NEERS FALL 2014 MEETING

October 16 – 18, 2014

University of Connecticut, Avery Point Campus, Groton, CT

Organized and Hosted By

Jamie Vaudrey – Chairperson
Faith Raymond, Craig Tobias, Amanda Vieillard, and Michael Whitney
Department of Marine Sciences, University of Connecticut, Groton, CT

Gold Supporters

Connecticut Institute for Resilience and Climate Adaptation, Dominion, Woods Hole Sea Grant
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MEETING PROGRAM

All events are at University of Connecticut's Avery Point Campus
All oral sessions are in the Academic Building Auditorium (2nd floor)

Thursday, October 16th

11:30 am – 12:30 pm	Meeting registration
12:30 – 5:00 pm	Special Symposium: Coastal Resilience to Climate Change – Emerging Strategies
5:00 – 6:00 pm	Meeting registration
5:00 – 7:00 pm	Welcoming social (Marine Sciences Building, Room 103)
7:00 pm	Dinner on your own in Groton

Friday, October 17th

7:30 – 8:30 am	Meeting registration
8:30 – 9:45 am	Oral presentations: Salt Marsh Dynamics – Drivers and Ecosystem Response
9:45 – 10:15 am	Break (Student Center)
10:15 – 11:30 am	Oral presentations: Estuarine Fluxes
11:30 am – 1:00 pm	Lunch (Student Center)
1:00 – 3:30 pm	Poster presentations and refreshment break (Library, 2nd floor)
3:30 – 4:30 pm	Oral presentations: Estuarine Interactions
4:30 – 5:30 pm	NEERS Business Meeting and Elections (Auditorium)
5:30 – 7:30 pm	Social and more poster viewing (Library, 2nd floor)
7:30 – 9:00 pm	Dinner on your own in Groton
9:00 pm - ?	Music and dancing at a local venue

Saturday October 18th

8:30 – 9:45 am	Oral presentations: Linking Estuarine Science and Management
9:45 – 10:15 am	Break (Student Center)
10:15 – 11:30 am	Oral presentations: Change in Marsh Elevation over Time and Space – Causes and Consequences
11:15 am	Student awards and Closing words
12:00 pm	Meeting adjourns
12:15 pm	Field trip to Barn Island Marsh departs from the auditorium (transportation not provided)

Thursday, October 16th

SPECIAL SYMPOSIUM:
Coastal Resilience to Climate Change: Emerging Strategies

Chair: Craig Tobias *Presenter

12:30 Welcome

12:40 Twilley, Robert R.
Department of Oceanography and Coastal Sciences, LSU, Baton Rouge, LA
CHALLENGES TO BOLD NEW IDEAS OF RIVER BASIN MANAGEMENT: COMPLEX INTERACTIONS OF LAND USE AND CLIMATE CHANGES TO RESTORING THE DELTAIC COAST OF LOUISIANA

1:20 Turner*, Elizabeth[1], C. Currin[2], and A. Harrison[3]
[1]National Centers for Coastal Ocean Science, NOAA National Ocean Service, Durham, NH
[2]National Centers for Coastal Ocean Science, NOAA National Ocean Service, Beaufort, NC
[3]The Baldwin Group on contract with Coastal Services Center/Office of Ocean and Coastal Resource Management, NOAA National Ocean Service, Durham, NH
TOOLS AND SCIENCE FOR RESILIENT COASTAL INFRASTRUCTURE AND ECOSYSTEM FUNCTIONING

2:00 **BREAK** (Marine Sciences Building, room 103)

2:30 Feurt, Christine
Department of Environmental Studies, Univ. of New England, ME and Wells National Estuarine Research Reserve, ME
RESILIENCE IS THE NEW SUSTAINABILITY - IMPLICATIONS FOR RESEARCH, PRACTICE AND POLICY

2:55 Branco, Brett F.
Dept. of Earth and Environmental Sci., Brooklyn College and CUNY Graduate Center, Brooklyn, NY; Aquatic Research and Environmental Assessment Center, Brooklyn College, Brooklyn, NY
BEFORE THE STORM: THE RUSH TO RESILIENCE

3:20 Felson, Alexander
School of Forestry and Environmental Studies and School of Architecture, Yale University, New Haven, CT
URBAN ECOLOGICAL DESIGN AND COASTAL ADAPTATION FOR A RESILIENT FUTURE

3:45 O'Donnell, James
Department of Marine Sciences, University of Connecticut, Groton, CT
EFFECT OF SEA LEVEL RISE ON THE COMMUNITIES AND ECOSYSTEMS IN LONG ISLAND SOUND

4:10 Panel Discussion

5:00 **NEERS WELCOMING SOCIAL** (Marine Sciences Building, Room 103)

7:00 Dinner on your own in Groton

Friday, October 17th

8:15 Welcome and Introductory Remarks – John Brawley, NEERS President

Salt Marsh Dynamics: Drivers and Ecosystem Response

Chair: John Brawley
*Presenter; **(K)** Ketchum Prize candidate for best graduate student presentation,
(R) Rankin Prize candidate for best undergraduate student presentation

8:30 Wigand*, Cathleen[1], R. McKinney[1], J. Gurak[1], K. Szura[1], A. Oczkowski[1], M. Garate[2], A. Hanson[1], and E. Davey[1]
[1]Atlantic Ecology Division, Office of Research and Development, U.S. EPA, Narragansett, RI
[2]University of Rhode Island, Kingston, RI
GOOD CRAB, BAD CRAB

8:45 Wilson*, Kristin R.[1], D.F. Belknap[2], J. Aman[1], and J. Miller[1]
[1]Wells National Estuarine Research Reserve, Wells, ME
[2]School of Earth and Climate Studies, University of Maine, Orono, ME
LINKING PATTERNS IN EUROPEAN GREEN CRAB ABUNDANCE IN THREE SOUTHERN MAINE SALT MARSHES TO OBSERVED CHANGES IN MARSH MORPHOLOGY

9:00 **(K)** Hanrahan, Kathryn
Trinity College Dublin, Boxborough, MA
IMPACTS OF *CARCINUS MAENAS* IN MASSACHUSETTS SALT MARSHES

9:15 Buchsbaum, Robert N.
Mass Audubon, Wenham, MA
DEATH AND RESURRECTION IN TWO MASSACHUSETTS MARSHES

9:30 **(K)** Martin*, Rose M. and S. M. Moseman-Valtierra
Department of Biology, University of Rhode Island, Kingston, RI
FROM *SPARTINA* MEADOW TO *PHRAGMITES* JUNGLE: A BIOLOGICAL INVASION MAY CHANGE COASTAL MARSH CARBON CYCLING

9:45 **BREAK** (Student Center)

Estuarine Fluxes

Chair: Michael Whitney
*Presenter; **(K)** Ketchum Prize candidate for best graduate student presentation,
(R) Rankin Prize candidate for best undergraduate student presentation

10:15 Kelsey*, S.W.[1], I. Forbrich[1], S.K. Bond[1], A.E. Giblin[1] and C.S. Hopkinson[2]
[1]Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA
[2]Dept. of Marine Sciences, University of Georgia, Athens, GA
USING WATER LEVEL LOGGERS AND NUTRIENT POREWATER CONCENTRATIONS TO LINK CONTRIBUTION OF MARSH TO ESTUARINE WATER

10:30 **(K)** Salazar*, Camilo[1,2], J.K. Cochran[1], and C. Heilbrun[1]
[1]School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY
[2]Water Quality Division, Suffolk County Department of Economic Development and Planning, Hauppauge, NY
RADIUM ISOTOPES AS A METHOD TO MEASURE POREWATER RESIDENCE TIME ON THREE MARSHES IN LONG ISLAND, NEW YORK

10:45 Fewings*, Melanie R.[1], S.J. Lentz[2], K.K. Hathaway[3], and P.J. Howd[4]
[1]Dept. of Marine Sciences, University of Connecticut, Groton, CT
[2]Dept. of Physical Oceanography, Woods Hole Oceanographic Institution, Woods Hole, MA
[3]Coastal Hydraulics Lab., US Army Corps of Engineers Field Research Facility, Duck, NC
[4]USGS, St. Petersburg, FL
NEARSHORE VELOCITY PATTERNS AND TIDAL SLOSHING OF THE CHESAPEAKE BAY OUTFLOW PLUME

11:00 **(R)** Whitcomb*, Jonathan[1] and I. Forbrich[2]
[1]Department of Civil and Environmental Engineering, Clarkson University, NY
[2]Marine Biological Laboratory, Woods Hole, MA
MEASURING DISSOLVED INORGANIC CARBON TRANSPORT IN THE PLUM ISLAND ESTUARY

11:15 **(K)** Fogarty, Michelle
University of Connecticut, Groton, CT
CLIMATE CHANGE THREATENS TO OVERHEAT EELGRASS EMBAYMENTS

11:30 **LUNCH** (Student Center)

1:00 **POSTER SESSION** (Library, second floor)
(See last page for map of poster locations)

Posters

*Presenter; **(D)** Dean Prize candidate for best graduate student poster,
(W) Warren Prize candidate for best undergraduate student poster

Macroinvertebrates and Environmental Change

A-1 **(W)** Nicholson*, Heather[1], D. Borkman[2], and J.F. Chace[1]
[1]Department of Biology, Salve Regina University, Newport, RI
[2]Graduate School of Oceanography, University of Rhode Island, Kingston, RI
MARINE SPECIES-SPECIFIC HABITAT MODELS USED TO PREDICT FUTURE DISTRIBUTIONS WITH SEA LEVEL RISE ALONG NEWPORT NECK

A-2 **(W)** Jones*, Katherine M.[1], D. Borkman[2], and J.F. Chace[1]
[1]Department of Biology, Salve Regina University, Newport, RI
[2]Graduate School of Oceanography, University of Rhode Island, Kingston, RI
HIGHLY SKEWED SEX RATIOS AMONG *HOMARUS AMERICANUS* , *LIBINIA EMARGINATA* AND *CANCER IRRORATUS* ALONG NEWPORT NECK

A-3 **(D)** Ober*, Gordon T.[1], J.J. Kolbe[1], C.S. Thornber[1], and J.S. Grear[2]
[1]Biological and Environmental Sciences, University of Rhode Island, Kingston, RI
[2]Atlantic Ecology Division, US EPA, Narragansett, RI
VARIATION IN THERMAL SENSITIVITY OF SWIMMING PERFORMANCE IN THREE SPECIES OF MYSID SHRIMP

A-4 **(W)** Cassone*, Christopher F.[1], J. Willis[1,2], and G.F. Branco[1,3]
[1]Department of Earth and Environmental Sciences, Brooklyn College, CUNY
[2]U.S. National Park Service
[3]Aquatic Research and Environmental Assessment Center, Brooklyn College, CUNY
A COMPARISON OF SEDIMENT PROPERTIES AMONGST NATURAL AND RESTORED SALT MARSHES IN JAMAICA BAY, NY

Fish and Wildlife Conservation

B-1 **(W)** Davis*, Dara, Maggie Sowa*, Kate Spence*, and M. Pregnall
Biology Department, Vassar College, Poughkeepsie, NY
NESTING AND NEST DEPREDATION PATTERNS OF NATURAL AND SIMULATED TURTLE NESTS IN FENCE-CONSTRAINED VERSUS UNCONSTRAINED NESTING AREAS AROUND A WETLAND COMPLEX

B-2 **(D)** Smith*, Kayla M., C.J. Byron, and J.A. Sulikowski
Dept. of Marine Sciences, University of New England, Biddeford, ME
DIADROMOUS FISH ASSEMBLAGE ASSESSMENT AND FOOD WEB CHARACTERIZATION IN THE SACO RIVER ESTUARY, ME

Plankton Community Dynamics

C-1 Dam, H.G., Michael Finiguerra*, D.E. Avery, and B. Cournoyer
Dept. of Marine Sciences, University of Connecticut, Groton, CT
THERMAL RESPONSES OF ZOOPLANKTON SPECIES ALONG A THERMAL GRADIENT OF THE EASTERN USA: GEOGRAPHIC DIFFERENCES AND PROJECTIONS

C-2 **(D)** Burris*, Zair P. and H.G. Dam
Department of Marine Sciences, University of Connecticut, Groton, CT
SPERMATOPHORE PRODUCTION RATES AS A FUNCTION OF FOOD AVAILABILITY IN THE MARINE COPEPOD ACARTIA HUDSONICA

C-3 **(D)** Park*, Gihong and H.G. Dam
Department of Marine Sciences, University of Connecticut, Groton, CT
SPATIAL-TEMPORAL VARIABILITY OF THE COPEPOD COMMUNITY IN LONG ISLAND SOUND

Estuarine Metabolism and Nutrient Cycling

D-1 **(D)** Raymond, Faith
Department of Marine Sciences, University of Connecticut, Groton, CT
MEASURING ESTUARINE ECOSYSTEM METABOLISM USING OXYGEN CONCENTRATIONS AND STABLE ISOTOPES

D-2 **(D)** Perry*, Rachel, H.M. Dierssen, and J.M.P. Vaudrey
Department of Marine Sciences, University of Connecticut, Groton, CT
ECOLOGICAL IMPORTANCE OF SEAGRASS WRACKS IN FLORIDA BAY

Nutrient Enrichment

E-1 Berounsky*, Veronica M.[1,2], A.M. DeSilva[1,2], E. Scott[3], and C.E. Vandemoer[4]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Narrow River Preservation Association, Saunderstown, RI
[3]Office of Water Resources, RI Department of Environmental Management, Providence, RI
[4]US Fish and Wildlife Serv., Rhode Island National Wildlife Refuge Complex, Charlestown, RI
USING WATER QUALITY MONITORING DATA TO DIRECT RESTORATION EFFORTS: A CASE STUDY IN THE PETTAQUAMSCUTT ESTUARY (NARROW RIVER) IN SOUTHERN RHODE ISLAND

E-2 **(W)** Sioux*, Heather D.[1,4], A.L. Lamb[2,4], and B.F. Branco[2,3,4]
[1]Dept. of Biology, Brooklyn College, Brooklyn, NY
[2]Dept. of Earth and Environ. Sciences, The Graduate Center, CUNY, New York, NY
[3]Dept. of Earth and Environ. Sciences, Brooklyn College, CUNY, Brooklyn, NY
[4]Aquatic Research and Environmental Assessment Center, Brooklyn College, Brooklyn, NY
NITRATE UPTAKE RATE OF AN OPPORTUNISTIC MACROALGAE, ULVA COMPRESSA PEAKS AT AN ENRICHED MEDIA CONCENTRATION

E-3 **(W)** Dostie, Amanda* and J.M.P. Vaudrey
Department of Marine Sciences, University of Connecticut, Groton, CT
CHARACTERIZATION OF THE EXTENT AND SOURCE OF NUTRIENTS SUPPORTING A MASSIVE MACROALGAE BLOOM IN LITTLE NARRAGANSETT BAY, CT

Invasive Species Interactions

F-1 **(W)** Logan*, J. Louis
Biology Dept, Salem State University, Salem, MA
IMPACTS ON EELGRASS (*ZOSTERA MARINA*) GROWTH

F-2 Neckles*, Hilary A.[1], A.D. Brewer[2], J.W. Sowles[3], S. Barker[4], C.C. Bohlen[5], M. Craig[5], M. Doan[6], and S. Lary[7]
[1]USGS Patuxent Wildlife Research Center, Augusta, ME; [2]ME Dept. of Environmental Protection, Augusta, ME; [3]North Yarmouth, ME; [4]Boothbay, ME
[5]Casco Bay Estuary Partnership, Portland, ME; [6]Friends of Casco Bay, South Portland, ME
[7]USFWS Gulf of Maine Coastal Program, Falmouth, ME
UPDATE ON A CONTINUING SAGA: EELGRASS AND GREEN CRABS IN CASCO BAY, MAINE

F-3 **(W)** Keegan*, L. Amanda
Biology Department, Salem State University, Salem, MA
OBSERVATIONS AND VARIATIONS OF GREEN CRAB PREDATION (*CARCINUS MAENAS*) ON JUVENILE SOFT SHELL CLAMS (*MYA ARENARIA*)

3:30 **ORAL PRESENTATIONS RESUME**

Friday, October 17th

Estuarine Interactions

Chairs: Amanda Vieillard & Faith Raymond
*Presenter; **(K)** Ketchum Prize candidate for best graduate student presentation,
(R) Rankin Prize candidate for best undergraduate student presentation

3:30 Hale, Stephen S.
Atlantic Ecology Division, Office of Research and Development, U.S. EPA, Narragansett, RI
WHEN GOOD MUD GOES BAD: EFFECT OF ORGANIC ENRICHMENT AND HYPOXIA ON THE ABILITY OF BENTHIC COMMUNITIES TO PROVIDE ECOSYSTEM SERVICES

3:45 **(R)** Leamy, Corey* and J.M.P. Vaudrey
Department of Marine Sciences, University of Connecticut, Groton, CT
EXTENT AND SEVERITY OF LATE SUMMERTIME HYPOXIA IN CONNECTICUT AND NEW YORK EMBAYMENTS OF LONG ISLAND SOUND

4:00 **(K)** Lamb*, Annesia L.[1,3], L.M. Anderson[3], H.S. Sioux[3], and B.F. Branco[1,2,3]
[1]Dept. of Earth and Environ. Sci., The Graduate Center, CUNY, New York, NY
[2]Dept. of Earth and Environ. Sci., Brooklyn College, CUNY, Brooklyn, NY
[3]Aquatic Res. and Environmental Assessment Center, Brooklyn College, CUNY, Brooklyn, NY
A UNIALGAL CULTURING METHOD FOR ULVA SPP. FOR USE IN MESOCOSM EXPERIMENTS

4:15 Feinman*, Sarah F., P.J. Kearns, and J.L. Bowen
Department of Biology, University of Massachusetts Boston, Boston, MA
THE EFFECT OF DIFFERENT OYSTER FARMING PRACTICES ON SEDIMENT MICROBIAL COMMUNITIES

4:30 NEERS Business Meeting and Elections (Auditorium)

5:30 **SOCIAL AND MORE POSTER VIEWING** (Library, second floor)

7:30 Dinner on your own in Groton

9:00 Music and dancing at a local venue

Saturday, October 18th

Linking Estuarine Science and Management

Chair: Steve Hale
*Presenter; **(K)** Ketchum Prize candidate for best graduate student presentation

8:30 Short, Frederick T.
University of New Hampshire, Dept. of Natural Resources and the Environment, Jackson Estuarine Laboratory, Durham, NH
EELGRASS SCIENCE, MANAGEMENT, AND POLITICS: A BI-COASTAL PERSPECTIVE

8:45 Stacey, Paul E.
Great Bay National Estuarine Research Reserve, NH Fish & Game Department, Greenland, NH
MANAGING GREAT BAY – IT'S NOT JUST ABOUT NITROGEN

9:00 **(K)** Mahoney*, Michael R.[1], M. Smith[1], L. Auermuller[2], K. Grant[3], C.B. Feurt[1], K.R. Wilson[1], A.N. Cox[1], and S. Bickford[1]
[1]Wells National Estuarine Research Reserve, Wells, ME; [2]Jacques Cousteau National Estuarine Research Reserve, Tuckerton, NJ; [3]Maine Sea Grant, Wells, ME
USING LESSONS FROM SUPERSTORM SANDY IN NEW JERSEY TO HELP SOUTHERN MAINE COMMUNITIES PLAN FOR COASTAL STORMS

9:15 Davis*, Amanda, J. Logan, C. Markos, H. Coble, and K. Ford
Massachusetts Division of Marine Fisheries, New Bedford, MA
ENVIRONMENTAL IMPACTS OF DOCKS ON SALT MARSH VEGETATION ACROSS MASSACHUSETTS ESTUARIES - A QUANTITATIVE FIELD SURVEY APPROACH

9:30 **BREAK** (Student Center)

Change in Marsh Elevation Over Time and Space: Causes and Consequences

Chair: Jamie Vaudrey
*Presenter; **(R)** Rankin Prize candidate for best undergraduate student presentation

10:00 **(R)** Williams*, Bethany L.[1] and D.S. Johnson[2]
[1]Florida State University, Tallahassee, FL
[2]Marine Biological Laboratory, Woods Hole, MA
MELAMPUS BIDENTATUS AS A MODEL FOR THE EFFECTS OF CLIMATE CHANGE ON SALT MARSH ANIMAL COMMUNITIES

10:15 Rozsa, Ron
Ashford, CT
BARN ISLAND SEA LEVEL FENS

10:30 Warren*, R. Scott[1] and N. Barrett[2]
[1]Connecticut College Department of Botany
[2]Natural Resources Conservation Service
SALT MARSHES AND SEA LEVELS IN LONG ISLAND SOUND

10:45 Bond*, Samantha K.[1], S.K. Kelsey[1], A.E. Giblin[1], and C.S. Hopkinson[2]
[1]Marine Biological Laboratory, Woods Hole, MA
[2]University of Georgia, Department of Marine Science, Athens, GA
FACTORS INVOLVED IN PLUM ISLAND ESTUARY SALTMARSH PLATFORM ACCRETION

11:00 Tyrrell*, Megan C.[1], C.S. Thornber[2], J.A. Burkhardt[1], and M. Congretel[3]
[1]Cape Cod National Seashore, National Park Service, Wellfleet, MA
[2]Dept. of Biological Sciences, University of Rhode Island, Kingston RI
[3]AgroParisTech – UMR SAD-APT, Paris, France
THE INFLUENCE OF SALT MARSH FUCOID ALGAE (ECADS) ON SEDIMENT DYNAMICS OF NORTHWEST ATLANTIC MARSHES

11:15 Presentation of Student Presentation Prizes and Closing Words – Jamie Vaudrey, NEERS President

12:00 Adjourn

12:15 Field trip to Barn Island Marsh departs from Auditorium, transportation not provided

ABSTRACTS

Berounsky*, V.M.[1,2], A.M. DeSilva[1,2], E. Scott[3], and C.E. Vandemoer[4]. [1]Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, RI; [2]Narrow River Preservation Association, Saunderstown, RI; [3]Office of Water Resources, RI Department of Environmental Management, Providence, RI; [4]US Fish and Wildlife Serv., Rhode Island National Wildlife Refuge Complex, Charlestown, RI <vberounsky@gso.uri.edu>

USING WATER QUALITY MONITORING DATA TO DIRECT RESTORATION EFFORTS: A CASE STUDY IN THE PETTAQUAMSCUTT ESTUARY (NARROW RIVER) IN SOUTHERN RHODE ISLAND

Typical of many northeast US estuaries, the 9km Pettaquamscutt Estuary, or Narrow River, in southern Rhode Island has seen a dramatic increase in residential development of its 35.5 km^2 watershed since the 1960's. Model calculations have shown that nitrogen loads to the estuary remain high despite many neighborhoods converting from individual septic disposal systems to municipal sewers. In 1979, certain areas were closed to shellfishing due to high fecal coliform levels and since 1994 the whole estuary has been closed. But fortunately, this estuary has over 20 years of water quality monitoring at ten stations throughout the estuary and 5-10 years of monitoring at four streams or outfalls thanks to volunteers and University of Rhode Island's Watershed Watch program. Also there is a fecal coliform TMDL report thanks to the Department of Environmental Management. These data have documented areas with high levels of bacteria and nitrogen. The US Fish and Wildlife Service maintains the 317 acre John H. Chafee National Wildlife Refuge, near some of these high inputs, and is supporting intensive monitoring around these areas. It is hoped that the sources can be located and identified. Also, since stormwater carries both nitrogen and bacteria, the planning and construction of additional BMPs is crucial, and the water quality monitoring is useful for both siting of BMPs and confirming that they are functioning satisfactorily. In addition to the Fish and Wildlife Service, this restoration project is a joint effort of a non-profit environmental organization, university scientists, a state agency, and two towns in the watershed.

Bond*, Samantha K.[1], S.K. Kelsey[1], A.E. Giblin[1], and C.S. Hopkinson[2]. [1]Marine Biological Laboratory, Woods Hole, MA; [2]Univ. of Georgia, Department of Marine Science, Athens, GA <sbond@mbl.edu>

FACTORS INVOLVED IN PLUM ISLAND ESTUARY SALTMARSH PLATFORM ACCRETION

New England marshes are valuable coastal resources that act a barrier between the ocean and upland zones. With growing concerns over how marshes will respond to sea-level rise, it is imperative to understand the factors that control the growth of saltmarsh platforms and how they may change. Since 2005, we have deployed Surface Elevation Tables (S.E.T.s) and Marker Horizons at six sites along the Rowley River in Plum Island Estuary (PIE), Rowley, MA. Each site has a transect of three individual plots along an elevation gradient. The dominate plant species at each site are either Spartina patens and Distichlis spicata or Spartina alterniflora. We examined change in our plots as a function of elevation, plant species and distance from the edge of the tidal creek, the Rowley River. We found that marsh accretion rates ranged from 2 to 8mm per year, and were dependent upon distance from the edge of the Rowley River and plot vegetation type. In general, sites at lower elevation were primarily S. alterniflora and had high rates of accretion, while sites at higher elevation were primarily S. patens and D. spicata and had low rates of accretion.

Branco, B.F. Dept. of Earth and Environmental Sci., Brooklyn College and CUNY Graduate Center, Brooklyn, NY; Aquatic Research and Environmental Assessment Center, Brooklyn College, Brooklyn, NY <bbranco@brooklyn.cuny.edu>

BEFORE THE STORM: THE RUSH TO RESILIENCE

Superstorm Sandy dramatically exposed the vulnerability of coastal communities and resources throughout the New York City Metropolitan Area. The Storm marked the need to develop effective resilience practices in preparation for future disturbances. However, the conceptual foundation of the Science and Resilience Institute at Jamaica Bay (SRIJB) had been established well before this seminal

event in response to the challenges posed by climate change and urbanization. The SRIJB, a CUNY-led consortium of nine academic, nonprofit, and government organizations emerged from a Cooperative Management Agreement between the City of New York and the National Park Service in early 2012. The SRIJB aims to increase understanding of how disturbances impact natural and human systems in urban estuaries through resiliency-focused research, and to communicate that knowledge to regional, national, and international audiences. The immediate research activity of the SRI focuses on assessing the resilience of the Jamaica Bay social-ecological systems and translating resilience thinking to practice. The SRIJB will be uniquely positioned to monitor and assess the resilience of Jamaica Bay in the wake of the shock of Sandy, and to future disturbances.

Buchsbaum, R.N. Mass Audubon, Wenham, MA <rbuchsbaum@massaudubon.org>
DEATH AND RESURRECTION IN TWO MASSACHUSETTS MARSHES
Salt marshes are occasionally subjected to rapid changes caused by human or natural processes. We have been monitoring responses of two salt marshes on Mass Audubon sanctuaries that experienced rapid vegetation losses induced by different stressors. In the spring of 2008, the inlet that connects Allens Pond (South Dartmouth, MA) to Buzzards Bay was sealed by shifting sands, completely eliminating tidal flushing. This raised the water level of this salt pond to the point that the surrounding marshes were submerged for several months. Dredging eventually restored tidal exchange, but the marsh grasses died back substantially. Based on vegetation transects first sampled five years prior to the flooding event, initial colonization of bare areas by *Salicornia depressa* was followed in subsequent years by gradual recovery of the *Spartina* spp. to greater than 80% of their initial cover five years after the flooding event. Areas of *Phragmites* were unaffected by the flooding event. The obligate saltmarsh birds, saltmarsh sparrows and seaside sparrows, declined substantially in the first three years after the flood but have slowly been trending upward after that. Our second salt marsh, located in Wellfleet, MA on Cape Cod, had been subjected to rapid vegetation loss associated with herbivory by the marsh crab, *Sesarma reticulatum*, first observed in 2005. Vegetation, primarily *Spartina alterniflora*, remained at low levels in the dieback areas for the first three years after the dieback event occurred. This has been followed by an apparent decline in the crab and the gradual recovery of very robust *S. alterniflora*. This grass is now spreading into the former *S. patens* zone.

Burris*, Z.P. and H.G. Dam. Department of Marine Sciences, Univ. of Connecticut, Groton, CT <burrisza@gmail.com>
SPERMATOPHORE PRODUCTION RATES AS A FUNCTION OF FOOD AVAILABILITY IN THE MARINE COPEPOD ACARTIA HUDSONICA
During mating in copepods, males deposit a sperm packet, or spermatophore, on the female. Lifetime spermatophore production rates are not known for any species of copepod, but would provide valuable information about male energetics and mating abilities. Spermatophore production rates were measured for males of *Acartia hudsonica* over their lifetime under three food regimes (high, low, and starvation) by providing males with four new, unmated females daily. Males of *A. hudsonica*produced an average of 8 spermatophores over their lifetime under high food conditions, while those fed at low food and starved produced 5 and 1 spermatophore, respectively. Males fed at high food had peak production within the first four days (maximum 0.7 spermatophores day^{-1}), while those fed at low food had a peak between days 5-8 (0.55 spermatophores day$^{-1)}$. Males fed at high food stopped producing spermatophores after about 12 days but continued to live for an average of 8 more days. Those fed at low conditions continued to produce spermatophores until death (average of 20 days). Under starvation, males produced spermatophores at a rate of 0.2 day^{-1} for the first eight days, until death after 10 days. These results suggest that spermatophore production rate is highly dependent upon food availability, but additionally, that males have a set number of spermatophores they are able to produce over their lifetime. If males reach this maximum number early in their lives, then production is stopped (as in the high food treatment). However, as in the low food condition, if this number is not achieved early on, spermatophore production will continue into old age.

Cassone*, C.F.[1], J. Willis[1,2], and G.F. Branco[1,3.] [1]Department of Earth and Environmental Sciences, Brooklyn College, CUNY; [2]U.S. National Park Service; [3]Aquatic Research and Environmental Assessment Center, Brooklyn College, CUNY <cassonechris@yahoo.com>
A COMPARISON OF SEDIMENT PROPERTIES AMONGST NATURAL AND RESTORED SALT MARSHES IN JAMAICA BAY, NY
In response to significant salt marsh loss over the past few decades in Jamaica Bay, NY salt marsh islands are being restored by the National Park Service (NPS) and partners in this ecologically significant estuary. The standard post restoration monitoring requirement for the NPS is five years. One factor that is infrequently used as a gauge of restoration success is macro-benthic infauna. Benthic samples were collected at Elders East and Elders West, restored marshes, as well as JoCo an unrestored reference marsh from 2007-2012. The species composition and abundance of the restored marshes and unrestored marsh will be compared. However, differences in composition and abundance may partially reflect differences in sediment characteristics between the marshes. We collected sediment cores at 15 sampling locations each at the three marshes, and analyzed dry bulk density, particle size (defined as percent sand, silt, and clay) and soil organic matter by loss-on-ignition. The results will be used to compare benthic communities amongst the salt marshes.

Davis*, A., J. Logan, C. Markos, H. Coble, and K. Ford. Massachusetts Division of Marine Fisheries, New Bedford, MA <amandagrace215@gmail.com>
ENVIRONMENTAL IMPACTS OF DOCKS ON SALT MARSH VEGETATION ACROSS MASSACHUSETTS ESTUARIES - A QUANTITATIVE FIELD SURVEY APPROACH
Proliferation of docks in salt marsh habitats poses potential cumulative impacts through shading and displacement of marsh vegetation. Permitting guidelines provide construction recommendations regarding various dock characteristics (e.g., height, orientation, deck spacing, deck materials), but few quantitative data exist to substantiate these guidelines. To assess the relative impacts of different dock designs on salt marsh growth, we performed a field survey of existing docks constructed over salt marsh across the Massachusetts coast. Using aerial imagery, we identified over 1,200 existing docks constructed over salt marsh and sampled vegetation at 200 of these dock sites. In this survey, we measured basic dock characteristics (i.e., width, height, orientation, plank spacing, decking type) and collected clip plot samples under (treatment) and adjacent (control) to docks. Live stem height, density, and dry weight were measured for all clip plot samples. A preliminary analysis of dock effects is presented as comparisons of marsh characteristics under and adjacent to dock structures and among docks with different designs. Preliminary results are discussed in the context of current management guidelines.

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NESTING AND NEST DEPREDATION PATTERNS OF NATURAL AND SIMULATED TURTLE NESTS IN FENCE-CONSTRAINED VERSUS UNCONSTRAINED NESTING AREAS AROUND A WETLAND COMPLEX
Turtle conservation efforts may utilize containment fences to diminish negative interactions with human activities, but such fences can restrict access to potential nesting sites. Moreover, turtle-nest predators then have a very confined zone with increased nest densities within which to forage. We determined the nesting patterns of turtles from a complex of natural and constructed wetlands in Dutchess County, NY, for which access to open nesting areas is constrained by a fence. We also determined nest depredation rates for various subhabitat types. We found that turtles nested in tilled areas and formerly tilled areas more frequently than in vegetated areas, but those nests were also more rapidly depredated. We determined depredation rates on simulated turtle nests created with quail eggs both within the fenced-in wetland area and outside the fence in larger, more open meadows and among athletic playing fields and a public golf course. Within the containment fence we observed that 95 % of turtle nests that were not protected by nest cages were depredated, nearly all within the first two nights. We found that depredation

rates of the simulated nests were significantly higher within the fenced-in areas compared to the unfenced areas, with nests in unfenced areas surviving 5.5 times longer than fenced-in nests. Similarly, nests in tilled areas were depredated more rapidly than those in vegetated areas, with nests in vegetation surviving 2.5-4.0 times longer than those in tilled areas. These results highlight some unintended negative consequences of wildlife conservation techniques that utilize constructed or constrained habitats.

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CHARACTERIZATION OF THE EXTENT AND SOURCE OF NUTRIENTS SUPPORTING A MASSIVE MACROALGAE BLOOM IN LITTLE NARRAGANSETT BAY, CT
Recently, the small and quaint towns bordering Little Narragansett Bay, CT, have fallen victim to a massive macroalgae bloom of *Cladophora* sp. This bloom is currently causing a surfeit of recreational, health and ecological problems. The macroalgae was first identified in the Bay in the late 1990s, following the loss of the seagrass *Zostera marina*. The areal extent of the bloom has increased to a point where it now covers nearly the entirety of Little Narragansett Bay. The large water shed of Little Narragansett Bay, where ample amounts of nitrogen are released daily from human activities, drains into the Bay through the Pawcatuck River and Wequetequock Cove. Members of the Wequetequock Cove community question whether the nitrogen stimulated algae blooms in the Cove are coming from activities in their watershed or if water derived from the Pawcatuck River is the source of the problem. One of the many pressing questions for local communities is: what is the main source of nitrogen driving the large *Cladophora* blooms? Should action by the community groups focus on the Pawcatuck River, or does Wequetequock Cove share the burden? Is Wequetequock Cove a source or sink of nitrogen? Answering these questions is an essential stepping stone to change in the community. In order to address these questions, our team conducted field work to identify the areal extent, biomass, and nitrogen content of the *Cladophora* bloom. Nitrogen loads from the Cove and River were estimated based on nutrient concentrations and river flow. The results of this work will support efforts to reduce nitrogen inputs and provide guidance on the main sources of nitrogen fueling the bloom.

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THE EFFECT OF DIFFERENT OYSTER FARMING PRACTICES ON SEDIMENT MICROBIAL COMMUNITIES
Aquaculture is a growing industry that will be a necessary component of future sustainable seafood practices. Oysters, an important part of the aquaculture industry, play a major role in estuarine environments by filtering water, providing a hard substrate, and acting as a nursery for many organisms, including crabs and small fish. Little is known about the microbial communities associated with oysters despite the importance of microbes in mediating many biogeochemical transformations including denitrification. In order to examine oyster associated microbial communities we collected sediment and water samples from oyster farms in Rhode Island and Massachusetts that use different oyster farming practices. We extracted DNA from sediments for metagenomic analysis of the 16S rRNA gene and measured water column and pore water nutrient concentrations. Our results show that the dominant members of the sediment microbial community do not change with the presence of oysters or with different sampling locations. Despite this stability in community membership, the proportion of certain bacterial OTUs (bacterial taxa) does appear to be affected by the presence of oysters. When analyzing the total microbial community, we see subtle differences in community composition based on oyster stocking density; different farming practices cluster separately from one another, though these distinctions are less apparent when phylogeny is taken into consideration. These results suggest that oysters do alter microbial communities, yet the extent to which these subtle changes affect estuarine biogeochemistry remains to be seen.

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URBAN ECOLOGICAL DESIGN AND COASTAL ADAPTATION FOR A RESILIENT FUTURE
Coastal climate adaptation efforts in Long Island Sound are revealing the more fundamental changes that are required to effectively manage our coasts. Adaptation will require profound changes in human behavior and spatial arrangements, which necessitates active collaboration between ecologists, engineers, and designers to reconfigure coastal zones. The most forward-looking initiatives across the Sound have in many cases circumvented traditional planning and political processes. This has had the benefit of fostering innovation, interdisciplinary collaboration, and more holistic approaches to addressing the problem. However, many also lack sustainable funding mechanisms to facilitate implementation and sustain on-going research and collective learning. At this critical stage where a number of promising pilot projects are underway, there is an opportunity to redefine how these initiatives proceed form design to implementation. The scientific community has a unique opportunity to prominently situate research at the core of these efforts and ensure climate change is innovative and integrated across projects, rather than dealt with in isolation. This presentation will review specific components of several adaptation efforts that exemplify this need for interdisciplinary knowledge and a more expansive conception of ‘coastal’ management. This will include examples from the Rebuild by Design project aimed at increasing resilience by reconnecting inland waterways, managing stormwater and CSOs, and promoting aquaculture development. Examples from Guildford’s coastal resilience plan including the larger potential to use active recreation as an opportunity to rethink transition areas and ecosystem migration will be discussed.

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RESILIENCE IS THE NEW SUSTAINABILITY - IMPLICATIONS FOR RESEARCH, PRACTICE AND POLICY
Resilience as an end goal is a concept nested within a complex framework of approaches to science that can confound even the most seasoned researcher. Gunderson and Holling’s book *Panarchy* captures the richness of the resilience concept in ecological terms. Researchers familiar with this theory can make connections between resilience and adaptive ecosystem management. Complex systems change in unpredictable ways and are fraught with surprises. Research helps us understand the structure and function of complex systems; describe and predict tipping points, and document recovery from change. Sustainability science captures the resilience concept in another way. The work of Kates and others in this evolving approach focuses on solutions oriented research that goes beyond interdisciplinarity to include effective engagement among researchers and stakeholders. A goal of sustainability science is to increase the relevance and effectiveness of science. Sustaining ecosystems and their services intersects with the resilience concept with the explicit aim of sustaining things people care about. During the past five years the Wells NERR and UNE have been part of ten externally funded projects where we have faced the challenges of conducting interdisciplinary research that advances scientific understanding, contributes to the practice of coastal management and informs policy. What did we learn about resilience in the process? Science that contributes to an end goal of resilience depends upon a commitment to boundary spanning methods, professionals and organizations that bridge the gap separating science from practice and policy. Boundary spanning is grounded in rigorous and explicit communication approaches which when paired with science provides feedback that can increase the relevance and application of science to both define what reliance looks like and identify tradeoffs people are willing to make to achieve it.

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NEARSHORE VELOCITY PATTERNS AND TIDAL SLOSHING OF THE CHESAPEAKE BAY OUTFLOW PLUME

The Chesapeake Bay freshwater outflow forms a buoyant, coastal-trapped gravity current that can propagate ~100 km southward over 2–3 dy. We present detailed observations of the nose and neck regions of 5 coastal-trapped Chesapeake plume events passing Duck, NC, ~60 km south of Chesapeake Bay. The observations are from a cross-shelf array of 6 acoustic Doppler current profilers and a nearshore array (2–4 m water depth) of electromagnetic current meters, and have enhanced temporal and spatial resolution compared to previous studies of these plumes. This enabled us to examine the flow field of individual plume events, rather than averaging over many events as in previous studies. We report the presence of multiple, opposing cross-shelf flow layers within the upper layer of along-shelf flow that constitutes the freshwater plume. We discuss the implications of this complex cross-shelf flow structure for the validity of existing two-layer theoretical models of buoyant plume propagation. We also present evidence for tidal sloshing of the plume layers in the cross-shelf direction. We discuss the cross-shelf transport associated with this sloshing and implications for larval delivery from the mid-shelf to the nearshore.

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THERMAL RESPONSES OF ZOOPLANKTON SPECIES ALONG A THERMAL GRADIENT OF THE EASTERN USA: GEOGRAPHIC DIFFERENCES AND PROJECTIONS

Zooplankton can adapt to climate change by phenotypic plasticity or evolutionary adaptation. We tested the hypothesis that populations of the coastal copepods Acartia tonsa and Acartia hudsonica are adapted to local temperature conditions. A. tonsa is prevalent during the warmer months (warm-adapted) and A. hudsonica during the colder months (cold-adapted). Using a common garden design, we compared thermal performance curves among three populations of both species along a thermal/latitudinal gradient on the east coast of the USA (Maryland, Connecticut and Maine for A. tonsa; New Jersey, Connecticut and Maine for A. hudsonica). We measured egg production, egg hatching frequency and adult survival at temperatures ranging from 7º to 27º C (A. hudsonica) and 11º to 33º C (A. tonsa). There was no difference in egg production rate among populations in either species. Adult survival was independent of temperature and population in A. tonsa. In A. hudsonica, adult survival was independent of temperature in the New Jersey population, but significantly decreased with temperature in the Connecticut and Maine populations. There were differences in egg hatching success among populations for both species, possibly affecting recruitment success. Overall, there seems to be little evidence of local adaptation to temperature for A. tonsa and hudsonica. Both species appear highly plastic in thermal tolerance, suggesting resiliency to projected increased temperatures of coastal waters.

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CLIMATE CHANGE THREATENS TO OVERHEAT EELGRASS EMBAYMENTS

Eelgrass, *Zostera marina*, plays an important role in the environment and the economy. Ideal water temperatures for eelgrass range from 10-20^{o}C. Growth ceases between 20-25^{o}C and temperatures exceeding 30^{o}C are lethal. The processes controlling water temperature in shallow embayments with eelgrass are not well understood. An imbalance between the measured net air-sea heat flux and the observed water column heat content suggests advection (i.e. flushing of the embayment) is an important cooling mechanism. However, it is unclear what processes maintain the advective cooling. Some of those processes, such as estuarine circulation, may weaken if rainfall patterns change. To determine the maximum water temperatures these embayments may experience under future climate conditions, we use the air-sea heat flux algorithm COARE coupled with the PWP mixed layer model to predict the evolution

of water column temperature profiles in water ~3 m deep over time when advection is ignored. Profiles are presented comparing typical July conditions, the July 2011 heat wave, and more extreme hypothetical future heat waves. The coupled models display a strong diurnal cycle of heating cooling superimposed on a gradual increase in temperature over the duration of the heat wave. We use the coupled model to investigate what heat wave conditions and durations produce water temperatures that are sublethal vs. lethal for eelgrass, and how long these conditions persist after the atmospheric heat wave ends.

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WHEN GOOD MUD GOES BAD: EFFECT OF ORGANIC ENRICHMENT AND HYPOXIA ON THE ABILITY OF BENTHIC COMMUNITIES TO PROVIDE ECOSYSTEM SERVICES
Excessive input of nitrogen to coastal waters leads to eutrophication and hypoxia that reduce biodiversity and impair key ecosystem services provided by benthic communities; for example, fish and shellfish production, bioturbation, nutrient cycling, and water filtration. Hypoxia is commonly defined in the literature as dissolved oxygen <2.0 mg/l, but this fails to take into account sub-lethal effects on ecosystem production functions (such as growth rate) that occur at levels up to 4 or 5 mg/l. Constraints on the upper limit of biodiversity imposed by organic over-enrichment (total organic carbon in sediments) and hypoxia in the coastal waters of the northeastern US result in a loss of potential biodiversity, shown by a 95th quantile regression of species richness versus dissolved oxygen. The mean species richness and secondary production of benthic community at stations in seasonally-hypoxic areas of Narragansett Bay, Rhode Island were significantly lower than those in normoxic areas, and a multidimensional scaling of Bray-Curtis species abundances also showed significant differences. Many rare species found in normoxic areas were not present in hypoxic areas. Eutrophication-related reductions in benthic community ecosystem production functions lead to a loss of things valued by the human population surrounding and using the Bay.

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IMPACTS OF *CARCINUS MAENAS* IN MASSACHUSETTS SALT MARSHES
Salt marsh ecosystems are critical in protection of coastal lands from erosion. They are driven by complex interactions between physical, biological, and chemical processes. Their functioning is sensitive to changes, especially biological invasions. Carcinus maenas is one of the most voracious invasive species worldwide. It has had a presence on US coasts since 1817 and in recent years, there have been noticeable changes in the ecosystems that they invade. In Massachusetts, extensive burrowing activity by C. maenas in salt marshes has been observed. Although visually these changes appear substantial, it is unclear how the physical changes associated with the behavior of C. maenas in the salt marsh are impacting infaunal diversity and primary resources in these areas. This novel study investigated the interactions between burrowing and percent vegetation cover, macrofauna, and organic matter fluctuations.

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HIGHLY SKEWED SEX RATIOS AMONG *HOMARUS AMERICANUS* , *LIBINIA EMARGINATA* AND *CANCER IRRORATUS* ALONG NEWPORT NECK
Accurate demographic information is required to build predictive models of future population growth, species responses to environmental change, and establish robust management plans for commercial fisheries. We ascertained age and sex distributions for American lobster (Homarus americanus), spider crab (Libinia emarginata) and rock crab (Cancer irroratus) and green crab (C. meanas) at fifty-two subtidal sites. Crabs were captured in shallow (< 10 m) ventless lobster traps baited with mackerel and checked twice per week May-September, 2011-2014. Animals were captured, sexed, lengths of the carapace measured to approximate age then released. Sex ratios were highly skewed towards males for three of the species, lobster (1 females: 3.69 males), spider crab (1: 3.31), rock crab (1: 6.21), but not green crab (1: 0.97). Sex ratios were consistent across all sites, even though abundance was highly

variable. While lobsters and rock and spider crabs have male biased sexual size dimorphism, we used size as an estimation of relative age. Larger individuals of both sexes for all species tended to be found more often in sites with greater wave exposure, whereas smaller, i.e., younger, individuals of all species tended to be found in protective coves. Coves along Newport Neck could serve as a nursery for these crustaceans. The skewed sex distribution could be due to several factors: biased sex ratio at birth, higher female mortality, and/or higher mobility and lower trap shyness of males.

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OBSERVATIONS AND VARIATIONS OF GREEN CRAB PREDATION (*CARCINUS MAENAS*) ON JUVENILE SOFT SHELL CLAMS (*MYA ARENARIA*)
Every year, the soft-shell clam (*Mya arenaria*) industry in Maine produces a net income of 5-10 million dollars. Yet, throughout the field nursery and grow-out stages of production, shellfish farmers suffer a significant loss of their crop due to disease and a variety of predators. Speculative evidence is holding green crabs accountable for the decline in adult clam densities due to the observations of high green crab densities in clam flats that prey on juvenile clams. It is alleged that green crabs could affect densities of keystone species such as clams in mudflats, but there are few quantitative studies to address these allegations. This experiment was designed to quantitatively observe the green crab (*Carcinus maenas*) impacts on soft shell clams (*Mya arenaria*) in situ utilizing multiple mudflat plots with several different treatments including seeded with net, seeded without net, no seeding with net, and no seeding without net. Weekly surveys included monitoring clam densities and size for residents, planted survivors and naturally recruited as well as the presence and size of green crabs. Thus far, data shows a drastic decrease of the planted clam populations and an increased inhabitance of newly settled green crabs. As to whether or not these mortalities are attributed to green crab predation, or simply other environmental variables, these results have yet to be determined.

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USING WATER LEVEL LOGGERS AND NUTRIENT POREWATER CONCENTRATIONS TO LINK CONTRIBUTION OF MARSH TO ESTUARINE WATER
We examined the role of marsh porewater in exporting organic matter (DOC) and nitrogen (DIN) to the greater estuarine system in Plum Island Estuary (PIE), Rowley, MA. Beginning in 2005, we measured water level heights and porewater chemistry at two sites along the Parker River, from late March to early December. One site is predominantly a freshwater marsh dominated by the cattail Typha angustifolia while the other is a mesohaline site dominated by cordgrasses Spartina sp. Porewater flow is influenced by tidal height, precipitation and the specific yield of the sediment. Tidal heights vary throughout the season due to astronomical forcing as well a short term events caused by strong winds and storm events. Our data show the importance of water flow along the creek edge where the majority of the porewater movement occurs. We found that porewater nutrients were affected by both salinity and vegetation type. Salinity varies seasonally due to precipitation, river discharge and tidal movements. Overall the Spartina dominated (higher salinity) site had a lower specific yield but exported more DIN to the system while the Typha site (lower salinity) had a higher specific yield and exported more DOC. We will discuss how these exports compare to inputs from rivers and how they change with spring versus neap tides.

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A UNIALGAL CULTURING METHOD FOR ULVA SPP. FOR USE IN MESOCOSM EXPERIMENTS

Ulva spp. are opportunistic macroalgae abundant in eutrophic shallow lagoons in the Eastern U.S. and world-wide temperate zones. Ulva blooms in estuaries are a chronic symptom of nitrogen pollution from urban and rural watersheds. Mesocosms provide an opportunity to study the impacts of Ulva spp. while controlling potential confounding variables (i.e., diatoms, flow variability, light, etc.) that are present in the natural environment. In addition, Ulva is difficult to identify at the species level, and mixed assemblages introduce variability into controlled experiments. Thus, we suggest using single Ulva species in experiments and mesocosm work to minimize variability of results. We have established culturing protocols for Ulva compressa (Lamb preliminary data). Measured growth rates and nutrient uptake rates of our cultured Ulva are similar to published values for field specimens. While we were unable to replicate the complete life cycle of Ulva in the laboratory, we maintained generations through continuous propagation from diploid/asexual adults. Viable freezing techniques can allow generations to be maintained continuously for a period of years. This method has suitable applications to answer a variety of research questions with mesocosms designed for phycological, ecological, and environmental studies. Future work aims to use cultured Ulva to quantify effects on nitrogen fluxes in Jamaica Bay, New York.

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EXTENT AND SEVERITY OF LATE SUMMERTIME HYPOXIA IN CONNECTICUT AND NEW YORK EMBAYMENTS OF LONG ISLAND SOUND

Long Island Sound is noted as America's most urbanized estuary, but what does this mean to the life inhabiting these waters and we humans who depend upon the Sound for livelihood and recreation? Long Island Sound includes over seventy small harbors and bays which serve as the entry point to people visiting the Sound. While much is known about the status of the deeper portions of the Sound, very little is known about these small shallow embayments. The shallow areas host a great diversity of habitats which in turn serve as nursery and feeding grounds for many commercially and recreationally important species. A rapid assessment approach was used to determine the extent and degree of hypoxia experienced in eight embayments during late summer of 2011 and 2012. Habitat characteristics were assessed and compared to the nitrogen load and trophic status of these embayments. Work continued in 2013 and 2014 with the rapid assessment approach used in 10 embayments in coordination with the one month deployment of oxygen sensors. Results indicate that embayments exhibit hypoxia in the innermost portions of the embayment, even in eastern areas where Long Island Sound does not exhibit hypoxia. Deployed oxygen sensors revealed low oxygen in all systems sampled, with some systems exhibiting a diel swing from anoxia to saturation.

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IMPACTS ON EELGRASS (*ZOSTERA MARINA*) GROWTH

Eel grass beds, such as Zostera marina, are an important part of the coastal environment because they provide an important habitat to house large, diverse population of aquatic organisms than areas that lack vegetation. A study was conducted last year on the effects of invasive tunicates in an eel grass bed at Juniper Beach in Salem, MA. Tunicates are known to have an unfavorable effect on eel grass growth. The data collected showed that eel grass at shallower depths had a higher growth rate and density than that of greater depths. Tunicates had a negative impact on growth based off of density measurements and observation, but no actual growth rate was taken during the summer which generated more questions. A follow up study performed this summer has revealed less tunicate presence beginning later than last year-and so far having little impact on the eel grass. However it was observed that large mats of drift algae (mainly kelp) were negatively impacting the health of the eel grass by lying over the blades and smothering portions of the bed. Studying the impacts of the drift algae and fouling by tunicates will continue into the fall and reported. Other eel grass beds will be surveyed to determine if the impacts from drift algae and tunicate fouling have similar impacts to eel grass growth and survival.

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USING LESSONS FROM SUPERSTORM SANDY IN NEW JERSEY TO HELP SOUTHERN MAINE COMMUNITIES PLAN FOR COASTAL STORMS
In Maine, residents' opinions differ on whether a major coastal storm similar to Superstorm Sandy could occur along the coast and what actions, if any, must be made in preparation for such an event. Two projects with similar goals address the need for coastal hazard decision support, combined with the actual experience of responding to and recovering from a major storm event. The first, a NOAA Science Collaborative-funded project between the Wells National Estuarine Research Reserve (NERR) and the Jacques Cousteau NERR titled "The Sandy Dialogues" brought stakeholders from two Maine towns with chronic beach erosion issues (Drake's Island, Camp Ellis) to Tuckerton, NJ to exchange experiences and lessons learned with NJ municipal officials and community members impacted by the storm. In September, these NJ stakeholders traveled to ME to share their experiences and helped co-lead community meetings in Drake's Island and Camp Ellis with their ME counterparts who visited NJ in June. An additional ME/NJ municipal officials meeting was also held that focused on preparedness measures for southern ME communities. The second event, "Building a Resilient Coast" is a one-day tour hosted by Maine Sea Grant that directly followed and built on the "Sandy Dialogues" events by targeting southern ME coastal property owners, appointed and elected officials, planners, and others interested in individual actions that can be made to properties to increase coastal resilience. Participants visited sites where landowners worked with or mimicked natural systems to protect coastal properties, shorelines and neighboring assets. Adaptation now will save lives and money in the long-term.

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FROM *SPARTINA* MEADOW TO *PHRAGMITES* JUNGLE: A BIOLOGICAL INVASION MAY CHANGE COASTAL MARSH CARBON CYCLING
Exotic plant invasions may significantly alter structure and function of coastal marsh ecosystems, as they affect edaphic parameters, hydrology, and plant communities. In salt marshes of northeastern North America, an invasive reed, Phragmites australis, frequently encroaches from marshes' landward edge into the high marsh. Given major physiological and ecological differences between tall Phragmites and shorter-statured native species, this vegetation community shift is likely to greatly change both ecological and biogeochemical aspects of these ecosystems. One potential effect of Phragmites invasion is a shift in carbon cycling, as methane (CH4) and carbon dioxide (CO2) fluxes in marshes may be quite high in the fresh, nutrient-rich soils where Phragmites thrives. To characterize net greenhouse gas (GHG) emissions from Phragmites and adjacent native high and low marsh zones, we measured CO2 and CH4 fluxes in four southern New England coastal marshes along a salinity gradient during the 2013 and 2014 field seasons. GHG flux measurements were performed using cavity ring-down spectrometers (CRDS) connected to customized, transparent static flux chambers. Rates of CH4 emission were typically orders of magnitude higher in Phragmites zones than in the native marsh, and ranged from 75 to over 10,000 μmol CH4 m-2 h-1. Phragmites zones also displayed CO2 uptake rates several times greater than those of the native high marsh species, and so were estimated to be larger net sinks of GHGs than native marsh zones. These results raise complex considerations for coastal sustainability, suggesting that Phragmites invasion may strengthen GHG sinks in salt marshes under current conditions.

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UPDATE ON A CONTINUING SAGA: EELGRASS AND GREEN CRABS IN CASCO BAY, MAINE
In 2012-2013 there were dramatic losses of eelgrass (*Zostera marina*) from Casco Bay, ME: mapping from 2013 aerial photographs revealed a 56% loss of coverage since 2002, largely from the upper bay. Eelgrass loss coincided with a population explosion of invasive European green crabs (*Carcinus maenas*), and bioturbation by green crabs was identified subsequently as the primary cause. Because of the importance of this habitat to the region's ecology and economy, a broad partnership formed in 2014 to investigate whether eelgrass loss is continuing and factors that may exacerbate or mitigate green-crab damage. We targeted five study sites along a gradient from the transition between former and current eelgrass cover in the upper bay to areas of persistent eelgrass in the lower bay. At each site we are (1) mapping eelgrass from low-altitude aerial photographs to quantify large-scale changes in coverage since 2013, and (2) measuring eelgrass population characteristics seasonally along fixed transects to quantify small-scale changes. Where eelgrass is growing in a range of sediment types, we established eelgrass transects in fine and coarse sediments. We are monitoring green crab abundance near each eelgrass transect as biweekly catch-per-unit-effort. In addition, we are measuring other eelgrass stressors to assess their influence on eelgrass response to green crab disturbance: water-column light attenuation (biweekly), sediment organic content, presence of eelgrass wasting disease, and accumulation of epiphytic algae and/or tunicates on leaves. Information on trends in eelgrass abundance and the factors contributing to eelgrass resilience will help guide protection and restoration of eelgrass habitats.

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MARINE SPECIES-SPECIFIC HABITAT MODELS USED TO PREDICT FUTURE DISTRIBUTIONS WITH SEA LEVEL RISE ALONG NEWPORT NECK
This study was undertaken to determine how sea level rise will affect the abundance and distribution of near shore invertebrate and fish populations. We tested the hypothesis that these marine species will be nonrandomly distributed along Newport Neck based on species-specific substrate preferences. In order to determine the current abundance and distribution of species in the subtidal zone of Newport Neck, ventless lobster traps were set at 45 sites from May-September 2011-2014. To determine substrate choice for lobsters (Homarus americanus), common spider crabs (Libinia emarginata), rock crabs (Cancer irroratus), and green crabs (C. meanas), we estimated the percent cover of bedrock, manmade features, large and small boulders, cobble, gravel, sand, and mud on the ocean floor at each trap site. Additionally, in order to predict which areas will be habitable for these species when sea level rises an estimated one to two meters, we also performed surveys in the current intertidal zone. Akiakie's Information Criterion (AICc) was employed to determine the substrate-habitat relationships of lobsters, spider crabs, green crabs, and rock crabs in the nearshore subtidal environment. Lobsters were most positively associated with large boulders; spider crabs with mud and cobble; green crabs with sand, mud, and bedrock; and rock crabs with bedrock, sand, and manmade substrate. The substrate coverage of the current intertidal zone is largely gravel, cobble and small boulders compared to the current subtidal zone substrate which is largely sand and large boulders. The predicted change in substrate availability for the key macroinvertebrate species of Newport Neck is likely to impact future distribution and abundance.

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VARIATION IN THERMAL SENSITIVITY OF SWIMMING PERFORMANCE IN THREE SPECIES OF MYSID SHRIMP
Anthropogenic climate change is warming the world's oceans at an unprecedented rate. In order to survive, marine species will need to move or adapt. Mysid shrimp represent an important link in coastal food webs, and are also a good model organism for investigating evolutionary adaptation and evolutionary potential under climate change. Here we have gathered baseline data on thermal tolerance and thermal sensitivity of swimming performance for two species of mysid shrimp from Narragansett Bay (*Neomysis americana* and *Heteromysis formosa*) and one species from the Gulf of Mexico (*Americamysis bahia*). Critical thermal minima (CT_{min}) and critical thermal maxima (CT_{max}) were determined for each species. Significant differences were found at both CT_{min} and CT_{max} between all three species. Swimming performance was obtained by recording burst swimming speed across a range of temperatures falling within CT_{min} and CT_{max}. Average burst speeds for each species across different temperatures created performance curves that were fit with quadratic models. These models indicate the temperature of peak swimming performance. Although ecologically similar, these species differ behaviorally, which may explain differences in performance at certain temperatures. Swimming performance is a key indicator of fitness and we expect that under future climatic conditions the performance curves and temperature at peak performance will shift towards warmer temperatures.

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EFFECT OF SEA LEVEL RISE ON THE COMMUNITIES AND ECOSYSTEMS IN LONG ISLAND SOUND
The changes in mean sea level anticipated in the coming century will have a range of effects on coastal ecosystems and communities. Among them will be substantial modifications of the expected return interval of storm surges. Using archived sea level records and simple theories we explain the spatial variation along the Sound of the return interval for anomalies resulting from extra-tropical (nor'easters) and tropical (hurricanes) cyclones. We also demonstrate that sea level rise will have a greater impact on the return periods of large surges in the eastern end of the Sound. This will affect the cost of ownership of coastal property, the growth rate of salt marshes and the salinity of coastal waters.

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SPATIAL-TEMPORAL VARIABILITY OF THE COPEPOD COMMUNITY IN LONG ISLAND SOUND
We characterized the spatial and seasonal copepod abundance in Long Island Sound. Zooplankton samples have been collected monthly at six stations along the central axis of Long Island Sound since 2002 by the water quality-monitoring program of the Connecticut Department of Energy and Environmental Conservation. Physical and biological parameters were measured along with zooplankton. Overall, the mean mesozooplankton biomass and copepod abundance indicated a major peak during the spring, and a pattern of decrease from west to east. In contrast, species richness and diversity of copepod were the highest at the extreme eastern end of the Sound. The dominant species were Acartia hudsonica, Acartia tonsa, and Temora longicornis in both abundance and biomass. Statistics clearly showed winter-spring and summer-fall assemblages in the copepod community. For the winter-spring assemblage, A. hudsonica was the most abundant species, but T. longicornis dominated the biomass. A. tonsa and Parvocalanus crassirostris were the dominant in the summer-fall species; however, it is now present in the western and central Sound for most of the year, signaling a major change in phenology for this species. Sex ratio of A. tonsa was strongly female-biased, with relatively high abundance of copepodites during winter and spring. We found that the other species, Centropages spp., Pseudocalanus sp. and Tortanus sp.,

Oithona spp., Labidocera aestiva, Parvocalanus crassirostris, and Pseudodiaptomus sp. also had their own spatial and temporal trends suggesting that regional differences in salinity, temperature, and prey concentration are driving factors in the distribution of the copepod community.

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ECOLOGICAL IMPORTANCE OF SEAGRASS WRACKS IN FLORIDA BAY
We conducted a study to determine the contribution of uprooted, floating seagrass mats to the nutrient subsidies of Florida Bay. Over-flight spectral analyses and GPS drifter tracking were used to estimate the residence time of floating mats in the bay. Nutrient shedding from seagrass mats was estimated from a series of dark, aerated incubations of mats and from time-dependent weight analysis of decomposing mats. Two types of uprooted seagrass, *Thalassia testudinum* and *Syringodium filiforme*, as well as one macroalgae, *Sargassum* sp., were collected, incubated for 14 days, subsampled regularly for analyses of suspended particulate and dissolved organic C (DOC) and N (DON), and for dissolved inorganic N (DIN). The production of mat litter was assessed by regular collections and mass determinations of fallen debris in mat incubations conducted over 11 days. GPS drifters were tracked exiting Florida Bay into the Atlantic Ocean. Results indicate rapid increases in DOC and DON, on the order of 10-fold and 1.3-fold over the 14 day incubation. *S. filiforme* wrack deposited detritus at a rate of 77 +/- 11 mg d^{-1} for every gram (wet weight) of the floating wrack. The naturally occurring mixed wrack deposited detritus at a rate of 56 +/- 3 mg d^{-1} for every gram (wet weight) of the floating wrack. *T. testudinum* wrack deposited detritus at a rate of 64 +/- 5 mg d^{-1} for every gram (wet weight) of the floating wrack. In combination with residence times of mats in the bay, these data will provide constraints on the nutrient subsidies of uprooted mats to Florida Bay. Similar approaches may be used to assess the contribution of floating mats in the Northeast.

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MEASURING ESTUARINE ECOSYSTEM METABOLISM USING OXYGEN CONCENTRATIONS AND STABLE ISOTOPES Estuaries can serve as either sources or sinks of atmospheric carbon regulated by the balance between photosynthesis and respiration. This net metabolism of estuarine ecosystems is tightly linked to dissolved oxygen dynamics. Here we use spatial and temporal changes in O2 concentration and its isotopic composition (δ18O2) to better understand the patterns of photosynthesis and respiration. The coupled relationship of oxygen concentration and δ18O2 can specifically be used to: 1) estimate net system metabolism; 2) calculate how respiration responds directly to changes in biological productivity; and 3) partition the total system respiration into contributions from the water column and sediments. We applied this approach to the New River Estuary, NC. This system is fed by a carbon-rich blackwater river and exhibits large and variable amounts of biological productivity. Estuary-scale O2 and δ18O2 measurements were made at a range of timescales, from diel to seasonal. Measurements to date indicate that the estuary was autotrophic with the metabolism spatially coupled to the salinity gradient, although there appeared to be a hotspot of primary production mid-estuary. The δ18O2 data indicates that in the lower estuary approximately 90% of the respiration took place in the water column, and in the upper estuary roughly 50% of the respiration occurred in the sediments. We can conclude from these preliminary results that the New River estuary appears to be a net carbon sink with the bulk of the primary production occurring in the mid- to upper reaches of the estuary.

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BARN ISLAND SEA LEVEL FENS
In July 2008 the perimeter vegetation known as the *Juncus gerardii* belt at the Brucker Marsh (on glacial sands) was discovered in an advanced stage of peat decomposition (aka “eroded edge of Miller & Egler”). In 2014, *Juncus* has migrated uphill into the *Panicum* belt. The lower several centimeters of the eroding *Juncus* peat contained the preserved rhizomes of *Panicum*, attesting to the transitory nature of the *Juncus*

belt and providing concrete evidence of marine transgression. Four eroded edge events have been observed since 1947 and the cycle repeats on a ~20 year basis. Groundwater discharge accounts for the mesohaline soil salinity of the *Juncus* belt. The *Panicum* belt is a newly recognized phase of the rare *Cladium* dominated sea level fen. The fens occupy a groundwater discharge zone at the base of hills and are underlain by a freshwater peat. The *Cladium* fen occurs as far north as Massachusetts and possibly New Hampshire. A *Cladium* dominated fen at eastern Barn Island described in 1993 has succumbed to sea level rise. The *Panicum* fens are declining at Barn Island as former farm pastures and fields revert to forests. The forested wetland of the upland edge of the tidal wetland dominated by the tree *Nyssa sylvatica* is likely the dominant pre-colonial seepage community.

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RADIUM ISOTOPES AS A METHOD TO MEASURE POREWATER RESIDENCE TIME ON THREE MARSHES IN LONG ISLAND, NEW YORK
A study of porewater residence time (PRT) as traced by short-lived radium (Ra) isotopes (224Ra and 223Ra) was conducted on three tidal marshes in the south shore of Long Island, NY. Samples were collected in July (summer) and November-December (early winter) of 2013 at depths of 20 cm and 120 cm over a three-station transect from the inner marsh to the marsh bank adjacent to a tidal channel. The marshes are located on U.S. Fish and Wildlife Service refuges: a restored marsh, Wertheim 1 and two non-restored marshes; Wertheim 2 and Seatuck. Wertheim 1 shows average PRT of ~7 days at 20 cm and ~4 days at 120 cm for summer, and ~4.5 days at 20 cm and ~6 days at 120 cm for early winter. Wertheim 2 shows ~8 days at 20 cm and ~5 days at 120 cm for summer, and ~3 day at 20 cm and ~2.5 days at 120 cm for winter. Seatuck shows ~3 days for summer at both depths, and ~17 days at 20 cm and ~10 days at 120 cm for winter. The observations suggest summer samples at Wertheim 2 with longer PRTs towards the marsh bank and less significant changes on summer at the inner marsh, possibly due to drainage effect by the tidal channel. Wertheim 1 shows higher PRTs by the mid-marsh and no significant differences at the marsh bank between summer and winter samples. Seatuck did not show significant differences between depths or sampling stations for both sampling events, however winter samples show longer PRTs. These observations suggest different porewater hydrological dynamics for the restored area than the non-restored marshes, possible due to different sources of terrestrial groundwater even within the Wertheim area. The method used to date porewater could have potential to study and compare marshes even at close geographical proximity.

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EELGRASS SCIENCE, MANAGEMENT, AND POLITICS: A BI-COASTAL PERSPECTIVE
Eelgrass science is pretty advanced: we know the major factors controlling plant physiology, the stressors that impact and damage the plants and the habitat, and we have the monitoring tools to diagnose status and health. Yes, we can always learn more - but do we need to? We could discover fascinating things about the roles of genetics and climate change, and the contribution of seagrass blue carbon to saving the planet. But for management purposes, we now know enough about seagrass: what makes it go away and what makes it come back. However, too often the science is disputed or dismissed. It happens all the time and delays positive management action, as I have seen in both Great Bay, NH and Puget Sound, WA. Management is caught in the middle; it needs to become more effective, but is often pressured to “do more studies,” impeding and delaying solutions. Agencies talk a lot and don’t like to take heat, an exception being EPA Region 1, which has started to move the needle of recovery in Great Bay (GB lost 50% of its seagrass in the last 20 years). In many cases, politics disregards both science and management, as in the WA decision to spray herbicide on seagrass flats! Seagrass ecosystems are among the most rapidly disappearing in the world – faster than coral reef systems, faster than rain forest. So – what to do? Can increased public awareness be developed in time to “save the bay”?

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NITRATE UPTAKE RATE OF AN OPPORTUNISTIC MACROALGAE, ULVA COMPRESSA PEAKS AT AN ENRICHED MEDIA CONCENTRATION
Ulva species are an opportunistic macroalgae that thrive in eutrophic shallow estuaries and are an indicator of nitrogen enrichment. Ulva was collected from Jamaica Bay and cultured from spring through fall of 2013 at Brooklyn College to develop unialgal culturing methods for mesocosm experiments. Von Stosch Enrichment Media (VSE) was chosen to culture Ulva spp. containing sodium nitrate, ferrous sulfate, and vitamins based on previous literature (Guiry and Cunningham 1984). Ulva compressa gametophyte fronds were cut into 1.2 cm diameter disks and placed into VSE, 1:8 VSE, and 1:16 VSE. We observed that disks in VSE enrichment media grew slower and looked less healthy than those grown in 1:8 VSE. Nitrogen uptake rates were monitored by media nitrate depletion every 3 hours over a 16 hour period in the 3 VSE concentrations. Nitrate was analyzed colormetrically by cadmium coil nitrate reduction using a Seal AQ2 discrete nutrient analyzer. Our results show that nitrogen uptake rate of Ulva is lower in concentrated VSE media than in 1:8 and 1:16 dilutions. Currently Ulva spp. is induced in the laboratory using sporophyte gametes in 1:8 diluted VSE and maintained in 250 mL volumetric flasks.

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DIADROMOUS FISH ASSEMBLAGE ASSESSMENT AND FOOD WEB CHARACTERIZATION IN THE SACO RIVER ESTUARY, ME
Significant population declines of diadromous fishes have impaired the productivity and trophic efficiency of shallow water estuarine ecosystems. Physical and biological factors influence the frequency and overall use of estuaries by diadromous fish, however little is known of these assemblages within small coastal rivers in the Gulf of Maine such as the Saco River estuary (SRE). From 2012 to 2014, weekly gillnet surveys were conducted at three sites from June-September to record fish species diversity and abundance in relation to environmental conditions (bottom temperature, salinity and dissolved oxygen). A static food web model will be created to estimate energy cycling, production, as well as ecosystem maturity and complexity. Standard outputs created from this modeling approach will be compared to similar systems where diadromous fish are known to maintain vital ecological processes and functions. From this model, multiple scenarios will be performed to investigate the role of diadromous fish as predators and prey within this estuary. Investigating trophic dynamics in coastal watersheds can provide managers a holistic understanding of complicated multispecies interactions on economically valuable and threatened species.

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MANAGING GREAT BAY – IT’S NOT JUST ABOUT NITROGEN
The age-worn tenet that good science leads to good policy, effective management and inspired public engagement is being tested. “Wicked” management problems caused by diffuse and pervasive decline of landscape structure and function reverberate through ecosystems and socio-economic institutions alike and are our biggest challenge. Solutions are costly and elusive and, thus, divisive as has been the case with nitrogen control in many of our nation’s estuaries. Research has greatly increased our understanding of nitrogen and its impacts on aquatic ecosystems – why does management continue to lag? While we debate the adequacy of science, and focus on single-pollutant solutions, our natural debt grows and restorative capacity diminishes with consequences for society and the economy. This presentation will review these challenges and offer possible solutions for revitalizing the good science to good outcomes paradigm. I will draw from experiences on Long Island Sound overviewed at the NEERS Spring 2014

Meeting and how they might be applied to other estuaries. Ecosystem-based approaches that preserve and restore ecosystem integrity have the highest potential for collectively meeting our most pressing environmental challenges. Integrated ecosystem management, now being tested in the Great Bay, NH, watershed, is expected to build resiliency against climate change, eutrophication and habitat destruction. This benefits both natural and human spheres with a common, comprehensive and integrated approach that acknowledges some of the limitations of scientific understanding and management skill that have stalled restoration progress.

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TOOLS AND SCIENCE FOR RESILIENT COASTAL INFRASTRUCTURE AND ECOSYSTEM FUNCTIONING

The NOAA National Ocean Service (NOS) provides science-based solutions to support coastal communities, promote a robust coastal economy, and protect coastal and marine ecosystems. NOS uses the following priorities to guide its programs: Coastal Resilience; Coastal Intelligence; and Place-based Conservation. These ideas are interwoven and all require a sound scientific foundation. This presentation will provide some examples of how NOS interprets these concepts and works to promote them. It will also provide some thoughts about the data and science needed to foster coastal resiliency. Much of the focus of the NOS resiliency effort is on the vulnerability of critical coastal infrastructure (roads, bridges, buildings) to hazards such as sea level rise and storm surge. Certainly recent experiences such as Superstorm Sandy have provided impetus for NOS to deliver better assessments and planning tools to enhance a community's ability to rebound from such events. The Digital Coast was developed by the Coastal Services Center/Office of Ocean and Coastal Resource Management to provide essential data sets, as well as tools and training coastal managers need to turn these data into useful information. Resilience tools and training will be profiled in the presentation. Another aspect of resiliency is ecosystem resilience in the face of multiple stresses. The National Centers for Coastal Ocean Science (NCCOS) and other NOS programs support investigations into the coastal ecosystem effects of climate change in concert with other stresses. Examples from the Chesapeake Bay, the North Carolina coast, and the northern Gulf of Mexico will illustrate how NOS science is being applied to support coastal ecosystem resiliency.

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CHALLENGES TO BOLD NEW IDEAS OF RIVER BASIN MANAGEMENT: COMPLEX INTERACTIONS OF LAND USE AND CLIMATE CHANGES TO RESTORING THE DELTAIC COAST OF LOUISIANA

Hurricane Katrina brought international attention to the major environmental changes in the nearly 1.3 million square mile watershed of the Mississippi River over the past century, including conversion of more than 80 percent of forested wetlands to agriculture and urban areas, channelization, and construction of dams and levees. Wetland loss rates over the next 20 years in coastal Louisiana, due to the combination of sea-level rise, freshwater delivery from upland watersheds, and disruption of coastal processes, will continue to convert land to open water, threatening the region's enormously valuable fisheries, aquaculture, and coastal agriculture, as well as navigation and other industries located near the coast. The challenge to develop bold new ideas of river management to reintroduce sediment to the coast are further complicated by how the chemistry of the river has changed over the last four decades. The Louisiana coastal region is at the receiving end of a large input of nitrate from upstream agricultural activities, increasing coastal eutrophication and the development of a large hypoxia zones in the region. The challenges of storm surge protection, wetland restoration, and eutrophication, all linked to bold new approaches to river basin management, has all been highlighted by the post-Katrina challenges for a sustainable coast. Managing all these competing tradeoffs to sustain the economic and natural resources of this region are representative of how we must consider new approaches, particularly with projections of climate change, to coastal catchments throughout the world.

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THE INFLUENCE OF SALT MARSH FUCOID ALGAE (ECADS) ON SEDIMENT DYNAMICS OF NORTHWEST ATLANTIC MARSHES
Resilience is currently a key theme within salt marsh ecological studies. Understanding the factors that affect salt marsh accretion and elevation gains are of paramount importance if management of these ecosystems is to be successful under increasing synergistic stresses of storm surge, inundation period, and eutrophication. We present the results of salt marsh fucoid algae (ecads) removal experiments on *Spartina alterniflora* abundance, production and decomposition and the sedimentary dynamics of two marshes on Cape Cod, Massachusetts. The presence of the thick layer of marsh fucoids had a significant and positive influence on sediment deposition, accretion, concentration of water column particulates, while it inhibited water flow. Decomposition rates of *S. alterniflora* in the field were significantly higher under the fucoid macroalgae layer, and, in lab experiments, *S. alterniflora* seedlings added more leaves when the marsh fucoids were present. In contrast, fucoids caused a significant decrease in *S. alterniflora* seedlings' survival in the field. We found that marsh fucoids are stable despite not being attached to any substrate, and field surveys revealed a relatively widespread, but not ubiquitous, distribution along outer Cape Cod. Salt marsh fucoid algae directly and substantially contribute to salt marsh sediment elevation gain, yet their potential inhibitory effects on colonizing *S. alterniflora* may counteract some of their overall contributions to salt marsh persistence and resilience.

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SALT MARSHES AND SEA LEVELS IN LONG ISLAND SOUND
The long-term 1939-2013 rate of RSLR (Relative Sea-Level Rise) at the New London tide gauge is ~2.6 mm yr^{-1}, near the maximum rate of salt marsh accretion reported in eastern LIS salt marshes. Since the late 1980s, however, RSLR has accelerated. Inter-annual variability can be high, but the last three decades have averaged 4.5 mm yr^{-1}, more than double the first 40 years of the New London record. This increase in RSLR is consistent with recent literature and the current rate is ~ 1.5x the highest recorded rate of New England high marsh accretion. A decade of SET measurements at the Barn Island system on Little Narragansett Bay and an accretion pin array at the Mamacoke Marsh on the Thames River confirm earlier work on accretion rates and demonstrate that marsh surface elevations on these systems are not keeping up with RSLR. Marsh hydroperiods are increasing, arguably driving the observed plant community dynamics on these and other area salt marshes that are consistent with greater tidal flooding. These vegetation changes are particularly dramatic on marshes that started with lower "elevation capital". Marshes in the low tide range eastern Sound are more susceptible to accelerating RSLR than those in the high tide range western Sound. Locations with appropriate topography and no anthropogenic barriers demonstrate another aspect of RSLR: replacement of upland vegetation with upper border, brackish and salt marsh plant species.

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MEASURING DISSOLVED INORGANIC CARBON TRANSPORT IN THE PLUM ISLAND ESTUARY
The Plum Island Estuary, located along Massachusetts' north shore, contains a large area of salt marshes. An ongoing study is being conducted in these marshes in an effort to determine the amount of carbon that these marshes can store. Eddy flux measurements of atmospheric carbon dioxide suggest that currently

the marsh is a large net sink of carbon. As part of this study, water samples were taken throughout tidal stages from one of the creeks located in the marsh. These samples were analyzed to find dissolved inorganic carbon (DIC) concentration, pH, and conductivity levels to determine aquatic carbon gains or losses. Sampling took place during June-July 2014, when photosynthesis rates were at their peak. It was found that approximately one gram of carbon per m2 of catchment area is exported per outgoing tide during the summer months, which represents a substantial fraction of the carbon accumulated from the atmosphere. The carbon balance calculated from atmospheric and aquatic fluxes will be compared to long-term carbon accumulation rates measured in dated soil cores.

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GOOD CRAB, BAD CRAB
Are crabs friends or foes of marsh grass, benefit or detriment to the salt marsh system? We examined Uca pugilator (sand fiddler) and Sesarma reticulatum (purple marsh crab) with Spartina patens (salt marsh hay) at two elevations (10 cm below MHW and 10 cm above MHW) in mesocosms in a greenhouse. The mesocosms were prepared with a marsh soil matrix and received a semidiurnal tidal cycle with Narragansett Bay water. While the purple marsh crab had significant negative effects on the salt marsh hay productivity at both elevations, the sand fiddler had positive effects on the plants at the high elevation, and apparently kept macroalgae blooms in check at the low elevations. Our results support published reports of the purple marsh crab as one potential cause of marsh dieback at sites where there are large populations of this crab species. The response of the marsh system to sand fiddlers was positive, which may bode well for some northern New England marsh systems where there are recent reports of fiddler crab movement into marsh areas previously devoid of these crabs. Future work will examine the nitrogen cycling in the plant/crab mesocosms, and the effect of the crabs on radiatively active gas emissions. With impacts of climate change (e.g., accelerated sea level rise; warming water temperatures) reported in many New England salt marshes, it is important to better understand plant-animal interactions and effects crabs have on the marsh system.

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MELAMPUS BIDENTATUS AS A MODEL FOR THE EFFECTS OF CLIMATE CHANGE ON SALT MARSH ANIMAL COMMUNITIES
Climate change and its associated effects such as sea-level rise and increased temperature are critical concerns for salt marsh ecosystems. We have just begun to understand the effects of climate change on salt marsh plant communities, but no work has focused on the effects on marsh animals. The coffee-bean snail, Melampus bidentatus, is a numerically dominant high-marsh invertebrate. Given that it is a pulmonate (‘air-breathing’) gastropod and susceptible to desiccation effects, it may be a useful animal model for understanding potential effects of sea-level rise, which will increase inundation and temperature of animal communities. One prediction of sea-level rise is a shift in marsh vegetation patterns, which could create a change in Melampus distribution. To establish their distribution across the marsh, we sampled 8 marshes to determine density and size-class patterns of Melampus across three habitats: creek-side Spartina alterniflora, Sparina patens, and short-form Spartina alterniflora. We found that Melampus was absent from creek-side S. alterniflora habitats, suggesting potential inundation stress. Melampus from short-form S. alterniflora were significantly larger than those in S. patens habitats. To elucidate the patterns driving these patterns and to assess the potential impact of climate change, we conducted a series of experimental field and lab manipulations. Our results suggest snails will physiologically be able to survive increased inundation; however, they will be exposed to increased predation. Melampus appears to be more susceptible to increased temperatures and shifts in vegetation patterns as high-stem-density S. patens is replaced by S. alternilfora.

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LINKING PATTERNS IN EUROPEAN GREEN CRAB ABUNDANCE IN THREE SOUTHERN MAINE SALT MARSHES TO OBSERVED CHANGES IN MARSH MORPHOLOGY
Recent studies indicate that intertidal crabs contribute to substantial changes in marsh morphology, including plant dieback, erosion, and marsh loss through foraging and burrowing activities. The European green crab (*Carcinus maenas*) is a highly successful invader established in southern Maine since the 1890s. Currently, Maine's coast is undergoing an explosive population growth of these crabs, similar to an outbreak in the mid 1950's. In the mid-coast region, green crabs are implicated in the widespread destruction of softshell clam flats, eelgrass beds, and salt marshes. This study quantifies green crab abundances at salt marshes in Damariscotta, Yarmouth, and Wells using two methods that sample different marsh habitats: fyke nets (marsh surface, fished for one full tidal cycle) and baited, modified eel traps (subtidal creeks, round traps, approximately 90 cm long with 1 cm mesh, 24-hour set). Concurrent sampling of these methods in late June and early August revealed much greater green crab activity in the tidal channel compared to the marsh surface and/or greater trap efficiency. Crab densities ranged from 0-0.5 crabs/m^2 with greater densities observed during the day for most sites and the lowest densities at Yarmouth. Trapping data from June, July, and August agree with the fyke net data and reveal that Yarmouth had many fewer crabs captured (0.2-3.0 crabs/hour) compared to Damariscotta (24.4-30.0 crabs/hour) or Wells (26.3-46.3 crabs/hour). The greatest sampling event to-date was Wells in early August, where 1,110 crabs were captured. Future work will combine these data with ecophysical data including stake erosion arrays, sediment elevation tables, and geologic cores.