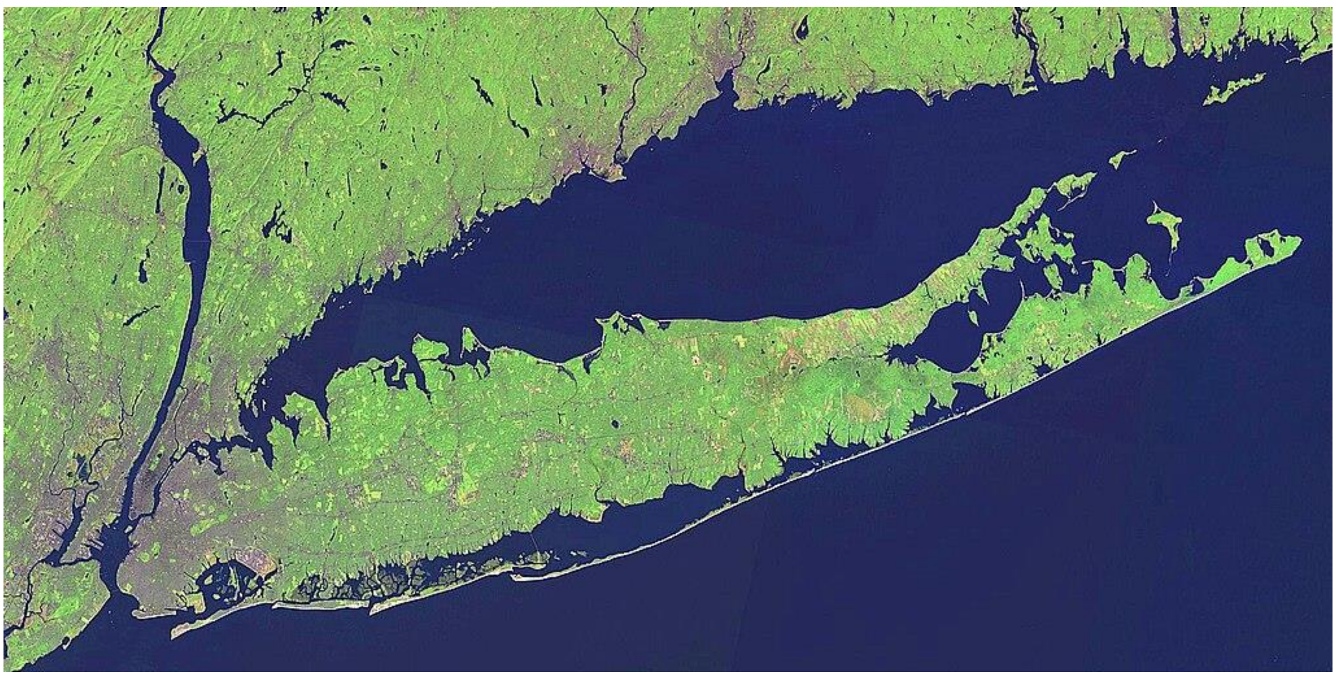
2024 Long Island Sound Research Conference

Wednesday, May 15, 2024
The Waterview, Port Jefferson, NY

"Science Serving the Sound"



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Acknowledgments

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We extend our gratitude to plenary speaker Dr. Phil Levin for his presentation, and to the discussion panel participants, Michele Golden, Jonathan Hoffman, Bill Lucey, Nancy Seligson, Brian Thompson, and panel moderator, Mark Tedesco. Finally, we appreciate all the oral and poster presenters for sharing their research. The Long Island Sound and its communities will greatly benefit from the wisdom imparted by all who work to ensure its health, beauty, and resilience.

Agenda

8:30 Breakfast /Registration / Poster set up, Atrium

9:15 Welcome! Main Ballroom
Opening Remarks by Dr. Rebecca Shuford, director NYSG, Dr. Sylvain De Guise, director CTSG, Dr Mark Tedesco, director LISS Office, US EPA

9:30-10:30 Parallel Sessions I

I A: Clean Waters and Healthy Watersheds, Soundview Room, Moderator: Syma Ebbin

1. *Spatial and Temporal Patterns of Groundwater-transported Nitrogen Loading From Watersheds on the North Shore of Long Island Sound*. Janet Barclay, Madeleine Holland, John Mullaney (U.S. Geological Survey, New England Water Science Center)

2. *Nylon Microfibers Develop a Distinct Plastisphere but Have No Apparent Effects on the Gut Microbiome of the Blue Mussel, Mytilus edulis*. Hannah I. Collins, Tyler W. Griffin, Bridget A. Holohan, and J. Evan Ward (University of Connecticut)

3. *Maximizing Nitrogen Bioextraction in Long Island Sound via the co-Cultivation of Seaweeds with Bivalves.* Michael H. Doall, and Christopher J. Gobler (Stony Brook University)

4. *Comparative Phytoplankton Assemblage Responses to Nitrogen Form Between the Long Island Sound Mainstem and Shore: Implications for Ecosystem Management.* Dianne I. Greenfield, Mariapaola Ambrosone, and Georgie E. Humphries (Advanced Science Research Center at the Graduate Center, City University of New York)

I B: Sound Science and Inclusive Management, Harborview Room, Moderator: Lane Smith

1. *Stakeholder Perceptions of Oyster Services: A Mixed Methods Approach to Mapping Services to Improve Management Efficiency*. Joshua Drew, Grace Grimes (State University of New York, College of Environmental Science and Forestry), and L. Jen Shaffer (University of Maryland)

2. *Oyster Habitat Restoration and Monitoring: Establishing Spawner Sanctuaries Using Habitat Suitability and Larval Transport Models*. Christopher J. Gioia, Aaren S. Freeman, and Ryan B. Wallace (Adelphi University)

3. *Continuous Water Quality Monitoring in the Norwalk River Estuary*. Kaitlin Laabs (US Geological Survey)

4. *Long Island Sound Seafloor Habitat Mapping Initiative Beyond Phase III*. DeAva Lambert (Connecticut Department of Energy and Environmental Protection)

I C: Sustainable and Resilient Communities / Thriving Habitats and Abundant Wildlife, The Grill, Moderator: Sylvain De Guise

1. *Triploid Oysters at Greater Risk of Mortality During Early Developmental Periods but Perform Equally as Well in the Field*. Christopher Brianik (Stony Brook University), Gregg Rivara, Michael Patricio (Cornell Cooperative Extension), Dina Proestou (USDA ARS National Cold Water Marine Aquaculture Center), Ming Liu (Morgan State University), Ximing Guo

(Rutgers University), Emmanuelle Pales Espinosa, and Bassem Allam (Stony Brook University)

2. *Educating About Long Island's Coastal Bluffs*. Kathleen Fallon (New York Sea Grant)

3. *Compound Flood Hazard Across Long Island and Long Island Sound: Analyzing the Convergence of Heavy Rainfall, Storm Surge, and Groundwater Using 50 Years of Historical Records*. Robin Glas (U.S. Geological Survey), Archi Howlader (Akima Systems Engineering), Liv Herdman, Salme Cook, and Kristina Masterson (U.S. Geological Survey)

4. *Assessing Present and Future Coastal Flooding Risk for Long Island, NY, and Long Island Sound (NY/CT), USA*. Salme Cook, and Liv Herdman (U.S. Geological Survey)

I D: Thriving Habitats and Abundant Wildlife, Main Ballroom, Moderator: Rebecca Shuford

1. *Genomic Resources to Support Shellfish Conservation, Restoration and Aquaculture in New York and the Region*. Bassem Allam (Stony Brook University)

2. *Combining Monitoring Data to Understand Availability of Saltmarsh Sparrow Breeding Habitat and Breeding Success at Long Island Marshes*. Sam Apgar, Suzanne Paton, Jonah Saitz, Mackenzie Payne, and Alison Kocek (USFWS Southern New England Coastal Program)

3. *Use of Historic Underwater Imagery to Assess Stability and Change in Boulder Habitat Communities Over Decadal Periods*. Peter J. Auster (University of Connecticut, Mystic Aquarium), Robert DeGoursey, Ivar Babb (University of Connecticut), Christian Conroy (University of New Haven), Catherine Matassa (University of Connecticut), and Roman Zajac (University of New Haven)

4. *Structure, Function, and Resilience of Long Island Sound's Restored Salt Marshes in a Warming World*. Sarah C. Crosby (The Maritime Aquarium at Norwalk)

10:30 Break - transit to session II

10:40-11:40 Parallel Sessions II

II A: Clean Waters and Healthy Watersheds, Soundview Room, Moderator: Syma Ebbin

1. *Multifarious Environmental Influences on High Fecal Indicator Bacteria Concentrations Along Connecticut Beaches*. Luke Glass, Michael M. Whitney, and Peter Linderoth (University of Connecticut)

2. *Quantifying and Forecasting the Seasonal and Spatial Extent of Hypoxia in Long Island Sound*. James Hagy (US EPA Center for Environmental Measurement and Modeling), Anna Lisa Mudahy (Oak Ridge Institute for Science and Education), Cayla Sullivan (EPA Region 2), and James Ammerman (NEIWPCC Long Island Sound Office)

3. *Methane and Nitrous Oxide Distributions and Sea-Air Fluxes in Western Long Island Sound*. Cara C. M. Manning, Anagha Payyambally, and Josie L. Mottram (University of Connecticut)

II B: Sound Science and Inclusive Management, Harborview Room, Moderator: Lane Smith

1. *Long Island Sound (LIS) Dynamic Spatially Referenced Regression on Watershed Attributes (SPARROW) Model*. Richard Moore, Laura Hayes, Craig Brown, and Richard Smith (USGS)

2. *Observing Marine Life and Their Environment*. Jackie Motyka, Cameron Thompson, and Austin Pugh (NERACOOS)

3. *Surface Sediment Distribution and Chemical Composition Revealed by the Long Island Sound Seafloor Habitat Mapping Project*. Frank O. Nitsche, Timothy C. Kenna (Lamont-Doherty Earth Observatory of Columbia University), and Cecilia McHugh (Queens College, City University of New York)

4. *Long-Term Effects of Adaptation (≥ 150 generations) to Ocean Warming and Acidification in the Calanoid Copepod, Acartia tonsa*. Lisa A. Piastuch (University of Connecticut), Edin Sission (Connecticut College), James A. deMayo (University of Colorado), Michael Finiguerra, and Hans G. Dam (University of Connecticut)

II C: Sustainable and Resilient Communities, The Grill, Moderator: Sylvain De Guise

1. *Equitable Access to Long Island Sound Waterfront and Beaches Through On-Demand Mobility*. Anil Yazici, and Elizabeth Hewitt (Stony Brook University)

2. *The Ocean Identity (OI) Survey: A Valid and Reliable Measure of Human Connections to Ocean Environments*. Miriah M. R. Kelly, Bri Perigyi, Chris Budnick, (Southern Connecticut State University), Jo-Marie Kasinak (Sacred Heart University), Emma McKinley (Cardiff University), and Jamie M.P. Vaudrey (University of Connecticut)

3. *Enhancing Coastal Resilience in Long Island Sound using the Northeastern Association of Coastal Ocean Observing System's Sensor Network*. Anna Simpson, Tom Shyka, Jake Kritzer, and Katy Bland (NERACOOS)

4. *Piloting the Ocean Identity Survey with Project Limulus*. Graham Templeman, Jo-Marie Kasinak, Emma McKinley, and Miriah M. R. Kelly (Southern Connecticut State University)

II D: Thriving Habitats and Abundant Wildlife, Main Ballroom, Moderator: Rebecca Shuford

1. *Natural Size-Structure Recovery in a Harvested Intertidal Oyster Reef, Fence Creek, CT*. Zachary Siper, Stephen R. Durham (Cornell University), and Gregory P. Dietl (Paleontological Research Institution and Cornell University)

2. *Seabed Effects of Extensive and Extended Mechanical Shellfish Harvesting in Oyster Bay Harbor, Long Island, New York*. Jason Mueller and Roger D. Flood (Stony Brook University)

3. *Assessing Human Impact on Historically Monitored Zostera marina Habitat and Future Restoration Sites within the Peconic Estuary*. Kristen Hutz (Stony Brook University)

4. *How Sediment Texture Affects Porewater Chemistry and Above Ground Plant Biomass in Salt Marsh Sediment Additions*. Madeline P. Kollegger, Nicolette Nelson, Madeleine Meadows-McDonnell, Franco Gigliotti (University of Connecticut), Min Huang (Connecticut Department of Energy and Environmental Protection), Chris S. Elphick, Beth A. Lawrence, and Ashley M. Helton (University of Connecticut)

11:40 Break - transit to Panel Discussion, Main Ballroom

11:45-12:30 **Panel Discussion: Research to Serve Management.**
Panelists: Michele Golden (NYSDEC), Jonathan Hoffman (NYCDEP), Bill Lucey (Long Island Soundkeeper / Save the Sound), Nancy Seligson (LISS CAC NY Co-chair), Brian Thompson (CTDEEP)
Panel Moderator: Mark Tedesco (EPA/LISS)

12:30-1:00 **Pick up Lunch and head to tables/plenary. Main Ballroom.**

1:00-2:00 **Lunch Plenary, Main Ballroom**
Dr. Phil Levin (White House Office of Science & Technology Policy and U.S. Global Change Research Program), *Moving Knowledge to Action for People and Nature: Musings From a Recovering Ecologist*

2:00-2:30 **Poster Session, Atrium**

2:25 **Break - transit to session III**

2:30-4:00 **Parallel Sessions III**

III A: Clean Waters and Healthy Watersheds, Soundview Room, Moderator: Penny Vlahos

1. *Modeling Stratification and Hypoxia in Long Island Sound Using Generalized Additive Models*. Anna Lisa Mudahy (Oak Ridge Institute for Science and Education), and James Hagy (US EPA Center for Environmental Measurement and Modeling)

2. *Carbonate System Parameters in Long Island Sound Waters*. Erich Nitchke, Samantha Rush (University of Connecticut), Katie O'Brien-Clayton (Connecticut Department of Energy and Environmental Protection), and Penny Vlahos (University of Connecticut)

3. *Tracing the Fate of Phytoplankton-Derived Nitrogen Through Oysters: Effects on Recycling, Denitrification, and Burial*. Peter Ruffino, and Craig Tobias (University of Connecticut)

4. *Actionable Satellite Water-Quality Data Products in LIS for Improved Management and Societal Benefits*. Jonathan Sherman (NOAA CoastWatch), Maria Tzortziou (The City College of New York, CUNY), Joaquim Goes (Lamont Doherty Earth Observatory, Columbia University), Melanie Abecassis (University of Maryland), Elizabeth Staugler (Florida Sea Grant), and Veronica Lance (NOAA CoastWatch)

5. *The Impacts of Two Macroalgae Species, Ulva sp. and Gracilaria sp. on the Growth and Survivorship of Eastern Oyster, Crassostrea virginica*. Laine Sylvers, Margot A. Eckstein, Bradley McGuire, Michael Doall, and Christopher J. Gobler (Stony Brook University)

6. *Integrating Spatial Modeling of Household Fertilizer Behavior with Nitrogen Transport Models to Inform Nonpoint Nutrient-Reduction Programs*. Jamie Vaudrey, David Dickson, Qian Lei-Parent (University of Connecticut), Robert J. Johnston, Tom Ndebele (Clark University), David Newburn, Derek Wietelman (University of Maryland), and Haoluan Wang (University of Miami)

III B: Sound Science and Inclusive Management / Thriving Habitats and Abundant Wildlife, Harborview Room, Moderator: Jim Ammerman

1. *Science to Impactful Management – Are We Making the Connection?* Paul E. Stacey (Footprints In The Water, LLC), and Chester Arnold (University of Connecticut)

2. *Connectivity Considerations within Long Island Sound*. Robert Wilson, and Han Sun (Stony Brook University)

3. *New LIS Hydrodynamic/Water Quality Model Development and Dissolved Oxygen Modeling*. Andy Thuman (HDR), Gregory Wilkerson, Abdulai Fofanah, David Lipsky (NYCDEP), Rich Isleib, Mikayla Reichard, Bin Wen, Ruta Rugabandana (HDR), Melissa Duvall, Mark Tedesco (USEPA), and Carl Cerco (USACE)

4. *Using Oxygen Stable Isotopes to Assess Respiration – the Conspiracy of Mixing and Other Things*. Craig R. Tobias (University of Connecticut), Mark Altabet (University of Massachusetts), and James O'Donnell (University of Connecticut)

5. *Scallop (Argopecten irradians irradians) Health in a Changing Climate*. Sivanna Q. Trainer (Stony Brook University), Harrison Tobi (Cornell Cooperative Extension), Annabelle Dominguez, Guillaume Cacot, Emmanuelle Pales Espinosa (Stony Brook University), Stephen Tettelbach Cornell (Cooperative Extension), and Bassem Allam (Stony Brook University) - Thriving Habitats and Abundant Wildlife

6. *Spatial Trends in Benthoscape Structure and Infaunal Communities in Long Island Sound*. Roman Zajac (University of New Haven), Peter Auster (University of Connecticut, Mystic Aquarium), Ivar Babb (University of Connecticut), Christian Conroy (University of New Haven), Lauren Stefaniak (Coastal Carolina University), Shannon Penna, Dena Chadi, Nicole Govert, Cortney Schneeberger, and Olivia Walton (University of New Haven) - Thriving Habitats and Abundant Wildlife

III C: Sustainable and Resilient Communities / Clean Waters and Healthy Watersheds / Marine Debris, The Grill, Moderator: Kamazima Lwiza

1. *Assessing Pluvial Flood Risk in Areas Surrounding Long Island Sound Using Multi-Criteria Decision Making and Iterative Ensemble Smoothing*. Rob Welk, Liv Herdman, Kalle Jahn, Robin Glas, Kristina Masterson, and Salme Cook (U.S. Geological Survey)

2. *Investigating Suspension-Feeding Invertebrates as Bioindicators of Microplastics*. Kayla M. Mladinich (NOAA Office of Education), Bridget A. Holohan, Sandra E. Shumway, and J. Evan Ward (University of Connecticut) – Clean Waters and Healthy Watersheds

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3. *What headway are we collectively making to implement the Long Island Sound Marine Debris Action Plan?* Nancy Balcom (Connecticut Sea Grant / University of Connecticut), Kathy Bunting-Howarth (New York Sea Grant / Cornell University) – Marine Debris

4. *Working Together in the Long Island Sound: Lessons Learned and Accomplishments of the Long Island Sound Lobster Trap Recovery & Assessment Partnership*. Scott Curatolo-Wagemann (Cornell Cooperative Extension), Sarah Crosby (The Maritime Aquarium of Norwalk), Bill Lucey (Save the Sound), Callie Scheetz (Project Oceanology), and David Hudson (Remote Ecologist) – Marine Debris

5. *Developing Education and Outreach to Foster Awareness of Synthetic Microfibers Leakage From Laundry Systems Into the Marine Environment*. Catherine Prunella, Katherine Bunting-Howarth (New York Sea Grant / Cornell University), Jonathan Ronn, and Beizhan Yan (Lamont Doherty Earth Observatory, Columbia University)

III D: Thriving Habitats and Abundant Wildlife, Main Ballroom, Moderator: Melissa Duvall:

1. *Can the Creation of Sediment Hummocks Support Saltmarsh Sparrow Recovery?* Nicolette Nelson, Franco Gigliotti, Madeline Kollegger, Olivia Lemieux (University of Connecticut), Blaire Steven (The Connecticut Agricultural Experiment Station), Min Huang (Connecticut Department of Energy and Environmental Protection), Beth Lawrence, Ashley Helton, and Chris Elphick (University of Connecticut)

2. *What's That Smell?! A Salt Marsh Restoration Case Study for Educators*. Beth Lawrence (University of Connecticut), Ly Williams (Smithtown High School), Larissa Graham (Connecticut National Estuarine Research Reserve), and Madeline Kollegger (University of Connecticut)

3. *Oyster Health and Restoration in Long Island Sound - Observations of Changing Water Chemistry*. Isaiah Mayo, Mariah Kachmar, Kyra Lenderman, Kelly Roper, Genevieve Bernatchez, Mark Dixon, LTJG Tyler Houck, Meghana Parikh, and Katie McFarland (NOAA Fisheries, Northeast Fisheries Science Center, Milford Laboratory)

4. *Evaluating Changes in Suitable Habitat and Biogeography of Cold and Warm Adapted Species in a Changing Long Island Sound*. Yong Chen, Robyn Linner, Claire Ober, Stephanie Arsenault, Krystina Braid, Sarah Praisner, (Stony Brook University), Kurt Gottschall (Connecticut Department of Energy and Environmental Protection), Kim McKown, and John Maniscalco (NYS Department of Environmental Conservation)

5. *Increasing Black Sea Bass Abundance in Long Island Sound*. Hannes Baumann, and David Riser (University of Connecticut)

6. *Is Drought the New Fad Diet? Effect of Entrapment on Size, Body Condition, and Growth Rates of Juvenile Anadromous Alewives*. Michael Burgess, Katherine King (University of Connecticut), Ryan Adams (Connecticut Department of Energy and Environmental Protection), James Knighton, and Eric Schultz (University of Connecticut)

4:00 **Conclusion, Main Ballroom, and board shuttle to ferry**
Closing Remarks by Dr. Rebecca Shuford, director NYSG, Dr. Sylvain De Guise, director CTSG, Dr. Jim Ammerman, Long Island Sound Study Science Coordinator

4:10 **Adjourn/Departure (shuttle departs)**

4:10 – 4:25 **Shuttle to Ferry**

4:45 **Ferry to Bridgeport**

Poster Presentations

(*Atrium*)

A. **Clean Waters and Healthy Watersheds**

1. The Structure and Variability of Vertical Transport by Turbulence in Western Long Island Sound. **Mehrnoosh Abbasian**, **James O'Donnell**, **Craig Tobias**, *University of Connecticut*
2. Spatiotemporal Patterns of Mercury Accumulation at the Base of a Coastal Food Web. **Anika Agrawal, Robert Mason, Jessica Brandt,** *University of Connecticut*
3. Droughts and Deluges: The Effect of River Discharge on the Carbonate Chemistry of Long Island Sound. **Lauren J. Barrett, Penny Vlahos, Mary A. McGuinness, Michael M. Whitney, Jamie M.P. Vaudrey,** *University of Connecticut*
4. Coastal Acidification Monitoring in Long Island Sound Tributaries and Embayments. **Gina Groseclose**, *U.S. Geological Survey*
5. Shore and Mid-Channel Surveys Reveal Distinct Phytoplankton-Bacterial Population Associations along Western Long Island Sound. **Georgia E. Humphries, Mariapaola Ambrosone, Dianne I. Greenfield,** *City University of New York*
6. Nearshore Permeable Reactive Barriers to Remove Nitrate in Groundwater before Submarine Discharge. **Jing-An Lin**, *Stony Brook University*, **Molly Graffam**, *Cornell Cooperative Extension*, **Ron Paulsen**, *Coastline Evaluation Corporation*, **Nils Volkenborn,** *Stony Brook University*
7. Settling Enhanced Mixing in Stably Stratified Flows. **Chang Liu, Reis Muccino**, *University of Connecticut*
8. Settling-Driven Layering in Double-Diffusive Convection. **Reis Muccino, Dr. Chang Liu,** *University of Connecticut*
9. Bioadvective Release of Iron and Phosphorus from Permeable Sandy Sediments. **Darci Swenson Perger, Ian Dwyer, Robert Aller, Nils Volkenborn, Christina Heilbrun, Laura Wehrmann,** *Stony Brook University*
10. Functional Response of Long Island Sound Plankton Community to Multiple Environmental Variables. **Youngmi Shin, Melissa Duvall,** *US EPA Long Island Sound Study Office*, **James W. Ammermann,** *Long Island Sound Study*, **Mark A. Tedesco,** *US EPA Long Island Sound Study Office*
11. Linking Hyperspectral Optics to Phytoplankton Pigments and Community Structure in Long Island Sound. **Kyle J. Turner, Maria Tzortziou,** *City College of New York*
12. Impacts of Hydrology and Extreme Events on Dissolved Organic Carbon Dynamics in a Heavily Urbanized Estuary and its Major Tributaries: A View from Space**. Maria Tzortziou, Fang Cao, Alana Menendez**, *City College of New York***, Joaquim Goes***, Columbia University*, **Kyle Turner,** *City College of New York*

B. **Sound Science and Inclusive Management**

1. Effects of Adaptation to Ocean Acidification and Warming on Critical Thermal Limits in the Calanoid Copepod, *Acartia Tonsa.* **Rowan A. Batts**, *University of Connecticut*, **Mathew Sasaki**, *University of Vermont*, **Hans G. Dam***, University of Connecticut*

2. High Spatial Resolution Remote Sensing Retrievals of Organic Carbon in the Tidal Estuaries of Long Island Sound**. Luka Catipovic,** *The City College of New York,* **Alana Menendez***, University of Virginia,* **Maria Tzortziou,** *The City College of New York*
3. Seafloor Habitat Mapping for Enhanced Marine Spatial Planning and Management in Long Island Sound: New Data and Insights between Norwalk and Huntington Bay (Phase III Area). **Mohamed Elsaied, Roger D. Flood,** *Stony Brook University*
4. Seafloor Habitat Mapping for Enhanced Marine Spatial Planning and Management in Long Island Sound: New Data and Insights South of New Haven from Milford to Bradford (Phase IV Area). **Roger D. Flood, Mohamed Elsaied,** *Stony Brook University*
5. Application of High-Resolution Satellite Imagery to Monitoring of Flooding and Impact on Sediment Fluxes and Water Clarity in Long Island Sound. **Tong Lin,** *Graduate Center of City University of New York*, **Maria Tzortziou,** *The City College of New York*
6. Analysis of Volatile Organic Compounds and Air Pollutants on Long Island During the June 2023 Canadian Wildfire Plumes. **Julia Marcantonio**, *Stony Brook University*, **Cong Cao**, *Hong Kong University of Science & Technology***, John Mak**, *Stony Brook University*
7. Heat Flux Estimates from a Synthesis of Satellite Observations and a Hydrodynamic Model (With Application to Long Island Sound). **Dr. Grant McCardell**, *University of Connecticut*, **Dr. Rachel Horwitz**, *Bedford Institute of Oceanography,* **Dr. Amin Ilia, Ms. M. Kay Howard Strobe, Mr. Todd Fake, Dr. James O'Donnell,** *University of Connecticut*
8. Optical Signatures of Bioavailable Terrigenous- and Biologically- Derived Dissolved Organic Matter in Long Island Sound. **Charlotte Rhoads, Maria Tzortziou, Kyle Turner,** *City College of New York*
9. Embayment Monitoring to Support Nutrient Management Activities in Connecticut for the Long Island Sound. **Paul A. Solis**, *U.S. Geological Survey*

C. **Sustainable and Resilient Communities**

1. Reduced-Order Modeling of Fluid-Structure Interactions. **Jino George, Chang Liu,** *University of Connecticut*
2. Wild Scallop Population Resilience: Using Multigenerational Studies to Estimate Robustness and Adaptive Potential to Rapidly Changing Ocean Acidification. **Samuel Gurr**, *National Research Council*, **Katherine McFarland**, **Genevieve Bernatchez, Mark S. Dixon, Lisa Guy, Lisa Milke, Matthew E. Poach,** *NOAA Fisheries*, **Alison Novara**, *EPP/MSI*, **Deborah Hart**, *NOAA Fisheries*, **Louis Plough**, *University of Maryland***, Dylan Redman, George Sennefelder, Sheila Stiles, Gary Wikfors,** *NOAA Fisheries*, **Dianna Padilla**, *Stony Brook University*, **Shannon L. Meseck,** *NOAA Fisheries*
3. Assessing Environmental Social Services in Connecticut: A Subset of the Long Island Sound Watershed. **Lucy Hendrickson, Yogesh Kumar, Steven Matile**, *University of Connecticut*
4. Understanding Compound Flood Risk: An Interactive Online Mapping Tool. **Kristina Masterson, Liv Herdman, Jack Monti, Rob Welk, Robin Glas, Kalle Jahn, Salme Cook, Janet Barclay, Archi Howlader,** *U.S. Geological Survey*
5. Sag Harbor Backyard Project. **Nilay Oza,** *Oza Sabbeth Architects*, **Anthony Madonna**, *The Guild Hall, East Hampton*
6. Detailed Geologic Records are Needed to Better Predict Future Sea-Level Rise Scenarios for the Long Island Sound and the Mid-Atlantic Bight Sea-Level Hotspot. **Robert K.**

Poirier, Taylor Kuligowski, Tom Cronin, *U.S. Geological Survey*

D. Thriving Habitats and Abundant Wildlife

1. Geospatial Characterization of Coastal Wetland Vulnerability in Long Island Sound. **Kate Ackerman, Neil Ganju, Zafer Defne,** *U.S. Geological Survey*
2. Effect of Improved Water Quality on Molluscan Communities in Long Island Sound: Preliminary Results. **Gregory P. Dietl, Matthew Pruden,** *Cornell University*, **John Handley**, *University of Rochester*
3. Can Soil Amendments Ameliorate Acidity Caused by Sediment Additions During Salt Marsh Restoration? **Madeline P. Kollegger, Nicolette Nelson,** *University of Connecticut*, **Min Huang,** *Connecticut Department of Energy and Environmental Protection*, **Chris S. Elphick, Beth A. Lawrence, Ashley M. Helton,** *University of Connecticut*
4. Elevated Temperature, Decreased Salinity and Microfibers, Oh My! How Many Stressors Can Eastern Oyster, *Crassostrea Virginica* take? **Tyler S. Mendela, Dr. Laura A. Enzor,** *University of Hartford*
5. Oyster Health and Restoration in Long Island Sound - Trends in Diseases of Unmanaged Oyster Populations. **Kelly Roper, Kyra Lenderman, Mariah Kachmar, Isaiah Mayo, Genevieve Bernatchez, Mark Dixon, LTJG Tyler Houck, Katherine McFarland, Meghana Parikh,** NOAA Fisheries

Contributed Oral Presentation Abstracts

(In alphabetical order by lead author)

Genomic Resources to Support Shellfish Conservation, Restoration and Aquaculture in New York And the Region. **Bassem Allam (bassem.allam@stonybrook.edu),** *Stony Brook University*

Recent advances in sequencing technologies, associated with a marked decrease in associated costs, have led to the development of a new set of affordable genomic approaches to answer basic and applied research questions. Building upon this revolution, the Marine Animal Disease Laboratory at Stony Brook University led two initiatives to sequence the genomes of, and develop "omics" tools in, two keystone shellfish species: the hard clam (*Mercenaria mercenaria*), and the bay scallop (*Argopecten irradians*). The hard clam genome has been published and this resource was used to probe the genetic diversity of the species from Maine to Florida. Generated information was then used to develop a high-throughput genotyping tool (single nucleotide polymorphism -SNP- array) that was shown to represent a robust and accurate means to segregate various clam stocks and to identify genetic features associated with resistance to biological and environmental stressors. This tool is currently being used for genomic selection ("precision breeding") of clams for aquaculture applications with an initial focus on traits related to disease resistance and resilience to heat stress. In the bay scallop, a high-quality chromosome-level genome assembly has also been generated and was used as a reference to identify genetic signatures associated with survivorship under stressful biological and environmental conditions. This information is now serving to help identify resilient scallop stocks that could be used for restoration activities. The power, accuracy and transposability of these tools make them extremely useful to identify shellfish stocks with traits relevant to conservation, restoration and aquaculture in a continuously changing environment.

Theme: Thriving Habitats and Abundant Wildlife

Combining Monitoring Data to Understand Availability of Saltmarsh Sparrow Breeding Habitat and Breeding Success at Long Island Marshes. **Sam Apgar (samantha_apgar@fws.gov), Suzanne Paton (suzanne_paton@fws.gov), Jonah Saitz (jonah_saitz@fws.gov), Mackenzie Payne (mackenzie_payne@fws.gov), Alison Kocek, (alison_kocek@fws.gov),** *U.S. Fish & Wildlife Service*

The saltmarsh sparrow (*Ammospiza caudacuta*) is a rapidly declining tidal marsh endemic species. This species is reliant upon the high marsh zone that historically floods only on the highest spring tides of the month. Saltmarsh sparrows are declining due to increased nest flooding caused by sea level rise and its interaction with existing alterations to marshes. Saltmarsh sparrows are strongly linked to the high marsh vegetation species *Spartina patens. S. patens* existence alone, however, does not indicate suitable nesting habitat, because habitat change lags hydrological change. We have combined avian, hydrological, elevation, and vegetation data collected in 2023 to assess the availability of saltmarsh sparrow nesting habitat and potential for success at two north shore sites on Long Island, NY. Using monitoring guidance from the Atlantic Coast Joint Venture and Tidal Marsh Bird Rapid Assessment protocol from the Saltmarsh Habitat and Avian Research program, we show limited breeding at sites that likely once had a higher abundance of saltmarsh sparrows. Using the MarshRAM protocol (Kutcher et al. 2022) paired with RTK elevation and HOBO water level logger data collection, we show that *S. patens* dominated patches are extremely limited and those that exist are inundated more frequently than the minimum 23 flood-free days saltmarsh sparrows require to breed. As a result, saltmarsh sparrows are likely incapable of breeding successfully at these sites. We aim to use this information to guide restoration decisions and evaluate success after restoration is completed.
Theme: Thriving Habitats and Abundant Wildlife

Use of Historic Underwater Imagery to Assess Stability and Change in Boulder Habitat Communities Over Decadal Periods. **Peter J. Auster (peter.auster@uconn.edu),** *University of Connecticut, Mystic Aquarium*, **Robert DeGoursey, Ivar Babb (babb@uconn.edu),** *University of Connecticut*, **Christian Conroy (cwconroy@newhaven.edu),** *University of New Haven,* **Catherine Matassa (catherine.matassa@uconn.edu),** *University of Connecticut,* **Roman Zajac (rzajac@newhaven.edu),** *University of New Haven*

Qualitative underwater images and field notes, collected while diving with scuba and ROVs from 1975 to present, were used to develop time series records of boulder habitat communities in the Fishers Island Sound region. Time series were used to assess stability and direction of change in occurrence of dominant structure forming taxa at Ellis Reef, Ram Island Reef, Latimer Reef, North Dumpling, and Deep Hole (southeast of Latimer Reef). Ellis Reef exhibited a general pattern of stability in occurrence of the dominant taxa *Cliona* and *Astrangia*. Significant shifts from *Mytilus* dominated communities to those of mixed invertebrate taxa inclusive of *Crepidula* were observed at Ram Island Reef, Latimer Reef, and North Dumpling. Reductions in *Laminaria* were noted as well as absence of the previously common *Metridium*. The Deep Hole exhibited increased occurrence of *Cliona* over time, then increasing *Astrangia*, followed by a widespread invasion of *Didemnum*. The present habitat state is a mix of *Cliona*, *Astrangia*, and *Didemnum*. Coincident with this change was a significant reduction in the abundance of the invertebrate predators *Asterias* and *Arbacia* that could drive such patterns. Structure forming taxa such as sponges, corals, and kelp increase spatial complexity of habitats and enhance the local diversity of associated species that use such structure for shelter and locating prey, including species of economic importance. Understanding the types and direction of habitat change can aid in assessing the effects of direct human-caused disturbance, the role of climate change, and evaluating alternatives for stewardship of our natural resources.
Theme: Thriving Habitats and Abundant Wildlife

What Headway Are We Collectively Making to Implement the Long Island Sound Marine Debris Action Plan? **Nancy Balcom (nancy.balcom@uconn.edu),** *Connecticut Sea Grant/University of Connecticut*, **Kathy Bunting-Howarth (keb264@cornell.edu)**, *New York Sea Grant/Cornell University*

In spring 2022, a community of partners led by the Connecticut and New York Sea Grant programs, with guidance from the NOAA Marine Debris Program, finalized a five-year plan to address marine debris in Long Island Sound. The plan, developed over a year-long series of meetings, seeks to understand, prevent and mitigate the impacts of 1) single-use plastic and other water/land-based consumer debris; 2) abandoned/lost fishing and aquaculture gear; and 3) microplastics and microfibers. This presentation will summarize the collective progress made by all partners towards the implementation of the strategies and actions for each goal over the first 24 months.
Theme: Clean Waters and Healthy Watersheds

Spatial and Temporal Patterns of Groundwater-transported Nitrogen Loading from Watersheds on the North Shore of Long Island Sound. **Janet Barclay (jbarclay@usgs.gov), Madeleine Holland (mholland@usgs.gov), John Mullaney (jmullane@usgs.gov),** *U.S. Geological Survey*

Elevated nitrogen loads, leading to adverse ecological effects such as fish kills and harmful algal blooms, are a pervasive issue in the Long Island Sound (LIS). Nitrogen from non-point sources, much of which is transported by groundwater, contributes 70 percent of the nitrogen load to the LIS from CT, yet the spatial and temporal patterns of groundwater-transported nitrogen loading on the northern shore of LIS are relatively poorly understood. Prior work by the U.S. Geological Survey suggested that groundwater travel times are relatively short in this area (median < 2 years) and that decade-long nutrient legacies are not widespread, but that seasonal flow and nutrient transport dynamics may be important. The objective of this study was to characterize spatial and temporal patterns of nitrogen loading from atmospheric deposition, septic systems, and fertilizers via the groundwater discharge pathway. We developed a monthly MODFLOW groundwater flow model with MODPATH particle tracking and coupled it with a nitrogen transport and attenuation model. We calculated monthly nitrogen loads and travel times by nitrogen source for each HUC12 watershed. Model calibration was done with an ensemble approach that provided a distribution of parameter values, allowing us to quantify the uncertainty in the simulated flows and nitrogen loads. Finally, we simulated septic system upgrades and reductions in turf-grass fertilizer use. Improved understanding of the spatial and temporal patterns of groundwater nitrogen loads, and their sensitivity to management actions, will provide essential management guidance for the reduction of nutrient loads to sensitive ecosystems.
Theme: Clean Waters and Healthy Watersheds

Increasing Black Sea Bass Abundance in Long Island Sound. **Hannes Baumann, (hannes.baumann@uconn.edu), David Riser (David.J.Riser@uconn.edu),** *University of Connecticut*

Black Sea Bass (BSB, Centropristis striata) is a temperate protogynous hermaphroditic grouper species, whose abundance in Long Island Sound (LIS) has significantly increased over the last ten years. BSB biomass overall decreased significantly after 1950; in 1978 the National Oceanic and Atmospheric Administration (NOAA) labelled BSB overexploited. NOAA commenced managing BSB in 1998 under the summer flounder management plan. Since that time, environmental conditions in LIS have also improved for BSB. For stock assessment purposes, fisheries managers assign ages to LIS BSB trawl data based on an age length key maintained by the Massachusetts Division of Marine Fisheries. We created a LIS-specific Black Sea Bass age length key from 813 samples from the 2021 and 2022 LIS trawl survey conducted by the Connecticut Department of Energy and Environmental Protection. We observed BSB from nine to 54 cm in length, from one to 11 years old, and a sex ratio of 50/50 in LIS. By measuring the gonadosomatic index we determined BSB recruitment occurs at age two in LIS. We then statistically compared my LIS BSB age length key to the Massachusetts age length key to test the hypothesis that BSB stock structure in LIS differs from the stock structure within the waters of Massachusetts. The two areas show significantly different age distributions. This work provides a tool to assess the potential impacts of this increasing population of BSB in LIS while also allowing fisheries managers to determine allowable catch for LIS.
Theme: Thriving Habitats and Abundant Wildlife theme.

Triploid Oysters at Greater Risk of Mortality During Early Developmental Periods, but Perform Equally as Well in the Field. **Christopher Brianik (christopher.brianik@stonybrook.edu),** *Stony Brook University*, **Gregg Rivara (gjr3@cornell.edu), Michael Patricio (rmp14@cornell.edu)**, *Cornell Cooperative Extension*, **Dina Proestou (dina.proestou@usda.gov)**, *USDA ARS National Cold Water Marine Aquaculture Center*, **Ming Liu (ming.liu@morgan.edu),** *Morgan State University*, **Ximing Guo (xguo@hsrl.rutgers.edu),** *Rutgers University*, **Emmanuelle Pales Espinosa (emmanuellepalesespinosa@stonybrook.edu), Bassem Allam (bassem.allam@stonybrook.edu),** *Stony Brook University*

Triploid oysters now constitute the predominant farm-raised oyster product in numerous regions with some hatcheries currently producing >90% triploid oyster spat. Triploid popularity is primarily driven by significant growth advantages and more consistent meat quality, with most prior work reporting comparable adult survivorship. Though adult performance is similar, some evidence suggests that triploids may be frailer during earlier age classes particularly to bacterial infections. Anecdotal reports from local farmers endorse this view.

To assess these claims, two cohorts of half-sibling diploid and triploid eastern oyster lines were produced in 2020 and 2021. A subset of larvae and juveniles from both spawns were then exposed to a cocktail of *Vibrio* pathogens and monitored for viability. Separate oysters from the same spawns were maintained at a hatchery for ~ 3 months before being deployed in either the Peconic Bay NY (2020), or Patuxent River MD (2021) and monitored for a year.

Survivorship was significantly higher in diploids than triploids at both the larval and juvenile stages, however differential mortality decreased as oysters aged, with nearly identical adult performance after a year in the field. These trends were consistent across spawns and lines. Overall, the results support that triploids are frailer at younger age classes, but these differences decrease over time. Therefore, farmers may benefit from purchasing larger or older triploid seed, and hatcheries should have heightened biosecurity measures when raising triploids due to increased risk of bacteria-related mortalities.
Theme: Sustainable and Resilient Communities

Is Drought the New Fad Diet? Effect of Entrapment on Size, Body Condition, and Growth Rates of Juvenile Anadromous Alewives. **Michael Burgess (michael.burgess@uconn.edu), Katherine King (katherine.2.king@uconn.edu),** *University of Connecticut*, **Ryan Adams (ryan.c.adams003@gmail.com),** *Connecticut Department of Energy and Environmental Protection,* **James Knighton (james.knighton@uconn.edu), Eric Schultz (eric.schultz@uconn.edu),** *University of Connecticut*

Many fishes require connectivity between nursery habitat and habitats for later life stages. Anadromous alewives (*Alosa pseudoharengus*) are a case in point: anthropogenic barriers that block migration between marine waters and freshwaters have depleted populations of this species of concern. Much attention has accordingly been focused on the need for passage for spawning adults. In contrast, little work has been done on the impact of barriers to juvenile out-migration to the sea, such as when streams dry up during periods of drought. We hypothesized that population density in nursery habitat remains high when juveniles are unable to out-migrate, reducing individual growth rates. To test this hypothesis, we compared features of young alewives we collected from their natal lake during an extensive period of drought to emigrants we collected leaving the lake in another year when connectivity was uninterrupted. Drought juveniles were 13% smaller in length, 76% smaller in mass, and had significantly lower body condition upon emigration. Analysis of the daily growth record revealed that they had grown 19% more slowly in length during the period of entrapment, in comparison to their non-drought counterparts. Consequences of reduced growth during freshwater residency may include smaller subsequent size, reduced survivorship, and lower reproductive potential. Maintaining connectivity for emigrating juveniles is therefore essential for producing strong year classes and restoring populations.
Theme: Thriving Habitats and Abundant Wildlife

Evaluating Changes in Suitable Habitat and Biogeography of Cold and Warm Adapted Species in a Changing Long Island Sound. **Yong Chen (yong.chen.2@stonybrook.edu), Robyn Linner (robyn.linner@stonybrook.edu), Claire Ober (claire.ober@stonybrook.edu), Stephanie Arsenault (stephanie.arsenault@stonybrook.edu), Krystina Braid (krystina.braid@stonybrook.edu), Sarah Praisner (sarah.praisner@stonybrook.edu)** *Stony Brook University*, **Kurt Gottschall (kurt.gottschall@ct.gov)**, *Connecticut Department of Energy and Environmental Protection*, **Kim McKown (kamckown@yahoo.com), John Maniscalco (john.maniscalco@dec.ny.gov),** *NYS Department of Environmental Conservation,*

Species composition in the Long Island Sound (LIS) has not been consistent over time due to diverse patterns in faunal distribution as well as highly variable environmental conditions. Some of these changes in the abundance of cold- and warm-adapted species have been associated with climate-induced changes. In recent decades, the LIS has shifted from a fish community dominated by cold-adapted species in the spring and warm-adapted species in the fall, to a fish community dominated by warm-adapted species in both seasons. The initial work identifying this shift was completed more than 15 years ago, and as climate impacts intensify, more recent analysis is needed. The overarching objective of this study is to evaluate distributional changes of cold- and warm-adapted species in the climatically altered LIS to inform monitoring and management. Specifically, for 15 selected cold- and warm-adapted species, we address the following objectives: 1) understand changes in abundance and distribution over time; 2) identify key environmental variables influencing habitat use; 3) develop models to hind-, now-, and fore-cast changes in suitable habitat and distribution; 4) evaluate the impacts of changes on the monitoring and management of the LIS fish community; and 5) engage with stakeholders for outreach and feedback to inform ecosystem-based management. We hypothesize that the spatial distribution of cold-adapted species is contracting and becoming patchier over time while the distribution of warm-adapted species is expanding. These changes in spatial distribution may help inform more effective monitoring and management of LIS fishes as we move into an uncertain future.
Theme: Thriving Habitats and Abundant Wildlife

Nylon Microfibers Develop a Distinct Plastisphere but Have No Apparent Effects on the Gut Microbiome of the Blue Mussel, *Mytilus Edulis*. **Hannah I. Collins (Hannah.i.collins@uconn.edu), Tyler W. Griffin (tyler.griffin@uconn.edu), Bridget A. Holohan (bridget.holohan@uconn.edu), J. Evan Ward (Evan.ward@uconn.edu),** *University of Connecticut*

Ingestion of microplastics (MP) by suspension-feeding bivalves has been well-documented. However, it is unclear whether exposure to MP could damage the stomach and digestive gland (gut) of these animals, causing ramifications for organism and ecosystem health. In many vertebrate species, the gut microbial community has been shown to aid in digestion, mediate abiotic stressors, and affect host immunity, therefore it is likely that in invertebrates the gut microbiome is involved in similar roles. Here, we show no apparent effects of nylon microfiber (MF) ingestion on the gut microbiome of the blue mussel, Mytilus edulis. We exposed mussels to two low concentrations (50 and 100 particles/L) of either nylon MF or Spartina spp. particles (dried, ground marsh grass), ca. 250–500 µm in length, or a no particle control laboratory treatment for 21 days. Results showed that nylon MF, when aged in coarsely filtered seawater, developed a different microbial community than Spartina spp. particles and seawater, however, even after exposure to this different community, mussel gut microbial communities resisted disturbance from nylon MF. The microbial communities of experimental mussels clustered together in ordination and were similar in taxonomic composition and measures of alpha diversity. Post-ingestive particle processing likely mediated a short gut retention time of these relatively large particles, contributing to the negligible treatment effects.
Theme: Clean Waters and Healthy Watersheds

Assessing Present and Future Coastal Flooding Risk for Long Island, NY and Long Island Sound (NY/CT), USA. **Salme Cook (secook@usgs.gov), Liv Herdman (lherdman@usgs.gov)**, *U.S. Geological Survey*

The potential for coastal flooding will become more frequent and costly with increasing sea levels globally. An understanding of the many factors that contribute to coastal flooding is essential to plan for resilient and sustainable coastal communities. Here we present an analysis of tides and storm surge under present day conditions and future climate projections, in addition to current wave climatology, to understand the possible changes in inundation extent in and around Long Island Sound between present-day (1980-2020) and 2050 conditions. We examine the extent of inundation for a range of storms from relatively frequent events, with a 99% annual exceedance probability, to more extreme events, with a 1 % annual exceedance probability. This analytical range is necessary to inform local stakeholders about which areas along Long Island Sound may be inundated with what can be considered generally routine flooding events as well as more catastrophic events resulting from tropical and extratropical storms.

Theme: Sustainable and Resilient Communities

Structure, Function, and Resilience of Long Island Sound's Restored Salt Marshes in a Warming World. **Sarah C. Crosby (scrosby@maritimeaquarium.org),** *The Maritime Aquarium at Norwalk*, **A. Bartholet (bartholet.a@northeastern.edu),** *Northeastern University*, **K. Burns (k.burns@earthplace.org), M. Donato (m.donato@earthplace.org),** *Harbor Watch*, **M. Fajardo (mfajardo@maritimeaquarium.org),** *The Maritime Aquarium at Norwalk*, **D. Healy (devan.healy@hdrinc.com),** *HDR, Inc.,* **D.M. Hudson (dmhudson@remoteecologist.org),** *Remote Ecologist*, **R. Hughes (ann.hughes@northeastern.edu),** *Northeastern University*, **M. Olavarria (m.olavarria@earthplace.org)**, *Harbor Watch*, **R. Raviraj (rraviraj@maritimeaquarium.org),** *The Maritime Aquarium at Norwalk*, **N. Spiller (n.spiller@earthplace.org),** *Harbor Watch*, **A. Smith (smitha52@tcd.ie),** *College of the Holy Cross,* **K. Sperry (sperry.k@northeastern.edu),** *Northeastern University***, L. Steele (steelel@sacredheart.edu),** *Sacred Heart University***, J. Susarchick (jsusarchick@maritimeaquarium.org),** *The Maritime Aquarium at Norwalk*

Salt marshes are ecologically valuable habitats that must gain elevation to keep pace with sea-level rise. Their ability to do so as temperatures rise is uncertain. In Long Island Sound, a small fraction of historic salt marsh extent remains and there is a growing interest in their restoration. Here, we studied the low marsh dominant plant, *Spartina alterniflora*, to improve our understanding of restored and natural marsh responses and with a goal of improving restoration approaches as a result. 12 salt marshes (natural and restored) were studied in 2021-2022 for *S. alterniflora* genetics, biomass and biometrics, and nekton and invertebrates. In 2023, experimental *in situ* warming was conducted in 8 of those marshes. The effective number of *S. alterniflora* genotypes was lower in natural than restored sites, and differentiation between each restored site and natural sites decreased with time. No difference was observed in live belowground biomass, however, natural marshes had significantly more dead belowground biomass. Differences were observed in marsh resident invertebrates, but there was no detected difference in nekton using the marshes at high tide. We found notable differences in flowering phenology between warming and control treatments. With restoration seeking resilient ecosystems, it is important to understand factors that may undermine or improve the persistence and function of restored sites and modify restoration accordingly. Through these studies, we will seek to provide actionable guidance to salt marsh restoration practitioners on expected trajectories of salt marsh changes under warming.
Theme: Thriving Habitats and Abundant Wildlife

Working Together in the Long Island Sound: Lessons Learned and Accomplishments of the Long Island Sound Lobster Trap Recovery & Assessment Partnership. **Scott Curatolo-Wagemann (sw224@cornell.edu),** *Cornell Cooperative Extension*, **Dr. Sarah Crosby (scrosby@maritimeaquarium.org),** *The Maritime Aquarium of Norwalk*, **Bill Lucey (blucey@savethesound.org),** *Save the Sound,* **Callie Scheetz (cscheetz@oceanology.org),** *Project Oceanology*, **Dr. David Hudson (dmhudson@remoteecologist.org),** *Remote Ecologist*

The catastrophic American lobster (Homarus americanus) die-off in 1999 in Long Island Sound continues to affect its fishing industry and dependent communities socially and economically. With this rapid decline in lobster abundance and the unclear future of the industry, some traps were intentionally abandoned and others were left in "wet storage" with the owner's intention of retrieving them when the industry rebounded. The prohibitive cost of land storage along the coasts, the cost of transporting traps, and the absence of an organized disposal and storage program contributed to this issue. Some fishers sought to recover their gear and repurpose it for use in other fisheries. Beyond traps left behind during the industry collapse, other traps were lost accidentally during fishing, both during its peak and in the years since. A collaborative group called the Lobster Trap Recovery & Assessment Partnership (L-TRAP) has been removing and assessing this marine debris from NY and CT waters in a collaborative and comprehensive nature. To date, more than 22,000 derelict traps have been removed by members of the L-TRAP. The NY partner has been engaged with removal efforts for over 12 years and has documented a wealth of trap specific data. Three partner organizations on the CT side have been actively removing gear for less than 2 years, three partner organizations on the CT side have been actively removing gear for less than 2 years, but have already achieved significant milestones in the number of traps removed, and revealed some novel findings on the biotic use of traps.

Theme: Marine Debris

Maximizing Nitrogen Bioextraction in Long Island Sound via the co-Cultivation of Seaweeds with Bivalves. **Michael H. Doall (michael.doall@stonybrook.edu), Christopher J. Gobler (christopher.gobler@stonybrook.edu),** *Stony Brook University*

Sugar kelp (*Saccharina latissima*) is an emerging mariculture crop in the United States that can provide a new means of revenue and diversification for shellfish farmers, as well as expand farm ecosystem services. Like bivalves, kelp and other seaweeds are non-fed, extractive aquaculture crops that sequester nutrients from surrounding waters to grow. These nutrients are removed from marine systems when bivalves and seaweeds are harvested, a process known as bioextraction. This project sought to directly quantify nitrogen (N) removal rates obtainable through sugar kelp farming across a range of water quality in the coastal waters surrounding Long Island, NY. Kelp growth differed significantly among eight sites, with yields at peak biomass ranging from 0.3 to 16.9 kg kelp per meter of line. Tissue nitrogen content also significantly varied among sites, ranging from 0.84 to 2.66 percent of dry tissue biomass, with higher tissue nitrogen content found in locations with greater kelp growth. These site differences in kelp growth and nitrogen content largely paralleled nitrogen loads and suggested high N environments are ideal for maximizing bioextraction of N by sugar kelp. Extrapolating the growth and nitrogen data obtained here using realistic farm designs, it is estimated that kelp farming can remove 1 to 339 kg N per hectare per year in NY waters, depending on location. These nitrogen removal rates will be compared to that found for oyster aquaculture, and the combined ecosystem services of oyster and kelp co-cultivation will be discussed.

Theme: Clean Waters and Healthy Watersheds

Stakeholder Perceptions of Oyster Services: A Mixed Methods Approach to Mapping Services to Improve Management Efficiency. **Dr. Joshua Drew (jadrew@esf.edu), Grace Grimes (ggrimes@esf.edu),** *College of Environmental Science and Forestry,* **Dr. L. Jen Shaffer (lshaffe1@umd.edu),** *University of Maryland*

Oysters are an important species both culturally and economically on Long Island, New York. They provide numerous ecosystem services ranging from filtering and cleaning the water to protecting the coast against storm surges and providing a local and sustainable source of seafood. Because the myriad services oysters provide are difficult to simultaneously optimize, decisions about which ones to prioritize often arise, and stakeholders may end up holding conflicting positions about best management practices. Throughout 21 focus group meetings across a range of stakeholders, people 1) identified what oyster services matter the most to them, and 2) what actors and drivers they saw affecting those services. This allowed us to understand how these services help shape their daily life.
We used Fuzzy Cognitive Modeling to produce quantitative modes of stakeholders' views of how ecosystem components are interrelated, which may allow managers to envision the impacts of various potential management strategies on specific oyster services.

While FCM provides a quantitative structure to understand the relationships among participants and the oyster ecosystem, exploring the emotional connections required an additional qualitative tool. In order to illuminate participant perceptions, a photovoice process followed the FCM mapping session.
Theme: Sound Science and Inclusive Management

Educating About Long Island’s Coastal Bluffs. **Kathleen Fallon (kmf228@cornell.edu),** *New York Sea Grant*

Coastal Bluffs are steep cliffs that line most of the North Shore of Long Island. These bluffs are the remnants of the terminal moraine deposited during the last glacial maximum and can range in height from 10 feet to upwards of 50 feet and are composed of loosely compacted sediments varying in size from clays, silts, sand, and gravel, up to large boulders. Due to their steep nature and the influence of waves, sea level rise, seepage, and runoff, bluffs are susceptible to erosion and episodic failures that may result in large quantities of sudden land movement. Communities are situated on top of most of these coastal bluffs and infrastructure, including homes, are at risk due to the erosion and recession of the features. New York Sea Grant works with stakeholders, including residents and municipal officials, to educate and provide resources that can result in shoreline management decisions that can mitigate or adapt to coastal erosion.
Theme: Sustainable and Resilient Communities

Oyster Habitat Restoration and Monitoring: Establishing Spawner Sanctuaries Using Habitat Suitability and Larval Transport Models. **Christopher J. Gioia (christophergioia@mail.adelphi.edu), Aaren S. Freeman (afreeman@adelphi.edu), Ryan B. Wallace (rwallace@adelphi.edu),** *Adelphi University*

Restoration of oyster habitat in heavily impacted coastal estuaries is facilitated by protection from overharvest, proven survival of adult oysters, and robust settlement of juvenile oysters. The Town of Oyster Bay (NY, USA) has established a spawner sanctuary in the Oyster Bay Complex, into which approximately 350,000 oysters (>40mm) have been deposited over the last two years. Oysters have come from a variety of sources. Additional oyster sanctuary sites in the Oyster Bay Complex are under consideration. Here, we describe several activities in support of the success of establishing oyster spawner sanctuaries: monitoring the survivorship of adult oysters transplanted to sanctuary sites, monitoring settlement of juvenile oysters (spat) in the sanctuary, and monitoring hydrological conditions affecting the sanctuary and potential additional sanctuary sites. Habitat suitability models were developed using bi-weekly high-resolution mapping of temperature (°C), dissolved oxygen (DO), pH, substrate type, and bathymetry data. This data was then supplemented with data collected at four high frequency monitoring stations where an acoustic Doppler current profiler (ADCP) was deployed. A coupled hydrodynamic/Lagrangian particle-tracking (LPT) model was constructed to simulate larval drift due to advection and turbulence within the Oyster Bay complex, where habitat suitability models were developed to generate maps of regions within the Oyster Bay that are most hospitable to the growth and survival of oysters. Collectively these efforts support and inform management and reestablishment of oyster beds in the Oyster Bay Complex.
Theme: Sound Science and Inclusive Management

Compound Flood Hazard Across Long Island and Long Island Sound: Analyzing the Convergence of Heavy Rainfall, Storm Surge, and Groundwater Using 50 Years of Historical Records. **Robin Glas (rglas@usgs.gov),** *U.S. Geological Survey*, **Archi Howlader (ahowlader@usgs.gov)**, *Akima Systems Engineering*, **Liv Herdman (lherdman@usgs.gov), Salme Cook (secook@usgs.gov), Kristina Masterson (kmasterson@usgs.gov),** *U.S. Geological Survey*

Compound flooding, the co-occurrence of more than one flood type, results in hazard potential that is higher than if the events occurred independently. Communities on Long Island and near the Long Island Sound shoreline are at risk for compound flooding due to urban development, exposure to coastal storms, and shallow groundwater levels. This study uses historical records dating back to 1970 to calculate probabilities of co-occurrence of extreme rainfall, storm surge, and groundwater emergence for Long Island and the Long Island Sound vicinity using statistical copula theory. Preliminary results show that the expected frequency of compound rain-surge events is higher than coincidence when high surge events are sampled along with their corresponding rain totals, as opposed to when high rain events are sampled along with their corresponding surges. For the selected co-occurring rain-surge events, spatio-temporal patterns of groundwater emergence are presented. Preliminary results further show that southwestern Long Island is at highest risk for compound flooding, where the average expected frequency is up to 20 times higher than if rain and surge events were to occur independently. Southern Connecticut is at moderate risk for compound flooding, with frequencies 2 to 6 times higher than the independence case. Suffolk County is at lowest risk, with events co-occurring most similarly to independence. Once published, these results will be available through an online mapper which will allow the user to assess risk of compound flooding throughout Long Island and Southern Connecticut.
Theme: Sustainable and Resilient Communities

Multifarious Environmental Influences on High Fecal Indicator Bacteria Concentrations Along Connecticut Beaches. **Luke Glass (luke.glass@uconn.edu), Michael M. Whitney (michael.whitney@uconn.edu),** *University of Connecticut*, **Peter Linderoth (plinderoth@savethesound.org),** *Save the Sound*

Connecticut public-access beaches provide recreational value for many people, but excess fecal indicator bacteria (FIB) concentrations can force closures. It is important to understand environmental conditions connected to high FIB concentrations. Recent precipitation is the sole environmental marker taken into consideration when pre-emptively enforcing beach closures, but other factors are noted as influential. Sound Health Explorer (SHE) has collected beach bacteria and precipitation data since 2003 across 74 Connecticut beaches. Using a categorical analysis approach, SHE beach bacteria data was cross-referenced against National Atmospheric and Oceanic Administration (NOAA) meteorological data, and NOAA Tides & Currents data from 2003-21 to ascertain how precipitation, winds and tidal stages align with high bacteria events. Onshore winds and high/flood tidal stages were hypothesized to increase the likelihood of beach bacteria outbreaks. Results show the occurrence of precipitation in the 48-hours prior to sampling was present in 67.3% of high bacteria cases, while 24-hour prior onshore winds and high/flood tidal stages were present in 66.9% and 67.2% of cases respectively. Thus, precipitation, onshore winds and the high/flood tidal stages have nearly equal influences on high FIB concentrations. Combining these results, we find that conditions with precipitation, onshore winds, and high/flood tidal stage are 8x more prevalent during high bacteria events than the opposite case. Results highlight a need for increased sampling given the relationship between the tidal cycle and beach bacteria events. Installing beach meteorological stations for local conditions will also aid beach-specific assessments of potential high bacteria events.
Theme: Clean Waters and Healthy Watersheds

Comparative Phytoplankton Assemblage Responses to Nitrogen Form Between the Long Island Sound Mainstem and Shore: Implications for Ecosystem Management. **Dianne I. Greenfield (dgreenfileld@gc.cuny.edu), Mariapaola Ambrosone (mambrosone@gc.cuny.edu), Georgie E. Humphries (georgia.humphries42@qmail.cuny.edu),** *Graduate Center of City University of New York*

Long Island Sound (LIS) receives excessive nitrogen (N) inputs from wastewater, runoff, atmospheric deposition, and other sources primarily from the NY City (NYC) metropolitan area. This elevated N-load contributes to harmful algal blooms (HABs) as well as seasonal hypoxia in western LIS (WLIS) from microbial respiration of dissolved organic carbon (DOC). N-loading into LIS, as well as hypoxia severity and duration, have declined over recent decades from successful wastewater management, though algal blooms and annual hypoxia recurs. In partnership with CT state long-term water quality and hypoxia monitoring efforts and regional collaborators, we have been conducting multi-year surveys of LIS physical water quality, ecological (bacteria, phytoplankton), and biogeochemical (nutrients, chlorophyll) features emphasizing the WLIS mainstem and shoreline. We have identified distinct spatial patterns of how variations in N-form (inorganic vs. organic) and source (proximity to wastewater outfalls) drive dominant phytoplankton taxa, particularly the relative abundances of diatoms to mixotrophs, including HAB-forming dinoflagellates. Major deviations in anthropogenic activity, such as changes in commuting and other travel patterns following COVID-19 stay-in-place orders, provided rare opportunities to assess the spatial and temporal extent of how N influences urban estuaries on short- and long-term timescales. This talk focuses on how dissolved organic N vs. inorganic N (nitrate vs. ammonium) loadings combined with DOC availability governs not only the relative prevalence of HAB-forming and chain-forming diatoms in WLIS, but also their associations with seasonal hypoxia. Results are broadly relevant to N-management across developing coastlines.
Theme: Clean Waters and Healthy Watersheds

Quantifying and Forecasting the Seasonal and Spatial Extent of Hypoxia in Long Island Sound.

James Hagy (hagy.jim@epa.gov), *US EPA*, **Anna Lisa Mudahy (mudahy.annalisa@epa.gov),** *Oak Ridge Institute for Science and Education,* **Cayla Sullivan (sullivan.cayla@epa.gov)**, *EPA Region 2,* **James Ammerman (james.ammerman@longislandsoundstudy.net),** *NEIWPCC Long Island Sound Office*

Nitrogen management in Long Island Sound (LIS) has reduced N loading and the extent of hypoxia over the last 2 decades. To support communication around successful remediation of hypoxia and the remaining challenges of N management, we are implementing additional analysis of the water quality record to further quantify temporal and spatial variability and long-term trends in DO, evaluate trends in the extent of low DO, and forecast hypoxia in the upcoming summer. We developed an effective time-space model of DO in LIS using Generalized Additive Models (GAMs), however, the model likely underestimates the spatial extent of low DO. Conversely, spatial interpolation bottom water DO (e.g., using kriging) can overestimate hypoxia extent by underpredicting bottom water DO in shallow water. We evaluated DO profiles to estimate the depth at which DO attains a threshold level, modeled the estimates in time and space using GAMs, and estimated the hypoxic area and volume by intersecting the response surface with the basin bathymetry. The estimated area with DO<3 mg/L decreased rapidly from 286 km^2 in 1995 to a local minimum in 1999, increased again, then decreased strongly after 2010. The average extent of hypoxia in 2014-2020 (40 km^2) represents an 83% decrease from the average during 1995-2009 (233 km^2), while the average duration of hypoxia decreased from 56 days to 47 days. Long-term responses of hypoxia extent to freshwater inputs, N loading, water temperature, and stratification are evaluated, and the prospects for forecasting hypoxia are evaluated.

Theme: Clean Waters and Healthy Watersheds

Assessing Human Impact on Historically Monitored *Zostera Marina* Habitat and Future Restoration Sites within the Peconic Estuary. **Kristen Hutz (kristen.hutz@stonybrook.edu),** *Stony Brook University*

Human impacts pose a threat to the health and quality of Long Island's marine ecosystems and water resources. The decline of eelgrass meadows in the Peconic Estuary has been of concern for the Peconic Estuary Partnership for many decades, leading to the creation of a long-term eelgrass monitoring program which ran from 1997 to 2019. The monitoring program along with other research projects have examined the health and environmental qualities of Peconic Estuary eelgrass meadows, but none have investigated local anthropogenic activities potentially impacting these meadows. This study applies a standardized human impact metric to historically monitored eelgrass meadows and future restoration sites to assess the presence and relative severity of human impacts known to influence the success of eelgrass. The impact metric is comprised of both local-scale and subwatershed-scale human impacts which are quantified using relevant indicators. These measurements are standardized by site characteristics and normalized to allow for meaningful comparison between sites and to show relative magnitude across the estuary. We hypothesize eelgrass sites are experiencing stress from various factors at a local level that an estuary-wide human impact assessment would not be able to account for. The site-specific knowledge created from this assessment will inform conservation management decisions to protect current eelgrass meadows, and advise of potential anthropogenic threats to the successful recruitment of eelgrass at restoration sites. This method can be applied to other areas of Long Island Sound to inform strategic conservation of eelgrass and further promote thriving habitats and a healthy estuary.
Themes: Thriving Habitats and Abundant Wildlife

The Ocean Identity (OI) Survey: A Valid and Reliable Measure of Human Connections to Ocean Environments. **Miriah M. R. Kelly (KellyM38@southernct.edu), Bri Perigyi (PerigyiB1@southernct.edu), Chris Budnick (BudnickC1@southernct.edu)** *Southern Connecticut State University*, **Jo-Marie Kasinak (Jomarie.Kasinak@sacredheart.edu),** *Sacred Heart University*, **Emma McKinley (McKinleyE1@cardiff.ac.uk),** *Cardiff University*, **Jamie M.P. Vaudrey (Jamie.Vaudrey@uconn.edu),** *University of Connecticut*

Worldwide, ocean ecosystems are experiencing unprecedented levels of anthropogenic pressure, and as efforts to address the challenges facing the global ocean continue to fall short, there is a growing call for greater consideration of the role of understanding human dimensions of ocean issues to impact ocean ecosystems more positively. Further, assessing changes associated with human-focused ocean interventions is fundamental to measuring the extent to which efforts are impacting individuals and communities. Few resources exist for measuring the unique connections humans maintain with ocean spaces. This work seeks to identify the theoretical underpinnings of the ocean identity construct, resulting in a valid and reliable instrument that can be used in academic and professional contexts. To establish the ocean identity survey we used a three-phase methodological process. 1) focus group inquiry and review by a panel of expert advisors 2) construct validation and exploratory analyses, and 3) survey implementation and confirmatory analyses. The result of this work is a valid and reliable measure for the construct of ocean identity. The applications of the ocean identity instrument are vast, and we encourage users to pragmatize the theoretical foundations of this work by utilizing it in ways that are useful to them.
Theme: Sustainable and Resilient Communities

How Sediment Texture Affects Porewater Chemistry and Above Ground Plant Biomass in Salt Marsh Sediment Additions. **Madeline P. Kollegger, (madeline.kollegger@uconn.edu)**, *University of Connecticut*, **Nicolette Nelson, (nicolette.nelson@uconn.edu),** *Center for Environmental Science and Engineering*, **Madeleine Meadows-McDonnell, (mmeadowsmcdonnell@uconn.edu), Franco Gigliotti, (frank.gigliotti@uconn.edu),** *University of Connecticut*, **Min Huang, (min.huang@ct.gov)**, *Connecticut Department of Energy and Environmental Protection*, **Chris S. Elphick, (chris.elphick@uconn.edu), Beth A. Lawrence, (beth.lawrence@uconn.edu), Ashley M. Helton, (ashley.helton@uconn.edu),** *University of Connecticut*

Coastal marsh habitat on the Long Island Sound (LIS) coastline is particularly vulnerable due to intensive development, and sea level rise, that are only projected to increase in the future. Therefore, implementing restoration techniques that increase marsh elevation, especially sediment addition projects, are a priority for coastal management. While work to understand sediment addition has increased, we lack understanding of how added sediment texture may influence outcomes. We conducted an in-situ experiment across three LIS marshes to evaluate how sediment texture (fine scale dredge and dredge mixed with loam, sand, or cobble) affects above-ground plant biomass and porewater chemistry. The experiment comprises 150 plots; 50 in each of three marshes, with 10 per treatment (including a control) split equally between high and low marsh habitat. The three marshes span LIS's tidal range variation and are locations with ongoing or planned marsh-scale sediment addition. After three years, preliminary analyses suggest that sediment texture significantly affected aboveground plant biomass and porewater chemistry (sulfide and ferrous iron concentrations) but the relationship varied among the three sites and between marsh habitat (low versus high marsh). As restorations of LIS marshes continue to target thriving habitats, and abundant wildlife, our work informs the best management practices for sediment addition projects.
Theme: Thriving Habitats and Abundant Wildlife

Continuous Water Quality Monitoring in the Norwalk River Estuary. **Kaitlin Laabs (klaabs@usgs.gov)**, *US Geological Survey*

Coastal estuaries in southern New England show the effects of excess nutrients and coastal eutrophication. The USGS, in cooperation with CTDEEP and LIS, has been operating three continuous water quality monitor stations in the Norwalk River Estuary since the Spring of 2021 as part of a larger project to look at water quality of select estuaries of LIS. These monitoring stations are equipped with YSI EXO2 multiparameter sondes that collected water temperature, specific conductance, salinity, dissolved oxygen (DO), turbidity and chlorophyll a.

During the summers of 2021-2023 the dissolved oxygen concentrations often went below 3 mg/ L in both the near surface and near bottom water at several of the monitored locations. Data from the monitoring stations show that there are wide ranging fluctuations in the concentration of DO in the Norwalk Harbor. During daylight hours primary productivity from algal photosynthesis produces DO and the concentrations in the water have been measured greater than 20 mg/L and greater than 200% saturation. At night the DO is consumed through gross respiration of the system and causes DO levels to drop often below 3.0 mg/l and often below 1.0 mg/L. The daily change in DO concentrations has a very large range and may cause the habitat to be unsuitable for many sensitive species of fish and invertebrates.
Theme: Sound Science and Inclusive Management

Long Island Sound Seafloor Habitat Mapping Initiative Beyond Phase III. **DeAva Lambert (DeAva.Lambert@ct.gov),** Connecticut Department of Energy and Environmental Protection

The Long Island Sound Seafloor Habitat Mapping Initiative conducts benthic mapping of Long Island Sound (LIS), providing seafloor landscape maps depicting habitat structure and the ecological characteristics associated with those habitats. These mapping projects integrate information from a variety of sources including acoustic bathymetry, backscatter, sedimentary, geochemical, physical, and biological data for LIS, which convey critical pieces of information essential for improving science-based environmental management and enhancing the scientific understanding of potential energy infrastructure effects and mitigation of their impacts. The Mapping Initiative is administered by the LIS Cable Fund (LISCF) Steering Committee, consisting of federal, state, and academic partners from Connecticut and New York.

LIS Seafloor Habitat Mapping Initiative projects are conducted through a collaborative partnership combining national and local expertise and resources, which includes NOAA's Biogeography Branch and two regional academic consortiums led by the University of Connecticut and Columbia University. In 2012 three high priority mapping areas in LIS were selected for benthic mapping based on their ecological value, multiple use conflicts, compliance, resource management, and potential for further development. Phases I & II of the mapping initiative are complete, and Phase III is currently underway. This presentation provides an update on the expansion of the Mapping Initiative into additional areas of LIS where high-resolution multibeam bathymetric and backscatter data is either outdated or unavailable.
Theme: Sound Science and Inclusive Management

What's That Smell?! A Salt Marsh Restoration Case Study for Educators. **Beth Lawrence (beth.lawrence@uconn.edu), University of Connecticut; Ly Williams,** *Smithtown High School*, **Larissa Graham (larissa.graham@uconn.edu),** *Connecticut National Estuarine Research Reserve,* **Madeline Kollegger (madeline.kollegger@uconn.edu),** University of Connecticut

Rising seas and developed coastlines along the Long Island Sound threaten the viability of salt marsh ecosystems, but scientists and coastal managers are testing how adding sediment to submerging marshes can promote coastal resilience. We developed an interactive educational case study targeting students in grades 7-12 that will soon be publicly available on the CT NERR website that will allow students to explore this emerging restoration technique through meet-the-scientist videos, field data, and a hands-on-experiment. The case study follows Katie on their journey to a Connecticut salt marsh that recently received (a stinky!) dredged sediment application to increase the elevation of the marsh surface. Students will help Katie wrangle with some challenging issues about how much sediment to add, what to do about acidic soils, and make management recommendations of their own. We will discuss case study learning objectives and share teaching tips for implementing the case in the classroom, with the goal of bolstering awareness about and confidence to implement this engaging teaching resource.
Theme: Thriving Habitats and Abundant Wildlife

Methane and Nitrous Oxide Distributions and Sea-Air Fluxes in Western Long Island Sound**.** **Cara C. M. Manning (cara.manning@uconn.edu), Anagha Payyambally (anagha.payyambally@uconn.edu), Josie L. Mottram (josie.mottram@uconn.edu),** *University of Connecticut*

Methane and nitrous oxide (CH_4 and N_2O) are greenhouse gases whose atmospheric concentrations are increasing due to human activities. Over a 100-year timescale, the global warming potentials of CH_4 and N_2O are 30 and 273 times greater than carbon dioxide (CO_2). CH_4 and N_2O are produced through biological reactions associated with organic matter processing and nutrient transformations in the water column and sediments. CH_4 and N_2O production can be enhanced in estuaries with high organic matter and nutrient supply that undergo seasonal hypoxia, such as Long Island Sound. Here we present the first water column measurements of dissolved CH_4 and N_2O concentrations in western Long Island Sound, which were collected in May and October 2023. CH_4 concentrations ranged from ~40–440 nmol/kg (~1800–18000 % saturation) in August and ~20–180 nmol/kg (~800–7000 % saturation) in October. Nitrous oxide concentrations in August and October ranged from ~8–13 nmol kg^{-1} (~110–170 % saturation). Calculated sea-air gas fluxes demonstrate that CH_4 emissions play a significant role in the total global warming potential (radiative forcing) of greenhouse gas emissions from western Long Island Sound. Future changes in Long Island Sound, including changes in dissolved oxygen levels, nutrient loading, organic matter supply, and stratification, could alter the emissions of these gases. Enhanced monitoring of these gases would improve understanding of the controls on their distributions and predictions of their future emissions from western Long Island Sound.
Theme: Clean Waters and Healthy Watersheds

Oyster Health and Restoration in Long Island Sound - Observations of Changing Water Chemistry. **Isaiah Mayo (isaiah.may@noaa.gov), Mariah Kachmar (mariah.kachmar@noaa.gov), Kyra Lenderman (kyra.lenderman@noaa.gov), Kelly Roper (kelly.roper@noaa.gov), Genevieve Bernatchez (genevieve.bernatchez@noaa.gov), Mark Dixon (mark.dixon@noaa.gov), LTJG Tyler Houck (tyler.houck@noaa.gov), Meghana Parikh (meghana.parikh@noaa.gov), and Katie McFarland (katherine.m.mcfarland@noaa.gov)**, NOAA Fisheries

Oysters in Long Island Sound (LIS) provide major economic and ecosystem services to the region's waters and coastal communities in the forms of harvested seafood and job creation, as well as denitrification, coastal protection, and habitat provisioning benefits. To more-fully realize these potential contributions, increasing shellfish production from aquaculture, recreation, and restoration has been identified as an ecosystem target by the LIS Study, a national estuary program dedicated to restoring and protecting the Sound's waters and watershed.

In this presentation, we will provide an overview of a newly established oyster health monitoring program funded by the LIS Study, that monitors the population health of four natural and restored oyster beds in the region. The primary objectives of this program are to 1) ascertain a quantitative understanding of the seasonal dynamics of disease and reproductive success in unmanaged oyster populations; 2) identify the key water quality and physical oyster bed characteristics that best relate to the population burden of disease; and 3) establish a standard methodology for incorporating disease burden in oyster population health assessments for future evaluation of restoration projects. Using this comprehensive approach, which considers disease progression in the context of the environment and overall population health, we aim to fill critical information gaps needed to guide restoration planning in a way that promotes the success of natural, restored, and cultivated oysters and in turns supports healthy, resilient ecosystems and coastal communities.
Theme: Thriving Habitats and Abundant Wildlife

Investigating Suspension-Feeding Invertebrates as Bioindicators of Microplastics. **Kayla M. Mladinich (kayla.mladinich@uconn.edu),** *NOAA Office of Education,* **Bridget A. Holohan (bridget.holohan@uconn.edu), Sandra E. Shumway (sandra.shumway@uconn.edu), J. Evan Ward (evan.ward@Uconn.edu),** *University of Connecticut*

Suspension-feeding animals inhabiting Long Island Sound interact with microplastics of different shapes and sizes suspended in the water column. Bivalve molluscs have been suggested as potential bioindicator species for microplastics as they are known to consume plastic particles in the natural environment, are widely distributed, sessile, and easy to collect. These molluscs, however, are selective suspension feeders and do not consume all particles to which they are exposed. This study investigated how two indiscriminate suspension feeders, the Atlantic slippersnail (*Crepidula fornicata*; gastropod) and sea grape (*Molgula manhattensis*; tunicate), interact with microplastics of different sizes, shapes, and polymers to determine their suitability as bioindicator species. The data were compared to that of previous experiments with oysters (*Crassostrea virginica*) and mussels (*Mytilus edulis*). Animals were offered aged polyester or nylon microfibers of different lengths, nylon and polyester microfibers of similar lengths, or polyethylene and polystyrene microspheres of similar diameters during a 2-h exposure. Pseudofeces and feces collection during and after the exposures revealed that slippersnails and sea grapes both exhibited size-based rejection of nylon fibers, rejecting longer fibers at higher proportions. Polymer type did not influence ingestion of fibers or spheres. Sea grapes were the most indiscriminate feeders when compared with slippersnails, oysters, and mussels, but egested microplastics as quickly as the other species. Although sea grapes rejected proportionally fewer microplastics than slippersnails, neither species will make an ideal bioindicator because they do not ingest all plastic particles they encounter and egest the particles quickly.
Theme: Clean Waters and Healthy Watersheds

Long Island Sound (LIS) Dynamic Spatially Referenced Regression on Watershed Attributes (SPARROW) Model. **Richard Moore (rmoore@usgs.gov), Laura Hayes (lhayes@usgs.gov), Craig Brown (cjbrown@usgs.gov), Richard Smith (rsmith1@usgs.gov),** *U.S. Geological Survey*

Dynamic SPARROW models for watersheds draining into Long Island Sound (LIS) are being developed cooperatively by the US Geological Survey (USGS) and the US Environmental Protection Agency (EPA). Both point and nonpoint sources are being modeled with a seasonal storage component that varies throughout the 21-year model period, 2000-2020. Predictor variable datasets, seasonally discretized wherever possible, include atmospheric deposition, land use such as urban land, waste-water-treatment plant discharges, agricultural sources (crop-specific land cover, nutrients from fertilizer and manure), snow cover, vegetation index, precipitation, temperature, and streamflow. A new variable, baseflow groundwater nitrogen loads, is being evaluated for inclusion in the nitrogen model.
The models use an enhanced version of the 1:100,000-scale stream network and catchments of the National Hydrography Dataset Plus Version 2.1 (E2NHDPlusV2) as its hydrologic framework. NHDPlusV2-based estimates of both mean annual and mean monthly streamflows account for excess evapotranspiration, major flow additions and removals, and gaged flow adjustments. Dependent variable data for the models are seasonal nitrogen, phosphorus, and suspended sediment loads measured at monitoring sites where sufficient data are available. Loads and source components will be simulated for each NHDPlusV2 flowline (river network or coastal reach) within the watershed. Each estimated load and source component for each flowline, for each seasonal time step, will be accompanied by an estimate of the portion of the load delivered to LIS. Once calibrated, the models can be used to test best management scenario conditions as currently planned by US EPA and other stakeholders using EPA's River Basin Export Reduction Optimization Support Tool (RBEROST).
Theme: Sound Science and Inclusive Management

Observing Marine Life and Their Environment. **Jackie Motyka (jackie@neracoos.org), Cameron Thompson (cameron@neracoos.org), Austin Pugh (austin@neracoos.org),** NERACOOS

The marine environment in the Northeast is experiencing rapid, climate driven changes. To understand these changes, long-term oceanographic data and information products are crucial. The Northeastern Regional Association of Coastal Ocean Observing Systems, NERACOOS, is the region's federally certified entity within the Integrated Ocean Observing System for producing, integrating, and communicating information about our region's coasts and oceans. To meet the informational needs of end users and respond to the challenges posed by changing ecosystems NERACOOS is increasingly considering how we can expand our capabilities to monitor marine life and share informational data products in Long Island Sound. Recent technological advancements in platforms, environmental sensors, passive acoustics, in situ imaging, and eDNA now enable novel methods for observing plankton, harmful algal blooms, soundscapes, and ocean acidification. NERACOOS wants to hear from the communities of Long Island Sound about their priorities, as we consider how best to observe and display information on marine life and their environment, and how NERACOOS can better produce, integrate, and communicate information on water quality and key ecosystem indicators.
Theme: Sound Science and Inclusive Management

Modeling Stratification and Hypoxia in Long Island Sound Using Generalized Additive Models.
Anna Lisa Mudahy (mudahy.annalisa@epa.gov), *Oak Ridge Institute for Science and Education***,**
James Hagy (hagy.jim@epa.gov), *US EPA*

Seasonal hypoxia, or low dissolved oxygen, in Long Island Sound (LIS) has declined since the early 2000s due to management actions that reduced point source nitrogen loading. To further quantify and better understand drivers of changes in the spatial and temporal distribution dissolved oxygen we applied a spatio-temporal modeling approach using generalized additive models (GAMs). We used monthly to monitoring data from the Connecticut Department of Energy and Environmental Protection and the Interstate Environmental Commission. We used estimates of freshwater inflow and nitrogen loading rates from 17 major rivers compiled by USGS and data on point source nitrogen discharges to rivers below gauge points or directly to LIS. We calculated Simpson's stratification index and a modified index that quantifies thermal vs. salinity stratification. Using GAMs, we modeled density stratification in 2-dimensions + time and DO in 3 dimensions plus time. The GAM predicting stratification quantified the seasonal and spatial pattern of stratification with r^2=0.644, while quantifying a 0.113 kPa/year increase in summer thermal stratification and 0.021 kPa/year increase in summer salinity stratification from 1991 to 2021. GAMs explained 90.5% of the variance in seasonal and spatial DO distributions. The model estimated that DO increased 0.2 mg/L and 0.3 mg/L in central and eastern LIS and decreased 0.04 mg/L in western LIS. Despite their usefulness in predicting overall DO levels, GAMs did not effectively quantify the frequency of low DO values associated with hypoxia (<3 mg/L).
Theme: Clean Waters and Healthy Watersheds

Seabed Effects of Extensive and Extended Mechanical Shellfish Harvesting in Oyster Bay Harbor, Long Island, New York. **Jason Mueller (jasonm5042@gmail.com), Roger D. Flood (roger.flood@stonybrook.edu),** *Stony Brook University*

The Oyster Bay Harbor seabed has been leased to a company which has used mechanical techniques to harvest shellfish (primarily M. mercenaria) for at least the last 30 years. The technique uses water jets to lift clams out of the sediment so they can be collected in a basket. Also, the technique creates a groove in the seabed and sediments resuspended by the water jets can move some distance away from the dredged location. Farming techniques on land often disturb sediments and there is an interest in reducing that disturbance, but some disturbance is accepted as a necessary part of the enterprise. This should also be true for shellfish harvesting and any harmful effects need to be understood. Here we used high-resolution seafloor mapping techniques and sediment samples to study sediments throughout Oyster Bay Harbor, Mill Neck Creek and Cold Spring Harbor in order to characterize the effects of shellfish harvesting. Water-column turbidity profiles were also collected and flow modeling is underway. Hand raking and mechanical techniques both disturb the seafloor but the mechanical disturbance is much more extensive and it has occurred outside of the permitted area. Acoustic backscatter and sample data were used to map sediment type, especially the distribution of muddy sediments which have low backscatter. Comparisons with prior surveys suggest that over the past 20-30 years fine-grained sediments have been accumulating at sites inside and outside of the lease area, perhaps due to the use of mechanical harvesting techniques.
Topic: Thriving Habitats and Abundant Wildlife

Can The Creation of Sediment Hummocks Support Saltmarsh Sparrow Recovery? **Nicolette Nelson (nicolette.nelson@uconn.edu), Franco Gigliotti (frank.gigliotti@uconn.edu), Madeline Kollegger (madeline.kollegger@uconn.edu), Olivia Lemieux (olivia.lemieux@uconn.edu),** *University of Connecticut*, **Blaire Steven (blaire.steven@ct.gov),** *The Connecticut Agricultural Experiment Station*, **Min Huang (min.huang@ct.gov),** *Connecticut Department of Energy and Environmental Protection*, **Beth Lawrence (beth.lawrence@uconn.edu), Ashley Helton (ashley.helton@uconn.edu), Chris Elphick (chris.elphick@uconn.edu)** *University of Connecticut*

Uniform sediment addition increases elevation capital and allows salt marshes to persist in the face of sea-level rise, but a new approach of generating elevation heterogeneity through a patch-work application of sediment has potential to enhance ecological function in degraded marshes and hasten recovery of certain marsh dependent species. Mounds of sediment ("hummocks") can create high-elevation marsh habitat for nesting birds such as saltmarsh sparrows while minimizing disruption to existing habitat. It is unclear, however, how vegetative regrowth varies along elevation and flooding gradients created with hummock restoration, and how this contributes to variation in suitability of saltmarsh sparrow nesting habitat. We studied 14 sediment hummocks created in spring 2022 at Great Meadows Marsh in Stratford, Connecticut (USA) (mean area: 272 m^2, maximum elevation mean: 1.70 m). Hummocks were experimentally planted with native marsh vegetation plugs that varied in density and species composition. After two growing seasons, total vegetation and thatch cover, metrics relevant to saltmarsh sparrow nesting, did not differ among planting treatments. Vegetation cover increased with elevation, but thatch cover was consistent across elevations. Total vegetation and cover of *Spartina patens,* which saltmarsh sparrows frequently use to build nests, averaged lower on hummocks than at known nest sites after two growing seasons, perhaps explaining the lack of saltmarsh sparrow nests on hummocks. Other saltmarsh birds nesting on hummocks experienced low nest success, apparently due to egg predation. Ultimately, our investigations will shed light on potential tradeoffs of different management goals associated with heterogeneous application of sediment.

Theme: Thriving Habitats and Abundant Wildlife

Carbonate System Parameters in Long Island Sound Waters. **Erich Nitchke (erich.nitchke@uconn.edu), Samantha Rush (samantha.rush@uconn.edu),** *University of Connecticut*, **Katie O'Brien-Clayton (katie.obrien-clayton@ct.gov),** *Connecticut Department of Energy and Environmental Protection,* **Penny Vlahos (penny.vlahos@uconn.edu),** University of Connecticut

Estuaries are complex transition zones from freshwater to saline conditions, which impact carbonate system parameters and measurements. Notably, estuaries undergo two types of acidification. The first is the long-term influx of carbon dioxide gas (CO_2) from rising atmospheric CO_2 levels and the second is through seasonal eutrophication wherein excess respiration generates elevated CO_2 levels in waters. This seasonal hypercapnia represents an additional stressor to LIS ecosystems and it is an important factor to constrain for sustaining LIS ecosystem integrity. In 2023 the CT Department of Energy and Environmental Protection integrated measurements of total dissolved inorganic carbon (DIC), total alkalinity (TA), and spectrophotometric pH to their monthly sampling effort, allowing for the establishment of a time-series of LIS carbonate system measurements. This study presents the first-year data to highlight both the trends and insights. We also compare TA measured directly to derived TA via CO2SYS by input parameters of DIC and pH to evaluate to differences and uncertainties in LIS measured TA. We also compare this data to other recent studies conducted in 2021-2022.
Theme: Clean Waters and Healthy Watersheds

Surface Sediment Distribution and Chemical Composition Revealed by the Long Island Sound Seafloor Habitat Mapping Project. **Frank O. Nitsche (fnitsche@ldeo.columbia.edu), Timothy C. Kenna (tkenna@ldeo.columbia.edu),** *Lamont-Doherty Earth Observatory of Columbia University*, **Cecilia McHugh (cecilia.mchugh@qc.cuny.edu),** *Queens College*

Sediment grain size distribution and chemical composition in coastal areas are important aspects of habitat characterization and assessment. In addition, this information can provide insights into sedimentary processes and sediment sources (e.g., major rivers). Here, we present available results of completed and ongoing sediment characterization work conducted as part of the Long Island Sound Seafloor Habitat Mapping project. To date, we have collected several hundred sediment grab samples in Eastern and Central Long Island Sound and determined grain size and chemical composition using x-ray fluorescence (XRF) analysis for element composition and isotope ratio mass spectrometer for carbon and nitrogen content. We compared our results with detailed bathymetry, backscatter, and oceanographic data. The findings confirm previously observed general trends including the east-west trend from coarse to fine grained sediment. Our results also show significant local variation in grain size and surface sediment chemistry. The Thames and Connecticut Rivers are major sources of fine grain sediments. Sediment chemical composition indicates both terrestrial and marine sources. Detailed analyses of sediment cores and subbottom data allows us to constrain deposition timing as well as to distinguish between erosional and depositional environments and provides insight into changes in the sedimentary environment through time.
Theme: Sound Science and Inclusive Management

Long-Term Effects of Adaptation (≥ 150 generations) to Ocean Warming and Acidification in the Calanoid Copepod, *Acartia Tonsa.* **Lisa A. Piastuch (lisa.piastuch@uconn.edu), Edin Sission (esiss@conncoll.edu),** *Connecticut College*, **James A. deMayo (james.demayo@ucdenver.,edu)**, *University of Colorado Denver,* **Michael Finiguerra (michael.finiguerra@uconn.edu), Hans G. Dam (hans.dam@uconn.edu),** *University of Connecticut*

Ocean warming (OW), ocean acidification (OA), and their combination (OWA) pose significant threats to the survival of marine organisms. It is, therefore, crucial to test if species can adapt rapidly to these conditions and explore the mechanisms and costs of adaptation. Here, we extend a previous study of the calanoid copepod *Acartia tonsa*, an abundant and widely distributed coastal species, to investigate its ability to adapt to OW, OA, and OWA conditions. Previous evidence suggested rapid, but limited adaptation capacity of *A. tonsa* to OWA conditions within the first 25 generations of exposure, following an initial decline at the start of the experiment. We revisited the population fitness of the *A. tonsa* lineages, which have been maintained for ≥ 150 generations across four different treatments: ambient (AM) (18°C, 400 ppm CO_2), OA (18°C, 2000 ppm CO_2), OW (22°C, 400 ppm CO_2), and OWA (22°C, 2000 ppm CO_2) conditions. We measured population fitness (the net reproductive rate) of each lineage from fitness-related traits: egg production rate, egg hatching success, C1-adult survivorship, development time, and sex ratio. Under OWA conditions, A*.tonsa* increased fitness by 18% by the 200th generation relative to the 25th generation, due to improvements in egg production rate and survivorship, coupled with a drastic reduction of development time. Conversely, the OA and OW treatments reached a plateau in the 25th generation and have since experienced a slight erosion in fitness. The fitness recovery in the OWA treatment suggests strong resilience of *A. tonsa* under multiple stress exposure.

Theme: Sound Science and Inclusive Management

Developing Education and Outreach to Foster Awareness of Synthetic Microfibers Leakage from Laundry Systems into the Marine Environment. **Catherine Prunella (cjp275@cornell.edu), Katherine Bunting-Howarth (keb264@cornell.edu),** *New York Sea Grant/Cornell University,* **Jonathan Ronn (jronn@ldeo.columbia.edu), Beizhan Yan (yanbz@ldeo.columbia.edu),** *Lamont Doherty Earth Observatory of Columbia University*

Synthetic textile materials like polyester and nylon shed plastic microfibers during laundering into wastewater and the atmosphere. Because of their small size, microfibers are not fully removed at wastewater treatment plants, and enter waterways where they absorb toxic compounds and pose a threat to marine life via ingestion. Despite the potential risks, the public is largely unaware of microfiber pollution in marine environments.

To inform microfiber education and outreach, New York Sea Grant (NYSG) is conducting semi-structured interviews at New York City laundromats to understand the extent to which New Yorkers consider their clothing a source of water pollution. We are asking participants questions like: if you ever notice your clothes changing after washing and drying, like shrinking, colors fading, or material thinning, why do you think this happens? Where do you think laundry wash water goes? Have you heard about microfibers and microplastics? NYSG will create outreach materials based on the results of these interviews, highlighting areas where increased knowledge is needed and using culturally relevant language. With these resources, NYSG will engage communities in remediating microfiber pollution from laundry. This work is funded by the National Oceanic and Atmospheric Administration's Marine Debris Challenge Competition through the Bipartisan Infrastructure Law.
Theme: Clean Waters and Healthy Watersheds

Tracing the Fate of Phytoplankton-Derived Nitrogen Through Oysters: Effects on Recycling, Denitrification, and Buria*.* **Peter Ruffino (peter.ruffino@uconn.edu), Craig Tobias (craig.tobias@uconn.edu),** *University of Connecticut*

Oyster reefs and aquaculture farms are considered for nitrogen (N) removal in nearshore systems to mitigate eutrophication. However, the scientific literature presents mixed findings regarding their efficacy and removal mechanisms. Oyster-mediated N removal is typically categorized as enhanced denitrification or biomass harvest, with unclear specificity regarding N sources and individual N pathways. This study utilizes 15N-labeled phytoplankton in open and closed system mesocosm experiments to assess oyster influence on N processing, denitrification enhancement, and the legacy effects of oysters on sediment N cycling. Oysters reduced phytoplankton-N mineralization by half, diverting N into their tissue. Denitrification accounted for <2% of phyto-N processed during active feeding periods. Oysters had no significant effect on denitrification of phyto-N. No legacy effect of oyster biodeposits on recycling or denitrification was observed over six months. Mesocosm sediments exhibited rapid initial recycling and release of phyto-derived N, followed by slower rates of loss with higher denitrification efficiencies. Approximately 75% of deposited N was lost over 180 days. This study showed the oysters' primary impact on phyto-N fate occurred during active feeding, with assimilation rates twenty times larger than denitrification. In high phytoplankton, low nitrate systems, oyster-driven denitrification enhancement is not a significant ecosystem service, suggesting oyster removal for effective nitrogen management. This underscores the importance of harvesting in nutrient credit schemes.

Theme: Clean Waters and Healthy Watersheds

Actionable Satellite Water-Quality Data Products in LIS for Improved Management and Societal Benefits*.* **Jonathan Sherman (jonathan.sherman@noaa.gov)***, National Oceanic and Atmospheric Administration CoastWatch*, **Maria Tzortziou (mtzortziou@ccny.cuny.edu)***, City College of New York*, **Joaquim Goes (jig2113@columbia.edu)**, *Lamont Doherty Earth Observatory, Columbia University*, **Melanie Abecassis (melanie.abecassis@noaa.gov)**, *University of Maryland*, **Elizabeth Staugler (staugler@ufl.edu)**, *Florida Sea Grant*, **Veronica Lance (veronica.lance@noaa.gov),** *National Oceanic and Atmospheric Administration CoastWatch*

Designated as an Estuary of National Significance, Long Island Sound (LIS) is amongst the most valuable natural resources in North America. It is also one of the worlds' most urbanized estuaries, becoming increasingly vulnerable to climate change including acidification, warming, and sea level rise. Seasonally recurring hypoxia and algal blooms continue to represent a threat to LIS water quality, public health, and the aquaculture industry. Understanding the drivers of these environmental issues require high-frequency, synoptic observations of the entire ecosystem, over different seasons and across a range of conditions, including extreme events which can be challenging for *in situ* monitoring. Satellite observations, obtained almost daily and across spatiotemporal scales not feasible with field-based monitoring alone, can uniquely provide data products of great value for water quality monitoring. Here we present the activities and goals of a NY Sea Grant funded project to produce satellite water quality data products that are freely available to end users through the data services of NOAA CoastWatch. These data products combine rich field datasets, laboratory experiments, and satellite observations at the ecosystem scale leading to satellite water quality indicators tailored and optimized for LIS. In addition, we will report on the outcomes of a recant LIS user engagement workshop held with federal, state and local agencies as well as academic researches. Current and future results from this project will strengthen equitable and inclusive access to near real-time actionable information for researchers, water resource management and decision making across LIS.

Theme: Clean Waters and Healthy Watersheds

Enhancing Coastal Resilience in Long Island Sound using the Northeastern Association of Coastal Ocean Observing System's Sensor Network. **Anna Simpson (anna@neracoos.org), Tom Shyka (tom@neracoos.org), Jake Kritzer (jake@neracoos.org),**
Katy Bland (katy@neracoos.org), *NERACOOS*

Coastal communities along Long Island Sound are confronting many challenges (e.g., frequent coastal flooding; algal blooms), and rely on ocean monitoring systems to provide both respond to, and prepare for, these hazards. Via a network of partners that operate ocean observing technologies from the Gulf of Maine to Long Island Sound, NERACOOS produces, integrates and delivers coastal and ocean data to end users to meet the most pressing information needs. In Long Island Sound, NERACOOS supports the Long Island Sound Integrated Coastal Observing System (LISICOS), and are expanding the network of near real-time water level sensors to help detect overland flooding during coastal storm events, improve flooding forecasts, and groundtruth regional inundation models. As coastal and ocean use evolves (e.g., offshore wind energy development), the data provided by an expanded suite of observing assets will be increasingly critical for informing real-time operational decisions and promoting safety and coastal community resilience.
Theme: Sustainable and Resilient Communities

Natural Size-Structure Recovery In A Harvested Intertidal Oyster Reef, Fence Creek, CT. **Zachary Siper (zjaysiper@gmail.com), Stephen R. Durham (stephen.r.durham@gmail.com),** *Cornell University*, **Gregory P. Dietl (gpd3@cornell.edu),** *Paleontological Research Institution and Cornell University*

Few studies have documented the harvest impact and recovery of an oyster bed beginning from an un-harvested state. However, an opportunity to document this dynamic arose for an oyster bed in Fence Creek, a small tidal creek in Madison, Connecticut. The oyster bed covered a substantial portion of Fence Creek's lower main stem, extending both upstream and downstream from a bridge near its mouth. In 2014, a local shellfish farming business leased the area upstream of the bridge and harvested its market-sized oysters. Due to the bed's small area, the farmers decided to leave the area alone afterward while the population recovered. We will present results from five years of monitoring the oyster population as it underwent this harvesting and subsequent recovery.

Our monitoring began in 2014, prior to completion of the oyster harvesting event, and continued until 2018 using a Before-After-Control-Impact design where the "Impact" and "Control" treatments corresponded with the harvested and unharvested areas of the oyster bed (i.e., upstream and downstream from the Fence Creek bridge, respectively). As expected, we observed a sharp drop in the number and sizes of oysters greater than market size (3") between 2014 and 2015. The numbers and sizes of oysters steadily increased afterward, and by 2018 median oyster sizes had recovered to 2014 levels for both treatments based on results of a Bayesian interrupted time series model. Our talk will further discuss these results as well as their potential implications for oyster management in Long Island Sound.
Theme: Thriving Habitats and Abundant Wildlife

Science to Impactful Management – Are We Making the Connection? **Paul E. Stacey (FootprintsInTheWater@outlook.com),** *Footprints In The Water LLC,* **Chester Arnold (chester.arnold_jr@uconn.edu),** *UConn Center for Land Use Education and Research*

The Long Island Sound Study has a long and productive history of scientific research that has improved understanding of the LIS ecosystem and the anthropogenic threats to its health. Early studies appropriately focused on nitrogen and hypoxia are now expanding to understand the growing challenges of watershed disturbance and climate change drivers. However, as the LISS begins a second update of its Comprehensive Conservation and Management Plan it's unclear whether the wealth of science is serving LISS management needs as it struggles to set objectives and management targets in context of today's social-ecological system (SES) and loss of stationarity. The Local Watershed Assessment and Decision Support Tool, developed under a CT DEEP, LISS applied research Enhancement Grant by UConn CLEAR and Footprints In The Water, has proven capability to make the Science-Management connection. Its solid basic and applied research foundation in a holistic, integrated watershed framework supports assessment and planning at an unprecedented 1-m scale for over 4300 catchments in CT. A user-friendly GIS interface guides local management towards biointegrity outcomes that meet overarching local ecosystem and human health and welfare objectives and user-defined water quality targets, including for nitrogen, in context of ecosystem health objectives. The presentation will demonstrate the capability for setting targets and guiding landscape management towards collective "chemical, physical and biological" Clean Water Act integrity goals in coastal watersheds, and the potential for achieving important local community environmental benefits, including advancements towards environmental justice goals. A proposed LIS TMDL update for nitrogen will also be presented.
Theme: Sound Science and Inclusive Management

Connectivity Considerations within Long Island Sound. **Han Sun, (zysunhan@163.com), Robert Wilson, (robert.wilson@stonybrook.edu),** *Stony Brook University*

Connectivity within Long Island Sound (LIS) is described using the particle tracking model LTRANS applied to 3D hydrographic fields derived from hindcasts using the Regional Ocean Modeling System (ROMS) for the spring and summer of 2008. The primary focus is on understanding the geographic expansion of regions infected by harmful algal *Alexandrium fundyense* blooms occurring in Long Island north shore embayments. A particular concern is the spread of cells to aquaculture sites distributed along the Connecticut shoreline. Basin-wide connectivity and source-to-destination relationships within LIS are quantified using the Lagrangian Probability Density Functions (LPDF) calculated from passive particle trajectories. Given the transient nature of *A. fundyense* blooms within LIS, the Retention Clock Matrix (RCM) is applied to trajectories to highlight changes in connectivity through time. Estimations of source and destination strengths indicate that aquaculture sites on the Connecticut shoreline are not “attractive” for Lagrangian particles released from infected Long Island north shore embayments. This result arises from an analysis of the mean Lagrangian Residual Circulation (LRC) within LIS, which incorporates the Eulerian residual currents and the Stokes drift. Analysis of vector field topology applied to LRC streamlines reveals important features of the Lagrangian residual field, including critical points, especially centers and attracting foci, and separatrices which delineate regions of coherent flow within the domain. Results emphasize analysis of LRC as a rational strategy for interpreting particle movements in specific biological and ecological connectivity applications within LIS.
Theme: Sound Science and Inclusive Management

The Impacts of Two Macroalgae Species, *Ulva sp*. and *Gracilaria sp*. on the Growth and Survivorship of Eastern Oyster, *Crassostrea Virginica.* **Laine Sylvers (laine.sylvers@stonybrook.edu), Margot A. Eckstein (margot.eckstein@stonybrook.edu), Bradley McGuire (bradley.mcguire@stonybrook.edu), Michael Doall (michael.doall@stonybrook.edu), Christopher J. Gobler (christopher.gobler@stonybrook.edu)**, *Stony Brook University*

Seaweeds can be considered to be nuisance organisms by shellfish farmers since they often bio-foul cages and other gear, potentially restricting water flow to the shellfish, and necessitating an increase in general farm upkeep and care. Seaweeds, however, also produce oxygen and sequester CO_2, deterring ocean acidification. The purpose of this study was to evaluate the impacts of two common macroalgae species, *Ulva* sp. and *Gracilaria* sp., on the survivorship and growth of the eastern oyster, *Crassostrea virginica*, in an aquaculture setting. Oysters were cultivated in floating mesh bags with and without the addition of these seaweed species in two embayment's on the north shore of Long Island, NY with contrasting water quality: Northport Harbor and Mount Sinai Harbor. Experiments were conducted from two to five weeks. Overall, experiments in both locations and with both seaweed species found no negative impacts on oyster growth and survivorship. In several experiments, oyster growth was significantly enhanced in the presence of seaweeds (p<0.05). Surface water mapping of large-scale *Ulva* arrays in Northport Harbor demonstrated the ability of this seaweed to regionally raise levels of DO and pH, suggesting *Ulva* sp. improved water quality stimulating bivalve growth. The results suggest that the co-cultivation of these seaweeds with shellfish may help improve commercial shellfish yields and help protect shellfish crops from coastal acidification. Additionally, since many seaweeds have commercial value, including *Ulva* and *Gracilaria*, the co-cultivation of seaweeds with shellfish may provide additional revenue streams for shellfish farmers.
Topic: Clean Waters and Healthy Watersheds

Piloting the Ocean Identity Survey with Project Limulus. **Graham Templeman (templemang1@southernct.edu),** *Southern Connecticut State University,* **Jo-Marie Kasinak, (Jomarie.Kasinak@sacredheart.edu),** *Sacred Heart University*, **Emma McKinley (McKinleyE1@cardiff.ac.uk),** *Cardiff University*, **Dr. Miriah Kelly (kellym38@southernct.edu),** *Southern Connecticut State University*

Ocean identity is a rapidly expanding idea on the complex nature of human connections with ocean areas. The use of statistically valid frameworks must be implemented to support conclusions related to ocean program impact. To this end, we will pilot the use of the newly released ocean identity survey to conduct a case study using Project Limulus as a pilot program. Project Limulus is a civilian scientist organization with the focus on the study of horseshoe crabs along the east Atlantic coast. The organization utilizes outreach programs with the general public to further promote the conservation and protection of this species. Our goal will be to implement the ocean identity survey within these programs across three different intervention types -- short term virtual interventions, short term in person interventions and long term in person interventions) Results will be used to assess the impact of different programs on individual ocean identity. The pilot will also be used to help develop the Ocean Identity toolkit, which is iteratively being developed. Others are encouraged to use the survey in their ocean outreach and engagement program and then tell us about their experiences via the ocean identity toolkit website. In the end we hope to use this polit experience to improve our understanding of program impact across intervention types while also improving the tools we provide to interested individuals who want valid and reliable ways to measure their ocean program impact.
Theme: Sustainable and Resilient Communities

New LIS Hydrodynamic/Water Quality Model Development and Dissolved Oxygen Modeling.

Andy Thuman (andrew.thuman@hdrinc.com), *HDR,* **Gregory Wilkerson (GWilkerson@dep.nyc.gov), Abdulai Fofanah (AFofanah@dep.nyc.gov), David Lipsky (lipskyd@msn.com),** *NYCDEP*, **Rich Isleib (Richard.Isleib@hdrinc.com), Mikayla Reichard (Mikayla.Reichard@hdrinc.com), Bin Wen (Bin.Wen@hdrinc.com), Ruta Rugabandana (Rutatenekwa.Rugabandana@hdrinc.com),** *HDR*, **Melissa Duvall (Duvall.Melissa@epa.gov), Mark Tedesco (Tedesco.Mark@epa.gov),** *USEPA*, **Carl Cerco (CarlCerco@outlook.com),** *USACE*

NYCDEP and USEPA are developing new hydrodynamic and water quality models (HWQMs) for Long Island Sound (LIS) to better understand nutrient impacts and climate change effects on achieving water quality standards in LIS. This LIS modeling project is an outgrowth of an independent review of the early 1990s System-Wide Eutrophication Model (SWEM) that recommended various model updates.

The HWQMs used are the Regional Ocean Modeling System (ROMS) hydrodynamic model and the Row Column AESOP (RCA) water quality model. The HWQMs aim to accurately represent tidal circulation and water quality in LIS and inter-connected water bodies. The models will be calibrated to data from 2005-2014, validated with 2003-2004 and 2015-2018 data, and assessed using 2019-2022 data. These years included more comprehensive data (e.g., ADCP, continuous measurements, primary production, benthic flux) than was available during SWEM development.

The HWQMs will have many new and notable features. Among them, a new algal predation formulation was implemented that significantly improves model predictions of bottom layer dissolved oxygen (DO) in western LIS. In addition, a new variable carbon to chlorophyll-a (C/Chla) ratio formulation was implemented that improves model predictions of observed west to east chlorophyll-a variability. The implemented formulations are not typically used in water quality/eutrophication models and were adopted from Chesapeake Bay modeling.

This presentation will provide an overview of the LIS modeling project and an update on progress made towards project completion. Information about the formulations employed for predicting bottom layer DO in western LIS will also be presented.

Topic: Sound Science and Inclusive Management

Using Oxygen Stable Isotopes to Assess Respiration – the Conspiracy of Mixing and Other Things. **Craig R. Tobias (craig.tobias@uconn.edu),** *University of Connecticut*,
Mark Altabet (maltebet@umassd.edu), *University of Massachusetts, Dartmouth*,
James O'Donnell (james.odonnell@uconn.edu), *University of Connecticut*

Isotopic fractionation during aerobic respiration preferentially consumes ^{16}O and enriches the residual dissolved oxygen pool in ^{18}O. This effect is maximally expressed during water column respiration but is minimally expressed during benthic respiration. Consequently systems with only benthic respiration show little to no enrichment in $d^{18}O$-O_2 with decreasing O_2 concentration, while systems with only water column respiration show large enrichments in $d^{18}O$-O_2 with decreasing O_2. The change in $d^{18}O$-O_2 as a function of O_2 loss is described by the isotope enrichment factor where the pure benthic or water column respiration scenarios would have enrichment factors equal to 0 and 20 per mil, respectively. Distributions of O_2 concentration and $d^{18}O$-O_2 measured in the field are commonly used to estimate an observed enrichment factor. The observed enrichment factor relative to the benthic and water column enrichment factors has been used to infer the relative contributions of benthic vs water column respiration. Photosynthetic O_2 production and vertical mixing complicates this interpretation. Through a combination of continuous automated measurements of water column respiration rates, benthic respiration measurements, fractionation experiments, spatially and temporally resolved $d^{18}O$-O_2 measurements, and numerical modeling we show that gas transfer, vertical mixing and photosynthesis can result in a misattribution of the importance of benthic respiration when interpreting $d^{18}O$-O_2 data absent of physical transport considerations. Conversely, we show that oxygen isotopes can constrain vertical mixing estimates when benthic and water column respiration rates are concurrently measured.
Theme: Sound Science and Inclusive Management

Scallop (*Argopecten Irradians Irradians*) Health in a Changing Climate. **Sivanna Q. Trainer, (sivanna.trainer@stonybrook.edu)**, *Stony Brook University*, **Harrison Tobi (hjt27@cornell.edu),** *Cornell Cooperative Extension*, **Annabelle Dominguez (annabelle.dominguez@stonybrook.edu), Guillaume Cacot (guillaume.cacot@stonybrook.edu), Emmanuelle Pales Espinosa (emmanuelle.palesespinosa@stonybrook.edu),** *Stony Brook University*, **Stephen Tettelbach (stt47@cornell.edu)**, *Cornell Cooperative Extension,* **Bassem Allam (bassem.allam@stonybrook.edu)**, *Stony Brook University*

Mass mortality events of adult northern bay scallop, *Argopecten irradians irradians*, have been reported in New York every summer since 2019. These events are attributed to heavy infection by an apicomplexan parasite occurring in conjunction with warm temperature anomalies and other stressful environmental conditions. To further investigate the effect of temperature on disease development and scallop survival, two experiments were performed by holding scallops for three (April-July) to six (January-July) months in flow-through systems maintained at ambient seawater temperature or adjusted to capture past (-2.5ºC) and future (+2.5ºC) temperature conditions. Throughout this period, scallops were monitored for mortality and disease. Water and biodeposit samples were also collected to understand the impact of temperature on parasite release into the surrounding environment.

Parasite loads in scallop tissue peaked fastest (early to mid-June) for the “hot” treatments followed by the “ambient” treatments. Alternatively, parasite loads in the “cold” treatment peaked around the end of June. Peaks in parasite loads were closely linked to increased mortality in all treatments. Scallops in the “hot” treatment experienced the greatest and fastest mortality out of all the treatments, while the “cold” treatment displayed the lowest mortality. Parasite load also increased with temperature in the environmental samples suggesting that scallops were shedding parasite cells as the disease progressed and/or scallop mortality occurred.

These results suggest that changes in temperature trends during spring and early summer may represent a major factor regulating parasite development, and consequently disease and mortality outbreaks in NY bay scallops.

Theme: Thriving Habitats and Abundant Wildlife

Integrating Spatial Modeling of Household Fertilizer Behavior with Nitrogen Transport Models to Inform Nonpoint Nutrient-Reduction Programs. **Jamie Vaudrey (jamie.vaudrey@uconn.edu), David Dickson (david.dickson@uconn.edu), Qian Lei-Parent (qian.lei@uconn.edu),** *University of Connecticut*, **Robert J. Johnston (RJohnston@clarku.edu), Tom Ndebele (TNdebele@clarku.edu),** *Clark University*, **David Newburn (dnewburn@umd.edu), Derek Wietelman (dcwietel@umd.edu),** *University of Maryland*, **Haoluan Wang (haoluan.wang@miami.edu),** *University of Miami*

Attainment of nutrient-reduction goals in Long Island Sound (LIS) requires addressing household behaviors such as lawn fertilizer use linked to nonpoint emissions. Nutrient impacts from residential lawns are a growing concern as urban populations increase and limited progress has been made to change household behaviors. While the impacts of excessive fertilization are well known, minimal attention has been paid to understanding behaviors by residential households, how to effectively implement behavior change campaigns, and implications for attaining nutrient-reduction goals.
This presentation will provide preliminary results of a novel, integrated economic-hydrologic model that first predicts high fertilizer impact areas based on household characteristics combined with spatially-explicit nitrogen load and transport estimates to LIS coastal waters. The model then predicts subsequent impacts of prospective behavior-change campaigns on fertilizer use and associated nitrogen delivery. The approach integrates multiple models within the LIS coastal boundary including: (1) econometric modeling using household survey data to predict parcel-level residential fertilizer decisions, (2) landscape predictions for fertilizer use across single-family households in coastal Connecticut, coupled with a nutrient transport model to predict LIS nitrogen loads, and (3) contingent behavior modeling to examine willingness to reduce fertilizer use in response to prospective policy interventions. To our knowledge, this is the first integrated economic-nitrogen transport simulation model to examine residential fertilizer behaviors coupled with an assessment of the potential for nutrient-reduction programs to target areas for mitigating nutrient impacts. The project also assesses whether nitrogen loads from high fertilizer use and transport areas have disproportionate impacts on environmental justice communities.
Theme: Clean Waters and Healthy Watersheds

Assessing Pluvial Flood Risk in Areas Surrounding Long Island Sound Using Multi-Criteria Decision Making and Iterative Ensemble Smoothing. **Rob Welk (rwelk@usgs.gov), Liv Herdman (lherdman@usgs.gov), Kalle Jahn (kjahn@usgs.gov), Kristina Masterson (kmasterson@usgs.gov), Salme Cook (secook@usgs.gov),** *U.S. Geological Survey*

Flooding from extreme rainfall (pluvial flooding) endangers human health and infrastructure and is influenced by landcover characteristics, atmospheric patterns, and topographical features. The U.S. Geological Survey, in cooperation with the Environmental Protection Agency, investigated the hazards posed by floods in communities surrounding Long Island Sound in New York and Connecticut as part of the Sustainable and Resilient Communities goal of the Long Island Sound Study. This study developed methods to identify areas susceptible to pluvial flooding using publicly available datasets which describe rainfall abundance, accumulation, and infiltration capacity and are continuous over the study area. Seven pluvial flood influencing variables were aggregated to a grid covering the extent of the study area with 900 by 900-meter grid cells binned to a common scale. A Multi-Criteria Decision Making framework, Analytical Hierarchical Process (AHP), was used to develop pairwise relationships between variables. To overcome the limitations of AHP, Iterative Ensemble Smoothing was used to vary initial parameter estimates to match recorded flood events. The resulting optimized variable weights were used to create spatially distributed risk ratings for the study area. These methods allow for the identification of vulnerable communities and the associated flood drivers, which can help with prioritizing resources for resilience building in and around Long Island Sound.
Theme: Sustainable and Resilient Communities

Equitable Access to Long Island Sound Waterfront and Beaches Through On-Demand Mobility.
Dr. Anil Yazici (anil.yazici@stonybrook.edu), Dr. Elizabeth Hewitt (elizabeth.hewitt@stonybrook.edu), Stony Brook University

Access to public beaches promotes physical and psychological health, fosters a sense of community, offers cooling opportunities during heat waves, and advances the goals of environmental justice. Lack of public transportation options and the overreliance on personal vehicles are major hurdles for equitable access to waterfront and beaches on Long Island, and a reflection of larger mobility issues throughout the U.S. To mitigate access issues to the Long Island Sound (LIS), the objectives of this project are to: 1) design and pilot on-demand shuttles that will facilitate equitable public access to LIS waterfront and 2) assess opinions of the pilot and pro-environmental attitudes towards the LIS to determine project impacts. The project will target underserved communities on Long Island who do not have the mobility means to use and appreciate LIS waterfront. This research hypothesizes that LIS access among underserved populations will increase as a result of the pilot shuttle and that respondents will report an increased sense of belonging, awareness, and pro-environmental attitudes towards the LIS after using the shuttle. To achieve these objectives, our research team will launch a trial run of the shuttle in May 2024 and the summer weekend shuttle pilot in June in partnership with private sector partner Flexigo. The survey will be administered at sign-up and on the shuttles. Expected outcomes of this work include contributions to research gaps, proof of viability and financial feasibility of the shuttle, and increased access to and awareness of the LIS among community members and end users.
Theme: Sustainable and Resilient Communities

Spatial Trends in Benthoscape Structure and Infaunal Communities in Long Island Sound.

Roman Zajac (rzajac@newhaven.edu), *University of New Haven*, **Peter Auster (peter.auster@uconn.edu),** *University of Connecticut, Mystic Aquarium,* **Ivar Babb (babb@uconn.edu),** *University of Connecticut,* **Christian Conroy (cwconroy@newhaven.edu),** *University of New Haven*, **Lauren Stefaniak (lstefania@coastal.edu)**, *Coastal Carolina University,* **Shannon Penna (ashanpenna@gmail.com), Dena Chadi (dchadi@health.nyc.gov), Nicole Govert (nicole.govert@uconn.edu), Cortney Schneeberger (schneeberger.courtney@gmail.com), Olivia Walton (owalton@newhaven.edu),** *University of New Haven*

Ecological characterizations performed under the Long Island Sound (LIS) Seafloor Habitat Mapping Initiative provide the opportunity to increase our understanding of the diverse habitats that make up the LIS benthoscape (seafloor landscape) and the ecological communities they support. This presentation summarizes and contrasts benthoscape structure and infaunal community ecology in the central-western and eastern portions LIS, based on the Phase I and Phase II portions of the project, respectively. Benthoscape structure in the central-western Phase I area is comprised mostly of large-scale mud and sand/mud patches, except for Stratford Shoal, which is a heterogeneous mix of sedimentary and hard substrate patches. Infaunal communities varied among large-scale patch types but also within patch types. In contrast, the eastern Phase II area is characterized by, primarily, extensive sandy sediment patches with high variability in grain size composition and scattered patches of muddy and hard substrate habitats. The variable sand composition generates distinct patch types distributed in a heterogeneous manner across the area. Infaunal community were highly variable across the eastern LIS benthoscape, but patch types supported relatively distinct set of community types. Taxonomic richness among the two areas is similar: 242 and 280 in Phase I and II, respectively, contrasting with previous assessments indicating a west to east increase in diversity. Overall, the results suggest that metacommunity dynamics may be important in shaping and maintaining infaunal communities across the LIS benthoscape. Understanding how habitat structure and associated communities change along the LIS gradient is critical to setting area-specific management criteria and assessments.

Theme: Thriving Habitats and Abundant Wildlife

Contributed Poster Abstracts

(In alphabetical order by lead author)

The Structure and Variability of Vertical Transport by Turbulence in Western Long Island Sound. **Mehrnoosh Abbasian (mehrnoosh.abbasian@uconn.edu), James O'Donnell (james.odonnell@uconn.edu), Craig Tobias (craig.tobias@uconn.edu)**, *University of Connecticut*

Nitrogen enrichment from various sources in the Long Island Sound (LIS) watershed is the primary cause of the hypoxia observed in this estuary, particularly during the summer months at the estuary's bottom. Hypoxia severity fluctuates in different years, ranging from anoxia to moderate hypoxia. The rate of decrease of dissolved oxygen (DO) near the bottom of LIS is controlled by air-sea gas exchange, ventilation by vertical turbulent transport, near-surface photosynthetic production, water column respiration, and sediment respiration. All of these are difficult to measure. To assess the transport rate and variability of turbulent eddy diffusivity, we used the Generalized Ocean Turbulence Model (GOTM), together with measurements of near-bottom current velocity, wind speed, salinity, and temperature. We then compared the predicted currents near the surface to observations, and stratification to observations, to assess the veracity of the model. The model predicts a vertical structure of near the surface and bottom. We find substantial variability linked to wind stress variations at the surface. The bottom boundary layer exhibits significant tidal and spring-neap fluctuations. The thickness of the bottom mixed layer varies with stratification and unsteady flow, resulting in complex dynamics at semidiurnal and subtidal time scales. The eddy flux at the pycnocline is typically very low (), but the model predicts intervals in which it is substantially higher due to increased wind speed and wind stress. The corresponding increased eddy diffusivity promotes water column mixing.

Theme: Clean Waters and Healthy Watersheds

Geospatial characterization of coastal wetland vulnerability in Long Island Sound. **Kate Ackerman (kackerman@usgs.gov), Neil Ganju (nganju@usgs.gov), Zafer Defne (zdefne@usgs.gov),** *U.S. Geological Survey*

Understanding the vulnerability of coastal wetlands to environmental stressors is important for establishing management priorities. We characterized Long Island Sound salt marshes using geospatial metrics (UnVegetated to Vegetated marsh Ratio (UVVR), elevation, tidal range, and sediment-based lifespan) to assess the susceptibility of salt marshes to deterioration. The UVVR estimates the areal ratio of tidal creeks, ponds, channels, and intertidal flats to vegetated marsh plain, and is a robust indicator of the state and trajectory of the marsh. The elevation of the entire marsh unit, and vegetated portion of the marsh plain, aid in the determination of marsh resilience to sea-level rise. Tidal range is positively correlated with biomass production, implying that a larger tidal range can provide an environment for greater vegetative growth. The sediment-based lifespan, which estimates a survival timescale for a marsh, is computed using UVVR, vegetated plain elevation, an estimate of sea-level rise and a substrate density. The elevation and UVVR metrics are combined in a decision matrix to determine which areas might be candidates for different management actions (e.g., restoration, monitoring, protection, or evaluation), and those decisions are mapped across the landscape. The combination of these geospatial metrics provides an objective, consistent, spatially complete insight into the present state and trajectory of salt marshes across Long Island Sound.
Theme: Thriving Habitats and Abundant Wildlife

Spatiotemporal Patterns of Mercury Accumulation at the Base of a Coastal Food Web. **Anika Agrawal (anika.agrawal@uconn.edu), Robert Mason (robert.mason@uconn.edu), Jessica Brandt (jess.brandt@uconn.edu)**, *University of Connecticut*

Coastal systems are at risk of rapid environmental change and are sensitive to stressors such as metal pollution. Specifically, mercury (Hg) and methylmercury (MeHg) concentrations have increased in coastal areas and seafood resources. This has led to concerns about MeHg bioaccumulation as seafood is the primary route of MeHg exposure to human consumers in the United States, and exposure to elevated MeHg concentrations has been associated with a suite of adverse health impacts. Nutrient availability can mediate Hg bioaccumulation and studies have shown that selenium (Se) may act as a nutrient mediator of Hg biogeochemistry as well. However, selenium's role as a nutrient at the base of the food web has been largely unstudied, despite basal food web interactions greatly influencing bioaccumulation and biomagnification in coastal food webs. To address these gaps in understanding, we are investigating the influence of macro- and micronutrients on the spatial and temporal dynamics of mercury bioaccumulation to phytoplankton and trophic transfer to oysters. This project involves a two-year field study (2022-2023) with monthly field collections at four sites distributed along the longitudinal gradient in the Connecticut portion of the Long Island Sound. The influence of Se and other abiotic variables on spatiotemporal trends in MeHg and Hg concentrations, and enrichment factors will be presented, and the trends assessed. We anticipate that the results of this project will inform how nutrient concentrations affect Hg cycling, leading to a better understanding of nutrient/Hg dynamics in coastal food webs.
Theme: Clean Waters and Healthy Watersheds

Droughts and Deluges: The Effect of River Discharge on the Carbonate Chemistry of Long Island Sound. **Lauren J. Barrett (lauren.jo.barrett@gmail.com), Penny Vlahos (penny.vlahos@uconn.edu), Mary A. McGuinness (maryalicemcguinness@gmail.com, Michael M. Whitney (michael.whitney@uconn.edu), Jamie M.P. Vaudrey (jamie.vaudrey@uconn.edu),** *University of Connecticut*

Long Island Sound (LIS) has historically experienced summertime water quality degradation in its western region. Nutrient inputs lead to large surface water phytoplankton blooms. Low wind speeds and surface water heating cause density stratification, so as algae sink to the bottom waters, microbial respiration consumes dissolved oxygen (O2) and produces carbon dioxide (CO2). This had led to yearly hypoxia (O2 < 60 µmol kg-1) or even anoxia (O2 < 20 µmol kg-1) in the bottom waters of western LIS. While hypoxia has been well-studied in LIS, with monthly O2 measurements since the early 1990's, the co-occurring acidification resulting from CO2 accumulation has received less attention. In this study, we measured dissolved inorganic carbon (DIC) and total alkalinity (TA) in spring, summer, and autumn from 2020 to 2022. This time span captured both seasonal and interannual variation, including the contrast between two historic drought years (2020 and 2022) and one year with significant tropical storm activity (2021). Observations revealed reduced acidification in WLIS during the high-river discharge summer, corresponding to a decrease in the DIC/TA ratio of the freshwater endmember in the Housatonic River. By contrast, bottom water DIC and DIC/TA were higher during the summers of 2020 and 2022, leading to more acidified conditions and persistent aragonite undersaturation. Increased river discharge mitigated respiration induced acidification in WLIS, likely due to a combination of decreased estuarine residence time and reduced riverine DIC/TA. These results motivate future studies of the carbonate chemistry of LIS and its freshwater endmembers in relation to hypoxia dynamics.
Theme: Clean Waters and Healthy Watersheds

Effects of Adaptation to Ocean Acidification and Warming on Critical Thermal Limits in the Calanoid Copepod, *Acartia Tonsa*. **Rowan A. Batts (rowan.batts@uconn.edu)** *University of Connecticut,* **Matthew Sasaki (matthew.sasaki@uconn.edu),** *University of Vermont,* **Hans G. Dam (hans.dam@uconn.edu),** *University of Connecticut*

The long-term effects of population adaptation to climate change are poorly documented and understood, particularly the costs of adaptation. Adaptation to one stressor such as ocean acidification (OA) may come at a cost to performance under other stressors such as ocean warming (OW). This study takes advantage of a long-term study of adaptation to climate change drivers that involves four lineages of a foundational coastal marine copepod species, *Acartia tonsa*, maintained under ambient (AM), OW, OA, and OWA conditions for 130+ generations. Previous observations showed complete fitness recovery in the OW and OA lineages, but not the OWA lineage after 25 generations, illustrating non-additive responses to combined stressors and suggesting a possible cost to OWA adaptation. As a metric of thermal performance, we measured critical thermal maximum (CTmax), equivalent to the temperature of ecological death, under both ambient and high CO_2 conditions. We determined the CTmax for the four lineages to quantify the effects of acidification and warming on thermal performance. Temperature, but not acidification had a significant effect on CTmax, and the OW and OWA lineages had a higher CTmax. Using a reciprocal transplant design, we measured CTmax after naupliar transplants between AM ↔ OA, AM ↔ OW, and OW ↔ OWA, conditions to determine the costs of long-term adaptation to warming and acidification on upper thermal limits. We found no difference in CTmax among transplants indicating that adaptation to OA, OW, and OWA does not come at the cost of upper thermal limits in *A. tonsa.*
Theme: Sound Science and Inclusive Management

High Spatial Resolution Remote Sensing Retrievals of Organic Carbon in the Tidal Estuaries of Long Island Sound. **Luka Catipovic (lcatpovic@ccny.cuny.edu)** *The City College of New York,* **Alana Menendez (amj6sz@virginia.edu)***,* *University of Virginia,* **Maria Tzortziou (mtzortziou@ccny.cuny.edu)**, *The City College of New York*

Long Island Sound is surrounded by tidal estuaries that imprint a chemical signature upon incoming water during the flow tide, which is then released back into the sound with the ebb tide. This exchange plays an important role in governing the carbon pools in, and fluxes from, these wetlands, marshes, and bays. These complex systems have spatially intricate geomorphologies which complicate satellite remote sensing retrievals from sensors with large pixel footprints. Therefore, this work examines the efficacy of using high spatial resolution satellite sensors to estimate the concentration and quality of organic carbon in these important embayments. Machine learning regression algorithms developed specifically for Long Island Sound were applied to Sentinel 2 Multispectral Instrument and Landsat 8/9 Operational Land Imager imagery to extract key biogeochemical parameters. Retrievals of dissolved organic carbon-specific CDOM absorption at 300 nm ($a^*_{CDOM}(300)$) and the absorption spectral slope between 275 and 295 nm ($S_{275-295}$) provide insight into the chemical quality of organic carbon in these estuaries. Furthermore, the *in situ* relationship between these two variables and the concentration of dissolved organic carbon ([DOC]) allows for the remote sensing retrieval of [DOC], which informs on the amount of dissolved organic carbon involved in these tidal exchanges. Finally, these satellite remote sensing data products help reduce uncertainties in carbon monitoring system (CMS) physical models as they help characterize exchange points between carbon sources and sinks. This research represents important steps toward better constraining the role these estuaries play in the greater biogeochemical systems that define Long Island Sound.

Theme: Sound Science and Inclusive Management

Effect of Improved Water Quality on Molluscan Communities in Long Island Sound: Preliminary Results. **Gregory P. Dietl (gpd3@cornell.edu), Matthew Pruden (mjp368@cornell.edu),** *Cornell University***, John Handley (jhandle3@UR.Rochester.edu),** *University of Rochester*

Water quality in Long Island Sound (LIS) has improved since the adoption of a nitrogen Total Maximum Daily Load (TMDL) management strategy in 2000. However, no long-term monitoring data of benthic macroinvertebrate communities are available for evaluating the success of the management intervention. Time-averaged molluscan death assemblages (DAs) that readily preserve and accumulate within the sediment provide a unique opportunity to reconstruct past habitat condition. Here we use the remains of dead mollusk shells retained in 10 benthic grab samples collected from LIS as part of the Environmental Protection Agency-led 2020 National Coastal Conditions Assessment to evaluate the response of benthic communities to the TMDL intervention. We hypothesized that habitat condition—measured using the AZTI Marine Biotic Index—in LIS changed since the introduction of the TMDL, with the direction of change related to the direction of change in water quality (indexed as the frequency of summer hypoxic events at each sampling location). Radiocarbon dating results confirm that the molluscan DAs reflect pre-TMDL conditions. Overall, post-TMDL improvements in water quality led to increases in pollution-sensitive species relative to pollution-tolerant species, although habitat conditions today at some sites remain moderately disturbed, potentially due to local sediment quality conditions. Our results illustrate how molluscan DAs that are collected using standard sampling protocols for the living benthic macroinvertebrate community can be used to provide a cost-effective means of retroactively acquiring data to assess the success of restoration actions when long-term monitoring data are not available.
Topic: Thriving Habitats and Abundant Wildlife

Seafloor Habitat Mapping for Enhanced Marine Spatial Planning and Management in Long Island Sound: New Data and Insights between Norwalk and Huntington Bay (Phase III Area).
Mohamed Elsaied (mohamed.elsaied@stonybrook.edu), Roger D. Flood (roger.flood@stonybrook.edu), Stony Brook University

Bathymetric and acoustic backscatter data from high-resolution multibeam mapping reveals seafloor topographies, sediments, benthic processes, and industrial infrastructure and, as a result, have become important components of benthic habitat studies. The Long Island Sound Seafloor Habitat Mapping Initiative under the LIS Cable Fund was undertaken in response to the growing interest in managing infrastructure uses in LIS. The habitat studies have benefited from NOAA seafloor mapping done for charting purposes in LIS over the past two decades; although, in some areas the NOAA multibeam bathymetric and/or acoustic backscatter data does not have the needed density or quality. We have been using multibeam mapping techniques to supplement the NOAA data where needed. Our efforts in 2022 were in the Phase IV area south of New London (between Bradford and Milford and extending 1/2 way across LIS, ~280 km^2) where there was no prior multibeam data and in 2023 were in the Phase III area between Norwalk and Huntington Bay (~280 km2) where there was incomplete bathymetric data and inconsistent backscatter data. We see natural seabed features including shoals, outcrops, steep scarps, deep, and broad channels as well as sand waves, sedimentary furrows, mud waves, and sediment tails resulting from water flow. Anthropogenic features such as shipwrecks, trawl marks from shellfish dredging, disposal sites, pipeline and cables routes, and a number of other features of unknown or uncertain origin also exist, and backscatter variations indicate regions of coarser or finer sediment. This poster shows our mapping results in the Phase III area.
Theme: Sound Science and Inclusive Management

Seafloor Habitat Mapping for Enhanced Marine Spatial Planning and Management in Long Island Sound: New Data and Insights South of New Haven from Milford to Bradford (Phase IV Area). **Roger D. Flood (roger.flood@stonybrook.edu), Mohamed Elsaied (mohamed.elsaied@stonybrook.edu),** *Stony Brook University*

Bathymetric and acoustic backscatter data from high-resolution multibeam mapping reveals seafloor topographies, sediments, benthic processes, and industrial infrastructure and, as a result, have become important components of benthic habitat studies. The Long Island Sound Seafloor Habitat Mapping Initiative under the LIS Cable Fund was undertaken in response to the growing interest in managing infrastructure uses in LIS. The habitat studies have benefited from NOAA seafloor mapping done for charting purposes in LIS over the past two decades; although, in some areas NOAA multibeam bathymetric and/or acoustic backscatter data does not have the needed density or quality. We have been using multibeam mapping techniques to supplement the NOAA data where needed. Our efforts in 2022 were in the Phase IV area south of New London (between Bradford and Milford and extending 1/2 way across LIS, ~280 km2) where there was no prior multibeam data and in 2023 were in the Phase III area between Norwalk and Huntington Bay (~280 km2) where there was incomplete bathymetric data and inconsistent backscatter data. We see natural seabed features including shoals, outcrops, steep scarps, and deep and broad channels, as well as sand waves, sedimentary furrows, mud waves, and sediment tails resulting from water flow. Anthropogenic features such as shipwrecks, trawl marks from shellfish dredging, disposal sites, pipeline and cables routes, and a number of other features of unknown or uncertain origin also exist, and backscatter variations indicate regions of coarser or finer sediment. This poster shows our mapping results in the Phase IV area.
Theme: Sound Science and Inclusive Management

Reduced-Order Modeling of Fluid-Structure Interactions. **Jino George (jino.george@uconn.edu), Chang Liu (chang_liu@uconn.edu)**, *University of Connecticut*

Fluid-structure interactions widely appear in physical oceanography and ocean engineering. For example, the interaction of ocean currents with complex bottom terrains and the flow past the marine structures. This presentation will discuss reduced-order modeling of fluid-structure interactions combining structured input-output analysis (SIOA) with immersed boundary method (IBM). We will focus on a canonical fluid-structure interaction as flow over a cylinder in channel flow that can be used to analyze flow past marine cables near the ocean bottom. The solid body will be modeled as IBM, which is an effective and accurate method to model flows around objects. IBM is a structured grid method which handles flow over complex shapes with ease while deployed on a cartesian grid. Flow over a cylinder is examined using IBM, and a novel interface reconstruction method is developed based on Ray tracing, which uses computer graphics to accurately identify the edges of bodies with complex shapes in an image. Near boundary cells are identified in fluid and solid domains where the forcing function is applied. The flow structures in the wake of the cylinder are studied using SIOA. As opposed to the traditional unstructured input-output analysis, SIOA is a structured approach that can identify dominant coherent structures without the computational cost of nonlinear optimization. The SIOA builds a feedback interconnection between linearized Navier-Stokes equation and the structured forcing preserving certain input-output properties of the non-linear forcing function.

Topic: Sustainable and Resilient Communities

Coastal Acidification Monitoring in Long Island Sound Tributaries and Embayments. **Gina Groseclose (ggroseclose@usgs.gov),** *U.S. Geological Survey*

Coastal acidification threatens shellfish, aquaculture, and fishing by reducing available oxygen and degrading aquatic habitat and water quality. Coastal acidification is primarily driven by microbial respiration, which is affected by eutrophication, tidal cycles, limited circulation, stratification, and atmospheric interactions and deposition. Coastal estuaries and embayments in southern New England and northern Long Island show effects of eutrophication and hypoxia, defining potential for coastal acidification. To address these concerns and meet goals of the Comprehensive Conservation and Management Plan, the Long Island Sounds Study has monitoring efforts throughout LIS and coastal embayments to evaluate the status and trends of acidification in these waters. This project will collect baseline information to describe coastal water conditions, determine areas of concern, and document overall coastal acidification trends across sites within LIS. Monitoring locations include major tributaries along northern LIS including Connecticut, Housatonic, and Thames Rivers, embayments along Mystic, Norwalk, and Saugatuck rivers, and as well as Oyster Bay and Flax Pond in southern LIS. Sites are sampled monthly for total alkalinity (TA), dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), pH, phosphate, and silica using methods developed for measuring ocean acidification, along with continuous pH using sensors deployed near bottom at sampling locations. Data will be used to quantify coastal acidification as aragonite saturation state and enhance our understanding of how coastal acidification relates to climate change and other conditions in LIS.
Theme: Clean Waters and Healthy Watersheds

Wild Scallop Population Resilience: Using Multigenerational Studies to Estimate Robustness and Adaptive Potential to Rapidly Changing Ocean Acidification. **Samuel Gurr (samuel.gurr@noaa.gov),** *NOAA NMFS*, **Katherine McFarland (Katherine.m.mcfarland@noaa.gov), Genevieve Bernatchez (genevieve.bernatchez@noaa.gov), Mark S. Dixon (mark.dixon@noaa.gov), Lisa Guy (lisa.guy@noaa.gov), Lisa Milke (lisa.milke@noaa.gov), Matthew E. Poach (matthew.poach@noaa.gov),** *NOAA Fisheries*, **Alison Novara**, *EPP/MSI*, **Deborah Hart (deborah.hart@noaa.gov)**, *NOAA Fisheries*, **Louis Plough (lplough@umces.edu)**, *University of Maryland*, **Dylan Redman (dylan.redman@noaa.gov), George Sennefelder (george.sennefelder@noaa.org), Sheila Stiles (sheila.stiles@noaa.gov), Gary Wikfors (gary.wikfors,@noaa.org),** *NOAA Fisheries*, **Dianna Padilla (dianna.padilla@stonybrook.edu)**, *Stony Brook University*, **Shannon L. Meseck (shannon.meseck@noaa.org),** *NOAA Fisheries*

For calcifying organisms, such as bivalves, short-term exposure to increased Ocean Acidification (OA; elevated ρCO_2) reduces growth, increases mortality, and disrupts shell formation. However, much of the current research investigates responses under acute exposures whereas effects across lifespan and generational timescales are less understood. Current model projections assume bivalves in the future will respond to increased OA in the same way as populations studied today, without consideration for adaptation. To better understand the physiological effects of prolonged OA exposure, bay scallops were raised for two generations under three OA conditions (500, 800, 1200 µatm). Larvae were not tolerant of 1200 µatm ρCO_2 resulting in lethal abnormalities when exposure began during embryogenesis. Survival improved when exposure to 1200 µatm ρCO_2 began during the post-larval period, but growth slowed. Significant differences between low and moderate OA were observed during reproductive maturation. Moderate OA led to greater gonad tissue mass index, coupled with a higher metabolic rate, and reduced survival, shell size, adductor tissue mass index, and excretion rate. Findings suggest that lifespan exposures may lead to asynchronous timing to reproductive maturity. Ongoing analysis will map putatively adaptive alleles among treatments and generations to infer genomic traits affecting phenotypic outcome. Ultimately, this work aims to characterize the resilience of scallop populations to OA and determine their capacity for adaptation across generations.
Theme: Sustainable and Resilient Communities

Assessing Environmental Social Services in Connecticut: A Subset of the Long Island Sound Watershed. **Lucy Hendrickson (lucy.hendrickson@uconn.edu, Yogesh Kumar (yogesh.kumar@uconn.edu), Steven Matile (steven.matile@uconn.edu),** *University of Connecticut*

Environmental Social Services (ESS) are those which integrate or enhance the natural environment to provide recreational, social, or provisioning services to benefit local communities. These services play a vital role in the health and wellbeing of communities located around Long Island Sound (LIS). ESS sources can include green spaces, like open space, or blue spaces, like public coastal access.
This study extracts publicly available data from state and open-source databases for a spatial analysis assessing the availability and quality of ESS for residents within the State of Connecticut at the census block level. With the results, a tool can be created for municipal agents to prioritize ESS improvement in locations which lack accessibility. Additionally, the tool can identify locations which are more suitable for siting new housing developments, especially those providing affordable or equitable housing opportunities. Prioritizing affordable housing developments in areas with access to ESS promotes environmental justice in communities within the Long Island Sound watershed.
Initial results indicate that public access to blue spaces and fishing is car dependent throughout Connecticut. Most of these waters, especially inland, are designated as impaired by CT DEEP. Areas near, but not necessarily on, the coast had the highest access to both fresh and marine blue spaces. Access to green space is directly related to urbanization. Around urban areas, open space becomes more limited while community gardens are more prevalent. Future work will include a statistical correlation analysis between accessibility results and CT DEEP Environmental Justice block group data.
Theme: Sustainable and Resilient Communities

Shore and Mid-Channel Surveys Reveal Distinct Phytoplankton-Bacterial Population Associations along Western Long Island Sound. **Georgie E. Humphries (ghumphries@gc.cuny.edu), Mariapaola Ambrosone (mambrosone@gc.cuny.edu), Dianne I. Greenfield (dgreenfield@gc.cuny.edu),** *City University of New York*

In nutrient-enriched urban estuaries such as the Western Long Island Sound (WLIS), phytoplankton and bacteria associations are crucial to ecological and biogeochemical function. Our prior research found that transitions in nitrogen (N) and dissolved organic matter (DOM), corresponded closely to bacterial population dynamics during WLIS hypoxia, and phytoplankton abundances were closely associated with inorganic N form and concentration. However, the potential phytoplankton-bacteria associations were not evaluated but are likely pivotal to the cycling and budgets of both carbon (C) and N within the estuary. Numerous recent studies have identified how bacteria and phytoplankton interact regarding DOM production, food web processes (such as mixotrophy), and other symbiotic relationships, underscoring the importance of current research. This study compared associations between physical, chemical, and ecological data at surface depth (0.5 m) between two WLIS regions (mid-channel and shore) (2020 and 2021). Specifically, we measured physical water quality, cell abundances of major phytoplankton taxa and genera, bacterial abundances, and concentrations of chlorophyll *a* and DOM (dissolved organic N, C, and phosphorus). We evaluated these data for relationships between regions and the overall drivers of microbial population numbers. Results will describe the associations between bacteria and phytoplankton taxa, revealing a key taxonomic group that most closely associates with bacterial abundances, and delineate key differences between mid-channel and shore locations. Results highlight the impact of DOM concentrations and proximity to N-sources on phytoplankton-bacterial dynamics, and provide novel insight into the environmental drivers of microbial processes and subsequent biogeochemical cycling within WLIS and potentially other urban estuaries.

Theme: Clean Waters and Healthy Watersheds

Can Soil Amendments Ameliorate Acidity Caused by Sediment Additions During Salt Marsh Restoration? **Madeline P. Kollegger (madeline.kollegger@uconn.edu), Nicolette Nelson (nicolette.nelson@uconn.edu),** *University of Connecticut*, **Min Huang (min.huang@ct.gov),** *Connecticut Department of Energy and Environmental Protection*, **Chris S. Elphick (chris.elphick@uconn.edu), Beth A. Lawrence (beth.lawrence@uconn.edu), Ashley M. Helton (ashley.helton@uconn.edu),** *University of Connecticut*

The restoration practice of sediment addition to the surface of salt marshes is increasingly used to raise elevation and prevent marsh loss caused by sea level rise. However, high sulfur sediment added to marshes can create acidic conditions, hindering the restoration process. We conducted both laboratory and in situ experiments to evaluate sediment amendments that either prevent the development of acid sulfate soils or neutralize the resulting acidity. In the laboratory, we evaluated four low-cost, easily accessible amendments (iron oxide mulch, crushed shells, pelletized lime, and recycled concrete) by hand mixing amendments with dredge and applying 8cm of the mixture to the surface of intact marsh soil cores (~7.5cm diameter, 8cm depth, seven replicates). We added artificial seawater daily, simulated daily tidal flooding, and collected porewater weekly from each core. Over 14 weeks, cores amended with recycled concrete had higher pH (7.6 +/-0.18) than other treatments (7.4 +/-0.23). For the in situ experiment, we evaluated dredge amended with recycled concrete, the most effective treatment from our laboratory experiment, and pelletized lime, an amendment being considered for a planned marsh-scale restoration. We added amended and unamended dredge to 15 cm diameter plots (three replicates) and sampled porewater monthly (May – October) for two years. Again, we found porewater pH was higher for the concrete (7.93+/- 0.74) than the lime (7.24/- 0.39) and dredge only (7.29+/- 0.44) treatments, likely because recycled concrete dissolves more slowly over time. Our experiments can inform management-scale decisions to amend soils in areas where sulfidic conditions are of concern.
Theme: Thriving Habitats and Abundant Wildlife

Settling Enhanced Mixing in Stably Stratified Flows. **Chang Liu (chang_liu@uconn.edu), Reis Muccino (reis.muccino@uconn.edu)**, *University of Connecticut*

One top priority for ecologists working to protect Long Island Sound is to prevent hypoxia (lack of oxygen) in the bottom water for fish, shellfish, lobsters, and other animals to survive. The hypoxia in the bottom water is prevalent during the summer where the top water is heated by the sun leading to lower density than bottom water, i.e., stably stratified flow. The stably stratified flow can significantly suppress the mixing between top and bottom water, leading to a limited oxygen in the bottom. The sediments carried by the rivers usually has a larger density than water and will settle down to mix the top and bottom oxygen dissolved in water. Moreover, due to the evaporation of water on the top layer, the water on the top also has a higher salinity that can settle down to enhance mixing. This talk will analyze settling enhanced mixing in stably stratified flows using fluid dynamics. We will start from the configuration with a negligible settling velocity, which is also known as salt-finger convection. We developed a reduced-order model of salt-finger convection that reduces three spatial dimensions into one vertical dimension, which can significantly increase the computational efficiency. This work also performs bifurcation analysis and found staircase-like solutions having mixed salinity separated by sharp interfaces. The influence of settling velocity is also analyzed using direct numerical simulations and linear stability analysis, which identify inclined waves followed by layering phenomena.
Theme: Clean Waters and Healthy Watersheds

Nearshore Permeable Reactive Barriers to Remove Nitrate in Groundwater before Submarine Discharge. **Jing-An Lin (jing-an.lin@stonybrook.edu),** *Stony Brook University*, **Molly Graffam (meg372@cornell.edu)**, *Cornell Cooperative Extension*, **Ron Paulsen (rjpaulson@clearbays.com)**, *Coastline Evaluation Corporation*, **Nils Volkenborn (nils.volkenborn@stonybrook.edu),** *Stony Brook University*

Elevated nitrogen in groundwater has significantly contributed to the eutrophication of coastal Long Island, NY through submarine groundwater discharge. Permeable reactive barriers (PRBs), composed of woodchips that provide a carbon source for microbially-mediated denitrification, are a promising technology to intercept groundwater and remove nitrate before it enters coastal surface waters.

A 96-ft wide PRB was installed in Hampton Bays, NY in 2020, comprised of twelve 8-ft wide and 12-ft deep test cells, with triplicates of 2.5-ft and 5-ft thick trench-type PRBs, column-type PRBs, and controls. NO_x^- removal was monitored from 2021-2023. The average NO_x^- concentration upstream was 4.4 mg N L^{-1}, and 100%, 99.7%, 84.5%, and 0.8% of NO_x^- was removed in 5-ft, 2.5-ft, column, and control cells.

Flow-through column experiments with different aged woodchip types were conducted to assess NO_x^- removal at relevant temperatures. Hardwoods (oak, and maple/cherry) outperformed softwood (pine) and N-removal rates for hardwoods were ~7.3-times higher at 20 ºC than at 7 ºC. Considering NO_x^- removal rates up to 4.25 mg N L^{-1} d^{-1} at 14 ºC, a 1.7 ft thick PRB would remove all incoming nitrate during most of the year if the groundwater NO_x^- concentration was 5 mg N L^{-1} and the groundwater velocity was 2 ft day^{-1}. A 100 ft wide and 10 ft deep PRB would then remove ~60 kg of N $year^{-1}$.

We conclude that strategically placed and properly installed PRBs should be considered as an additional tool in the toolbox to reduce N-loads to coastal surface waters.

Theme: Clean Waters and Healthy Watersheds

Application of High-Resolution Satellite Imagery to Monitoring of Flooding and Impact on Sediment Fluxes and Water Clarity in Long Island Sound. **Tong Lin (tlin2@gradcenter.cuny.edu),** *Graduate Center of City University of New York*, **Maria Tzortziou (mtzortziou@ccny.cuny.edu),** *The City College of New York*

Advanced satellite measurements of ocean color can be used to obtain key water quality and ecological parameters in inland and coastal aquatic systems that, in turn, can inform decision making and local-to-global responses to coastal hazards. One of the main challenges for accurate remote sensing of ocean color, especially in coastal urban environments, is correcting for the influence of the atmosphere (i.e., aerosols and trace gases) on the top-of-atmosphere signal measured by a satellite sensor. In this study, we integrated a rich in-situ bio-optical dataset – collected over nearly six years across the heavily urbanized Long Island Sound – with high-resolution atmospheric aerosol and trace gas measurements from a network of land stations as well as shipboard, airborne and satellite sensors to evaluate the effect of urban air pollution on coastal ocean color algorithms. Results were used to validate application of various atmospheric correction approaches, including OC-SMART, POLYMER, L2gen and ACOLITE, to satellite imagery from the Operational Land Imager (OLI), MultiSpectral Instrument (MSI) and the Ocean and Land Colour Instrument (OLCI). The atmospherically corrected satellite datasets were used to develop and evaluate optimized remote-sensing algorithms for high resolution retrievals of chlorophyll a (Chla), suspended particulate matter (SPM), and harmful algal blooms (i.e., red/brown tides) in this highly dynamic - and particularly vulnerable to hazards – coastal environment.
Theme: Sound Science and Inclusive Management

Analysis of Volatile Organic Compounds and Air Pollutants on Long Island During the June 2023 Canadian Wildfire Plumes. **Julia Marcantonio (julia.marcantonio@stonybrook.edu),** *Stony Brook University,* **Cong Cao (cong.cao@stonybrook.edu),** *Hong Kong University of Science & Technology,* **John Mak (john.mak@stonybrook.edu),** *Stony Brook University*

The 2023 wildfire season was the most intense fire season on record for Canada, breaking the previous records for area burned in both Canadian and North American history. In June 2023 the wildfires in Quebec, Canada, transported smoke thousands of miles to the Northeastern United States affecting air quality for millions of Americans. During a wildfire, smoke is released into the troposphere and contains air pollutants such as particulate matter (PM2.5), nitrogen oxides (NOx), ozone (O3), and volatile organic compounds (VOCs), all of which are harmful to human health and wildlife. The Long Island Sound (LIS) is commonly affected by summertime air pollution events characterized by O3 exceedance days, making it an important region to study O3 and its precursors (i.e., VOCs). New York City (NYC) and Long Island were significantly impacted by the June 2023 Canadian wildfire events indicated by multiple air quality alerts and smoky skies. The Flax Pond Marine Laboratory, located ~200 meters from the LIS, was impacted by these plumes and we measured this by quantifying VOC concentrations with the proton-transfer-reaction time-of-flight mass spectrometer (PTR-ToF-MS). The PTR-ToF-MS measured elevated VOC concentrations at Flax Pond from the transported wildfire plumes, specifically VOCs attributed to biomass burning and O3 formation. Here, we analyze and quantify VOCs measured at the Flax Pond Marine Laboratory during the Canadian wildfire plumes to understand how these extreme air pollution events impacted local air quality at the urban-rural interface and the implications on secondary pollutant formation over the Long Island Sound.
Theme: Sound Science and Inclusive Management

Understanding Compound Flood Risk: An Interactive Online Mapping Tool. **Kristina Masterson (kmasterson@usgs.gov), Liv Herdman (lherdman@usgs.gov), Jack Monti (jmonti@usgs.gov), Rob Welk (rwelk@usgs.gov), Robin Glas (rglas@usgs.gov), Kalle Jahn (kjahn@usgs.gov), Salme Cook (secook@usgs.gov), Janet Barclay (jbarclay@usgs.gov), Archi Howlader (ahowlader@usgs.gov)**, *U.S. Geological Survey*

Compound flooding results from the co-occurrence of multiple flood drivers such as extreme precipitation events, incidents of coastal storm surge and tidal flooding, and flooding as shallow groundwater rises above the land surface. These flooding hazards have compelled communities to reconsider how they plan and manage coastal development, as well as when and where to make investments in infrastructure and resilience. The U.S. Geological Survey, in cooperation with U.S. Environmental Protection Agency and Long Island Sound Study (LISS), began a study in 2021 to assess compound flood risk from the combined effects of sea level rise (SLR) on coastal storm surge, tidal and groundwater flooding, and stormwater. The study area for the LISS compound flood risk study, and a concurrent study supported by Hurricane Ida supplemental funding, includes coastal areas of Rhode Island and Connecticut and Westchester, Bronx, New York, Kings, Queens, Nassau, and Suffolk counties in New York State. An interactive online mapping tool is under development to facilitate and explore study results and assessment of compound flood risk. This tool will display the risk ratings of individual flood drivers and the compound flood potential and will allow users to compare the individual and compound flood risks in areas of interest. The tool will also contain a series of maps which will display flood influencing variables for the respective drivers and the extent of coastal area inundation and groundwater emergence flooding under current and future SLR conditions.
Theme: Sustainable and Resilient Communities

Heat Flux Estimates from a Synthesis of Satellite Observations and a Hydrodynamic Model (With Application to Long Island Sound). **Dr. Grant McCardell (grant.mccardell@gmail.com)**, *University of Connecticut*, **Dr. Rachel Horwitz (Rachel.Horwitz@dfo-mpo.gc.ca),** *Bedford Institute of Oceanography,* **Dr. Amin Ilia (aminilia@gmail.com), Ms. M. Kay Howard Strobel (kay.howard-strobel@uconn.edu), Mr. Todd Fake (todd.fake@uconn.edu), Prof. James O'Donnell (james.odonnell@uconn.edu),** *University of Connecticut*

Accurate estimation of water temperatures is important to understanding both physical and biological processes in Long Island Sound. We show that the assimilation of sea surface temperatures (SST) from satellite data into a hydrodynamic model of Long Island Sound (LIS) dramatically improves the model representation of water temperatures throughout the water column. To demonstrate the utility of this, we use the model to estimate net surface heat fluxes in LIS. These are both difficult and expensive to estimate conventionally using direct observations. We present a methodology whereby we estimate the net surface fluxes as the difference between the depth-integrated heat tendencies and the depth-integrated horizontal heat exchanges in the hydrodynamic model. We calibrate the model to achieve a good representation of mixing and advection and then assimilate satellite SST observations into the model at an 8-day scale. The SST data assimilation forces a good representation of observed temperatures and heat tendencies both at the surface and throughout the water column. We estimate the horizontal heat exchange directly from the model output and then infer the surface fluxes required to close the budget. When we apply this methodology to a model with prescribed surface heat fluxes and without data assimilation, we can recover the prescribed fluxes with an RMS error of ±10 W/(sq m) and an r-squared value of 0.998. When we compare our surface heat flux results to those estimated using Coupled Ocean-Atmosphere Response Experiment bulk formulae with observations in western Long Island Sound, we find similarly good agreement.
Theme: Sound Science and Inclusive Management

Elevated Temperature, Decreased Salinity and Microfibers, Oh My! How Many Stressors Can Eastern Oyster, *Crassostrea Virginica* Take? **Tyler S. Mendela (mendela@hartford.edu), Dr. Laura A. Enzor (enzor@hartford.edu),** *University of Hartford*

Microfibers and microplastics are now the leading forms of marine debris. Filter feeders such as Eastern oyster, *Crassostrea virginica*, can ingest this debris, leading to significant changes in filtration efficiency and physiological homeostasis. Despite their role as a keystone species in the estuary, as well as a focal aquaculture species in the northeast, the effects of microfiber exposure in addition to impacts of global climate change on oyster physiology have been relatively unexplored. We, therefore, set out to determine how the interactive effects of elevated temperature (27°C from 20°C) and/or decreased salinity (17‰ from 27‰) impacted the aerobic and anaerobic metabolism of oyster, as well as changes to oxidative stress or total antioxidant potential over two, 21-day exposures. The first exposure quantified the impacts of changing temperature and salinity, the second, changes to temperature and salinity, combined with microfiber exposure. Gill and adductor muscle were used to quantify changes in aerobic and anaerobic metabolism use (measured with citrate synthase and malate dehydrogenase activities), levels of oxidative stress (protein carbonyl formation) and total antioxidant potential. Exposure to elevated temperature and elevated temperature combined with decreased salinity resulted in a decline in oyster mass, which was exacerbated by the presence of microfibers. Small changes in metabolism and oxidative stress were seen, which were largely influenced by exposure time. Overall, these studies demonstrated that short-term exposures to environmental changes did not largely influence oyster metabolism or levels of oxidative stress, but the changes were impacted by the presence of microfibers.
Theme: Thriving Habitats and Abundant Wildlife

Settling-Driven Layering in Double-Diffusive Convection. **Reis Muccino (reis.muccino@uconn.edu), Dr. Chang Liu (chang_liu@uconn.edu),** *University of Connecticut*

The study of sediment in rivers and oceans is important to understand the transport and mixing of sediments that play an important role in ecosystems in estuaries. Gravitational sedimentation in rivers results in heavier sediments than water in the ocean, while salty ocean water has a higher salinity than river water leading to stable stratification. This is the process by which solid particles are suspended in a fluid sink and are separated from the fluid. Relying on the action of the earth's gravitational field and the difference in density between the particles and the fluid, the relative movement occurs and settles, i.e. gravitational sedimentation, but this settling motion will also be suppressed due to density difference between salty ocean water and fresh river water. Such competing density difference of two dissolved components with different diffusivity leads to so-called double-diffusive convection. When these dense sediments are moved into an ocean, they will settle on the bottom, which at the same time, mixes the water. This mixing can affect the different salt levels at different depths in the ocean which results in what is known as thermohaline layering. With these computations, we can see how sediment affects salt finger convection in the ocean near river mouths. We also analyze the influence of settling velocity using numerical simulations, to identify large-scale layering phenomena. This layering is driven by settling velocity and its dynamics will be analyzed in detail using direct numerical simulations.

Theme: Clean Waters and Healthy Watersheds

Sag Harbor Backyard Project. **Nilay Oza (nilay@ozasabbeth.com)** *Oza Sabbeth Architects*, **Anthony Madonna (amadonna@guildhall.org),** *The Guild Hall, East Hampton*

This project is a call to action for a community-led coastal resilience effort to ensure historic Sag Harbor has a sustainable urban future.

The Situation

In the last couple of decades, Sag Harbor has been revitalized from a sleepy historic village to one where big money is often at odds with the local community's needs. We no longer need revitalization; we need resilience.

We need coastal resilience, which people living in these parts have had to contend with for time immemorial. When Sag Harbor was settled in the sixteenth century, a pond called George's Pond existed here. Low-lying hills were terraformed, and marshland around the pond was filled. The pond is now the parking lot. And predictably, it is flooding. This flooding will only continue to worsen with sea level rise.

According to NOAA's sea level rise viewer, this area is hydrologically disconnected; when water gets in, it cannot get out, as happened during Hurricane Sandy. Even with this situation, private developers are also looking to add a sizeable mixed-use housing and retail project in this area, which only worsens the problem.

The Community Effort

One of the main features of this effort is that young people are leading it.

Teen Arts Council participants will educate the community about the nature of flooding in Sag Harbor's backyard through posters, informational videos, and art installations. They will advocate for studying this issue and for solutions to be included in the comprehensive plan currently being drawn up in Sag Harbor's Village Hall.

Theme: Sustainable and Resilient Communities

Detailed Geologic Records are Needed to Better Predict Future Sea-Level Rise Scenarios for the Long Island Sound and the Mid-Atlantic Bight Sea-Level Hotspot. **Robert K. Poirier, (rpoirier@usgs.gov), Taylor Kuligowski (tkuligowski@icloud.com), Tom Cronin (tcronin@usgs.gov),** *U.S. Geological Survey*

Elevation data from recent studies using years to decades of satellite altimetry and those from stationary GPS benchmarks have been used to calculate rates of vertical land motion (VLM) along the eastern U.S. coast. These findings have been widely publicized due to their demonstration that land-subsidence (i.e., negative VLM) is compounding sea-level rise in several highly populated areas, including the Long Island Sound (LIS) and greater New York City region. These records are in general agreement with up to a century of tide gauge records that indicate higher than average rates of sea-level rise along the U.S. east coast. However, several key factors must be considered when determining long-term, changing background rates of VLM that these datasets alone cannot account for. Furthermore, the precision of measurements using satellite and GPS data is often greater than the calculated VLM rates for specific regions, which may account for some discrepancies between the two datasets. Land-subsidence along the U.S. east coast is primarily driven by glacio-isostatic adjustment (GIA), with long-term (i.e., thousands of years) estimates for regional subsidence rates being derived from GIA models. These models rely upon several assumptions related to the vertical and lateral viscosity of the mantle and crust. As such, different models produce a variety of results. To better constrain these models, and ultimately provide better long-term background VLM rates, more geologic data are needed. We present a summary of current data, and research aimed at more precise estimates for rates of sea-level rise.
Theme: Sustainable and Resilient Communities

Optical Signatures of Bioavailable Terrigenous- and Biologically- Derived Dissolved Organic Matter in Long Island Sound. **Charlotte Rhoads (crhoads000@citymail.cuny.edu), Maria Tzortziou (mtzortziou@ccny.cuny.edu), Kyle Turner (kturner@ccny.cuny.edu),** *City College of New York*

Dissolved organic matter (DOM) plays a significant role in the carbon cycle as it is one of the greatest sources of organic carbon to aquatic environments. Additionally, DOM is an important source of carbon and nutrients for microbes and can provide insight into ecosystem health and productivity. Linking the cycling of DOM to events such as hypoxia and eutrophication is crucial for water quality management in regions like the Long Island Sound (LIS) — a coastal estuary impacted by heavy urbanization. The characterization of DOM based on its optically active components is possible because the molecular structure of DOM impacts its optical (absorption and fluorescence) signature. Terrestrially-derived DOM originates from soil and plant matter degradation, as well as anthropogenic inputs (e.g., wastewater effluents). Biological activity can also result in significant production of DOM in highly eutrophic systems. Here, we investigate the optical signature of terrigenous and biologically derived colored dissolved organic matter (CDOM) in LIS and how this relates to differences in the bioavailability of DOM from different sources. Water samples were collected at five marsh sites across the Sound as well as from phytoplankton cultures endemic to LIS. CDOM absorption and fluorescence were measured before and after microbial incubations conducted under controlled conditions in the laboratory. Results provide novel insights into how the origin, composition, and degree of previous transformation of DOM impact its microbial processing in LIS with implications for carbon cycling studies and water quality management in this urbanized estuarine system.
Theme: Sound Science and Inclusive Management

Oyster Health and Restoration in Long Island Sound - Trends in Diseases of Unmanaged Oyster Populations. **Kelly Roper (kelly.roper@noaa.gov), Kyra Lenderman (kyra.lenderman@noaa.gov), Mariah Kachmar (mariah.kachmar@noaa.gov), Isaiah Mayo (isaiah.mayo@noaa.gov), Genevieve Bernatchez (genevieve.bernatchez@noaa.gov), Mark Dixon (mark.dixon@noaa.gov), LTJG Tyler Houck (tyler.houck@noaa.gov), Katherine McFarland (katherine.m.mcfarland@noaa.gov), and Meghana Parikh (meghana.parikh@noaa.gov),** NOAA Fisheries

This poster introduces the project activities addressing the objective to ascertain a quantitative understanding of the seasonal dynamics of disease and reproductive success in unmanaged oyster populations. Expanding existing natural beds presents a desirable opportunity to increase oyster-related ecosystem services; however, little is known about how expansion may affect the proliferation and transmission of oyster pathogens between restored and harvested populations. Development of risk-based guidance for mitigating bivalve diseases is essential to the successful restoration and cultivation of oysters throughout Long Island Sound and may translate to other coastal regions in the United States.

We will describe the diagnostic methods being used to assess oyster health and the progression of Dermo (*Perkinsus marinus*), MSX (*Haplosporidium nelsoni*), and SSO (*Haplosporidium costale*) diseases, including the implementation and validation of a triplex qPCR assay developed by Piesz et. al, 2022. Preliminary results of monthly monitoring from four study sites will be presented. The study sites represent unique environments and population sizes with both intertidal and subtidal reefs, and both well-established and newly restored beds being monitored. We will discuss initial observations of biotic and abiotic factors that may currently drive health and disease at these sites, such as biofouling, population demographics, and environmental conditions. (201 words)
Theme: Thriving Habitats and Abundant Wildlife

Functional Response of Long Island Sound Plankton Community to Multiple Environmental Variables. **Youngmi Shin (shin.youngmi@epa.gov), Melissa Duvall (duval.melissa@epa.gov),** *US EPA Long Island Sound Study* **James W. Ammermann (james.ammerman@longislandsoundstudy.net),** *NEIWPCC Long Island Sound Office*, **Mark A. Tedesco (tedesco.mark@epa.gov),** *US EPA Long Island Sound Study*

Resolving changes in plankton community composition resulting from changes in the environment is essential to our understanding of the Long Island Sound (LIS) ecosystem. Primary production by phytoplankton is a key contributor to the development of summertime hypoxia, a longstanding water quality concern in LIS. Although understanding plankton community composition is important for modeling and assessment of coastal water quality, research to inform plankton parameterizations and formulations in process-based models has been limited.

A twenty-one-year (2002 – 2022) phytoplankton and micro- and meso- zooplankton dataset collected in LIS was analyzed along with biogeochemical and environmental variables. The empirical models (e.g., generalized additive model and nonlinear mixed effects model) being developed using this data set will be used to evaluate the functional response of individual plankton groups to varying environmental conditions, and multivariate effects on community composition across a range of timescales (seasonal – multiyear). Insights gained can be used to improve phytoplankton parameterizations and formulations in mechanistic water quality models currently being developed by the Long Island Sound Study partnership.
Theme: Clean Waters and Healthy Watersheds

Embayment Monitoring to Support Nutrient Management Activities in Connecticut for the Long Island Sound. **Paul A. Solis (psolis@usgs.gov)**, *U.S. Geological Survey*

In May 2021 the U. S. Geological Survey, in cooperation with the Connecticut Department of Energy and Environmental Protection (CT DEEP) began collecting water quality and hydrologic data across Long Island Sound for the following five embayments: Mystic, Norwalk, Saugatuck, Southport, and Farm. Data collected from this project will be used by CT DEEP in the development of a series of models from each embayment to assist managers with better understanding of how water quality and hydrologic properties of each embayment interact. Discrete and continuous water-quality and hydrologic data were collected year-round for two years and measured near surface and near bottom conditions for each embayment. The project collected representative discrete water-quality samples through a range of seasonal conditions to characterize the water quality spatially and vertically in each embayment. In addition, continuous water-quality measurements for water temperature, salinity, dissolved oxygen, turbidity, and chlorophyll were collected with high temporal resolution providing time-series data needed for water quality model calibration and evaluation. Water-elevation and velocity data at multiple locations in each embayment have also been collected to provide an additional understanding of physical mixing and variability at different spatial scales for each of the embayments. In addition to being available for use as model inputs, these comprehensive datasets will be valuable on their own to characterize the water quality conditions in each of the embayments.
Theme: Sound Science and Inclusive Management

Bioadvective Release of Iron and Phosphorus from Permeable Sandy Sediments. **Darci Swenson Perger (darci.swenson@stonybrook.edu), Ian Dwyer (ian.dwyer@stonybrook.edu), Robert Aller (rober.aller@stonybrook.edu), Nils Volkenborn (nils.volkenborn@stonybrook.edu), Christina Heilbrun (christina.heilbrun@stonybrook.edu), Laura Wehrmann (laura.wehrmann@stonybrook.edu),** *Stony Brook University*

Permeable sediments are biogeochemically dynamic systems that can act as a prominent internal source of nutrients to the water column, including iron (Fe), phosphorus (P) and nitrogen (N). Few studies have estimated the magnitude of the benthic release from these types of sediments where advective forcing can dominate the transport of particles and dissolved constituents into and out of the deposit. Here we investigated the effect of bioirrigation — which induces bioadvective flushing and alters the oxygen dynamics within the sediment — on the magnitude of dissolved Fe (Fe_d) and dissolved phosphate (PO_4^{3-}) fluxes from sandy permeable sediments in Shinnecock Bay, Long Island. The results of sediment incubation experiments with simulated bioirrigation indicate that, due to bioadvective porewater flushing and redistribution of Fe and P inventories near the sediment surface, irrigated sandy sediments can be a significant source of Fe_d and PO_4^{3-} throughout the year, with flux estimates ~10-100x larger than previously reported estimates. Porewater ammonium (NH_4^+) profiles also suggest potentially large N fluxes due to bioadvective flushing. The fluxes of Fe_d and PO_4^{3-} were especially large during experiments investigating the effect of overlying water hypoxia (<63 µM O_2). These results have important implications for global benthic Fe_d and PO_4 flux estimates and point toward a meaningful release of nutrients (especially PO_4^{3-} and N) from sands into the water column in coastal systems around Long Island, particularly in systems already suffering from eutrophication induced hypoxia, including Long Island Sound.
Topic: Clean Waters and Healthy Watersheds

Linking Hyperspectral Optics to Phytoplankton Pigments and Community Structure in Long Island Sound. **Kyle J. Turner (kturner@ccny.cuny.edu), Maria Tzortziou (mtzortziou@ccny.cuny.edu),** *City College of New York*

The Long Island Sound (LIS) ecosystem is supported by a biodiverse and dynamic phytoplankton community. Monitoring changes in phytoplankton community structure in response to ocean warming, urbanization, and other environmental drivers is essential to protecting the health of the Sound, from fisheries to human populations. Routine *in situ* observations of water quality and phytoplankton parameters (e.g., *Chl-a*) across the LIS have been conducted at fixed stations by the Connecticut Department of Energy and Environmental Protection (CT DEEP) for over 30 years, providing an extremely valuable dataset for understanding seasonal-to-decadal ecological trends. However, *in situ* monitoring alone inherently leaves much of the Sound "unseen" over space and time. The recently launched NASA Plankton, Aerosol, Cloud ocean Ecosystem (PACE) satellite has ushered in a new age of hyperspectral ocean color remote sensing, providing the unprecedented ability to detect unique optical signatures of phytoplankton groups from space with daily, global coverage. Here, we explore connections between *in situ* hyperspectral optical measurements in LIS (e.g., remote-sensing reflectance, phytoplankton absorption) and coincident HPLC phytoplankton pigment data collected by CT DEEP over the last five years. These efforts will help us to better utilize the hyperspectral data from PACE for enhanced, synoptic observation of phytoplankton community shifts in LIS.

Theme: Clean Waters and Healthy Watersheds

Impacts of Hydrology and Extreme Events on Dissolved Organic Carbon Dynamics in a Heavily Urbanized Estuary and its Major Tributaries: A View from Space. **Maria Tzortziou (mtzortziou@ccny.cuny.edu), Fang Cao (fcao@ccny.cuny.edu), Alana Menendez (amj6sz@virginia.edu),** *City College of New York*, **Joaquim Goes (jig2113@columbia.edu)**, *Columbia University*, **Kyle Turner (kturner@ccny.cuny.edu),** *City College of New York*

Accounting for more than half of the total organic carbon export from land to oceans, dissolved organic carbon (DOC) provides a critical link between terrestrial and aquatic ecosystems. Satellite observations can uniquely capture the hydro-biogeochemical connectivity of terrestrial and aquatic landscapes, across scales. Yet, accurate satellite retrievals of CDOM and dissolved organic carbon (DOC) dynamics remain challenging in urbanized estuaries and coasts. Here, we present new advanced algorithms for space-based retrieval of coastal CDOM and DOC dynamics in Long Island Sound – one of the world's most heavily urbanized estuaries that is becoming increasingly vulnerable to climate change stressors. A rich bio-optical dataset, encompassing a wide range of environmental conditions, was integrated into the algorithm training to retrieve DOC concentrations and CDOM spectral shape (i.e., spectral slope S275–295) – a proxy for DOC quality. The new algorithms were applied to high spatial resolution (30-300 m) satellite imagery from Sentinel-3/OLCI, Landsat/OLI and Sentinel-2/MSI, after thoroughly evaluating the performance of several ocean color atmospheric correction approaches. Application of the algorithms to multi-year satellite imagery captured, for the first time, the coupled impact of seasonal transitions, wind regimes, freshwater inputs, anthropogenic disturbances, and hydrological extremes (both intense precipitation and droughts) on DOC fluxes and CDOM quality at the ecosystem scale. Results have important implications for improved predictions of coastal biogeochemical fluxes in complex urban-estuary systems. (221 words)
Theme: Clean Waters and Healthy Watersheds

Impacts of Dam Construction and Urbanization on Carbon and Mercury Sequestration in Knell's Island Salt Marsh: A 200-Year Study. **Hejia Zhang (nikki.zhang@yale.edu), Bibek Shrestha, (bibek.shrestha@yale.edu), Derrick Vaughn (derrick.vaughn@yale.edu),** *Yale University*, **Maodian Liu (maodian.liu@pku.edu),** *Peking University*, **Peter Raymond (peter.raymond@yale.edu)**, *Yale University*

Wetlands are recognized as critical sinks of carbon among terrestrial ecosystems. The demand for atmospheric carbon mitigation underscores the importance of wetland carbon sequestration. However, increased anthropogenic activities disrupt sediment dynamics in coastal wetlands, affecting their capacity to sequester carbon. This study explores the impact of dam construction and urban development over the past 200 years on one of the largest salt marshes in Connecticut: Knell's Island, located in the lower Housatonic watershed in Long Island Sound. To explore the urbanization impacts, one-meter sediment cores were extracted, and samples were analyzed for total organic carbon (TOC), stable carbon isotope ($\delta^{13}C$), carbon/nitrogen (C/N) ratio, radiocarbon ($\Delta^{14}C$) and mercury (Hg) concentrations throughout the core. The results show a drastic shift in TOC source from allochthonous freshwater vegetation to marine OC, caused by the Stevenson dam upstream of the Housatonic River in 1900. Additionally, radiocarbon analysis reveals that old sediments, likely from minerals, have been continuously deposited on Knell's Island, suggesting rapid urban development and land use change during the past 200 years. Although Knell's Island is keeping up with the sea-level rise with a sediment accretion rate of 0.33 cm/yr, the carbon sequestration rate had decreased by almost 40% after the dam was built. Furthermore, Hg analysis highlights Hg dilution by organic matter and the effects of anthropogenic point source releases of Hg. Notably, Knell's Island showed extremely high Hg concentrations and decoupling between Hg and TOC, tracing back to localized Hg releases from hat industries in Danbury, Connecticut, during the 19th century.
Theme: Thriving Habitats and Abundant Wildlife