NEERS FALL 2012 MEETING

October 11 – 13, 2012
Spring House Hotel, Block Island, Rhode Island

Hosted By
The Graduate School of Oceanography, University Of Rhode Island

Local organizers:
Veronica Berounsky, Walter Berry, Charley Roman, MJ James-Pirri, and Autumn Oczkowski

Gold Supporters
The Nature Conservancy, Woods Hole Sea Grant

Silver Supporter
Woods Hole Group

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Sea Grant
Woods Hole

MEETING SCHEDULE

All oral presentations are in Victoria's Parlor, all posters and exhibits are in the Sunroom Wing, and all meals are in the Dining Room of the Spring House Hotel

Thursday, October 11th

6:00 am	Be at ferry dock in Pt. Judith for 6:30 Block Island ferry OR
10:30 am	Be at ferry dock in Pt. Judith for 11:00 Block Island ferry
11:00 am – 12:00 pm	Meeting registration (on 11:00 Block Island Ferry)
12:15 pm – 1:25 pm	Buffet lunch (included in registration fee) and hotel check-in
12:30 pm – 1:25 pm	Meeting registration (Spring House foyer)
1:30 pm – 5:00 pm	Symposium: "Thinking Beyond Boundaries: Broader Perspectives in Coastal Ecology"
4:15 pm	Still on the mainland? Catch the 4:45 pm ferry to the meeting.
5:15 pm – 6:45 pm	Welcoming social and poster set-up
6:45 pm – 8:30 pm	Buffet dinner (must sign-up during pre-registration)
8:00 pm – 9:00 pm	Informal symposium discussion

Friday, October 12th

7:00 am – 7:55 am	Continental Breakfast (included with hotel room), poster set-up
7:00 am – 8:00 am	Meeting registration (Spring House Foyer)
8:00 am – 12:05 pm	Oral presentations: "Nutrient Budgets and Biogeochemical Cycling"
12:05 pm – 1:05 pm	Buffet lunch (included in registration fee)
1:05 pm – 2:45 pm	Oral presentations: "Primary Production and Higher Trophic Levels"
2:45 pm – 4:00 pm	Poster presentations on Estuarine Science, Management, and Policy
4:00 pm – 5:00 pm	Oral presentations: "Physical Environments"
5:00 pm – 6:00 pm	NEERS Business Meeting and Elections
6:00 pm – 7:15 pm	Social and continued poster viewing
7:15 pm – 9:00 pm	NEERS Student Awards Banquet (must sign-up during pre-registration)
9:00 pm - ??	Games, entertainment, and dancing

Saturday, October 13th

7:00 am – 7:55 am	Continental Breakfast (included with hotel room)
8:00 am – 9:20 am	Oral presentations: "Ecology, Restoration, and Management of Shellfish Populations"
9:20 am – 10:10 am	"Ignite" session on special topics
10:30 am – 12:10 pm	Oral presentations: "Estuarine Ecosystems"
12:15 pm	Meeting adjourn
12:30 pm – 2:30 pm	Optional field trips around Block Island
2:45 pm	Be at ferry dock for 3 PM ferry to Pt. Judith OR
5:45 pm	Be at ferry dock for 6 PM ferry to Pt. Judith

Thursday, October 11th

SPECIAL SYMPOSIUM:
Thinking Beyond Boundaries: Broader Perspectives in Coastal Ecology

Dr. Scott W. Nixon was an active participant in NEERS meetings for many years – giving presentations, asking probing questions, keeping the discussion going – and he always encouraged students to present their research results at NEERS. Scott loved the NEERS Block Island meetings; he often suggested speakers, topics, and ideas for the Rhode Island NEERS meetings and this past winter and spring were no exception. To honor Scott we thought that, rather than having a session focusing on Scott's works (since there will be other sessions dedicated to that at URI-GSO and CERF), we would do it NEERS style, and have a session that Scott would have enjoyed. Scott was not afraid to think outside of the box, nor was he afraid to jump into public debate. This session will embody some of the key aspects of Scott's work: thinking beyond the boundaries of scale, time, space, ecosystem, discipline, and convention. We also think this symposium would be appreciated by two others who also recently left us: Dr. Michele Dionne of the Wells National Estuarine Research Reserve in Maine, and the Providence Journal environmental writer Peter Lord who spoke at several Block Island NEERS meetings and interviewed many NEERS members about science issues. Hopefully this session will keep us thinking and inspire us to move onward from the work of Scott, Michele, and Peter.

Chairs: Veronica Berounsky and Walter Berry * Presenter

1:30 Welcome by URI-GSO's Brand New Dean Dr. Bruce Corliss

1:40 Introduction to the Symposium and brief bio of Scott W. Nixon, Ph.D.
by Veronica Berounsky and Walter Berry

2:00 Introductory Presentation by the
2012 Recipient of the NEERS Achievement Award: Fred T. Short
Aquatic Resources Div., Washington State Dept. of Natural Resources, Olympia, WA
HISTORY THROUGH THE LENS OF SEAGRASS SCIENCE

2:30 Giblin, Anne E.
Marine Biological Laboratory, Woods Hole, MA
NEW NITROGEN PROCESSES – RIDICULOUS OR SUBLIME?

3:00 Kincaid*, Chris, C. Balt, A. Pfeiffer-Herbert, and D. Ullman
Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
CHARACTERIZING THE INFLUENCE OF THE GREAT 2010 FLOOD ON CIRCULATION, FLUSHING AND CHEMICAL TRANSPORT IN NARRAGANSETT BAY

3:30 BREAK

3:45 McWilliams*, Scott, P. Paton, K. Winiarski, P. Loring, and J. Osenkowski
University of Rhode Island, Kingston, RI
ASSESSING THE POTENTIAL IMPACTS OF OFFSHORE WIND FACILITIES ON BIRDS: IN THE BEGINNING

4:15 Swift, Judith
Coastal Institute, Graduate School of Oceanography, U.R.I., Narragansett, RI
COASTAL ECOLOGY: A MIXING ZONE OF THE NIXONIAN MIND

4:45 Panel Discussion (all the speakers)

5:15 Welcoming Social

5:45 Ferry arrives from Pt. Judith

6:00 If you must leave today, head to the ferry. New arrivals join social at Spring House Hotel.

6:30 Ferry departs for Pt. Judith.

6:45 Dinner at Spring House Hotel for those who are staying

8:00 Informal symposium discussion

Friday, October 12th

8:00 Welcome and Introductory Remarks – Steve Hale, NEERS President

Nutrient Budgets and Biogeochemical Cycling

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

8:05 Brown*, Shelley M.[1], A. L. Ehrlich[1], C. Deacutis[3] and B. D. Jenkins[1,2]
[1]Department of Cell and Molecular Biology and
[2]Graduate School of Oceanography, University of Rhode Island, Kingston, RI
[3]Narragansett Bay Estuary Program, Narragansett, RI
BIODIVERSITY OF ACTIVE NITROGEN FIXERS DECREASES ALONG THE ESTUARINE GRADIENT OF NARRAGANSETT BAY

8:25 **(K)** Ehrlich*, Andraya L.[1], S. M. Brown[1], L. L. Coiro[2], C. Doucet[1], A. Jones[1], R. Spinette[1], C. Deacutis[3], and B.D. Jenkins[1,4]
[1]Dept. of Cell and Molecular Biology, Univ. of Rhode Island, Kingston, RI
[2]US EPA, ORD, NHEERL, Atlantic Ecology Division, Narragansett, RI
[3]Narragansett Bay Estuary Program, Narragansett, RI
[4]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
TESTING THE RELATIONSHIP OF HYPOXIA AND MICROBIAL NITROGEN FIXATION IN SEDIMENTS MAINTAINED IN A LABORATORY SETTING

8:45 **(K)** Heffner*, Leanna R.[1], A. E. Giblin[2], R. Marino[2,3], and S. W. Nixon[1]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Marine Biological Laboratory, MA
[3]Dept of Ecology & Evolutionary Biology, Cornell University, NY
RESPONSES OF NITROGEN FIXATION AND DENITRIFICATION TO VARYING N LOADS IN NEW ENGLAND SALT MARSHES: A TRANSPLANT EXPERIMENT

9:05 **(K)** Vieillard*, Amanda M. and R. W. Fulweiler
Department of Earth and Environment, Boston University, Boston, MA
ARE TIDAL FLATS FUNNY? NITROUS OXIDE FLUXES AND THE WETTING AND DRYING OF TIDAL FLAT SEDIMENTS

9:25 **(R)** Rogener*, Mary Katherine[1], E. M. Heiss[1], and R. W. Fulweiler[1,2]
Departments of [1]Earth and Environment and [2]Biology, Boston University, Boston, MA
METALS, MUD, AND THE NITROGEN CYCLE – THE IMPACT OF MN AND FE ON SEDIMENT N_2 FLUXES IN A TEMPERATE MARINE ECOSYSTEM

9:45 **(K)** Chang*, Nicole W.[1], C. R. Tobias[1], and J. K. Bohlke[2]
[1]University of Connecticut, 1080 Shennecossett Rd, Groton, CT
[2]U.S. Geological Survey, 12201 Sunrise Valley Dr, Reston, VA
ANAMMOX IN COASTAL GROUNDWATER

10:05 BREAK

10:25 **(K)** Schmidt*, Courtney[1], S. Nixon[1], K. Raposa[2], and B. Buckley[1]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Narragansett Bay National Estuary Research Reserve, Prudence Island, RI
WET ATMOSPHERIC DEPOSITION OF NO_3^- AND NH_4^+ IN NARRAGANSETT BAY FROM 1988-1996

10:45 **(K)** Carey*, Joanna C. [1] and R. W. Fulweiler[1,2]
Departments of [1]Earth and Environment and [2]Biology, Boston University, Boston, MA
WATERSHED LAND USE - A MAJOR CONTROL ON SILICA EXPORT TO MARINE WATERS

11:05 **(K)** Heiss*, Elise M.[1] and R. W. Fulweiler[1,2]
Departments of [1]Earth and Environment and [2]Biology, Boston University, Boston, MA
WATER COLUMN NITRIFICATION FROM SHORE TO SHELF

11:25 **(K)** Foster*, Sarah Q.[1] and R. W. Fulweiler[1, 2]
Departments of [1]Earth and Environment and [2]Biology, Boston University, Boston, MA
NET N_2 FLUX AND NUTRIENT CYCLING DYNAMICS OVER A TRAJECTORY OF INCREASING EUTROPHICATION IN WAQUOIT BAY, MA

11:45 **(K)** Fields*, Lindsey[1], S. W. Nixon[1], S. Granger[1], and R. W. Fulweiler[2]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Departments of Earth and Environment and Biology, Boston University, Boston, MA
AN APPARENT RAPID RESPONSE OF BENTHIC-PELAGIC COUPLING TO ECOSYSTEM CHANGES IN MID-NARRAGANSETT BAY, RHODE ISLAND

12:05 – 1:05 LUNCH

Primary Production and Higher Trophic Levels

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

1:05 **(K)** Emery*, Hollie E.[1] and R. W. Fulweiler[1,2]
Departments of [1]Earth and Environment and [2]Biology, Boston University, Boston, MA
DECREASED SALT MARSH GREENHOUSE GAS EMISSIONS ASSOCIATED WITH *PHRAGMITES AUSTRALIS*

1:25 **(K)** McManus*, M. Conor and C. A. Oviatt
Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
COASTAL CURRENT EFFECTS ON PRIMARY PRODUCTION RATES AND IMPLICATIONS FOR ECOSYSTEM DYNAMICS IN MASSACHUSETTS BAY

1:45 **(K)** McNamara*, Marianne E., D. J. Lonsdale, and R. M. Cerrato
School of Marine and Atmospheric Science, Stony Brook University, Stony Brook, NY
CONTRASTING MICROPLANKTON ABUNDANCE AND COMPOSITION DURING POPULATION BLOOMS OF *MNEMIOPSIS LEIDYI*

2:05 **(R)** Weiss*, Lena[1], C. A. Karp[1], and B. K. Sullivan-Watts[2]
[1]Center for Environmental Studies, Brown University,Providence, RI
[2]Department of Biology, Providence College, Providence, RI
DISTRIBUTION AND RELATIVE ABUNDANCE OF *MNEMIOPSIS LEIDYI* ALONG A DOWN-BAY WATER QUALITY GRADIENT IN NARRAGANSETT BAY

2:25 **(K)** Meserve*, Molly and K. A. Ono
Department of Marine Sciences, University of New England, Biddeford, ME
BROOD PROVISIONING AND TOTAL FORAGING TIMES IN AN INLAND AND COASTAL COLONY OF GREAT BLUE HERONS (*ARDEA HERODIAS*) IN MAINE

2:45 – 4:00 POSTER SESSION

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

(D) Ballentine*, Mark L., R. Smith, P. Vlahos, and C. Tobias
Department of Marine Sciences, University of Connecticut, Groton, CT
UPTAKE AND PARTITIONING OF TNT AND RDX IN COASTAL MARINE ORGANISMS

(D) Corman*, Sarah S.[1], A. Angermeyer[1], J. M. Adler[1], M. D. Bertness[1], L. A. Deegan[2], and H. M. Leslie[1]
[1]Department of Ecology and Evolutionary Biology, Brown University, Providence, RI
[2]Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA
SPARTINA ALTERNIFLORA IN A CHANGING CLIMATE: IMPACTS OF RISING TEMPERATURES ON SALT MARSH ELEVATION

Coupland*, Catherine.[1], H. Stoffel[2], C. Oviatt[1], S. Kiernan[2], and E. Requintina[1]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Rhode Island Department of Environmental Management- Office of Water Resources
EXAMINING OCEAN ACIDIFICATION IN ESTUARINE WATERS USING THE NARRAGANSETT BAY FIXED SITE MONITORING NETWORK DATA

(D) Guardiani*, Jenay M.
Department of Marine Sciences, University of Connecticut, Groton, CT
STABLE CARBON AND NITROGEN ISOTOPIC RATIO VARIATIONS OF PARTICULATE ORGANIC MATTER OF THE NEW RIVER ESTUARY, NC

(D) Hall*, Janis V.[1], K. S. Schoolcraft[1], S. M. Moseman-Valtierra[2], and B. Govenar[1]
[1]Department of Biology, Rhode Island College, Providence, RI
[2]Department of Biological Sciences, University of Rhode Island, Kingston, RI
COMPARISON OF RIBBED MUSSEL POPULATIONS ALONG A NITROGEN LOADING GRADIENT IN NARRAGANSETT BAY, RI SALT MARSHES

Kelsall*, Nathan K. and R. D. Davis
Anchor QEA, LLC, Cambridge, MA and Glens Falls, NY
EELGRASS (*ZOSTERA MARINA*) MITIGATION: HABITAT SUITABILITY AND OUTCOMES

(W) Lima*, Tim[1], S. Moseman-Valtierra[2], B. Govenar[3], K. Egan[3], S. O'Brien[3], and J. Tang[4]
[1]University of Rhode Island; [2]Biology Department, For Rhode Island College, RI
[3]U Mass, Amherst, MA; [4]Marine Biological Laboratory, The Ecosystem Center, MA
GREEN HOUSE GAS FLUXES FROM SALT MARSHES ALONG A NITROGEN GRADIENT IN NARRAGANSETT BAY, RI

(W) Palmisciano*, Melissa[1], C. Deacutis[1], L. Lambert[1], E. Gooding[2], and G. Cicchetti[3]
[1]Narragansett Bay Estuary Program, Narragansett, RI; [2]Sacred Heart University, Fairfield, CT
[3]US EPA, ORD, NHEERL, Atlantic Ecology Division, Narragansett, RI
MACROALGAL ABUNDANCE IN NARRAGANSETT BAY AND COVER CHANGES FOLLOWING HURRICANE IRENE (2011)

Raposa*, Kenneth B.[1], M. Dionne[2], C. Peter[2], R. Weber[1], J. Fear[3], S. Lerberg[4], C. Cornu[5], H. Harris[5], and N. Garfield[6]
[1]Narragansett Bay NERR, Prudence Island, RI; [2]Wells NERR, Wells, ME
[3]North Carolina NERR, Beaufort, NC; [4]Chesapeake Bay NERR, Gloucester Point, VA
[5]South Slough NERR, Charleston, OR; [6]NOAA Estuarine Reserves Division, Silver Spring, MD
MEASURING TIDAL WETLAND RESPONSE TO RESTORATION USING PERFORMANCE BENCHMARKS FROM LOCAL NATIONAL ESTUARINE RESEARCH RESERVE REFERENCE SYSTEMS

(W) Rossi*, Ryann[1], B. J. Jessen[2], and D. S. Johnson[3]
[1]College of Environmental and Life Sciences, University of Rhode Island, Kingston, RI
[2]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[3]The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA
LEAF LITTER DECOMPOSITION AND PROCESSING IN A CARIBBEAN MANGROVE FOREST AND ITS IMPLICATIONS FOR CARBON SEQUESTRATION

(D) Sampieri-Horvet, Sara J.
Dept. of Estuarine and Ocean Sci., SMAST, UMass Dartmouth, New Bedford, MA
EFFECTS OF NUTRIENT ENRICHMENT ON SPATIAL AND TEMPORAL PATTERNS OF BENTHIC COMMUNITIES IN SOUTHEASTERN MASSACHUSETTS ESTUARIES

Sharif*, Rahat, A. M. DeSilva, and V. M. Berounsky
Narrow River Preservation Association, P.O. Box 8, Saunderstown, RI 02874
BACTERIAL TRENDS IN THE METTATUXET SUBWATERSHED OF THE PETTAQUAMSCUTT ESTUARY OVER A PERIOD OF TWENTY YEARS

(D) Shaw, Kaitlyn C.
Dept. of Estuarine and Ocean Sci., SMAST, UMass Dartmouth, New Bedford, MA
ASSESSING SPATIAL ACCUMULATIONS OF OPPORTUNISTIC MACROALGAE IN S.E. MASSACHUSETTS ESTUARIES

Stoffel*, Heather[1], C. Coupland[2], C. Oviatt[1], E. Requintina[1], and S. Kiernan[2]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Rhode Island Department of Environmental Management- Office of Water Resources
CHARACTERIZING HYPOXIC EVENTS FOR AN ASSESSMENT TOOL FOR MANAGERS WITHIN NARRAGANSETT BAY, RI

Physical Environments

Chair: MJ James-Pirri
* Presenter; **(K)** Ketchum Prize candidate for best graduate student presentation

4:00 **(K)** Harder*, Timothy M.[1], G.C.L. David[2], T. W. Arienti[1], S. M. Gill[1], and C. E. Tilburg[1]
[1]Dept. of Marine Sciences and Marine Science Center, Univ. of NE, Biddeford, ME
[2]Dept. of Earth and Oceanographic Science, Bowdoin College, Brunswick, ME
CHANNEL MORPHOLOGY SHIFTS WITHIN THE SACO RIVER ESTUARY, MAINE

4:20 **(K)** Theve, Marissa C.
USDA- NRCS, Tolland, CT and UConn Dept. Natural Res. and Environment, Storrs, CT
HALINITY IN COASTAL SOILS

4:40 **(K)** Still*, Brett S. and M. H. Stolt
Department of Natural Resources Science, University of Rhode Island, Kingston, RI
SOIL SCIENCE AND OYSTER AQUACULTURE IN RHODE ISLAND - SUBAQUEOUS SOIL MAPS AS A TOOL FOR SPATIAL PLANNING

5:00 NEERS Business Meeting and Elections

6:00 Social and continued poster viewing

7:15 NEERS AWARDS BANQUET
Presentation of SPECIAL ACHIEVEMENT AWARD to Fred Short
Presentation of Student Presentation Awards

9:00 Entertainment and dancing

Saturday, October 13th

Chair: Pam Morgan * Presenter

Ecology, Restoration, and Management of Shellfish Populations

8:00 Brown*, David[1] and B. Still[2]
[1]The Nature Conservancy; [2]University of Rhode Island
EASTERN OYSTER, *CRASSOSTREA VIRGINICA*, POPULATION DEMOGRAPHICS AND ASSOCIATED ENVIRONMENTAL CHARACTERISTICS IN NINIGRET POND, RHODE ISLAND

8:20 Macfarlane, Sandra L.
Coastal Resource Specialists, Orleans, MA
CHANGING PUBLIC PERCEPTIONS ONE OYSTER AT A TIME

8:40 Hines*, Coral M., K. Ruddock, and D. S. Brown
The Nature Conservancy, Rhode Island Chapter, 159 Waterman St. Providence, RI
DEVELOPING A GIS-BASED SITE SUITABILITY INDEX FOR RESTORATION OF THE EASTERN OYSTER, *CRASSOSTREA VIRGINICA*

9:00 Johnson, J.[1], L. DiPippo[1], M. Gomez-Chiarri[1], B. DeAngelis[2], and Matt Griffen*[3]
[1]University of Rhode Island; [2]NOAA Restoration Center; [3]Roger Williams University
SIM DATABASE: A DATABASE FOR THE INTEGRATED MANAGEMENT OF SHELLFISH WILD, RESTORED, AND FARMED POPULATIONS

NEERS Ignites!

Chair: Walter Berry * Presenter

9:20 Vaudrey*, Jamie M. P.[1], J. Eddings[2], C. H. Pickerell[2], L. Brousseau[2], and C. Yarish[3]
[1]Department of Marine Sciences, University of Connecticut, CT
[2]Marine Program, Cornell Cooperative Extension of Suffolk County, NY
[3]Depts. of Ecol. and Evolutionary Biol. and Marine Sciences, Univ. of Connecticut, CT
DEVELOPMENT AND APPLICATION OF A LONG ISLAND SOUND GIS-BASED EELGRASS HABITAT SUITABILITY INDEX MODEL

9:30 Elmer*, Wade H.[1], R. E. Mara[1], H. Li[2], and B. Li[2]
[1]The CT Agr. Exp. Sta., New Haven, CT
[2]Fusan Univ., Shanghai, China
COMPARISON OF THE *FUSARIUM* SPECIES COMPOSITION BETWEEN A NEW ENGLAND AND CHINESE SALT MARSH AFFECTED BY DIEBACK

9:40 Bergondo*, Deanna L.[1], M. J. Burke[2], W. T. Bell[2], and S. G. Winterberger[2]
[1]United States Coast Guard Academy, New London, CT; [2]United States Coast Guard
VARIABILITY IN RESIDENCE TIMES FOR THE THAMES RIVER ESTUARY, CT

9:50 Uva*, Thomas, J. Motta, J. Kelly, P. Reitsma, C. Comeau, and C. Oliver
Narragansett Bay Commission
ACHIEVING WATER QUALITY STANDARDS BY IMPLEMENTING SUSTAINABLE ESTUARINE HABITAT RESTORATION AND AQUACULTURE PROJECTS

10:00 Hale, Stephen
US EPA, ORD, NHEERL, Atlantic Ecology Division, Narragansett, RI
ECOLOGY OF GREAT SALT POND, BLOCK ISLAND

10:10 BREAK

Estuarine Ecosystems

Chair: John Brawley * Presenter

10:30 Krumholz*, Jason[1,2], R. Burg[2,3], S. Deonarine[4], J. Latimer[5], L. O'Neil[6], M. Parker[7], J. Rose[1], and M. Tedesco[2]
[1]NOAA Northeast Fisheries Science Center Milford Lab, Milford, CT
[2]EPA Long Island Sound Office, Stamford, CT
[3]New England Interstate Water Pollution Control Commission, Lowell, MA
[4]New York State Department Department of Environmental Conservation, Albany, NY
[5]EPA Office of Research and Development, Narragansett, RI
[6]EPA Region 1 office, Boston, MA
[7]Connecticut Department of Energy and Environmental Protection, Hartford, CT
LANGUAGE BARRIERS: THE SCIENCE OF TRANSFORMING MONITORING DATA INTO ENVIRONMENTAL MANAGEMENT INDICATORS

10:50 Berounsky*, Veronica M.[1], R. Sharif[1], L. Maranda[1], D. Borkman[1], L. Green[2], R. Smith[2], and S. W. Nixon[1]
[1]Graduate School of Oceanography, University of Rhode Island, Narragansett, RI
[2]Watershed Watch Program, University of Rhode Island, Kingston, RI
PRELIMINARY RESULTS OF WHOLE-BASIN ECOSYSTEM METABOLISM CALCULATIONS AND NUTRIENT DYNAMICS FOLLOWING AN ANOXIC WATER VENTILATION

11:10 Bell*, Jeremy M.[1] and T. Nye[2]
[1]Div. of Ecological Restoration, Mass. Department of Fish and Game, Boston, MA
[2]The Association to Preserve Cape Cod, Barnstable, MA
ECOLOGICAL CHANGE IN A FORMERLY RESTRICTED SALT MARSH AT SESUIT CREEK, DENNIS, MA

11:30 Pregnall, A. Marshall
Biology Dept. and Environmental Research Institute, Vassar College, Poughkeepsie, NY
NEW GREEN INFRASTRUCTURE AND FLOODPLAIN RESTORATION IN AN URBANIZED WATERSHED OF THE HUDSON RIVER ESTUARY: HOW MUCH IMPROVEMENT CAN WE GET FOR HOW LITTLE AREA MODIFIED?

11:50 Patrizzi*, Beth[1] and S. P. Grace[2]
[1]Cedar Island Marina Research Lab, Clinton, CT
[2]Southern Connecticut State University, Biology Department, New Haven, CT
WHAT AN *ASTRANGIA* PLACE TO SETTLE!

12:10 Closing remarks – John Brawley, Incoming NEERS President

12:15 Adjourn

12:30 Field trip departure

ABSTRACTS

Ballentine*, M. L., R. Smith, P. Vlahos, and C. Tobias. Department of Marine Sciences, University of Connecticut, Groton, CT < mark.ballentine@uconn.edu>
UPTAKE AND PARTITIONING OF TNT AND RDX IN COASTAL MARINE ORGANISMS
The munitions constituents 2,4,6–trinitrotoluene (TNT) and hexhydro–1,3,5– trinitro–1,3,5–triazine (RDX) are compounds commonly found in explosives and used widely at Department of Defense facilities, including coastal military installations. TNT and RDX and their derivatives are Environmental Protection Agency priority pollutants. Both have known toxicity with a variety of terrestrial and aquatic species and have been shown to persist in freshwater environments and soils. Less is known about TNT and RDXs fate and transport in marine systems. As part of a multi-scale marine ecosystem fate and transport study, we have measured degradation rates of TNT and RDX in seawater and characterized uptake of these compounds into several common coastal marine floral and faunal species. Time series of seawater and seawater plus fauna exposed to multiple elevated TNT and RDX concentrations were conducted in recirculating tanks. The selected organisms represent a cross section of common shallow water marine species found across multiple trophic levels. In seawater-only treatments, TNT loss from the water column was on the order of 0.16 mg L-1 day-1 to 0.2 mg L-1 day-1, while RDX persisted at fairly constant concentrations for the duration of the incubation. In the presence of organisms, TNT removal from seawater was 2 to 3 times higher while RDX remained as persistent in the water as observed in the absence of fauna. Bioconcentration factors were calculated for TNT, RDX, and their derivatives for each species. Analysis of trophic transfer of munitions using stable isotope tracers is anticipated to be used to garner a better understanding of the fate and uptake of TNT and RDX in salt water systems in future follow-up experiments.

Bell*, J. M.[1] and T. Nye[2]. [1]Div. of Ecological Restoration, Mass. Department of Fish and Game, Boston, MA; [2]The Association to Preserve Cape Cod, Barnstable, MA < jeremy.bell@state.ma.us>
ECOLOGICAL CHANGE IN A FORMERLY RESTRICTED SALT MARSH AT SESUIT CREEK, DENNIS, MA
The Sesuit Creek-Bridge Street Restoration Project located in Dennis, Massachusetts (Cape Cod) completed in 2008 remains the largest known tidal restriction restoration to date in Massachusetts at 65-acres (hectares). With approximately 80% of the natural tidal range muted for over 100 years, restoring the tides has resulted in widespread, extreme changes within the historic salt marsh foot print and beyond. The presenter will describe the process leading to the restoration, detail the current ecological trajectory of the marsh, and discuss lessons learned.

Bergondo*, D. L.[1], M. J. Burke[2], W. T. Bell[2], and S. G. Winterberger[2]. [1]United States Coast Guard Academy, New London, CT; [2]United States Coast Guard < Deanna.L.Bergondo@uscga.edu>
VARIABILITY IN RESIDENCE TIMES FOR THE THAMES RIVER ESTUARY, CT
The Thames River is a complex estuarine system, the physical characteristics of which are affected by both tidal and non-tidal factors. While tidal flows are generally the most significant and play the largest role in determining stratification, non-tidal components such as wind-driven circulation and freshwater

input also affect the stratification of the Thames River estuary. The physical properties of the Thames River also influence the residence time and play a large role in the transport of pollutants. Profiles of temperature, salinity and depth were collected at 8 stations along the Thames River estuary from Winthrop Point to Norwich, approximately 10 miles. Sampling occurred from September to November 2008 and from April 2010 to May 2011. Results demonstrated a highly stratified river in the spring and fall, with a partially mixed river in the winter and the summer. The residence time was determined using the fraction of freshwater method. The residence time during the study period varied from 15 hours to 8 days due to the variability in the river input.

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PRELIMINARY RESULTS OF WHOLE-BASIN ECOSYSTEM METABOLISM CALCULATIONS AND NUTRIENT DYNAMICS FOLLOWING AN ANOXIC WATER VENTILATION
The Pettaquamscutt (Narrow River) Estuary is a 9km estuary in southern Rhode Island with two deep (13m and 18m) basins containing anoxic waters overlaid with 3-4 m of well-oxygenated waters. In October 2007, a ventilation (or overturn) occurred in the northern basin and the anoxic waters mixed throughout the water column. Such events are natural and occur when drought conditions, strong winds and a drop in temperature exacerbate the normal fall weakening of stratification. Daily profiles of water column parameters and weekly samples for phytoplankton and nutrients were taken from the day after the ventilation to early December. Phytoplankton were dominated by *Prorocentrum minimum* after the ventilation but after ten days several other species dominated. Ammonium concentrations were high (150-400µM) soon after the ventilation but decreased (to 40-80µM) over the next 6 weeks. Nitrate plus nitrite concentrations were low (none detectable to 1 µM) but increased slightly (to 3µM) over the next 6 weeks. Phosphate concentrations were high (12.5-27.5µM) and then decreased (2.5µM). Calculations were made for the basin as a whole. Rates of ammonium loss were higher than literature values for rates of phytoplankton uptake of ammonium in the adjacent Narragansett Bay. Rates of nitrate plus nitrate gain were similar to rates of nitrification in Narragansett Bay. Based on these nitrogen values and Redfield stoichiometry, rates of carbon loss for the basin were also high, decreasing by half over the 6 weeks. This study provides a glimpse into the consequences of anoxia, whether from natural or anthropogenic sources.

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EASTERN OYSTER, *CRASSOSTREA VIRGINICA*, POPULATION DEMOGRAPHICS AND ASSOCIATED ENVIRONMENTAL CHARACTERISTICS IN NINIGRET POND, RHODE ISLAND
Oyster post-larval settlement is affected by a number of factors, including substrate quality, the presence of biofilms, pheromones, seasons, and salinity. We quantified site specific variation in larval and spat recruitment and quantified the relationship between key environmental variables and predation on oyster demography. We hypothesized that oyster recruitment and survival is higher at sites with greater food availability, water residency times, lower salinity, and predation rates. We determined how these processes varied along the physical and biogeochemical gradients present in Ninigret Pond. Recruitment showed a predictable pattern with temperature/salinity and substantially higher recruitment moving from the lower to upper pond associated with increasing water residence time. The data generated by this study not only provides information about the basic ecology of oysters, but also provides critical information for prioritizing sites for future oyster restoration projects both in Rhode Island coastal lagoons and Narragansett Bay.

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BIODIVERSITY OF ACTIVE NITROGEN FIXERS DECREASES ALONG THE ESTUARINE GRADIENT OF NARRAGANSETT BAY
Marine sediments harbor metabolically versatile bacteria whose activities can influence the cycle of nutrients on global scales. Nitrogen (N) cycling microbial communities are extremely diverse making it difficult to identify the functional groups and elucidate controls on their activity. Recently, benthic

sediments from the estuary Narragansett Bay (RI) were shown to exhibit a seasonal switch in N cycling with high rates of net N_2 fixation, challenging the denitrification-dominated paradigm. To target the microbes that are the most likely players contributing to the balance of N inputs via N fixation and N outputs via denitrification in the Bay sediments, we are following the expression of functional genes for N fixation (*nifH*) and denitrification (*nirS*). We detected the highest diversity of N fixers expressing *nifH* near the freshwater head of the Bay. The biodiversity decreases along the gradient of the Bay with the lowest levels observed at two offshore continental shelf sites. A group of microbes related to *Pelobacter carbinolicus*, an anaerobe with the ability to reduce iron and sulfur compounds, was identified at all sites. The remaining diazotroph community composition shifts from being predominated by microbes related to sulfate and sulfur reducers in the Upper Bay to one group related to an uncultivated marine cyanobacterium, UCYN-A, at the offshore sites. Several different ecological mechanisms including temperature, organic matter loading and oxygen concentrations may be driving the shift in microbial biogeography patterns. Field measurements of gene expression can provide insight into how these microbes react to and in turn influence conditions in their ecosystem.

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WATERSHED LAND USE - A MAJOR CONTROL ON SILICA EXPORT TO MARINE WATERS
It is well known that human activities have directly altered nitrogen (N) and phosphorus (P) loading to marine waters. Less well understood are the direct anthropogenic impacts on dissolved silica (DSi) export. The ratios of N:P:Si in marine waters dictate phytoplankton community composition, as diatoms, the most common type of phytoplankton in temperate coastal systems, require as much DSi to N to grow. Rivers contribute over 80% DSi to the ocean, making them the major control over marine water DSi availability. Riverine fluxes of DSi are typically thought to be controlled primarily by geology and runoff. However, using a 20-yr USGS record of DSi data from 25 watersheds across New England, we found land use/land cover (LULC) to be an important driver of DSi export from rivers, accounting for 40% to 70% of DSi transport from land to sea. In addition, forest cover was significantly negatively correlated, and urban development was significantly positively correlated, with in-stream DSi concentrations and fluxes. In order to determine the mechanisms driving our observed relationships between watershed LULC and DSi export, we collected a high temporal resolution dataset (weekly for 1 yr) on 4 MA rivers along a gradient of LULC. In the most forested watersheds we observed a sharp spring decline of in-stream DSi concentrations. We hypothesize that land plants are responsible for this DSi drawdown and calculate a potential terrestrial vegetation uptake rate of 2.7 uM DSi per day, or 68 kmol Si km^{-2} annually. In contrast, the river draining the most urban watershed exhibited no DSi spring decline. This work highlights that human activities, through LULC change, directly alter DSi export to coastal receiving waters.

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ANAMMOX IN COASTAL GROUNDWATER
Anaerobic ammonium oxidation (ANAMMOX) is a microbial process that converts NO_2 and NH_4 into nitrogen gas (N_2), acting as an alternate pathway for denitrification in the nitrogen cycle. This process may be important for attenuating groundwater derived dissolved inorganic nitrogen prior to discharge into coastal habitats. Two isotopic approaches are being used for in situ detection of ANAMMOX in a nitrogen rich coastal groundwater plume on Cape Cod, MA. The first approach uses the natural abundance distribution of ^{15}N to infer ANAMMOX, and controlled laboratory incubations were designed to estimate the isotopic fractionation factors for steps in the ANAMMOX pathway. The second approach uses an in situ ^{15}N tracer injection to measure ANAMMOX rates. In summer 2011, an isotope tracer experiment was conducted at site F575 in the plume where ANAMMOX activity was suspected. Initial results from the isotope fractionation experiments show fractionation factors for the initial reduction of NO_2 on the order of 20‰. These values approximate those of denitrification, suggesting similar reduction pathways. Additional resolution may be gained from changes in the $\delta^{15}N_2$ during the incubations. In the second approach, the direct ^{15}N tracer injection into the aquifer showed clear evidence of ANAMMOX in the subsurface, indicating that the natural distribution of ^{15}N isotopes in NO_2, NH_4 and N_2 results at least

in part from contributions from the ANAMMOX reaction. Work is ongoing with more fractionation experiments and in situ isotope tracer experiments planned for other plume locations in 2012.

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SPARTINA ALTERNIFLORA IN A CHANGING CLIMATE: IMPACTS OF RISING TEMPERATURES ON SALT MARSH ELEVATION
With increasing temperatures and sea level rise rates, it is critical to understand how the foundation species of salt marshes will respond. *Spartina alterniflora* (cordgrass) marshes must maintain elevation (via above and belowground accretion processes) relative to sea level to resist drowning. Aboveground stems slow tidal water and promote sedimentation, while belowground production accumulates as peat. On the U.S. Atlantic coast, there are latitudinal differences in the allocation of cordgrass biomass: northern marshes maintain elevation primarily through peat production, while southern marshes maintain elevation primarily by sedimentation. However, it is not understood if this shift with latitude is driven by local adaptation or phenotypic plasticity. Using reciprocal transplants, a common garden, biomass sampling and other methods, we explored allocation patterns at 8 sites along the U.S. Atlantic coast, using a latitudinal gradient as a proxy for future climate. Reciprocal transplants revealed plasticity in allocation; cordgrass moved north produced more belowground biomass, and less when moved south. Southern plants showed a greater height increase in the greenhouse, suggesting growth may be stunted by extreme temperatures. Cordgrass from northern marshes was unable to withstand southern conditions in the field, and a significant relationship between latitude and decomposition rate was found. Further analyses will explore intra- and inter-annual variation in allocation and other variables with latitude. In the future we may see greater marsh loss to drowning than is currently predicted due to shifts in growth allocation, and this relationship may be further altered by changing phenology.

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EXAMINING OCEAN ACIDIFICATION IN ESTUARINE WATERS USING THE NARRAGANSETT BAY FIXED SITE MONITORING NETWORK DATA
To assess water quality in Narragansett Bay, a number of agencies worked together to establish the Narragansett Bay Fixed-Site Monitoring Network (NBFSMN). The stations are located strategically to transect the length of Narragansett Bay and serve as sentinels of changing conditions. There is a greater concentration of sites in upper Narragansett Bay because of the presence of discharges from both wastewater treatment facilities and large tributary rivers. Each station is equipped to provide high-resolution temporal water quality data. These stations measure near surface and near bottom temperature, salinity, oxygen, pH, chlorophyll and depth at 15-minute intervals where applicable. Buoy stations are deployed from May-October and land-based stations operate year-round, if possible. All 12 bay stations were analyzed on a summer seasonal basis June-September and three year round stations were also examined for changes in pH levels. All stations fall within Rhode Island state criteria for pH (6.5-8.5). PH varies inter-annually and by station location. Several factors, such as chlorophyll blooms and salinity levels affect pH levels. The headwaters of the bay have an influx of freshwater delivering nutrients to the bay. As a result, phytoplankton levels tend have a north to south gradient in bloom concentrations and salinity in Narragansett Bay. PH follows this gradient with pH ranges of 9.18-6.78 in the upper bay compared to ranges of 8.35-7.48 in the lower bay. Over the 15 year annual record at the GSO dock, no change in pH has been documented in the time series record.

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TESTING THE RELATIONSHIP OF HYPOXIA AND MICROBIAL NITROGEN FIXATION IN SEDIMENTS MAINTAINED IN A LABORATORY SETTING

Anthropogenic input of nitrogen (N) is a major contributor to the onset of seasonal hypoxia in Narragansett Bay, RI. Determining appropriate criteria for controlling N loading has become a management challenge. In the summer of 2006, the N cycle in the bay unexpectedly switched from that of net N removal from denitrification to that of N input from N_2 fixation. Interestingly, the bay experienced severe hypoxia in the summer of 2006. Previous work by the Jenkins lab has suggested that microbial N_2 fixation, indicated by the expression of a gene encoding a key enzyme for N_2 fixation (*nifH*), may be stimulated by hypoxic conditions in the estuarine sediments. To further elucidate the relationship between hypoxia and nitrogen fixation, sediment cores from two Narragansett Bay sites were incubated in different temperature and dissolved oxygen (DO) treatments for three weeks in a controlled environment at the U.S. Environmental Protection Agency, Atlantic Ecology Division. One sampling site, located near a wastewater treatment plant, experiences severe seasonal hypoxia. The second site, closer to the mid bay, has fewer and less severe hypoxic events. The vertical gradients of redox potential and oxygen concentrations that influence microbial distribution and activity were measured within the cores over the duration of the experiment. The cores were sub-sampled and analyzed for *nifH* expression and abundance at three time points. The microbial community composition and extent of *nifH* expression will be compared to the redox profiles of cores to examine the impact of hypoxia on the N cycle.

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COMPARISON OF THE *FUSARIUM* SPECIES COMPOSITION BETWEEN A NEW ENGLAND AND CHINESE SALT MARSH AFFECTED BY DIEBACK

A dieback of *Phragmites australis* (PA) at Dongtan of Chongmong Island in the Yangtze River estuary near Shanghai, China was found in areas where the invasive *Spartina alterniflora* (SA) had made serious inroads into PA communities. In contrast, New England dieback of SA occurs in the low marsh while PA remains a vigorous colonizer of the high marsh. *Fusarium palustre* and *F. incarnatum* are fungal endophytes/pathogens of SA along the Atlantic and Gulf coasts in and comprised approximately 80 % of the species found. Both species were recovered in greater densities from salt marshes stressed by dieback. It was not known what species of *Fusarium* would be found on Chongmong Island. Our objectives were to assay the stems and roots of both PA and SA in dieback and healthy areas on Chongmong Island to determine what species of Fusarium are present. Twenty sites were sampled. Three to five plants per sites were sampled, bulked, washed, and surface-disinfested in 0.53% NaClO for 1 min and rinsed. From these plants, 40 pieces of stems and 20 pieces of roots were placed on Peptone PCNB agar and incubated for 5 days. A single spore from each colony was sub-cultured onto carnation leaf agar for 7-12 days and identified under 200 X magnification. Out of 270 colonies from China, 60% were *F. incarnatum*, 24% were *F. palustre*. Given the differences between these sites, it was surprising to find both marshes were dominated by the same two species of endophytic *Fusarium*. This suggests that these species may have coevolved with salt marsh plants.

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DECREASED SALT MARSH GREENHOUSE GAS EMISSIONS ASSOCIATED WITH *PHRAGMITES AUSTRALIS*

Salt marshes are excellent natural carbon (C) sinks. However, various anthropogenic impacts such as hydrologic changes, invasive species, and sea level rise all have the capacity to alter salt marsh C balance. Changes can occur in the magnitude of existing fluxes (eg, enhanced decomposition rates), or in the nature of fluxes (eg, a switch from aerobic respiration to methanogenesis). The objective of the research described here is to quantify annual greenhouse gas (GHG) fluxes (CO_2, CH_4, and N_2O) from stands of native and invasive species in the Great Marsh around Plum Island Estuary. GHG fluxes from both vegetated and unvegetated sediments were quantified monthly in stands of *Phragmites australis* and *Spartina alterniflora* at a relatively unimpacted marsh. Although unvegetated sediments exhibited similar emission rates regardless of species association, fluxes from vegetated sediments were significantly different. *P. australis* was associated with greater CO_2 uptake during the growing season, and *S. alterniflora* was associated with high CH_4 emissions. The marsh was an overall weak sink for N_2O, with no differences between species. We hypothesize that the greater size and photosynthetic rate of the invasive exotic species *P. australis*, coupled with its greater capacity to oxygenate the rhizosphere, may boost net carbon uptake in the short term by increasing CO_2 uptake and decreasing CH_4 production.

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AN APPARENT RAPID RESPONSE OF BENTHIC-PELAGIC COUPLING TO ECOSYSTEM CHANGES IN MID-NARRAGANSETT BAY, RHODE ISLAND
Tight benthic-pelagic coupling is an important characteristic of shallow coastal marine ecosystems, but there has been evidence of weakening caused by climate-induced oligotrophication in Narragansett Bay, RI. Measurements of benthic metabolism and nutrient fluxes began in Narragansett Bay in the 1970s, and at the time, benthic nutrient regeneration supplied 50 to over 200 percent of the required nitrogen and phosphorus to the water column. However, climate-induced changes (changes in phenology, warming of the water, increased cloudiness, etc.) caused a considerable reduction in both benthic metabolism and nutrient regeneration that was apparent in measurements made during the mid-2000s. It was postulated that the response time of benthic-pelagic coupling to changes in the ecosystem was rather fast, and likely varies on relatively short time scales. Our most recent measurements show that although benthic metabolism (as measured by oxygen uptake) and some nutrient fluxes have not changed much since the mid-2000s, ammonium and phosphate fluxes have increased in the past ~5 years. These increases are concurrent with changes in phytoplankton bloom phenology in mid-Narragansett Bay and could be evidence of a rapid response of benthic-pelagic coupling to changes in the ecosystem.

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NET N_2 FLUX AND NUTRIENT CYCLING DYNAMICS OVER A TRAJECTORY OF INCREASING EUTROPHICATION IN WAQUOIT BAY, MA
The natural gradient of eutrophic conditions that exists in Waquoit Bay, (Cape Cod, Massachusetts) allowed us to examine how key biogeochemical processes respond to eutrophication over time. Using a space-for-time substitution we measured sediment fluxes of oxygen (O_2), dissolved nutrients, and di-nitrogen (N_2) gas at four stations to examine links between eutrophication and benthic metabolism. In addition, for two sites we compared our more recent measurements to those made in the bay nearly 20 years ago (1992-1994). While we did not find a spatial pattern that was linearly linked to nitrogen (N) loading, our results show characteristics of a system in change. Sediment oxygen consumption was measured at 45% of its historic rate and ammonium release at only 30%. The difference in net denitrification rate is particularly large, as our mean rate (29.9 μmol N_2-N m^{-2} h^{-1}) is considerably lower than the mean historic value (172 μmol N_2-N m^{-2} h^{-1}). This 83% reduction represents substantial dampening of a key microbial process for the removal of reactive N from the ecosystem. Additionally, at our most impacted site, North Basin, we measured significant rates of net N fixation, indicating that the sediments are becoming a net source of reactive N. If this trend of decreasing net denitrification and increasing net N fixation holds into the future, it will have important consequences for the ecology and management of this coastal system.

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NEW NITROGEN PROCESSES – RIDICULOUS OR SUBLIME?
Over the last two decades our understanding of the nitrogen cycle has grown tremendously. Processes thought to be rare curiosities have turned out to be more common than previously thought and it seems that every few years a new novel process is discovered. This has turned out to be fortunate for

biogeochemists interested in every detail no matter how arcane but has it fundamentally altered the way we thing about the cycling and fate of N in ecosystems? Are most of these new processes important in estuaries? How much mechanistic understanding of the N cycle do we need to have to successfully manage estuaries? I will argue that some of these processes are turning out to perhaps be important to understand and may prove useful.

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STABLE CARBON AND NITROGEN ISOTOPIC RATIO VARIATIONS OF PARTICULATE ORGANIC MATTER OF THE NEW RIVER ESTUARY, NC
Particulate organic matter (POM) samples were analyzed monthly from eight sites along the tidal estuary of the New River, NC as part of a study to determine the sources and processing of estuarine organic matter. The sampling stations were examined from March 2010 to May 2012 and ranged from oligo to euryhaline zones. Chemical and stable isotopic measurements of carbon and nitrogen plus qualitative parameters were used to describe the POM in the surface and bottom waters, which include: δ13C, δ15N, C:N, Chlorophyll *a* concentration, and salinity. Isotopic and chemical signatures compared against previously reported end-member values indicated a POM pool dominated by phytoplankton in the estuary most of the time. Along the surface layer of the entire estuarine transect during Winter 2010 and of the upper estuary during the Winter 2011 and Spring 2012, inputs of soil organic matter from the watershed (depleted δ13C) were identified during high periods of river discharge. During Fall 2010/11 and Winter 2011, the surface layer of the lower estuary experienced a brief input of marsh-derived (high δ13C) plant material. Both the surface and bottom layers of the estuary had high δ15N values during Spring 2010 and 2011, indicating the integration of anthropogenic N into POM. Seasonal estuarine mixing curves signify that the estuary was almost consistently a sink for particulate organic carbon (POC), but the δ13C mixing curves for POC appeared to mix conservatively, leaving the mechanism for POC removal still unidentified.

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ECOLOGY OF GREAT SALT POND, BLOCK ISLAND
Great Salt Pond is an island of estuarine water on Block Island, which sits out on the continental shelf. Retreating Wisconsin-era glaciers left a high spot on a terminal moraine that became two islands as the sea rose from the melting glaciers. Later, longshore drift connected the two islands with sandy beaches and created the Pond. Rain falling on the Pond's watershed formed a salinity gradient between the fresher water in the southeast corner of the Pond and shelf-level saltwater elsewhere. Prior to the construction of the permanent breachway in 1895, the western beach was periodically battered open by storms, then closed again by movement of sand. The mix of species changed with the resultant salinity changes. The freshwater supports stands of both native and invasive Phragmites. The Pond (255 ha) is relatively deep for a coastal lagoon: 50% of area > 4m, 17m maximum. The deeper waters may provide a winter refuge for species that, on the mainland, move out of salt ponds during the winter. The Pond's watershed (858 ha) covers about one-third of the island. Present-day saltmarshes formed after the 1938 hurricane. Eelgrass, formerly abundant, has apparently disappeared from the Pond. New forces— invasive species on boat dock pilings, areas of elevated nitrogen and fecal bacteria coming from the watershed, the effects of 20,000 boat-days during the summer season—are driving new changes to the species mix, but are to some degree offset by ongoing protection and restoration efforts.

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COMPARISON OF RIBBED MUSSEL POPULATIONS ALONG A NITROGEN LOADING GRADIENT IN NARRAGANSETT BAY, RI SALT MARSHES
Salt marshes have a range of important roles in coastal ecosystems, serving as nursery grounds for fish and invertebrates, feeding areas for many fish and bird species, and filtering freshwater run-off into the oceans. Growing residential development along the coasts is resulting in increased land use, fertilization,

and waste; all of which contribute to the degradation of salt marshes. These anthropogenic influences lead to high levels of nitrogen in marshes and eventually enter the open ocean. Narragansett Bay in RI displays an increasing nitrogen loading gradient from north to south, causing a range of environmental changes in these ecosystems. *Geukensia demissa*, the ribbed mussel, is a dominant species in these habitats, and populations of *G.demissa* were shown to increase in total biomass and density, but not physiological condition, with increasing levels of nitrogen in 1998-99. We sampled *G. demissa* populations at three of the same sites monthly over the course of summer 2012. Similarly, we found an increase in biomass and density along the nitrogen-loading gradient. However, we also found a correlation between nitrogen-loading and the condition index of the mussels and will further investigate the fecundity and individual growth rates to determine the underlying mechanism of how increased nitrogen levels affect ribbed mussel populations in Narragansett Bay.

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CHANNEL MORPHOLOGY SHIFTS WITHIN THE SACO RIVER ESTUARY, MAINE
The Saco River estuary is approximately 10 Km long, punctuated by a dam system at its head, and a mouth bordered by a rock jetty structure with geology in between varying from exposed granite narrows, to wide, silty marshes. The shape of the river channel varies by depth, material, and geometry within each of these areas, affecting the hydrology and sediment transport dynamics. The river experiences accretion in the harbor nearest the jetty, and has been dredged periodically over the last 100 years with the most recent, and largest taking place in 1996, executed by the US Army Corps of Engineers (Kelley et al. 2009) in an effort to maintain a 6 foot anchorage area. The morphology of the river channel at cross channel transects within the estuary was described during a 1992 study (Manthorp 1995), and since then there have been two total dredging events in the upper and lower parts of the estuary. During this study, an ADCP was used to measure the depth along these same transects within the river in order to create a comparison to determine if the river channel returned to the shape which was described 20 years ago. Data collected to this point suggests a deepening of parts of the river, primarily within the main channel, throughout the estuary. This suggests that significant scouring has taken place within the Saco River and that previous dredging and sediment management models may have changed.

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RESPONSES OF NITROGEN FIXATION AND DENITRIFICATION TO VARYING N LOADS IN NEW ENGLAND SALT MARSHES: A TRANSPLANT EXPERIMENT
For decades much attention has been given to understanding nutrient fluxes within salt marshes, with a recent interest in the potential for marshes to remove anthropogenic nitrogen via denitrification. We have been measuring N-fixation using the acetylene reduction assay and denitrification using the isotope pairing technique in two marshes located at the extremes of the nutrient concentration gradient in Narragansett Bay, RI. Preliminary data show that N-cycling rates differ between these sites. We hypothesized that this difference is largely driven by the contrast in nutrient regimes. To test how an alteration in N-loading affects N-fixation and denitrification, we performed an experiment where sediment cores were transplanted within and between the low and high N-loaded marshes. Two sets of triplicate cores were extracted from each marsh. One set from each site was transplanted and the other set served to control for extraction and planting effects. After 3 months the cores were removed, then brought to the lab and incubated at ambient soil temperature to measure N-fixation and denitrification rates. In addition we extracted cores directly from the marsh, immediately incubated, and measured ambient rates. In ambient and control cores, N-fixation rates were significantly greater in the low compared to the high N-load site. In the transplanted cores, N-fixation rates were altered, likely responding to the change in nutrient regime. Denitrification rates were greater at the high N-load site in the ambient and control cores and there was no clear effect on denitrification in the transplanted cores. In all cases denitrification dominated in both sites, which signifies the marshes likely act as a sink for anthropogenic N.

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WATER COLUMN NITRIFICATION FROM SHORE TO SHELF
Nitrification is the two step microbial mediated oxidation of ammonium (NH_4^+) to nitrite (NO_2^-) and then to nitrate (NO_3^-). Nitrification provides a crucial link between reduced and oxidized forms of nitrogen in the marine environment. Another ecologically significant role of nitrification is providing the substrate, NO_3^-, needed for denitrification. Denitrification, the microbial conversion of NO_3^- to inert dinitrogen (N_2) gas, acts as a natural filtering mechanism in marine systems. Additionally, autotrophic nitrifying microbes compete with phytoplankton for NH_4^+ within the photic zone, and thus can affect rates of primary production. Numerous studies have shown that rates of water column nitrification vary with environmental conditions, including NH_4^+ concentration, dissolved oxygen, temperature, depth, and pH. The goal of this research is to determine how water column nitrification rates vary along an anthropogenic N-loading gradient from Narragansett Bay to the continental shelf break. We also wanted to determine the relative importance of environmental variables regulating water column nitrification rates. Samples were collected from four sites up to two times between May and August 2012. Using stable isotope ^{15}N tracers, we directly measured rates of ammonium and nitrite oxidation separately. These are the first measurements of water column nitrification in Rhode Island Sound and the New England continental shelf break.

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DEVELOPING A GIS-BASED SITE SUITABILITY INDEX FOR RESTORATION OF THE EASTERN OYSTER, *CRASSOSTREA VIRGINICA*
Reef formations of the Eastern Oyster, *Crassostrea virginica*, provide significant ecosystem services and social benefits, including denitrification, enhancing water clarity, creating benthic habitat, and protecting the shoreline. Despite their significance, oyster reefs are declining due to loss of suitable habitat resulting from water quality degradation, coastal development, destructive fishing practices, overfishing, and storm impacts. In order for oyster restoration efforts to be successful and sustainable, it is necessary to select sites that support long-term growth, survival, and reproduction of oysters; to do so a habitat suitability index is utilized. The suitability index combines environmental variables known to restrict the growth, survival and reproduction of *Crassostrea virginica* (such as salinity, substrate type, sedimentation environment, and dissolved oxygen content) and enters them into a weighted rank model which classifies a given site as optimal, suitable, or unsuitable for oyster restoration. Geospatial data of the environmental variables will be entered into a GIS, allowing maps highlighting the potential suitable and unsuitable areas to be generated. The model will then be field validated, and selection of optimal restoration sites can proceed. This method enables restoration efforts to focus in on potentially ideal locations, decreasing time spent in the field surveying. The ongoing methods for this project, which focuses on Narragansett Bay and the salt ponds of Rhode Island, as well as the future plans, will be discussed.

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SIM DATABASE: A DATABASE FOR THE INTEGRATED MANAGEMENT OF SHELLFISH WILD, RESTORED, AND FARMED POPULATIONS
Multiple factors can severely impact shellfish populations, with serious biological, social, and economic consequences. Despite intensive efforts in the monitoring of shellfish populations, there are no consistent mechanisms for storing, managing, and analyzing the data, constraining the ability to reliably monitor restoration efforts and shellfish management on a local, regional, or national level. As a result, shellfish restoration practitioners have recognized a pressing need to build a strategy to better manage shellfish restoration efforts and monitoring, including coordinated data management between different agencies. In partnership with the Rhode Island Shellfish Technical Working Group, we have developed a relational database and graphic user interface for storing and managing oyster population data. The Shellfish Integrated Management Database has the capacity for systematic data capture, storage and management

of shellfish monitoring data, disease surveys, and management of data pertaining to commercial aquaculture such as hatchery source and genetic broodstock. This effort provides a framework for better management of shellfish restoration efforts, including data storage and coordination, regional and habitat prioritization and goal setting, systematic ecological monitoring protocol of restoration sites, and provides a model for how the shellfish community can coordinate to pro-actively increase the success of oyster restoration.

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EELGRASS (*ZOSTERA MARINA*) MITIGATION: HABITAT SUITABILITY AND OUTCOMES
Eelgrass (*Zostera marina*) is a limited habitat resource in coastal Massachusetts and particularly in Boston Harbor. Expansion of a runway safety area at Boston-Logan International Airport by the Massachusetts Port Authority caused impacts to 1.5 acres of eelgrass, prompting need for mitigation. Our work to select appropriate eelgrass planting locations built on two recent mitigation projects, completed in 2009, associated with construction of the Hubline Natural Gas Pipeline. Both studies were based on modified versions of the Preliminary Transplant Suitability Index model, focusing on physical site characteristics such as light availability, wave energy, depth and substrate to identify eelgrass transplant sites. Our study used the outcome of transplanting tests from these studies to refine the site selection model and plan for greater uncertainty in light availability due to sustained high sea-level, increased cloud cover, rain and turbidity. Using available GIS data, six primary and three backup locations were chosen for field investigation. At each site, bathymetry, side-scan sonar, sediment texture, manual water depth, and light availability data were collected, and the model was rerun with site-specific data. Two of the primary sites were found to possess suitable conditions for eelgrass; one was chosen for full planting and the other for test planting in 2011. Post-planting monitoring revealed that eelgrass was not established to project specifications. Eelgrass establishment was likely limited due to several factors including weather and sediment quality. These results indicate the need for more refined site-specific data in eelgrass restoration.

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CHARACTERIZING THE INFLUENCE OF THE GREAT 2010 FLOOD ON CIRCULATION, FLUSHING AND CHEMICAL TRANSPORT IN NARRAGANSETT BAY
Nearly 20 years of current meter data in Narragansett Bay has produced a consistent picture of circulation style within the estuary and exchange pathways with the shelf waters of Rhode Island Sound. These data show how important wind and runoff events are in modifying background flow and flushing patterns, particularly within the northern, impacted regions of Narragansett Bay. In late March, 2010 a large flood event hit Rhode Island, with discharge exceeding 450 CMS through the Blackstone Rivers. Fortunately, we had 20 current meters deployed in the Providence River during this event. We combine these results with a series of Regional Ocean Modeling System (ROMS) simulations of 3D circulation and transport in Narragansett Bay to characterize the long-term impacts of the flood on the estuary. A total of 16 different dyes, one for each major river and waste water treatment facility (WWTF) discharging to Narragansett Bay, are employed as chemical tracers in the ROMS simulations. Observations and models show distinct hydrodynamic zones within the Providence River which strongly influence flushing rates for the estuary. ROMS simulations are also used to characterize transport pathways through, and accumulation zones within, Narragansett Bay for each of the distinct river and WWTF dyes. Comparisons between flood simulations and cases with normal discharge show the residence time of the flood within different sub-regions of the Bay persists for 10-30 days. Results highlight how Greenwich Bay is influenced by remote chemical sources and, interestingly, show the inner basin of Greenwich Bay experiences the longest lasting effect from the Great Rhode Island Flood of 2010.

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LANGUAGE BARRIERS: THE SCIENCE OF TRANSFORMING MONITORING DATA INTO ENVIRONMENTAL MANAGEMENT INDICATORS

The difficulty of translating scientific research and monitoring activity into sound management policy is a topic of increasing focus in regional, national, and international scientific meetings. Balancing the need for concrete objectives, milestones, and thresholds, in order to effectively communicate the need for, and effectiveness of legislation or management action against the high degree of uncertainty which is often present in scientific analysis can often be problematic. The Long Island Sound Study (LISS) seeks to work within this context by creating and monitoring a suite of indicators for changes caused by climate and other human activities. These indicators range from water quality parameters and populations of keystone or representative species, to population, land use, and critical habitat restoration metrics. By working with a suite of indicators, the LISS aims to effectively communicate the status and trends in the ecology of Long Island Sound while also assessing the success of recent management actions and the susceptibility of the ecosystem to future perturbation. We will review this technique by using field data on hypoxia and eutrophication from 2011 and 2012.

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GREEN HOUSE GAS FLUXES FROM SALT MARSHES ALONG A NITROGEN GRADIENT IN NARRAGANSETT BAY, RI

We measured greenhouse gas fluxes (carbon dioxide, methane, nitrous oxide) at three different coastal salt marshes along an anthropogenic nitrogen gradient in Narragansett Bay. We tested pilot warming tents that aimed to simulate the effect global warming will have on salt marsh biogeochemistry. Our field sites were located in Apponaug Cove (High N load) and Passeonkquis Cove (Intermediate N load)in Warwick, Rhode Island and Fox Hill Cove (Low N load) in Jamestown, Rhode Island. Gas fluxes were measured in early and late summer in 11-12 plots (5-6 in the upper marsh and 6 in the lower marsh) at Fox Hill and Passeonkquis; at Apponaug no upper marsh vegetation was present (6 plots only). Our results show that in the early summer, the most pristine salt marsh had the largest CO2 uptake rates (up to 24 mg CO2 m-2 h-1), while the sites with intermediate and high N loads had either smaller uptake or CO2 emissions (up to 28 mg CO2 m-2 h-1). Nitrous oxide fluxes were mostly small but at Fox Hill, they ranged from emissions of 46 umol N2O m-2 day-1 from the high marsh zone to consumption (-103 umol N2O m-2 day-1) in the low marsh. Possibly due to N enrichment, N2O emissions at Passeonkquis were observed in the low marsh. Along with gas sampling; pore water nutrients, soil salinity, soil moisture, pH, plant surveying, average height and density were also measured in each marsh. Relationships to gas fluxes are being explored.In late summer, we also compared gas fluxes measured using discrete sampling and gas chromatography to those obtained with in-situ analyzers (cavity ring-down spectrometers; Picarro and Los Gatos Research). Those method comparisons will be discussed for interpreting salt marsh ecosystem function.

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CHANGING PUBLIC PERCEPTIONS ONE OYSTER AT A TIME

Shellfish restoration has become a growth industry in the last two decades with many communities, research institutions and non-profit organizations combining a desire to execute a particular project with volunteer energy to accomplish the task. In the process, everyone gains an education. For the project proponents it can be the joys and frustrations of working with volunteers; for academics it can be imparting text-book knowledge to people with practical knowledge and life-experience; for the volunteers it can be gaining a completely new perspective of marine ecology and what it takes to grow shellfish or build a reef. For communities dealing with the effects of estuarine nutrient loading, shellfish can act as

partial ameliorators at least until such time as land-based solutions are put in place though restoration projects are not usually framed in that manner, but rather as projects to increase the supply of shellfish, the filtering capacity of the shellfish an added bonus. A pilot project begun in Orleans, MA through the Orleans Pond Coalition proves the point as volunteers embarked on a voyage of discovery to grow a small number of oysters at a land-based upweller facility. As the oysters grew and the need for field grow-out became apparent, the group learned about best practices for shellfish restoration and the issues surrounding shellfish aquaculture on a larger scale.

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COASTAL CURRENT EFFECTS ON PRIMARY PRODUCTION RATES AND IMPLICATIONS FOR ECOSYSTEM DYNAMICS IN MASSACHUSETTS BAY
Based on our conceptual model, oceanographic and meteorological variables were analyzed with primary production rates to determine if concurrent changes in the environment were responsible for reduced production rates in Massachusetts Bay. Primary production rates were measured from 1992-2010 in Massachusetts Bay and Boston Harbor for the Massachusetts Water Resource Authority's outfall monitoring program. In 2003, annual primary production rates decreased 221-279 g C m^{-2} $year^{-1}$ with decreased rates continuing through 2010. Our study has indicated that a stronger influx of low saline waters from the western Maine coastal current (WMCC) into Massachusetts Bay might be responsible for the decreases in production in recent years. The WMCC appears to have become fresher from increased Maine river discharges and influx of Labrador Subarctic Slope Water into the Gulf of Maine. More northeasterly winds in recent years provided favorable conditions in assisting the WMCC intrusion into western Massachusetts Bay. While hypothesized that increased stratification resulting from fresher surface waters had resulted in reduced vertical mixing and nutrient concentrations in surface waters for phytoplankton growth, there were no significant correlations between stratification and surface nutrient concentrations. However, the correlations of primary production to surface salinities and stratification suggest the impact of the WMCC on production rates. Reduced production rates in Massachusetts Bay seem to have affected grazers and benthic pelagic coupling in summer months, as zooplankton abundances, benthic ammonium fluxes and sediment oxygen demand all simultaneously decreased.

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CONTRASTING MICROPLANKTON ABUNDANCE AND COMPOSITION DURING POPULATION BLOOMS OF *MNEMIOPSIS LEIDYI*
The ctenophore *Mnemiopsis leidyi* A. Agassiz is an ecologically-important gelatinous predator in temperate coastal environments. Their populations consist of lobate adults and cydippid larvae. Since larval *M. leidyi* depend on microplankton for prey, the abundance and composition of microplankton may regulate the timing and magnitude of ctenophore blooms and subsequent recruitment into mesozooplankton-feeding adults. Ctenophore population data were used alongside mesozooplankton and microplankton abundances to investigate the potential for top-down control by *M. leidyi* on the planktonic community in Great South Bay, NY. Field data suggested significant top-down control of mesozooplankton and microplankton during peak abundances of adult and larval *M. leidyi*, respectively. Certain microplanktonic taxa exhibited substantial decreases following the highest abundances of larval ctenophores. Abundances of dinoflagellates declined by 45% and 56% and abundances of aloricate ciliates declined by 83% and 97% in the week following peak abundance of larval ctenophores in 2008 and 2009, respectively. Furthermore, the dramatic reduction of mesozooplankton during the bloom of adult *M. leidyi* resulted in a cascading effect on microplankton, and to a lesser extent nanoplankton. Correlations between high adult *M. leidyi* /low mesozooplankton with high microplankton abundances were identified, and preceded the increase in ctenophore larvae. These findings suggest that blooms of *M. leidyi* result in a feedback system, in which intense feeding activity by adults on mesozooplankton releases certain microplankton taxa from grazing pressure, enhancing prey conditions for larval ctenophores.

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ASSESSING THE POTENTIAL IMPACTS OF OFFSHORE WIND FACILITIES ON BIRDS: IN THE BEGINNING
The marine renewable energy industry (MREI) has seen dramatic growth in Europe, particularly the expansion of offshore wind energy. In North America, onshore wind facilities developed rapidly, while there still are no offshore wind facilities. This is expected to change, as a number of large-scale offshore wind projects are in the final stages of approval. Thus, there is a pressing need to understand the potential impacts of MREI on natural resources including avian populations. Since 2009, we have been conducting a baseline assessment of avian use of marine waters for the Rhode Island Special Area Management Plan (SAMP). This is the first application of the SAMP process to an offshore, ocean ecosystem. We adopted a quantitative, relatively large-scale approach for assessing seasonal variation in the spatial distribution and abundance of birds that reside in the Ocean SAMP study area. We combined this with more focused satellite-telemetry studies that provided information on the spatial ecology of a few key species. Several major challenges remain: how can we effectively integrate such information from the full suite of natural resources, including birds, to inform decisions about where to place offshore wind facilities, and how will we work with the MREI to assess the effects of offshore wind facilities on our natural resources?

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BROOD PROVISIONING AND TOTAL FORAGING TIMES IN AN INLAND AND COASTAL COLONY OF GREAT BLUE HERONS (*ARDEA HERODIAS*) IN MAINE
Life history theory proposes that individuals adapt to meet the demands of their environment; i.e. reduction of annual breeding performance to increase chances of adult survival (Millon et al. 2010; Nevoux et al. 2010). Great Blue Herons (GBHE) (*Ardea herodias*) nest in a variety of habitats, the main distinctions being inland versus coastal. Inland sites can be in swamps, forests, and wetlands, whereas coastal (island) sites are typically densely wooded with rocky shores. This study is concerned with the brood provisioning behaviors within each of these habitat types. Do prey delivery rates and total foraging times of GBHE's in coastal and inland colonies differ and how may these factors affect chick survival? Animals behave differently depending on their environment; therefore we would expect the brood provisioning behavior of a coastal colony to be highly tide dependent whereas an inland colony foraging in nearby lakes and streams may not have the same restrictions. Two colony sites were chosen as the main focus of this study; an inland colony in Bridgton, ME and a coastal colony in Brunswick, ME. Behavioral data, focusing on prey delivery rates for brood provisioning, foraging duration, number of chicks hatched per nest, and the number of fledglings per nest, were gathered from April 14-July 18, 2012. Chick and fledgling counts from GBHE colonies throughout the state of Maine were gathered by Heron Observation Network volunteers and will be used in this study. If similarities and/or differences in GBHE behaviors are observed within the inland and coastal colonies then this will help inform the Maine Department of Inland Fisheries and Wildlife in the future management of this species of special concern.

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MACROALGAL ABUNDANCE IN NARRAGANSETT BAY AND COVER CHANGES FOLLOWING HURRICANE IRENE (2011)
Abundance and distribution of ephemeral, unattached, nuisance macroalgae species may provide an indicator of water quality in shallow, temperate coastal waters. Narragansett Bay, a eutrophied estuary located in Rhode Island, experiences symptoms of high anthropogenic nutrient loadings such as the loss of seagrass species, localized hypoxia, and blooms of phytoplankton and macroalgae. Mandated reductions to sewage treatment plant discharge in the state of Rhode Island are expected to improve water quality in the Bay. In order to establish a baseline for seaweed cover and measure ecosystem response to nutrient reductions, the Narragansett Bay Estuary Program began conducting surveys of near-shore subtidal and intertidal macroalgae along western Narragansett Bay in 2006, using oblique, true color

aerial photography. Analysts visually determine macroalgae percent cover using qualitative categories. Percent cover data for 21 aerial flights from 2006-2011 were analyzed. Results indicate that green macroalgae coverage tends to decreases in a down-bay gradient, while red macroalgae coverage increases from the head to the mouth of the Bay. Average macroalgae surface cover for all flights was 4.29 km2, or 24% of the 17.6 km2 surveyed area. Several hotspots for growth were identified, including northern Conimicut, Stillhouse Cove, and Riverside in the Providence River, where targeted harvesting could potentially limit blooms. Hurricane Irene, which hit Rhode Island on August 28, 2011, removed large quantities of seaweed from the Bay, yielding a 57% drop in macroalgae density and the lowest recorded cover of any flight.

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WHAT AN *ASTRANGIA* PLACE TO SETTLE!
Astrangia poculata is the only scleractinian found along the northeast coast of the United States. In the Long Island Sound, this temperate coral has a slow growth rate and occurs in low abundances, yet inhabits varying depths, salinities, temperatures, light intensities, flow rates, and on various substrates. Until recently *A. poculata* has been observed on rocky substrates and occasionally on empty bivalve shells. Recent observations have demonstrated *A. poculata* colonies on two previously undocumented organisms in Long Island Sound: chains of the relatively sessile Atlantic Slippersnail, *Crepidula fornicata*, and the motile Spider Crab, *Libinia emarginata*. Multiple *A. poculata* colonies were found scattered on *C. fornicata* chains of varying sizes. Colonies present on *L. emarginata* were located on the carapace and in close proximity to the mandibles. Colonies were only present on females of similar size with the majority being highly decorated and gravid. At this time sample size of both species is limited (*C. fornicata*, n = 10 and *L. emarginata*, n = 31), but data collection will continue throughout the year to increase sample size.

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NEW GREEN INFRASTRUCTURE AND FLOODPLAIN RESTORATION IN AN URBANIZED WATERSHED OF THE HUDSON RIVER ESTUARY: HOW MUCH IMPROVEMENT CAN WE GET FOR HOW LITTLE AREA MODIFIED?
A major difficulty of improving water quality in direct-to-estuary urbanized watersheds is that much of the floodplain, riparian zone, and near-stream zones have been extensively modified and built upon for decades to centuries, so green infrastructure modifications to moderate runoff volume and quality are greatly constrained by either available space for restoration or the cost of acquiring space in an urban setting. We are monitoring the Fonteynkill, a small tributary of the Casperkill, which drains directly to the Hudson River estuary, for discharge, nutrients, conductivity, coliform bacteria, and benthic macroinvertebrate communities in preparation for construction of a new building that will span the stream. Parts of the construction project will remove an existing parking lot in the riparian zone, divert roof and street runoff to vegetated detention ponds, and replace aging sanitary sewer lines that cross and run along the stream. The stream presently has a predominance of pollution-tolerant invertebrates, coliform levels that far exceed health standards, elevated chloride and conductivity levels from decades of de-icing road salt applications, and a very “flashy” storm hydrograph. We will assess responses of these factors during construction phase and continue through post-construction and restoration phases to determine if the modifications to runoff yield improvements in those measures of stream quality prior to entering the Hudson estuary.

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MEASURING TIDAL WETLAND RESPONSE TO RESTORATION USING PERFORMANCE BENCHMARKS FROM LOCAL NATIONAL ESTUARINE RESEARCH RESERVE REFERENCE SYSTEMS

The ability to fully evaluate the success of salt marsh restoration efforts suffers due to a lack of appropriate reference sites and standardized sampling methdologies among projects. To help address these issues, the National Estuarine Research Reserve System (NERRS) and the NOAA Restoration Center engaged in a three-year partnership to monitor ecological responses and evaluate the success of 17 salt marsh restoration projects funded with Estuary Restoration Act Funds. Participating reserves include Narragansett Bay (RI), Wells (ME), South Slough (OR), North Carolina (NC), and Chesapeake Bay (VA). The goals of this study were to 1) determine the utility of using long-term marsh monitoring sites within Reserves as reference sites for local marsh restoration projects, 2) determine the level of restoration achieved by each project, 3) identify key vegetation (biotic) and hydrologic (abiotic) indicators that best explain variation in restoration response, and 4) compare response of hydrologic and excavation/fill types of restoration. Results from our study indicate that NERR marshes can serve as appropriate long-term reference sites for local tidal wetland restoration projects. Our study also shows that the recently formalized Restoration Performance Index (RPI), which compares change in select variables over time between reference and restoration sites, is an effective tool for measuring restoration success, and that two abiotic variables (elevation of the marsh platform and depth to groundwater) are significantly correlated with plant community structure and thus provide important indicators of tidal wetland restoration performance. These results will help improve the evaluation of future marsh restoration efforts.

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METALS, MUD, AND THE NITROGEN CYCLE – THE IMPACT OF MN AND FE ON SEDIMENT N_2 FLUXES IN A TEMPERATE MARINE ECOSYSTEM
Both biotic and abiotic pathways can remove nitrogen (N) from marine waters. A particularly important N removal process is denitrification which transforms nitrate to dinitrogen (N_2) gas. During summer in coastal systems, when nitrate concentrations are low, this process is often tightly coupled to nitrification (the two step oxidation of ammonium to nitrate). However, there are other lesser constrained N removal processes. Specifically, both manganese (Mn) and iron (Fe) react with nitrogen to form dinitrogen (N_2) gas in a process typically referred to as chemo-denitrification. In this study we measured sediment concentrations of Mn and Fe in both particulate and dissolved forms within the pore water as well as the fluxes of these metals across the sediment-water interface. We focused our study on four sites along a gradient of high (Providence River Estuary) to low (Continental shelf) anthropogenic impact. These are the first measurements of Mn and Fe in Rhode Island Sound. We will relate these metals to concurrently measured sediment N_2 fluxes at these sites. In addition, to examine possible historical changes in Narragansett Bay, we compare these recent metal data to those collected over three decades ago.

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LEAF LITTER DECOMPOSITION AND PROCESSING IN A CARIBBEAN MANGROVE FOREST AND ITS IMPLICATIONS FOR CARBON SEQUESTRATION
Mangrove ecosystems are highly productive coastal wetlands that provide ecological services on local and global scales. Mangroves are potential sites of carbon sequestration due to this high productivity and efficient carbon storage within tree and leaf biomass. An essential process for carbon sequestration is organic matter processing, which includes macro-invertebrate shredding and microbial decomposition

activities. This study investigates the effect of macro-invertebrate (e.g., crabs) shredder activity on the rate of leaf litter decomposition and processing. Fallen leaves of *Rhizophora mangle* were collected from three sections within the Jobos Bay National Estuarine Research Reserve (Aguirre, Puerto Rico) in a fringing mangrove forest. Collected litter was deployed in mesh bags that excluded macro-invertebrates or bundled by monofilament to allow for macro-invertebrate shredder activity. Litterbags and leaf bundles were incubated on the mangrove platform surface and buried in crab burrows. Replicates were removed at intervals up to 24 days. The rate of litter processing was determined by mass loss of leaves and shredder activity was measured by loss of leaf area. While no significant loss of leaf material due to microbial decomposition was observed within the 24-day incubation, a significant effect of macro-invertebrate shredding on the mangrove platform and within the crab burrows was observed. These results illustrate the major role of macro-invertebrate activity for organic matter cycling in a coastal mangrove forest.

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EFFECTS OF NUTRIENT ENRICHMENT ON SPATIAL AND TEMPORAL PATTERNS OF BENTHIC COMMUNITIES IN SOUTHEASTERN MASSACHUSETTS ESTUARIES
The effects of nitrogen enrichment on the benthic communities in 57 southeastern Massachusetts estuaries were examined over a five year period. We quantified the spatial distribution of benthic species and their relation to summer nutrient related water quality and determined the role of temporal changes in dissolved oxygen in structuring benthic communities. Physical and chemical characteristics were sampled biweekly from summer to early fall over multiple years and used to calculate concentrations of total nitrogen, chlorophyll-a, and dissolved oxygen. Benthic grabs were collected in 777 sites during the late fall from 2004-2008 to detect variations in benthic communities within environments displaying a wide range of nutrient enrichment. In 2007 and 2008 additional grabs were collected in early spring at selected sites to bracket the critical summer period of potential low oxygen in order to capture changes in species diversity associated with hypoxic events. Our results indicated that nitrogen enrichment and dissolved oxygen levels were closely linked to habitat quality and that a threshold exists above which benthic communities show declining diversity and shifts to stress tolerant opportunistic species.

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WET ATMOSPHERIC DEPOSITION OF NO_3^- AND NH_4^+ IN NARRAGANSETT BAY FROM 1988-1996
Atmospheric deposition of N is an important, but often overlooked piece of an estuarine N budget (estimated to be 5-40% of N along the east coast). In 1992 to 1996, wet DIN (as NO_3^-, and NH_4^+) deposition data were collected from Prudence Island, Narragansett Bay, Rhode Island and the Graduate School of Oceanography, Rhode Island. An analysis of [NO_3^-] and [NH_4^+] versus flux (μmol N m^{-2} per rain event) and flux versus rainfall (mm) for both Prudence Island and the GSO sites shows that fluxes of both NO_3^- and NH_4^+ are dependent largely on rainfall amount, not concentration of the N species within the rainfall. Comparison of the Prudence Island and GSO data yield no significant differences between the sites (NO_3^-: $p = 0.95$, $n = 221$; NH_4^+: $p = 0.90$, $n = 221$). Therefore, the two stations are treated as one data set. The largest component of atmospheric deposition in Narragansett Bay is wet deposition of NO_3^- (1.9 mmol N m^{-2} y^{-1}). The yearly average of DIN wet deposition is 3.0 mmol N m^{-2}. This data set was combined with previously published data collected on Prudence Island from 1998-1990 and then compared with monthly total rainfall amounts. Results showed no rainy season in Narragansett Bay, however, a small seasonal trend in wet atmospheric deposition may be present.

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BACTERIAL TRENDS IN THE METTATUXET SUBWATERSHED OF THE PETTAQUAMSCUTT ESTUARY OVER A PERIOD OF TWENTY YEARS
This study looks at trends in bacterial levels in a subwatershed of the Pettaquamscutt (Narrow) River Estuary, located in southern Rhode Island. The Narrow River Preservation Association conducts a River

Watch water quality monitoring program. Volunteers go biweekly to take water samples for analysis, from May till October, at fourteen different stations in the Pettaquamscutt estuary. As of 2012, the program has continued for twenty years, which provides the opportunity to see long term trends. This study utilizes the temporal scope of these data to look at trends in bacterial levels at the station at Mettatuxet Beach, including the impact of precipitation and construction events on bacterial levels in this subwatershed. While the dataset contains a multitude of parameters, including nutrients, salinity, temperature, and chlorophyll, bacteria has been chosen for this study because it is the parameter that is used to determine shell fishing and swimming closures. Since 1992, this program has measured fecal coliform, but in 2007 the state changed their criteria for closures, since then enterococci has also been included. By choosing the station at Mettatuxet beach, our study looks at how bacterial levels can change based on the changes in development over the twenty year period in this subwatershed, as well as see the influence of a storm water management system (also known as Best Management Practice, or BMP) installed in 2006. This study reflects the impact these different events can have on bacterial levels in this subwatershed and potential trends in the estuary as whole, and the value of citizen water quality monitoring programs to the scientific community.

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ASSESSING SPATIAL ACCUMULATIONS OF OPPORTUNISTIC MACROALGAE IN S.E. MASSACHUSETTS ESTUARIES
New England estuaries provide essential feeding grounds and nursery habitat for commercially important fish and shellfish species. However, this function is being altered by a recent shift in estuarine plant dominance. Slow growing long-lived benthic species (e.g. eelgrass) are being replaced with fast growing opportunistic species. Opportunistic macroalgae are capable of fast growth and thick accumulations. These accumulations shade seagrasses, smother benthic habitats, wash up on shores and lead to low dissolved oxygen concentrations in bottom waters. We hypothesize that dense opportunistic macroalgal accumulations are controlled by increased nutrient enrichment and decreased hydrodynamic energy regime. To test this hypothesis we conducted macroalgae surveys in S.E. Massachusetts estuaries to quantify the level of accumulation within systems of differing nutrient concentrations and residence times. To address the influence of hydrodynamics, we conducted a macroalgae tidal flux. Our results indicate that there is a gradient in macroalgae species due to nitrogen enrichment and hydrodynamic energy regime. This research has implications towards the management of estuaries affected by dense macroalgal populations.

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HISTORY THROUGH THE LENS OF SEAGRASS SCIENCE
The evolutionary history of seagrasses 100 and 65 mya occurred during the break-up of Pangaea with current seagrass species distribution resulting in part from that reordering of the Earth. Documentation of seagrasses began in Europe with Linnaeus (1735) while early locations of eelgrass in the USA are found on navigation charts from the 1800s (Nixon et al. 2007). Studies of seagrass ecology began with Ostenfeld (1908) and expanded exponentially through the late 1900s to include the landmark papers of H.T. Odum and Hoskin (1958) and Nixon and Oviatt (1972). In the year 2008 alone, 3300 seagrass papers were published. Seagrass research has expanded from early descriptive studies to detailed botany and onward in many directions including molecular investigations and global ecosystem models. Science since then has clearly demonstrated the impacts of human activity on seagrasses and the health of estuaries with dredging, sedimentation and nutrient loading progressively causing seagrass demise. Scott Nixon initiated much of coastal and estuarine ecology, the dynamics of nitrogen processes, and of course, seagrass science to address these topics; his students and academic descendants continue these efforts. The cutting edge of seagrass science today includes studies of ocean acidification and “estuarine basification”, a term Scott generated that highlights the role of seagrasses and other marine plants in reversing acidification, as well as global climate change, genetics, carbon sequestration, and all the issues at the management-science interface which must be addressed to preserve the global seagrass ecosystem.

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SOIL SCIENCE AND OYSTER AQUACULTURE IN RHODE ISLAND - SUBAQUEOUS SOIL MAPS AS A TOOL FOR SPATIAL PLANNING

For over a decade, soil scientists have been mapping estuarine habitats throughout Rhode Island as subaqueous soils. These subaqueous soil maps incorporate USDA-NRCS soil mapping and characterization standards to stratify coastal estuaries into dominant soil landscapes. The soils approach to classify shallow subtidal-habitats is now recommended in the national Classification of Marine and Estuarine Standards (CMECS) when use and management interpretations are the goal. Since 2008, the Laboratory of Pedology and Soil Environmental Science at URI has been conducting field experiments to test the effect of soil type on the growth rates and survival of eastern oysters *Crassostrea virginica* within coastal lagoons and embayments. These experiments are revealing significant differences in growth rates and survival among soil landscapes, indicating that soil landscapes are important when considering economic return associated with aquaculture development. Oyster aquaculture within the state of Rhode Island is expanding, and has proven to be an economically viable alternative to wild oyster harvest. In 2011, Rhode Island aquaculturists produced over 4 million oysters, valued at nearly $2.5 million dollars, or over $17,000 per acre under production. A majority of these farms are located on a select few soil landscapes demonstrating the high ecological and economic value of these soils. Given the increasing use of the coastal zone, and the associated anthropogenic stressors to coastal habitats, further characterization and study of these soil landscapes will provide managers with a valuable suite of tools for spatial planning and resource utilization from ecological and economic perspectives.

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CHARACTERIZING HYPOXIC EVENTS FOR AN ASSESSMENT TOOL FOR MANAGERS WITHIN NARRAGANSETT BAY, RI

Seasonal intermittent hypoxia events with the potential to threaten ecological health are measured in Narragansett Bay, RI from June-September. The Narragansett Bay Fixed-Site Monitoring Network (NBFSMN) was created to analyze the spatial and temporal distribution of hypoxia in Narragansett Bay. This network is instrumental for managers and scientists to determine potential influences management strategies have on water quality improvements related to low oxygen events within Narragansett Bay. The data generated from this network are used to characterize and analyze these intermittent events based on forcing factors. Based on previous work, these hypoxic events (daily average oxygen < 2.9 mg O^2/L) are correlated with river flow. Years with higher numbers of hypoxic events have anomalously large summer seasonal river runoff and/or high spring/summer temperatures. Years with the lowest temperatures and low flow from river runoff are correlated with the fewest hypoxic events. The time-series records for 10 years (2002-2012) of temperature, salinity, and dissolved oxygen records at near-surface and near-bottom depths are examined during low flow years. The low flow years will be examined to see if there is any relationship that can be drawn between events (durations/intensity) and implemented nitrogen nutrient reduction designed to improve water quality with respect to the hypoxia issue.

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COASTAL ECOLOGY: A MIXING ZONE OF THE NIXONIAN MIND

A presentation focused on Scott Nixon's irreverent reverence for science and a vision both futuristic and unmoved by the trendy.

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HALINITY IN COASTAL SOILS
Ocean-derived soil salinity, or halinity, is an important environmental characteristic determined by the frequency of tidal flooding and reflected in salt marsh vegetation. Halinity decreases moving away from the open ocean and moving towards fresh water sources. Tides deliver salts, sediments, oxygen, and organic matter which fuel tidal ecosystems. This added energy creates marsh productivity of up to 1000 grams square meter-1 which breaks down to ultimately feed our shellfish and finfish populations (Warren and Fell 1998). The purpose of this study is to investigate soil conductivity (EC) lab methods and develop soil halinity classes from samples taken along the Connecticut River. Once established, these classes will be used in the National Cooperative Soil Survey technical references to help land owners and decision makers formulate better informed decisions about land use. This presentation will discuss the background, field and laboratory methods, and findings of the study as well as its relation to the rest of Connecticut's ecosystems.

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ACHIEVING WATER QUALITY STANDARDS BY IMPLEMENTING SUSTAINABLE ESTUARINE HABITAT RESTORATION AND AQUACULTURE PROJECTS
When imposing new NPDES limits on sewage plants, regulatory officials are often quick to offer historical perspectives that detail how estuarine waters were "fishable and swimmable" before the sewage plants were built. Unfortunately, regulators rarely review the complete historical record regarding the estuary to holistically evaluate all the causes attributable to water quality impairments before imposing new standards, and sustainable solutions are rarely adopted. This is the case for upper Narragansett Bay. In the early 1900s, maps of the urban waterfront clearly detail acres of wetlands and an estuary rich with productive oyster beds and eel grass. By overlaying a current GIS map it is evident man has filled acres of wetlands and productive bay areas to construct roads and berths for shipping. Urban rivers were channelized, a deep shipping channel was dredged and the rivers silted up with sand runoff from our roads. These physical changes have dramatically altered the hydrologic circulation patterns of upper Narragansett Bay, eliminating vital wetlands and seriously degrading water quality. Sewage facility upgrades to remove nutrients and improve oxygen levels have cost multi-millions of dollars, increasing electric and chemical demand, user rates and doubling the facilities' carbon footprint. Unfortunately water quality standards are still not expected to be met. A more sustainable nitrogen reduction solution is to implement an ecosystem based watershed management approach, incorporating responsible sewage plant upgrades, selective dredging, construction of new wetlands to redirect and improve circulation patterns, and development of upper bay aquaculture to restore once productive lower bay fisheries.

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DEVELOPMENT AND APPLICATION OF A LONG ISLAND SOUND GIS-BASED EELGRASS HABITAT SUITABILITY INDEX MODEL.
Seagrass (including eelgrass, *Zostera marina* L.) has been identified as a valuable habitat and an indicator of good water quality. In some areas, seagrass is used to identify criteria for watershed management, setting load limits that are protective of seagrass habitats. In an effort to preserve and support the growth of eelgrass habitats, the Long Island Sound Study requested a GIS model for evaluating current and potential eelgrass habitats in relation to water quality and other habitat characteristics. The model employs bathymetry and tidal range as a first estimator of suitable area, assuming an adequate level of light must reach the bottom for eelgrass to be successful. Habitat characteristic data available from a variety of sources were used to rank areas within Long Island Sound, based on literature values of suitable ranges in each parameter. These parameters included the percent of light reaching the bottom, sediment characteristics (grain size, organic content), oxygen, temperature, and data on human use of near shore waters (mooring fields, aquaculture leases, etc.). Development of the Sound-wide model is complete.

Validation of the model and application to a number of case study sites is underway. The model results will assist with targeting restoration activities to suitable areas and will assist with identifying barriers to restoration throughout Long Island Sound.

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ARE TIDAL FLATS FUNNY? NITROUS OXIDE FLUXES AND THE WETTING AND DRYING OF TIDAL FLAT SEDIMENTS

Nitrous oxide (N_2O) has a global warming potential approximately 300 times that of carbon dioxide, and it is the number one contributor to the depletion of stratospheric ozone. In marine systems N_2O is produced primarily during nitrification and denitrification, however, denitrification can also consume nitrous oxide. As one of these processes is aerobic (nitrification) and the other anaerobic (denitrification), the amount of N_2O they emit is thought to be controlled partly by oxygen as well as inorganic nitrogen concentrations. For this reason, marine systems with varying oxygen and nutrient availability are likely to experience fluctuations in nitrous oxide emissions. In this study we measured N_2O fluxes from a salt marsh tidal flat in Rowley, MA, part of the Plum Island Estuary Long Term Ecological Research site. Using microelectrodes we measured N_2O and O_2 profiles at high temporal and spatial resolution over the drying and rewetting of two tidal cycles. While we observed a wide range of N_2O fluxes, the tidal flat was a net sink of nitrous oxide with an average flux of -3.73±2.7µmol N_2O m^{-2} h^{-1}. However, we did observe emissions of N_2O, the largest (12.18µmol N_2O m^{-2} h^{-1}) of which occurred within the first 20 min of drying. Additionally we measured the affect of nutrient addition on N_2O fluxes, and found that emissions increased >4x under a 70uM nitrate addition. Though these systems currently act as net sinks of N_2O, it appears that increased anthropogenic N loading could turn them in to a source of this potent greenhouse gas.

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DISTRIBUTION AND RELATIVE ABUNDANCE OF *MNEMIOPSIS LEIDYI* ALONG A DOWN-BAY WATER QUALITY GRADIENT IN NARRAGANSETT BAY.

Jellyfish have the ability to negatively impact marine environments through voracious predation, high levels of recruitment, and their ability to tolerate areas of poor water quality. When conditions are favorable, these organisms also tend to aggregate in high densities. These “blooms” quickly decimate prey populations, as well as cause nuisances for humans. Examining jellyfish at a local scale is extremely relevant to Narragansett Bay since the region is susceptible to hypoxia during the summer months and has a vulnerable fishery, making vulnerable if jellyfish populations increase. There has been extensive documentation of changes in the timing and abundance of jellyfish blooms in the bay between the 1970s and 2000. Therefore, it is important to understand how trends in local biophysical factors correlate with the timing, abundance and distribution of these blooms. The abundances of gelatinous zooplankton in Narragansett Bay, as well as zooplankton abundance, water temperature, salinity, and dissolved oxygen were studied at three sites forming a down-bay water quality gradient. These observations were compared to past data to determine how blooms may be changing due to physical and biological shifts in the bay. Although data collection is still ongoing, bloom patterns this year appear to be unrelated to surface water temperature, the major driver for blooms in previous years. Thus, another factor, most likely lowered food availability, has displaced water temperature as the strongest driver of jellyfish abundance in the bay. Continued data collection will help to determine how this significant biological shift will alter the ecology of the bay.