

Delaware

WETLANDS

CONFERENCE

*Providing opportunities for collaboration across
the Mid-Atlantic region.*

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Delaware Wetlands



Dates & Location

January 29 & 30, 2020
Wilmington, DE

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WE WELCOME YOU

Hard to believe this is the 9th conference. No matter how many times we have hosted this event it never gets old. Each conference is exciting and fun to coordinate and we look forward to it every other year. This time is no different. We let the abstract submissions drive the theme and session topics and they did not disappoint. We are excited to have some fresh topics on the agenda such as Remediation, Soils, and Hydrodynamics. There are 54 presentations in total, 50 exciting posters on display, and 34 exhibitors and sponsor tables to visit. New this year is an in-house networking hour at the end of Day 1; no need to drive anywhere!

This time around we are fortunate to be teaming up with two regional professional organizations- the Mid-Atlantic Wetland Work Group (MAWWG) and the Mid-Atlantic Chapter of the Society of Wetland Scientists (MAC SWS). Each group will be hosting an open meeting during lunch, MAWWG on Wednesday and MAC SWS on Thursday. We are long-standing MAWWG members and are pleased to be part of their redevelopment phase. As new members of the MAC SWS we look forward to becoming active and meeting the accomplished members. We couldn't be happier to use our conference as an opportunity to have these groups meet concurrently and hopefully draw some new members from the crowd. Consider joining them over lunch and getting to know them.

As always it takes a village to execute this conference every two years and we couldn't do it without the support from DNREC, our generous sponsors, the help of volunteers, and the contributed content from our presenters! Take these two days to learn, be inspired and meet new people.

Enjoy the Conference!

*Wetland Monitoring & Assessment Program &
Delaware National Estuarine Research Reserve*



Conference Committee

Wetland Monitoring & Assessment Program

Mark Biddle
Erin Dorset
Brittany Haywood
Alison Rogerson
Kenny Smith

Delaware National Estuarine Research Reserve—Coastal Training Program

Rachael Phillos
Kelly Valencik

Name Tag Decoder*

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University of Delaware Career Center

THINGS TO KNOW

Networking Opportunities

Collaborative Group Meetings

Mid-Atlantic Wetland Workgroup (MAWWG) Meeting

Wednesday, January 29 at 12:10

Christina Ballroom

MAWWG's primary goal is to support a forum in which to facilitate the development and implementation of wetland monitoring strategies, including elements of a comprehensive wetland monitoring program, that meet the needs of the Mid-Atlantic states. Attendees may grab their lunch from the main Riverfront Ballroom, then head over to the meeting room. (non-members welcome)

Mid-Atlantic Chapter of the Society of Wetlands Scientists (MAC SWS) Meeting

Thursday, January 30 at 12:10

Christina Ballroom

MAC SWS objectives include encouraging communication of wetlands issues and research activities in the Mid-Atlantic region (New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia). Attendees may grab their lunch from the main Riverfront Ballroom, then head over to the meeting room. (non-members welcome)

Lunch & Poster Sessions

Each day time has been set aside for you to enjoy your lunch in the Riverfront Ballroom, and network. The exhibit hall and posters will be staffed following lunch in Governors' Hall. This is also where an afternoon treat will be available.

Eat, Drink & Connect

Join us in **Governors' Hall of the Chase Center on the Riverfront from 4:00 –6:00 PM on Wednesday**. Enjoy complimentary light hors d'oeuvres and a cash bar while catching up with old and new friends alike. This networking event is sponsored by Century Engineering.

Goings On..

Student Poster Competition

The student poster competition returns for 2020! Posters participating in the competition are grouped together and marked with a star. Judging takes place on Wednesday, and awards are handed out on Thursday during the morning greeting in the Riverfront Ballroom. First place will be the recipient of the inaugural Dr. Christopher Sommerfield Memorial Award and a \$200 gift card, second place will receive a \$100 gift card, and third place will receive a \$50 gift card.

If you are interested in judging on Wednesday, please stop by the registration desk and ask how you can help!

Field Trip: Trees, Trails & Marsh Restoration on the Christina River

Russell Peterson Wildlife Refuge/
DuPont Environmental Education Center

Wednesday & Thursday, 1:30 - 2:45

Leaves from Registration Desk

Join Robert Meadows to explore a wetland restoration site. Over 3,800 native trees have been planted on the Peterson Refuge with many lessons learned. With the completion of all restoration work this coming winter, a final effort has been initiated to build 1 mile of hiking trail and 2 miles of interconnecting water trail and dock in the Christina River.

Pre-registration required. To sign-up or make inquiries please visit registration desk. Field trip is weather dependent as it will be outside, requires a minimum attendance, and is approximately a 10-15 minute walk to the site.



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Logistics

Session Timing

Each oral presentation will be 15 minutes. The audience will have an additional 5 minutes to ask questions followed by a 5 minute lapse. Please feel free to move between sessions during this time.

Professional Credits

Professional credits are available for attending this conference. American Planning Association AICP- 12 hours of certification maintenance credits. Certified Floodplain Managers- 7.5 continuing education credits. Professional Engineers- 10.5 professional development hours. (Credits listed assume you attend both days.) For more information please contact Kelly Valencik at 302-739-6377 or Kelly.Valencik@delaware.gov.

We Need Your Help!

At the end of your stay with us, please fill out the online survey located at this web address: surveymonkeys.com/r/2020DEWetlandsConf or use the QR code to the right. Your input is important in determining future efforts for this conference.



Plenary Speaker Bios



Secretary Shawn M. Garvin
Delaware Department of Natural Resources & Environmental Control

Bio: Shawn M. Garvin joined Governor John Carney's cabinet in March 2017 as Secretary of the Department of Natural Resources and Environmental Control, leading the agency tasked with protecting and managing Delaware's natural resources, protecting public health, providing outdoor recreational opportunities and educating Delawareans about the environment. Secretary Garvin's career in intergovernmental affairs spans more than 25 years at the federal, state, and local levels. In November 2009, he was appointed by President Barack Obama to serve as Administrator of Region 3 for the U.S. EPA, overseeing the agency's work in the Mid-Atlantic.



Alison Rogerson
Delaware Department of Natural Resources & Environmental Control

Bio: Alison has been an Environmental Scientist for DNREC for 12 years, working in wetlands statewide to improve wetland conservation, science and management. She attended the University of New Hampshire and University of Delaware for degrees related to wildlife and wetlands. In her off time she enjoys birding, ice skating and spending time with her husband and two daughters.



Derek Brockbank, Executive Director
American Shore and Beach Preservation Association (ASBPA)

Bio: As Executive Director of ASBPA, Derek is responsible for the growth, strategic planning, and government affairs goals of the nation's leading organization advocating for beach and coastal restoration. With a background in climate and coastal conservation and experience as a grassroots organizer, Derek is getting ASBPA to lead coastal communities and coastal decision-makers in the tough but necessary conversations about how they will address sea level rise, increasing storm intensity, and other climate impacts. Prior to starting with ASBPA, Derek worked as campaign director for a coalition effort to restore the Mississippi River Delta and Coastal Louisiana, and was part of a gulf-wide campaign to pass the RESTORE Act, securing billions of dollars for Gulf Coast restoration. This followed up on his work with National Wildlife Federation on climate adaption. Derek grew up in New York City and got his coastal education from an early age playing on the beaches of Long Island, and kayaking and fishing in Peconic Bay.



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2020 Schedule—Day 1—Wednesday, January 29

8:15	Registration & Refreshments - Lobby		
9:15	Opening Remarks, Welcome & Wetland Warrior Award - DNREC Secretary Shawn M. Garvin- Riverfront Ballroom		
9:30	A Decade in Review: Delaware Statewide Wetland Changes 2007-2017 : Alison Rogerson, DNREC Wetland Monitoring & Assessment Program- Riverfront Ballroom		
Room:	Dravo Auditorium	Christina Ballroom	Pusey & Jones Room
Title:	Implementation Tools	Coastal Resilience	Soils
Moderator:	Bonnie Arvay	Maggie Pletta	Andy Howard
10:20	New Wetland Map for Pennsylvania- How Accurate is It? <i>Stephen Kunz, Schmid & Company, Inc.</i>	Total Water Levels, Storm Surge, and Inundation Frequency Along Delaware's Coasts <i>John Callahan, University of Delaware</i>	Assessing the Effects of Salinity and Inundation on Halophytes Litter Breakdown in Yellow River Delta Wetland <i>Jiexiu Zhai, West Virginia University</i>
10:45	Can DNREC Help Fund Your Wetland Restoration Project in Delaware's Chesapeake Bay Watershed? <i>Brittany Sturgis, DNREC Nonpoint Source Program</i>	Building Coastal Resilience <i>Jackie Specht, The Nature Conservancy</i>	Advances in IRIS Technology for Wetland Soil Assessment <i>Martin Rabenhorst, University of Maryland</i>
11:10	Overcoming Barriers to Wetland Restoration in the Choptank Watershed <i>Joanna Ogburn, JBO Conservation, LLC and Envision the Choptank</i>	Strengthening Delaware's Climate Response <i>Terrienne Lavin, University of Delaware</i>	Introduction to NRCS Coastal Zone Soil Survey Initiative <i>Greg Taylor, USDA- Natural Resources Conservation Service</i>
11:35	Updating the Delaware Invasive Species Council List... More Than Just Plants <i>Marcia Fox and Bill McAvoy, DE Invasive Species Council and DNREC</i>	Implementing a Climate Adaptation Strategy in the Town of Bowers, Kent County, Delaware <i>Anthony Gonzon, DNREC Division of Fish and Wildlife</i>	Vulnerability of Stored Soil Carbon in Delaware's Coastal Wetlands <i>Daniel Warner, Delaware Geological Survey</i>
12:00	Lunch- Riverfront Ballroom , Poster Viewing, Networking & Dessert- Governors' Hall		
12:10	Mid-Atlantic Wetlands Work Group Meeting (MAWWG)- Christina Ballroom		
Title:	Beneficial Use	Monitoring & Assessment	Remediation
Moderator:	Alison Rogerson	Kari St. Laurent	John Cargill
1:30	Poplar Island- Challenges and Successes of a Large Scale Restoration Project in the Chesapeake Bay <i>Michelle Osborn, Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island</i>	Assessing Tidal and Nontidal Wetlands in Delaware's Appoquinimink Watershed <i>Erin Dorset or Kenny Smith, DNREC Wetland Monitoring & Assessment Program</i>	NVF- Yorklyn Remediation and Wetland Creation <i>John Cargill, IV, DNREC Watershed Assessment & Management Section</i>
1:55	Thin- Layer Sediment Placement: Evaluating an Adaptation Strategy to Enhance Coastal Marsh Resilience Across the NERRS <i>Scott Lerberg, CBNERR- VIMS</i>	USDA- NRCS- SPSD National Coastal Blue Carbon Assessment Project <i>Robert Tunstead, USDA- Natural Resources Conservation Service</i>	In-Situ Bioremediation: A New Alternative for Treating PCB Impacted Sediments <i>Kevin Sowers, University of Maryland Baltimore County</i>
2:20	Digital vs. Traditional Learning: Mitigating Marshes Against Sea Level Rise <i>Stephanie Letourneau, CBNERR- Juniata College</i>	The New Jersey Tidal Wetlands Monitoring Network <i>Metthea Yepsen, New Jersey DEP</i>	Christina/Brandywine River Remediation, Restoration & Resilience <i>Todd Keyser, DNREC Remediation Section</i>
2:45	Break		
3:00	USACE Thin Layer Placement Guidance- Best Management Practices <i>Ram Mohan, Texas A&M University & Anchor QEA</i>	An Evaluation of Performance Standards and Monitoring Protocols for Nontidal Wetland Mitigation Banks in Maryland <i>David Smith, Coastal Resources, Inc.</i>	South Wilmington Wetland Park- Under Construction <i>Justin Reel, RK&K</i>
3:25	Beneficial Use of Dredge Materials for Salt Marsh Restoration in Rhode Island <i>Andrew Timmis, J.F. Brennan Company, Inc.</i>	Biochar- a Brita for the Marsh? <i>Kari St. Laurent, DNREC Coastal Programs</i>	Effect of Legacy Sediment Removal and Floodplain Reconnection on Riparian Plant Communities <i>Patrick Baltzar, Century Engineering</i>
4:00	Eat, Drink & Connect in Governors' Hall: 4:00 - 6:00PM		

Plenary Presentation: A Decade in Review: Delaware Statewide Wetland Changes 2007-2017 (Alison Rogerson, DNREC)
 DNREC has just completed an anticipated 10-year update of the Delaware statewide wetland mapping resource. Completed by Virginia Tech and DNREC's Wetland Monitoring and Assessment Program using 2017 aerial photos, these maps were completed to National Wetland Inventory standards and will be made available in the new year. Wetland maps are a critical tool for planning and can be used by professionals and landowners alike. This presentation will briefly review methods and updates to the mapping process and will focus on highlighting the current status of wetlands in Delaware and common sources of change in the last 10 years.

2020 Schedule—Day 2—Thursday, January 30

8:15	Registration & Refreshments - Lobby		
9:15	Opening Remarks & Student Poster Awards, Alison Rogerson, DNREC- Riverfront Ballroom		
9:30	A Coastal Sediment Crisis of Dust Bowl Proportions and a New Deal for BUDM: Derek Brockbank, American Shoreline and Beach Preservation Association (ASBPA)- Riverfront Ballroom		
Room:	Dravo Auditorium	Christina Ballroom	Pusey & Jones Room
Title:	Restoration	Wildlife: Turtles and Friends	Policy/Legal
Moderator:	Lori Brown	Kenny Smith	Kim Cole
10:20	A Site-Based Wetland Decision Tool for Guiding Salt Marsh Restoration <i>Joshua Moody, Partnership for the Delaware Estuary</i>	Herpetofaunal Response to Restored Wetlands in Central Appalachian Wetlands <i>James Anderson, West Virginia University</i>	Current Status of Clean Water Act Programs and the Definition of Waters of the U.S. <i>Marla Stelk, Association of State Wetland Managers</i>
10:45	Seven Mile Island Living Laboratory <i>Lenore Tedesco, The Wetlands Institute</i>	Landscape Influences on Heavy Metal Bioaccumulation in Two Turtle Species in North- Central West Virginia <i>Darien Lozon, West Virginia University</i>	Development of a Sussex County Wetlands and Waters Buffer Ordinance <i>Chris Bason, Delaware Center for the Inland Bays</i>
11:10	Elizabeth, New Jersey Wetland Restoration- Ecological Uplift in an Urban Setting <i>Michael Rehman, Princeton Hydro, LLC</i>	Piping Plover increases Following Habitat Creation in Delaware: Benefits for the Wider Recovery Unit <i>Evangelin VonBoeckman, DNREC Division of Fish & Wildlife</i>	Observations About Wetland Enforcement Case Development and Trial Preparation <i>Charles Rhodes, Jr., Retired EPA Ecologist</i>
11:35	An Award-Winning Constructed Wetland as a Critical Design Feature of Waterfront Redevelopment in Laurel, DE <i>Ed Lewandowski, UD Sustainable Coastal Communities/ Delaware Sea Grant</i>	Counting Diamondback Terrapins- A Citizen Science Project in the Maryland Coastal Bays <i>Katherine Phillips, Maryland Coastal Bays Program</i>	Applying Monitoring and Assessment Tools on Wetlands Enforcement Cases <i>Robert Brooks, Pennsylvania State University</i>
12:00	Lunch- Riverfront Ballroom , Poster Viewing, Networking & Dessert- Governors' Hall		
12:10	Mid-Atlantic Chapter of the Society of Wetland Scientist's Meeting (MAC SWS)- Christina Ballroom		
Title:	Green Technology	MAC SWS: Mitigation	Hydrodynamics
Moderator:	Clare Sevcik	Mark Biddle	Erin Dorset
1:30	Increasing Use of Natural and Nature-Based Features to Build Resilience to Storm-Driven Flooding <i>Pamela Mason, Virginia Institute of Marine Science</i>	Successes and Challenges Associated with Wetland Creation using a Delayed Hydrology Approach <i>Karley Routh, RK&K</i>	Coastal Flood Effects on the Growth of Low-Lying Eastern Red Cedars in Kent County, Delaware <i>Stephanie Stotts, Wesley College</i>
1:55	Shooting Island: A Multifaceted Approach to Coastal Wetland Restoration <i>Steven Bagnall, Anchor QEA, LLC</i>	Multi-Spectral Drone Data for Tidal Wetland Monitoring <i>Natalie Byers, RK&K</i>	Coastal Flood Effects on the Growth of Low-Lying American Hollies in Kent County, Delaware <i>LeeAnn Haaf, Partnership for the Delaware Estuary</i>
2:20	Sassafras Landing Living Shoreline Demonstration Project <i>Chris Pfeifer, Cardno, Inc.</i>	A New Look at Mitigation: Refocusing on Functional Uplift <i>Emily Dolbin or Scott Lowe, McCormick Taylor</i>	The Future of the High Marsh: Forest Retreat and <i>Phragmites</i> Spread <i>Keryn Gedan, George Washington University</i>
2:45	Break & Refreshments - Governors' Hall		
3:00	Investing in Living Shorelines to Promote Cleaner Water? Show Me the Data <i>Danielle Kreeger, Partnership for the Delaware Estuary</i>	Successions Role in Wetland Mitigation <i>Bill Buettner, Maryland State Highway Administration</i>	Flow Paths for Flooding on the Back-Barrier of Slaughter Beach, Delaware <i>Thomas McKenna, University of Delaware</i>
3:25	Investigating Shellfish Recruitment to Living Shoreline Materials for Maximizing Water Quality Enhancement in Future Shoreline Designs <i>Sarah Bouboulis, Partnership for the Delaware Estuary</i>	The Mitigation Challenges Associated with FAA Part 77 Compliance at Ocean City Airport <i>Jennifer Slacum, AECOM</i>	Black Duck Restoration Efforts in Saltwater Intruded Ag. Lands <i>Mike Dryden, The Nature Conservancy</i>

Plenary Presentation: A Coastal Sediment Crisis of Dust Bowl Proportions and a New Deal for BUDM (Derek Brockbank, American Shore and Beach Preservation Association (ASBPA), Washington, D.C., USA)

In the 1920s, new farming techniques and technology was expanding farm production, but undermining the agricultural sustainability of America's breadbasket. When a 100+ year drought hit the Midwest, black blizzards blew topsoil for thousands of miles creating the "dust bowl" and America's first modern climate migrants due to a "sediment crisis" in America's farmland. The Dust Bowl was technological and economic disaster, exacerbated by climatic changes, that was solved through a political commitment to conserve soil in America's heartland and a federal investment to make it happen. Our nation's coasts are facing a parallel plight with the loss of coastal sediment, leaving coastal (rather than farming) communities in existential uncertainty. Do we have the national political commitment to counter our coastal sediment crisis and will there be the necessary federal investment to prevent catastrophic coastal erosion in the face of sea level rise?

Abstracts

Implementation Tools: Day 1, AM—Dravo Auditorium

Moderated by: Bonnie Arvay, *Bonnie Arvay is an environmental scientist with DNREC's Coastal Management Program. She is primarily responsible for federal reporting requirements and is currently focused on strategic planning.*

New Wetland Map for Pennsylvania – How Accurate Is It?

Stephen P. Kunz (*Schmid & Company, Inc.*)

A new digital map of Pennsylvania wetlands was released in mid-2019. It is based on recent, high-resolution aerial photos, LiDAR and hydrogeologic data, and statistical/object-based modeling to identify likely areas of wetlands. This presentation will discuss this new map, contrast it with other desktop resources like NWI and soil surveys, and compare its accuracy and reliability with actual onsite wetland delineations. The presentation will provide numerous illustrations from actual project sites.

Overcoming Barriers to Wetland Restoration In The Choptank Watershed

Joanna Ogburn (*JBO Conservation, LLC and Envision the Choptank*)

Through an intensive Stakeholder Engagement Process, Envision the Choptank identified the primary barriers to wetland restoration implementation on private lands and received grant funding to carry out innovative solutions to these barriers. Solutions include creating a shared Landowner Assistance Coordinator to provide one-on-one assistance to landowners, regularly convening all technical service providers to overcome shared challenges, and developing BMP incentive programs to build off of or offer an alternative to existing cost-share programs.

Can DNREC Help Fund Your Wetland Restoration Project In Delaware's Chesapeake Bay Watershed?

Brittany Sturgis (*DNREC Nonpoint Source Program*)

In 2019, Delaware developed a third phase of Delaware's Chesapeake Bay Watershed Implementation Plans (WIPs). DE's Phase III WIP established aggressive goals of creating, restoring, and rehabilitating wetlands. Delaware DNREC receives funding annually for the implementation of projects in the Chesapeake Bay watershed to help reach these goals. During this presentation, you will learn details of this grant funding and if there is potential in partnering with DNREC to fund wetland creation, restoration, and/or rehabilitation projects.

Updating the Delaware Invasive Species Council list....More Than Just Plants

Marcia Fox & Bill McAvoy (*Delaware Invasive Species Council & Delaware Department of Natural Resources & Environmental Control*)

The Delaware Invasive Species Council (DISC) updated the invasive species list. The current DISC list contained only plant species and was last updated in 2006. DISC convened a committee which expanded the new list to include species of vertebrates, aquatics, and invertebrates. Through a facilitated approach, experts narrowed the initial working list of 109 potentially invasive species to 40 invasive species. Here, we present the adopted approach and findings.

Coastal Resilience: Day 1, AM—Christina Ballroom

Moderated by: Maggie Pletta, *Maggie Pletta holds a degree from the University of Maryland and is a planner for DNREC's Delaware Coastal Programs working on ocean resources and climate adaptation planning. She previously held positions within DNREC providing communication, education, and outreach for the Delaware National Estuarine Research Reserve and the Delaware Wetlands Program.*

Total Water Levels, Storm Surge, and Inundation Frequency Along Delaware's Coasts

John Callahan (*University of Delaware*)

Delaware and the U.S. Mid-Atlantic states are well known for being severely impacted by both tropical and mid-latitude coastal storm systems as well as anomalously high rates of relative sea-level rise. Coastal flooding is a significant risk hazard for Delaware's natural and developed environments. This presentation will summarize recent observations of the seasonal distribution and changes over time of total water level, storm surge, and inundation frequency along Delaware's coast.

Building Coastal Resilience

Jackie Specht (*The Nature Conservancy*)

Coastal resilience pursuits need to look beyond localized shoreline projects and turn to landscape-scale resilience planning. Building landscape-scale resilience requires strategic coordination with partners, innovative restoration and communication techniques, and thoughtful science to guide these efforts. The Nature Conservancy (TNC) is using this framework to demonstrate the efficacy of nature-based solutions for coastal resilience, including through communication with virtual reality headsets, a wave attenuation study to inform resilience targeting, and exploration into innovative restoration techniques.

Strengthening Delaware's Climate Response

Dr. Terrienne Lavin (*University of DE, Dept. of Geography & Spatial Analysis*)

25% of Delaware consist of wetlands, most of which are freshwater, with an additional 381 miles of shoreline, making Delaware particularly vulnerable to climate change impacts such as increased flooding, drought, number of high heat days, frequency and severity of storms, and sea level rise. This proposal strengthens Delaware's commitment to the U.S. Climate Alliance and EO41 through the expansion of the State of Delaware's current climate programs to include transparency, accountability, and education.

Implementing a Climate Adaptation Strategy in the Town of Bowers, Kent County, Delaware - A Case Study

Anthony Gonzon (*DNREC - Division of Fish & Wildlife*)

DNREC's Divisions of Fish & Wildlife and Water Stewardship are collaborating with the Town of Bowers on a climate adaptation strategy through a Strategic Opportunity Fund for Adaptation grant from DNREC's Division of Climate, Coastal, and Energy. Objectives include converting two acres of impervious surface to green space and creating vegetated buffers as a first phase in a two-phase project. Phase Two will enhance habitat and improve water quality entering the community's drainage system.

Soils: Day 1, AM—Pusey & Jones Room

Moderated by: Andy Howard, Andy is an environmental scientist within the Watershed Assessment and Management Section of DNREC. Andy primarily focuses on improving water resources in Kent County and Chesapeake Bay related grants.

Assessing the Affects of Salinity and Inundation on Halophytes Litter Breakdown in Yellow River Delta Wetland

Jiexiu Zhai & James T. Anderson (West Virginia University)

Litter decomposition influences wetland ecosystem function. We examined water quality and soil properties from the Yellow River Estuary, China to investigate *Phragmites australis* and *Suaeda salsa* litter decomposition dynamics. Results showed that *Suaeda salsa* litter decomposition rate was significantly higher than that of *Phragmites australis*. Litter decomposition rate had a significant relationship with water parameters. This study demonstrated the effects of abiotic variables on halophyte litter decomposition in this estuarine wetland.

Advances in IRIS (Indicator of Reduction In Soils) Technology for Wetland Soil Assessment

Martin Rabenhorst (University of Maryland, Dept. of Environmental Science and Technology)

Since IRIS technology was first introduced 15 years ago for documenting wetland soil function, significant advances have been made which make this technology more useful, quantitative and green. The latest approaches will be discussed showing how IRIS can be easily used to demonstrate that important ecosystem services are being performed by wetland soils.

Introduction to NRCS Coastal Zone Soil Survey Initiative

Greg Taylor & Rob Tunstead (USDA - Natural Resources Conservation Service)

In 1899, work began to inventory and map the soil resources of the United States, with the primary focus on agriculture lands. This remained the primary focus for over 100 years. However, recently the NRCS has ventured beyond the water's edge to update the mapping within wetland, coastal and subaqueous environments. New customers are using our data for restoration, shellfish, dredge, sea-grass, and other related projects. This presentation will cover the when, where, and why.

Vulnerability of Stored Soil Carbon in Delaware's Coastal Wetlands

Daniel L Warner, John A Callahan & Tom McKenna (Delaware Geological Survey)

Coastal wetlands sediments, and the carbon stored within them, face an uncertain future due to sea level rise and climate change. We investigated the vulnerability of several coastal marshes in Delaware at high spatial resolution using corrected LIDAR DEMs and multiband aerial imagery. We created marsh-wide vulnerability metrics and localized indices to identify particularly vulnerable or resilient areas, which will help inform our ongoing efforts to map soil carbon storage in these wetland systems.

Beneficial Use: Day 1, PM—Dravo Auditorium

Moderated by: Alison Rogerson, Alison Rogerson is an environmental scientist for the Delaware Department of Natural Resources and Environmental Control (DNREC). She is the program lead for DNREC's Wetland Monitoring and Assessment Program.

Poplar Island - Challenges and Successes of a Large Scale Restoration Project in the Chesapeake Bay

Michelle Osborn (Maryland Environmental Service) & Dr. Lorie Staver (University of Maryland Center for Environmental Science)

Poplar Island is a beneficial use of dredged material project located in the Chesapeake Bay. The MDOT Maryland Port Administration and U.S. Army Corps of Engineers, Baltimore co-sponsor the project. Upon completion, the island will be over 1,700 acres in size and contain over 68 million cubic yards of dredged material. The project is highly monitored and is developed through the adaptive management process. To date, over 370 acres of wetland habitat have been restored.

Thin-Layer Sediment Placement: Evaluating an Adaptation Strategy to Enhance Coastal Marsh Resilience Across the NERRS

Scott Lerberg (Chesapeake Bay National Estuarine Research Reserve of Virginia at the Virginia Institute of Marine Science) Dr. Kenny Raposa, Dr. Kerstin Wasson, Jennifer West, Dr. Elizabeth Watson & Dr. Joanna Nelson

Beneficial use of dredged sediment to enhance coastal resilience is a concept that resonates in many coastal states. Eight NERR sites are conducting replicated restoration experiments examining the effectiveness of thin-layer sediment placement as a climate adaptation strategy. Novel aspects of this project include the broad distribution of sites, the examination of effectiveness at different marsh elevations, the development of a standardized monitoring protocol, and the incorporation of biochar to improve soils and plant health.

Digital vs. Traditional Learning: Mitigating Marshes against Sea Level Rise

Stephanie Letourneau (Chesapeake Bay National Estuarine Research Reserve in Virginia/Juniata College)

With the advancement of digital technology tools, teachers can implement digital learning of authentic science to aid classroom instruction. This study compared teacher and student perspectives of traditional learning versus digital learning through a lesson plan and Story Map about the thin-layer placement marsh restoration experiment in the National Estuarine Research Reserve System. By better understanding perspectives on digital learning, we can provide useful resources to assist in quality science education.

USACE Thin Layer Placement Guidance - Best Management Practices

Ram Mohan (Texas A&M University & Anchor QEA), Candice Piercy (U.S. Army Engineer Research & Development Center) & Tim Welp (U.S. Army Engineer Research & Development Center)

This presentation will give an overview of the U.S. Army Corps of Engineers' Thin Layer Placement guidance document. Best management practices for planning, engineering, and constructing thin layer placement projects will be discussed.

Remediation: Day 1, PM—Pusey & Jones Room

Moderated by: John G. Cargill IV, *John G. Cargill IV is a Hydrologist V with the Delaware Department of Natural Resources and Environmental Control (DNREC). John manages Delaware's Toxics in Biota Program (fish advisories) and is Co-Leader of DNREC's WATAR Team. John also oversees contamination assessment and cleanup projects, and designs and implements State lead assessment and remediation projects, including innovative contaminated sediment projects.*

NVF-Yorklyn Remediation and Wetland Creation

John G. Cargill, IV, P.G. (DNREC - Watershed Assessment & Management Section)

In 2009, the National Vulcanized Fibre (NVF) company in Yorklyn, Delaware entered its third and final bankruptcy. Shortly thereafter, the DNREC began development of the Auburn Valley Master Plan that included 119 acres of the former NVF properties. Subsequent environmental investigations, solid waste removal and demolition activities led to the most aggressive remedial project at the site... zinc source removal and wetland creation. In addition, a flood storage wetland was created.

In-Situ Bioremediation: A New Alternative for Treating PCB Impacted Sediments

Kevin R. Sowers & Upal Ghosh (University of Maryland Baltimore County)

We describe results from pilot scale in situ treatment of PCB impacted sediments sites treated by bioremediation. The innovative aspect of the technology is the application of anaerobic organohalide respiring bacteria and aerobic PCB degrading bacteria with selected activities to sediments with an AC agglomerate as a delivery system. Pilot-scale field studies show the promise of bioremediation as a new strategy to reduce contamination of the aquatic food web from exposure to sediment-bound PCBs.

Christina/Brandywine River Remediation, Restoration & Resilience

Todd A. Keyser, P.G. & John G. Cargill, IV, P.G. (DNREC - Remediation Section)

DNREC's Watershed Approach to Toxics Assessment and Restoration (WATAR) team and its partners have been working to address toxic contaminants in the Christina River basin for many years. The culmination of this work has led to a basin-wide remediation, restoration and resilience initiative designed to bring fishable, swimmable, and potable water to the basin in the shortest timeframe possible.

South Wilmington Wetland Park - Under Construction

Justin Reel (RK&K)

The City of Wilmington's South Wilmington Wetland Park will reduce flooding, clean up a brownfield, and restore wetlands once construction is complete in Spring 2020. Wetland restoration in urban and disturbed sites pose unique challenges not encountered at natural and undisturbed sites. Unforeseen conditions and unusual circumstances are more common during construction of disturbed sites. On-going construction at the Wetland Park will illustrate some of the unique challenges and conditions experienced.

Effect of Legacy Sediment Removal and Floodplain Reconnection on Riparian Plant Communities

Patrick Baltzer & Vanessa Beauchamp (Century Engineering)

Legacy sediment removal and floodplain reconnection is a stream restoration practice designed to reconnect streams to their floodplains. This project surveyed vegetation communities at six legacy sediment removal and floodplain reconnection sites to determine if restored floodplains are dominated by native hydrophytic vegetation. Restored vegetation communities had more hydrophytic vegetation than reference reaches but similar proportions of native plants. NMDS scaling showed the majority of variation within vegetation communities was site specific.

Restoration: Day 2, AM—Dravo Auditorium

Moderated by: Lori Brown, *Lori Brown is an Environmental Planner IV in the Nonpoint Source Program in DNREC's Division of Watershed Stewardship. She is a GIS specialist and her efforts are primarily focused on the Chesapeake Bay Watershed.*

A Site-Based Wetland Decision Tool for Guiding Salt Marsh Restoration

Joshua Moody, LeeAnn Haaf & Irina Beal (Partnership for the Delaware Estuary)

Salt marsh restoration across the Mid Atlantic has surged in recent years. Many questions remain, however, regarding the identification of site-specific deficiencies and pairing them with appropriate tactics. We discuss the development of a salt marsh decision support tool that compiles remote and field-based data using established protocols to assess a series of recognized functional attributes. Present and projected conditions for each attribute are integrated to evaluate evidence of site deficiency and attributes of concern.

Seven Mile Island Living Laboratory

Lenore P. Tedesco, Lisa Ferguson (The Wetlands Institute), **Monica Chasten** (U.S. Army Corp of Engineers), **Ginger Kopkash & Dave Fanz** (New Jersey Department of Environmental Protection)

The USACE Philadelphia District partnered with the State of New Jersey, The Wetlands Institute, and the USACE Engineer Research and Development Center to launch the Seven Mile Island Living Laboratory in Cape May County, New Jersey. The initiative is designed to advance dredging and marsh restoration techniques through innovative research, knowledge sharing and practical application. Engineering with Nature principles and practices will be utilized to develop innovative solutions for sediment management needs within the region.

Elizabeth, New Jersey Wetland Restoration- Ecological Uplift in an Urban Setting

Michael Rehman, PWS (Princeton Hydro, LLC)

This urban wetland restoration site was previously a significantly disturbed mosaic of wetland and upland comprised of a monoculture of common reed on historic fill. It serves as an example of how urban sites can be restored. Presently, there are a variety of freshwater wetland habitats that are rare in this highly urbanized area, providing valuable ecosystem services; including sediment retention and roosting, foraging, and nesting opportunities for both resident and migratory bird species.

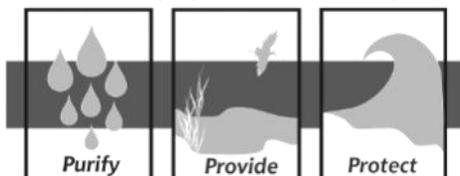
An Award-Winning Constructed Wetland as a Critical Design Feature of Waterfront Redevelopment in Laurel, DE

Ed Lewandowski (University of Delaware Sustainable Coastal Communities Coordinator/Delaware Sea Grant) & **Dr. Jules Bruck**, (Director, University of Delaware Landscape Architecture Program)

When community stakeholders in Laurel, DE sought to redevelop the downtown waterfront along the Broad Creek, a University of Delaware design team responded by proposing a constructed wetland to address storm water runoff as part of a conceptual design. In 2018, a combined bioswale/constructed wetland was installed at the developing Tidewater Park, which treats more than 2 ½ acres of impervious surfaces draining to this important tidal tributary of the Nanticoke River.

Congratulations to the 2020

DELAWARE



WETLAND WARRIOR

Mike Mensinger

Mike Mensinger is an Environmental Scientist with the DNREC's Coastal Program. Mike won this award for his work with the marsh restoration at the Prime Hook National Wildlife Refuge where he went above and beyond expectations and was so pivotal to the project's success.

In 2008, the USFWS began working with the DNREC Coastal Program on water monitoring projects at both Bombay Hook and Prime Hook National Wildlife Refuges. A central part of the work was the installation of a real-time water monitoring network at Prime Hook NWR to help address the flooding and management challenges there. This began Mike's critical role in supporting the refuge's large tidal marsh restoration project. Mike's technical knowledge saved the refuge a lot of time developing protocols and deciding on equipment to purchase at the outset. He served as a liaison with the equipment company, ensuring the refuge was getting what they needed. He trained refuge staff on the basic maintenance of the equipment, and made himself available

– often on short notice and under unpleasant conditions – to help with field installations, troubleshooting, fixing damage, and more.

Although he has been content to remain behind the scenes these last nearly 10 years, Mike has had an invaluable role in many phases of the marsh restoration project.



Wildlife: Day 2, AM—Christina Ballroom

Moderated by: Kenny Smith, Kenny Smith is an environmental scientist for the Delaware Department of Natural Resources and Environmental Control (DNREC). He is part of DNREC's Wetland Monitoring and Assessment Program.

Herpetofaunal Response to Restored Wetlands in Central Appalachian Wetlands

James T. Anderson (West Virginia University)

Response of reptiles and amphibians to wetland restoration is necessary to assess function. Anuran species richness was higher in mitigation than reference wetlands. Spring peeper and green frog metamorphs, anuran occupancy, and red-spotted newt diets were minimally affected by wetland type. Snapping turtle abundance was similar but painted turtle abundance was higher in restored wetlands. Amphibian and turtle communities are similar between restored and natural wetlands and some functions are being fulfilled in created wetlands.

Landscape Influences on Heavy Metal Bioaccumulation in Two Turtle Species in North-Central West Virginia

Darien N. Lozon (West Virginia University)

We assessed 29 wetlands for heavy metal contamination (cadmium, chromium, lead, total mercury, selenium, and zinc) through snapping (*Chelydra serpentina*) and painted turtle (*Chrysemys picta*) non-destructive tissue sampling. Land use within 1 km of wetlands (i.e. agriculture, forest, or both) was significant in explaining snapping turtle mercury and selenium concentrations ($p < 0.01$). Due to lead, selenium, and zinc bioaccumulation variability, multi-species monitoring is necessary to appropriately assess wetland habitat condition.

Piping Plover Increases Following Habitat Creation in Delaware: Benefits for the Wider Recovery Unit

Evangelin VonBoeckman, Henrietta A. Bellman, Stephanie Warshawsky, Audrey L. Derosé-Wilson (Delaware Division of Fish and Wildlife), **Annabella Larsen & Stormy Vandeplass** (U.S. Fish and Wildlife)

In 2016, 35ha of beach was created during a restoration project at Prime Hook Wildlife Refuge (PHNWR). Historically, there are no records of plovers breeding on bay beaches, and Delaware's small plover population ($n=6$ pairs) had nested exclusively on Atlantic Coast beaches. However, in 2016 one pair nested in the newly created habitat at PHNWR and since pair numbers have increased to 15. These trends demonstrate the potential benefit of habitat creation for breeding plovers.

Counting Diamondback Terrapins – A Citizen Science Project in the Maryland Coastal Bays

Katherine Phillips & Roman Jesien (Maryland Coastal Bays Program)

Diamondback terrapins (*Malaclemys terrapin*) were commercially harvested in Maryland for their meat until 2007, causing the population to face severe decline. Today, the additional threats of shoreline development and abandoned crab pots continue to negatively affect their population. Since 2011, Maryland Coastal Bays Program has been conducting an annual terrapin headcount survey to evaluate the population in the Maryland Coastal Bays. Trends, challenges, and successes of the 5-day annual citizen science survey will be presented.

Policy/ Legal: Day 2, AM—Pusey & Jones

Moderated by: Kim Cole, Kimberly Cole is an Environmental Program Administrator for the Coastal Programs Section in the Delaware Department of Natural Resources and Environmental Control which focuses on the preservation, development, and use of coastal, estuarine, and ocean resources.

Current Status of Clean Water Act Programs and the Definition of Waters of the U.S.

Marla Stelk (Association of State Wetland Managers)

Since E.O. 13868 on “Promoting Energy Infrastructure and Economic Growth” was issued on April 25, 2019, the United States has witnessed an unprecedented effort by the current Administration to roll back environmental regulations protecting our water, air, land and public health. This presentation will provide an update on current rulemaking efforts impacting Clean Water Act programs such as §401, §404(c), 404(g) and the definition of Waters of the U.S.

Development of a Sussex County Wetlands and Waters Buffer Ordinance

Chris Bason (Delaware Center for the Inland Bays)

Improving requirements for buffers between new developments and the wetlands and waters of Sussex County has been an important and controversial action of the Comprehensive Conservation and Management Plan for Delaware’s Inland Bays. The science behind the water quality function of buffers will be discussed. As will the history of efforts to realize improvements to requirements. Finally, the process Sussex County Council has taken to address wetlands and waters in its code and develop a new ordinance using a stakeholder approach will be presented.

Observations About Wetland Enforcement Case Development and Trial Preparation

Charles A. Rhodes Jr. (Retired Former EPA Ecologist for 38.5 years (1979-2017))

Using the background of past cases developed over thirty years, the presentation will provide observations with regard to the preparation of evidence in anticipation of a hearing, trial or other enforcement action. Subjects include the development of strategy and tactics; how to collect and present data; the critical importance of teamwork and the understanding of each team members role(s).

Applying Monitoring and Assessment Tools on Wetland Enforcement cases

Robert P. Brooks & Laura Brown (Pennsylvania State University)

Wetland monitoring and assessment tools have many uses. Here, we discuss applying them across space and time on a federal wetland enforcement case. Initially, we examined information collected by agency personnel for the site in northwestern Pennsylvania. We used aerial photographs from 1939-2016 to detect temporal changes. Wetland delineation techniques were used to document past and current extent of wetlands, which were compared to reference wetlands. Data were synthesized in an expert opinion report.

Green Technology: Day 2, PM—Dravo Auditorium

Moderated by: Clare Sevcik, Clare Sevcik is an Environmental Scientist with DNREC’s Nonpoint Source Program. Clare focuses on freshwater mussel surveys, Chesapeake Bay Watershed nutrient pollution reduction, and nonpoint source pollution education and outreach.

Increasing Use of Natural and Nature-based Features to Build Resilience to Storm-driven Flooding

Pamela Mason, Jessica Hendricks & Carl Hershner (Virginia at the Virginia Institute of Marine Science)

Resilience to coastal flooding is improved by natural and nature-based features (NNBFs) such as wetlands, wooded areas, living shorelines. NNBFs provide multiple ecologic and socio-economic benefits including water quality/ TMDL and FEMA flood insurance credits. A GIS-based analysis identified NNBFs which 1) allows priority ranking for NNBF protection, and 2) locates priority areas for creation/ restoration of NNBFs to benefit infrastructure and generate co-benefits credits. Outreach to local governments will enable informed decisions for coastal resilience.

Shooting Island: A Multifaceted Approach to Coastal Wetland Restoration

Steven Bagnall, Ram Mohan P.E. & Travis Merritts (Anchor QEA, LLC)

This presentation will explore lessons learned during the successful design and construction of a ~4,000 linear foot multipart living shoreline in coastal NJ. It will also identify key design considerations for subsequent beneficial use and thin layer placement projects that have been designed for the site. Optimization measures to increase project efficiency and cost effectiveness of living shoreline and beneficial use projects will be discussed.

Sassafras Landing Living Shoreline Demonstration Project

Chris Pfeifer, Stephanie Briggs (Cardno), Bob Collins (Delaware Center for the Inland Bays) & Rob Gano (Delaware Division of Fish & Wildlife)

Living shoreline techniques were used to restore and enhance eroding shoreline at Assawoman Wildlife Area as part of a multi-partner demonstration project. Tidal salt marsh that once protected the berm maintaining an ecologically valuable freshwater impoundment had been lost to chronic erosion and coastal storms. A segmented low-profile toe sill was constructed just offshore using riprap and bagged oyster shell. Landward areas were then backfilled with clean sand and planted with native marsh grasses.

Investing in Living Shorelines to Promote Cleaner Water? Show Me the Data

Danielle Kreeger (Partnership for the Delaware Estuary)

Living shorelines are often touted as an ecologically beneficial alternative to traditional shoreline armoring, and studies have confirmed that they enhance fish and wildlife habitat, help control erosion, attenuate waves, and capture carbon. Additionally, living shorelines are touted as providing cleaner water, but comparatively little work has been done to squarely test this statement. The presentation will summarize what is currently known and unknown about the contributions of various living shoreline bivalves to water quality.

Hydrodynamics: Day 2, PM—Pusey & Jones

Moderated by: Erin Dorset, Erin Dorset is an environmental scientist for the Delaware Department of Natural Resources and Environmental Control (DNREC). She is part of DNREC's Wetland Monitoring and Assessment Program (WMAP).

Coastal Flood Effects on the Growth of Low-Lying Eastern Red Cedars in Kent County, Delaware

Stephanie Stotts, Joseph Howard (Wesley College) & LeeAnn Haaf (Partnership for the Delaware Estuary)

We investigated climate and coastal floods as factors governing growth of 14 eastern red cedars over 52 years at the Delaware National Estuarine Research Reserve. Summer climate had the greatest effects of red cedar growth. Although many grow at very low elevations, we found no evidence that floods have appreciable effects on red cedar growth. We did find lags, however, where reduced growth existed 0-4 years after winter floods and 0-1 years after spring floods.

Coastal Flood Effects on the Growth of Low-Lying American Hollies in Kent County, Delaware

LeeAnn Haaf (Partnership for the Delaware Estuary) & Stephanie Stotts (Wesley College)

We investigated climate and coastal floods as factors governing growth of 43 American hollies over 118 years at the Delaware National Estuarine Research Reserve. Holly growth appeared most affected by spring droughts. Low-elevation hollies grew better than those at higher elevations after cold winters. This is attributable to salt water exposure, which reduces vessel sizes, thus fostering cavitation resistance. Further, hollies experience reduced growth 0-3 years after winter floods and 1-2 years after autumn floods.

The Future of the High Marsh: Forest Retreat and *Phragmites* Spread

Keryn Gedan, Phoebe Shaw, Justus Jobe & Man Qi (George Washington University)

A widespread invasive species, *Phragmites* is becoming still more dominant within marsh plant communities affected by sea level rise. Can its recent increase simply be attributed to the spread phase of the *Phragmites* invasion, or is sea level rise and resulting forest retreat interacting with *Phragmites* invasion dynamics?

Flow Paths for Flooding on the Back-barrier of Slaughter Beach, Delaware

Thomas E. McKenna (University of Delaware, Delaware Geological Survey)

Coastal storms cause flooding in Slaughter Beach. Flooding occurs on the west side of town adjacent to salt marsh, in swales in the barrier interior, and on roads leading to the mainland. Most flooding is likely from tidal surge, but some could be from saturation overland flow caused by the water table rising to the surface due to storm surges and/or rainfall. Drainage pipes between the marsh and swale may be significant pathways for flooding.

Black Duck Restoration Efforts in Salt-water Intruded Ag. Lands

Mike Dryden (The Nature Conservancy)

Since 2017, The Nature Conservancy, along with their partners, have been performing targeted outreach to landowners that are likely or already experiencing the effects of salt water inundation on agricultural fields to discuss conservation options to protect and restore areas on the lower eastern shore for both black duck and water quality habitat. During this process TNC has been working closely with landowners to address their concerns with restoration in ag fields.

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Student Poster Competitors

- 1 Raymond Andrews**
Delaware State University
Investigating Conditions for Wild Oyster Spat Recruitment along the Delaware Coast. *Raymond Andrews, Mirey Kurkcuoglu, and Dr. Gulnihal Ozbay (Delaware State University)*
- 2 Margaret Capoooci**
University of Delaware
Using Automated Measurements to Understand the Patterns and Biophysical Controls on CO2 Efflux in Tidal Salt Marsh Soils. *Margaret Capoooci and Rodrigo Vargas (University of Delaware)*
- 3 Sandra Demberger**
Villanova University
Carbon Sequestration in the Delaware Estuary: Millions of Dollars in Ecosystem Services Lost? *Sandra Demberger, Nathaniel Weston, and Alec Davis (Villanova University)*
- 4 Mohana Gadde**
Delaware State University
Analysis of Carbon and Nitrogen Isotopes to Assess Nutrient Loading in Rehoboth Bay, DE and Its Effects on Oyster Activities. *Mohana Gadde, Memory Nakazwe, Dr. Venu Kalavacharla, Dr. Gulnihal Ozbay (Delaware State University), and Andrew McGowan (The Delaware Center for Inland Bays)*
- 5 Sydney Hall**
Wesley College
Dendroecological Analysis of Salt Stress on Atlantic red Cedar Within the St. Jones Reserve. *Sydney Hall, Dr. Stephanie Stotts (Wesley College), and LeeAnn Haff (Partnership for the Delaware Estuary)*
- 6 Sydney Hall**
Wesley College
Wastewater Treatment and Microplastics: Murderkill River Compared to the St. Jones River. *Sydney Hall (Wesley College), Mike Mensinger, and Kari St. Laurent (DNREC Delaware Coastal Programs)*
- 7 Andrew Hill**
University of Delaware
Small Yet Mighty... The Coastal Salt Marsh: A Comparison of Different In-Situ Sensors and Vegetation Indices for Carbon Modeling in a Spatially Restrictive Ecosystem. *Andrew C. Hill and Rodrigo Vargas (University of Delaware)*
- 8 Emily J. Kottler**
The George Washington University
Light-Limited Flowering of a Migrating Marsh Grass. *Emily Kottler and Dr. Keryn Gedan (The George Washington University)*
- 9 Mirey Kurkcuoglu**
Delaware State University
Tidal Variation in Water Quality in Delaware's Murderkill and Cedar Creek Rivers. *Mirey Kurkcuoglu, Raymond Andrews, Robert Allison, Dr. Venu Kalavacharla, and Dr. Gulnihal Ozbay (Delaware State University)*
- 10 Hannah McGee**
University of Maryland
Use of Leaf Area Index to Describe Plant Abundance in Tidal Freshwater Forested Wetlands. *Hannah McGee, Diane Leason, and Andrew Baldwin (University of Maryland)*
- 11 Catherine Medlock**
University of Delaware
LiDAR Vertical Bias Assessment and Digital Elevation Model Correction of Tidal Salt Marshes in Delaware. *Catherine Medlock, Thomas E. McKenna, John A. Callahan, and Daniel Warner (University of Delaware)*
- 12 Memory Nakazwe**
Delaware State University
Comparing the Ecological Impact of Artificial Oyster Reefs and Oyster Farms on Wild Oyster Restoration, Species Diversity, Predation, and Water Quality Enhancements in Delaware Inland Bays. *Memory Nakazwe and Dr. Gulnihal Ozbay (Delaware State University)*
- 13 Krista Noe**
West Virginia University
Small Mammal Communities in Created and Natural Wetlands in the Central Appalachian Mountains. *Krista Noe and James T. Anderson (West Virginia University)*
- 14 Amanda Kathryn Pappas**
Delaware State University
Monitoring a Toxic Harmful Algal Bloom Species, *Dinophysis acuminata*, in Rehoboth Bay, Delaware, USA. *Amanda K. Pappas, Dr. Gulnihal Ozbay (Delaware State University), Amanda Williams, and Dr. Kathryn Coyne (University of Delaware)*
- 15 Karen Steedhoudt**
Temple University
Adaptive Design for a Resilient Waterfront at the Delaware Botanical Gardens. *Karen Steedhoudt (Temple University)*
- 16 Alma Vazquez-Lule**
University of Delaware
Carbon Dioxide and Methane Exchange at Ecosystem Scale in Tidal Salt Marsh of Delaware. *Alma Vazquez-Lule and Rodrigo Vargas (University of Delaware)*
- 17 Matthew Walter**
University of Delaware
Using Satellite Data to Quantify and Map Wetland Stress. *Matthew Walter and Pinki Mondal (University of Delaware)*
- 18 Jocelyn Wardrup**
University of Delaware
Soil Organic Carbon Datasets and Geomorphology Within Tidal Wetlands Delmarva to Maine, USA. *Jocelyn Wardrup, Mario Guevara, and Rodrigo Vargas (University of Delaware)*

Professional Posters

- 19 Michael Allen**
Rutgers University
Mapping Eastern Black Rail Habitat to Aid Climate Resiliency and Conservation Planning. *Michael C. Allen and Julie L. Lockwood (Rutgers University)*
- 20 Eric Amrhein**
Anita C. Leight
Estuary Center
A Survey of Microplastics in Otter Point Creek. *Eric Amrhein, Kyle Derby, Rebecca Swerida, Kriste Garman (Anita C. Leight Estuary Center)*
- 21 Katie Bartling**
Temple University, AECOM
Thinking Outside the Box: A Study on the Impact of Culvert Design on Watershed Health and Brook Trout Habitat in the Upper Gunpowder River Watershed in Maryland. *Katie Bartling (AECOM)*
- 22 Emily Baumbach**
Partnership for the Delaware Estuary
Developing a Freshwater Mussel Living Shoreline for Water Quality Enhancement and Habitat Uplift along the Schuylkill River in Philadelphia, PA. *Emily Baumbach, Joshua Moody, Danielle Kreeger, and Kurt Cheng (Partnership for the Delaware Estuary)*
- 23 Irina Beal**
Partnership for the Delaware Estuary
Water Quality Uplift Through Bivalve Population Enhancement on the Mispillion Living Shoreline. *Irina Beal, Dr. Joshua Moody, Sarah Bouboulis, Matt Gentry, and Dr. Danielle Kreeger (Partnership for the Delaware Estuary)*
- 24 Sindupa De Silva**
West Virginia University
West Virginia Wetland Water Quality Standards. *Sindupa De Silva, James T. Anderson, Jason A. Hubbard, Ramsey E. Kellner, Mike P. Strager, Christopher T. Rota (West Virginia University), and Elizabeth A. Byers (West Virginia Department of Environmental Protection)*

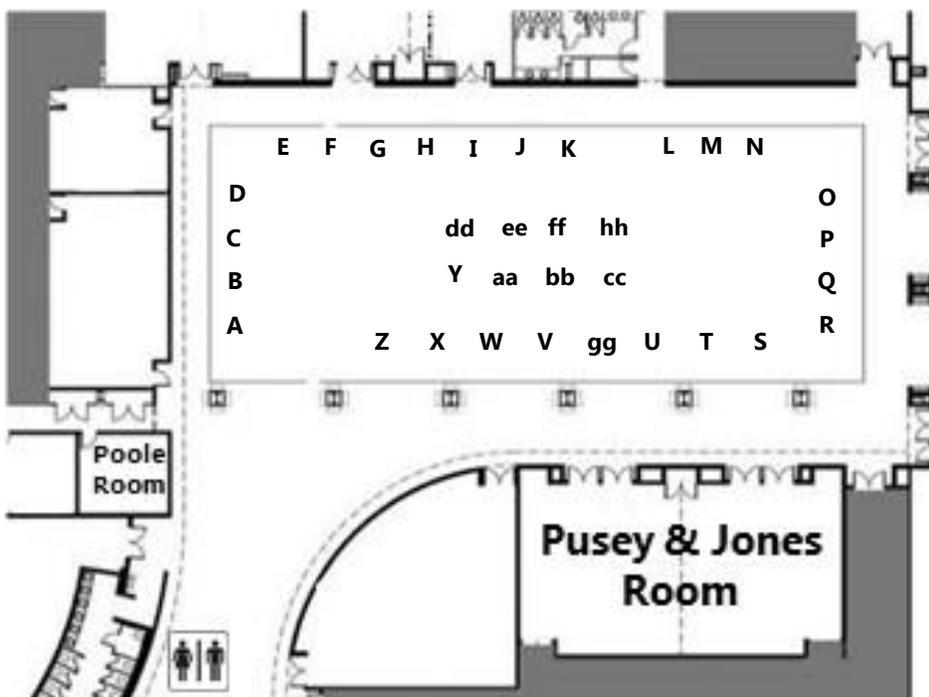
- 25 Mithun Deb**
University of Delaware
Increased Tidal Asymmetry and Channel Erosion from Anthropogenic and Natural Changes in a Multi-Inlet Wetland System: Bombay Hook NWR, DE. *Mithun Deb, James Kirby, Fengyan Shi (University of Delaware, Center for Applied Coastal Research), Susan Guiteras (USFWS, Coastal Delaware NWR Complex), and Ali Abdolali (NOAA, NWS/NCEP/ Environmental Modeling Center)*
- 26 Andrea Habeck**
Jacques Cousteau National Estuarine Research Reserve
Tuckerton Peninsula Salt Marsh System: A Component of the Sentinel Site Program. *Andrea Habeck (Jacques Cousteau National Estuarine Research Reserve)*
- 27 Christopher M. Heckscher**
Delaware State University
Delaware's Top 10 Insect Species of Greatest Conservation Need Most Imperiled by Sea-Level Rise. *Christopher M. Heckscher (Department of Agriculture and Natural Resources, Delaware State University)*
- 28 Michelle Henicheck**
VA Department of Environmental Quality
Using VA's Wetland Condition Assessment Tool for Management Decisions. *Michelle Henicheck and Dave Davis (VA Department of Environmental Quality)*
- 29 Gary Jellick**
Acorn Environmental and Advanced IRIS Oxides
What are IRIS (Indicator of Reduction in Soils) Films and How do They Help my Wetland Assessment? *Gary Jellick (Acorn Environmental and Advanced IRIS Oxides) and Martin C. Rabenhorst (Department of Environmental Science and Technology, University of Maryland)*
- 30 Todd Keyser, P.G.**
DNREC-Remediation Sctn.
Christina/Brandywine River Remediation, Restoration & Resilience. *Todd A. Keyser, P.G. and John G. Cargill, IV P.G. (DE DNREC- Remediation Section)*
- 31 Tara Mazurczyk**
Pennsylvania State University
Riparia Reference Wetland Database: Research & Application. *Tara Mazurczyk, Peter Backhaus, and Elham Nasr (Riparia at Pennsylvania State University)*
- 32 Ryan Mello**
Salisbury University
Remapping the Critical Area. *Ryan Mello (Eastern Shore Regional GIS Cooperative, Salisbury University)*
- 33 Elham Nasr-Azadani**
Pennsylvania State University
Riparia Wetland Database: Education and Outreach. *Elham (Ellie) Nasr-Azadani, Tara Mazurczyk, and Peter Backhaus (Riparia at Pennsylvania State University)*
- 34 Ashley Norton**
DNREC-S&W Section
Revisiting the Delaware Beach Regulatory Building Line. *Stephen Perrin, Jesse Hayden, Ashley Norton, and Jennifer Pongratz (DNREC Division of Watershed Stewardship: Shoreline & Waterway Section)*
- 35 Beatrice O'Hara**
Partnership for the Delaware Estuary
Examining the Morphological Differences Between American Holly Wood Vessels at High and Low Flood Zones in a Delaware Coastal Forest. *Beatrice O'Hara and LeeAnn Haff (Partnership for the Delaware Estuary)*
- 36 Katherine Phillips**
Maryland Coastal Bays Program
A Rapid Assessment of Tidal Wetlands in the Maryland Coastal Bays' Watershed. *Katherine Phillips and Carly Toulan (Maryland Coastal Bays Program)*
- 37 Emily Pirl**
Barnegat Bay Partnership
Bridging Methodological Gaps for Evaluating Coastal Marsh Restoration Performance. *Emily Pirl, LeeAnn Haff, Angela Padeletti, Danielle Kreeger (Partnership for the Delaware Estuary), Jessie Buckner, and Martha Maxwell-Doyle (Barnegat Bay Partnership)*
- 38 Laura Reynolds**
Rutgers University
Long-Term Accretion in Tidal Marshes Along the Delaware River and Bay. *Laura Reynolds, Julie Lockwood, Robert Kopp, and Richard Lathrop (Rutgers University)*
- 39 Kristin Rigney**
EA Engineering, Science, and Technology, Inc. PBC
Chesapeake Bay Derelict Crab Trap Removal for Tidal Mitigation. *Kristen Rigney, Sarah Koser, Julia Klassen (EA Engineering, Science, and Technology, Inc. PBC), H.Ward Slacum Jr. (Oyster Recovery Partnership), and Mark Smith (Maryland Department of Transportation)*
- 40 Nicole Rodi**
DNREC-Division of CC&E
Evaluating Microplastics in Beach Sands in the St. Jones Watershed. *Nicole Rodi, Rachael Faust, and Dr. Kari St. Laurent (DNREC Division of Climate, Coastal, and Energy)*
- 41 Clare Sevcik**
DNREC-NPS
Documenting Freshwater Mussels in Delaware. *Clare Sevcik (DNREC Nonpoint Source Program)*
- 42 Anthony Silva**
DuBois & Associates, LLC
Amphibian Habitat Conservation Through Wetland Mitigation Banking. *Anthony J. Silva (DuBois & Associates, LLC)*
- 43 Sigrid D.P. Smith**
Delaware State University
Mapping the Diversity of Ecosystem Services in Delaware's Coastal Wetlands *Sigrid D.P. Smith and Helen E. Tripp (Delaware State University)*
- 44 Michael Tholstrup**
DNREC-Division of CC&E
A League of Our Own: Delaware's Resilient and Sustainable Communities League (RASCL) *Michael Tholstrup (DNREC Division of Climate, Coastal, and Energy) and Danielle Swallow (DE Sea Grant)*
- 45 Phillip Todd**
Atlantic Reefmaker
Shoreline Protection of Cultural and Coastal Resources at Brunswick Town/Fort Anderson *Phillip Todd (Atlantic Reefmaker), Jim McKee (North Carolina State Historic Sites), and Devon Eulie (University of North Carolina)*
- 46 Kelly Valencik**
DNREC-Division of CC&E
The More the Mightier: Coming Together for Resilient and Sustainable Communities in the Second Smallest State. *Kelly Valencik (DNREC Coastal Programs Office)*
- 47 Shannon Vasquez**
Barnegat Bay Partnership
Paddle for the Edge: Using Citizen Science to Monitor Marsh Shorelines. *Shannon Vasquez, Emily Pirl, Martha Maxwell-Doyle, Erin Reilly (Barnegat Bay Partnership)*
- 48 Christina Whiteman**
DNREC-Division of CC&E
Removal and Monitoring Efforts of Parrot's Feather (*Myriophyllum aquaticum*) at the Blackbird Creek Reserve. *Christina Whiteman and Ewan Malenfant (DNREC Delaware Coastal Programs)*
- 49 Bartholomew Wilson**
USFWS
The Use of Remote Sensing Data and Analysis in Prime Hook NWR Ecosystem Restoration. *Bartholomew Wilson P.G. Ph.D., Susan Guiteras, Nate Bush (Coastal Delaware National Wildlife Refuge Complex, USFWS), and Mark Nardi (USGS)*
- 50 Adrianna Zito-Livingston**
The Nature Conservancy NJ
Vegetative Response to Beneficial Reuse of Dredge Sediment to Restore Marsh Platform at Three Sites in Southern NJ. *Adrianna Zito-Livingston, Doug Faircloth, Laura Crane (The Nature Conservancy), and Metthea Yepsen (New Jersey Department of Environmental Protection)*

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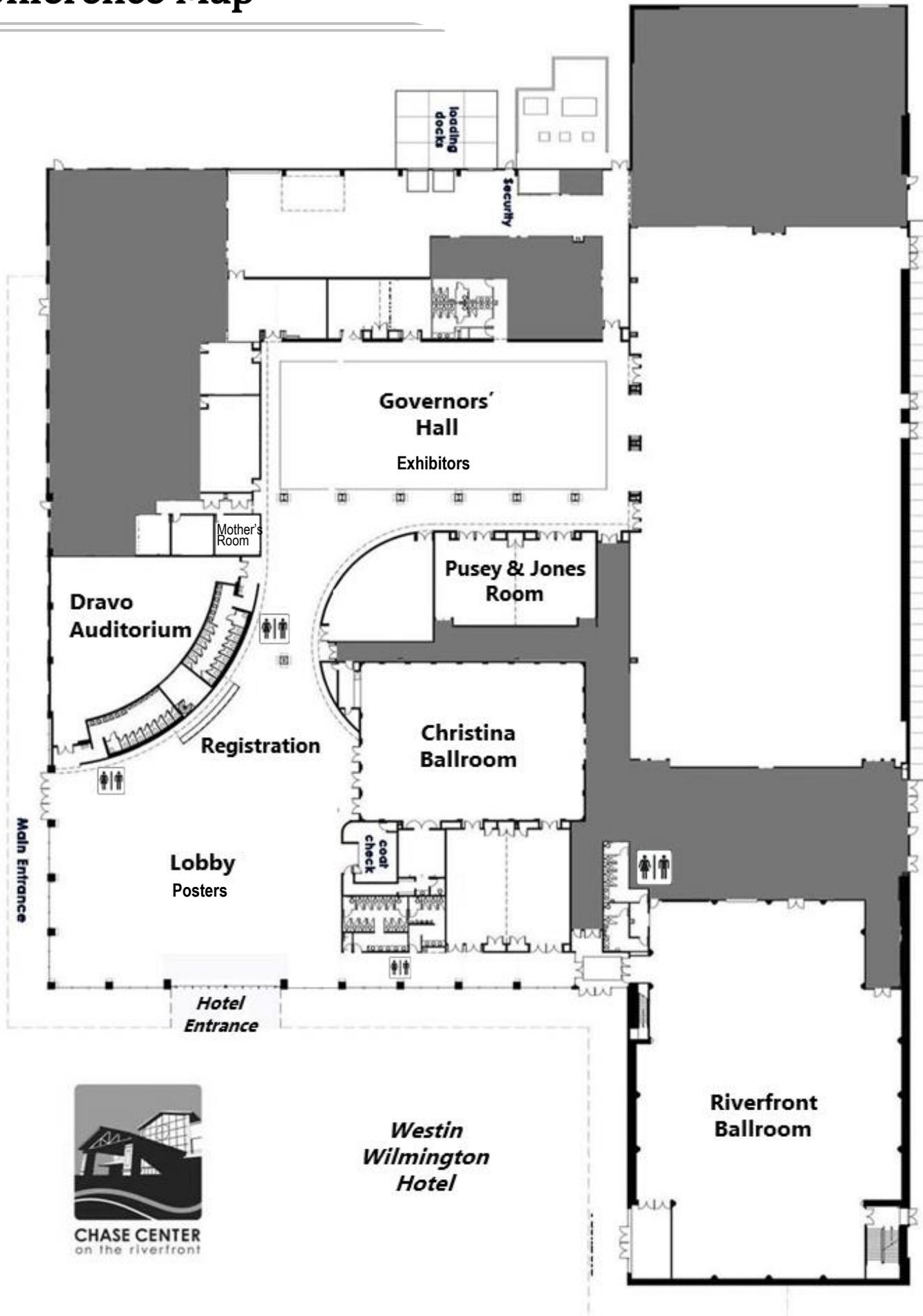


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Notes



A series of horizontal lines for writing notes, consisting of 20 evenly spaced lines.



Anchor QEA supports Resilient and Sustainable Shorelines and Healthy Ecosystems

We live and work along America's shorelines. Our passion is for sustainable long-term management of coastal habitats from a local perspective.

- ▶ Nature based coastal resiliency and risk reduction
- ▶ Wetland and shoreline habitat restoration
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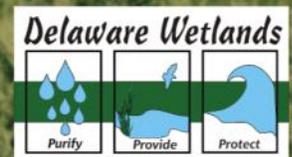


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