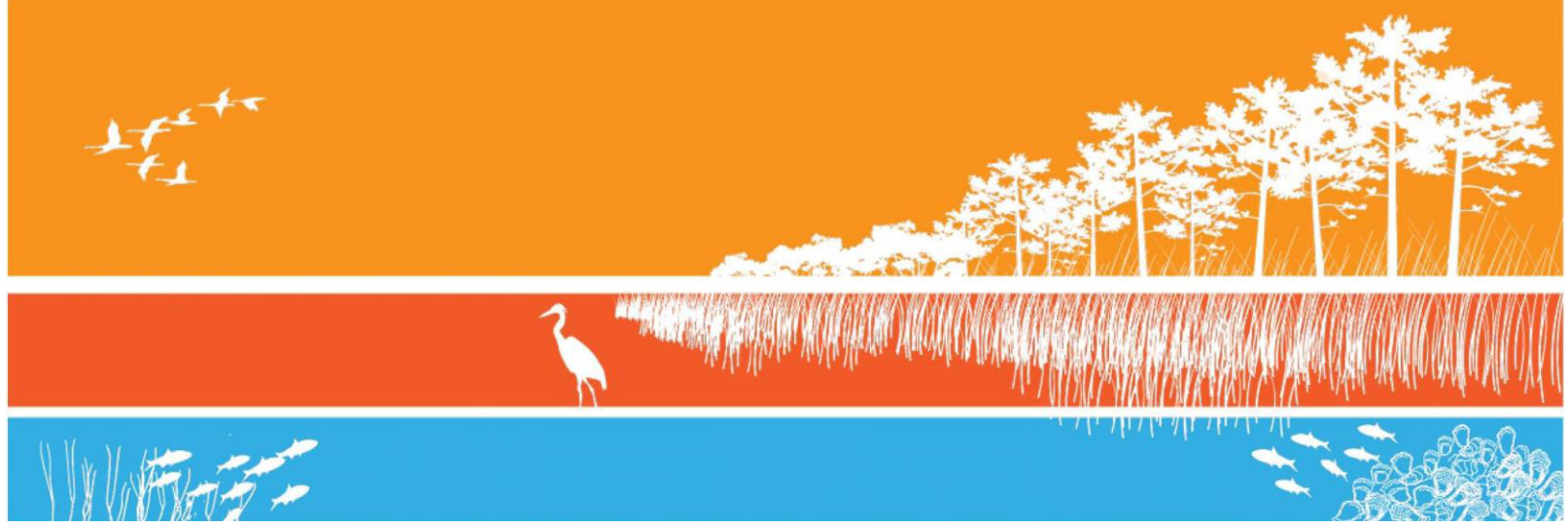
Atlantic Estuarine Research Society

AERS

Est. 1948



Tides of Change: Advancing Environmental Justice

March 21-23, 2024

Virginia Institute of Marine Science, Gloucester Point, VA

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* indicates chair

President's Remarks

Dear fellow AERSians,

Welcome to the Virginia Institute of Marine Science! I am thrilled that my last meeting as President is being held at my home institution. AERS and VIMS have a long standing history; many founding members called VIMS (then the Virginia Fisheries Laboratory) home and several of our earliest meetings were held here as well. Though VIMS did host AERS in 2013, the meeting itself was held in Colonial Williamsburg. The last time we were actually on the VIMS campus was in spring of 1999, exactly 25 years go. For that meeting, the late Iris Anderson was our local host and Linda Blum, current CERF President, was AERS President. I know many of you attending today were at that meeting as well and I hope you will enjoy seeing the familiar sites around campus, as well as the ways we have continued to improve and grow. Though we will be celebrating our history a bit at this meeting, we primarily want to focus on the future and how AERS scientists will continue to have great impacts on estuarine research. With that in mind, the theme for this meeting is **Tides of Change: Advancing Environmental Justice.** Our three keynote panelists, **Erica Holloman-Hill, Molly Mitchell** and **Adrian Wood** each offer unique perspectives on the intricate landscape of environmental justice. I hope you enjoy their blend of science and storytelling and have a chance to interact with them during the panel discussion and breaks.

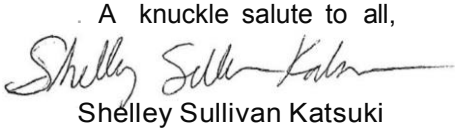
Of course, we do have to have some reflection on our past at an anniversary meeting. **Linda Blum** will provide a retrospective on AERS history during her plenary session Friday after lunch. I know there will be many great photos and stories there! In addition, be sure to check out the "150 meetings" posters during the breaks. If you count CERF meetings (which I am, considering we helped to found it), this marks the 150th AERS meeting. Make your mark on history by filling out how many meetings you have attended and sign your name in the corresponding color to our poster. It doesn't matter if this is your first meeting or your 50th, we want everyone to participate.

There are a few new things at this AERS meeting. The first is that we held an art contest, hosted by our **JEDI committee,** with the theme of "What does diversity mean to you". Be on the lookout for these works of art as well as winner announcements during the business meeting. We also are partnering with the **VIMS Dive In committee** to host a lunchtime inclusivity and allyship training, so be sure to check that out after you grab your food.

Lastly, I want to take a moment to acknowledge and thank several people who have helped to make this meeting possible. Our local hosts **Mark Brush, Amber Hardison** and **Sara Blachman** have been working tirelessly behind the scenes for months to ensure that this is a successful and fun event for all. **Anthony Himes** and **Treda Grayson** as our program committee compile, select, edit, and constantly rework the schedule to accommodate as many talks as possible. This time around we had a record number of student presentation requests and they worked especially hard to ensure we were able to accept them all. Due to that high number of student presentations, I also want to thank **Charles Schutte** as student endowment chair. He has been recruiting judges and will spend most of this meeting compiling the scores to select best student presentation winners, which will be announced at the end of the meeting Saturday. Speaking of student endowment, **Leslie Youtsey** has been working hard to set up our online silent auction, which will benefit the student endowment fund. I also wish to thank **Jessie Jarvis** and **Roberto Llanso** for their help behind the scenes with website, registration, sponsorship and other tasks for this meeting.

Lastly I wish to thank all of you for making my last two years as AERS President such a great experience. I have had a wonderful time in this role, have learned a lot and am so happy to see how AERS has bounced back and continued to grow after the pandemic. I love this community and the sense of family AERS has always provided to me and so many others. Thank you all for your support and grace and I look forward to the next 75 years of AERS.

A knuckle salute to all,



Shelley Sullivan Katsuki
AERS President

Local Planning Committee

Mark Brush, Amber Hardison, and Sara Blackman

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Thank you!

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Virginia Institute of Marine Science

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Potomac Environmental Research and Education Center at George Mason University

William & Mary

Krystle Bell
Linda Blum
Immanuel Burns
Ben Fertig
Courtney Harris
Joseph Luczkovich
Jeffrey McKinnon
Sara Tenda
Tom Wazniak

THURSDAY

Davis Hall

- 12:00 – 5:00 pm Margaret A. Davidson Workshop
- 3:00 – 5:00 pm Board Meeting
- 5:00 – 6:00 pm Tour of Acuff Center for Aquaculture and Nunnally Fish Collection
- 6:00 – 9:00 pm Welcome Social

FRIDAY

Watermen's Hall

- 8:00 – 8:45 am Registration and Light Breakfast
- 8:45 – 9:00 am Welcome and Announcements
- 9:00 – 10:15 am Keynotes and Panel Discussion: Erika Holloman-Hill, Molly Mitchell and Adrian Wood
- 10:15 – 10:30 BREAK
- 10:30 – 10:45 Koontz*, Erika

An assessment of regional and local trends in submersed aquatic vegetation (SAV) associated with three living shoreline designs in the Chesapeake Bay

- 10:45 – 11:00 DiPetto*, Ella

Evaluating the short-term trajectory of small-scale living shorelines within a socioecological context

- 11:00 – 11:15 Pellegrino, Peter

The Living Seashore: An Interactive Video Guide to the Shallow Water Invertebrate Communities of the Atlantic Coast

- 11:15 – 11:30 Dodsworth*, Emma:

Development of a Living Shoreline Model to Compute Ecosystem Restoration Benefits

* Indicates presenter is a student

LUNCH ON YOUR OWN

Food trucks will be available outside of Waterman's Hall for you to grab a lunch. Please consider joining us back in the auditorium at noon for an optional ally/community education workshop hosted by the VIMS Dive-In committee.

- 1:00 – 1:15 Plenary: Linda Blum
- 1:15 – 1:30 Loftis, Derek

A Machine Learning Approach to Automated Water Level Monitoring

- 1:30 – 1:45 Rebolledo-Sanchez*, Zlatka

Carbon Dynamics Spatial Variability in Virginia Salt Marshes

- 1:45 – 2:00 Iorliam*, Glory

Temporal and Spatial Variability of Radon Emissions from Wetland and Upland Forest Ecosystems at the Smithsonian Environmental Research Center, Maryland.

- 2:00 – 2:07 Armstrong*, Mary Beth

(Ignite) Considering Tidal Flooding to Provide a Holistic Approach to Nutrient Input

- 2:08 – 2:15 Baker*, Paris

(Ignite) Development of a spatially explicit model for projecting future salinity distributions in coastal regions

- 2:15 – 2:30 Guldin*, Joanna

Groundwater-derived nutrient fluxes and mixing rates along the New Jersey coast

- 2:30 – 2:45 BREAK
- 2:45 – 3:00 Yin, Donxiao

Estuarine exchange flow in a lagoonal estuarine system

- 3:00 – 3:15 McQuade, Drew

Three Plus Decades of Fisheries Research in the New Jersey Meadowlands

- 3:15 – 3:30 Henry*, Hannah

Adapting Angling: Assessing the Willingness of Recreational Anglers to Modify Hook and Bait Choices for Sea Turtle Conservation

- 3:30-4:30 Business Meeting
- 4:30-6:30 Poster Session
- 6:45-9:45 Banquet - Riverwalk Landing, Yorktown VA

SATURDAY

- 8:00 – 8:45 am Registration and Light Breakfast
- 8:45 – 9:00 Welcome and Announcements
- 9:00 – 9:07 Chambers, Randolph

(Ignite) Terrapin Conservation in the Blue Crab Fishery

- 9:08 – 9:15 Ramos*, Juan

(Ignite) Population Characteristics of Blue Crab (Callinectes Sapidus) and Monitoring Callinectes Sapidus Reovirus 1 (CsRV1) Using PCR Techniques.

- 9:15 – 9:30 Newton*, Gabby

Effects of Salinity Variation on the Life History and Thermal Tolerance of the Marine Annelid Ophryotrocha labronica

- 9:30 – 9:45 Fowler, Amy

Caribbean Creep meets Chesapeake Creep: 2023 Rapid Assessment Survey of Marine Bioinvasions of the Mid-Atlantic Coast, USA

- 9:45 – 10:00 Boonman Morales*, Axel

Microbial Community Composition Analysis in Coastal Lakes of New Jersey as an Indicator of Harmful Algal Bloom Formations

- 10:00 – 10:15 Roldan Ayala*, Zabdiel

Using prey removal experiments to estimate the ingestion rate of mixotrophic cultures

- 10:15 – 10:30 BREAK
- 10:30 – 10:45 O'Connor*, Margaret

CSI Oyster: A Citizen Science Project

- 10:45 – 11:00 Attarwala*, Tahera

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

- 11:00 – 11:15 Bevans*, Amanda

Understanding Foundational Habitat Changes in the Chesapeake Bay with a York River Ecosystem Model

- 11:15 – 11:30 Pujols*, Javier

Investigating Spatiotemporal Correlations Between Water Quality and Bivalve-Associated Carbon Fluxes

- 11:30 – 11:45 Rivest, Emily

Coastal acidification and other drivers are projected to reduce oyster growth in lower Chesapeake Bay

- 11:45 – 12:00 Reilly, Francis

The Clean Water Act: Legislating from the bench without the benefit of science

- 12:00 – 12:30 Awards and Closing

Keynote Speakers

Erica Holloman-Hill
Chief Envisioning Officer/Chief Scientific Officer
Ayika Solutions, Inc.

The Ebbs and Flows of Advancing Environmental Justice

"Ebb and flow" is often used as an idiom to describe the natural rhythms of life and the continuous changes within it, and describes our movement in advancing environmental justice (EJ) in the US. Currently, we are in a "flow" to advance EJ, as reflected in the new environmental justice Executive Order (E.O.) 14096, which builds on the first EJ E.O. 12898 signed 30 years ago. Between 1994 and now, efforts to advance environmental justice in Marine Science have "ebbed and flowed". From the continued call and need to increase the diversity in the fields of earth system sciences to the creation of organizations such as Blacks in Marine Science (BIMS) or Black Women in Ecology, Evolutions, and Marine Science BWEEMS, a tidal chart of critical EJ paradigm advancements and its impact on the field of Marine Science will be delineated and explored.

Molly Mitchell
Research Assistant Professor
Center for COastal Resource Management - VIMS

Actionable science and engaging with diverse communities

Good data is one of the most empowering things that a community can have when advocating for themselves. However, scientific publications and presentations are frequently aimed at other scientists, and the use of that science to provoke change is left to others to figure out. This strategy makes it hard for the science to trickle down to the communities that most need the information. In this talk, we will discuss how science and data can be disseminated to a variety of end users and some of the important considerations for including environmental justice and social equity concerns into tools for decision making.

Keynote Speakers

Adrian Wood
Multimedia Producer
The Repair Lab
University of Virginia

Environmental Justice, Gentrification and Displacement in Norfolk

Sea-level rise is an environmental justice problem that threatens disproportionate harm to communities of color in Hampton Roads. Sea-level rise poses an existential threat to Norfolk, but not in the obvious mode of flooding. Climate-change fueled gentrification threatens to displace Black Norfolkians who might become collateral damage to the violence of sea-level rise. This is a lecture about three major flood resilience projects in Norfolk and some of their potential unintended consequences.

Plenary Presenter

Linda K. Blum
Research Associate Professor
Department of Environmental Science
University of Virginia

A very brief history of the Atlantic Estuarine Research Society

Three threads that are the heart of AERS will be discussed: The people, the mission, and the relevance of that mission then and now

Field Trips

Thursday 5pm-6pm

Acuff Center for Aquaculture Tour

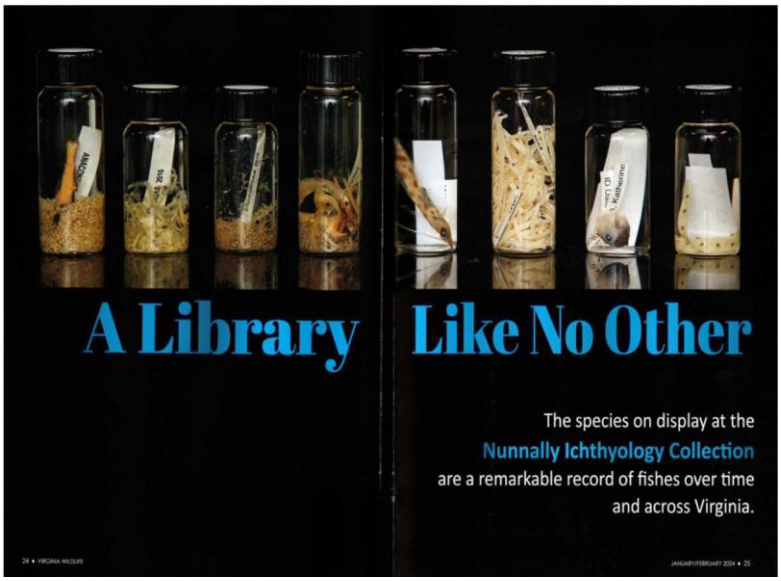
Completed in 2022, the Acuff Center for Aquaculture is a 22,000-square-foot shellfish hatchery that supports collaborative research, education, and advisory teams within VIMS' Shellfish Aquaculture Program. The building has an expansive, open floorplan allowing flexibility to meet the changing research and husbandry needs of many users, with capacity for shellfish spawning, larval culture and setting, as well as a specialized algae and broodstock rooms, 4 labs, 4 offices, and a workshop. There is ample space to accommodate hundreds of distinct shellfish cultures in their early life stages, from spawning through settlement. State-of-the-art seawater filtration and climate-control systems maintain optimal conditions for ripening broodstock, culturing shellfish larvae, and growing microalgae for feeding animals throughout the facility.

The Acuff Center serves as a resource for not only researchers and educators, including the Aquaculture Genetics and Breeding Technology Center (ABC), but for stakeholders and partnering organizations in the aquaculture industry as well. The collaborative efforts of these groups to advance and support a thriving, sustainable shellfish aquaculture community will help answer questions and solve problems in shellfish aquaculture through globally relevant science, outreach, and education.

Haley Uliaz, Acuff Center Algologist, will lead attendees on an educational visit through all areas of the Acuff Center for Aquaculture to foster a broader understanding of how oyster larvae are spawned and reared and what this work means for oyster consumers.

Photos courtesy Ouinn Evans

Nunnally Fish Collection Tour



The VIMS Nunnally Ichthyology Collection serves a broad community of basic and applied research scientists and fisheries managers, and it provides an important resource for local community outreach. Through its history, the VIMS collection has grown from an uncatalogued teaching collection to become one of the largest repositories for freshwater, Chesapeake Bay, and coastal fishes in Virginia. The VIMS collection currently maintains over 35,000 catalogued lots of fishes (c. 350,000 total specimens) and includes specimens from 316 families and more than 1,000 genera.

Field Trips

Thursday 5pm-6pm

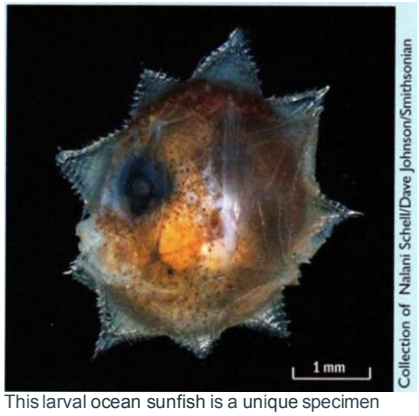
The VIMS collection also houses a number of specimens of significant general scientific interest, including two specimens of the Coelacanth (Latimeria chalumnae), a whole-body specimen of a juvenile Great White Shark (Carcharodon carcharias), and unique distributional records (e.g., an Ocean Sunfish, Mola mola, from the Chesapeake Bay).

Join Dr. Sarah Huber, Curatorial Associate, for a tour of this extensive collection and see specimens, big and small in this exciting behind the scenes tour.

Small Specimens, Big Stories

Some of the smallest specimens at the Nunnally Ichthyology Collection are also some of its most fascinating-the larval fish collection. The collection has one of the most extensive larval fish collections in the world, with about 50,000 larval fish vials. To the novice, some larvae look like tiny translucent fish with a black eye; some look like shrimp; some are tiny, nondescript balls.

Dr. Sarah Huber recalled that a VIMS graduate student was dissecting a fish for a project and made a unique addition to the collection. "In that fish's stomach, she found a larval ocean sunfish in a stage that is almost unheard of in collections," Huber said. "So now we have a little, baby ocean sunfish larva that's pencil eraser size. It's part of a missing stage of ocean sunfish larvae that doesn't get captured very often, so no one's really sure where they are or what they're doing at this particular stage in their development. She was able to find a gorgeous specimen in the stomach of another specimen that ended up going into our collection. We find some really cool things. Not just in what we collect, but in the bellies of things we collect, too!"



This larval ocean sunfish is a unique specimen found in the stomach of another specimen.

Photos courtesy Virginia Wildlife Magazine

Have some extra time on your way to or from AERS? Check out these self-guided field trips at your leisure.

https://maps.app.goo.gl/smgsMhShpfuz19rv5

Field trips for AERS 2024

17N (up the Middle Peninsula)

- Start your trip home with a stop at one of Virginia's newest State Parks: Machicomoco, opened to the public in 2021. Located just 15 minutes up Route 17 from VIMS. The picturesque park hosts an open-air interpretive pavilion providing information on the culture, landscape, and movement of Virginia Native Tribes through displays and a walking path.
- Enjoy a taste of our Virginia waters at the Merrior Tasting Room in Topping, a restaurant run by the folks at the Rappahannock Oyster Company (*784 Locklies Creek Road, Topping VA 23169*, 804-758-2871). They offer seasonal views of the Rappahannock and satisfying small-plates.

64W (Before Richmond)

- What's good in Williamsburg?
  - Head over to Pierce's Pit BBQ for lunch, (*447 East Rochambeau Drive, Williamsburg, VA 23188; 757-565-2955).* Did you know some scholars claim the roots of American BBQ grew out from right here in Virginia? Voted Best BBQ in VA by Southern Living magazine, March 2024.
  - From there you are only 15 minutes away from the beautiful York River State Park, https://www.dcr.virginia.gov/state-parks/york-river. Although the parks famed fossil beach is currently closed, there are plenty of trails for you to explore and water craft & bike rentals to help you do it.

64E (through Norfolk & VB)

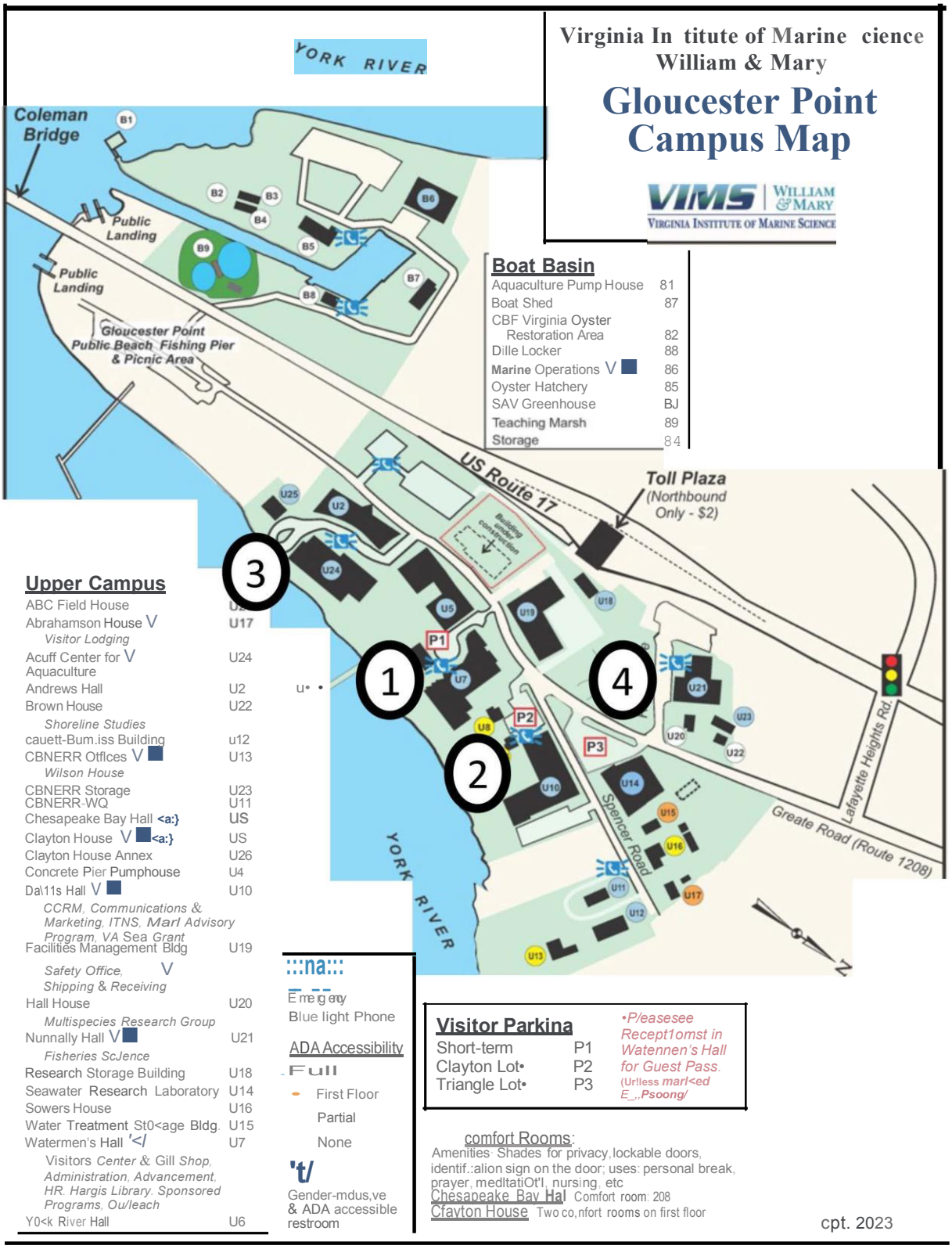
- 264 W to Brunch & Bike the Elizabeth River Trail (ERT) in Norfolk
  - Rent bikes to ride the ERT along Norfolk's working & scenic waterfront
  - Grab lunch first & check out the local merchants at the Selden Market in downtown Norfolk, OR take a break from biking about half-way down the trail, to grab food at one of the local restaurants in the Chelsea neighborhood or refresh with a beer from one of the local breweries.

- 264 E to Virginia Beach where the Chesapeake Bay & the Atlantic meet
  - Spend the afternoon at the Virginia Aquarium & Marine Science Center, although it has been a staple of marine science in the region for decades, the aquarium just finished an extensive renovation.
  - Before or after your visit, check out the painted sea life on the streets on the VIBE creative district, just off the Virginia Beach Oceanfront. In addition to bright bold street art, the neighborhood is also filled with great restaurants, bakeries, and coffee shops.

Route 13 exploring the Eastern Shore

- The first significant town you reach as you travel up Virginia's Eastern Shore, is Cape Charles. This quaint bayside community has stroll-worthy streets and beaches, although fair warning not every shop will be open this early in Spring.
- A little off the beaten path you will find Savage Neck Dunes, a natural maritime forest preserve nestled against the Chesapeake Bay. If you have never seen sand dunes surrounded by loblolly pines(or maybe it is the other way around), this short walking trail is worth the trip, however, be aware that parking is limited and there are no restroom facilities.

Campus Map



1) Watermen's Hall
Friday and Saturday
Scientific Program

2) Davis Hall
Thursday
Welcome Social

3) Acuff Center for Aquaculture
Thursday Tour
(5-6pm)

4) Nunnally Hall
Thursday Fish Collection Tour
(5-6pm)

AERS

Silent Auction

2024

Scan Me!

Pay by Cash, Check, or Card through the donation center on the AERS Website

https://www.32auctions.com/AERSVIMS2024

JEDI ART CONTEST

The JEDI (Justice, Equity, Diversity and Inclusion) committee, hosted its first ever art contest leading up to the spring meeting. Express the beauty of inclusivity through your art. Capture the essence of diverse cultures, identities, perspectives, and the harmonious blend that brings us together. We invited artists of all backgrounds to showcase their vision of what diversity and inclusion mean through their art, whatever medium or form of expression that may be

Congratulations to our two finalists. Winners will be announced at the business meeting Friday evening

By Anji Cooper It's important to have an appreciation for perspectives outside one's own experience. The goal of this piece is to demonstrate how diversity, equity and inclusion (DEI), and its many forms, whether it be racial, cultural, or any portion of one's identity fosters creativity and ideas. Cross cultural understanding and appreciation are vital for both cohesion and innovation. Diversity itself promotes innovation as mindsets from different backgrounds conjure differing solutions to the same question.

What is a Rainbow? By Maizer Fox Sparkman (They/Them)

A rainbow is every color.

It stands for everyone. The reds and the purples seem to be the barrier.

However, there are many more colors the Human Eye cannot see.

Is crossing to barrier illegal? Is combination unholy?

To some colors it may seem as though this is a taint. A disrespect to their identity.

Looking further still, one sees a multitude of colors within any one color.

Blood, a rose, a hat, a chariot sometimes.

Are all these things red? Or just a combination?

I believe we are burdened with classifications of colors.

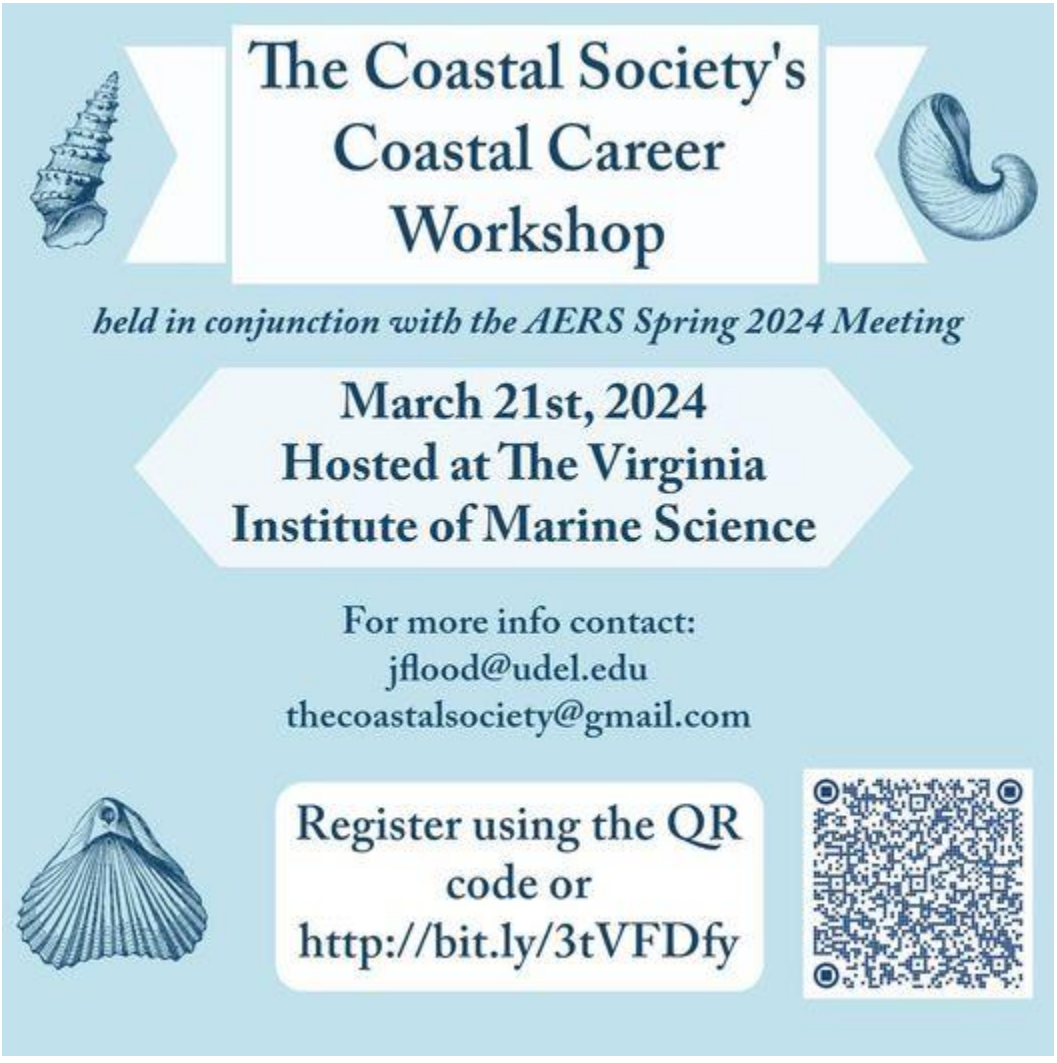
Stand too close to one and you fail to see that it's two or three or four or more.

Look Harder.

Keep searching. That rainbow is connected to you...

MFS

A special thanks to The Coastal Society and VIMS Dive-In Committee for hosting their events in conjunction with the spring 2024 AERS Meeting



MARCH 22, 2023 @ 12:00 - 12:50

MCHUGH AUDITORIUM

Dive-In & AERS present

SUPPORTING GENDER IDENTITY AT WORK

TRAINING:

LED BY SARAH HUBER

Expand your knowledge about gender identity and learn ways to provide a more welcoming, inclusive environment to Transgender and Nonbinary individuals. Topics include:

- Risk factors & protective factors
- Best practices through a gender lens
- How to support transgender students, staff, and faculty
- How to become an ally - every action makes a difference

www.hesheweze.org:

EXPERT PANEL:

FEATURING MAR ARROYO, CO-AUTHOR & VIMS ALUM "NAVIGATING GENDER AT SEA"

Transgender and gender diverse (TGD) scientists face specific challenges during fieldwork including encounters with sexual harassment, misconduct, privacy issues, and legal and medical struggles at sea. The author will recount their experiences and provide recommendations for individuals, cruise leaders, and institutions for making seagoing work safer for TGD communities.

Navigating Gender at Sea:

This years banquet entertainment, The Tidewinders, play hard-driving bluegrass, poignant ballads, and classic favorites. Members Chris Smith and Jared Lawson are former VIMS interns and run a local oyster hatchery and farm in Mathews, VA . Rounding out the band are Doug LeForge, Pete Liljeberg, and Michael Gregg. Visit their website to learn more and see where else they will be playing next: https://www.tidewinders.com/

The Friday evening banquet is at Riverwalk Landing Restaurant along the Yorktown waterfront. 323 Water St, Yorktown, VA 23690 Those staying at the Yorktown Beach Hotel will be able to walk over. For everyone else driving over, there is a parking garage directly across from the restaurant. Parking is free. Please note there is a $2 toll to cross the York River northbound. For those with EZpass, it is $0.85alk

Abstracts – Talks

Considering Tidal Flooding to Provide a Holistic Approach to Nutrient Input

Armstrong, Mary Beth[1*]
1. Virginia Institute of Marine Science

Tidal flooding can significantly contribute to nutrient loading in the Chesapeake Bay, with one event potentially equaling a year's worth of the Total Maximum Daily Load (TMDL) for a tributary. Despite its significance, tidal flooding is currently overlooked in water quality modeling and TMDL calculations. We explored the inclusion of tidal flooding in nonpoint source management frameworks for coastal water quality, with a focus on Norfolk and the Eastern Shore of Virginia. Engaging scientists, modelers, and coastal managers through interviews and a stakeholder meeting, we identified mechanisms for modeling tidal flooding's impact and solutions that offer co-benefits for flood and nutrient management. This research anticipates delivering actionable recommendations, with applicability across the Chesapeake Bay.

Masters Student
*mbarmstrong@vims.edu

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

Attarwala, Tahera[1*], Juan Ramos1, Emily Andrade1, Ali Parsaeimehr1, Gulnihal Ozbay[1]
1. Delaware State University

Eastern Oysters *(Crassostrea virginica)* are keystone species known to provide many ecosystem services and economic benefits. Predation is a biotic factor that can affect oyster recruitment and distribution. Oyster predation and species diversity were assessed using underwater cameras for real-time monitoring at different sites around Rehoboth Bay, DE including artificial reefs, aquaculture farms, and a control site. All documented species were identified and recorded for comparisons between sampling sites. Environmental DNA (eDNA) is also introduced as a complimentary method for species identification. This study will help to promote sustainable aquaculture and restoration efforts in Delaware.

Masters Student
*tattarwala17@students.desu.edu

Understanding Foundational Habitat Changes in the Chesapeake Bay with a York River Ecosystem Model

Bevans, Amanda[1*], Muhammad Sulyman1, Matthew S. Woodstock[2], Scott Knoche1, Thomas F. Ihde[1]
1. Morgan State University, 2. Woods Hole Oceanographic Institution

An ecosystem model of the York River, Chesapeake Bay was developed to better understand the effects of change to the foundational habitats Eastern Oyster *(Crassostrea virginica)* and Eelgrass *(Zostera marina).* The model integrates life histories, predator-prey interactions, harvests, and environmental conditions. Habitat changes were modeled separately and in combination to gain insights into synergistic effects. Harvest increased substantially when eelgrass coverage was modeled at historic levels, which might not be attainable given climate change. Modeled oyster restoration resulted in more moderate harvest increases, as aquaculture and natural recruitment already support a relatively large oyster biomass in the York River.

PhD Student
*a ma nda .bevans@morgan.edu

Microbial Community Composition Analysis in Coastal Lakes of New Jersey as an Indicator of Harmful Algal Bloom Formations

Boonman Morales, Axel Diederik[1*]
1. Monmouth University

Harmful Algal Blooms are complex phenomena that impact waterbodies and can have ecological and anthropogenic impacts. Genomics approaches can improve our ability to monitor and understand HAB dynamics. Here, eDNA samples collected from three coastal lakes in 2021 and 2022 were analyzed by 16s meta-barcoding to examine the spatial and temporal distribution of microbial community composition. Through NMDS ordinations and K-means clustering, the composition can be reduced to a single variable that can more easily be analyzed and spatially represented. A pipeline was created to seamlessly run the same process to analyze future samples.

Undergraduate Student
*s1345446@monmouth.edu

Terrapin Conservation in the Blue Crab Fishery

Chambers, Randolph[1*], Kirk Havens[2], David Stanhope[2], Kory Angstadt[2], Lindsey Dillard[1]
1. William and Mary, 2. Virginia Institute of Marine Science

Bycatch reduction devices (BRDs) keep diamondback terrapins from drowning in the blue crab fishery. All mid-Atlantic states except Virginia have BRO regulations on the books. Because of the resistance to BRO use in Virginia, we have explored potential alternatives that might reduce terrapin mortality while maintaining the legal crab catch. We designed and tested many versions of a "terrapin release hatch," but none was effective. A simple hatch made with bungee cords showed the most promise and has undergone more extensive testing. In the meantime, BRO use at least by recreational crabbers should be requisite in all mid-Atlantic states.

*rmcham@wm.edu

Evaluating the short-term trajectory of small-scale living shorelines within a socioecological context

DiPetto, Ella[1*], Eric L. Walters[1]
1. Old Dominion University

Living shorelines are seeing a surge along developed, privately owned properties. These shorelines differ markedly from those in less-developed regions, harboring lower biodiversity, increased habitat fragmentation, and altered hydrology. Additionally, the importance of individual resident values exacerbates these socioecological considerations. This ongoing study follows five living shorelines pre- and post-restoration to investigate the trajectory in protective service indicators over 2 years. Preliminary results reveal significant variation in short-term development of elevation, vegetation, and oyster recruitment. This study will improve our understanding of living shoreline effectiveness and provide guidance for practitioners and landowners in navigating the complexities of these unique shorelines.

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Development of a Living Shoreline Model to Compute Ecosystem Restoration Benefits

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Living shorelines are nature-based coastal adaptations which have become replacement habitats for natural marshes. They are an approved best management practice (BMP) in the Chesapeake Bay for reducing nutrient and sediment loads, yet there are no tools available to compute site-specific removals. The objective of this research is to develop a web-accessible, decision support simulation model for stakeholders to compute removals. Parameterization and validation of the living shoreline model has been completed and scenario analyses will be presented for nitrogen, phosphorous, and sediment removals at representative sites in the lower Chesapeake Bay. The model will be provided online for stakeholders.

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Caribbean Creep meets Chesapeake Creep: 2023 Rapid Assessment Survey of Marine Bioinvasions of the Mid-Atlantic Coast, USA

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In June 2023, we conducted the first-ever Marine Bioinvasions Rapid Assessment Survey from Virginia to New Jersey (350kms) sampling floating docks in 10 recreational marinas. Monitoring non-native species relative abundance and new species records is fundamental for management officials needing to keep their fingers-on-the-pulse of continually changing ecosystems. Among the 25 non-native invertebrate and seaweed species documented, new "Caribbean Creep" species (seasquirt *Distaplia)* and introduced species expanding southward to their natural temperature tolerances (seasquirt *Styela plicata)* were found. More than a half-dozen non-native species not previously known from mid-Atlantic waters were documented, and invasive species spatially dominated 9/10 marinas sampled.

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Groundwater-derived nutrient fluxes and mixing rates along the New Jersey coast

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Radium isotopes are natural tracers useful for studying the magnitude of groundwater discharge and the transport and fate of nutrients in the coastal ocean. We collected radium and nutrient samples in groundwater and surface waters along the southern New Jersey coast. We calculated the flux of groundwater-derived nutrients and coastal mixing rates; results varied between the two years of sampling. The data we collected will serve as baseline estimates for assessing how human activities and sea level rise impact the magnitude and quality of groundwater discharged along the New Jersey coast.

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Adapting Angling: Assessing the Willingness of Recreational Anglers to Modify Hook and Bait Choices for Sea Turtle Conservation

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Recreational saltwater angling is a culturally significant and economically vital coastal recreational activity, particularly in the Gulf of Mexico, attracting enthusiasts worldwide and contributing significantly to the identity and wellbeing of Gulf Coast communities. However, this activity poses threats to ecologically important species, notably sea turtles, which inhabit Gulf waters and are federally protected under the Endangered Species Act. Our study specifically focuses on the potential efficacy of two key modifications: the use of circular hooks over traditional "J" hooks and the selection of bait types to minimize sea turtle bycatch. Our study aims to bridge the gap in existing research by assessing the willingness of recreational anglers to adopt tackle modifications to support sea turtle conservation efforts. We designed a social science survey, administered online and in person in Mobile Bay, Alabama, to gather data on angler knowledge, behaviors, and attitudes toward sea turtle conservation measures. We used statistical analysis, including generalized linear models, to examine factors influencing anglers willingness to adopt sea turtle-friendly practices. Our analysis suggests that factors such as gender, state residency, motivation for coastal visits, and ecological knowledge may influence anglers' willingness to adopt sea turtle-friendly tackle modifications, underscoring the importance of tailored conservation strategies and educational outreach efforts. By fostering a collaborative approach and encouraging angler involvement in conservation efforts, this research aims to contribute to the sustainable management of recreational fishing, ensuring the Gulf's economic, cultural, and ecological vitality.

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Temporal and Spatial Variability of Radon Emissions from Wetland and Upland Forest Ecosystems at the Smithsonian Environmental Research Center, Maryland

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Trees are known to emit methane, the source and pathways of which are poorly understood. To understand this, we used radon gas to trace methane in soils, trees, and cypress knees in wetlands, as radon has the potential to disentangle the biotic and physical processes that regulate gas transfer between soils, plants, and the atmosphere. **SNIFF** chambers connected to RAD-7 detectors were mounted on trees at -40 and -140cm heights to measure gas fluxes during summer and winter to characterize seasonal variability. This study will increase our understanding of trees' role in the global methane budget.

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An assessment of regional and local trends in submersed aquatic vegetation (SAV) associated with three living shoreline designs in the Chesapeake Bay

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In Chesapeake Bay, eroding shorelines are cause for concern. Historically, shorelines were protected with hardened infrastructure (e.g., riprap) that couldn't adapt to environmental changes, but recently living shorelines are the preferred alternative. Shoreline modification prompts investigation on impacts to nearshore benthic habitats, especially for submersed aquatic vegetation (SAV). This study investigates SAV density patterns at 100 living shorelines (three different designs all comprised of created marshes with rock sills) before and after their installation with respect to regional trends. If SAV was present, preliminary results suggest that density patterns follow regional trends both before and after installation for all designs.

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Drivers of Vertical Accretion and Carbon Accumulation Rates in Plum Island Estuary, Massachusetts

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This study quantifies accretion processes in Plum Island Estuary, Massachusetts, USA, with relatively high spatial resolution. Long-term accretion rates averaged 0.655 ± 0.319 cm/yr; carbon accumulation averaged 176.87 ± 66.38 gC/m2/yr. Elevation was the most significant factor in predicting accretion and sediment deposition rates, but there was no correlation with carbon accumulation rates. Marsh geomorphology was a significant factor for mineral accretion rates and short-term sediment deposition rates. Contrary to initial assumptions, plant biomass and species composition did not predict accretionary processes. Low elevation marsh areas may be lost to rising sea levels, emphasizing the dynamic nature of the platform.

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A Machine Learning Approach to Automated Water Level Monitoring

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Artificial Intelligence advancements in edge detection and machine learning algorithms has made it possible to create an effective video inundation monitoring system using passive remote sensing web cameras. To achieve this goal, the USGS Next Generation Water Observing System has funded a collaboration with the Virginia Institute for Marine Science and the City of Virginia Beach to assess both hardware and software models capable of accurate stage detection from near-real time image inputs. In this project, recently deployed fixed-mounted video cameras were used to send image data to train a Deep Learning algorithm, and then that algorithm was successfully field-tested in tidal tributaries of Chesapeake Bay. Several camera hardware models were evaluated, each featuring 4K resolution to ensure ample pixel density for accurate error detection, and infrared imaging to facilitate effective nighttime recording. Water levels recorded via video and pictometry data were cross-verified using USGS Ka-band radar active remote sensors at each monitoring site. A successful combination of web camera sensor hardware and an Xception convolutional neural network trained on over 7,000 images resulted in an RMSE of 3.26 cm over 1 month in 2022. Thus, a novel passive remote sensing technology was refined and demonstrated, showcasing its ability to detect and extract water levels from real-time imagery.

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Three Plus Decades of Fisheries Research in the New Jersey Meadowlands

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NewJersey's Meadowlands District is a unique complex of wetlands and development located within the New York and New Jersey Harbor Estuary, in the largest metropolitan area in the US. Despite over two centuries of attempts to fill these wetlands and a legacy of industrial pollution, the wildlife of this area has proven to be resilient and is responding well to attempts to restore the ecosystem. The fish community of this district is a perfect example of this positive response, and over three decades worth of data will be discussed, along with current research and plans for the future.

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Effects of Salinity Variation on the Life History and Thermal Tolerance of the Marine Annelid *Ophryotrocha labronica*

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Climate change intensifies oceanic variability, urging the exploration of marine organisms' adaptability. Shallow-water coastal species are particularly affected by drastic shifts in abiotic conditions, such as increased evaporation, precipitation, and heat waves. This study investigates the changes in life history and thermal tolerance in the marine annelid *Ophryotrocha labronica* in response to nine salinity levels chosen across a salinity gradient (from 12 %0 to 50 %0) encompassing both optimal and suboptimal conditions. Findings yield insights into marine species' resilience to extreme salinity and temperature events, thus helping predict the relationship between abiotic stressors and performance traits in changing coastal habitats.

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CSI Oyster: A Citizen Science Project

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With the Chesapeake Bay oyster population near a historic low, there is still much to learn about how water quality affects the survival of Eastern Oysters. The Civic Science Initiative: Oyster project (CSIO) is a multiyear citizen science project that tracks how oyster growth is impacted by water quality parameters within the Chesapeake Bay. Each year, 50 oysters are deployed and monitored at Virginia and Maryland sites. In addition to furthering understanding of the Chesapeake Bay ecosystem, this project also presents high schoolers an opportunity to learn more about marine science through participating in biweekly data collection at each site.

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The Living Seashore: An Interactive Video Guide to the Shallow Water Invertebrate Communities of the Atlantic Coast

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The Living Seashore is a PowerPoint based interactive, multimedia program that combines live video footage of over 500 invertebrate species along with physical descriptions of habitats and organisms. The interactive format allows the user to control the flow of information and rapidly switch from community to community and from species to species. This program provides the viewing of living invertebrates with their natural colors rather than just looking at lifeless, colorless preserved specimens. This program allows the user to gain the true essence of these animals and to appreciate their natural beauty.

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Investigating Spatiotemporal Correlations Between Water Quality and Bivalve-Associated Carbon Fluxes

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Little is known about the influence of macrofauna on carbon dynamics within the context of existing spatiotemporal variability of estuarine carbonate chemistry and water quality. We investigated whether water quality indicators correlate with total alkalinity (TA) and dissolved inorganic carbon (DIC) fluxes for benthic calcifiers within Chesapeake Bay. We collected animals and water quality data, including carbonate chemistry, at sites in the York and Potomac River Estuaries, spanning a salinity gradient. Preliminary data suggest TA fluxes associated with benthic calcifiers varied with water conditions, particularly salinity. Additional data are needed to clarify relationships among DIC fluxes and species.

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Population Characteristics of Blue Crab *(Callinectes Sapidus)* and Monitoring *Callinectes Sapidus* Reovirus 1 (CsRV1) Using PCR Techniques

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The blue crab *(Callinectes sapidus)* population in the Delaware Inland Bays, particularly Rehoboth Bay, holds significant economic and ecological importance. C. *sapidus* is a key contributor to the seafood industry in Maryland and Delaware. This ongoing study focuses on areas associated with oyster aquaculture and pilot oyster reefs. The primary objective is to evaluate the blue crab population and identify a potential pathogenic virus affecting them. The study specifically targets *Callinectes sapidus* reovirus 1 (CsRV1), analyzed in the lab using PCR (polymerase chain reaction) and qPCR (Quantitative polymerase chain reaction) methods. Notably, no prior research has comprehensively examined both the C. *sapidus* population and CsRV1 within the Delaware Inland Bays. CsRV1 primarily affects the gills, impacting the respiratory system, and is associated with elevated mortality rates in aquaculture settings. In natural habitats, infected crabs exhibit symptoms such as lethargy, behavioral changes, and respiratory distress. Study sites were selected based on distinct characteristics, including areas with oyster aquaculture, artificial reefs, and control sites. The research involved deploying 18 traps across six sites, each equipped with two large commercial cages and one small lobster pot. During the summer and fall of 2022, the research team collected data from over 1,000 blue crabs. Our findings indicate stable populations of adult females at natural control sites throughout the season, with an increase in adult male abundance during the cooler months at aquaculture and reef sites. In 2023, CsRV1 was identified in the lab using PCR and qPCR techniques.

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Carbon Dynamics Spatial Variability in Virginia Salt Marshes

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Carbon estimates in coastal ecosystems often rely on location, regional, or national averages without considering spatial variability. A seascape approach was used to understand carbon storage in salt marshes of the lower Chesapeake Bay. Our results indicate patch shape and size are important explanatory variables. Small and medium-sized marsh patches are susceptible to edge effects, resulting in less carbon storage. We observed spatial heterogeneity at various spatial scales, implying differences across sites and between and within patches. Our study emphasizes the need for a finer spatial approach to estimating carbon in salt marshes for improved estimates and better management.

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The Clean Water Act: Legislating from the bench without the benefit of science

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"The waters of the United States (WoUS) shall attain their designated uses." Clarification of the definition of WoUS is a never-ending political saga, begun with the Rivers and Harbors Act of 1894 frequently revised by Congress, Presidents, various agencies, and a series of court challenges. WoUS had two major inflection points in 2023; A science-based redefinition of WoUS by the EPA and ACOE overturned almost immediately by Sackett vs EPA, a Supreme Court Case.

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Coastal acidification and other drivers are projected to reduce oyster growth in lower Chesapeake Bay

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In estuaries, the multiple drivers of water quality make predictions of future environmental change and its impacts difficult. We asked how and where will acidification, warming, and nutrient management actions affect carbonate chemistry and growth of Eastern oysters in a region with extensive oyster aquaculture, southwestern Chesapeake Bay? An oyster bioenergetics model embedded in a 3-D coupled hydrodynamic-biogeochemistry model generated simulations, forced with present-day and combined future conditions. Oyster shell growth will be most reduced not where the greatest reductions of calcite saturation state occur, but where calcite saturation states are lower in present-day.

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Using prey removal experiments to estimate the ingestion rate of mixotrophic cultures

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Current methods to measure mixotrophs ingestion rates have drawbacks that may impact the accuracy of ingestion rates (e.g. bias for or against a prey item and short incubation times). The prey removal experiment, used to study copepod ingestion rates, could be used to estimate mixotroph ingestion rates on prokaryotic prey in non-axenic cultures. However, a protocol for this approach has not been developed. Here, we present best practices for using prey removal experiments to estimate mixotrophs ingestions on prokaryotic prey. Prey removal experiments have the potential to provide accurate mixotroph ingestion rates on prokaryotes.

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Estuarine exchange flow in a lagoonal estuarine system

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In this study, we investigate the controlling mechanisms of estuarine exchange flow in Albemarle-Pamlico Estuarine System at short- and long-time scales using a realistic numerical model. We find that estuarine exchange flow over different parts of the Albemarle-Pamlico Estuarine System are controlled by various mechanisms. Short-term variation in exchange flow does not result in significant change in salt contents in the system and its tributary estuaries. Long term increase in exchange flow due to increase in river discharge leads to salt content decrease in the system and its subbasins. These results can be useful for future research on similar systems.

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Abstracts - Posters

Test of a Terrapin Release Hatch for the Blue Crab Fishery

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Terrapins frequently drown in Virginia's blue crab fishery, as bycatch reduction devices (BRDs) are not required. To examine potential alternatives to BRDs, we designed a prototype of a "terrapin release hatch," constructed of bungee cords to allow terrapins to escape traps and to retain crabs. Based on results of an eight-week field study, however, three versions of the prototype were unsuccessful, and further tests will be required to develop an inexpensive, functional terrapin release hatch. In the meantime, efforts will focus on getting VA to include BRO regulations in their crab fishery, in line with all other mid-Atlantic states.

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Habitat Suitability for Oyster Aquaculture Grow-Out Conditions in Rehoboth Bay, Delaware

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Oyster aquaculture leases returned to the Delaware Inland Bays (Rehoboth Bay) in 2017 (period?) boosting local economies, improving water quality, and providing important habitats for fish and invertebrates. Efforts to monitor and identify relationships between cage depth, oyster condition, water nutrient levels, and pathogens responsible for oyster mortality are vital to successfully manage the re-emerging oyster industry and restoration in the area. This project will analyze targeted pathogen levels and water quality and correlate these with oyster health at a recently established aquaculture lease. Pathogen identification is conducted using cultured water and oyster samples collected at surface and bottom depths. The polymerase chain reaction (PCR) and quantitative polymerase chain reaction (qPCR) approaches will be used for the detection of oyster pathogenic vibrios-Vibrio *coralliilyticus* and *Vibrio tubiashii-and* parasites responsible for the oyster diseases MSX *(Haplosporidium nelsont)* and dermo *(Perkinsus marinus).* In-situ water quality data and samples are collected from the same depths and further analyzed for nutrient content. Oyster condition index (CI) is calculated using Hopkin's Formula; low CI indicates the oyster and potential offspring are more vulnerable to disease and environmental stressors. The data provided from this study will contribute to a greater understanding of current farming strategies and habitat suitability of study sites in this re-emerging industry.

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

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Global change factors can alter coastal marsh ecosystems. However, it's still unknown 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. Exposure to N enrichment showed increased fitness by increasing reproductive output, with the effect strengthening over time. The effects of CO_2 showed considerable interannual variation. These findings provide further evidence that ecologically important plants can respond rapidly via eco- evolutionary mechanisms.

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The Combined Effects of Salinity and Temperature on *Urosalpinx cinerea* Predation of *Crassostrea virginica*

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Oyster restoration has been an important focus for Barnegat Bay, NJ. With the environmental changes came more predators, one being *Urosalpinx cinerea,* the Atlantic oyster drill. Higher temperatures and salinities have a significant impact on predation rates; however, whether it increases or decreases is conflicting. *U. Cinerea* was collected at various sites in Barnegat Bay in 2023. There were two temperature and four salinity treatments based on water quality data from 2021-2023. Predation was measured as the number of drilled oysters and oyster change in wet weight over time. This will aid in understanding predation risks during restoration efforts.

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The Biomechanics of Filter Feeding of the marine annelid *Branchiomma bairdi* Under Extreme Conditions

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Climate change is imposing profound alterations on marine ecosystems, including estuarine ecosystems. Using Digital Particle Image Velocimetry, I plan to study the biomechanics of filter feeding in the marine annelid *Branchiomma bairdi* under extreme conditions of temperature and salinity. Using a controlled experimental setting, I will investigate how changes in the feeding biomechanics ultimately affect individual fitness by measuring their metabolic rates. My study will elucidate how conditions expected with the increase in frequency and intensity of extreme climate events may affect both feeding behavior and the overall effectiveness of filter feeding in estuarine species.

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Effects of increased tidal inundation on salt marsh vegetation of the Chesapeake Bay

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This study investigated if increased flooding caused declines in salt marsh vegetation condition in a Chesapeake Bay marsh. We collected above and belowground biomass, and water level using data loggers from two 5-m radius plots. Plots were dominated by *Spartina patens,* but vegetation appeared more vigorous in one ("healthy site") than the other ("stressed site"). The stressed site showed longer periods of inundation and lower aboveground biomass and stem heights than the healthy site **(a=** 0.05). Other vegetation parameters showed a similar pattern **(a=** 0.10). This provides evidence of flooding-related stress on vegetation, resulting from sea level rise.

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Why so Patchy? Edge-of-range Halodule wrightii productivity along a depth gradient in North Carolina

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Increased water temperatures in North Carolina have contributed to declines of the temperate seagrass species, *Zostera marina.* However, tropical seagrass *Halodule wrightii,* which is more tolerant of warmer water temperatures, has not replaced *Z. marina* in NC meadows. To address why *H. wrightii* is not filling these gaps, productivity measurements will be taken along a depth gradient at two seagrass sentinel sites during three critical months in *H. wrightii's* growing season (June, September, and January). This research will quantify the roles of decreased light and/or cold stress in limiting the expansion of *H. wrightii* patches at the species' northern limit.

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Impacts of Biochar on Phosphorus Distribution in Salt Marsh Surface Soil in Delaware

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Theinvasive reed, *Phragmites australis,* may provide an enhanced phosphorus storage ecosystem service compared to native vegetation, and its removal may reduce phosphorus storage in marsh soil. Biochar introduced by prescribed burns may recoup this lost service via sorption. We examined soil phosphorus in marshes of varying burn frequency and conducted biochar addition experiments. Results show that burning is not correlated with organic or inorganic phosphorus concentrations, but it may reduce refractory phosphorus concentrations. Further, *Phragmites* seem to store more phosphorus in soil than the native grasses, so burning *Phragmites* reduces phosphorus retention in marshes.

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Dietary specialization and plasticity in generalist species: a case study with the widespread, omnivore polychaete *Alitta succinea* in the Chesapeake Bay

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Generalist species are expected to exploit a wide array of food types, but some evidence shows that individual dietary specialization is not uncommon. To test the occurrence of dietary specialization in estuarine invertebrates, I will characterize the diet and diet preference of the clam worm *Alitta succinea,* an omnivore annelid species widespread in Chesapeake Bay. I will analyze and compare the gut content of specimens collected from different habitats, such as fouling and oyster reef communities, sandy-muddy sediment, and rocky shores. I will also conduct preference experiments to test how resource variation affects their metabolic rates.

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Sudden Changes in Salinity and Inundation Alter Salt Marsh Methane and Carbon Dioxide Emissions

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Environmental disturbances like storm surges and hydrologic restoration can alter salinity and inundation patterns in salt marshes and may, in turn, alter methane emissions. Three marsh organs were installed along a salinity gradient in the Mullica River and planted with full grown *S. alterniflora.* We show that methane emissions did not change drastically even 13 weeks following a large shift in salinity (20-42: 15-20). When planning restoration in projects aimed at minimizing methane emissions, it is important to consider that desired changes in methane emissions may come about slowly.

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Assessing the impacts of rhizocephalan infection and host sex and body size on trematode infection load in white fingered mud crabs

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Estuarine invertebrates like crabs and other arthropods commonly act as intermediate hosts for multi-host parasites such as digenean trematodes. Here we investigate how infection with a rhizocephalan barnacle *(Loxothylacus panopae,)* and host body size and sex predict trematode infection load in mud crabs *(Rhithropanopeus harris,)* overwintering in low-salinity ecosystems. Crabs were collected from October 2023 to February 2024 and dissected for quantification of host size (carapace width), sex, and parasite infection. Host body size and rhizocephalan infection were positively associated with higher trematode infection loads, potentially signaling coinfection facilitation. Finally, male crabs had higher trematode cyst loads than female crabs.

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Sexual Dimorphism, Throat Coloration, and the Evolution of Gene Expression in Threespine Stickleback Brain Tissue

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In the threespine stickleback *(Gasterosteus aculeatus),* sexual dimorphism in color and morphology is known to vary dramatically among populations. Here I examine how sexual dimorphism of gene expression in the brains of stickleback fish varies with color pattern and life history across populations. In previous studies, marine (anadromous) populations showed greater morphological dimorphism and more consistent color dimorphism. Data comes from four freshwater populations and one marine population. Initial remapping of the reads to a stickleback genome and a principal component analysis (PCA) of the data shows strong divergence in sex for all five populations and some divergence by population.

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Evaluating eelgrass resilience and restoration potential to enhance adaptive management techniques in a warming climate

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Tropicalization throughout the western Atlantic coast has resulted in the gradual decline and poleward shift of the temperate eelgrass *Zostera marina.* To ensure restoration success, the identification of thermally-tolerant and highly efficient donor sites is becoming critically important for managers. By comparing the frequency of resilient alleles within North Carolina populations, where eelgrass exhibits more thermal tolerance, against Virginia populations from 2007 and 2023, we can both quantify how these restoration factors fluctuate over time and identify potential donor or recipient sites, thus providing a fuller understanding of the genetic and reproductive factors lending to eelgrass adaptive management techniques.

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Examination of Coastal Protection Service Provided by Intertidal Oyster Reef Living Shorelines

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Living shorelines are promoted for their capacity to improve coastal resilience, while also providing a wide range of ecological and socio-economic benefits associated with natural habitats. In Virginia, a primary goal of many living shoreline projects is to provide coastal protection. While there is a growing suite of research demonstrating living shorelines can provide coastal protection, to what consistency and extent is limited by lack of monitoring. In this study, we aim to hindcast monitoring by employing a shoreline change analysis tool in GIS to examine effect of intertidal oyster reef living shorelines on the provision of shoreline protection.

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Mysid Habitat Preferences and Niche Overlap in Patuxent River, Chesapeake Bay

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Limited knowledge exists regarding mysids within the Chesapeake Bay Watershed, despite their important role in benthic-pelagic coupling. Clarifying habitat preferences for various mysid species is crucial for habitat restoration efforts and ecological understanding, offering insights into ecosystem health and responses to environmental changes. Our study examines mysid habitat preferences in the Patuxent River, investigating abundance variations between habitat structure, depth, and tidal cycle. We found *Americamysis bahia* dominated other species in summer months in the lower Patuxent River, and a greater abundance of mysids in unstructured habitats compared to structured.

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Applying a new method for stickleback color pattern analysis, with results from a significant sample size of *Apeltes quadracus*

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Studies of stickleback color dimorphism have largely been confined to one species, *Gasterosteus aculeatus,* and often excluded a key trait, the spines. Using a recent wide spectrum method based on stickleback vision, we investigated color dimorphism in the fourspine stickleback *(Apeltes quadracus).* In preliminary research, making use of the "micaToolbox" software for processing UV and visible spectrum images and collecting data, we found that fourspine stickleback have sexually dimorphic spine color but not jaw color. In current analyses of a larger sample of fourspine stickleback we are evaluating initial findings more definitively and assessing body coloration more comprehensively.

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A novel, low-cost methane datalogger for continuous deployment in wetland soil

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Currently there is no way to measure direct, continuous methane concentrations in salt marsh soils. Developing a low-cost, methane datalogger is critical to determine how methane concentrations vary between and within wetlands over time. An equilibration chamber was designed for burial in wetland soils, with a silicone membrane permeable to methane and an efficient permeable surface area for equilibration. Preliminary testing determined that 11.70% permeable surface area is sufficient to 90% equilibrate a range of methane concentrations within a 137 minute average timeframe. Considering these factors will allow the burial of these loggers to accurately measure soil methane content.

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Prolonged periods of exposure increase *Spartina alterniflora* photosynthesis

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Tidal cycles lead to patterns of inundation and exposure that impact salt marsh plant growth and metabolism. However, wind forcing can lengthen the typical tidal patterns of inundation and exposure that marsh plants experience in microtidal environments. Using a mesocosm-based experiment in Louisiana, we show that a 5-day period of continuous exposure increased *Spartina alterniflora* photosynthesis while a 6-day period of continuous inundation did not. In contrast, extended periods of inundation and exposure had no measurable impact on respiration. Therefore, wind-driven patterns of inundation and exposure in microtidal wetlands should be incorporated into calculations of annual carbon budgets.

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Spartina alterniflora Response to Sudden, Rapid Changes in Inundation and Salinity

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Salt marshes are vulnerable to short-term hydrology changes from storm surges and tidal restoration efforts. We hypothesized that increases in inundation and salinity would decrease plant health. Marsh organs were constructed with five elevation levels, filled with mature *Spartina alterniflora* in July 2023, and placed at low (-0-15 PSU), intermediate (-2-25 PSU) and high (-20-32 PSU) salinity. From August to November, the largest median values changed from 1300 leaves m-2 to 1500 leaves m-2 at low salinity and 1400 leaves m-2 to over 2000 leaves m-2 at intermediate salinity, where samples were taken. Sudden environmental shifts decrease Spartina alterniflora health.

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Genotypic variation and rapid evolution of invasive *Phragmites australis* in response to global change factors

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Invasive *Phragmites australis* has become increasingly abundant in North American marshes, becoming a dominant ecosystem engineer (Mozdzer, et al. 2022) and significantly impacting marsh ecosystem function and resilience to climate change (Gu, et al. 2020). A long-term experiment at the Global Change Research Wetland (GCREW) has been growing *Phragmites* under predicted levels of elevated CO_2 (700 ppm), elevated nitrogen (25 g/year), and elevated CO_2 and nitrogen, with ambient controls. Comparing genotypic makeup over three years (2020-2023), higher genetic diversity was observed in reference plots compared to treatment plots, indicating that anthropogenic pollutants can act as selective pressures.

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Seasonal and Spatial Changes in Dissolved Inorganic Carbon in the York and Potomac River Estuaries

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Thefate of carbon in estuarine ecosystems is complex and system-specific, yet these habitats are critical carbon cycling zones. This study aims to (1) identify seasonal and spatial patterns of dissolved inorganic carbon (DIC) concentrations in the Potomac River Estuary and York River Estuary and (2) determine potential drivers of these patterns. Twelve stations along the salinity gradient of each river were sampled seasonally from spring 2023 to winter 2024. CO_2 system parameters (e.g., pH, total alkalinity, pCO) andwater quality parameters (e.g., temperature, salinity, dissolved oxygen, chlorophyll a, turbidity) were measured in surface and bottom waters at each station.

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Response of vegetation and soil properties to runnels used as a salt marsh restoration strategy

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We tested the efficacy of tidal restoration in two Massachusetts-salt marshes using runnels. Photos before and after restoration were analyzed using ImageJ for runnel and control sites. Organic matter (OM), water content (WC), and bulk density (BD) were measured from 5-cm depth cores using standard procedures. Photo analysis showed bare ground decreased with runnels by more than 1000% on average, disappearing at two sites. There was no significant effect of the runnels on OM, countering concern that runnels decrease OM. WC and BD were also compared. Further study is needed to understand how soils, hydrology, and vegetation change long term.

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Leaf compost can enhance plant growth and carbon burial in coastal restoration projects

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Thin layer placement **(TLP)** of dredged material increases salt marsh elevation but can inadvertently bury plants and limit their regrowth. We investigated whether using organic-rich leaf mulch as an alternative to dredged sediment could increase plant growth and carbon sequestration. We measured plant growth and gas fluxes in four sediment types: mud, sand, peat, and leaf mulch. When grown in leaf mulch, *Spartina patens,* a characteristic high marsh plant, yielded maximal biomass and photosynthesis, while maintaining the same methane flux compared to other sediments. Leaf mulch could be an effective alternative material for **TLP,** particularly for habitat restoration projects.

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Comparing the provision of ecosystem services (wave energy dissipation, habitat, primary productivity, blue carbon) of an anthropogenically modified salt marsh to a natural salt marsh

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Natural marshes are valued for their high biodiversity but most importantly for the ecosystem services they have to offer. This research quantifies the ecosystem services of a natural marsh in the Acadian Peninsula. The natural marsh variables were compared to those of an anthropogenically modified marsh. Results indicate that while anthropogenically modified marshes do provide some form of ecosystem services, the quantity provided by an anthropogenically modified marsh is more compromised compared to that of a natural marsh. This is an essential consideration in decision-making to balance ecosystem service trade-offs and coastal restoration goals, while maintaining ecosystem resilience.

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Assessing the joint effects of freeze and tropical storm events on *Avicenna germinans* by region

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Frequency and intensity of extreme events (freezes and tropical storms) can impact range limits and they are likely to be impacted by climate change. Effects are most salient in mangroves, which have been limited in range due to freeze sensitivity. *Avicennia germinans,* is the most freeze-tolerant mangrove species regionally and has expanded its range in the southeastern US. Previous studies have emphasized freeze, but few have considered the joint impact of freeze/tropical storms. Our greenhouse experiment explores these combined impacts. We hypothesize a positive feedback loop wherein one extreme event enhances plant resilience to another through changes in functional traits.

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Detection of Vibrio species in *Crassostrea virginica* and *Callinectes sapidus* using SYBER green based real-time PCR

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A multiplex real-time PCR assay was employed for the immediate detection of *Vibrio parahaemolyticus, Vibrio vulnificus, Vibrio coralliilyticus,* and *Vibrio tubiashii* in *Crassostrea virginica.* Initially, a set of primers was studied against the NCBI database for the confirmation of specificity, and the selected primers' specificity was validated using conventional PCR. Subsequently, a SYBR Green-based real-time PCR was optimized to detect the pathogenicity genes of the studied *Vibrio* species at a low level of bacterial population (1QA2 CFU). The assay's performance was evaluated for specificity and limitation in bacterial detection through a series of bacterial dilutions. Finally, the test's validation was conducted using samples from *Crassostrea virginica* tissues. The high sensitivity exhibited by this multiplex real-time PCR assay renders it suitable for detecting low copies of *tlh, vvh,* and *dnaJ* in *Vibrio* spp.

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A tale of two inlets: Impacts of bathymetric modification on exchange flow through tidal inlets in Barnegat Bay - Little Egg Harbor, New Jersey

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Exchange flow through tidal inlets impacts estuary flushing time, a major determinant of estuarine water quality. Shallow lagoonal estuaries common to the U.S. Mid-Atlantic coast have varying patterns of exchange with the coastal ocean based on inlet geometries and degree of hardening or dredging. Our study compares hydrodynamics of two major inlets on the coast of New Jersey, one fortified with jetties and regularly dredged and another with undeveloped shorelines and minimal historical dredging. We will present the contrasting tidal and subtidal currents that develop in these two inlets and their potential impact on flushing dynamics.

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PFAS Mixology: The Physiological Response of Texas Coastal Phytoplankton to Perfluoroalkyl Substance Mixtures

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Perfluoroalkyl substances (PFAS) are persistent and toxic chemicals ubiquitously detected in aquatic environments, yet understanding of PFAS toxicity to phytoplankton is limited. This study employed a four-day bioassay to assess the physiological response of natural phytoplankton communities exposed to tertiary and unary mixtures of three PFAS (perfluorooctane sulfonate, PFOS; perfluorooctanoic acid, PFOA; perfluorobutane sulfonate, PFBS) at environmentally relevant concentrations (0-6000 µg/L). Measurements of growth, oxidative stress, and exudate release reveal increasing mixture concentrations (60-6000 µg/L) elicit significant physiological changes. Our results suggest that mixture toxicity may be driven by PFOS as this compound produced the greatest impact among unary exposures.

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Effects of *Halodule wrightii* on *Zostera marina* germination

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North Carolina coasts are dominated by co-existing seagrass species *Halodule wrightii* and *Zostera marina.* However, there are limited studies on interspecies interactions. The goal of this study is to determine if the presence of *H. wrightii* inhibits *Z. marina* seed germination. *Z. marina* seeds from three different NC populations will be planted in four sediment types (sediment from each source meadow with a sand control). Half of the treatments will contain *H. wrightii* shoots at in situ densities (n =5). Effects of *H. wrightii* on sediment abiotic conditions, mean time to germination, and maximum germination will be quantified.

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Detection of eastern oyster *(Crassostrea virginica)* larvae behavior in hatchery tanks using a particle-size analyzer

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Eastern oyster *(Crassostrea virginica)* larvae exhibit vertical swimming behavior, but less is known about this behavior within oyster hatcheries. Water conditions and larvae are assumed to be uniform in tanks, but this assumption doesn't consider innate behaviors. We used a particle-size analyzer and CTD to detect oyster larvae distribution and water conditions within hatchery rearing tanks at the Horn Point Laboratory Oyster Hatchery. Two out of the five tanks showed larval density as a function of depth; however, tank conditions were not found to be homogenous. Results point to new avenues of research for improving larvae production in hatcheries.

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Ditching creates increased oxidation-reduction potential in salt marshes

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There is little published research on how pond expansion changes soil and porewater chemistry in salt marshes. In this study, we attempted to determine whether the chemical properties of the environment are different in locations that contain expanding ponds in a ditched marsh, as compared to sites with stable ponds and are unditched. We gathered samples on *Spartina Patens* dominated marshes at two distances from known pond conditions. We found that soil oxidation reduction potential is significantly higher in ditched sites as compared to unditched sites. This is likely due to increased drainage from ditching.

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Modeling changes to foundational habitats in the Piankatank River, Chesapeake Bay

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Eastern Oyster *(Crassostrea virginica)* restoration efforts in the Piankatank River have enhanced existing reef habitat while Eelgrass *(Zostera marina)* coverage continues to decline. An ecosystem model was developed to examine the effects of changing habitats on harvested populations. Simulations of change in each habitat (restoration, current status, decline) were performed singly and jointly to better understand non-additive effects of simultaneous habitat change. Results predicted greatly enhanced system productivity of Eelgrass restored to the management goal and similar trends restored to recent historic coverage. Restored oyster reef also predicted increased system harvest, combined effects with restored Eelgrass had synergistic positive impacts.

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Pulse Nitrate and Salinity Effects on Tidal Marsh Trace Gas Fluxes and Carbon Storage

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Tidal freshwater wetlands in the Chesapeake Bay region experience frequent pulses of nitrate and salinity, but their effects on carbon cycling processes are poorly understood. Our research uses a 2x2x2 split-plot time-series to assess the effects of salinity and nitrate pulses on CO_2 and CH_4 exchanges and macrophyte biomass production at two marsh heights in mesocosm-simulated tidal freshwater wetlands. Nitrate and, especially, salinity caused rapid, but generally reversible, changes in CO_2 and CH_4 fluxes indicating higher-than-expected resilience. These findings will be used to improve wetland carbon cycling models.

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Comparing York River box model performance across a multi-model assemblage

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An existing 2D box model of the York River (YR) (Virginia, USA) uses a forced down-estuary salinity gradient. Since the model relies on observed salinity, it cannot be used in simulations with altered discharge or operate when a reversed salinity gradient occurs. The model applied in this study, ACExR, dynamically calculates the salinity, temperature, and volume of each box based on physical processes. This poster presents a comparison of exchanges and flushing times between the existing YR model, ACExR, and a 3D hydrodynamic model. Preliminary comparisons between the YR box model and the 3D hydrodynamic model predict similar flushing times.

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Using genetics to monitor and advance wild fishery stock restoration of bay scallops *(Argopecten irradians)* in Virginia

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Bay scallops, *Argopecten irradians,* were once abundantly harvested in Virginia, but in the early 1930s the fishery collapsed and never recovered. Bay scallop restoration was initiated in 2009 when North Carolina scallops were brough to the VIMS Eastern Shore Lab (ESL) and used to develop an ESL scallop line. Concerns about limited genetic diversity of bay scallops in Virginia prompted the acquisition of new broodstock scallops in 2018-2019 from New York (NY), North Carolina (NC), and Florida (FL). High throughput genotyping-by-sequencing was used to determine how the genetic profile of the restored Virginia bay scallop population has changed from 2016-2023.

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