

1. Partnership for the Delaware Estuary, 2. U.S. Fish and Wildlife Service

Tidal marshes provide a suite of ecosystem services, yet many marshes along the Delaware Bayshore are degraded and susceptible to loss. In this study, we review the effects of intervention activities carried out to reduce marsh losses and enhance resilience at two National Wildlife Refuges in southern New Jersey: Cape May (Reeds Beach), which was runnelled, and Supawna Meadows, which underwent breakwater repair. Prior to intervention in 2015 and again in 2022, we performed broad-scale (watershed-wide) and site-specific surveys to ascertain marsh conditions. Vegetation density and substrate firmness were analyzed to show changes in plant community health and peat-building capacity, both across watersheds and within intervention areas. We also compared elevation, grouped by elevation zones, to understand changes along a topographical gradient within intervention areas. Finally, we determined how vegetation productivity varied over the 7-year time period to surmise whether changes in field-based metrics were related to intervention tactics or followed broader patterns of change. Broadly, Reeds Beach's substrate was significantly less firm ($n = 34$, $p<0.05$) in 2022 while aboveground vegetation was not significantly different. Within the intervention area, 3 out of the 4 elevation zones showed significantly higher elevations in 2022 ($n= 12$, $p<0.05$). Runnelling at Reeds Beach has likely increased tidal flushing, perhaps lending to elevation building through sedimentation, although plant production does not yet show signs of significant change. Supawna's aboveground vegetation was significantly denser ($n = 5$, $p<0.05$), and substrates were firmer in 2022. This is likely a result of the pervasive, highly productive, and resilient non-native species P*hragmites australis* at Supawna. This study shows the utility of using broad and site-specific surveys to determine how intervention efforts may affect marsh conditions over time, which in turn helps inform future tactic designs to ameliorate marsh loss.

*kfaller@delawareestuary.org

Exploring Restoration Strategies for Salt Flooded Maritime Forests

Gould, Emma[1*], Emma Cusano[1], Einat Shayer[1], Pedram Daneshgar[1]

1. Monmouth University

It is vital to have restoration strategies for when climate change-induced saltwater intrusion events occur. This study investigated which salt-tolerant species are best to introduce to an affected ecosystem after a salt-flooding event and after how much rainfall they should be planted. To accomplish this, a greenhouse experiment was conducted, utilizing six native species. Findings suggest species such as *Iva frutescens, Spartina alterniflora*, and *Panicum virgutum* tolerate higher soil salinities than species like *Liquidambar styraciflua* or *Juniperus virginiana*. Identifying which native species can withstand the effects of salt-flooding and thereby restore salt-affected areas most effectively will help to safeguard our shores.

Undergraduate Student

*emma.gould@comcast.net

Subtidal Oyster Reef Effects on Water Quality

Heffernan, Colleen[1*], Christine Thompson[1], Anna Pfeiffer-Herbert1

1. Stockton University

The eastern oyster, *Crassostrea virginica*, is a bivalve mollusk that can provide water quality benefits through filtration and nitrogen removal in areas affected by eutrophication. The goal of this study was to estimate the filtration rate for oysters on a restored subtidal reef by using oyster filtration equations and applying the parameters of oyster size, density and water quality parameters that affect filtration. Filtration rates showed seasonal variation with higher filtration rates in warmer summer months. This data shows that the planted oysters are filtering the water and locally improving the water quality in Barnegat Bay.

Undergraduate Student

*heffernc@go.stockton.edu

Genotypic variation in decomposition: New insights into integrating eco-evolutionary processes into carbon cycle studies.

Kaulbach, Griffin[1*], Mayci Shimon[1], Melissa K. McCormick[2], Michael J. Blum[3],Thomas J. Mozdzer[1]

1. Bryn Mawr College, 2. Smithsonian Environmental Research Center, 3. University of Tennessee, Knoxville

Salt marsh ecosystems store disproportionally more carbon than terrestrial ecosystems due in part to high rates of productivity and low decomposition rates. These ecosystems also have well documented responses to global change factors including elevated CO_2, nitrogen enrichment, and sea level rise. It is widely assumed that marshes change due to plastic responses of foundation species, but there is growing evidence that plants can rapidly evolve in response to global change and that heritable changes in plant traits can alter ecosystems. Building on evidence that exposure to elevated nitrogen and CO_2 changes genetic diversity and identity in the common reed, *Phragmites australis*, we examined whether aspects of the carbon cycle are susceptible to shifts in genetic variation. Preliminary analyses detected significant differences in decomposition rates and rates of litter respiration at both the genotype and population level, and the possibility that the effects of genotypic variation can be as important as species-level effects on carbon cycling. Our results suggest that carbon cycling is also subject to rapid evolution in response to global change.

Undergraduate Student

*gkaulbach@brynmawr.edu

Chlorophyll trends and sampling method variability in Barnegat Bay, NJ

Lapsley, Sara[1*], Christine Thompson[1]

1. Stockton University,

Chlorophyll testing is an essential part of water quality monitoring as it helps to identify the presence of phytoplankton in the water. Chlorophyll monitoring can help estimate oyster-mediated nutrient removal and indicate the food available for filter feeders. In collaboration with the NJDEP, chlorophyll data was collected at four different sites in Southern Barnegat Bay using three different methods. By comparing chlorophyll levels from in-situ, YSI fluorometer, and aircraft surveys, variation between methods can be identified and used to improve future sample collection. Comparing data will also show chlorophyll variation between June and October 2022 at each site.

Masters Student

*lapsleys@go.stockton.edu

Effects of the Deal Lake outlow on a nearby swimming beach

Mauro, Marie[1*], Jason Adolf[1]

1. Monmouth University

Deal Lake is a polluted coastal lake located in Monmouth County, NJ that directly drains into a nearby swimming beach. Deal Lake has been observed to harbor Enterococcus bacteria and cyanobacteria that creates potentially toxic harmful algal blooms (HABs). The goal of this research was to gather samples from different sites of Deal Lake and Loch Arbour Beach in the outflow location to test if there is a presence of Enterococcus and / or HABs in the swimming areas. Results to date indicate that the water conditions of Deal Lake have an influence on the water conditions of Loch Arbour Beach.

Undergraduate Student

*s1300214@monmouth.edu

E3: eDNA, Estuaries and End Users: Standardized eDNA sampling to support resource management in the National Estuarine Research Reserves

McHugh, Patty[1*]

1. Jacques Couseau NEER and Rutgers University

We are conducting a collaborative eDNA (environmental DNA) monitoring program at ten estuaries in the National Estuarine Research Reserve System (NERRS) to directly address needs identified by local resource managers. The NERRS is a network of 30 coastal systems with a mission to conduct both research and outreach. Supported by NOAA and local agencies, they are closely connected to local resource managers. Water samples are collected quarterly at 5 locations within each reserve. DNA extracted from the samples are analyzed to detect fish species, as well as a range of marine plankton, birds and other species of interest. Reserve staff at each site collect water samples, interpret results, and work with their local end users to determine how/if the eDNA information is useful. We are working together to refine protocols to collect, analyze, and present eDNA data that are practical, streamlined, but effective. Questions include: What aquatic species can we detect? How does eDNA-based monitoring compare to traditional fish surveys? What is the relative cost of these methods? In the first quarter, 290 samples yielded positive tests for 181 species. Detected species are compared to NERR staff survey results to determine which species are missing, and help identify optimal target primers. Initial sample efficacy varied with between 0-43 fish species detected per sample. Zero results are probably due to systematic issues related to substrate binding in mesohaline saltmarshes, inhibition from organic compounds, and off target analyses. Additional sample cleanup and analyses are expected to improve these results.

*pttmchugh@marine.rutgers.edu

Potential influence of tidal currents in Little Egg Inlet, New Jersey on the formation of a new ebb tidal delta island

Nanni, Jessica[1*], Craig Baronowitz[1], Anna Pfeiffer-Herbert[1]

1. Stockton University

Tidal currents in an inlet determine rates of sediment resuspension, transport, and deposition. Over the past several years, sand has been collecting offshore of the Little Egg Inlet, New Jersey, forming a subaerial swash bar called Horseshoe Island. We examined acoustic Doppler current profiler data from the inlet to determine the likelihood of sediment transport toward the island. Studies like this that help to identify the dynamics of sediment deposition could contribute to identifying risk areas for navigation around ebb tidal deltas.

Undergraduate Student

*nannij@go.stockton.edu

Multiplex SYBR green real-time PCR for detection of *Vibrio* species in *Crassostrea virginica*

Parsaeimehr, Ali[1*], Gulnihal Ozbay[1]

1. Delaware State University

A multiplex real-time PCR assay was used for rapid detection of *Vibrio parahaemolyticus*, *Vibrio vulnificus*, *Vibrio coralliilyticus*, and *Vibrio tubiashii* in *Crassostrea virginica*. In this regard, a set of primers were searched against the NCBI database platform for specificity confirmation of the selected primers, and the specificity of the primers was confirmed using a conventional PCR. At the next step, a SYBER Green based real-time PCR has been optimized to detect the pathogenicity genes of the studied *Vibrio* species at low level of bacterial population (10 2 CFU). The assay was examined based on linearity and limitation in bacterial detection using a series of bacterial dilution. Finally, the validation of the test was examined using samples from the *Crassostrea virginica* tissues and *Callinectes sapidus* hemolymph. The high sensitivity of this multiplex real-time PCR assay makes it suitable for detection of low copies of tlh, vvh, and dnaJ in *Vibrio* spp.

*aparsaeimehr@desu.edu

Side scan sonar evaluation of pelagic fish distribution around a proposed continental shelf sand borrow site

Pescatore, Scott[1*], Thomas Grothues[1], Stephen Potts[1]

1. Rutgers University Marine Field Station,

We examined a submerged shoreface sand ridge for fish habitat use by trawl, hydrographic, bathymetric and surficial feature mapping. Side scan sonar (900 kHz) revealed the distribution of abundant fish schools and large individuals over a 30 km survey path. Schooling individuals were of two size modes, one corresponding to adult Atlantic menhaden. Distribution was non-random, with more and larger schools present over the inshore trough side, and secondly on the deepest offshore extent of the survey area. This pelagic fish distribution corresponded with the pattern in richness and abundance of benthic fish, crabs, and nekton as sampled by trawl.

*scottdpescatore@gmail.com

Benthic invertebrate community response to power plant cooling water discharge closure

Piper, Sophia[1*], Rosemarie Petrecca[1], Charlotte Fuller[1], Thomas Grothues[1], Gary Taghon (posthumous)[1]

1. Rutgers University Marine Field Station

Closure of the Oyster Creek Nuclear Generating Station in 2018 decreased a 1.5 B gal/day warm water (10°C above ambient) discharge into Barnegat Bay by 95%. A Before-After-Gradient design used Principal Components Analysis site scores from grab samples of benthic invertebrates as proxies y of community response. Overall beta diversity overturn was weak based on the distribution of numerous common species, but a generalized linear mixed model including fixed factors Before/After and Distance, their interaction, and blocked random categorical variables Years, revealed a response to distance in the first principal mode and all factors in the 3rd principal mode.

PhD Student

*sp2272@hsrl.rutgers.edu

Population Characteristics Assessment and Virus Identification of Blue Crabs (*Callinectes sapidus*) using PCR analysis on Delaware Inland Bays

Ramos, Juan[1*], Tahera Attarwala[1], Robert Turner[1], Ali Parsaeimehr[1], Gulnihal Ozbay[1]

1. Delaware State University

The objective of this study targets population characteristics and a pathogenic microbiological standpoint for testing the presence of a deadly virus called *Callinectes sapidus* Reovirus 1 (CsRV1) within the waters of Delaware inland bays of the blue crabs (*Callinectes sapidus*), in Delaware waters. Specifically, around the Indian River Inlet Marina. The Project will be conducted by deploying 18 traps in 6 study sites. (Sally's Cove1, Sally's Cove Controlled2, Camp arrowhead3, Rehoboth Bay Oyster Company4, Big Bacon Reef5 and Redefer Controlled6). While each study site have 3 cages. This includes 2 large commercial cages per study site and 1 small lobster pot per study site, overall, 18 traps. Census data is retrieved twice a month (every 2 weeks), traps are deployed and left out for roughly 24-36 hours. Additionally, water quality parameters are also gathered using a YSI 556 in the field. While also collecting 500mL water samples (3 per site) for further in lab analysis using a YSI 9500 Photometer for other parameters. As a complementary step, we will use molecular biology approach for monitoring the biodiversity of the prey of *C. sapidus* using Environmental DNA (eDNA).

Masters Student

*jramos20@students.desu.edu

Salt Marsh Ponds as Harmful Algae Reservoirs

Ren, Ling[1*], Mihaela Enache[2], Douglas Hood[3], Thomas M. Grothues[3]

1. George Mason University, 2. New Jersey Department of Environmental Protection, 3. Rutgers University Marine Field Station

NJ coastal salt marsh ponds (SMPs) provide unique microhabitats for diverse aquatic organisms including algae and fish, and year-round food supplies for birds. We hypothesize that the tidal SMPs can serve as inoculum for HAB species and potentially function as HABs reservoirs for NJ wetland and coastal waters. Monthly samples have been collected from six SMPs on Tuckerton Peninsula since May 2022. Microscopic analysis showed that summer and fall phytoplankton comprised some highly abundant and dominant HAB species, including dinoflagellates, raphidophyte *Chattonella subsalsa*, and cyanobacteria *Planktothrix agardhii*, accounting for as high as 95% of algal abundance in some SMPs.

*lren2@gmu.edu

Fish and crab assemblage in an urban shallow water habitat enhancement area as sampled by traps

Rosen, Miranda[1*], Thomas Grothues[1], Kiernan Bates[1], Lesley Baggett[2]

1. Rutgers University Marine Field Station, 2. AKRF Inc.

Enhancement in Hudson River Park Trust waters seeks to renew nursey function to historically altered habitat through the placement of ecological analogues of oyster reefs. Fish and crab response as measured by trapping will be assessed over 5 years in a Before-After-Control-Impact design. In the first year, 529 fish and crabs were collected over 12 weekly summer trap recoveries. *Centropristis striata, Opsanus tau, Callinectes sapidus*, and *Libinia* spp were the most abundant species, while 13 of 21 taxa were represented by only three or fewer individuals. Catch was similar in control and enhancement areas, but enhancements features continue to mature.

*mr1451@marine.rutgers.edu

Impact of global change factors on phenotypic traits and the eco-evolutionary implications

Smeltzer, Julia[1*]

1. Bryn Mawr College

Salt marshes are incredibly important ecosystems that provide a variety of ecosystem functions. Global change factors, specifically elevated CO_2 and nitrogen enrichment, have the potential to greatly affect salt marshes by impacting plant phenotypic traits and putting selective pressures on plants. Phragmites australis is a common reed that has invaded salt marshes all over the US. Phragmites is an ecosystem engineer that has been known to take advantage of elevated CO_2, nitrogen enrichment, and the combination of the two. This project investigates the impact of global change factors on phenotypic traits of *Phragmites* and the eco-evolutionary implications.

Undergraduate Student

*jsmeltzer@haverford.edu

Analyzing Seasonal Changes of Primary Productivity in the St. Mary's River via Light-Dark Bottle Incubations

Smith, Megan[1*]

1. St. Mary's College of Maryland

Primary production is an important indicator of eutrophication in estuaries. I measured primary production in the St. Mary's River via light-dark bottle incubations to assess the system's trophic status in relation to previous measurements collected throughout Chesapeake Bay. Primary production was greatest in late spring into early summer and lowest in winter. My estimated annual rate was comparable to or greater than those reported for other mesohaline regions of the Bay, suggesting that the river is highly eutrophic. Monitoring should continue as increases in the rate of organic matter in the system fluctuate due to natural and anthropogenic drivers.

Undergraduate Student

*mesmith4@smcm.edu

Investigation of flood vulnerability in southern New Jersey

Watson, Grace[1*], Jeong Eun Ahn[1]

1. Rowan University

Part of the Mid-Atlantic region, southern New Jersey, faces an increase of flooding events due to climate change. Communities along the coasts are at a heightened risk due to their exposure to flooding, storm surge from hurricanes, and sea-level rise and social vulnerability. Transportation network resilience for evacuation and emergency response is important to consider in connection to flooding vulnerability. Through the investigation of a factor-based flood vulnerability index for southern New Jersey that encompasses exposure, socio-economic susceptibility, and transportation resilience, the vulnerable areas were highlighted and displayed to help increase resilience studies for the state.

PhD Student

*watsong0@students.rowan.edu

Developing a continuous water quality program for St Mary's College waterfront

Wisner, Kira[1*]

1. St. Mary's College of Maryland

Nutrient inputs increase primary productivity and, therefore, eutrophication in estuaries like Chesapeake Bay. To assess the trophic status of the St. Mary's River, a small tributary of the Potomac River, I measured dissolved oxygen concentrations using a HOBO data logger and calculated metabolic rates using the open water method. Primary production was comparable to other nearby highly eutrophic tidal rivers and much greater than values reported for other estuaries, suggesting that despite signs of recovery in other regions of the Bay, the St. Mary's is still heavily degraded. Continued monitoring will be important for assessing future responses to nutrient management.

Undergraduate Student

*kmwisner@smcm.edu