Spring online Conference of the New England Estuarine Research Society and the Atlantic Estuarine Research Society

April 27 – 30, 2021

Ahmed Abbas

LOSS OF SALT MARSH PLANTS DECOUPLES THE MARSH-MUSSEL MUTUALISM AND REDUCES THE ECOSYSTEM SERVICE OF NITROGEN REMOVAL. Abbas*, A. (1) A. Cardenas (1), D. LaFond(1), B. Guasaquillo (1), and C. Zarnoch (1,2). (1) Department of Natural Sciences, Baruch College CUNY, New York, NY; (2) Biology Program, Graduate Center CUNY, New York, NY.

The mutualism between cordgrass and ribbed mussels can increase the ecosystem service of nitrogen (N) removal via denitrification. Sea-level rise and eutrophication, however, can lead to mussels persisting where cordgrass has been lost to erosion and inundation. The function of remnant mussel beds, in the absence of cordgrass, remains unclear. We sampled an eroding marsh in Jamaica Bay (NY) to determine mussel density, size, and age in remnant beds and vegetated beds. We also collected sediment cores from remnant mussel beds and adjacent mudflats for continuous-flow incubations to measure nutrient, O_2, and N_2 fluxes. Remnant beds were dominated by larger mussels compared to vegetated beds, suggesting less recruitment to remnant beds. Although previous studies found positive effects of mussels on denitrification, we found similar rates in remnant mussel beds and mudflats. Our study suggests that remnant mussels do not enhance N removal and the mutualism with cordgrass may be key to N removal in eutrophic marshes. ahmed.abbas@baruchmail.cuny.edu

Katherine Altamirano

ENVIRONMENTAL JUSTICE IN THE NARRAGANSETT BAY REGION. Altamirano*, K. and J. Twichell. Narragansett Bay Estuary Program, Providence, RI

In a highly visual online resource—an Esri StoryMap—the Narragansett Bay Estuary Program investigates what environmental justice means to the Narragansett Bay region. Who benefits from environmental amenities such as green space? Which communities are burdened by water pollution, flooding, or other environmental hazards? First, we identify “environmental justice priority areas” using U.S. Census data sourced from EJSCREEN, a nationally recognized U.S. Environmental Protection Agency resource. Next, we present a curated series of interactive maps and data visualizations to facilitate discovery of regional-scale patterns around the distribution of environmental benefits and burdens relative to priority areas. Topics explored include green space, water quality, coastal and inland flooding, traffic, air pollution, urban heat islands, and more. Consistent disparities emerge, revealing opportunities to advance racial equity, to increase success for all communities in the region, and to inform new tools to effect change via our programs. julia.twichell@nbep.org

Nia Bartolucci

(PROPOSED STUDY ON) DETERMINING THE EFFECTS OF THIN-LAYER PLACEMENT OF SEDIMENT (TLP) ON CARBON AND NITROGEN CYCLING IN NEW ENGLAND SALT MARSHES
Bartolucci*, N.N., R.W. Fulweiler. Department of Earth and Environment, Boston University, Boston, MA.

Salt marshes are important 'Blue Carbon' systems that play a significant role in climate change mitigation through their ability to sequester and store carbon. However, salt marsh survival is being threatened as marsh net elevation gain cannot keep pace with sea level rise. Thin layer sediment placement (TLP) is one proposed strategy to boost elevation by applying a sediment to the marsh surface. While TLP may boost salt marsh elevation, few studies have been published on its biogeochemical impacts. In this presentation I will share my proposed research plan so that I may gain feedback and improve my research through feedback from the NEERs community. Briefly, I plan to use an automated gas analyzer and the nitrogen isotope push-pull method, to quantify how TLP alters carbon fluxes (i.e., carbon dioxide and methane) and nitrogen removal, respectively. This research will take place in experimental plots set up in Coggeshall Marsh on Prudence Island, RI and is funded by a NOAA Margaret Davidson Fellowship. barto22n@bu.edu

Katelyn Beissert

THE IMPACTS OF HURRICANE FLORENCE ON SOUTHEASTERN NORTH CAROLINA SEAGRASS MEADOWS.
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Hurricanes occur frequently in the southeastern US, causing large amounts of damage to coastal communities and ecosystems. Of these coastal habitats, seagrass meadows are of particular interest due to their ecological and economic value. Hurricane Florence made landfall in North Carolina (NC) in September 2018. The storm deposited over 36 inches of rainfall, becoming one of the most destructive hurricanes in NC history. Our study aimed to evaluate if Hurricane Florence impacted seagrass meadows in southeastern NC. Using data from 2017 to 2019, we used a series of generalized linear models to assess any differences in regional, species, and yearly biomass (DW g/m^2) and above to below-ground (AG:BG) biomass ratios in the pre- and post-hurricane seasons. We found no significant impacts of Hurricane Florence on our study sites outside of the range of natural variability. To better understand interannual patterns in seagrass response and to help determine how they may be impacted by future disturbances, we recommend continued monitoring. khb2821@unw.edu

Alice Besterman

"RUNNELLING" TOWARD CLIMATE ADAPTATION: ASSESSING A HYDROLOGIC MANAGEMENT STRATEGY FOR SALT MARSHES. Besterman*, A.F. (1,2), R.W. Jakuba (1), L.A. Deegan (2), W. Ferguson (3), D. Brennan (4), J. Costa (5), H.L. Sullivan (2), N.K. Ganju (6). (1) Buzzards Bay Coalition, New Bedford, MA; (2) Woodwell Climate Research Center, Woods Hole, MA; (3) Save the Bay, Providence, RI; (4) Bristol County Mosquito Control Project, Attleboro, MA; (5) Buzzards Bay National Estuary Program, Mattapoisett, MA; (6) Woods Hole Coastal and Marine Science Center, U.S. Geological Survey, Woods Hole, MA.

Interior drowning is a leading cause of salt marsh loss, primarily driven by sea level rise. Runnels are a hydrologic adaptation strategy used to slow, or ideally reverse drowning by draining impounded water and promoting revegetation. While positive outcomes have been observed from runnel adaptation, controlled studies including pre- and post- monitoring are limited. In 2020 our team of scientists and resource managers launched an experimental test of runnels at two marshes in the Buzzards Bay, Massachusetts watershed. Twenty experimental sites were established for monitoring, including 10 treatment and 10 reference sites. Monitoring for a suite of hydrologic, geomorphic, and biotic variables was initiated prior to runnel creation, which occurred in late 2020. We will present our strategy for site selection, our monitoring plan and activities completed to-date. We will describe key questions on runnel function and ecological responses, and how we will use results to advance fundamental salt marsh science and runnel application. besterman@savebuzzardsbay.org

April M.H. Blakeslee

INVASION OF THE BODY SNATCHERS: THE ROLE OF PARASITE INTRODUCTION IN HOST DISTRIBUTION AND RESPONSE TO SALINITY IN INVADED ESTUARIES. Blakeslee, A.M.H (1), D.L. Pochtar (2), A.E. Fowler (2), C.S. Moore (1), T.S. Lee (1), R.B. Barnard (1), K.M. Swanson (1), L. Lukas (1), M. Ruocchio (1), M.E. Torchin (3), A. Whitman Miller (4), G.M. Ruiz (4), C.K. Tepolt (5). (1) Biology Department, East Carolina University, Greenville, NC; (2) Department of Environmental Science and Policy, George Mason University, Fairfax, VA; (3) Smithsonian Tropical Research Institute, Panama City, Panama; (4) Invasion Ecology Laboratory, Smithsonian Environmental Research Center, Edgewater, MD; (5) Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA.

In highly dynamic systems like estuaries, organisms are faced with variable selective forces that may elicit tradeoffs. Salinity is a strong driver of diversity gradients, while parasites can strongly shape species distributions and demography across these same scales. Here, we investigated an invasive, body-snatching parasite (*Loxothylacus panopaei*) and its host crab (*Rhithropanopeus harrisii*) along salinity gradients in two North Carolina rivers. Over a three-year period, we performed field surveys every 6-8 weeks to determine the driving factors of parasite prevalence, host abundance, and associated taxa diversity. We found salinity and temperature significantly affected parasite prevalence, with low salinity sites (<10 PSU) lacking infection, while populations in moderate salinities and warmer temperatures reached infection prevalence as high as 60%. Further, host population abundance was negatively associated with parasite prevalence. Additionally, because hosts may have a refuge from infection in low salinity waters, we carried out a lab experiment to investigate host response (time-to-right and transcriptomics) to salinity. Crabs from the lowest salinity source had a marginally slower righting response. Host gene expression was highly plastic to acclimation salinity, with a handful of osmoregulatory and immune-related genes demonstrating source-dependent salinity response. Also,

support for selection on standing variation was found in a genetic marker whose allele frequency was strongly correlated with salinity across both rivers. Altogether, our study illuminates the selective tradeoffs that may exist in natural systems and how they can shape host evolutionary ecology.
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Chloe Brownlie

EFFECTS OF A LARGE-SCALE NATURAL SEDIMENT ADDITION EVENT ON MACROINVERTEBRATE COMMUNITIES IN A NEW ENGLAND SALT MARSH. Brownlie*, C. (1) G.E. Moore (1), M.C. Tyrrel (2), R.E. Grizzle (1). (1) Department of Biological Sciences, University of New Hampshire, Durham, NH; (2)Waquoit Bay National Estuarine Research Reserve, East Falmouth, MA.

Invertebrates play a vital role in salt marsh ecosystems by cycling nutrients and connecting trophic levels. Sediment accretion in marshes constantly builds substrate for invertebrates to exploit. However, during winter storm Grayson in January of 2018, ice rafting deposited an average of 30.1+/- 2.1mm across extensive areas of the Great Marsh in Massachusetts. We hypothesized that sediment addition would impact the abundance and diversity of invertebrates in the marsh since the literature suggests marsh taxa are sensitive to disturbance and slow to recover. Sediment cores were collected from 3 sites in Massachusetts that received ice-rafted sediment to identify and quantify benthic macroinvertebrates. Preliminary analyses show that diversity and total animal count were not significantly impacted by the event. Oligochaeta and *Ecrobia truncata* were the most abundant taxa. A companion study is ongoing to see if genomic analyses provide a more complete representation of the sediment community.
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Christine E. Bruno

EXPLORING THE IMPORTANCE OF MICROPLASTIC AS A VECTOR OF METALS TO SUSPENSION FEEDERS. Bruno*, C.E.(1), W.G. Wallace (2). (1) Earth and Environmental Sciences, The Graduate Center, CUNY; (2) Biology Department, College of Staten Island, CUNY.

Microplastics (MP) are now ubiquitous in every marine system on the planet. Some MPs are similar in size to suspended sediment particles and algae and, as such, they may be ingested by marine filter feeders. Metals readily adsorb to the surface of plastic particles, ingestion therefore represents a pathway for plastic and associated toxins to enter and be transferred within the food web. This study aims to answer the following question: Do MPs serve as a vector of toxic metals, specifically Cd, when consumed by a model marine zooplankton, *Artemia salina*? To answer this question *A. salina* were fed MP particles with adsorbed Cd-109 or a mixture of MP particles and algae. Subsequent to feeding, *A. salina* were allowed to depurate and were radio analyzed every 30 minutes for 2 hours. Preliminary results suggest that *A. salina* assimilate greater amounts of Cd associated with MP particles when fed a mixture of algae and MP compared to when fed MP alone and do serve as a vector of toxic metals.
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Cody Carroll

RESTORING OYSTER REEFS AT CITY ISLAND: A COLLABORATION BETWEEN THE ACADEMY AND A COMMUNITY Carroll*, C., T. Preuss. Hunter College, New York, NY.

In the 1800's, City Island, a small community in the Bronx, had an oyster population plentiful enough to economically support many of its residents. Today, the natural oyster population has declined to fewer than 900 oysters. City Island Oyster Reef (CIOR) is a grassroots organization formed in response to local residents' desire to bring oysters back to their bays. CIOR has partnered with a dedicated group of scientists and volunteers to systematically collect data for the purpose of determining the most suitable locations for successful oyster reef restoration. Beginning in 2019, data collection was initiated with a spat and biodiversity recruitment experiment. In January of 2020, beach surveys began in order to quantify the current oyster population. Finally, in August of 2020, four oyster research stations were placed around the island to be monitored for oyster survival and growth. Data collection will continue throughout 2021, culminating in an application for permits at the end of the year.
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Katherine A. Castagno

ESTUARINE SEDIMENTATION MONITORING PROTOCOLS FOR THE HERRING RIVER RESTORATION PROJECT, CAPE COD, MA Castagno*, K.A. (1,2), M. Borrelli (1,2), T. Smith (3), F. Peri (2). (1) Center for Coastal Studies, Provincetown, MA; (2) School for the Environment, University of Massachusetts Boston, Boston, MA; (3) Cape Cod National Seashore, Wellfleet, MA.

The Herring River Restoration Project seeks to restore the 1,100-acre estuary that opens into Wellfleet Harbor, MA. Replacement of tidally-restrictive structures installed in the early 20th century is expected to reestablish hundreds of acres of intertidal salt marsh, in turn promoting associated ecological functions. Wellfleet's shellfishing industry was valued at $6.8 million in 2018. The restoration project will increase tidal flushing and reduce the ~90 acres of shellfish harvest area downstream that is currently closed seasonally or permanently due to contaminated discharge from the restricted Herring River. There are concerns, however, that changes to sediment transport associated with the restoration may negatively impact the aquaculture operations in the Wellfleet Harbor. We present a set of monitoring protocols to determine the fine-grained sediment transport dynamics and related water quality parameters associated with the Herring River Restoration Project. kcastagno@coastalstudies.org

Jack Cerra

QUANTIFYING BLUFF EROSION ALONG THE WESTERN SHORELINE OF BLOCK ISLAND, RHODE ISLAND USING AIRPORNE LiDAR Cerra, J. and B.A. Oakley. Environmental Earth Science, Eastern Connecticut State University, Windham, CT.

Bluff erosion along the western Block Island, Rhode Island shoreline between Dories Cove and Charleston Beach was quantified using Airborne Light Detection and Range (LiDAR) data from 2011, 2012, 2014, and 2018. The annualized volume of sediment eroded here is roughly 5,000 m^3 yr^{-1} but varied within the data. Construction of a jetty at the inlet of Great Salt Pond has disrupted longshore transport, depositing sediment in the inlet where it is later dredged. Dredging from 2012–2017 removed roughly 11,500 m^3 yr^{-1} of sediment from Great Salt Pond. The volume of sediment dredged is roughly double the total volume of sediment estimated to have eroded from the study area. Differences in volumes can be attributed to sediment input from bluffs further south, cross-shore sediment transport, and LiDAR uncertainty. Future studies seek to analyze transects towards Southwest Point likely accounting for most of the remaining sediment dredged, developing a more accurate sediment budget. oakleyb@easternct.edu

Lena Champlin and Haley Carlton (co-presenters)

SPATIAL AND TEMPORAL VARIABILITY OF COASTAL ACIDIFICATION IN A EUTROPHIC ESTUARY. Champlin*, L.K., H. Carlton*, E.B. Watson. Drexel University and the Academy of Natural Sciences, Philadelphia, PA.

Many coastal zones and estuaries are experiencing enhanced rates of ocean acidification. In addition to increasing atmospheric carbon dioxide, eutrophication can exacerbate coastal pH declines. Elkhorn Slough, a eutrophic estuary in central California, is an important focal area for studying coastal acidification. This study examined the temporal and spatial variability of acidification within the Slough using 25 years of pH monitoring at 22 sites. Carbonate chemistry was modeled at 6 sites from 2018 to 2019. Results indicate that diel and seasonal variability of pH was greater in sites further from the marine inlet. However, the higher alkalinity limits aragonite undersaturation in these tidally restricted areas. Dissolved oxygen and pH had the strongest correlation at sites with a moderate tidal range suggesting the greatest influence of biomass decomposition on pH in these mid-tidal areas. This study underscores the complexity of processes, including tidal flushing and buffering, on the acidification of eutrophic estuaries. lkc45@drexel.edu

Tyler Chidsey

N2O EMISSIONS FROM TEMPERATE SEAGRASS MEADOWS ARE HIGHLY VARIABLE Chidsey*, T.(1,2), A.N. Al-Haj (1) and R.W. Fulweiler (1,2). (1) Department of Earth and Environment, Boston University, Boston, MA
(2) Department of Biology, Boston University, Boston, MA.

There is growing interest in using seagrass carbon storage to mitigate climate change. To understand the true carbon storage potential of seagrasses, their greenhouse gas emissions must be measured. There are only three published studies quantifying nitrous oxide (N_2O) emission from seagrass meadows despite N_2O having a sustained flux global warming potential 270X that of carbon dioxide. We quantified N_2O fluxes across the sediment-water interface from two *Zostera marina* meadows in Massachusetts. Preliminary analysis shows N_2O fluxes from seagrass and bare sediment are variable and not

significantly different from each other (mean; seagrass=-1.86 ± 20.7 nmol $m^{-2}h^{-1}$, non-vegetated=-8.72 ± 5.0 nmol $m^{-2}h^{-1}$; ANOVA p=0.744, F=0.108). These fluxes are much less (i.e., 14-200X lower) than those reported for other seagrass systems. Next steps include examining environmental conditions that may drive these fluxes. chidsey@bu.edu

Theresa Davenport

RECRUITMENT ENHANCEMENT VARIES BY TAXONOMIC GROUP AND OYSTER REEF HABITAT CHARACTERISTICS Davenport*, T.M. (1), A.R. Hughes (1), P.S.E. zu Ermgassen (2), J.H. Grabowski (1). (1) Marine Science Center, Northeastern University, Nahant, MA; (2) Changing Oceans Group, School of Geosciences, University of Edinburgh, Edinburgh, EH9 3FD, UK

The rapid loss of coastal and estuarine biogenic habitats has reduced the delivery of valuable ecosystem services, increasing calls for habitat restoration. Yet, limited information on how restored habitat characteristics influence ecosystem service delivery may reduce restoration effectiveness. We assessed the influence of reef type (natural or restored), nekton taxa, and restored reef size, vertical relief, age, and tidal zone on recruitment enhancement for fish and swimming crabs via meta-analysis. Restored reefs enhanced recruitment of six families, while natural reefs enhanced recruitment of one family. Resident nekton families were more consistently enhanced than transients. Recruitment enhancement increased with reef size across taxa and decreased with higher vertical relief for two families. Understanding variation across taxa in response to key design elements will improve restoration success and return on investment. We recommend factorial studies of nekton recruitment responses to multiple reef habitat characteristics. davenport.th@northeastern.edu

Sam Dickran

TOWARD REMOTE SENSING OF MARSH VULNERABILITY: USING VEGETATION CHARACTERISTICS TO INDICATE ROOT BIOMASS IN COASTAL WETLANDS OF LONG ISLAND. Dickran*, S.S., C. Wilkinson, D. Pascucci, S. Serbin and S. Baines. Department of Ecology and Evolution, Stony Brook University, Stony Brook, NY.

Root biomass helps stabilize platforms of coastal marshes against storms and contributes to accretion of the platform as sea levels rise. Reduced plant allocation to root biomass can result from increased inundation and nutrient inputs, leading to erosion at marsh edges or ponding in the marsh interior. We collected sediment cores and plant allometric data from 6 Long Island marshes to establish a link between easily observable above ground traits and below ground processes. Our data show a significant relationship between the height of marsh grasses and the root biomass content of the sediments below those grasses. We also demonstrate how advances in unmanned canopy sensing can be used in coastal environments to observe vegetation traits with high spatial and spectral resolution. These results support a non-destructive and spatially explicit methodology for observing marsh system characteristics by detecting the allometric properties of vegetation through advanced remote sensing. sam.dickran@stonybrook.edu

Jason Eklund

VISUALIZING 63 YEARS OF VEGETATION DYNAMICS ON A CONNECTICUT TIDAL MARSH. Eklund*, J.A, M. Sax, and R.S. Warren, Connecticut College, New London, CT.

The *ca.* 1 ha Mamacoke saltmarsh on the Thames River, CT connects Mamacoke Island to the mainland. Vegetation was mapped in 1957, 1975, 1983, 1991, 1997, & 2020 by assembling field drawn communities within 15x15m grid boxes. Data sheets were digitized, uploaded to ArcGIS, and with kriging interpolations, were assembled into vegetation maps for each year. The general vegetation pattern has remained stable: narrow bands of tall *S. alterniflora* (Sat) along N and S coves, *Spartina patens* on cove-front levees, and a large short *S. alterniflora* (Sas) panne between the two levees. There have, however, been some striking changes in individual species. *Juncus gerardii*, common until 1997, was nearly gone in 2020, perhaps driven by RSLR. *Distichlis spicata* cover varied but fell from 1991 to 2020, opposite of what would be predicted from RSLR. The central Sas panne varied in size and plant cover over the years; some shifts may reflect short term RSLR as well as tide range change with the metonic cycle. jeklund@conncoll.edu

Brianna Fischella

THE LATEST TRENDS IN NEW ENGLAND SALT MARSHES: USING NERR SENTINEL SITE DATA TO INFORM COASTAL WETLAND MANAGEMENT Fischella*, B.(1), D. Burdick (2), C. Peter(1), K. Raposa (3), M. Tyrrell (4), J. Allen (4), J. Mora (4) C. Feurt (5), J. Goldstein (5) L. Crane (5). (1) Great Bay National Estuarine Research Reserve; (2) University of New Hampshire; (3) Narragansett Bay National Estuarine Research Reserve; (4) Waquoit Bay National Estuarine Research Reserve; (5) Wells National Estuarine Research Reserve.

Sea level rise and climate change present major threats to salt marshes nationwide. The National Estuarine Research Reserves established Sentinel Sites around the country to track and understand impacts to salt marshes from these and other stressors. Although sites had been monitored for 7+ years by 2018, most Reserves had not yet analyzed their marsh monitoring data. In this project, researchers from the UNH and the four New England Reserves conducted the NERRS' first regional trend analysis of Sentinel Site vegetation and marsh surface elevation change in response to sea level rise. Univariate and multivariate data analyses revealed significant changes across New England, particularly in southern Reserves with smaller tidal ranges. Other project outputs include a "How To" report detailing methodologies including a novel method to integrate different cover estimate data (point-intercept and ocular cover), monitoring recommendations, and individual-Reserve trends. christopher.peter@wildlife.nh.gov

Anne Giblin

NITROGEN CYCLING IN THE COASTAL ZONE: ANYTHING NEW LEFT TO SAY? Giblin, A.E., The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA

New microbial methods and isotope tracing techniques have revealed a host of nitrogen cycling processes that were unknown a few decades ago. The importance of these processes varies greatly across different coastal and marine habitats. Data over the last decade suggests that dissimilatory nitrate reduction to ammonium (DNRA), a nitrogen conserving process, may be particularly important in many coastal marshes and sea grass beds. DNRA rates can exceed those of denitrification and may be facilitated by plant/microbe associations. In many respects, this makes ecological sense. Plants which occur in what is normally a nitrogen limited environment would benefit by creating conditions that conserve nitrogen rather than denitrification. How does this change with N loading? Understanding how the ratio of DRNA/denitrification changes with eutrophication is a critical question to know if we wish to understand the role of marshes as nitrogen sinks. agiblin@mbl.edu

Peter Groffman

RESTORATION, REDEVELOPMENT, REVITALIZATION AND NITROGEN IN A COASTAL WATERSHED Groffman, P.E. Advanced Science Research Center at the Graduate Center, University of New York, NY and Cary Institute of Ecosystem Studies, Millbrook, NY.

Using funding from the National Science Foundation (NSF) Coastal Sustainability and Long Term Ecological Research programs, we have addressed interactions between biophysical and social science factors that underlie the effects of urbanization on coastal sustainability. A team of ecologists, engineers, geographers, sociologists and economists evaluated the nitrogen benefits and public support for a series of old and new stream restoration projects in the Baltimore, MD area and determined if the nitrogen benefits of these restorations and other green infrastructure interventions are significant and visible in watershed-scale nitrogen mass balances. We assessed the willingness of stakeholders to adopt these interventions in neighborhoods varying in socio-economic status and distance to the coast. This information was used to identify “sweet spots” within the urban to exurban complex where social and biophysical factors converge to create opportunities for restoration and revitalization. pgroffman@gc.cuny.edu

Justin Hayes

PATHOGEN TESTING IN NEW YORK HARBOR: HOW COMMUNITY SCIENTISTS AND STUDENTS CAN HELP TO FILL DATA GAPS IN SEWAGE CONTAMINATION Hayes*, J.S.(1), C. Roble (1), R. Buchanan (2). (1) Hudson River Park Trust, New York, NY; (2) Billion Oyster Project, New York, NY.

A consequence of New York City's combined sewer system is that storm events cause sewage to flow into local waters. Since 2011 the Citizens' Water Quality Testing Program (CWQTP) has amassed a database on harbor pathogens comprising nearly 10,000 separate test results. The CWQTP operates for 20 consecutive weeks from May to October. Samples are collected weekly and brought to designated labs where the Idexx Enterolert system is used to process and analyze them for the fecal indicator bacteria *Entercoccus sp.* Results are color coded based on NYC Department of Health standards and posted weekly, online, making the data publicly available and accessible. The data are used for safety advisement, education, and advocacy purposes. This year, in a new initiative, we will work closely with a range of students and professionals to develop curriculum, independent research projects, and real-time data displays. jhayes@hrpt.ny.gov

Melissa Herring

MONITORING CHANGES IN SPARTINA ALTERNIFLORA GROWTH ACROSS A SOUTHERN NEW ENGLAND WATERSHED Herring, M.*(1,2), A. Besterman (2,3), R. Jakuba (2). (1) Northeastern University, Boston, Massachusetts; (2) Buzzards Bay Coalition, New Bedford, Massachusetts; (3) Woodwell Climate Research Center, Woods Hole, Massachusetts.

Salt marshes in the Buzzards Bay, Massachusetts watershed are understudied despite widespread observations of rapid dieback and erosion. In 2019, Buzzards Bay Coalition launched a system-wide long-term monitoring program to assess baseline conditions and begin tracking annual changes. At 11 marshes, we established permanent transects extending from the high-tide line to the creek edge. Across sites, a total of 220 permanent plots were strategically located to capture distinct vegetativecommunities. The plots were split into quadrants, and the 3 tallest *Spartina alterniflora* stems from each quadrant were recorded, generating over 2,500 unique observations per year. Stem height statistics were calculated for different growth forms of *S. alterniflora* for 2019-2020. Differences in stem height between and within marshes along environmental gradients will be presented. Understanding baseline patterns will improve conservation and management of salt marshes affected by sea level rise and other stressors in New England. herring.m@northeastern.edu

Georgie E. Humphries

ASSESSING TRENDS IN BACTERIAL ABUNDANCES AND HYPOXIA IN WESTERN LONG ISLAND SOUND DURING 2020 Humphries*, G.E. (1,2); J. Espinosa (1), Z. Roldan Ayala (1,2), S. Angles (1), M. Tzortziou (3), J. Goes (4), D.I. Greenfield (1,2). (1) Advanced Science Research Center at the Graduate Center, City University of New York (CUNY), New York, NY; (2) School of Earth and Environmental Sciences, Queens College, CUNY, Flushing, NY; (3) City College Center for Discovery and Innovation, CUNY, New York, NY;; (4) Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY.

High nitrogen (N) inputs into Long Island Sound (LIS) from combined sewer overflow systems, runoff, groundwater, atmospheric deposition, and other sources are known to fuel seasonal bottom hypoxia in Western LIS (WLIS). However, bacterial abundance responses to N inputs and phytoplankton biomass in WLIS have been largely under-reported in recent years, leaving a gap in our understanding of hypoxia dynamics. N-utilization by phytoplankton contributes to the fixation of inorganic carbon. The subsequent production of dissolved organic matter (DOM) becomes an autochthonous dissolved organic carbon (DOC) source for heterotrophic bacteria, fueling bottom water microbial biological production in WLIS. This study evaluates WLIS nutrients (N and P), as well as DOC, chlorophyll a, bacterial abundances, and water quality from ship-board surveys. Here we report preliminary findings (July to October 2020) that assess microbial population and nutrient levels across multiple stations and depths. Data can inform predictions of hypoxia events. georgia.humphries42@gmail.cuny.edu

Carissa Hunter

POREWATER AND SURFACE WATER ANALYSIS IN THE TIDAL FRESHWATER POTOMAC RIVER FOR THE PRESENCE OF PHARMACEUTICAL AND PERSONAL CARE PRODUCTS Hunter*,C and G. Foster. Department of Chemistry and Biochemistry, George Mason University, Fairfax, VA.

Porewater is the water held between the pores within soil or sediment. It is a very under-studied sub-compartment in environmental chemistry, though it can provide valuable information regarding environmental fate. This is because porewater regulates the transport of chemicals into and out of sediment. Pharmaceutical and Personal Care Products (PPCPs) are your over-the-counter medications, cosmetic, hygiene, and hormone products. With the increased daily use of these products, they have entered and impacted our environment in numerous ways, including the tidal freshwater Potomac River (TFWPR) in the Capital Region. Surface water, porewater and sediment were collected along the TFWPR in order to analyze for the presence of PPCPs. Results via liquid-chromatography mass spectroscopy provided data on the concentrations of PPCPs. We concluded that PPCPs in porewater compared to surface water were much greater. This evaluation of the fate and effects of these chemicals are important for potential risk assessments. chunte14@gmu.edu

Amelia Hurst

LINKING HUMAN ACTIVITIES TO COASTAL WATER QUALITY IN SOUTHERN NEW ENGLAND: PAST AND PRESENT Hurst* A., C. Tobias (1), J. Vaudrey (1), E. Ouimet (2), W. Ouimet (3). University of Connecticut Department of (1) Marine Sciences; (2) Anthropology; (3) Geoscience and Geography.

This project examines the timing and effect of direct and indirect anthropogenic influences on the marine environment in embayments in southern New England over the past decades to century timescale. We investigated the effects of human land-use from colonial through post-industrial times, determined baseline conditions and natural climatic variability, and analyzed the response of marine ecosystems to specific local management actions aimed to improve water quality. A coastal sediment core was taken in Mumford Cove, CT and was analyzed downcore for eutrophication markers (C:N, %C, %N, $\delta^{15}N$, $\delta^{13}C$) and metals (Hg, Pb, Cu, and Zn). Analyses used include Elemental Analyzer/Isotope Ratio Mass Spectrometry (EA/IRMS) for eutrophication markers, X-Ray Fluorescence (XRF) and Mercury Analyzer for metals, and archival research to obtain relevant local histories. Preliminary results suggest major ecosystem shifts that track across all measurements, indicating both direct and indirect anthropogenic influences. amelia.hurst@uconn.edu

Beryl C.M. Kahn

ACUTE EFFECTS OF ACIDIFICATION ON SEDIMENT NUTRIENT CYCLING IN SHINNECOCK BAY, NY. Kahn*, Beryl C.M. (1,2); C. Zarnoch (1,2), A. Lowell (3), B. Peterson (3). (1) Biology Program, Graduate Center CUNY, New York, NY; (2) Department of Natural Sciences, Baruch College CUNY, New York, NY; (3) School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY.

Nitrogen (N) loading contributes to degradation of coastal habitats through harmful algal blooms, habitat loss, and hypoxia. Strategies to enhance reactive N removal through denitrification has been identified as vital to continuing ecosystem services and improving long term coastal stability. However, it is unclear how coastal acidification will impact sediment nutrient cycling. We measured nutrient cycling in sediment cores from intact Zostera marina meadows and bare-sand habitats in Shinnecock Bay NY in a continuous-flow system with acidified and N enriched treatments. Under ambient conditions, N fixation was the dominant pathway for both habitats; however, under acidified conditions denitrification was dominant. The sediment N_2 flux was higher in eelgrass than sand habitats under acidified/N enriched treatments. This adds to our understanding of the service of N removal and internal N recycling that sustains eutrophic conditions. Documenting changes to N pathways under coastal acidification can inform efforts to manage N loading. bkahn@gradcenter.cuny.edu

Marissa Kordal

ALTERED GAMETOGENESIS GENE EXPRESSION OF THE EASTERN OYSTER (*CRASSOSTREA VIRGINICA*) IN RESPONSE TO PLASTIC EXPOSURE. Kordal*,M.L. and L.Eierman. Department of Biology, SUNY Cortland, Department of Biology, SUNY Cortland.

Marine plastic pollution leaches chemicals that cause detrimental effects such as reduced fecundity and feminization of males in marine species. The eastern oyster, *Crassostrea virginica*, is a valuable species to study the effects of plastic on sex differentiation because it is a protandric hermaphrodite that undergoes gametogenesis yearly. My objective was to investigate a potential cause of an observed female-skew in the sex ratio of first year oysters exposed to plastic by measuring differential gene expression of eight gametogenesis genes from oysters grown on plastic compared to those on shell. Plastic exposure increased the expression of genes involved in egg production for females and reduced the variation in expression for males. The results suggest plastic may be altering gene expression in a way that results in a female-skewed sex ratio as observed in plastic-exposed oysters.
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Brandon Lenberger

ASSESSING THE NUTRIENT-REMOVAL POTENTIAL OF FLOATING TREATMENT WETLANDS IN A MESOCOSM FIELD EXPERIMENT Lenberger*, B. and M. Alldred. Center for Earth and Environmental Sciences, SUNY Plattsburgh, Plattsburgh, NY.

Inputs of nutrients (*e.g.*, nitrogen and phosphorus) to aquatic ecosystems lead to increased algal production and anoxia, with negative consequences for ecosystem and human health. Floating treatment wetlands (FTWs) offer one solution for removing excess nutrients. We monitored nutrient uptake and plant growth for three FTWs, relative to a non-vegetated control, under field conditions on Long Island, NY. FTWs equilibrated for several days and were then exposed to site-collected water from Lake Ronkonkoma. Water samples were collected daily from each mesocosm for an 11 day period and analyzed for dissolved nutrients using standard colorimetric techniques. We measured species-specific plant height, percent cover, and root length on Days 0, 11 and 22. Aboveground and belowground biomass and new root growth were harvested, dried and weighed. Preliminary results indicate great potential for nutrient removal in plant biomass. In the future, we plan to quantify *in situ* rates of nutrient removal processes. blenb001@plattsburgh.edu

Erika Lentz

FUTURE COASTAL HAZARDS: UNCERTAINTY, DECISION-MAKING, AND WHAT'S AT STAKE, Lentz, E.E. U.S. Geological Survey, Woods Hole, MA

Decision makers face a dizzying array of information available for evaluating future coastal vulnerability and options for acting on that information. Challenges include understanding where land loss and landscape change are most likely, changes to the landscape in response to a specific rise in sea level at a particular point in time, and evaluating the consequences of different adaptation actions (or inaction) that may be taken. Delivering products that furnish this information in useful form requires an in-depth understanding of decision-making needs, research gaps and capabilities, and a recognition of communication nuances among researchers and end users. Decision-science can facilitate collaborations between coastal researchers and stakeholders, informing research approaches and improving dissemination of hazard information – in accessible forms such as tools, websites, and

publications – to increase its utility and accessibility to a variety of users, such as resource managers, coastal homeowners, and the general public. elentz@usgs.gov

Justin Lesser

UNDERSTANDING THE IMPACT OF ENVIRONMENTAL SETTING ON TEMPORAL AND SPATIAL TROPHIC NICHE VARIABILITY IN PLUM ISLAND ESTUARY, MA Lesser*, J.S. (1); R.H. Garritt (2), L.A. Deegan (3), and J.A. Nelson (1). (1) Department of Biology, University of Louisiana at Lafayette, Lafayette, LA; (2) Marine Biological Laboratory, Woods Hole, MA; (3) Woodwell Climate Research Center, Woods Hole, MA

A confluence of factors establishes the environmental context of food webs. This context varies greatly over time and across space and is rarely investigated by long-term studies that match the full range of extremes possible for the system. Here, we synthesize 10 years of environmental and food web data across Plum Island Estuary (MA) to identify potential drivers of food web niche metrics. While many factors correlated with species' niche metrics over time, these factors differed across space, due to contrasting environmental context of sites, and between species, due to different modes of consumption and requirements for specific blends of production channels. Additionally, environmental factors acted on niche components independently, highlighting the complex influence of context on food webs. This study highlights the importance of setting in understanding the nature of long-term food web dynamics and seeds future explorations of specific environmental drivers of energy flow in highly dynamic systems. justin.lesser@louisiana.edu

Joseph Luczkovich

LINKING FISHING BEHAVIOR AND ECOSYSTEM DYNAMICS USING SOCIAL AND ECOLOGICAL NETWORK MODELS Luczkovich*, J.J.(1), J.C. Johnson (2); R.A. Deehr (3), K.J. Hart (4), L. Clough (5), and D. Griffith (6). (1) Department of Biology, East Carolina University, Greenville, NC; (2) Department of Anthropology, University of Florida, Gainesville, FL; (3) The Hutchison School, Memphis, TN; (4) North Carolina Division of Coastal Management, Washington, NC; (5) The National Science Foundation, Wilson Avenue, Arlington, VA; (6) Department of Coastal Sciences, East Carolina University, Greenville, NC.

We studied an estuary as a social-ecological system, examining impacts on multiple species from fisheries. We linked fisher behavioral networks with a food-web network model of an estuarine ecosystem and its commercial fisheries. Fisher behavioral networks were created from reported catches of species from individual fishers along with the gear fished to create an affiliation network to model "switching pathways". We simulated a gill net ban and the fishing effort under two scenarios: Scenario 1, no gill net fishing effort; Scenario 2, no gill net fishing effort with increased effort in alternative gear using the predicted switching pathways for the affiliation network. Scenario 1 predicted an increase in Paralichthys biomass over a decade. Scenario 2 predicted a switch from gill nets to pound nets, which produced a 7% decline in flounder biomass over ten years. The gillnet ban with increased effort due to switching is predicted to have the opposite effect on the conservation goal, which was to increase flounder stocks. luczkovichj@ecu.edu

Laura Lukas

BIOLOGICAL INTERACTIONS BETWEEN HOSTS, PARASITES, AND MERCURY Lukas*, L.C., A.M.H. Blakeslee and C.S. Moore. Department of Biology, East Carolina University.

Sea level rise is becoming an inevitable fate for coastal regions worldwide. One biogeochemical impact of sea level rise is a chemical reaction by anaerobic bacteria in the sediment, which converts inorganic forms of mercury into methyl-mercury. Methyl-mercury then can bioaccumulate and magnify through trophic levels. Research suggests that parasitized animals tend to have lower levels of methyl-mercury within their bodies than unparasitized conspecifics. Parasite diversity has also been shown to positively correlate with salinity, providing opportunities for estuarine species and their parasites to enter into new areas with enhanced salinization. Sites were chosen within two estuaries in North Carolina. Collection methods of target species include deployment of passive sampling devices. Target species include: naked gobies and mud crabs. Because these species are residential, they are good models to study the in situ impacts of mercury levels and parasite abundance along a salinity gradient.
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Eric Mazur

IDENTIFYING BACTERIAL PATHOGENS OF REEF-FORMING CORALS USING LASER CAPTURE MICRODISSECTION Mazur, E.V., E.C. Peters and J.L. Salerno. Department of Environmental Science and Public Policy, George Mason University, Fairfax, VA.

The impact of infectious diseases on reef-forming corals has sharply increased in recent years. In order to effectively mitigate the impacts of disease, more information needs to be collected on the agents that are accelerating the decline of these important species. Many of the modern methods applied in medical research can be adapted to the study of coral disease and provide valuable insights. We have developed a working protocol in which laser capture microdissection can be used to remove suspected bacteria from formaldehyde-fixed and paraffin-embedded coral tissue for identification with 16S SSU sRNA sequencing. The application of this method to the study of coral disease will aid in the identification of the etiological agents of diseases for which none have previously been identified.
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Claudia Mazur

RATES AND CONTROLS OF DISSIMILATORY IRON REDUCTION IN MARINE SEDIMENTS Mazur*, C.I.(1), R.W. Fulweiler (1)(2). (1) Department of Earth and Environment, Boston University, Boston, MA; (2) Department of Biology, Boston University, Boston, MA.

The importance of dissimilatory iron reduction (FeR) as a pathway for carbon oxidation in marine sediments is debated. Clarifying its role in coastal carbon oxidation is important because it drives the distribution of metals and nutrients. Here we provide a synthesis of published literature on FeR rates in salt marsh, mangrove, intertidal flat, subtidal coastal, and continental shelf sediments. We also describe the environmental drivers of FeR. Our findings show salt marshes had highest FeR rates (median (±mad): 37.6 ±20.6 μmol C m^{-2} d^{-1}), while continental shelves had the lowest (0.09 ±0.13 μmol C m^{-2} d^{-1}). Temperature (r=0.4, p<0.0001), oxygen penetration depth (r=-0.3, p=0.05), and dissolved iron (r=0.5, p<0.0001) were the primary drivers of FeR. Finally, FeR rates are higher in vegetated and bioturbated sediments compared to bare sites. These data demonstrate that FeR accounts for 45% of anaerobic carbon oxidation in nearshore sediments. claudia.mazu@gmail.com

Christina Menniti

ASSESSING THE IMPORTANCE OF VARIABILITY IN OXYGEN CONCENTRATIONS AND FLUXES IN WESTERN LONG ISLAND SOUND Menniti*, C.M., M.M. Whitney, P. Vlahos, J. Vaudrey. Marine Sciences, University of Connecticut, Avery Point, CT.

Horizontal transport of oxygen in estuaries is most commonly studied as a function of subtidal flow and single point oxygen concentrations or along-estuary oxygen gradients. This work aims to fill a gap by including spatial and tidal variations in horizontal advection calculations using data from western Long Island Sound, which experiences summer hypoxia. Measurements of oxygen concentrations at several stations and depths along the study area boundaries are used to assess spatial and temporal variety in oxygen, and tidally resolved current measurements are used to calculate the horizontal flux of oxygen over one tidal cycle in two seasons. Differences in oxygen concentration in inflowing and outflowing water generate a horizontal oxygen flux can be of comparable magnitude to other oxygen sources/sinks like air-sea gas exchange. We expect that across-estuary variability in oxygen concentration and small-scale spatial and temporal variations in currents may be similarly important in other estuaries. christina.menniti@uconn.edu

Charles Menzie

USING A TIERED APPROACH TO DIAGNOSE CAUSES OF BIOLOGICAL IMPAIRMENTS OR DAMAGES IN COASTAL SYSTEMS Menzie C.A. Exponent Inc.

Environmental impairments and damages - fish kills, algal blooms, loss of production and diversity, loss of shellfish beds and sea grasses- can arise from myriad causes. Often claims are made about a cause and this becomes the focus of assessment without adequate consideration of the multiple-stressor nature of environmental outcomes. A tiered causal analysis approach provides a logical sequence of reviews of environmental evidence to provide a basis for ruling in or out causes and for identifying the predominant cause or the combination of causes contributing to the environmentally adverse outcome. The approach will be illustrated by two case studies: the “Water Wars” case before the Supreme Court and the Uruguay River case before the International Court of Justice. The presentation will point toward

the importance of data quality and equity in assessing causes of coastal environmental impairments. camenzie@exponent.com

Agnes Mittermayr

USING EELGRASS AS BIO-INDICATOR FOR NITROGEN LOADING IN GREAT BAY, NH Mittermayr*, A. (1), B. Legare (1), H. Plaisted (2). (1) Center for Coastal Studies, Provincetown, MA; (2) Northeast Coastal and Barrier Network, Interior Region 1, Cape Cod National Seashore,Wellfleet, MA.

Great Bay, NH is an important provider of ecosystem services to surrounding areas, but nutrient loading and subsequent eutrophication has been a chronic threat to its health. Municipalities have reacted by increasing land conservation and reducing nutrient loading from point sources. The identification and quantification of the relative contributions of nitrogen sources has a decade long history in aquatic sciences and is crucial to determining the efficacy of the management practices. Through nitrogen isotope composition analysis of submerged aquatic vegetation (SAV), we can differentiate between nitrogen sources as they will be reflected in SAV signatures. To trace nitrogen sources across time and space, we are analyzing stable isotope ratios of an extensive collection of dried eelgrass samples collected across Great Bay starting 1983. While results are pending at this time, we plan to determine if the regulations implemented in the past have had the desired effects by looking at nitrogen loading over the past 40 years. amittermayr@coastalstudies.org

Anna Lisa Mudahy

IMPROVING LONG TERM IN SITU WATER COLUMN RESPIRATION MEASUREMENTS IN WESTERN LONG ISLAND SOUND Mudahy*, A.L. and C.Tobias. Department of Marine Sciences, University of Connecticut, Avery Point, CT.

Western Long Island Sound (WLIS) suffers from severe hypoxia during summer months with some regions experiencing extended periods of anoxia. We developed and deployed autonomous respiration chambers (ARCs) in WLIS during the summer of 2020 to measure water column respiration rates. The ARCS were deployed at the pycnocline depth. Respiration rates were measured over six-hour intervals and each ARC yielded four rates per day. A total of 1,820 respiration rates were measured over 4 months. Peak average values in July and August exceeded 2 micromoles O2 per litre per hour. ARCs rates were comparable with published values for WLIS and demonstrated the feasibility of obtaining in situ rate measurements on large temporal and spatial scales. The high frequency of measurements provided by the ARCs can help better identify factors controlling respiration in WLIS and other estuaries. anna.mudahy@uconn.edu

Lydia Pinard

COMPARING ATMOSPHERIC AND HYDROLOGICAL FACTORS OF THE GULF OF MAINE. Pinard*, L.M., C.E. Tilburg. School of Marine & Environmental Programs, University of New England, ME.

The Gulf of Maine is warming faster than ninety-nine percent of the global ocean. To further investigate the causes, we have calculated the change in heat content of the Gulf of Maine. We selected eight NERACOOS buoys distributed throughout the Gulf of Maine to represent different geographic regions. The depths ranged from surface level to two-hundred-and-fifty meters. Using this data, we calculated specific heat, density, and change in temperature of seawater at each region. We then automated our scripts to calculate the change in heat content integrated over a volume to quantify the change in heat content of the entire Gulf of Maine. lpinard2@une.edu

Edward Reiner

HYDROLOGICAL EVALUATION OF TIDAL RESTRICTIONS AT RUMNEY MARSH IN REVERE AND SAUGUS, MASSACHUSETTS Reiner E, US Environmental Protection Agency, Boston, MA.

Three bridges were reconstructed by the Massachusetts Highway on State Route 107 between 2009-2012 with wider spans and increased height to improve tidal flushing, decrease erosion, and improve recreational access along the Pines River. In 2019, EPA installed 7 pressure transducers at various locations to evaluate the improvement to tidal hydrology. Water levels were recorded at 6-minute intervals for 142 days. We calculated MHW, MHHW and Max Tides to evaluate the effects on tidal flooding. We discovered that the maximum daily tidal water level on the upstream side of the abandoned I-95 embankment were nearly identical to the unrestricted tides along the lower Pines River, however, the maximum daily water level was slightly lower on the upstream of Route 107. Based on the results of this study we conclude that the Route 107 bridges slightly restricts tides in the estuary and the I-95 embankment, does not reduce tidal flooding. Removal of the embankment would not increase tidal flooding which is controlled by Route 107. reiner.ed@epa.gov

Miguel Rivera

SEDIMENT-WATER FLUXES OF ENDOCRINE-DISRUPTING CHEMICALS NEAR WASTEWATER DISCHARGE INTO THE TIDAL FRESHWATER POTOMAC RIVER Rivera*, R(1), M Rivera* and G. Foster. Department of Chemistry and Biochemistry, George Mason University, Fairfax, VA

Sediment-water fluxes provide insight into the dynamics of the source or sink behavior near wastewater outfalls. The goal of this study was to investigate the fluxes of 18 endocrine disruptor chemicals in the tidal freshwater Potomac River at varying distances from wastewater discharge. Samples were collected at two sites to determine concentrations and evaluate sediment-water fluxes in surface water, sediments and porewater. Each water sample was extracted using Supel-select HLB solid-phase extraction cartridges, sediment prepared using micro QuEChERs, and analyzed by liquid chromatography-tandem mass spectrometry. 17-Alpha-ethynylestradiol was found at the highest concentrations in surface water and porewater and not in sediment, the detergent 4-tert-octylpehnol was found in sediments and porewater but not in surface water. All samples showed the presence of bisphenol A. Sediment-water flux estimates showed that sediments serve as both sources and sinks at various locations in tidal rivers. mriver18@gmu.edu

Andrew Robinson

INFLUENCES OF TIDE, WIND, AND BATHYMETRY ON EXCHANGE BETWEEN A CONSTRICTED-INLET BASIN AND COASTAL BAY THROUGH A COMPLEX HARBOR Robinson*, A.R. and C.E. Tilburg. School of Marine & Environmental Programs, University of New England, Biddeford, ME.

Nearshore areas, especially sheltered basins, tend to experience complex flow, as large-scale forcings interact with local bathymetry to alter normal dynamics. We undertook a multi-season study of surface transport between a constricted inlet basin and open bay in southern Maine. Exchange occurs through a shallow harbor fringed by rocky islands and divided by a dredged channel. Surface currents were assessed with repeated deployments of GPS drifters and drone surveys of the harbor. The majority of transport was found along the channel, controlled by tidal displacement ($R^2=0.75$), while cross-channel winds explained the majority of cross-channel displacement ($R^2=0.62$). Topography also directed ebb discharge out of the basin and constrained the area from which water flowed in during flood tides. Examination of individual drifter deployments demonstrated variability within each track, including eddies near the inlet and around islands. Our results can be applied to future studies of water quality and dredging impacts in the harbor. arobinson15@une.edu

Zabdiel Roldan Ayala

SPATIAL AND TEMPORAL TRENDS IN LONG ISLAND SOUND PHYTOPLANKTON COMMUNITY COMPOSITION DURING 2020 Roldan Ayala*, Z. (1,2), G. Humphries (1,2), S. Angles (2), J. Espinosa (2), M. Brown (1,2), M. Ambrosone (2), M. Tzortziou (3), J. Goes (4), and D.I. Greenfield (1,2). (1) School of Earth and Environmental Sciences, Queens College, CUNY, Flushing, NY; (2) Advanced Science Research Center at the Graduate Center, City University of New York (CUNY), New York, NY; (3) City College Center for Discovery and Innovation, CUNY, New York, NY; (4) Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY.

Long Island Sound (LIS) is one of the most urbanized estuaries in the world. The Western LIS (WLIS) in particular receives high levels of nitrogen (N) inputs from the nearby NYC metropolitan area due to runoff, combined sewer overflow systems, and other sources. N loading is linked to WLIS hypoxia formation as well as harmful algal blooms (HABs) caused by multiple phytoplankton genera across LIS. Despite known linkages between N and HAB development, the extent to which LIS phytoplankton assemblages vary across spatial (area, depth) and temporal (weeks, months) scales remains less characterized, representing a critical gap in our understanding of bloom dynamics and prediction. Here we report evaluations of water quality, chlorophyll a, nutrients (N, P, Si), and phytoplankton (microscopy, molecular) from multiple depths (surface, sub-chlorophyll maxima) and stations, emphasizing WLIS, during 2020. Results can be used to inform biogeochemical models, predict future HABs, and interpret remote sensing data. zabdiel.roldanayala11@gmail.cuny.edu

Ella Rothermel

A HABITAT MOSAIC APPROACH TO LIVING SHORELINE DESIGN ALONG THE URBANIZED SCHUYLKILL RIVER, PHILADELPHIA, PA Rothermel*, E.R., S. Bouboulis, J. Moody. Partnership for the Delaware Estuary, Wilmington, DE.

Ecological restoration projects along freshwater tidal urban shorelines present unique challenges due to their position in predominantly hardened landscapes with legacies of ecological disconnection. In Philadelphia PA, renovations along the Schuylkill River, including a trail, skatepark, and upcoming floating classroom site, offer a unique opportunity to demonstrate novel techniques for shoreline enhancement that provide ecological uplift. A habitat mosaic approach at this living shoreline will position structural log and stone features to create energetic refuge for vegetation while serving as habitat for multiple fauna. The living shoreline will also conserve vital ecosystem connections between the water and land through installation of a subtidal SAV-mussel pool and upland “turtle tunnel” pathways for native species. These enhancements support ecological functioning and will be ideally positioned to publicly showcase the variety of endemic habitats that were once common along the greater Philadelphia shoreline. erothermel@delawareestuary.org

Stephen Bradley

INTERSECTION OF ART & ESTUARINE SCIENCE Bradley, S.(1) C. Dahlenburg (2), L. Gash (2), and E. Schott (3). (1) University of Maryland Baltimore County, Catonsville, MD; (2) The National Aquarium in Baltimore, Baltimore, MD; (3) IMET-University of Maryland Center for Environmental Science, Baltimore, MD.

As urban estuaries transition from sites of industry to waterfronts valued for their scenic and recreational potential, there is also a growing awareness of them as aquatic habitat. There is a disconnect between the regulatory mandates driving government action to mitigate ongoing stressors and the understanding of recreational users about what constitutes “healthy water”. Decades of effort by non-governmental organizations, schools, and municipalities have struggled to help citizens understand the connection between regulatory metrics and what they experience of water. Artists at UMBC are working with scientists at the National Aquarium and IMET to create emotional bridges to help the public appreciate the complexities of estuarine ecology and help scientists reframe their comprehension of the systems they study and restore. Viewing estuary science through both scientific and artistic filters increases potential for creating solutions through expanded participation in and support for estuary restoration projects. schott@umces.edu

Samantha Shaw

NUTRIENT ENRICHMENT LOWERS GENETIC DIVERSITY ALTERING COASTAL MARSH STABILITY
Shaw*, S.(1), M.K. McCormick (2), L. Deegan (3), T.J .Mozdzer (1). (1) Bryn Mawr College, Bryn Mawr, PA; (2) Smithsonian Environmental Research Center, Edgewater, MD; (3) Woodwell Climate Research Center, Falmouth,MA.

Coastal marshes provide essential ecosystem services, but they are threatened by interacting global change factors including nutrient enrichment and sea-level rise. In a long-term nutrient enrichment experiment, TIDE, we evaluated the relationship between nutrient enrichment and creek bank stability. To assess this, we measured genetic diversity, clonal structure, and genotypic identity in both intact and fragmented creek banks in the nutrient-enriched and reference ecosystems. Our preliminary results show that reference creeks contain greater levels of genetic diversity, and may therefore be more resilient to disturbance. Surprisingly, and contrary to our expectation, we found that fragmented creek banks were more diverse than intact creek banks, regardless of nutrient treatment. Additional findings will be presented at the meeting, but our initial analysis strongly suggests losses of creek bank stability from nutrient enrichment can potentially be attributed to aspects of genetic diversity.
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Logan Wallace Shepard

META-ANALYSIS OF ECOSYSTEM SERVICES PROVIDED BY *PHRAGMITES AUSTRALIS* TO THOSE OF NATIVE PLANT SPECIES
Shepard*, L.W. (1), F. Romero (1), J. Weis (2), E. Kiviat (3), T.J. Mozdzer (1). (1) Bryn Mawr College, Bryn Mawr, PA; (2) Rutgers University, Newark, NJ; (3) Hudsonia, Annandale, NY.

Phragmites australis is one of the most common invasive coastal marsh species in North America, but consequences of its invasion on ecosystem services are poorly understood despite decades of study. To evaluate the degree to which *P. australis* invasion alters ecosystem services, we performed a meta-analysis of published North American studies that were identified using Web of Science. Our study synthesizes 76 peer-reviewed publications containing 1,096 data points comparing ecosystem services provided by *P. australis* and native plant communities. Preliminary analysis in R employing the “metafor” and “meta” packages has shown no overall effect of plant community type on ecosystem services. Final analysis will be presented at the meeting. Given our initial findings, future management of *P. australis* should be re-evaluated on a case by case basis, especially in terms of ecosystem resilience, given recent evidence that repeated herbicide management can prompt conversion of marsh to open water.
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Vitalii Sheremet

WATER LEVEL MONITORING SYSTEM IN ESTUARIES AND MARSHES BASED ON STOCK ACCELEROMETER LOGGERS FOR PLANT INUNDATION STUDIES AND RESTORATION PLANNING Sheremet*, V.A. (1), M.C. Tyrrell (2). (1) Okeanolog, Falmouth, MA; (2) Waquoit Bay National Estuarine Research Reserve, Falmouth, MA.

At Waquoit Bay NERR, we have been employing a simple and inexpensive system of water level monitoring utilizing a custom built Arm-and-Float water level based on a stock HOBO Pendant G accelerometer logger made by Onset Computers. The principle of operation is based on converting the raw signal of the arm tilt into the elevation of the float relative to a fixed pivot by multiplication by the arm length. Due to a relatively small cost of the loggers, a large number of sites can be instrumented simultaneously, which permits analysis of the spatial patterns and timing of inundation in the marsh. The system is efficient for understanding sea level change effects on vegetation and accretion, restoration planning, removal or remediation of tidal restrictions – improperly sized or placed culverts; planning other hydrological manipulations – runnels, ditch remediation. Examples from Waquoit Bay NERR are presented. We are transferring this system to six other NERRs spread along the East Coast from Maine to Florida. vsheremet@whoi.edu

Larry Spencer

THE R. V. ALBATROSS, TAXIDERMY, AND THE SAVING OF THE NORTHERN ELEPHANT SEAL Spencer, L.T. Plymouth State University Dept. of Biological Science, Plymouth, NH.

The R. V. Albatross was a fisheries research vessel built in the 1880s to be used by the US Fish Commission then headed by Spencer Fullerton Baird who was also the head of the US National Museum. The initial goal was to determine the loss of fish stock in the Gulf of Maine and along the eastern seaboard. In a past presentation, I've mentioned that in the 1920s before its decommissioning, Henry Bryant Bigelow used the vessel to study the biology of the Gulf of Maine. This talk will describe its use in 1911 by Charles Townsend, acting director of the American Museum of Natural History, to collect individual elephant seals from Guadalupe Island off the west coast of Mexico and the outcomes associated with that episode. lts@plymouth.edu

Robert Thieler

SEA-LEVEL RISE AND NEW ENGLAND COASTAL IMPACTS: PAST, PRESENT, AND FUTURE. Thieler, E.R. U.S. Geological Survey, Woods Hole, MA.

Sea-level rise is one of the most certain outcomes of climate change: as the climate warms, land-based ice melts into the ocean, and a warmer ocean expands in volume. By 2100, the Northeastern U.S. is most likely to see sea levels rise between 2 to 4.5 feet (0.6 to 1.4 m). Worst case scenarios are much higher (11 feet [3 m]). All projections of sea-level rise rates are higher and faster than the past ~4000 years. Even a small rise can have profound effects on coastal areas, including increased coastal erosion, greater vulnerability to storms, saltwater intrusion into groundwater, stresses on ecosystems, and infrastructure damage. Adapting to a rising sea while preserving what society expects from and enjoys about the coast is a major scientific and societal challenge. Communities face difficult choices as they decide how to respond to sea-level rise, and robust scientific research can help inform these choices. r.thieler@usgs.gov

Audrey Vinton

QUANTIFYING MASSACHUSETTS EELGRASS CHANGE, 1994-2007 Vinton*, A. (1), K. Haviland (2), M. Hayn (3,4), R. Marino (3), R.W. Howarth (3,4). (1) Environment and Sustainability, Cornell University, Ithaca, NY; (2) Department of Natural Resources & the Environment, Cornell University, Ithaca, NY; (3) Ecology and Evolutionary Biology, Cornell University, Ithaca, NY; (4) Ecosystem Center, Marine Biological Laboratory, Woods Hole, MA.

The Massachusetts Department of Environmental Protection has been mapping eelgrass (*Zostera marina*) extent statewide using aerial imagery since 1994. In 2011, C. Costello and W. Kenworthy published a study detailing these mapping methods and analyzing changes in eelgrass extent in different embayments along the coast of Massachusetts from 1994-2007. In the present study, we sought to recreate the embayment delineations from the original report and update the 2011 analysis using data from two more recent surveys. We then expanded our analysis to investigate the changes in eelgrass cover at statewide and regional scales to better characterize past trends and current status of eelgrass decline in Massachusetts. alv63@cornell.edu

Thomas Whaley

GEUKENSIA RECRUITMENT AND POPULATION STRUCTURE IN A NATURAL AND RESTORED MARSH. Whaley*, T. (1), B. Freynk (2), C. Zarnoch (2), P. Rafferty (3), J. Willis (3), and M. Alldred (1). (1) Center for Earth and Environmental Science, SUNY Plattsburgh, Plattsburgh, NY; (2) Department of Natural Sciences, Baruch College CUNY, New York, NY; (3) Gateway National Recreation Area, National Park Service, Staten Island, NY.

Geukensia demissa, the Atlantic ribbed mussel, is a foundational species in salt marsh ecosystems in the eastern United States. It plays important roles in marsh ecology, facilitating growth of its plant mutualist *Spartina alterniflora* and altering rates of sediment processes. We examined patterns in the abundance and size distributions of *Geukensia* populations at two sites within Jamaica Bay (New York, NY). Elders East was the site of a 40-acre restoration in 2006, and JoCo was monitored as an unmodified reference site. We used ground surveys of *Geukensia*, elevation data, and aerial imagery to visualize changes in *Geukensia* populations and marsh geography from 2005-2012. *Geukensia* abundance and size increased at Elders East beginning two years after restoration, indicating that restored marshes provide suitable habitat for *Geukensia*. *Geukensia* abundance declined at JoCo, possibly due to loss of edge habitat in the unrestored marsh. twhal005@plattsburgh.edu

Mike Whitney

REDUCING HYPOXIA IN AN URBAN ESTUARY DESPITE CLIMATE WARMING Whitney*, M.M., P. Vlahos, Marine Sciences, University of Connecticut, Avery Point, CT

This study on hypoxia in Long Island Sound (LIS), a large urbanized estuary, focuses on responses to managed nitrogen load reductions and climate change. At the analyzed station in western LIS, warming in bottom waters favors hypoxia. Total nitrogen concentrations have decreased with load reductions, but no linear temporal trend in chlorophyll is discernible. Bottom dissolved oxygen has increased, despite warming-induced solubility decreases. Decreasing trends in hypoxic area and volume reflect improved conditions and are coincident with reducing loads. Regressions link hypoxic extent to nitrogen loads, chlorophyll, salinity, and winds. Though mitigation has reduced hypoxia, these improvements will not be sustained in the warming climate without continued intervention. The warming-induced oxygen solubility

decrease forecasted for 2099 would erode 35% of the observed oxygen gains. Implementing additional nitrogen load reductions before the century's end are needed to offset the oxygen solubility decline.
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