QUEBEC-LABRADOR FOUNDATION
Atlantic Center for the Environment

1995-2015

The Sounds Conservancy

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QLF MISSION STATEMENT

QLF exists to promote global leadership development, to support the rural communities and environment of eastern Canada and New England, and to create models for stewardship of natural resources and cultural heritage that can be shared worldwide.

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Photograph by Candace Cochrane

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Photograph by Candace Cochrane

Back Cover Photograph: *Western tip of Vineyard Sound, Martha's Vineyard, Massachusetts*
Photograph by Candace Cochrane

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Photograph by Candace Cochrane

LETTER FROM THE PRESIDENT

It is hard to believe that The Sounds Conservancy has been part of Quebec-Labrador Foundation/Atlantic Center for the Environment (QLF) well over a decade. When its Founder, Chris Percy, and I sat down in the early 1990s to discuss the idea of his organization joining forces with QLF, never did we dream that it would grow to what it has become today.

The four Sounds Conservancy endowment funds now total more than $1 million and of that, a small percentage is disbursed in annual installments through The Sounds Conservancy Grants Program. On an average, the program provides 40 grants each year. Now, there are hundreds of budding young marine scientists, educators, policy specialists, and environmental journalists who have been helped along in their career quest.

One of the earliest grantees, Helen Hays, is in her 45th year working to conserve the Common Tern and Roseate Tern nesting on Great Gull Island off the Connecticut coast. After four decades, Helen's work is the definition of *longitudinal* research. She spends her "off island" months on the staff at the American Museum of Natural History in New York City. Helen has lately been using Sounds Conservancy support to develop wildlife stewardship exchanges—in Argentina and Brazil—between North and South America, the tern migration route. The Sounds Conservancy Program, like others at QLF, is connecting conservationists in our home region with those in regions far distant.

I want to thank all those who have helped us along the way to keep Chris Percy's dream alive. Through individual assistance, family foundations, corporate support, and program sponsorships, The Sounds Conservancy continues to expand its efforts.

Each November, former Directors of The Sounds Conservancy meet to learn the latest news about the program's accomplishments. Any organization would be fortunate to have had such dedicated leadership. I suspect Chris knew that these men and women would continue their personal involvement long after QLF took over the management of The Sounds Conservancy. And they certainly have.

I acknowledge them here:

Mr. W. Campbell Hudson

Mr. Chester W. Kitchings, Jr.

Mr. Kenneth O. Kitchings

Dr. G. C. Matthiessen

Ms. Penelope C. Sharp

Mr. Prentice K. Stout

Congratulations to all for an important reference for all those interested in the health and future of the Sounds and in coastal and marine conservation.

Larry Morris
President

Fall 2015

ACKNOWLEDGEMENTS

THIS PUBLICATION HONORS THE 20TH ANNIVERSARY OF THE SOUNDS CONSERVANCY with the Quebec-Labrador Foundation. The publication notes the research and accomplishments of Sounds Conservancy Grantees over the last twenty years, and documents marine research, advocacy, outreach and education on these subjects: Rivers and Watersheds; Bays and Estuaries; Coastal Marshes; Intertidal Zone; Subtidal Zone; Environmental Education; and Marine Legislation.

The Sounds Conservancy is a natural fit for QLF as it complements our historic work in community-based conservation. QLF believes that individuals make a difference and that is why we invest in our Alumni in our home region (New England and Eastern Canada) and beyond. In this publication, you will read of the accomplishments of hundreds of Grantees. Each is making a difference in marine conservation, research, and environmental education.

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This publication represents the collective effort and commitment by QLF Staff, Consultants, and Interns.

I extend my gratitude to former summer staff member, Henry Hatch, for his tireless efforts to shepherd this project to its completion.

I also wish to acknowledge former QLF staff members Charles Hildt and Grace Weatherall, for their writing and editing. I extend my appreciation to Adrianne Brand and Constance de Brun, who as former Interns wrote a publication documenting the first five years of The Sounds Conservancy Program. Those narratives are incorporated in this publication.

A special recognition of Kailani Acosta, Elizabeth Hopkins, and Agnes Simon for their work as Editors of this publication. And I extend my appreciation to the publication's Photography Editors, Chris O'Book and Kevin Porter for identifying the photographs and illustrations for this publication.

A special thanks to Candace Cochrane, former QLF Senior Consultant, Culture and Heritage Programs, for her photographs of the Sounds and coastal waters of southern New England and New York.

With great appreciation and thanks to Greig Cranna, QLF's Photojournalist who has spent the past two decades documenting the work of Helen Hays of the American Museum of Natural History. For nearly a half century, Helen has tracked Common and Roseate Terns on Great Gull Island off the coast of Connecticut, and Punta Rasa, Argentina. Greig Cranna's photographs of Helen's work on Great Gull Island and Punta Rasa are in this publication.

I extend my gratitude to Kevin Porter, QLF Webmaster, for the design of The Sounds Conservancy pages on the QLF website: www.QLF.org

A special thanks to Stephen Engle, QLF Senior Consultant, Community and GIS Mapping, who has constructed an interactive website for all program grantees. The link to the website, The Sounds Conservancy Grants Explorer, is: http:// tsc.qlfmaps.org

I remain grateful to Debbie Hird for her gifted, artistic vision and graphic design so apparent in all the work she does for QLF.

And with thanks to our printer, RAM Printing (New Hampshire), one of the first in New England to purchase Forest Stewardship Council (FSC) certified paper and print products that contribute to the conservation responsible management of forests.

And finally, I am deeply grateful to the funders of this publication who share in our belief in the intrinsic value of the documentation of marine conservation, research, and environmental education along the Sounds of southern New England and New York. This publication is made possible with the generous support of the Rockefeller Brothers Fund, the Chester Kitchings Family Foundation, and the donors of The Sounds Conservancy. None of this would be possible without you.

With heartfelt appreciation to one and all,

Elizabeth Alling
Executive Vice President

THE SOUNDS CONSERVANCY


Chris Percy

THE SOUNDS CONSERVANCY was founded by Chris Percy in 1984. An ardent environmentalist, Chris Percy was committed to the conservation of the estuaries and coastal waters of the six Sounds of southern New England and New York (from Long Island Sound to Nantucket Sound); and the protection of its marine ecosystems. Upon Chris Percy's retirement in 1995, QLF assumed the assets of The Sounds Conservancy. At the time he remarked, "QLF is a natural fit for us. What we've done will continue to grow and prosper."

Chris Percy died suddenly and unexpectedly in 2002. In his honor, QLF remains steadfast in continuing Chris Percy's vision, commitment, and dedication to the conservation and protection of the Sounds. To this end, The Sounds Conservancy directs a small grants program to fund marine research, advocacy, conservation, and education. In a given year, The Sounds Conservancy awards up to 40 grants to graduate students and professionals affiliated with leading academic institutions and organizations along the Sounds.

We are mindful that a bright future for the Sounds must involve all stakeholders. Our approach has been to develop a program that builds on Chris Percy's commitment to the conservation of the Sounds, and by sharing research and innovations, brings together marine researchers, scientists, educators, and enthusiasts who share a common dedication to the bays, estuaries, harbors, rivers, and coastal waters of the Sounds.

THE QUEBEC-LABRADOR FOUNDATION

THE QUBEC-LABRADOR FOUNDATION/Atlantic Center for the Environment (QLF) is a not-for-profit organization in the U.S. (incorporated in 1963) and a registered charity in Canada (1969). With its headquarters in Ipswich, Massachusetts, QLF has an office in Montreal, Quebec, and Field Desks throughout New England and Atlantic Canada. QLF has a Staff of twenty with Consultants. QLF has a Board of Directors in the U.S. and Canada, Honorary Directors, and a Council that serves as an Advisory Board.

QLF's Mission is defined in two parts: a regional component (New England and eastern Canada), and an international component, which ties our regional model to a global network; that is, *to promote global leadership development, to support the rural communities and environment of eastern Canada and New England; and to create models for stewardship of natural resources and cultural heritage that can be shared worldwide.*

Over five decades, QLF has been a model of what cooperation can achieve: politically, between two countries; geographically, within a bioregion; and locally, among the mixture of religious denominations and ethnic identities, which make up the rural population of eastern Canada and New England.

QLF began as an organization providing community service and leadership programs for young people living in isolated fishing communities along the Quebec-Labrador coast. In the mid-1970s, programs were expanded both geographically and programmatically when QLF offered residential conservation camps and experiential outdoor leadership opportunities for youths, adults, and families. In 1977, the Atlantic Center for the Environment was created to develop environmental programs throughout the home Region—New England and Eastern Canada.

More than thirty years ago, QLF realized its regional programs could be an effective model as countries overseas looked for ways to address environmental issues over an international border. In 1981, QLF created its International Programs to foster an exchange of experience and conservation innovation among organizations and individuals in other regions that face similar challenges and opportunities. Today, our program model of cross-border, bioregional conservation is shared beyond our home region of New England and eastern Canada with conservation leaders in Europe; Central and Southeastern Europe; Latin America and the Caribbean; the Middle East, North Africa, the Gulf States; and Southeast Asia.

Binding all programs together is QLF's commitment to leadership development through community service; community-based conservation; and stewardship of natural resources and cultural heritage.

THE SOUNDS CONSERVANCY GRANTS PROGRAM
1995-2015

Rivers and Watersheds

RIVERS AND WATERSHEDS are essential in the hydrologic cycle: the continuous movement of water on, above, and below the surface of the earth. Sounds Conservancy grantees have studied the impact of development near coastal waters, dams along New England rivers, and pesticides and fertilizers that flow into rivers and watersheds. What follows are abstracts of the research of grantees who have taken measures to assess such environmental impact, and protect rivers and watersheds.

Brendan Annett (2003)
Anadromy and Genetic Relationships in Remnant Anadromous Brook Trout Populations
Marine Program, Boston University

Historically, anadromous Brook Trout were a common and valuable resource in the waters along the southern New England coast, and prized for angling and eating. Overfishing and habitat loss have contributed to the decline of Brook Trout, particularly at the southern end of their range. Populations in New England and Long Island have been significantly reduced.

Brendan Annett, Manager of the Stewardship Program at the Waquoit Bay National Estuarine Research Reserve, documented the salt water migration and genetic diversity of remnant populations of sea-run Brook Trout in coastal waters of southern New England and Long Island. Annett sampled scale and fin tissues from Brook Trout in six streams draining to Nantucket Sound, Buzzards Bay, and Long Island Sound. Genetic relation between anadromous and resident fish from the same stream, wild and hatchery stocks, and regional stream populations was quantitatively compared. Annett shared his results in journal publications and workshops sponsored by the Waquoit Bay National Estuarine Research Reserve.

Peter August and Janice Sasi (2015)
Ecological Reconnaissance of the Napatree Lagoon
Chair, Watch Hill Conservancy and Manager,
Napatree Point Conservation Area, Watch Hill Conservancy

The lagoon at Napatree Point formed following the Hurricane of 1938 and is now a defining feature of the Napatree Point Conservation Area (NTPCA) landscape. It is the western extent of the barrier dune ecosystem and is designated a Nationally Important Bird Area (IBA) by the Audubon Society. Furthermore, the lagoon is a critical habitat for juvenile horseshoe crabs. Despite its prominence on the Napatree landscape and its importance to biodiversity, surprisingly little is known about the lagoon. In 2014, Peter August and Janice Sasi began a long-term assessment of the lagoon. The 2014 study focused on abiotic factors with the goals to map the bathymetry, survey the subaqueous soils, and assess the water quality.

In 2015, biological monitoring will assess nekton diversity (fish, invertebrates), assess the composition of epifauna and infauna in the subaqueous soils, and monitor algal composition and abundance. In addition, water quality will be continually monitored. These results will provide insight into lagoon dynamics that support populations of federally endangered Piping Plover, Least Tern, American Oystercatcher and Osprey, as well as horseshoe crabs and other organisms that rely on the lagoon for habitat and food.

Along four randomly selected transects, Peter August and Janice Sasi will conduct monthly surveys for algae at low tide and nekton at high tide. Algae will be identified to the species level and mass will be recorded. Nekton will be identified to the species level and total length measured. WHC will continue water quality monitoring as part of the URI Watershed Watch program. Results will be reported in the annual State of Napatree Report, included in a manuscript for peer reviewed publication, presented at local science conferences and incorporated into the WHC education and outreach programs.

Maria Iliana Ayala (1996)
Protozoans as Indicators of Pollution Level
Yale School of Forestry & Environmental Studies

Biologists in Europe and Latin America have created a saprobic index that correlates protozoan species (microscopic, single-celled organisms) with levels of pollution. Each protozoan species has a different resistance to pollution, and the abundance of protozoan species, or saprobic indices, in aquatic environments can impact water quality. These indices had not yet been applied in the United States when Iliana Ayala used protozoans to determine water pollution levels of the West River in New Haven, Connecticut, as a part of her Master's research.

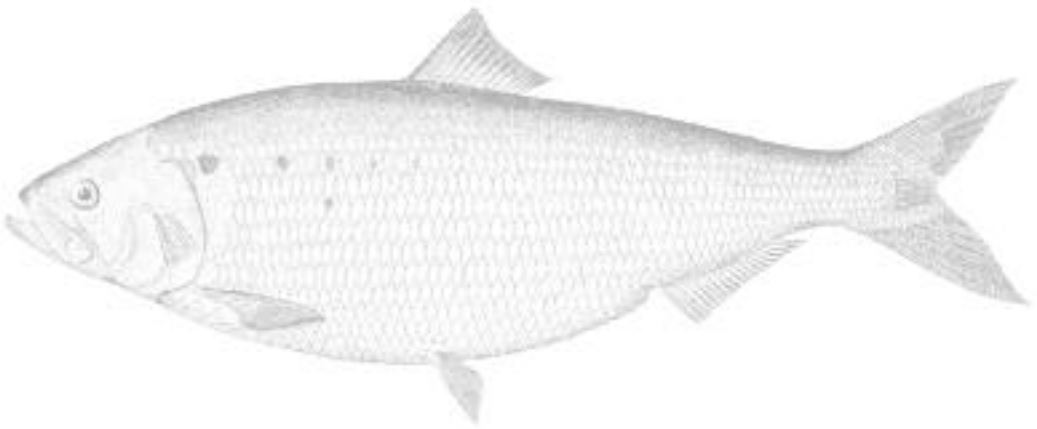
Ayala measured the abundance and variety of the protozoan populations at nine sites along the river, and applied the European saprobic index to classify the pollution level. To evaluate the accuracy of her classification, Ayala tested levels of dissolved oxygen and ammonia, which are the standard chemical tests for pollution.

In her Master's thesis, Ayala identified the pollution hot spots of the West River noting that saprobic indices are a useful technique to qualify pollution levels in aquatic environments in New England. Using protozoans is an effective way to determine water safety. Ayala's results were referenced in the creation of a watershed management plan to improve water quality in Long Island Sound. Saprobic indices can also be used to evaluate sewage treatment performance and to facilitate regulatory decisions.

Karen Baar (2011)
Green Infrastructure Project 2011
Connecticut Fund for the Environment/ Save the Sound
New Haven and Bridgeport, Connecticut

The Connecticut Fund for the Environment (CFE), led by Director of Grants Karen Baar, sought a grant for the purpose of supporting an intern for the Save the Sound Green Infrastructure (GI) Project. The project goal was to help the cities of New Haven and Bridgeport pioneer the use of GI in city neighborhoods to prevent raw sewage and stormwater from polluting Long Island Sound. GI mimics the natural ability of forests and wetlands to absorb and/or filter stormwater runoff, helping to prevent sewage overflows, creating more greenery and cooling urban neighborhoods. City street infiltrator-planters, rain gardens and green roofs are examples of GI strategies. Studies in other cities, such as Portland, Oregon, show that GI also creates jobs and strengthens the city's economy.

In order to facilitate GI implementation, CFE hired an intern from Yale University's School of Forestry and Environmental Studies to research possible challenges and approaches and prepare a report. With the GI team, the intern worked to develop critical components of a GI business plan designed to supercharge green infrastructure delivery. The research objectives of this project included lessons learned from cities like Seattle and Portland, where neighborhood-scale GI projects have already been built. Since accurate cost estimation was not yet well defined for GI projects, the research also aimed to use project cost data from cities where neighborhood-scale projects have been built in order to develop a cutting-edge tool that will be



available to professionals nationally. Other research objectives included economic benefits of GI to both private landowners and to cities and GI marketing. While some GI projects can be completed on publicly-owned property, neighborhood-scale projects depend on recruiting, selling and enlisting private property owners in the retrofitting of their roofs, parking lots and garden areas. The intern examined the most successful private landowner economic incentives and GI marketing tools and the broader citywide, regional and national outreach and media techniques that spur demand for GI expansion both within cities and the wider Long Island Sound watershed.

John Bean (2000)

The Importance of Organic Forms of Nitrogen to Coastal Pollution
University of Connecticut at Avery Point

Nutrient pollution is common in eutrophication, harmful algae blooms, dead zones, fish kills, shellfish poisoning, and the loss of seagrass, kelp beds, marine mammals, and seabirds. More than 60 percent of our coastal rivers and bays in the continental United States are moderately to severely degraded by nutrient pollution.

The presence of nitrogen is a limiting factor in the growth of marine plants and supplying more nitrogen can stimulate excessive growth of phytoplankton or seaweed. Most studies of the effects of nitrogen in coastal regions have measured only inorganic forms of nitrogen. John Bean, an undergraduate student majoring in Coastal Studies at the University of Connecticut at Avery Point, learned that organic compounds containing nitrogen have an impact on coastal ecosystems.

Bean analyzed environmental water samples for the Coastal Environmental Lab, including inorganic chemical nutrients. His research involved learning the methods to analyze organic nitrogen, incorporating this analysis into the protocols, and making the first measurements of organic nitrogen in the Niantic and Pawcatuck Rivers, of which both are located in Connecticut. Test results enhanced educational programs and community-based conservation as it pertains to water quality and the ecological health of coastal waters.

Michael Bednarski (2006)

Biology of the Thames River's Unique Wintering Aggregation of Striped Bass
Queens College

The Thames River flows into Long Island Sound and Fishers Island Sound in New London, Connecticut, and is home to a larger population of Striped Bass. The Thames River does not support reproduction by Striped Bass; it supports a dense population during the cold months of the year. The densest part of the aggregation is found in the Norwich region where the Yantic and Shetucket Rivers meet, and fishermen have been known to land more than 100 stripers there per trip.

Relatively little is known about the wintering biology of the Striped Bass. Michael Bernardski, a Master's candidate at Queens College, studied the winter aggregation of Striped Bass in the Thames to observe the movements of individuals in relation to its salinity and temperature characteristics. He applied ultrasonic tracking using six transmitters and the requisite receiving equipment, and acoustic storage transmitter tags to secure periodic real-time readings on the temperature, salinity, and the depth of individual specimens. Information from these tags was enlightening to the scientists studying this aggregation, and provided insight into the preferred habitat of these aggregated fish.

Sara Owen Bisson (2004)

Assessment of Heavy Metal Contaminant Levels, Transport Mechanisms, and Potential Health Impacts of Polluted Sediments
Yale School of Forestry & Environmental Studies

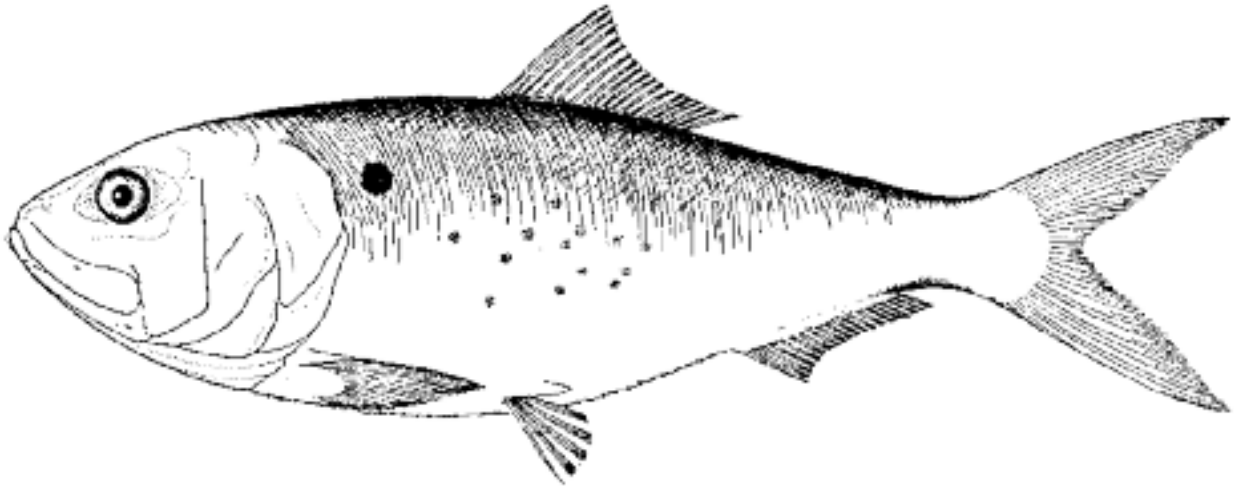
The Quinnipiac River is the largest of three rivers flowing through New Haven Harbor to Long Island Sound in Connecticut. Based on previous surveys of metals in sediments, New Haven Harbor has been found to be one of the most contaminated sites in Long Island Sound, in densely populated areas of the country.

Sara Owen Bisson, a Master's candidate in Environmental Management at the Yale School of Forestry and Environmental Studies, designed a study to capture the long and short-term sediment profiles of heavy metal contamination at the mouth of the Quinnipiac River, adjacent to a strip of industrial facilities along River Street on the Fair Haven waterfront. Her results were highly variable, and more research is needed to better understand the degree to which local point sources or non-point sources of metal pollution are responsible for high metal concentrations in this area.

Lindsay Brin (2007)

Land Derived Nitrogen Loads and Estuarine Sediment Denitrification: Tracking Human Inputs to Algal Blooms in a Cape Cod Estuary
Marine Program, Boston University

Anthropogenic inputs of nitrogen (N) have caused eutrophication and subsequent algal blooms in estuaries worldwide. Waquoit



Bay, in Cape Cod, Massachusetts, is frequently impacted by algal blooms that have had detrimental effects on its natural functions, often damaging the ecosystem's health. The Bay's discrete sub-estuaries receive varying land derived N loads, making it a fitting study site to determine the link between land use and eutrophication. Using her research on Waquoit Bay, Brin proposed to identify the proportion of N input removed by microbial activity and quantify the link between land-derived N loads and denitrification.

Studies indicated that land-derived N loads increase parallel to stable isotope ($\delta^{15}N$) values in salt marsh Cordgrass (*Spartina alterniflora*). $\delta^{15}N$ serves as an effective tracer of external N loads and it is believed that salt marsh sediment profiles can be analyzed for this isotope to determine whether they hold a record of increasing eutrophication. Brin measured microbial denitrification and dissimilatory nitrate reduction to ammonium in sediment cores from several sub-estuaries of Waquoit Bay, and membrane inlet mass spectrometry was used to estimate the balance between N fixation and denitrification. Data analysis allowed her to determine microbial activity and the link between N loads and denitrification. The results of this study help land managers advance the application of $\delta^{15}N$ as a monitoring device and also understand limits of microbial denitrification to ensure increased water quality.

Wendi Buessler (2012)

Improving Nutrient Sampling and Data to Keep Oyster Pond Healthy

Oyster Pond Environmental Trust Inc.

Oyster Pond, in Woods Hole, Massachusetts, is experiencing the negative impacts of excessive levels of nutrient inputs from septic systems and stormwater. The eutrophication of the pond is causing low dissolved oxygen levels, thus stressing aquatic life and reducing diversity of benthic animal communities. In 2005 the Oyster Pond Environmental Trust began water quality monitoring, measuring nutrients, salinity, temperature, dissolved oxygen, and turbidity, expanding on previous water quality programs by the Falmouth Pond Watchers and Massachusetts Estuaries Project (MEP).

In 2012, the OPET developed an integrated Quality Assurance Plan (QAPP) for the data collection. The integrated QAPP allowed OPET data to be compared to previous data series and insured quality of data. As a result, longer-term trends in water quality could be identified and used to evaluate future nitrogen management options and storm water improvements to Oyster Pond.

Julianna Connolly (2000)

Organic Carbon and Nitrogen Cycling in Coastal Soils

Williams College

Nitrate is the most commonly detected groundwater pollutant in the U.S. and is a cause of eutrophication in marine waters. Nitrogen concentrations in groundwater are usually several orders of magnitude higher than estuarine receiving waters, and nitrogen from contaminated groundwater has been linked to eutrophication of commercially and recreational coastal areas. Denitrification is common in coastal marine sediments and often removes a significant fraction of the nitrate load for coastal ecosystems. However, according to Julianna Connolly, Chemistry major at Williams College, the rate and efficiency of groundwater nitrate loss in the coastal fringe is unknown.

Patterns in aquifer nitrate contamination and denitrification are caused by differences in the availability of organic carbon. Connolly studied the availability of organic carbon in coastal sediment in three different landscape settings: low energy back lagoon basin, fringe salt marsh, and salt tolerant shrub border. These sites were selected because they contain a mechanism that facilitates interaction with organic matter and a sufficient flow of groundwater. Connolly's research helped to describe the factors that govern groundwater nitrate transport and loss in various geomorphic settings in southern Rhode Island.

Sean Corson (2000)

West River Connecticut Fish Ladder Feasibility Study

Yale School of Forestry & Environmental Studies

Anadromous fish such as the Alewife, Blueback Herring, and American Shad migrate yearly to spawning habitats in the rivers of southern New England. However, there are numerous dams on small rivers throughout southern New England that impede

the progress of anadromous fish. A fish ladder, a gradual declining water ladder adjacent to the dam, is one method of reconnecting fish with their natural spawning grounds.

The goal of Corson's project was to help the Connecticut Department of Environmental Protection make an informed decision about placing a fish ladder in the West River, where a gristmill dam stands as the primary barrier to anadromous fish passage to the spawning grounds in the upper West River watershed. Corson, a Master's student of Forest Science at the Yale School of Forestry and Environmental Studies, collected baseline information prior to the construction of a fish ladder at the site to define the benefits of a fish ladder. After numerous site samplings and water quality tests, Corson concluded that the majority of the herring in the river appear to be blocked from upstream spawning habitat by the dam and that once the fish ladder is completed, new spawning grounds will be available to them.

Julie Goodness (2009)

Efficiency of Wet Pond Best Management Practices in Removal of Nitrogen from Connecticut Stormwater
School of Forestry and Environmental Studies,
Yale University

Excess nitrogen loading caused by human activity can cause oxygen depletion and 'dead zones', or hypoxia, in aquatic ecosystems. Long Island Sound has been identified as an area susceptible to hypoxia due to stormwater runoff, which has caused the Connecticut Department of Environmental Protection to plan a 10% reduction in nitrogen runoff in Connecticut by the implementation of structural best management practices, including wet ponds. Wet ponds assist in cleaning stormwater runoff by letting harmful chemicals settle to the bottom, while also allowing natural biological reactions with algae to occur, which eliminates excess nitrogen in the water. Wet ponds are considered a cost effective and efficient way to treat stormwater runoff.

During the summer of 2009, Julie Goodness of the Yale School of Forestry and Environmental Studies, embarked on a project to determine if wet ponds can be implemented as an effective management strategy to reach a 10% reduction of nitrogen loading in Connecticut. She compiled a list of 40 wet pond sites of which she narrowed down to four; two having lower nitrogen concentrations, and two having higher nitrogen concentrations. Each wet pond was sampled after three consecutive storms, and flow and concentration were measured. Inflow and outflow samples were compared, and the differences were documented. Goodness shared the results of her study with the Connecticut Department of Environmental Protection, and calculated the amount of land that must be converted into wet ponds in order to achieve the 10% nitrogen reduction goal.

Torrance Hanley (2007)

Ecological Stoichiometry and Predation: Examining Life History Trade-Offs in Daphnia
Department of Ecology and Evolutionary Biology
Yale University

The removal of dams and the addition of fish ladders in streams of the northeast have restored the passage between marine and freshwater environments, allowing the passage of fish from ocean to lake to spawn. Declining populations of the anadromous Alewife *(Alosa pseudoharengus)* have benefited from these restoration efforts. However, the reintroduction of Alewives also impacts freshwater ecosystems that are opened up to them. Torrance Hanley, a Ph.D. candidate at Yale, investigated the consequences of this strategy.

Hanley concentrated on *Daphnia,* the dominant zooplankton grazer and keystone species in freshwater trophic cascades. He examined and compared changes in the growth and reproduction of *Daphnia* in samples from Bride Lake (accessible for Alewife) in East Lyme, Connecticut, and Linsley Pond (inaccessible to Alewife) in North Branford, Connecticut. Additionally, he recorded the carbon, nitrogen, and phosphorous content of algae and *Daphnia* from both ponds.

Linsley Pond was also host to Hanley's mesocosm experiment in which Alewives were added in differing densities and samples of algae were collected to measure changes in any of the factors mentioned above. His project showed the possible effects of the reintroduction of the Alewife into freshwater ecosystems and provided useful information to authorities creating marine management plans for these areas.

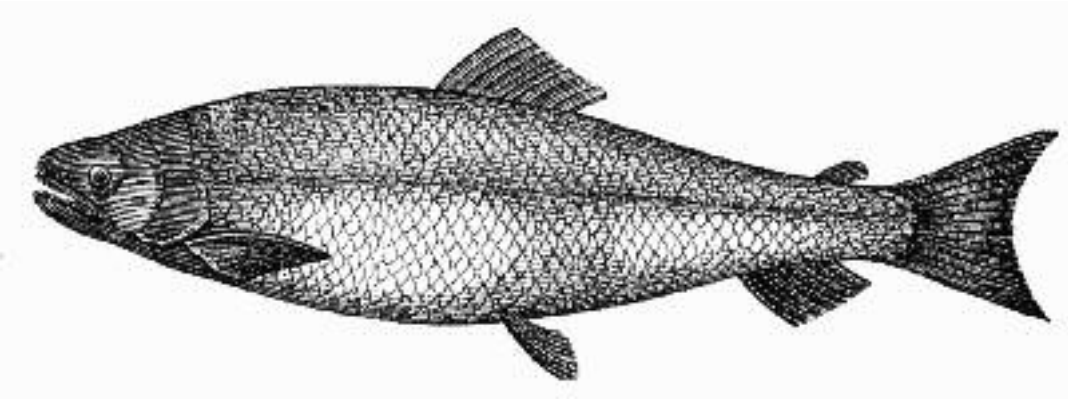
Ipswich River Watershed Association (2015)

Purchase and Operation of an Underwater Video Camera to Monitor River Herring and Other Fish during Spring Migration
The Voice of the River

The Ipswich River Watershed Association is the voice of the river, working to make sure there is enough clean water to meet community needs, while protecting fish, wildlife and nature. The Ipswich River plays a big part in making Ipswich a great place to live, work and visit. The Ipswich River Watershed Association serves over 300,000 people, visitors and thousands of businesses in 21 communities by protecting the Ipswich River as a vital source of drinking water and habitat for fish and wildlife.

The purpose of the video camera is to support the annual volunteer herring count, which takes place each spring at the Ipswich Mills dam fish ladder in Ipswich, MA. Volunteers perform ten-minute counts during the day, while looking down into the water, to record when and under what conditions herring migrate. Since 1999, numerous volunteers have performed a total of 5,000 individual counts towards this effort. A video camera will help to supplement this tremendous outpouring of community involvement and interest in the restoration of herring in the Ipswich River. The camera will aid the monitoring program and serve as a new outreach tool. Problem with visual counts include run size estimates that greatly vary from actual trap data collected by the Massachusetts Division of Marine Fisheries from 2006-2009, and the small and sporadic nature of the run as well as visibility issues at the counting size make it difficult to collect consistent results. A submerged camera and specialized software will make it possible to accurately monitor herring and other fish while being less intrusive and easier to deploy than a trap. The camera is also beneficial because the video can be streamed directly to a website, which is an effective and important means of outreach and education to protect and restore a healthy herring fishery.

Andrew W. Jones (2011)
Testing the Effects of Density and Resource Ability on Juvenile Alewife Foraging Patterns
Yale University
Lakes across New England



Anadromous alewives *(Alosa pseudoharengus)* are a species of great ecological importance because they strongly influence trophic levels above and below them. They are also a species of great conservation concern, due to their recent decline in southern New England. Despite this, relatively little is known about the ecological forces that affect juvenile foraging in freshwater. Thus, Andrew Jones conducted a controlled field experiment to test the effect of density on alewife diet sources and to determine how resource availability modifies this effect.

Juvenile anadromous alewife experience strong density dependent growth, therefore it is possible that density is a driver of their dietary patterns. Jones hypothesized that the depletion of pelagic zooplankton resources drives juvenile alewives to incorporate more littoral resources in their diets. Jones proposed to run a field experiment in the summer of 2011 in which juvenile alewife density and pelagic zooplankton abundance were manipulated. To this end, Jones established 14 large plastic film enclosures in a local lake and stocked them with a natural range of alewife densities. The natural density of zooplankton for the lake was replicated within each enclosure, and half of the enclosures were then supplemented with additional zooplankton. At the end of the experiment all fish were collected for dietary analysis. It was expected that the proportion of littoral prey would increase with density for all enclosures, and that the rate of increase would be faster in the un-supplemented set of enclosures.

The information collected from this study could help assist the assessment of possible ecological changes due to changes in alewife population. Additionally, these results could be used to refine existing nutrient budgets for lakes that anadromous alewife spawn in. The results of this study are to be disseminated in the form of academic publications as well as oral presentations for stakeholders.

Leslie Katz (1999)
Watershed Management Plan for the Great Salt Pond, Block Island, Rhode Island: Environmental History, Present Status, and Projections for the Future
Center for Environmental Studies, Brown University

Since the 1960s, increasing numbers of houses have been built along the shores of Great Salt Pond, Block Island, Rhode Island. During the summer, the 1,000-acre pond hosts as many as 1,500 motor boats per day. Only patchy records of fish catch exist, shellfish harvests are merely estimated, and trends in the pond's water quality and animal populations have not been documented. Many Block Island residents are concerned the Great Salt Pond is in danger.

Leslie Katz, a Master's candidate at Brown University's Center for Environmental Studies, worked to identify the most important factors influencing water quality and animal populations in the Great Salt Pond. She identified trends in these indicators and made projections for water quality, habitat, and space availability based on these trends. Katz examined historical records of human use of the Great Salt Pond watershed through dredging records, fishing logbooks, and town maps. She tested the Great Salt Pond's waters and surveyed the bottom to establish its condition.

Based on her projections for the future, Katz presented a management plan for the watershed to the Committee for the Great Salt Pond (a non-profit organization on Block Island), The Nature Conservancy, the Harbors Department of New Shoreham, and the New Shoreham Town Council.

Kevin Kroeger (1999)
Assessment of Groundwater and Streamwater Nitrogen Contamination from the Ashumet Valley Wastewater Plume
Marine Program, Boston University

Green Pond, an estuary on the south shore of Cape Cod in Falmouth, Massachusetts, flows into Vineyard Sound. Residents near the pond have noted changes in the estuary, including noxious algal blooms, mucky sediments, and declining populations of Quahogs, Blue Crabs, and finfish. Declining Eelgrass beds, species composition, and low dissolved oxygen levels were associated with an increase in nitrogen-loading from human activity on land. Green Pond has an intermediate annual land-derived nitrogen load, 60% of the load enters the pond from the northernmost portion of the watershed. Preliminary research suggests that 15-40% of that nitrogen may have originated from the Ashumet Valley wastewater plume.

Kevin Kroeger, a Ph.D. candidate at Boston University's Marine Program, collected further evidence that the wastewater plume contributes to changes in Green Pond. Kroeger measured nitrogen concentrations and isotope ratios in groundwater and streamwater entering from the northernmost part of the watershed. Nitrogen originating from forest soils and fertilizers has a different stable isotope ratio than wastewater. By comparing the data he collected with computer models of expected nitrogen loads, Kroeger planned to discover if the extra nitrogenis originates from the wastewater plume. He demonstrated the usefulness of this relatively rapid and low-cost technique for detecting wastewater contamination in groundwater and its contribution

to estuarine nitrogen loads. This research provided stakeholders with information on efficient ways of reducing nitrogen loads in Green Pond.

Anne LaFleur (1996)

Chester Creek Vegetation Survey and Management Guide
Chester Land Trust

In 1996, the most pristine freshwater tidal creek marsh of the lower Connecticut River was Chester Creek, located in Chester, Connecticut. Anne LaFleur identified, compiled, and evaluated information on the biological and physical characteristics of Chester Creek for the Chester Land Trust. She used aerial photographs, scientific reports, and historical documents to recount the human and geologic history of the area, current and past land uses, land cover, and the varying soil types at Chester Creek.

LaFleur also did an on-site evaluation by foot and by kayak, mapped vegetation patterns, described the submerged aquatic vegetation, prepared herbarium specimens, photographed and catalogued all plants, birds, fish, reptiles, and amphibians she found. Most exciting was the sizable population of Golden Club *(Orontium aquaticum),* state-listed as a Species of Special Concern. After evaluating her data, LaFleur discussed potential threats to the Chester Creek marsh including development, erosion, sediment accumulation, invasive species, and fecal coliforms. Her data and recommendations are used as guidelines for the conservation and management of this marsh system by the Chester Land Trust, local and municipal officials, and the Nature Conservancy.

Jennifer R. McCann (1995)

The Lieutenant River Watershed: Environmental Impacts and Monitoring Plan
Antioch University New England

The Lieutenant River is a tributary of the lower Connecticut River in Old Lyme, Connecticut, that empties into Long Island Sound. The Ramsar Convention (an international treaty that seeks to conserve wetland habitat important to migratory fauna) designated the river's marshes as Wetlands of International Importance, and the Nature Conservancy named the marsh as one of the "Last Great Places." However, despite the Ramsar Convention and the Nature Conservancy's efforts, new developments threaten this marshland habitat.

Jennifer McCann conducted a study of the Lieutenant River for the Connecticut River Watershed Council and the Old Lyme Conservation Trust to assess water quality, land use impacts, and design a monitoring plan. She studied publications, maps, and aerial photographs of the river before surveying its physical characteristics, wetland plants and aquatic life, and the land use patterns of the surrounding area. McCann tested the water quality at three sites using dissolved oxygen, fecal coliforms, pH, temperature, total phosphate, nitrogen, and turbidity.

McCann found that levels of fecal coliforms, phosphorous, and ammonia in the Lieutenant River did not meet Connecticut water quality standards. Her report explained the connections between water quality, land use, and ecosystem health, and prompted a continuing study by a professor at Southern Connecticut State University who did an in-depth review of the area. McCann's research also contributed to efforts aimed at improving the water quality of Long Island Sound and the Connecticut River.

Mark Mello (2000)

It's Your River: The Paskamansett/Slocums River Restoration Project
Lloyd Center for Environmental Studies

The Paskamansett and Slocums Rivers have their headwaters at the Acushnet Cedar Swamp, a National Natural Landmark. Its watershed lies within Dartmouth and New Bedford, Massachusetts. Dense Eelgrass beds once flourished at the mouth of the Slocums River in the southwestern part of Buzzards Bay. In 1992, Hurricane Bob destroyed much of this habitat. Mark Mello, Research Director at the Lloyd Center for Environmental Studies, implemented a restoration project aimed to restore a portion of this area. The project also focused on restoring the natural resources of the Slocums River estuary that had been impacted by elevated nutrient loads and development.

Working in collaboration with the University of New Hampshire, Mello was able to establish nine plots of Eelgrass at the mouth of the Slocums River. Growth and colonization of the Eelgrass was tracked and a baseline survey of benthic invertebrates and substrate conditions was completed. An educational program was also offered to school classes relating to environmental degradation and the steps taken to combat the loss of habitat and the loss of resources.

Sandra Millan-Tripp (2006 and 2008)

Video Production of the Natural Flow Hatchery Pilot Project for the Atlantic Salmon Restoration at Mill Brook
Tributary Mill Conservancy

The Tributary Mill Conservancy (TMC) is located in Old Lyme, Connecticut, on the Lower Mill Brook, its waters join into the Connecticut River. TMC is a scientific and educational corporation that focuses on preserving the Mill Brook ecosystem. They work with researchers and cooperate with other environmental NGOs and academics to educate the public about the importance of coexisting with nature and the conservation of our natural ecosystems.

As part of the Atlantic Salmon Restoration Program of Connecticut, TMC and the Department of Environmental Protection designed an experimental natural flow hatchery at the Old Grist Mill on the Lower Mill Brook between October 2004 and April 2005. Using power from the old mill, this pilot project hatched 96% alevines of 71,000 eyed eggs, and stocked 60% fry in the Eight Mile River, a tributary of the Connecticut River. Using video footage from this project, TMC created a 60 minute educational video on the incubation and successful hatching and stocking of Atlantic Salmon in a natural flow hatchery. This video is used in local schools.

The Department of Environmental Protection has asked TMC to double the output from 60,000 fry to 120,000 fry. As part of this project, the TMC has four cameras documenting the operations of their hatchery and desires to increase this number so that

schools and business have a seasonal look at the salmon eggs during the incubation process.

Rita Oliveira Monteiro (2008)

Effects of Land Use on Alewife Growth and Recruitment Using Biogeochemical Tracers in New England Estuaries
College of Environmental Science and Forestry
State University of New York

Populations of Alewife *(Alosa pseudoharengus)* have drastically diminished during the last half-century in New England waters and beyond. Degradation of spawning and nursery habitat due to intensified human activity in the watersheds surrounding vital freshwater habitat is one of many reasons for the loss of Alewife stocks. The linkage between land use and changes in the metrics of populations of this anadromous fish are important.

Rita Monteiro, a doctoral student at the State University of New York, performed a study of Alewife populations in five coastal streams of Cape Cod, two streams draining into Great Bay (New Hampshire), and two coastal streams in southern Maine to identify the impact of land use on fish populations. She analyzed available land use data and compared it to chemical signatures and elemental composition of otoliths of both juvenile and adult Alewives.

Monteiro's work provides a greater understanding of watershed-level processes and production of anadromous fishes, giving a new set of causal links between watersheds and coastal marine ecosystem functioning. Results from this study could allow land managers to adopt strategies for anadromous fish habitat. Monteiro's research was shared with the National Estuarine Research Reserves System.

Eric Montie (2003)

Environmental Contaminants and Neurodevelopment in Marine Mammals in Nantucket and Vineyard Sounds
Woods Hole Oceanographic Institution

Numerous species and populations of marine mammals exhibit high levels of polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCs) in blubber and other tissues. At sexual maturity, females transfer these burdens to offspring during pregnancy and lactation.

Eric Montie, a Ph.D. student in Biological Oceanography at the Woods Hole Oceanographic Institution/Massachusetts Institute of Technology, studied the effects of PCBs and OCs on the thyroid hormone system and neurodevelopment of marine mammals. He focused his study on Atlantic White-sided Dolphins *(Lagenorhynchus acutus)* and Harbor Seals *(Phoca vitulina)* inhabiting the waters of Massachusetts.

Montie performed contaminant chemical analysis to determine the brain regions that selectively retain PCBs and OCs. Plasma, liver, blubber, and brain samples from Atlantic White-sided Dolphins and Harbor Seals that had washed up along the beaches of Massachusetts were analyzed. Montie shared his information with the Environmental Protection Agency, National Marine Fisheries Service, and the National Institute of Environmental Health Science.

Eric Palkovacs (2004)

Fishways as a Method for Anadromous Alewife Restoration in Connecticut
Yale University

The Alewife *(Alosa pseudoharengus)*, like other anadromous fish, spawns in freshwater and migrates to the ocean where it lives its adult life. These spawning migrations make the Alewife an important link between marine, estuarine, and freshwater food webs along the Atlantic Coast. Populations have been declining since 1990 and are now at historically low levels, and anadromous Alewives living in the Sound are at risk of extinction.

Eric Palkovacs, a Ph.D. student at Yale University, investigated the effective impact of fishways for restoring Alewife populations in Connecticut. Two fish ladder installations allowed for spawning Alewives to access Rogers Lake in Old Lyme and Linsley Pond in North Branford. Small dam removal allowed Alewives to access inland waters. Palkovacs monitored the ecological effect of addition of Alewives to landlocked water systems. Palkovacs conducted Alewife sampling from 2004 through 2006. To help educate tomorrow's environmental professionals, Palkovacs involved high school students from the New Haven Sound School and Yale undergraduates in this project.

Suzanne Polmar (2002)

A Study of the Restoration of Anadromous Fish in the West River Watershed
Yale School of Forestry & Environmental Studies

In New England, river basins have been substantially altered for over three centuries by the construction of dams that has caused dramatic declines in native fish populations as their natural spawning runs have been obstructed. The West River, in south central Connecticut, is one example of these impeded spawning runs. The Center for Coastal and Watershed Systems at the Yale School of Forestry and Environmental Studies continued a study that began in 2000, and provided general life history attributes and baseline data before the Pond Lily Dam fishway was installed in 2001. This study was designed to compare the data to document the progress of restoration of anadromous species.

The results of the study provided temporal and spatial trends of anadromous fish spawning, habitat use data, migratory characteristics and trends in fishway use to other small, urban, coastal watersheds where restoration is being considered. The results were distributed to town officials, government regulators, and watershed associations.

Emily Russell (2010)

WRWA Internship
Bates College
Westport, Massachusetts

The Westport River Watershed Alliance (WRWA), is a nonprofit citizens group formed in 1976 to protect the natural resources of the Westport River and its 100 Square-mile watershed. The Westport River is confronted with serious problems associated with its water quality and status of habitat: bacterial contamination, excessive nutrient loading and the spread of invasive plants.

Portions of the river are categorized by the Commonwealth of Massachusetts as "impaired water bodies" due to pollution levels determined in the Clean Water Act. For seventeen years WRWA has conducted consistent fecal coliform bacteria monitoring of the Westport River, providing water quality data to the public and town agencies. Seasonal nutrient monitoring has been done for several years and monitoring of declining horseshoe crab populations began this spring. The WRWA's primary purpose and goals are to promote the environmental integrity of the Westport River watershed and its environs on Buzzards Bay and Rhode Island Sound, to advocate the wise use and preservation of the natural resources for the aesthetic, recreational, and economic benefit of watershed citizens, and to educate the general public about the interrelationship of our water, soils, plants, animals, and people.

For over 10 years, the WRWA has offered 12-week internships to college students. Most interns are natural science majors, and receive course credit for their work. They are paid a small salary that Sounds Conservancy grant program funding would help to support. Since 2008, the WRWA has worked with the Division of Marine Fisheries (DMF) to conduct monitoring program for Westport's horseshoe crabs. The interns play a key role in the field, conducting surveys using the DMF protocol. The interns also assists in the WRWA's school-based education program, the watershed Education Program (WEP), consisting of grade specific field studies, curricula, museum quality kits, teacher workshops, and classroom visits. Finally, the interns assist with the WRWA's monitoring program, attempting to accurately identify regions for the Westport River and its tributaries that continued to suffer from high levels of contamination. Monitoring these areas has led to the implementation of the best management practices to address water pollution problems. WRWA continues to monitor and expand its database because the data is used to evaluate the success of remediation projects.

Erika Schielke (2006)

Effects of Anadromous Alewife Restoration on Food Web Structure and Mercury Transfer
Department of Ecology and Evolutionary Biology
Yale University

The Alewife *(Alosa pseudoharengus)* is an anadromous fish that spends its adult life in salt water and returns to freshwater lakes to spawn in the spring. Dams and other man-made obstructions have blocked many Alewife spawning runs, but recently, fishways have been constructed allowing anadromous fish to circumnavigate dams and return to their spawning habitat. Erika Schielke, a Ph.D. candidate in Ecology and Evolutionary Biology at Yale University, believes that Alewife restoration has the potential to change food web dynamics in freshwater lakes, which could lead to elevated levels of mercury in the Alewife population through biomagnification.

Schielke determined the effects of Alewife-induced changes in food web structure on mercury concentrations in fish. She conducted a comparative study of lakes with and without Alewives by measuring algal biomass, zooplankton biomass, and food chain length, and also mercury concentrations in algae, zooplankton, and fish. Changes in these aspects in freshwater lakes can affect mercury biomagnifications. High levels of mercury in food can be harmful to human health, and therefore an understanding of Alewife restoration on fish mercury levels will benefit generations to follow.

Cornelia W. Twining (2011)

The Ecological History of Coastal Connecticut's Watersheds
Yale School of Forestry & Environmental Studies
Coastal Watersheds of Connecticut

The coastal watersheds that feed into the Long Island Sound have gone through profound changes from pre-colonial times to present. These ecosystems, previously driven by non-human organisms, such as anadromous fishes, are now driven and dominated by humans. However, the magnitude and timeline of this shift from non-human to human driven systems remain poorly understood. Cornelia Twining proposed to examine this major shift in ecological history of coastal Connecticut's watersheds through a combination of a paleoecological study and modeling.

Anadromous fishes are being restored throughout coastal Connecticut in lakes and streams that feed into the Long Island Sound. The effect of the restored runs of anadromous fishes on nutrient loading in these systems is unclear, however, as is the way in which this effect compares to nutrient loading associated with human land use. Having previously completed a study of the historical impact of anadromous fishes in coastal Connecticut watersheds, Twining wished to examine the effect of human development and modification of the landscape on watersheds in this region. Twining proposed to use the collected data to reconstruct historic nutrient loads and model projected future nutrient loads to watersheds in the region from both anadromous fishes and humans.

This study focused on four lakes that feed into the Long Island Sound. In each of these lakes, Twining examined changes in carbon stable isotopes from lake sediment cores, which provide an indication of land clearing and human land use change. Twining also studied changes in concentrations of two limiting major nutrients, phosphorus and nitrogen, which give estimates of nutrient loading to aquatic ecosystems over time. Finally, Twining dated sediment cores to create a timeline of major ecological events in the region's watersheds. Twining's data can facilitate a modeling of the way in which these ecosystems might change in the future as anadromous fishes continue to be reintroduced to the region.

Jonathan P. Velotta (2011)

Evolutionary Changes to the Osmoreaulatory System in Alewives (Alosa pseudoharongu) *Adaptive Physiological Responses to the Loss of Anadromy*
University of Connecticut
Storrs, Connecticut

Human-driven fragmentation of aquatic habitats has selected for dramatic life history shifts in anadromous fish that migrate between freshwater and seawater. Alewife populations in Connecticut provide a unique example of this phenomenon. Although ancestrally anadromous, multiple populations of alewife have been landlocked by the damming of access streams,

as recently as 300 years ago. Meanwhile, Connecticut alewife populations are declining. Physiological changes associated with land-locking may be particularly pronounced in anadromous fish such as alewives because of the multiple integrated physiological adjustments required for movement between salinity environments. These changes due to loss of migration likely involve rapid modification of the osmoregulatory mechanisms by which salt and water homeostasis are maintained. Changes in osmoregulation therefore, may serve as an indicator of the functional changes that are made in response to migration disruption.

Results of previous short-term salinity challenge experiments suggest that land-locking results in a reduction of seawater tolerance and a weaker response of several pathways involved in seawater osmoregulation. In his study, Jonathan Velotta conducted long-term salinity challenge experiments on multiple alewife populations in order to investigate the physiological changes in osmoregulatory performance associated with land-locking. Specifically, changes in the rate of mRNA transcription of several candidate ion-regulatory genes involved in osmoregulation were measured, because adaptive changes to the expression and regulation of genes may be a critical evolutionary process during transitions into new environments. Thus quantification of adaptive changes in expression of osmoregulatory genes yields insight into the adjustments associated with alewives' loss of seaward migration.

Velotta's results inform specific management issues regarding alewives in Connecticut, as restoration of fish passage between nursery habitat and the sea is considered for landlocked populations. The likelihood that opening a new habitat for migratory alewife will help to sustain Connecticut's populations depends in part on the degree to which landlocked residents have become physiologically distinct from the anadromous form. Yet such reintroduction is important to the ecosystem at large, because alewives, and other members of the genus Alosa, are important transporters of marine derived nutrients into coastal ecosystems. Thus the inhibition of anadromous migration is likely to represent a significant challenge to the functioning of coastal ecosystems.

Annika Walters (2006)

The Impacts of Anadromous Alewife on Nutrient Loading in Coastal Streams

Department of Ecology and Evolutionary Biology
Yale University

The Alewife *(Alosa pseudoharengus)* is an anadromous fish found in the coastal waters of New England. They spend most of their adult life in salt water and return to spawn in freshwater lakes during the spring. For years, dams have blocked many streams that link these freshwater lakes to the ocean, but recently fish ladders have been installed enabling Alewife to bypass dams and return to their spawning grounds. The reintroduction of Alewife into these coastal lakes, ponds, and streams could have a significant effect on nutrient dynamics, and the impacts of these changes need to observed and documented.

Annika Walters, a Ph.D. candidate in Ecology and Evolutionary Biology at Yale University, studied the impacts of marine-derived nutrients in coastal streams. She conducted her research at Brides Brook, a coastal stream on Long Island Sound that has one of the largest Alewife runs in Connecticut: 60,000 to 90,000 per year. She collected water samples to create a nutrient loading model for coastal streams based on Alewife excretion rates, and assessed nutrient uptake of the stream community by collecting invertebrates by using stable isotope analysis. Marine-derived nitrogen tends to have a higher stable isotope (^{15}N) signal, making it readily distinguishable from land-derived nitrogen. She also tested the natural process of leaf decomposition in the presence of nitrogen and phosphorus to determine the limiting nutrient in the study. Walters believes that nutrient loading is an important issue for coastal managers and that the impact of anadromous Alewife restoration on nutrient dynamics in coastal streams may improve coastal management policies.

William Jerry West, Jr. (1996)

Quinnipiac River Biodiversity Inventory

Yale School of Forestry & Environmental Studies

The Quinnipiac River, part of Connecticut's fourth largest river system, is an important resource for anglers, boaters, and hikers. Here, increasing urbanization has led to habitat and water quality problems through sedimentation, pollutants in storm water runoff, and water reallocation.

Jay West, a Master's student at the Yale School of Forestry and Environmental Studies, documented the biological resources of the Quinnipiac River watershed during a 13-week biodiversity inventory. West inventoried 11 wetland and riverside plant communities, identified species and noted percent cover, height, and sociability (whether the plant is solitary or lives in clumps). He identified 157 plant species representing 21 families, 13 amphibian and reptile species, and 1086 macroinvertebrates from over 55 families. Most surprisingly, he found two native freshwater mussel species that are rare in North America.

West's final report is a comprehensive guide to the biota of the Quinnipiac River as many of the areas he sampled had not been previously investigated. The Connecticut Department of Environmental Protection, the Connecticut Sea Grant Program, the Quinnipiac River Watershed Association, and Yale researchers working on the Quinnipiac River all benefit from his report. West prepared an educational slide show for the Quinnipiac River Watershed Association to increase the public's awareness for the watershed's rich natural resources and organized a series of workshops for Quinnipiac watershed residents.

Bays and Estuaries

BAYS AND ESTUARIES—partially protected from the ocean—provide a natural habitat and refuge for migratory birds, and serve as filters, diluting runoff of pesticides and chemicals. Of importance, estuaries form a transition zone between river and ocean environments, and the inflow of seawater and freshwater provides nutrients in the water column and sediment. Development and land use have had an adverse impact on the natural cycle of these waters. Over time, Sounds Conservancy grantees have collected data to identify point and non-point sources of pollution, the results of which are essential to construct and establish regulatory measures for the protection of bays and estuaries along the Sounds.

Andrew Altieri (2005)

Assessing the Full Impact of Oxygen Depletion on the Narragansett Bay Estuarine Community
Brown University

Hypoxia, a form of habitat degradation in which dissolved oxygen drops to stressful levels for aquatic organisms, is an emerging problem that has been plaguing coastal ecosystems of southern New England in recent years. One of the most striking examples of hypoxia is the "Dead Zone" of the Gulf of Mexico, a 27,000 square-km area at the mouth of the Mississippi River that is completely devoid of life due to high nutrient concentrations in the runoff from the Mississippi River watershed. While southern New England has not experienced anything comparable to this, hypoxia is an increasing threat to coastal ecosystems as populations rise and urbanization increases.

Andrew Altieri, a doctoral candidate of Ecology and Evolutionary Biology at Brown University, set out to gather a basic understanding of how hypoxia affects community structure in a marine environment by observing coastal ecosystems in Narragansett Bay, Rhode Island. His research tested the tolerances of dominant species of mussels *(Mytilus edulis)*, softshell clams *(Mya arenaria)*, and hardshell clams *(Mercenaria mercenaria)* to the effects of hypoxia, and monitored water quality conditions (e.g. dissolved oxygen, temperature, and salinity). He also conducted field experiments to determine if predation activity had declined in areas with low levels of dissolved oxygen. His findings advocated for stronger regulations against the discharge of wastewater, and were shared in public forums, professional meetings, and journals.

Donald M. Anderson (1999)

The Impact of Dredging Operations on Toxic Cyst Distributions and Subsequent Red Tide Blooms
Woods Hole Oceanographic Institution

Transporting shellfish and dredging activities has been known to cause the proliferation of toxic algal blooms in bays and coves. In Connecticut, it was proposed that clams be dredged up and moved from Mumford Cove to Palmer Cove, despite the threat that it could cause an algal bloom in Mumford Cove since *Alexandrium tamarense,* a toxic dinoflagellate, was previously discovered there. *Alexandrium* cells spend much of the year in sediments as dormant cysts, germinating in the spring to start blooms that can become red tides poisoning shellfish.

An expert on toxic algae and their resting stages, Donald Anderson of the Woods Hole Oceanographic Institution was asked to study the effects of dredging in Mumford Cove. Anderson took sediment cores from both coves prior to any dredging to determine the abundance and vertical distribution of *Alexandrium* cysts. Then he took cores in these coves immediately after the clam dredging to see if redeposition altered cyst profiles from those prior to dredging. The final stage involved taking core samples several months later, and before the spring bloom season.

This study answered some long-standing questions about toxic algal blooms that have stopped or delayed other dredging operations. The results were distributed through the Woods Hole Oceanographic Institution and Connecticut Sea Grant Programs. State agencies and shellfish commissions can use this information to make informed decisions regarding dredging operations in areas with toxic cysts.

Rebecca Barnes (2004)

Managing Nitrogen in Narragansett Bay: A Stable Isotope Approach
Yale School of Forestry & Environmental Studies

Nitrogen is often the limiting nutrient in coastal ecosystems, including those in Narragansett Bay, Rhode Island. Researchers have found that human activities are responsible for over 80% of the total dissolved inorganic nitrogen flux to the Bay, most of which comes from the discharge of wastewater treatment facilities. As a result of high nitrogen loadings, the Bay's ecosystem is functionally impaired with impacts including seasonal hypoxia in bottom water, changes to plants and benthic faunal communities, fish kills, and a decline in the Eelgrass beds. Non-point sources were ruled to be the primary contributor of nitrogen to the estuary.

Rebecca Barnes, a Ph.D. candidate in aquatic chemistry at the Yale School of Forestry and Environmental Studies, used paired stable isotope analysis to monitor and identify nitrate sources in the Bay. According to Barnes, stable oxygen and nitrogen isotope techniques have been used to identify and track both point and non-point source pollutants to rivers. Greater understanding of the fate of nitrogen and how processes vary over landscapes enhance our ability to manage nutrients entering our coastal ecosystems.

Abigail Bockus (2014)

*The Physiological Consequences of Climate-Induced Acidification and Warming on Metabolism and Acid-Base Balance in the Spiny Dogfish (*Squalus acanthias*): Northeast Fishery and Ecosystem Instability in Response to Climate Change*
University of Rhode Island

The spiny dogfish comprised an important fishery in the Northeast United States for much of the 20th century, and has recently been reinstituted as a viable fishery after the population recovered from overfishing. Recently, it has become a more popular product as it serves to replace other species that have become depleted. Further, because the spiny dogfish is an apex predator, shifts in population dynamics of the spiny dogfish will have widespread ecological influence and thus indicate larger ecological shifts. The spiny dogfish population, however, has the potential to be adversely affected by ocean acidification, exacerbated by climate change, in the coming years. Abigail Bockus recognized the need for increased knowledge in this area to allow fisheries to implement policies to protect the spiny dogfish.

In this study, Abigail Bockus captured spiny dogfish in Narragansett Bay, Rhode Island during the summers of 2014 and 2015. She then transferred the spiny dogfish to the Graduate School of Oceanography at the University of Rhode Island and conducted temperature and acidification experiments, procuring data on metabolic and acid-base data, as well as molecular mechanistic determinations.

Jane Brawerman (2007)

Conduct Comprehensive Inventory/Assessment of Natural Communities and Unique Features of Salt Island Overlook
Connecticut River Coastal Conservation District

In 2004, the town of Westbrook, Connecticut acquired Salt Island Overlook. This seven-acre open space property lies within the state's coastal zone management area and consists of a thriving salt meadow, tidal and inland wetlands, upland floodplain, and rocky vegetated plateaus. Acquisition goals of this property were to protect and enhance Long Island Sound's resources, provide public access for viewing the Sound and historic Salt Island, and educate the public about the need for conservation, restoration, and management of the Sound.

At the town's request, the Connecticut River Coastal Conservation District (CRCCD), led by Executive Director Jane Brawerman, coordinated a two-phase project in partnership with the Westbrook Conservation Commission. Phase one included the documentation of resources on the property as well as recommendations toward the protection, restoration, pubic access, education, and long term management of the area. Dr. Wendy Goodfriend, Natural Resource Specialist for CRCCD, assisted in mapping the physical conditions of the area, assessed possible activity areas, and developed a comprehensive stewardship plan for Salt Island Overlook. This stewardship plan was used to acquire funding for phase two of the project that involved restoring and enhancing the site's natural resources, developing a self-guided education trail with an overlook, and constructing a pervious surface parking lot, protecting the resources of Long Island Sound.

John Bruno (1997)

Species Composition and Large-Scale Distribution of Cobble Beach Plant Communities in Narragansett Bay, Rhode Island
Brown University

Cobble beach plant communities are made up of various salt-tolerant plants living among small round cobble beach stones. Daily immersion by salt water, nutrient-poor soils, and shifting stones due to wave action make this habitat difficult to colonize. These plant communities are important because they reduce coastal erosion and run-off into Narragansett Bay and support a variety of invertebrates, shorebirds, migrating waterfowl, and several protected plant species.

John Bruno, a doctoral candidate in Ecology and Evolutionary Biology at Brown University, collected baseline data on cobble beach plant communities. Bruno set up 50 quadrants along three transects, and surveyed 300 habitats at 10 sites in Narragansett Bay. He recorded the identity and percent cover of each species, and determined the species composition, intertidal zonation, and large-scale distribution of cobble plant communities in the bay.

The pattern Bruno observed was that cobble beach plant communities were found only in the calmer waters behind beds of Smooth Cordgrass *(Spartina alterniflora)* in parallel bands along the shore. In the absence of the buffering Spartina beds, rolling cobbles push plant seeds too deep, and the tide removes the seedlings. Rare species are the least tolerant of shifting cobbles, and found only behind the largest Cordgrass beds, farther from the cobbles. Smaller Cordgrass beds do not adequately buffer the plant community, and support fewer species. Bruno initiated a long-term monitoring program with his sampling. Bruno's study complemented ongoing experimental research on cobble beach plants, and the results were used in formulating marine preserve plans to protect and restore other cobble beach plant communities.

Monica Candal (2004)

Nutrient Analysis for Eelgrass Restoration
Save the Bay, Rhode Island

Eelgrass beds are a primary source of food and shelter to marine life, including economically important finfish and shellfish. It is recognized that the vitality of an estuary's Eelgrass beds is an indicator of its health. In Narragansett Bay, Rhode Island, Eelgrass is in peril. It is estimated that the majority of historic Eelgrass beds have been lost. Today, only 99.5 acres of Bay Eelgrass remain. Save the Bay, a local conservation organization, has taken the lead in promoting the restoration of Eelgrass.

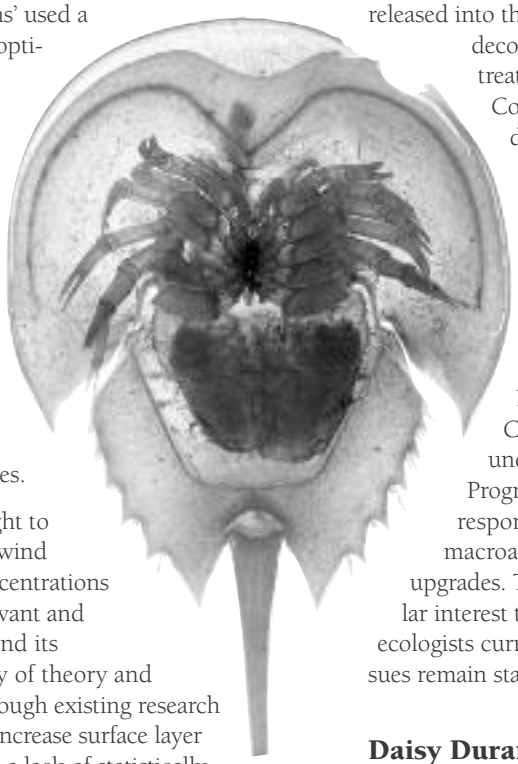
Monica Candal, an undergraduate student at Brown University, worked in collaboration with the staff of Save the Bay to gain more information about its nutrient levels. Candal conducted phosphorus and nitrogen analysis tests at sites of historic and current Eelgrass presence every two weeks, and at successful and failed transplantation sites. This information on optimal Eelgrass conditions may lead to successful Eelgrass transplantation, encouraging habitat reformation in Narragansett Bay.

James Robert Collins (2010)

Controls on Nutrient Flux and Productivity in Long Island Sound: Variation Over Multiple Time Scales
Yale School of Forestry & Environmental Studies
Long Island Sound

Estuaries are among the Earth's most productive ecosystems, supporting average annual production rates nearly four times those of the continental shelf and nearly 10 times those of the open ocean. Frequently located adjacent to major population centers, these ecosystems are highly responsive to the loading of excess nutrient material, including increases in the export of anthropogenically derived nitrate. In Long Island Sound (LIS) specifically, the eutrophic loading of nitrate from terrestrial and atmospheric sources has caused harmful algal blooms and a recurring pattern of seasonal hypoxia. The various mechanisms by which this nitrate is made available to phytoplankton have been the subject of continuous study in LIS for over 50 years. However, the relative effects on nitrate loading of two short-term meteorological variables: wind stress and rainfall—the subjects of James Collins' study—had not received adequate attention.

Collins investigated the factors that control primary productivity and nutrient flux in a large coastal estuary. To accomplish this objective, Collins' used a high-precision, high-resolution optical nitrate sensor and real-time observations from moored and shoreside monitoring stations. In situ sensors provided a significant advantage over traditional discrete sampling methods: Data collected at a high temporal resolution revealed variation that occurs over periods of just minutes or hours, in addition to the seasonal and interannual variations that have been the focus of research in LIS for several decades.



The proposed study, which sought to determine the relative effects of wind stress and rainfall on nitrate concentrations in the LIS surface layer, was relevant and novel both in its research aims and its methodology. A significant body of theory and anecdotal evidence obtained through existing research suggested these variables could increase surface layer nitrate concentrations. However, a lack of statistically significant empirical data had, to that point, prevented researchers from quantifying the specific nature of these relationships. By providing managers with a better understanding of how nitrate is supplied to marine organisms through eutrophication, Collins intended to contribute through his research to the health of the largest estuary in the northeastern United States.

Jessica E. Conover (2010)

Decomposition Characteristics of Macroalgae Species in a Eutrophic Estuary
University of Rhode Island
Narragansett Bay, Rhode Island

Macroalgal blooms form in response to a variety of factors, of which the most prominent in Narragansett Bay is nutrient influx from wastewater treatment effluent. Macroalgal tissues that are not consumed by herbivores decompose through microbial action. The chemical and physical characteristics of an algal species may cause differences in decomposition rates and the rate at which algae lose nitrogen and release it to the surrounding community may differ by species as well. Stable isotopic nitrogen values may also vary throughout decomposition, suggesting that anthropogenically sourced nitrogen may have a differential impact on the rate and quality of macroalgal decomposition and recycling of nutrients. By assessing the rates of macroalgal decay with regard to biomass loss, nitrogen loss, and isotopic nitrogen values in estuarine communities, Jessica Conover intended to better assess the role of decaying tissue on nutrient cycling in Narragansett Bay.

In order to determine the rate at which decomposing macroalgae in Narragansett Bay loses biomass, organic content, and total nitrogen, to determine the rate at which the two isotopically stable forms of nitrogen are lost from macroalgal tissues and released into the surrounding community, and to compare decomposition rates of algae exposed to secondary-treated sewage effluent verses tertiary-treated effluent, Conover conducted experiments tracking the decomposition of five common macroalgal species. To so, Conover used a mesh litter-bag technique at several sites in Narragansett Bay, Rhode Island during the summer of 2010.

Conover's research was especially relevant in light of the reductions in anthropogenic nitrogen release projected over the next several years due to tertiary treatment upgrades at Narragansett Bay's sewage treatment plants. Conover's research, in conjunction with projects underway at URI and the Narragansett Bay Estuary Program, aimed to inform predictions of the ecological response of important primary producers such as macroalgae and eelgrass to major sewage treatment upgrades. The isotopic nitrogen results should be of particular interest to the US EPA Atlantic Ecology Division, whose ecologists currently assume that isotopic nutrient values in tissues remain stable over a period of decay.

Daisy Durant, Ph.D. (2011)

Assessment of the Benthic Infaunal Community at Three Long-Term Water Quality Monitoring Sites within the Narragansett Bay Research Reserve
Narragansett Bay National Estuarine Research Reserve
Prudence Island, Rhode Island

The Narragansett Bay National Estuarine Research Reserve (NBNERR) on Prudence Island (PI), RI, serves as a platform for long-term estuarine research, education and stewardship. Prior to Dr. Daisy Durant's research, however, qualitative and quantitative studies of the benthic infauna around NBNERR had not been conducted. Thus, the objectives of Durant's study were to obtain information on species richness and diversity and compare these factors along a gradient of habitat types, and to establish a long-term benthic monitoring program that, along with the ongoing water quality monitoring, might be able to detect estuarine ecosystem changes as a result of climate change or other anthropogenic inputs to NBNERR waters over time.

Durant's study began with an examination of the bethic infaunal community around the NBNERR at three long-term water quality stations. Durant identified and counted macrofauna found at the sites, and described the benthic infauna by using measures of diversity, evenness, density, and relative abundance. She also analyzed benthic community structure. After analyzing the data from 2010, Durant proposed to present the results in a technical report and in a newsletter, and to submit a manuscript for publication in an appropriate scientific journal. Further, Durant photographed different species of macrofauna found in the different habitat types in order to create a photographic library of PI's benthic macrofauna. This tool could be used for education and outreach by the Reserve and other interested parties, and aimed to

improve the efficiency of further sampling and to help support staff and interns assisting with the project.

Lindsey Fields (2009)

An Annual Mass Balance of Silica in Narragansett Bay, Rhode Island
Graduate School of Oceanography, University of Rhode Island

Silica (Si) is a vital nutrient to coastal ecosystems because of its importance to diatoms, a group of microscopic phytoplankton that provide much of the primary productivity that supports marine food chains. Diatoms use silica in their ornate shells, also called frustules, and any perturbation in the biogeochemical cycle of silica in an ecosystem could be devastating to the whole marine food chain. Despite being one of the fundamental nutrients in coastal marine ecosystems, little attention has been given to silica compared to other major nutrients.

In 2009, Lindsey Fields looked at the inflows and outflows of silica for her Master's thesis, and developed an annual mass balance of silica in Narragansett Bay. Silica comes in two forms in the bay: BSi (Si in diatoms), and DSi (Si dissolved in water). When diatoms die and sink or are grazed, their BSi-rich frustules sink to the bottom and collect, making the bottom of the bay rich in silica. Fields collected ten short sediment cores throughout the bay to find an annual burial rate of silica, using BSi content from the cores and sediment accretion rates. She collected water samples from the bay and Rhode Island Sound to find the amount of DSi in these waters and used estimates of net water flow to find the amount of annual DSi exchange. The results may reveal the importance of the major sources, sinks and transformations of silica in Narragansett Bay.

Christina Garabedian (1999)

Hypoxia Dynamics in Long Island Sound
Save the Sound

Save the Sound is a non-profit membership organization in Stamford, Connecticut, which is "dedicated to the restoration, protection, and appreciation of Long Island Sound and its watershed through education, research, and advocacy." During the summer of 1999, Save the Sound conducted water quality research and a study of hypoxia (low dissolved oxygen). Hypoxia is a problem in Long Island Sound, and a better understanding of how it develops in harbors will benefit marine life and those who swim, fish, and boat in these areas.

Christina Garabedian, a summer intern at Save the Sound, tracked algal blooms in Long Island Sound to gain a better understanding of hypoxia. She analyzed water samples from six harbors for chlorophyll A content, samples from three harbors for nitrogen and phosphorus levels, and samples from four harbors for phytoplankton. She maintained a database on dissolved oxygen, salinity, turbidity, acidity, water and air temperature, wind speed and direction, weather conditions, and wildlife. Trained volunteers collected data from sites in 12 harbors located on the western end of Long Island Sound, from Echo Bay, New York, to Essex Harbor, Connecticut.

Garabedian found that the harbors exhibited low hypoxia in the summer of 1999. As a result of her research, the 1999 *Long Island Sound Water Quality Report* on the water quality at all 12 harbors was published, and 400 copies were distributed to other agencies that monitor Long Island Sound's waters. Garabedian's research will be incorporated into a display at the Connecticut River Museum in Essex, Connecticut.

Jason Garnett (2009)

Sampling, Analyzing, and Communicating Hypoxia in Southwestern Connecticut
Soundkeeper, Inc.

Hypoxia is an anthropogenically derived condition in water where dissolved oxygen levels drop to low levels that put extreme stress on marine organisms that live in the area. In recent years, it has become evident that hypoxia is directly affecting the productivity of southern New England's marine ecosystems, bringing this form of habitat degradation to the center of attention. The Long Island Soundkeeper Fund has monitored water quality in Stamford Harbor, Connecticut, for several years in an effort to gather data and raise awareness of the problems that poor water quality can bring to coastal ecosystems.

During the months of July, August, and September of 2009, Jason Garnett and Soundkeeper collected water samples at four sites within Stamford Harbor, and tested them for dissolved oxygen content, conductivity, and temperature. At each of these four sites, measurements were taken every meter until reaching the bottom. These samples were collected each Thursday morning at 7 A.M., and were graphed on an Excel spreadsheet. The Connecticut Department of Environmental Protection monitors water quality further out in the Sound, but not in harbors. This information bridged a data gap and is useful to policymakers, resource managers, scientists, and the general public. This data was added to the *Biodiversity Index,* a database of Long Island Sound water quality and biodiversity established to further advance public understanding of Long Island Sound and its watersheds.

Sara Grady (2004)

Population Structure of Horseshoe Crabs in Cape Cod Estuaries
Marine Program, Boston University

Horseshoe Crabs *(Limulus polyphemus)* have evolved little in the last 250 million years, and have survived because of their hard, curved shells, that make it difficult for predators to overturn them and expose their soft, vulnerable underbellies. There have been suggestions that mortality related to harvests may cause east coast Horseshoe Crab populations to decline. Sara Grady, a Ph.D. student in Boston University's Marine Program at the Marine Biological Laboratory in Woods Hole, Massachusetts, researched Horseshoe Crabs in Barnstable Harbor and Stage Harbor on Cape Cod, Massachusetts. Grady created a matrix model used to determine what stages of the Horseshoe Crab life cycle are the most important to the maintenance of Horseshoe Crab populations, and what levels of exploitation could be sustained by Horseshoe Crab populations.

The model predicted that with no harvest, a hypothetical population would grow about 7% a year, while a heavily harvested

population would decline between 2% and 10% a year. She also found that harvesting smaller adults has a greater impact on population growth than harvesting larger adults, and that harvesting later in the season causes less decrease in its population. This model will aid managers trying to deal with public pressure to manage horseshoe crab populations in the face of apparent excessive harvests.

Jennifer Anne Hauxwell (1997)

Interaction between Grazing and Nutrients as Controls of Macrophyte Biomass and Community Structure in Shallow Estuaries
Marine Program, Boston University

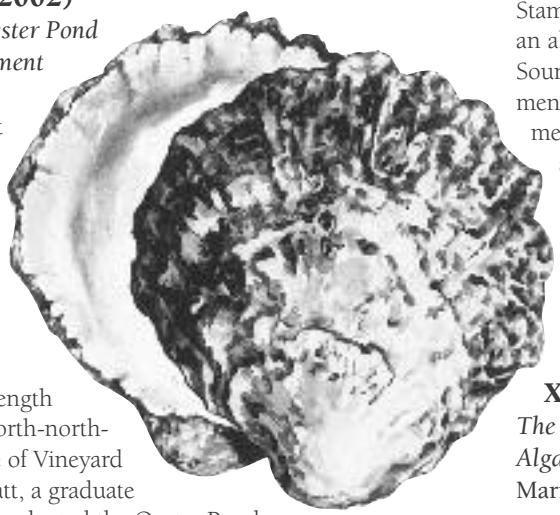
Eutrophication, or nutrient enrichment, increases growth rates of free-floating seaweeds and algae. Thick canopies of seaweed shade eventually displace Eelgrass beds that commercially valuable species such as juvenile flounder and scallop use as nurseries. Herbivores that graze on seaweeds and algae have the ability to restore the structure of the estuarine community.

Jennifer Hauxwell, a Ph.D. candidate in Marine Science at Boston University, studied nutrient loads in three estuaries of Waquoit Bay, Massachusetts. Hauxwell used stable isotopes of carbon and nitrogen to establish the diets of grazers and to trace food webs in the estuaries. Every primary producer has its own specific and distinct stable isotopic signature, and consumer tissues reflect the isotopes of their food. Essentially "you are what you eat," except for a small, measurable difference between food sources and body tissues called fractionation.

Hauxwell collected three species of grazers, kept them in the lab for a month, and fed them seaweed with a known signature of carbon and nitrogen. She found the difference between the seaweed and grazer tissues, or fractionation values, and with these numbers she was able to interpret the diets of grazers (in the field) from their tissue samples.

Jason Hyatt (2002)

OPSaFE: The Oyster Pond Salt Flux Experiment
Institute of Technology Joint Program of Oceanography MIT/WHOI Joint Program



Oyster Pond, in Falmouth, Massachusetts, is 1,000 meters in length and is oriented north-northwest on the shore of Vineyard Sound. Jason Hyatt, a graduate student at MIT, conducted the Oyster Pond Salt Flux Experiment *(OPSaFE)* which measured flow rates and salinity of water entering or leaving Oyster Pond and correlated it with influencing factors such as precipitation and tides. Hyatt believes that life in the pond is sensitive to salinity, and identifying and understanding factors that change the salinity are important to the organisms that live there.

Working with his professors, Dr. Sandy Williams and Dr. Jim Irish, Hyatt built his own hydrometer (normally a several thousand-dollar instrument) entirely from spare parts. The 10-ft instrument was installed in the culvert just downstream of a fishing weir where it measured temperature, salinity, pressure, and along-channel velocity. He found that flow in the culvert was nearly always seaward, even during rising tides. Correspondingly, measured salinity remained very low during these times with exceptions only occurring during strong spring tides associated with full and new moons. Then, water flow was toward the pond and high levels of salinity were recorded. This project benefitted individuals exploring ways to control and monitor the salinity of a coastal pond after its natural system has been disrupted by coastal development.

Julia Hyman (2007-2008)

Stamford Harbor Monitoring Project
Soundkeeper, Inc.

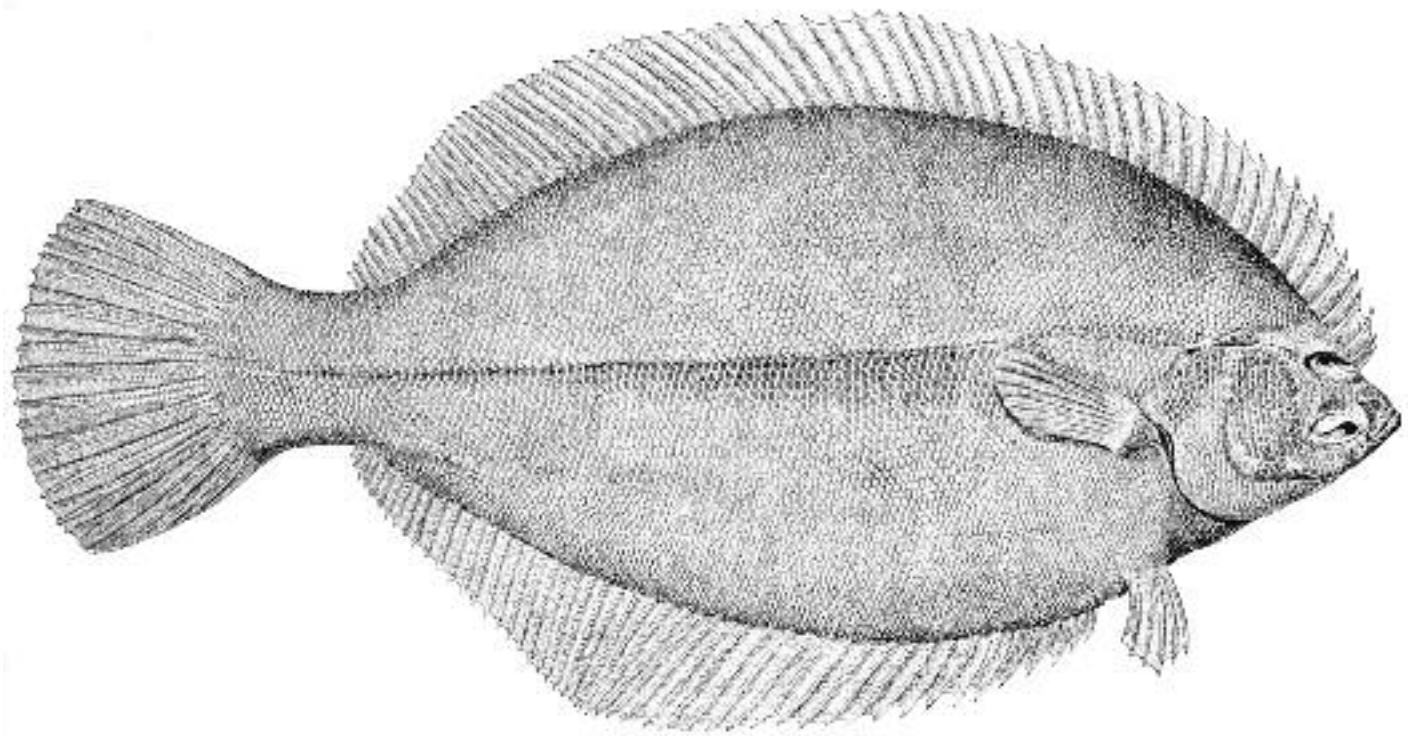
An Ocean Blueprint of the 21st Century, released in 2004 by the U.S. Commission on Ocean Policy, stated *"Ongoing monitoring is essential to assess the health of ocean and coastal ecosystems and detect changes over time. More than any other measure, monitoring provides accountability for management actions…to make informed decisions, adapt actions as needed, and assure effective stewardship of ocean and coastal resources."* While the Connecticut Department of Environmental Protection monitors open water, little monitoring activity takes place in the harbors and embayments of the Connecticut coast. Soundkeeper is an environmental conservation and advocacy group dedicated to the protection and enhancement of the biological, physical, and chemical integrity of Long Island Sound and its watershed. Soundkeeper partnered with the Maritime Aquarium in Norwalk, Connecticut, to assist in their work of compiling water data from nearshore locations.

This project focused on the gathering of water quality data from Stamford Harbor (Stamford, Connecticut) and became part of an already active Clean Boater Program. Using the existing Soundkeeper boat stationed in Stamford Harbor and new equipment purchased through funding of this project, research staff measured dissolved oxygen, chlorophyll, salinity, water temperature, air temperature, cloud cover, turbidity, wind speed, and direction, and other relevant observations in various locations of the Harbor. The data were used to update the Quality Assurance Plan for Stamford Harbor and were shared with state and federal agencies to advance planning and policy making for the region's ecosystem.

Xiaodong Jiang (2008-2009)

The Evolution of Zooplankton Resistance to Harmful Algal Blooms
Marine Science Research Center, Stony Brook University

Algal blooms have become an annual event on eastern Long Island and have caused rapid mortalities in multiple species of finfish and shellfish. The predator-prey relationship between planktonic species is considered a tool for controlling algal



blooms, but the impact of zooplankton grazing has been debated largely because of the relatively slow growth rate and/or feeding avoidance. Evolutionary properties of plankton could provide new insight for conservation strategies. In his proposed study, Xiaodong Jiang planned to examine the ability of a commonly found zooplankton to develop resistance to a toxic dinoflagellate that has recently been proliferating on the east coast of the United States.

Jiang, a Ph.D. student at Stony Brook University, performed laboratory experiments using various populations of *Acartia tonsa* (common zooplankton) to assess its adaption to *Cochlodinium polykrikoides* (proliferating dinoflagellate) through the measurement of *A. tonsa* life history traits. He found that *C. polykrikoides* depressed *A. tonsa* survival, feeding, and fecundity at high density, but also that *A. tonsa* performed better in *C. polykrikoides* than the known nutritious phytoplankton of *Rhodomonas lens* at low density. This discrepancy led Jiang to develop a new hypothesis that the nutritional value of *C. polykrikoides* for zooplankton varies with cell density, which led to his summer research of 2009. His hypothesis was that *A. tonsa* can rapidly develop resistance to the toxic *C. polykrikoides.*

To test his hypothesis, Jiang conducted experiments in 2009 where copepods grazed on different proportions of *C. polykrikoides* and *R. lens* to determine the impact of *C. polykrikoides* on copepod production. The experiments were set up for different concentrations of algal carbon to determine how cell density affects the nutritional value of *C. polykrikoides.* The results of this study provided improved understanding of the consequences of *C. polykrikoides* to copepods, and hence food webs in marine ecosystems, and is valuable to management plans that aim to mitigate toxic algal blooms.

Captain David Johnson (2004, 2006-2010)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2008, 2010); Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Eco Center

The oyster population in the waters around Long Island is greatly diminished. Habitat loss and three major oyster diseases affecting the east coast brought recreational oystering to a standstill in the 1990s. David Johnson, a Cornell University trained aquaculturist and Director of the Long Island Seaport and Ecology Center, has worked for seven years to establish a Shellfish Restoration Project in Setauket Harbor of the Port Jefferson Harbor Complex. The goal of the project is to establish a large enough population of disease resistant spawners to maintain a stable, sustainable shellfish population in the future.

During the 2003 season, Johnson raised 120,000 oysters and 6,000 bay scallops in floating cages attached to two aquaculture platforms, converted from docks. Seven years later, the results of the project have begun to show success. Initial surveys indicated that 95% of the oysters found at low tide were disease-resistant. Continuing the shellfish restoration project is critical to establishing a self-sustaining population of disease resistant oysters. More than 202,000 oysters and 6,000 adult bay scallops have been released into the harbor. Harvest levels have continued to improve, and the local economy is estimated to benefit by $1 million each year.

In 2006, the Coastal Steward Investigations Program, started and run by Captain David Johnson, organized volunteers and resources to carry out regularly scheduled beach cleanups on Long Island Sound. Their programs, Adopt-a-Beach and Sponsor-a-Beach, focus on coastlines. By April 2007, they had removed more than 137 tons of garbage from Long Island

beaches. This program encourages children to participate and to collect data about the debris so that they can see what washes up on the beaches everyday.

Captain David Johnson continued to oversee the project, and in 2013 the Coastal Steward organization requested funds from The Sounds Conservancy to support an intern position for the program.

Micheline S. Labrie (2015)

Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality

UMass Dartmouth – School for Marine Science and Technology Coastal Systems Program

Estuaries worldwide are degraded by anthropogenic inputs of nitrogen. On Cape Cod, Massachusetts, nitrogen loading is attributable to on-site wastewater disposal and fertilizer run-off. The addition of this biologically available nitrogen stimulates phytoplankton blooms, which can significantly decrease oxygen concentrations in the estuaries. Low levels of oxygen can lead to fish kills and the loss of benthic communities.

The quality of US waters is standardized under the Clean Water Act (1972); therefore, municipalities with substandard embayment quality are required to develop remediation plans. Consequently, towns are investigating inexpensive methods of reducing nitrogen levels in their estuarine systems. One method is the use of suspended oyster culture (SOC) to remove nitrogen from estuarine systems. However, towns require quantitative data to determine the effectiveness of SOC before it can be incorporated into a regulatory framework.

Micheline S. Labrie aims to quantify nitrogen removal from eutrophic Cape Cod coastal embayments by SOC through the processes of assimilation and enhanced denitrification. Three embayments where SOC has been established will be studied: Little Pond and Quisset Harbor in Falmouth, MA and Three Bays in Barnstable, MA. The first objective is to determine SOC mediated changes in water column turbidity and phytoplankton biomass via biweekly water quality sampling. Next, through particle trap deployments, oyster biodeposition rates can be determined. Total area affected by SOC is then determined through the measurement of vertical velocity and horizontal advection of sinking biodeposits from SOC through a novel Acoustic Doppler Current Profiler method. Lastly, sediment core incubations will determine sediment-water nutrient fluxes.

Mark Lever (2001)
The Importance of Nutrients and Macrograzers in Controlling the Biomass of Benthic Microphytes
Marine Program, Boston University

Benthic microphytes are microscopic algae and bacteria that grow on sediment of aquatic ecosystems and are a major component of photosynthetic production. In many shallow water systems, microphytes
produce more biomass than phytoplankton, and their productivity can surpass that of salt marsh grasses, sea grasses, microalgae, mangroves, and corals. Microphytes are the base of the food chain and are important components of the diets of many marine organisms including snails, clams, shrimp, copepods, and nematodes. Located at the sediment surface, they play a critical role in controlling the exchange of carbon, oxygen, and nitrogen between the sediment and water column.

Mark Lever, a Master's student at the Boston University Marine Program, examined the effects of nitrogen enrichment on benthic microphytes. Lever selected six estuaries in Waquoit Bay that receive different levels of nitrogen (Sage Lot Pond, Hamblin Pond, Eel Pond, Green Pond, Quashnet River, and Childs River) on Cape Cod, Massachusetts. Lever found that benthic microphytes represent a major component of the food chain and are an important food source to commercially harvested organisms, and understanding the mechanisms involved in controlling the biomass of these organisms is a necessary element to the success of coastal management.

Melinda Loberg (2011)
Owen Little Way Rain Garden-Bioswale
Tisbury Waterways, Inc.
Vineyard Haven, Massachusetts

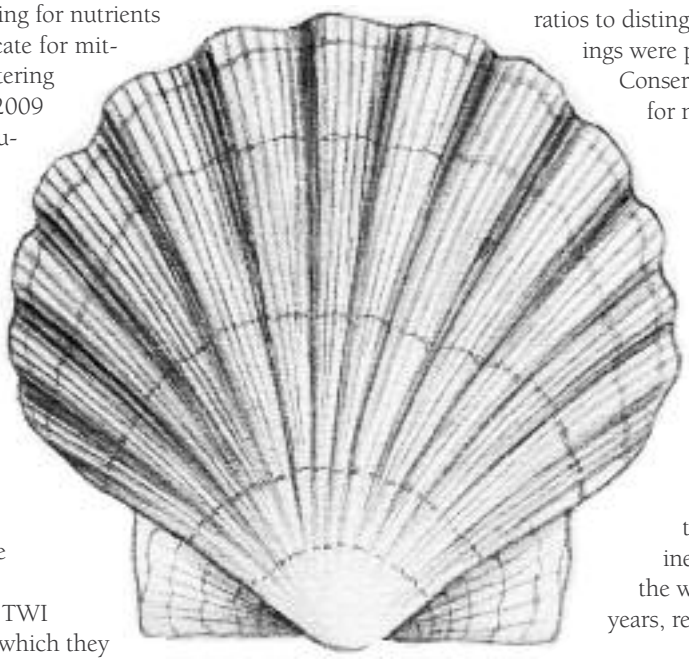
Tisbury Waterways Incorporated is a non-profit organization in Vineyard Haven, Ma, founded in 1988 by private citizens concerned with conservation of the environment, advocacy for healthy marine life and clean waterways and harbors. TWI has in the past performed water testing for nutrients during rain events in order to advocate for mitigation of storm water pollution entering our waterways. Results from TWI's 2009 program reveal that the highest pollution counts continue to occur at the bottom of Owen Little Way between the Vineyard Haven Yacht Club and the Town of Tisbury's public beach access. This is a popular swimming area in the main Vineyard Haven harbor and entrance to the island.

TWI saw an opportunity to address the polluting road run-off in a manner that mitigates pollution while simultaneously beautifying the area and providing an educational resource for the public. To this end, TWI planned a demonstration project in which they engineered and planted a rain garden, or bioswale: an accepted best practices standard for mitigating road run-off. TWI planted the garden at the end of Owen Little Way, where the drainage problems persist. The installation of this garden included a TWI-sponsored workshop for the public filmed for MVTV, for the purpose of enabling interested Island residents and others to learn about the benefits of a rain garden and how to install one step by step. This project, the first of its kind on the island, was consistent with the mission of Tisbury Waterways to advocate for clean water initiatives while acting as a catalyst and educator for innovative solutions to the local pollution challenges.

Ivan Mateo (2008)
Identification of Critical Habitat for Tautog by Otolith Chemistry
Department of Fisheries, Animal, and Veterinary Science
University of Rhode Island

Chemical habitat tags in the otoliths ("ear stones") of juvenile fish are used to differentiate individual fish from different habitats. Through the chemical analysis of the juvenile core of adult otoliths, the habitat tag is used to determine the proportion of the adult population that resided in different juvenile habitats. The dependence of fish production and population dynamics on dispersal and migration among multiple habitats is a critical property of marine populations, and determining the origin of adult fish is crucial to the analysis of marine environments.

Ivan Mateo, a Ph.D. Student at the University of Rhode Island, demonstrated the variability, both temporal and spatial, in otolith chemical signatures of recently settled Tautog in Rhode Island waters. The Tautog *(Tautoga onitis)* is an ecologically important fish with juveniles depending upon estuaries for nursery habitats. Mateo's long-term goal is to define habitat linkages in Narragansett Bay and other nearby estuaries in order to quantify the relative contribution and connectivity of different estuarine habitats for adult Tautog populations. Tautog were sampled by seine net from various locations and their otoliths were examined for elemental composition and stable isotope ratios to distinguish their origin. His findings were presented to The Nature Conservancy to help identify sites for marine protected areas.



Pia Moisander (2011)
Toxin Production of Cyanobacteria on Nantucket Island
University of Massachusetts Dartmouth
Nantucket Island, Massachusetts

Toxin-producing cyanobacterial blooms occur in estuarine environments throughout the world. Over the past few years, reports of the presence of

potentially toxin-producing cyanobacteria have appeared from Nantucket Island. This study contributed to the information about growth controls, diversity, and toxin production of cyanobacterial blooms in Nantucket Island sounds. The results provided information to support local management efforts of these blooms on Nantucket and other similar island ecosystems in New England.

The majority of studies on cyanobacterial blooms have been conducted in freshwater systems. Bloom formation and impacts of toxic cyanobacterial blooms in estuaries to marine life are not well understood, but are potentially significant. A recent study reported cyanobacterial toxin-associated liver damage in a number of deceased sea otters in the coastal Northern California and Monterey Bay. Juvenile life stages of marine fish and crabs that spend time in estuaries may be especially susceptible for impacts of estuarine cyanotoxins.

In order to better understand the conditions of toxin productions, Pia Moisander collected water from the blooms in different parts of the island and measured toxin production and the expression of toxin genes. To investigate use of full salinity seawater as a management strategy for toxic cyanobacteria in Nantucket Sounds, Moisander conducted measurements of cyanobacterial toxin production in response to salinity in Nantucket island sounds. Bloom samples were incubated for 48 hours under a range of salinity levels, and then examined for toxin concentration and the expression of a key gene involved in microcystin production (mcyA).

Pia Moisander (2013)

Spatio-temporal Distributions of Brown Tide Causing Harmful Algal Species Cochlodinim polykrikoides *in Buzzard's Bay*
UMass Dartmouth – Biology Department

Among the many adverse effects of anthropogenic pressure on our coastal waters, harmful algal blooms are an important example. Periodic accumulations of the dinoflagellate *Cochlodinium* have caused brown tides in Northeast coastal waters. Though *Cochlodinum* is not known to cause harm to humans, it has caused extensive fish kills and can impair the reproduction of shellfish such as oysters. Given the importance of the waters of Rhode Island Sound and Buzzards Bay for recreational fishing and the shellfish industry, it is important to develop a better understanding of spatio-temporal distributions and growth controls of *Cochlodinium* in this area.

Using quantitive PCR, Pia Moisander and her fellow researchers quantified the abundance of *Cochlodinium* in surface waters of Buzzards Bay over a two-year period. They also took parallel measurements of temperature, chlorophyll, total bacterial numbers, and meso-zooplankton abundances. The researchers intended to characterize the emergence of several toxic algal bloom species/genera in the bay over the seasonal cycle. Increased knowledge of the extent of the brown tide formation potential in coastal waters is important, so that both the general public and the fisheries industry can be informed about the potential for brown tide formation, and targeted studies can be planned to investigate the bloom formation potential.

Riley Young Morse (1996)

Habitat Selectivity and Movement of Young-of-the-Year Winter Flounder
University of Rhode Island

Understanding the life history and habitat requirements of juvenile Winter Flounder is necessary for effective management of the species. This commercially important fish lives in estuarine waters along the north Atlantic coast. The early life stages of Winter Flounder are easier to study because spawning and recruitment into the reproductive population occur entirely within an estuary.

Riley Young Morse investigated the early life history of the Winter Flounder as part of her Master's thesis in Fisheries Science at the University of Rhode Island. Her research continued an ongoing study of Winter Flounder abundance and distribution in Point Judith Pond, Rhode Island. Using a six-meter circling net to collect juvenile Winter Flounder, Morse marked and recaptured Winter Flounder at one-week intervals. Results provided critical information for the effective management of this important species. Identifying the Winter Flounder's movement patterns from one habitat to another determines the importance of habitats to the fish and the level of vulnerability of year-class structure with habitat quality.

Swathi Mummini (2011)
The Effect of Summer Environmental Stressors on the Metabolism of Eastern Oysters in the Bronx River
CUNY Hunter
Bronx River, New York

Eastern oysters *(Crassostrea virginica)* were historically found in great numbers in the New York City Harbor. The significance of oyster restoration has been recognized due to the their role in increasing the quality of surrounding water. Oysters are major agents in benthic-pelagic coupling, acting as natural filters by removing particulates from the water column and transferring them to the benthos. Oyster reefs also act as natural habitats for other animals, increasing ecological diversity. In 2006, the Natural Resource Group (NYC Parks Dept.), along with other community groups, worked to implement the first pilot oyster reef in Soundview Park, located where the Bronx River meets the East River. Since then, several other oyster reefs have been constructed in the area. Oysters face a variety of stresses in the river, however, often driven by algal blooms in warm weather. Algal blooms increase turbidity, and algal die-offs and decomposition create low dissolved oxygen levels.

In order to determine suitable conditions for oyster restoration, Swathi Mummini analyzed the oysters' responses to stresses faced during the summer months. Responses were measured through an assessment of metabolic rate through both electron transport system (ETS) activity and pyruvate kinase (PK) activity. Clearance rates were also measured as behavioral indication of the effect of these environmental stressors. These measurements of the oysters' stress responses were taken along with seston measurements, the temperature, and levels of dissolved oxygen in surrounding water. The correlation of the water quality and stress response measurements was used to observe the effect of water quality on oyster metabolism.

Ylva Olsen (2005-2006)
Human Driven Loss of Seagrass Habitat: Effect on Food and Cover for Fish and Invertebrates
Marine Program, Boston University

Seagrass meadows are one of the world's most threatened environments and provide valuable food and shelter for many species of fish. Waquoit Bay in Massachusetts has seen a significant decline in seagrasses on the estuarine floor, caused by increased nitrogen loads from the watershed resulting in an increase in macroalgae that require sunlight and nutrients from the seagrasses.

In 2005, Ylva Olsen, a Ph.D. candidate at the Boston University Marine Program, investigated the importance of Eelgrass *(Zostera marina)* as cover habitat and food to fish and invertebrates in Waquoit Bay. Olsen sampled producers and consumers in three sub-estuaries of Waquoit Bay subject to different nitrogen loads from the watershed populated by Eelgrass cover. She deployed artificial seagrass units adjacent to seagrass beds in each estuary with varying degrees of cover (dense, sparse, and bare) comparable to field conditions in the three estuaries. Preliminary results

of the study indicated various levels of Eelgrass cover in the estuaries.

Olsen continued her study in 2006 by identifying the diets of consumers in the Eelgrass habitats of Waquoit Bay, using natural carbon and nitrogen stable isotopic ratios. She collected samples in the spring, summer, and fall, and sent them to University of California, Davis Stable Isotope Facility for stable isotope analysis. The results of this analysis provide information on the sample's diet and are useful to the management of seagrass beds in and around Waquoit Bay.

Laurie L. Perino (2008)

Short and Long-Term Effects of Harmful Algae on Three Important Bivalve Species
Marine Science Research Center, Stony Brook University

Harmful algal blooms may result in a decrease of finfish and shellfish populations, thwarting conservation and restoration efforts as well as impacting important fisheries. In the recent years, *Alexandrium fundyense* has caused annual red tide blooms off the coast of New England. Determining the impact of the species upon local populations of ecosystem engineering species such as the Northern Quahog, the Blue Mussel, and the Bay Scallop is crucial to future management plans.

Laurie Perino, a doctoral candidate at Stony Brook University, researched the region's coastal fisheries by assessing the direct and indirect impacts of *A. fundyense* on adult shellfish and their larvae. She collected bivalves and exposed them to various concentrations of *A. fundyense*. The sub-lethal effects of this diet were assessed by measuring shells and soft tissue growth, as well as through histology and staining to quantify egg production on a subset of animals. Furthermore, a subset of adults was spawned and reared with identical diets. Larval performance was measured by quantifying survivorship, growth, time for metamorphosis, and lipid storage at the time of metamorphosis. Perino's study provides essential information for executing current plans for ecosystem-based management in coastal Atlantic waters. Her findings were shared with local shellfish hatcheries and townships.

Elaine Potter (2013)

Life Cycle Dynamics of the Bloom-Forming Macroalga Ulva rigida
University of Rhode Island

Blooms of the green algae *Ulva,* a common occurance during the summer months in shallow estuarine systems, can cause severe ecological and economic harm. Elaine Potter assessed life cycle dynamics of *Ulva rigida* in Narragansett Bay, RI, examining temporal and spatial variability of *Ulva rigida* population dynamics. *U. rigida,* like many marine algae, has a complex life cycle with free living haploid and diploid individuals, and it is currently unknown which phase(s) contribute to bloom formation. To assess temporal and spatial dynamics, Potter used a BD Influx flow cytometer to determine the ploidy content of 20 samples of *U. rigida* collected at each of three bloom-forming sites in Narragansett Bay, bimonthly from May to December 2013.

By analyzing data from samples collected during peak bloom (mid-summer) and non-bloom (spring and fall/winter months), Potter assessed the temporal (bimonthly) and spatial (among site) variability in *U. rigida* life cycle dynamics. These data could then be used to predict general patterns of macroalgal blooms worldwide, as well as to investigate the impact of blooms on marine communities and economically important areas of society, such as tourism and fisheries. Understanding these complex lifecycle dynamics will help in making better-informed coastal management decisions.

Justin K. Rivera (2006)

Nantucket Sound Water Quality Monitoring
Nicholas School of the Environment and Earth Sciences
Duke University

The waters of Nantucket Sound are the gateway to Nantucket Island, and commercial fishermen must pass through these waters to get to fishing grounds at sea. Initiatives have been taken to monitor the water quality of the Sound.

Justin Rivera, a Master's candidate at Duke University, spent the summer months of 2006 monitoring Nantucket Sound to establish baseline water quality data for the area. He worked with the Cape Cod Commercial Hook Fishermen's Association to incorporate local fishermen's knowledge and skills to help monitor designated areas throughout the Sound. Rivera measured dissolved oxygen levels, nitrogen, and chlorophyll *A* concentrations, salinity, and temperature using fishing vessels as platforms and monitoring stations. Samples were analyzed through the National Park Service, and spatial and temporal comparisons were made. The data are valuable to water quality managers on Cape Cod.

Melissa Sanderson (2007)

Lower Cape Cod Stream Restoration: Cedar Pond Rehabilitation
Cape Cod Commercial Hook Fishermen's Association

In collaboration with Friends of Pleasant Bay and the Orleans Pond Coalition, Cape Cod Commercial Hook Fishermen's Association began the rehabilitation of Cedar Pond and the Rock Harbor Creek ecosystem in 2007. Cedar Pond is connected to Cape Cod Bay by Rock Creek Harbor and is a threatened coastal environment that provides valuable habitat and environmental services to the nearshore ecosystem of Cape Cod.

Cape Cod Commercial Hook Fishermen's Association worked with the Town of Orleans and the aforementioned organizations to identify maintenance tasks to improve the health of ecosystems in the area. As a result, they increased tidal flow by removing sediment and rock from the stream bed, removed vegetation hindering water flow and fish passage, performed a tidal survey to determine the extent of tidal restriction, monitored conditions of Cedar Pond, removed dead vegetation from Cedar Pond, and used a feasibility study to identify implications associated with removing a dike and replacing a culvert in Rock Harbor Creek.

Complete restoration of Cedar Pond would result in improved water quality, nutrients and shelter for valuable finfish and shellfish, habitat for otters and bird species, coastal buffering from storms and flooding, filtering of runoff, and the return of a

native ecosystem. Cape Cod Commercial Hook Fishermen's Association plans to continue monitoring the Cedar Pond area and has identified several other sites for future restoration.

Christina Senft (2008)

Saxiphilin: A Possible Pathway to PSP Toxin Resistance in Calanoid Copepods
University of Connecticut at Avery Point

Calanoid Copepods (*Acartia hudsonica*) are one of the main grazers of harmful algal blooms in southern New England. Algal blooms often contain saxitoxin, a paralytic shellfish toxin harmful to finfish and shellfish. The method by which this toxin is transferred from an algal bloom to other organisms in the marine environment is important to understand. It has been noted that some phenotypes of *Acartia hudsonica* are resistant to paralytic shellfish poisoning (PSP). It is possible that saxiphilin, a protein and strong binder of saxitoxin, is produced in copepods as a mechanism of defense to saxitoxins. If copepod resistance to PSP is transferred through saxiphilin, the toxins remain. Thus, fish consumption of copepods that have been exposed to harmful algal blooms could be fatal and result in large scale fish kill.

Cristina Senft, a Ph.D. candidate at the University of Connecticut, collected *Acartia hudsonica* copepods from Long Island Sound and the Gulf of Maine, and identified individuals of resistant and non-resistant phenotypes through toxic dinoflagellate feeding experiments. The different phenotypes were tested for presence of saxiphilin activity. When presence was detected, Senft compared the saxiphilin content and the historical exposures of the animals to harmful algal blooms. This work advances the understanding of the trophic dynamics of harmful algal blooms and may lead to better management and planning.

William P. Shadel and Aubrey McMahon (2002-2003)

Water Quality Monitoring Program
Save the Sound

Save the Sound is a non-profit organization dedicated to the restoration, protection, and appreciation of Long Island Sound. In 1991, the organization initiated its volunteer-based Water Quality Monitoring Program in Stamford Harbor, the mission of which was to monitor the condition of Long Island Sound by gathering scientific data, to inform the public, and affect policy to improve the quality of the Sound and its watershed. Volunteers gathered data on salinity, temperature, turbidity, dissolved oxygen, chlorophyll, nitrogen, and phosphorus.

In 2002, Save the Sound hired a Master's of Biology student to run the Water Quality Laboratory, performing chlorophyll analysis and training other interns in the same methods. The intern researched the various methods and associated costs necessary for Save the Sound to perform nutrient analysis in its laboratory and served as a scientist and pilot for one of the harbors in the program.

In 2003, Save the Sound initiated a comprehensive study of Stamford Harbor, based on 12 years of water quality data collected by Save the Sound volunteers. The goals of the study were to determine status and trends of water quality in Stamford Harbor, write a report documenting its findings, and educate local residents and regional organizations about the results.

Kaitlyn Shaw (2011)

Assessing Spatial Accumulations of Opportunistic Macroalgae in S.E. Massachusetts Estuaries
University of Massachusetts
S.E. Massachusetts Estuaries

New England estuaries provide essential feeding grounds and nursery habitat for commercially important fish and shellfish species. This function is being altered, however, 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 is capable of fast growth and thick accumulations. These accumulations shade seagrasses and eelgrass, smother benthic habitats, wash up on shores and lead to low dissolved oxygen concentrations in bottom waters. The factors driving these shifts are well-studied and can be placed into two categories: factors primarily driven by hydrodynamics and those driven primarily by nutrient enrichment.

Kaitlyn Shaw hypothesized that opportunistic macroalgal accumulations are constrained to central locations within estuarine systems due to the combination of hydrodynamics and nutrient enrichment. To test this hypothesis, she observed the growth rates of macroalgae in varying hydrodynamic settings by anchoring contained specimens within the water column and associated bottom sediments along the nutrient gradient present in estuaries. This experiment sought to clarify whether hydrodynamics are the main factor controlling macroalgal accumulations within estuarine systems. Additionally, Shaw hypothesized that macroalgal accumulations may not exist in the upper reaches of estuarine systems due to the presence of highly reducing sediment conditions and periodic water column anoxia.

Shaw compared hydrodynamic setting with measured growth rates to determine whether opportunistic species are capable of growth across a range of velocities. She also compared growth rates of macroalgae to water quality parameters, including salinity, temperature, nutrients and light, and to station sediment types and organic contents. Shaw's project can be used as an assessment of the level and cause of macroalgal accumulation in southeastern Massachusetts estuaries. The study can also inform on potential relationships between growth and nitrogen related water quality parameters. Towns presently working on nutrient management of their estuaries will receive a macroalgal accumulation fact sheet at the conclusion of this project, addressing public concern over macroalgal accumulations in their estuaries.

Andrea Shriver (2001)

Effects of Coastal Eutrophication on the Food Supply and Growth of the Bay Scallop (Argopecten irradians)
Marine Program, Boston University

The Bay Scallop *(Argopecten irradians)* is a commercially important shellfish species, especially in Massachusetts. Over the past

few decades, populations have been declining and aquaculture techniques have been investigated to understand the potential for enhancing or re-establishing natural Bay Scallop populations. Many coastal estuaries in southern New England, an important habitat for Bay Scallops, are undergoing nutrient enrichment.

Nitrogen is often the limiting nutrient in water and it is naturally present in the atmosphere entering bodies of water through rainfall and groundwater flow. However, nitrogen levels in estuaries are increasing in southern New England from introduced sources such as lawn fertilizers and septic systems associated with population growth of the region. Eutrophication, often the result of increased nitrogen loading, can have an impact on Bay Scallops because of their short, two-year life span.

Andrea Shriver, a Master's of Biology candidate at the Boston University Marine Program studied the effects of coastal eutrophication on the food supply and growth of the Bay Scallops. Shriver transplanted Bay Scallops in cages into eight estuaries off Vineyard Sound, Falmouth, and Buzzards Bay, Massachusetts. The estuaries had varying levels of known nitrogen loads and therefore different food supply characteristics. The results of this study may be used in aquaculture projects and were shared in journal publications.

Larry Sickels (2002)

*Colonization of a Restored Rhode Island Salt Pond by Winter Flounder (*Pseudopleuronectus americanus*)*
Roger Williams University

Winter Flounder range from Labrador to Georgia, and are most abundant from the Gulf of St. Lawrence to the Chesapeake Bay. They usually inhabit near-shore coastal and estuarine waters from October through May and migrate slightly offshore during the summer. In the fall, most return to the same estuary that they inhabited the previous winter. Historically, Winter Flounder have been the most valuable commercial fishery in Rhode Island waters, but since 1985, the fishery has declined by 66%.

Larry Sickels, a Marine Biology student at Roger Williams University, compared the use of a restored salt pond to a largely unaltered pond to examine the effectiveness of restoration efforts that provided new Winter Flounder spawning habitat. Common Fence Point Pond in Portsmouth, Rhode Island, was a small tidally restricted pond that had been filled with dredge materials. In 1997, the pond was restored by removing the dredge material and creating a tidal flow channel allowing spawning fish to enter. Sickels also monitored Mill Pond in Bristol, Rhode Island, which is known for its established Winter Flounder population and compared data from the two locations. Sickels counted, measured, sexed, and tagged the Winter Flounder to provide insight to the value of salt pond restoration.

Sarah M. Thompson (1997)

Use of Land-Derived and Recycled Nitrogen in Cladophora vagabunda *in Waquoit Bay*
Marine Program, Boston University

Cladophora vagabunda is a large algae that grows in nitrogen-enriched marine environments. In Waquoit Bay, Massachusetts, there are two sources of nitrogen loading; coastal sources and internally recycled ammonium within bay sediments. While a Master's student in Boston University's Marine Program, Sarah Thompson evaluated the impact of nutrient loading on nutrient assimilation and growth rates of *C. vagabunda.* Thompson chose three estuaries of Waquoit Bay, each with a different nitrogen loading rate and measured growth rates, nutrient uptake rates, and tissue constituents of *C. vagabunda* at each site. She also performed several enzyme assays and quantified the differential assimilation of land-derived nitrate and recycled ammonium. Using an elemental analyzer, she determined percent nitrogen content of algae samples as well.

In the estuary with the highest rate of nitrogen loading, Thompson found *C. vagabunda* with the highest percent nitrogen tissue content, the most enzyme activity, and the fastest growth rate. Increased nitrate concentration alters nutrient uptake and assimilation, and gives algae the competitive advantage over vascular plants like Eelgrass. The decline of Eelgrass beds can lead to the collapse of the scallop and quahog fisheries. Thompson's research provides important documentation on nutrient loads in estuaries and their relation to algal blooms.

Dr. Lucy Vlietstra (2004)

Potential Implications of Unusual Early Ctenophore Blooms for the Fisheries of Long Island Sound
United States Coast Guard Academy

During the 1970s, seasonal peaks in abundance (blooms) of the Ctenophore *(Mnemiopsis leidyi)* on the North Atlantic coast typically occurred from August through September. In the 1990s, Ctenophore blooms have been occurring as early as June and July. The feeding activity of early bloomed *Mnemiopsis* would coincide more closely with the spawning season of many commercially important species of fish. This interspecific competition for food by both Ctenophores and fish larvae may reduce recruitment of either group into breeding populations.

Lucy Vlietstra, a Postdoctoral Teaching Fellow at The United States Coast Guard Academy in New London, Connecticut used field surveys and stable isotope analysis to evaluate the potential implications of early *Mnemiopsis leidyi* blooms on food-web dynamics in the Thames River Estuary in Long Island Sound. This research could have implications for the fisheries of Long Island Sound, which depend upon local estuaries for critical spawning habitat that supports a $1.3 billion fishing industry.

John Waldman (2010)

Publish Results of Kimberly Williams Master's Thesis Research (Striped Bass Wintering at Power Plants) in the Northeastern Naturalist – Aspects of the Wintering Biology of Striped Bass at a Power Plant Discharge
City University of New York
Long Island Sound, New York

John Waldman published Kimberly Williams' dissertation entitled *Aspects of the Wintering Biology of Striped Bass at a Power Plant Discharge*. Williams' dissertation discussed the effect of the warm water outflow at a power station in Northport, New York on striped bass. The outflow of this plant aggregates striped bass, *Morone saxatilis,* in winter, as do other power plant discharges

in the Northeast, creating unique angling opportunities. Substantially more striped bass were available to anglers in the winter of 1995-1996 than in the winter of 1996-1997. Although striped bass were observed within and around the heated effluent of the plume, tracking using ultrasonic transmitters indicated they were not trapped in the area by the colder water surrounding the discharge. However, there also was little evidence of a natural forage base. Tag returns from marked striped bass over subsequent years suggest that striped bass displayed similar movement patterns to striped bass found in Long Island waters during other seasons and that they do not necessarily return to the Northport study site for overwintering. Differences in availability of striped bass among years may reflect seasonal changes in temperature, cohort abundance, and other factors.

Beth Weinman (2002)

The Geochemical Significance of the Breakwater in Flushing Bay: The Effects of Reoxidation on Sulfide-Bound Metals
Geology Department, Queens College

In the 1960s, the Army Corps of Engineers built a breakwater in Flushing Bay, New York, that created controversy as it has been accredited with causing the degradation of water quality throughout much of the bay. There was great pressure to have the breakwater removed to allow the Bay to reoxygenate and rejuvenate itself. Since the 1970s, steady improvements in fecal coliform levels and dissolved oxygen content occurred while the breakwater was in place, which suggests that it is possible for the bay to undergo reoxygenation despite the presence of the breakwater.

Flushing Bay has been exposed to anthropogenic waste, and sulfidic benthic sediments provide a sink for polluted influent, including a number of heavy metals. It has been suggested that improved circulation and reoxygenation of the Bay may cause benthic sediment to lose the capability to bind heavy metals and would result in their release into overlying waters. The results of this type of pollutant release would be devastating. Beth Weinman, a Geology undergraduate at Queens College, analyzed Flushing Bay sediment samples for acid volatile sulfide and simultaneously extracted metal content. She then studied the reaction of these sediments to reoxygenation and investigated the release of metals and sulfides into an overlying water column. Her results indicated that the concentration of labile sediment sulfides increased in samples that were closer to the ocean, due to sulfate influx.

Joanna York (2000)

The Role of Iron in Controlling Shallow Estuarine Primary Production
Marine Program, Boston University

Eutrophication is a growing concern for coastlines worldwide. The focus of controlling eutrophication has been on controlling nitrogen inputs. However, advances in biological oceanography suggest that iron plays a role in controlling primary productivity in nitrogen-rich areas of the open ocean.

Joanna York, a Ph.D. student of the Boston University Marine Program, studied the role that iron plays in controlling eutrophication in shallow coastal estuaries. York conducted two experiments to determine whether iron limits primary production in shallow estuaries. Water was collected from the Childs River in Waquoit Bay, Massachusetts. The results of this study indicated that there is a co-limitation of primary productivity by both iron and nitrogen and advanced coastal managers' strategy for controlling eutrophication. Results from the experiment were published in *Environment Cape Cod,* which is concerned with environmental management issues.

Coastal Marshes

THE COASTAL SALT MARSH is a productive ecosystem that supports significant biodiversity. Beyond the shoreline, tides carry nutrients from the ocean that settle in marsh sediment resulting in vegetation growth and a healthy ecosystem. The following abstracts describe the research and conservation efforts by Sounds Conservancy grantees to reverse the impact of development (near the salt marsh) as well as the impact of invasive species to successfully restore and protect the coastal marsh.

Carlos Ballon (2015)

The parasite Cryptocotyle lingua *reduces consumption rate of* Littorina littorea
Adelphi University

For many years ecologists have debated whether bottom-up or top-down forces control salt marsh productivity. Recent evidence has revealed that bottom-up and top-down control can be indirectly facilitated by both biological and abiotic factors. In this study, Carlos Ballon is investigating parasitism of an invasive marsh snail (*Littorina littorea*) by a digenean trematode (*Cryptocotyle lingua*). *L. littorea* is a salt marsh snail that primarily feeds on algae often incrusted on salt marsh cord grass. Uncontrolled algae grazing by *L. littorea* damages marsh cord grass, mediating a top-down trophic cascade causing loss of plant life and ultimately salt marsh die-off. It is not well understood whether the impact of parasitism by *C. lingua* reduces grazing intensities by *L. littorea* within salt marshes. Previous research has shown that the parasite *C. lingua* reduces consumption rate of *L. littorea*. Building on this previous work, Carlos Ballon wishes to address the following questions: 1) Do parasite infected snails have lower consumption rates than uninfected snails? And 2) Will the effects of the parasite on host snails reduce grazing intensities and counteract strong top-down control and indirectly facilitate bottom-up control?

In order to do this, Carlos Ballon will first begin scouting various sites along Long Island Sound where host infection is highest. Preliminary sampling of snails will then begin, collecting 50 to 100 adult snails with a mean size of 8mm. By placing each sample in its own enclosed environment given the same amount of food daily, consumption rates will be observed. All data will be recorded until the end of the experiment where snails will be dissected to determine parasite infections. Then, data will be reprocessed and consumption rates determined for both infected and uninfected snails. There will also be an experiment to study the effects the parasite may have on regulating top-down control. A similar set up to the lab experiment will be conducted by placing groups of snails in cages. The experiment will run for a total of 3 to 4 months and data will be analyzed using ANOVA.

Holly K. Bayley (2011)

Testing the Resilience of Genetically Distinct Eelgrass (Zostera marina L.) *Populations for Improved Management and Restoration*
University of New Hampshire
Southern New England and New York

Eelgrass *(Zostera marina)* beds are ecologically and economically vital to southern New England (NE) and New York (NY). The many functions of these beds include: forming the foundation of coastal food webs, supporting high levels of species diversity, comprising nursery grounds for marine fauna, filtering and stabilizing sediments, protecting shorelines by dampening wave energy, cycling nutrients, and sequestering carbon. Extensive losses of eelgrass have occurred across southern NE and NY over the past decades, mostly due to direct and indirect human impacts, including coastal development and excess nutrients. Climate change is anticipated to exacerbate these threats. Information on the ability of eelgrass to survive and grow under stressful conditions is essential in the effort to increase the success of both management and restoration. The resilience of eelgrass to environmental stressors may be influenced by the genetic makeup of eelgrass populations, yet until recently no studies had investigated whether the genetic composition of southern NE and NY eelgrass populations influences their resilience to environmental stressors.

As part of her master's thesis, Bayley proposed to use mesocosm experiments to investigate the way in which population genetics influence eelgrass growth and survival. To do so, Bayley evaluated the responses of genetically distinct eelgrass populations from southern NE and NY to environmental stressors associated with observed eelgrass declines (light and sediment quality). Mesocosms are experimental tank systems that facilitate detailed examination of plant stressors, and allow manipulation of only

the target variables. The proposed project contributed to a large study funded by The Nature Conservancy (TNC) and National Oceanic and Atmospheric Administration (NOAA). Beginning in May 2011, Bayley used mesocosms to test the response of eelgrass collected from ten genetically distinct populations in Massachusetts, Rhode Island, Connecticut and New York to reduced light and increased sediment organic matter in a full factorial experimental design. Bayley hoped her findings would be valuable to regional coastal resource managers, communities reliant on healthy coastal systems, and the greater scientific community.

Holly K. Bayley (2012)

Assessing the Influence of Donor Population on Eelgrass Restoration Success
University of New Hampshire

Efforts to restore eelgrass beds have been largely unsuccessful. Failures are typically attributed to poor restoration site selection, yet restoration efforts have failed to consider the role of donor stock in the selection process. Genetic analysis has shown that spatially disconnected eelgrass beds are genetically differentiated. Thus Hayley Bayley conducted a study to determine whether restoration of eelgrass can be improved by evaluating the genetic differences of eelgrass growth and survival among prospective restoration sites. The purpose of the study was to determine if some eelgrass populations are more suitable donors and to establish whether populations are more adapted to survival in their native or foreign locations. Proposed restoration study was carried out in three locations in East Harbor Truro, Massachusetts, with three different donor beds.

Lenny Bellet (1997)

The Effects of Nitrogen Loading on Two Fringing Marshes in the Mystic River Estuary
Connecticut College

An ecological issue on Long Island Sound is excessive nutrient loading resulting from land use and coastal development. Wetlands are essential to the ecosystem's health as nutrient filters and influences the amount and rate of flow from the terrestrial to the marine environment. Lenny Bellet, a Master's student in Botany at Connecticut College, explored the role of coastal wetlands in nutrient loading of estuaries and bays.

Bellet constructed water wells and analyzed the nutrient concentrations of interstitial (pore) water in two fringing salt marshes of the Mystic River Estuary in Connecticut. The two marshes had the same salinity and hydrology; one was located in a cove that receives nutrient-rich effluent flows from the town wastewater treatment facility, and additional nutrient loading from marinas and recreational boating activity; the other had no major sources of nutrient enrichment. There were technical problems during the chemical analysis, and no significant difference between the two sites was detected.

Bellet then shifted his study to the remapping of vegetation and elevation of tidal marshes along the Connecticut coast that had not been mapped in 25 years. One species of Cordgrass *(Spartina patens)* that historically dominates the high marsh was being replaced by the short form of a patchier Cordgrass species *(Spartina alterniflora),* leaving "bare spots" in the high marsh. His research provided evidence that increased flooding driven by accelerated relative sea level rise resulting in vegetation change. Bellet also established transects for continued monitoring and data comparison of sea level rise on vegetation.

Lori K. Benoit (1995)

Impact of the Spread of Phragmites *on Populations of Tidal Marsh Birds in Connecticut*
Connecticut College

The health of tidal marshes is vital for many salt marsh specialist birds, especially those endangered and/or threatened. Dense monocultures of introduced *Phragmites australis,* Common Reed Grass, have rapidly replaced the characteristic Spartina Cordgrasses and Cattail marsh vegetation. While a Master's student in Zoology at Connecticut College, Lori Benoit researched the impact of *Phragmites* expansion on bird populations and focused on the structure of the bird community in marshes dominated by *Phragmites* or by Spartina and cattails.

Benoit identified 40 salt and brackish marshes along the Connecticut shoreline for her study sites and surveyed birds by listening and observing at specific spots for timed periods. She broadcasted tape-recorded calls of eight bittern and rail species and listened for responses. Marsh Wren and Swamp Sparrow (not threatened) preferred the tall, reedy vegetation at sites with more *Phragmites* or Cattails, but overall, Benoit found few bird species in dense *Phragmites*-dominated wetlands. Seaside Sparrow and Sharp-tailed Sparrow, species of special concern to conservationists, were conspicuously absent from *Phragmites* dominated marshes. Willets, listed as threatened, construct nests from only one species of salt marsh grass, and many state-listed wading birds and sandpipers that use open pools and mud flats are also negatively influenced by the spread of *Phragmites*.

While a few species benefit from reed invasion, many marsh birds that have already declined in number are impacted even further by this phenomenon. Benoit concluded that there is a need for marsh restoration, reed grass control, and conservation of large marshes.

Lindsay Brin (2012)

Coastal Nitrogen Removal in the Face of Global Change: Environmental Regulation of the Temperature Response of Denitrifier Communities
Maine Biological Laboratory
Brown University

In coastal ecosystems, nitrogen (N) is essential for primary productivity. However, excess N leads to eutrophication, with consequences that are detrimental to marine life and coastal livelihoods. Microbially-mediated denitrification mitigates eutrophication by acting as the major N sink in coastal ecosystems. Denitrification rate is controlled by environmental factors such as temperature and carbon availability, but we are only beginning to understand the regulatory affects, let alone the changes, that may occur through climate change. In order to know if eutrophication will be a greater or lesser problem in the future, we need to know how to model and predict N cycling.

One way to assess sediment-denitrifying capacity is to measure denitrification rates in a thermal gradient incubator, resulting in a profile of the kinetic response of denitrification across a range of temperatures. Results of Lindsay Brin's long-term temperature studies suggest an interactive effect of temperature and organic carbon availability, which alters the entire thermal profile shape and therefor the denitrifier community capability. Brin hypothesizes that increasing temperature and carbon will expand thermal profiles, thus increasing the denitrifying capacity of Rhode Island Sound sediments.

Kate Boicourt (2008)

Refining Restoration Strategies: Assessing M-type Phragmites australis *Removal in Long Island Sound*
Yale School of Forestry & Environmental Studies

In Connecticut, approximately one third of its tidal wetlands have been lost since 1880 and most restoration projects are focused on quality of existing wetlands and the removal of invasive species. The invasive species of major concern is the non-native genotype (M-type) of the tall spikegrass, *Phragmites australis,* which has recently begun to dominate Atlantic U.S. coastlines. This species is often removed through herbicidal spraying and subsequent mowing of dead stands with the goal of restoring native species and increasing biodiversity. However, the effectiveness of this method is unclear. Resultant bare soils, loss of nutrient and sediment filtration, loss of habitat, dense mats of *P. australis* leading to difficult recolonization of natives, and alteration of hydroperiod are all concerns related to this method during the interim period of restoration initiatives.

Kate Boicourt, a Master's candidate at the Yale School of Forestry and Environmental Studies, worked with the Connecticut Department of Environmental Protection to choose study sites that have undergone *Phragmites* removal to examine the effectiveness of spray-and-mow. She focused on sites of varying salinity (measured by percent cover of native species) and the effects of removal projects on soil chemistry, sedimentation, and hydrology. Boicourt created a framework for predicting the likelihood of restoration success based upon the physical characteristics of tidal wetlands. With an improved knowledge of the various parameters affecting restoration success, managers are able to allocate resources to the most appropriate sites and will therefore be more effective in enhancing and expanding critical habitat for marine resources.

Mark Carabetta (2000)

Patterns and Rates of Phragmites australis *Expansion and Retreat*
Connecticut College

Phragmites australis, or Common Reed, is a wetland plant species found almost everywhere throughout the United States. It is a colonial plant, spreading by rhizomes (underground stems) and capable of forming large stands or colonies arising from one or a few seeds or plant pieces. These colonies form in brackish water and in disturbed areas, and their aggressive growth and tendency to overtake other plants and form monospecific (single species) stands has many conservation biologists worried.

Mark Carabetta, a Master's candidate in Botany from Connecticut College, investigated the pattern and rate of *Phragmites* expansion as a function of the hydroperiod (percent of tides submerged) and salinity in two unrestricted, mesohaline tidal marshes where *Phragmites* is invading. The three marshes Carabetta researched are located along the Connecticut coast of Long Island Sound.

Carabetta's research suggests that areas of brackish marsh subject to less frequent tidal flooding, deeper depth to groundwater, lower salinity, and lower porewater sulfide concentrations relative to other areas of the marsh will be more susceptible to invasion in marshes where *Phragmites* is currently expanding. He further analyzed and documented generalized patterns of *Phragmites* expansion and retreat within the study marshes by using historical false color inferred aerial photographs. Tidal marsh restoration is a major concern in Long Island Sound. Carabetta's results were beneficial to the scientists working on coastal areas of New England.

Jennifer Cooper (2000)

Erosion of Sensitive Coastal Wetlands at the Charles E. Wheeler Wildlife Sanctuary: Physical Mechanisms and Long-Term Rates of Change
Southern Connecticut State University and
Connecticut Coastal Audubon Center

Nell's Island, part of the Charles E. Wheeler Wildlife Sanctuary, is located in the lower Housatonic River Estuary of Long Island Sound, one of Connecticut's largest estuaries. Jennifer Cooper, an undergraduate at Southern Connecticut State University, suggested that severe erosion is occurring in the environmentally sensitive coastal wetlands along the Housatonic River Estuary. Field studies over a two-year period indicated that large segments of the high marsh habitat were eroding at rates as high as one meter per year. Cooper investigated mechanisms including current shear, ice abrasion, and bio-erosion by burrowing fiddler crabs and boat wakes. Her results indicated that crab burrow density does not correlate well with erosion rates, but appears to play an important role in erosional style.

Cynthia Coron, Ph.D. and Thomas Fleming, Ph.D. (2003-2005, 2010-2011)

Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut Tidal Marshes
Department of Earth Sciences, Southern Connecticut State University

Fletcher's Creek tidal marsh is part of Silver Sands State Park, a 47-acre recreational beach and salt marsh along Long Island Sound in Milford, Connecticut. The area had been a dumping site for local inhabitants since the 1920s and had been used by the town of Milford as an unregulated landfill since the end of WW II. The site was officially closed in 1977 and capped with fly ash beginning in 1990. Anecdotal information indicates that household waste, hazardous materials including asbestos, lead paint, pesticides, oil, battery acid, freon, toluene, PCB's, and radioactive medical waste were discarded at the site.

Restoration of the Fletcher's Creek tidal marsh was performed in 1999 and the dredging, boardwalk construction, and clearing of *Phragmites* uncovered surface debris. Monitoring of this site was initiated shortly after restoration, and samples taken from the debris field and tidal channel in 2000 and 2001 indicated elevated concentrations of heavy metals (including chromium, copper, iron, lead, manganese, mercury, nickel, selenium, and zinc) of probable anthropogenic origin. In 2003 and 2004, Dr. Cynthia Coron and Dr. Thomas Fleming, Professors at Southern Connecticut State University, expanded monitoring to include the connected un-restored tidal marshes of Great Creek to the east and Nettleton Creek to the west. Analyses of sediments from the Nettleton Creek watershed also identified areas of concern containing high proportions of heavy metals.

In 2005, the second phase of the project expanded the sample database and also improved upon the debris field map of the watershed. Cores were taken from two sites on the Nettleton Creek marsh to investigate the fluctuation of heavy metal levels over time by using an Innov-X handheld metals analyzer. In 2010, an intern on the project investigated heavy metal concentration fluctuation in the sediments in the core through time, in order to track sedimentary sequences from pre-industrialized to post-industrialized accumulation. A second student intern collected plant species in the summer of 2011 and analyzed the heavy metal concentration uptake of natural and invasive species. Results of the study were shared with the Connecticut Department of Environmental Protection and the Town of Milford and helped the community identify areas of concern in the Nettleton Creek watershed.

Jennifer Culbertson (2004-2005)

Examination of Methylmercury Magnification in a New England Salt Marsh
Marine Program, Boston University

Much attention has been given to the discovery that contaminants such as organochlorines, DDT compounds, and other xenobiotics have biomagnified within food webs. Biomagnification is the transfer of a contaminant from food to an organism that leads to higher concentrations of the chemical in the consumer than were originally found in the source. Accumulated concentrations of contaminants can adversely affect organisms, but developments in stable isotope research have made it possible to determine the trophic position of organisms to further an understanding of biomagnification.

Jennifer Culbertson, a Ph.D. candidate in Biology from the Boston University Marine Program, studied biomagnification of methylmercury in the Great Sippewissett salt marsh on Cape Cod, Massachusetts. Experimental plots in the marsh have been fertilized with metal-containing fertilizer since 1974. In 2004, Culbertson measured total mercury levels in Common Mummichogs, several species of invertebrates, and two species of plants in the marsh, and compared these levels to past records and their stable isotope ratio (trophic position in the food web) to determine the extent of biomagnification. Results of this study showed no significance between total mercury content and stable isotope ratios.

Culbertson expanded upon her research in 2005 by measuring methylmercury content in the same species, which is the predominant form of mercury that bioaccumulates. Mercury content did not show a significant correlation with the trophic position of species in the Great Sippewissett salt marsh. According to Culbertson, examination of biomagnification in organisms with chronic exposure to polluted environments will assure progress in understanding the effects of mercury magnification.

Jessica Darling (2005)

The Role of Nutrients in Marsh Drowning in Long Island Sound
Yale School of Forestry & Environmental Studies

Tidal marsh drowning is the conversion of marsh land to mud flat as a result of an increase in water levels or a gradual subsidence of marsh sediment. Subsidence is common in areas where natural tidal ranges have been restricted and the normally porous, water-filled marsh sediments have been exposed for prolonged periods. Evaporation draws out the moisture content from the pore spaces and the soil eventually compacts resulting in elevation loss. Also, high nutrient levels can change the biological structure of a marsh by allowing superior competitors to displace the characteristic specialists of a low marsh leading to substantial changes in the physical structure of a marsh.

While a Master's candidate at the Yale School of Forestry and Environmental Studies, Jessica Darling studied three different marshes on Long Island Sound. Plots were established at one healthy, low-nutrient marsh; one degrading, high-nutrient marsh; and one aggrading marsh with recently restored tidal flushing. Levels of nutrients were tested at each site, and measurements of sediment respiration were also taken to determine the effect of nutrient loading on decomposition processes. This research helps scientists and managers better understand the mechanisms by which nutrient loads affect marsh elevation.

Henry Scott DeBey, Gaboury Benoit, Ph.D. (2010)

Developing an Approach for Coastal and Marine Spatial Planning (MSP) of the Long Island Sound
Yale University
Long Island Sound

Henry DeBey and Gaboury Benoit proposed to use the restoration of a well-studied salt marsh ecosystem as a natural experiment to test the causal links between environmental quality and human perceptions and behavior in an urban area. DeBey and Benoit aimed to further elucidate the relationship between environmental condition and quality of life in urbanized areas. This project focused on marshes in public urban areas because they provide significant recreational opportunities for a human population that generally lacks them, and the quality of such opportunities depends directly on the quality of the ecosystem. In particular, the researchers asked how people perceive improvements in environmental quality resulting from an urban salt marsh restoration, and how changes in perceptions feed back as modified attitudes and behavior toward the restored system.

DeBey and Benoit quantified environmental quality by measuring changes in water quality and its effects on vegetation, fish,

and bird communities before and after restoration of tidal exchange in a former salt marsh ecosystem located on the West River in New Haven, Connecticut. They also measured changes in local knowledge of the experimental system, the community's attitudes and behavior towards it, and the way in these are influenced by general environmental attitudes and social networks.

This research was among the first to test causality between environmental quality and human attitudes and behaviors at the community scale. The project included an education component, aiding K-12 public school students, undergraduates, and graduate students. The researchers also intended to enhance education by posting real-time web water quality data. Finally, such research directly benefits both society and environmental systems, as an understanding of the way in which ecosystem restoration can lead to improvements in human well-being, which in turn fosters greater environmental stewardship.

Jessica Mulready Dominguez (2006)

Addressing Community Value in Wetland Restoration on Cape Cod
Marine Affairs, University of Rhode Island

Public support of habitat restoration projects is often vital to their long-term success. If the public does not value the area which is being restored or does not appreciate the results of a restoration project, they are not likely to continue to support these programs. When discrete ecological criteria is the only measure of a restoration project's success, public backing of future restoration projects will be jeopardized if these criteria are not of interest to the public.

Jessica Mulready Dominguez, a Master's candidate at the University of Rhode Island, investigated restoration projects on Cape Cod to determine the value of the resulting improved ecological functions to stakeholders and if there was continued support for these restoration projects by local residents. She discovered that although property owners held high positive valuation of salt marsh resources, very few knew of or had seen salt marsh restorations. Dominguez indicated that this is a sign of a significant discrepancy between value and awareness and that the current high valuation for this resource is not properly being utilized. She stated that in order to sustain restoration practices, communication of salt marsh goals to the public need to be considered. By better understanding community resource valuation, restoration projects of substantial ecological value can be better marketed to the community, and will therefore be more generously supported by stakeholders and local residents. Dominguez shared her results in her Master's thesis and with local management authorities.

Debora Fillis (2004)

Application and Evaluation of a Rapid Assessment Technique for New England Salt Marshes
Yale School of Forestry & Environmental Studies

Nearly 80% of New England's coastal wetlands have been destroyed by filling and dredging and are now lost to development. Laws have been passed to protect wetlands from this type of direct destruction; however, they continue to be degraded through non-point sources, toxic spills, introduced species, and submergence.

Debora Fillis, a graduate student at Yale University's School of Forestry and Environmental Science, conducted research designed to create a region-wide tool for evaluating New England's salt marshes. Her three-tiered research involved a landscape assessment using a Geographic Information System, an assessment of the wetland, and a comparison of the results with data from an intensive site evaluation. The overall goal of the project is to develop and apply procedures and tools to measure, assess, and describe the condition of New England salt marsh wetlands.

Allison Fitzgerald (2015)

Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University

Naturally occurring oyster reefs are absent in the western Long Island Sound due to centuries of overharvesting, pollution and disease. In the recent past, many groups have been working towards restoring the populations of this ecological engineer to preserve the ecosystem services of the oyster and improve water quality in the area. However, restoration efforts have only been partly successful. Most restorations tend to add juvenile oysters to the habitat as spat on shell or as loose juvenile oysters. However, while these oysters are able to grow and survive, they are having problems reproducing. Oysters naturally reproduce yearly once they reach maturity; however it has been observed that oysters in Western Long Island Sound are reproducing every five to six years. The oyster reef will never be successful long term if there is not a self-sustaining population.

It is hypothesized that the deficiencies observed in reproductive output and reproductive potential are due to lowered dissolved oxygen, high levels of contaminants and high sedimentation in the area. If the oysters' reproductive potential is related to these abiotic field conditions, this will influence how sites are chosen for future oyster restorations. Both oysters naturally occurring at a site in the western Long Island Sound (Soundview Park, Bronx, NY) and aquaculture oysters placed at the same restoration site will be collected and studied for reproductive potential. Oysters will be analyzed for biotic responses to the environment: overall condition, presence of gametes, lipid levels and presence of vitellin proteins. Additionally, the environment will be analyzed for abiotic parameters that could influence oyster reproduction: water quality (temperature, salinity, dissolved oxygen, pH), sediment type and sedimentation rates, and presence of contaminants (specifically Hg, which bioaccumulates in lipid tissues). Statistical analyses will determine if there are any significant relationships between abiotic conditions and biological responses of the oysters with respect to reproductive condition. The results of this project will allow for restoration managers to make decisions for long-term success of projects.

Kathryn Hanrahan (2014)
Short Term Study on the Impacts of Carcinus maenas *on Ecosystem Functioning in a Massachusetts Salt Marsh*
Massachusetts Coastal Zone Management

The European Green Crab (*Carcinus maenas*) has been present on the United States coasts since 1817, and is one of the most successful invasive species worldwide. Further, the crabs cause noticeable changes in the ecosystems they invade. In Massachusetts, burrowing activity by these crabs has been observed in the banks of saltmarsh creeks. Kathryn Hanrahan sought funding to conduct a research project during the summer of 2014 that would investigate the impacts the European Green Crab is having on these saltmarshes. During the project, Hanrahan collected sediment from saltmarshes in the Plum Island Sound region. She then analyzed the samples for total organic carbon and total organic nitrogen, in order to quantify the bioturbation associated with European Green Crab burrows.

Troy Hill (2007)
The Effect of Nutrient Enrichment on Carbon Dynamics in Long Island Sound Salt Marshes
Yale School of Forestry & Environmental Studies

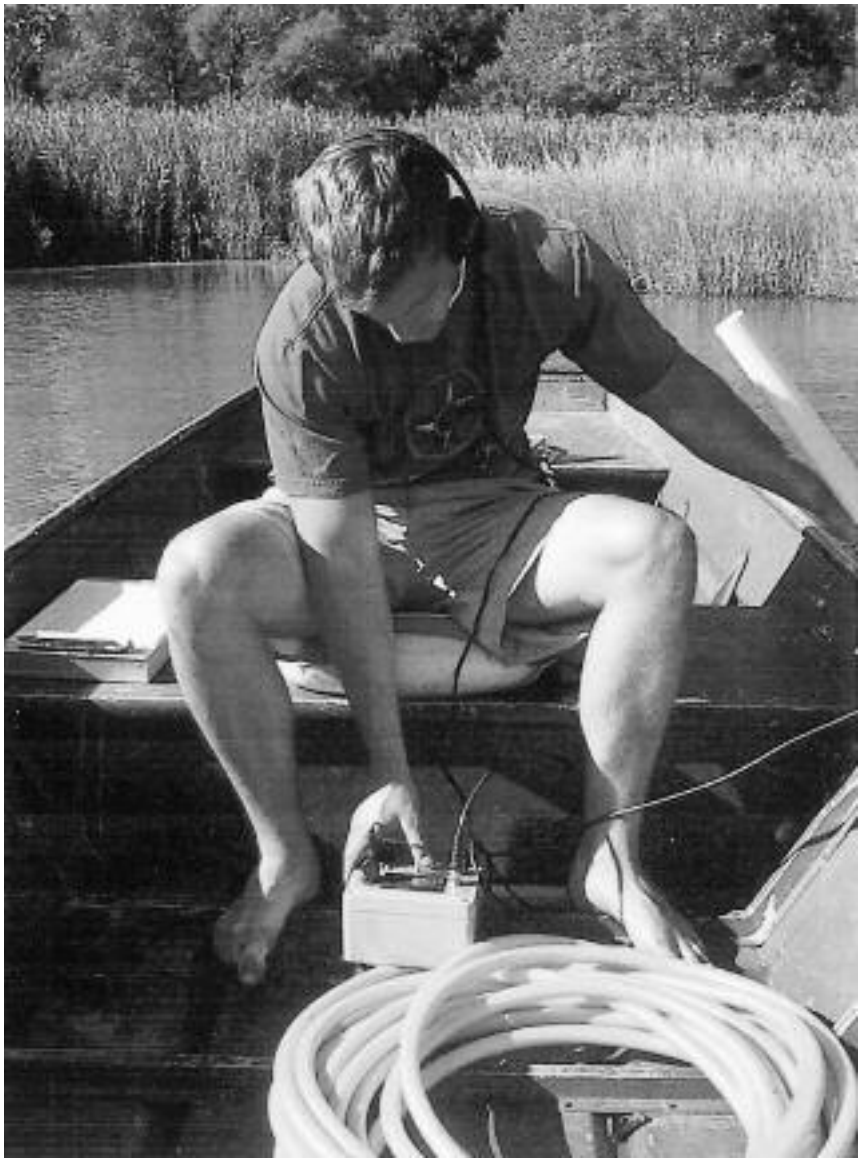
Connecticut's salt marsh acreage had decreased by more than 30% since 1969, and much of the loss was due to direct anthropogenic influences (i.e., dredging, filling). Despite recent strict legislative restrictions, marshes within Long Island Sound are still disappearing. As populations rise and coastal habitation becomes more desirable, nutrient inputs from human sources (i.e. wastewater treatment and fertilizer use) have heavily augmented nitrogen and phosphorous loads discharged into salt marshes. Rising sea level and sediment subsidence are known causes of salt marsh loss, but research also suggests that nutrients can influence processes controlling marsh elevation, and thus, indirect human impacts may also cause marsh loss.

As part of his work towards a Master's in Environmental Science, Troy Hill characterized below ground primary productivity, decomposition, and carbon mineralization in three salt marshes on Long Island Sound and evaluated the effect of nutrient enrichment on those processes. The study gives an understanding of nutrient input and salt marsh elevation loss. Hill presented his research to relevant state and local agencies and organizations to focus management efforts and policies.

Tim Hoffman (1998)
Geomorphic Processes and Evolution of Wildlife Habitat at the Charles E. Wheeler Wildlife Sanctuary at the Mouth of the Housatonic River
Southern Connecticut State University

The Charles E. Wheeler Wildlife Sanctuary is located on an 840-acre salt marsh at the mouth of the Housatonic River in Milford, Connecticut. The lower Housatonic constitutes one of Connecticut's largest estuaries and contributes 11% of the total volume of freshwater entering Long Island Sound. The salt marshes are the only major wetlands in the state that have not undergone mosquito ditching, infilling, or tidal restriction. Effective management of this ecosystem requires an understanding of ongoing changes in geomorphic processes within this area.

While a Geology major at Southern Connecticut State University, Tim Hoffman helped the Connecticut Audubon Coastal Center establish initial geomorphic data for Nell's Island, the oldest section of the Wheeler salt marsh. Hoffman and three other students paddled out to the survey site and sunk wooden stakes



into the ground from which a baseline was established. The distance from the baseline to the bank of the island was measured every 20 meters and the resulting data allowed comparisons to be drawn from future studies to determine erosion or accretion rates. Hoffman identified six erosion features that may show patterns of erosion and accretion on Nell's Island that should be monitored for many years to come.

The Connecticut Audubon Coastal Center displayed a poster of the baseline data points and photos of the six erosion features at the Long Island Sound Research Conference in New York. The data were used to educate students, decision makers, and the general public about the importance of coastal wetland and watershed preservation, and have been used in subsequent studies of the area.

Erin Kinney (2007)

$\delta^{15}N$ Profiles in Salt Marsh Sediments: Calibrations Using Decadal Scale N Loads
Marine Program, Boston University

Land-derived nitrogen (N) loads have more than doubled in Waquoit Bay, Massachusetts, during the last half-century due to development and land use changes. Increased N loads are substantially changing the nature of estuarine and coastal environments, altering water quality, food webs, and restructuring coastal ecosystems. As N loads rise, eutrophication becomes more common and effective tools are needed to assess changes in magnitudes of inputs over time and to pinpoint the sources of N entering coastal ecosystems.

After obtaining vertical sedimentary profiles of nitrogen's stable isotope ($\delta^{15}N$) and %N in dated cores, Erin Kinney compared these profiles with previously calculated N loads and contribution of N from various sources over time and proposed to interpret and calibrate the sedimentary record of eutrophication in Waquoit Bay. Kinney, a Ph.D. candidate in Marine Biology at Boston University, developed and tested a protocol by which stakeholders can assess the level and trend of present eutrophication in any given area, and identified the major sources and levels of N. This research contributes to the basic understanding of land-sea coupling and retention of N in estuarine sediments and will have applied benefits as well. Knowing the time course of N loads would indicate what sources and human activities are instrumental in causing eutrophication and whether conditions are improving or deteriorating. Kinney shared this information with the Waquoit Bay National Estuarine Research Reserve staff to help them create a valuable monitoring tool and also published the results of her study.

Melissa Lage (2002)

Impact of Anthropogenic Disturbance on the Composition and Ecosystem Functioning of Microbial Communities in New England Salt Marshes
Brown University

Salt marshes are important nursery grounds and wildlife habitats. They provide flood and erosion control, improve water quality, and offer recreational retreats. Despite their value as a productive ecosystem, salt marshes are still affected by the negative impacts of anthropogenic disturbances. In New England, nearly 80% of salt marshes have been decimated by increases in nitrogen and invasive species linked to human development.

Melissa Lage, a Ph.D. candidate at Brown University, studied the relationship between human disturbance and ammonia oxidizing bacteria diversity and whether changes in this diversity were accompanied by changes in ecosystem function. Lage took soil core samples from three relatively undisturbed Rhode Island salt marshes located along Narragansett Bay as well as three samples from marshlands that have been significantly disturbed by human activities. She compared the diversity of ammonia oxidizing bacteria, which are important in the marsh nitrogen cycle. Bacterial and plant communities were sampled along with water at each

site. The water samples were measured for salinity, pH, temperature, sulfates, phosphates, ammonia, and nitrates. Lage believes that one of the most significant ways science can facilitate an understanding of the impact of disturbance on these ecosystems, as well as their potential for recovery or restoration, is to understand the dynamics between below and above ground species and their function in the salt marsh ecosystem.

Alexandria Moore (2015)

Importance of Community Structure in Tidal Wetland Restoration
Yale School of Forestry & Environmental Studies

Wetlands are among the most environmentally and economically important ecosystems globally, providing services and benefits to humans valued in the billions of dollars annually. However, due to various anthropogenic activities, wetlands are also being considered among the most threatened environments worldwide. Given their value, extensive efforts are now being undertaken to recover services lost through pollution, habitat transformation, and other human activities. Unfortunately, restoration of critical ecosystem functions has been limited because traditional methods aim to restore the physical features of wetland sites with little regard to the biological features, such as species interactions, which may be instrumental drivers of ecosystem functioning. This research seeks to incorporate an ecological perspective into restoration and evaluates how biological diversity and species interactions impact wetland restoration success.

Furthermore, Alexandria Moore aims to elucidate how species diversity and their interdependencies influence successful restoration of New England saltmarsh ecosystems. Using multi-year field and laboratory experiments that will run from May to August of 2015 to 2017, Moore will resolve how interactions between functionally important plant and crab species, smooth cord grass and fiddler crabs, affect ecosystem functioning. Using constructed wetland mesocosms, species identity and abundance can be manipulated to directly evaluate the mechanisms by which ecosystem functions vary under distinct ecological communities. This knowledge will then be applied to develop experimentally informed projects that restore degraded marsh ecosystems in coastal New England.

Rachel Neurath (2008)

Recent Sea Level Rise Recorded at Barn Island Salt Marsh in Connecticut
The Maritime Studies Program, Williams College and Mystic Seaport

At the start of the 20th Century, the rate of sea level rise nearly doubled. Rachel Neurath proposed to use radiometric dating of Barn Island Marsh cores to determine the rate of marsh accretion and local sea level rise to see whether the marsh records a change in the rate of sea level rise for the past 200 years. Currently, estimates using hurricane layers yield local sea level rise rates of approximately 2 mm per year.

As part of her Bachelor's studies at Williams College, Neurath took five sediment cores on ten meter intervals from a transect moving inland from the shore of the marsh and transported them to the Williams-Mystic Marine Science Center for analysis. Here, sand horizons in the cores were identified and correlated to recent hurricanes. Additionally, ten samples were sent to Memorial University in Newfoundland for ^{210}Pb and ^{137}Cs radiometric dating. Using the compiled information, local rates of sea level rise were determined allowing critical regional environmental management issues to be more accurately addressed.

Christine Newton (2009-2010)

Effects of Drift Macroalgae on Salt Marsh Communities/ Can Algae Save Our Marshes?
University of Rhode Island

The salt marshes along Rhode Island's extensive coast are home to species of commercial importance. Salt marshes are the transition area between land, brackish, and saline habitats, and filter land derived pollutants before they enter marine ecosystems. Eutrophication, an excess of nutrients in bodies of water, has impacted ecosystems by causing increases in macroalgal bio-mass, resulting in damaging algal blooms and macroalgal drifts in salt marshes. These events have the potential to alter the coastal marsh ecosystem by increasing nutrient availability, changing habitat structure, and altering species interactions within the ecosystem.

Though this increase in macroalgae can have negative results, macroalgae can sequester excess nitrogen in their tissues, and release this nitrogen into the sediment upon decomposition. By providing this limiting nutrient to lower marsh plants, macroalgae may facilitate the growth of the native cordgrass, *Spartina alterniflora.* An increase in cordgrass growth would in turn increase sediment accumulation rates, the entire process thereby counteracting erosion while reducing anthropogenic nitrogen in the water column.

To quantify the species composition, biomass, and distribution of macroalgal blooms in Rhode Island salt marshes, Christine Newton of the University of Rhode Island conducted monthly surveys at ten fringing salt marshes throughout Narragansett Bay from May to September of 2009. She set up fifteen cages at each site: five containing a high density of macroalgae, five with a low density, and five with no macroalgae. At each cage, cordgrass growth, herbivore density, and predator density were measured. At the same time, Newton carried out a similar experiment in the lab, removing the aspect of tide cycles. Though macroalgal blooms are regarded as a negative consequence of eutrophication, they could provide limiting nutrients to native marsh plants, reducing erosion rates and further stabilizing the coastal ecosystem. Thus, these macroalgal blooms may have the potential to naturally restore salt marshes and to increase the ability of the marshes to perform their natural functions.

Alyssa Novak, Ph.D. (2013)

Test-Transplanting Genetically Differentiated Eelgrass Donor Populations Along Cape Cod National Seashore to Identify Those Most Suitable for a Successful Restoration
University of New Hampshire

Eelgrass meadows are both ecologically and economically valuable to coastal waters and have become the focus of resource management and restoration initiatives in Massachusetts. Studies

have shown that eelgrass donor populations vary in their resiliency to multiple stressors and suggest that proper selection of donor populations is a critical parameter to restoration success. In an effort to identify which strain of eelgrass were best-suited for large-scale restoration at two sites along the Cape Cod National Seashore, Dr. Alyssa Novak performed test-transplants using genetically differentiated eelgrass donor populations. Eelgrass for the study was collected from three genetically differentiated eelgrass populations from Massachusetts: from Southway, on Cape Cod, from Nahant, and from West Island, in Fairhaven.

200 shots were collected from a bed at each of the 3 donor sites and planted at four test-transplant sites within Nauset and East Harbor. Test transplants were monitored for 1 year: checked monthly for the first 6 months, and measured at 4 weeks, 16 weeks and 52 weeks. The measurements included shoot density, leaf area, and canopy height, and were used to evaluate how each respective population was performing, as well as to predict shoot survival, expansion of the transplant plot, and restoration suitability. At the same time, water quality parameters were taken both at the test-transplant sites and at the donor sites.

Novak's ultimate goal was to increase eelgrass along the Cape Cod National Seashore and to ensure that the populations selected would be resilient to future stressors, including climate change. Further, the results of Novak's study would provide critical information to scientists and managers on the role of donor populations in transplant success for future eelgrass restorations.

Sara Petrochic (2007)

The Ecological Role of Diamondback Terrapins in the Structure and Dynamics of Benthic Communities in Oyster Bay Harbor
Long Island University

The Diamondback Terrapin (*Malaclemys terrapin*) is the main predator of benthic invertebrates in Oyster Bay, Long Island and may have an impact on the diversity and biomass of the benthic community of Long Island Sound marshes and embayments. Much of their foraging ecology is unknown. Sara Petrochic studied the foraging habits of terrapins and their impact on salt marsh ecosystems.

Petrochic's analysis of terrapin fecal matter determined variations in diet over time and the dietary niche overlap between sexes. Food preference tests were performed and bite force was measured to identify prey that consists of the terrapins' diet. Exclosure studies were performed to determine if foraging is a factor in benthic community structure. The study used two exclosures with stainless steel mesh sized to exclude either all terrapins (small size mesh) or only female terrapins (large size mesh). Females grow larger than males. Another control area allowed grazing by all terrapins. A comparison of all exclosure sites showed the impacts of terrapins foraging on the benthic community. Petrochic's results were included in her Master's thesis.

Jessica R. Price (2010)

The Effect of Fiddler Crab Behaviors on Salt Marsh Ecosystem Function in the Presence or Absence of Avian Predation
Yale School of Forestry & Environmental Studies
Guilford, Connecticut

Salt marshes are one of the most productive ecosystems in the world and support a great diversity of plant and animal species. Yet human disturbance continues to harm and destroy salt marsh ecosystems, leading to the need for salt marsh restoration and research to inform these restoration efforts. The success of salt marsh restoration is known to be dependent on the activities of certain keystone species, especially crabs. The objective of Jessica Price's research was to measure and describe the effect of fiddler crab behaviors on ecosystem function in the presence or absence of avian predation.

It is well documented that fiddler crab burrowing behavior is vital for healthy marsh ecosystem function. Further, avian predation alters fiddler crab behavior at multiple levels. It stands to reason then, that variation in avian predation strongly impacts ecosystem function by influencing fiddler crab behavior. Price undertook a study in a salt marsh near Guilford, Connecticut, from April to August of 2010 in order to evaluate this hypothesis. The results of Price's study were intended to provide insight to inform and implement restoration initiatives.

Price measured abiotic and biotic ecosystem properties in natural plots and in and plots that excluded avian predators. Some plots were surrounded by aluminum flashing that acted as a barrier to fiddler crab movement, while other plots lacked this aluminum flashing. Those plots that excluded birds included a narrow grid of monofilament fishing line above the plots. Preliminary data collection took place in April before the enclosures were placed in the salt marsh and then continued throughout the field season at one-month intervals. To ensure proper data collection, measurements and soil samples were collected in 5 different locations within each plot. Salinity, temperature, pH, plant species composition, percent cover, plant biomass, soil nutrient status, and soil organic carbon were recorded. The results of this research were expected to further explain the importance of avian predators and fiddler crabs to the health of New England salt marsh ecosystems.

Tara Rajaniemi (2009)

Recovery of Ecosystem Structure and Function in a Restored Salt Marsh
University of Massachusetts Dartmouth

The Atlas Tack Corporation Superfund Site consists of 40 acres of freshwater wetland and salt marsh located on Buzzard's Bay in Fairhaven, Massachusetts, and was home to an industrial facility which discharged waste into a nearby lagoon. The site was found to be polluted with heavy metals, and the Environmental Protection Agency completed a salt marsh restoration (October 2007). The site offers a unique opportunity to observe the salt marsh restoration.

Tara Rajaniemi of the University of Massachusetts Dartmouth researched the restoration project in restoring the structure and

function of a healthy salt marsh. She focused on monitoring functions including plant production that provides wildlife habitat; accumulation of soil organic matter that provides habitat for invertebrates at the base of the food chain; and nutrient cycling that contributes to improved water quality. Rajaniemi sampled plants and soil in June and September of 2009 from 24 plots that span the range of conditions at the site, from intact soils and plant to unplanted remediated soils, and plant cover and mass, soil organic matter and nutrient content, and soil nitrogen cycling rates. Rajaniemi found that soils in the remediated marsh have little plant growth and lower organic matter and nitrogen than undisturbed marsh.

Nicole Rohr (2010)

Predatory Effects of Hemigraphsus sanguineus *on* Littorina littorea
Department of Biological Sciences, University of Rhode Island

Biodiversity is an important indicator of healthy and resilient marine ecosystems, and its maintenance is an important management goal. Introductions of exotic species throughout the world's coastal areas are widely recognized as serious biological threats due to their ability to upset the delicate balance of these ecosystems through changes in food web interactions.

The Asian shore crab, *Hemigrapsus sanguineus*, was first discovered off the coast of New Jersey in 1988 and has since become common in Narragansett Bay. *H. sanguineus* frequently out-compete established — yet ironically, also invasive — green crabs, *Carcinus maenas*, which has led to the displacement of *C. maenas* from the intertidal zone of cobble beaches in Narragansett Bay, Rhode Island. This replacement could have significant impacts on the already altered native marine fauna in the coastal northwestern Atlantic.

In 2010 Nicole Rohr earned a QLF grant to aid her investigation of the predatory effects of H. sanguineus, on the native marsh periwinkle snail, *Littorina littorea.* Rohr conducted a series of field tethering experiments on *Littorina littorea* in the intertidal zone of cobble beaches in Narragansett Bay to determine if there are differences in predatory pressure on the *L. littorea* among three tidal depths relative to mean low water. At each tidal height, Rohr divided 30 replicate cages among three treatments: uncaged to allow all predation on *L. Littorea*; enclosed in a 4 mm mesh that allowed the passage of *H. sanguineus* to assess the predation on *L. littorea* that can be attributed to this invasive crab; and enclosed in 4 mm mesh to exclude all predators and account for natural mortality. Each experiment was run for seven days; results were recorded in number of *L. littorea* consumed per day.

As coastal invasion rates continue to increase due to human-mediated dispersal and climate change, invasive species research such as this, as well mitigation techniques informed through such research, will be key components of the development of ecosystem-based management plants.

Rebecca A. Schultz (2013)

Differentiating Drivers of Marsh Loss in Long Island Sound
Yale School of Forestry & Environmental Studies

In Long Island Sound, wetlands are highly integrated into urban and suburban coastal development, providing important buffers against storms and protecting water quality by filtering and trapping pollution. Yet marshes throughout the region are experiencing widespread degradation. Over the last 30 years, Long Island Sound marsh systems have lost large tracts of grassland to unvegetated mudflat, a conversion that aerial photographic records indicate may be irreversible. Multiple factors are likely in play at different locations, e.g., pollution, herbivory, ecosystem fragmentation, reduced sediment availability, accelerated sea level rise, etc., but no coherent typology of marsh loss has been established. Differentiating drivers of marsh loss and identifying their signatures will be critical to prescribing interventions for rehabilitation and conservation of this valuable habitat.

Rebecca Schultz's project demonstrated and differentiated two mechanisms of marsh degradation: 1) crab defoliaton, an ecological or biogeochemical phenomenon associated with extensive activity of the native marsh crab, *Sesarma reticulatum;* and 2) marsh drowning, a physical phenomenon related to accelerated sea level rise and inadequate sediment supply. To demonstrate these two types of loss, Schultz examined the effects of crab exclusion and relative elevation on cordgrass productivity at two sites: Jarvis Creek in Branford CT where *Sesarma* was suspected to be causing marsh loss, and Sherwood Island State Park in Westport, CT, where drowning was expected to be occurring. Samples of cordgrass, *Spartina alterniflora*, were transplanted across four treatments: elevated, exclusion cage, cage control, and control. There was expected to be greater productivity in crab exclusion treatments in Branford, but not in Westport, and greater productivity among elevated treatments in Westport, but not in Branford.

End-of-season aboveground biomass were also harvested for lab analysis, and sediment cores were collected and analyzed for macro and micro organic matter content and bulk density among other factors, to aid in characterizing signatures of marsh loss type.

Gregory Shriver (2000)

New England Salt Marsh Bird Survey
Massachusetts Audubon Society

Salt marshes support diverse wildlife and provide valuable breeding and migratory habitat for numerous species of shorebirds, waterfowl, colonial waterbirds, and songbirds. Gregory Shriver of the Massachusetts Audubon Society developed habitat specific surveys that compliment the widely used Breeding Bird Survey.

According to Shriver, documenting bird species distribution and abundance is the first step in determining the sites for the breeding bird community and aids in prioritizing future conservation initiates. The New England Salt Marsh Bird Survey established baseline population estimates for all bird species breeding in salt marsh habitats, and provided a framework for the development of a monitoring program designed to detect trends in species populations. The monitoring program has been made available to land managers throughout New England.

Marcia J. Tobin (1995)

Effect of Tide Gates on Sedimentation Rates in Tidal Wetlands
Yale School of Forestry & Environmental Studies

It is not uncommon that many tidal wetlands in Connecticut are equipped with tide gates or other flow restrictions. Gates drain agricultural fields and control flooding. At Leetes Island in Guilford, Connecticut, tide gates are used during the summer to allow for salt marsh haying and to prevent marsh drowning. The gate closes during flood tide and opens during ebb tide. The reduced tidal cycle contributes to a number of changes in the marsh soil, and alters the nutrient dynamics of the system.

Marcia Tobin, a Master's student at the Yale School of Forestry and Environmental Studies, focused on how these gates affect sediment accumulation and marsh productivity. She chose three sites in Connecticut with similar geomorphology and substrates: Leetes Island and Sluice Creek (both with tide gates); and Hoadley Creek (the control, without tide gates). Tobin took sediment cores from the three tidal wetlands and examined them for iron, aluminum, and trace metals such as copper, zinc, lead, cadmium, and silver. Using radiometric dating of lead-210 and cesium-137, Tobin determined the age and sedimentation rate of each core. She then dried and powdered the core slices and found the percent of carbon and nitrogen. Tobin found evidence that alterations to the hydrologic flow of a tidal marsh affect the rate and amount of sediment accretion. The data researched by the Army Corps of Engineers, the Connecticut Department of Environmental Protection, and the Town of Guilford in decisions [regarding] the management of tide gates.

Johan C. Varekamp, Ph.D. (2010)

Modern Marsh Growth Processes at Jarvis Creek, Guilford, Connecticut
Wesleyan University – Earth & Environmental Sciences
Guilford, Connecticut

Coastal salt marshes are among the most productive ecosystems on earth, and many species spend their juvenile period in the protected, shallow, and vegetated bays and gullies. Marshes also serve as coastal barriers during storms, protecting human developments and infrastructures. Despite the recognition of their importance in ecology and civil defense, coastal marshes have been neglected over the years, and are being lost at an alarming rate. Enhanced rates of relative sea level rise (RSLR) over the last 150 years are an additional threat to coastal salt marshes, and changes in marsh ecology as a result of increased salt water flooding have already been documented. In order to protect marshes better in the future, it is important to better understand how marshes grow and maintain elevation during periods of enhanced RSLR. To this end, Varekamp and fellow researchers designed a project in the Jarvis Creek Marsh. Researchers examined the impacts of climate warming on Long Island Sound coastal salt marsh productivity, and their paleo-ecological studies assessed historic accretion rates and sea level rise. This research project received pilot funding by the newly established Yale Climate and Energy Institute, as well as from The Sounds Conservancy.

Part of Varekamp's work involved mapping the ecology of benthic foraminifera small unicellular organisms (Protista), as a function of the salt water flooding frequency in the marsh. Varekamp's team established the micro-topography of a marsh transect, and determined the flooding frequency with water elevation recording instruments. In addition, the researches studied the accumulation of the contaminant Mercury, which is both deposited through direct atmospheric deposition on the marsh surface and imported with fine-grained sediment. Short cores were taken on the transect to examine to what extent the surface measurements reflected the Hg accumulation history of the last few decades. These measurements would provide the following data: What are the sources of fine-grained sediment for a coastal marsh? What is the range of flooding frequencies in Guilford marsh today and how does that compare with the recent past? Do the benthic foraminifera assemblages already show evidence for marsh 'drowning'? Are coastal salt mash sequences good recorders of atmospheric deposition of pollutants such as Hg? And will the Hg geochemistry of marsh sediments help to unravel sediment dynamics in the marsh?

William Wilcox (2003)

Water Quality Assessment of James Pond, Martha's Vineyard, Massachusettts
Martha's Vineyard Commission

Coastal salt ponds along the shores of southern New England and Long Island are threatened by air pollution, exotic species, pathogens, jetty construction, excess nitrogen from septic systems, sewage treatment plants, fertilizers, and excessive use of the ponds.

James Pond is a 42-acre coastal great pond on the north shore of Martha's Vineyard, Massachusetts, with reported eutrophic conditions (2003). William Wilcox, the Water Resource Planner for the Martha's Vineyard Commission, gathered data to assess the pond and outline a management plan for restoring its integrity. Data consisted of dissolved nutrients (nitrogen, silica, and phosphorus), particulate nutrient and chlorophyll, tidal volume, and pond basin size. Tidal exchange was measured between the pond and Vineyard Sound by placing a recording electronic tide gauge in both locations.

Benjamin Zuckerberg (2001)

Grassland Restoration on Nantucket Island: The Effects of Habitat Restoration on Grassland and Shrubland Birds in Island Ecosystems
Massachusetts Audubon Society

Since 1966, the number of grassland and shrubland birds has declined in the United States. In the northeast, this decline can be attributed to the maturation of New England's forests, habitat loss and fragmentation, and residential development. Benjamin Zuckerberg researched the status of grassland and shrubland birds on Nantucket Island, Massachusetts, as part of his Master's thesis, and noted that regional loss of suitable breeding habitat has increased the need to conserve threatened grasslands and shrublands.

Nantucket Island supports the largest continuous area of coastal hearthlands and sandplain grasslands remaining in the northeastern United States, and represents a unique source of regional biodiversity. Working with the Massachusetts Audubon and the Partnership for Harrier Habitat Preservation, Zuckerberg documented the early effects of a large-scale grassland restoration through burning and mowing management on declining shrubland and grassland songbirds. His research focused on the nesting success of eastern Towhees (*Pipilo erythrophthalmus*), a shrubland species in decline in the northeast and in other shrubland areas on Nantucket.

Zuckerberg analyzed aerial photography to quantify changes in grassland and hearthland areas for the past 48 years. In 2001, this was a unique opportunity to study the early responses of songbirds to habitat restoration. Zuckerberg's findings indicated that the decline of grassland birds is due, in part, to shrubland encoachment and residential development, and grassland conservation requires management and restoration.

Intertidal Zone

THE INTERTIDAL ZONE—the foreshore, seashore, and the littoral zone—is exposed to the air at low tide and underwater at high tide. The intertidal zone consists of different types of habitats: steep rocky cliffs, sandy beaches, wetlands, and/or mudflats where crabs, mussels, snails, and other organisms compete for space. The following abstracts document marine research on the intertidal zone including the impact of non-native species such as the Asian Shore Crab.

Karen Baar (2008)
Clean Up Your Act: Watershed Cleanup
Save the Sound Inc./Connecticut Fund for the Environment

Save the Sound, a program of the Connecticut Fund for the Environment, has expanded and created Clean Up Your Act: Watershed Cleanup that organizes volunteer efforts throughout the year. In 2007, 1,403 volunteers collected 8,449 lbs of trash from 40 shorelines in Connecticut.

Save the Sound hires interns during the summer months to provide support for educational programs, outreach initiatives, and recruitment of volunteers, and is working with Yale University and Southern Connecticut State University to reclaim urban watershed in New Haven, Connecticut.

Save the Sound programs improve beach habitat while teaching volunteers about the marine environment, and help create a future generation of environmentally aware citizens.

Diana Barrett (2015)
Effects of Abiotic Stressors and Soil Microbiota on the Zonation of Dune Plants
University of Massachusetts Dartmouth

Vegetated coastal dunes can defend inland areas from the damaging effects of wind and sea more effectively than bare dunes. Abiotic variables such as salt and wind exposure, and distance from shore predict vegetated dune patterns. Additionally, microclimatic conditions at the soil surface and below vary with distance from shore. A definitive variable driving dune plant distribution has not been identified, although some suggest salt spray and burial. There is a need to elucidate the mechanisms through which these distributions exist.

Plant establishment is a key phase of development, where the accumulation of biomass dictates the likelihood of contribution to the plant community in the following season. Diana Barrett's strategy is to test the seedlings of four key Massachusetts dune species in a series of abiotic and biotic treatments. Seedlings will be exposed to varying amounts of salt spray, burial, light and nutrients for our abiotic tests individually and in appropriate combinations that mimic microclimates at the dune front, where there is the most exposure and fewest nutrients, and the dune back and flat, where there is less exposure and more nutrients. For the biotic tests, the soil of seedlings grown in sterile media will be inoculated with soils collected from each of the above zones to determine belowground effects. Finally, soil communities at each zone will be characterized using molecular methods, such as metacommunity genetic sequencing, performed on collected, homogenized and preserved soil samples.

Johanna Blasi (2001)
*Predatory Relationships Between Intertidal Amphipods and the Non-indigenous Crab (*Hemigrapsus sanguineus*) Along the Massachusetts Coast*
University of Massachusetts Dartmouth

Hemigrapsus sanguineus, the Asian Shore Crab, consumes prey such as algae, bivales, and gastonpods. Intertidal amphipods, small crustaceans along the rocky shore, may provide another prey source for this invasive crab, though this predatory interaction had not been explored until 2001. Amphipods, which are common along the Massachusetts coast, are integral members of the marine ecosystem. Amphipods graze on algae and are prey for larger organisms helping to anchor the food webs of the habitat.

Johanna Blasi, a Master's student of Biology at the University of Massachusetts at Dartmouth, studied the effects that Asian Shore Crabs have on the amphipods along the Massachusetts coast. The study provided information regarding the impact of this non-indigenous crab on marine food webs and other community changes as its population continues to increase. In Blasi's laboratory studies, she found that *Hemigrapsus sanguineus* could consume amphipods, but insignificant interaction between these species was found. Field studies offered mixed results as some of the cages were lost or damaged due to a large storm. Blasi noted that additional studies are needed to identify the impact of the Asian Shore Crab on the marine habitat.

Nicole A. Dobroski (2000, 2002)
Geographic Variation in Claw Form and Function in an Invading Crab Predator & Ecological Role of a Highly Mobile Introduced Predator: The Foraging Behavior of Juvenile Crabs on a Temperate Rocky Shore
Northeastern University and University of Rhode Island

The European Green Crab *(Carcinus maenas)*, a non-indigenous species, invaded the Atlantic coast of North America 100 years ago. Studies have shown it to be quicker and more dexterous than other native species of crab. The European Green Crab preys on a multitude of organisms, including clams, oysters, mussels, marine worms, fish and some birds. Crabs can modify claw form and performance in response to prey resistance.

While studying at Northeastern University, Nicole Dobroski researched the claw morphology and prey consumption of the Green Crab to test for possible advantages over native species (2000). She collected Green Crabs from four locations in Massachusetts, examined and compared claw structures, and presented them with native prey. The results were insufficient to identify clear patterns of morphology or preference for prey.

In 2002, as a Master's candidate in Biological Sciences at the University of Rhode Island, Dobroski investigated the foraging behavior of another invasive species of crab that displaced the European Green Crab. The Asian Shore Crab *(Hemigrapsus sanguineus)* was first identified on American shores in New Jersey in 1988 and has now spread from North Carolina to Maine. It is the most common intertidal crab in southern New England, and insight into its foraging ecology is necessary to understand the biological impact of this invader on native species.

Dobroski used juvenile crabs to identify prey preference by presenting them with the odor of whole and crushed periwinkles, mussels, or one of two algal species native to the Narragansett Bay region. She found that the Asian Shore Crab had a strong preference for the odor of mussels and displayed no preference for periwinkles or algae over the seawater control. Blue Mussels have declined since the Shore

Crabs introduction to New England waters. She determined the effects of dietary conditioning in the foraging behaviors of adult Shore Crabs.

Michele Guidone (2009)

Examination of the Abundance and Relative Palatability of Select Ulva Species in Rhode Island
University of Rhode Island

Macroalgal blooms are a threat to coastal ecosystems worldwide, as they can contain harmful chemicals that can damage the flora and fauna found in these ecosystems. The causes and consequences of these algal blooms have been studied, but much remains unknown about bloom biodiversity, particularly in *Ulva lactuca* and four tube forming *Ulva* species that were previously unreported in the area.

Michele Guidone of the University of Rhode Island visited areas of the Rhode Island coastline prone to algae blooms to find which blade-forming species of *Ulva* is most abundant and which species contributes most to the coastal food web. Guidone conducted field surveys monthly from May to September at five different Rhode Island sites, three of which were affected by annual *Ulva* blooms; and where blooms do not occur. Using quadrat methodology in the field combined with laboratory analysis, Guidone identified sampled *Ulva* species, and used image analysis to estimate herbivore damage to ten randomly selected blades of each species from each site to estimate the contribution to the coastal food web. The study provided data on blooms in Rhode Island. Such data will prove to be beneficial as these blooms threaten coastal ecosystems.

Michele Guidone (2009-2010)

Herbivore Impact on Macroalgal Blooms in Narrangansett Bay, Rhode Island
University of Rhode Island
Narragansett Bay, Rhode Island

Macroalgal blooms are a serious threat to coastal ecosystems around the world and, as such, their causes and consequences have been extensively studied. However, many questions remain about the role herbivores play in limiting bloom severity and persistence. Previous studies on herbivore-bloom dynamics have found their relationship to be complex and highly dependent on the herbivore species, algal species, and the environmental factors present in the system. Consequently, Michele Guidone set out to clarify the impacts of herbivores on macroalgal blooms in Narragansett Bay, RI. Several invertebrate herbivores co-occur with bloom macroalgae in the bay, including mudsnails, amphipods, shrimp, and mud crabs.

To assess the impact of herbivores on macroalgal bloom biomass, Guidone conducted monthly herbivore exclusion experiments from May through August at three field sites representing a range of macroalgal bloom intensities. At each site, Guidone placed a known biomass of *U. compressa* and *U. rigida* (the most abundant bloom species) inside cages constructed from varying sized mesh. These cages were located subtidally, with five of each mesh size at each site. After a period of ten days, the contents of the cages were retrieved for measurement of the macroalgal biomass and a calculation of the change in biomass. Herbivores found within the cages were counted and identified, and co-occurring densities of herbivores outside the cages were also determined. In addition, Guidone assessed the influence of environmental conditions by monitoring algal organic and nitrogen content, dissolved inorganic nitrogen levels, and temperature fluxes.

Torrance Hanley (2014)

*Predicting the Effects of the Invasive European Green Crab (*Carcinus maenas*): A Comparison of Key Traits Across Habitats in New England*
Northeastern University

The European green crab (*Carcinus maenas)* is invasive in eastern North America and is rapidly expanding in this area. Further, European Green Crabs (EGCs) have recently been implicated in the decline of shellfish populations and the loss of seagrass habitat in New England. EGCs can survive in a variety of different habitats, and thus affect organisms in salt marshes, seagrass beds, and rocky intertidal communities. Torrance Hanley undertook a study to identify EGC traits that could be affecting their successful invasion of multiple different habitats, and to determine EGCs overall impact on community and ecosystem processes across habitats.

In his study, Hanley conducted a series of laboratory experiments, measuring key traits of EGCs collected from three different habitats from Maine to Long Island in order to address various questions. First, Hanley wished to determine if green crabs from salt marshes, seagrass beds, and rocky intertidal communities exhibit different traits, and whether crabs from different geographical locations display different traits within or between habitats. Second, Hanley intended to determine the way in which trait differences of EGCs from each habitat and location relate to the genetic composition of the population.

Hanley hoped that the information gained in his study would aid coastal management projects that aim to eradicate EGCs and restore native habitat.

The aim of this research was to determine which herbivores utilize bloom algae as a food source and whether they impact bloom biomass. In addition, by examining herbivory simultaneously on two bloom species, Guidone intended to determine whether herbivory drives the relative abundance of these species. The results of this research increases general understanding of herbivore bloom-dynamics and can inform future policy decisions regarding bloom management.

Emily Jones (2005-2006)

Impacts of Invasive Marine Algal Hosts on Epiphyte Species Diversity, Growth, and Survival
University of Rhode Island

Exotic marine organisms have altered marine communities on the New England coastline causing shifts in dominant species, declines in natural biodiversity, and have raised concern within the scientific community. The invasion by *Codium fragile* and *Grateloupia turuturu,* species of macroalgae, have indirectly displaced native macroalgal species throughout New England's coastline and could impact on the abundance, distribution, diversity, and survival of native epiphytic algae. These invasive species have physiological traits that could benefit native species

of epiphytic algae.

As a Master's candidate in Biological Sciences at the University of Rhode Island, Emily Jones investigated whether invasive species of macroalgae are positive facilitators for epiphyte growth on their host tissues. To quantify algal host and epiphyte abundance, Jones performed intertidal surveys on rocky shores within Rhode Island Sound, and compared the results for epiphytes on native versus invasive hosts. She used image analysis to determine net growth for selected epiphytes on native and exotic algal hosts, and compared and contrasted the data to determine if invasive algal hosts impede or accelerate the epiphytes' growth process. According to Jones, ecological research is essential to understand both the 'natural' state of these systems as well as new interactions that are created through human alterations and environmental change.

Anita Kim (2001)

Fundulus majalis *as a Potential Predator of the Invasive Crab Species* (Hemigrapsus sanguineus)
University of Massachusetts Dartmouth

The Striped Killifish *(Fundulus majalis)* may be a potential predator of the invasive Asian Shore Crab *(Hemigrapsus sanguineus)*. The Striped Killifish is a small minnow found along sandy and rocky shores from New Hampshire to Florida, and therefore has a range that overlaps that of the Asian Shore Crab. It eats organisms living on the bottom, including crustaceans, and may be an effective control of the *Hemigrapsus sanguineus* population.

Anita Kim, a Master's of Biology student at the University of Massachusetts at Dartmouth, conducted laboratory experiments to evaluate the ability of the Striped Killifish to consume and forage for Asian Shore Crabs. Bare tank experiments were used to determine whether the fish could eat the crabs, and sand and rocks were used to detect if the fish could forage for the crabs. The results showed that *Fundulus majalis* consume larval, megalopae, and small juvenile crabs when no sediment was present. However, consumption decreased as crabs increased in size and in tanks with sediment. The results show that Striped Killifish may not be good foragers for crab in the wild.

Gut analyses of wild Striped Killifish collected from areas where the *Hemigrapsus sanguineus* is present did not show any sign of predation. Kim indicated that this may change in the future and continued monitoring is essential to understand future interactions.

Meredith Kratzmann (2007)

Assessing the Impacts of Beach Scraping to Barrier Island Morphology
Geosciences Department, University of Rhode Island

Beach scraping is the process of transferring sand from the beach face to the back beach to create an artificial foredune to protect communities from storm wave damage. On barrier islands such as Fire Island, south of Long Island, New York, little is known about the effectiveness and long-term impacts of beach scraping on the dunes and beach. Since this is common practice, beach profile analyses, beach volumes and widths, and shoreline positions are necessary to be collected in any area where beach scraping is performed.

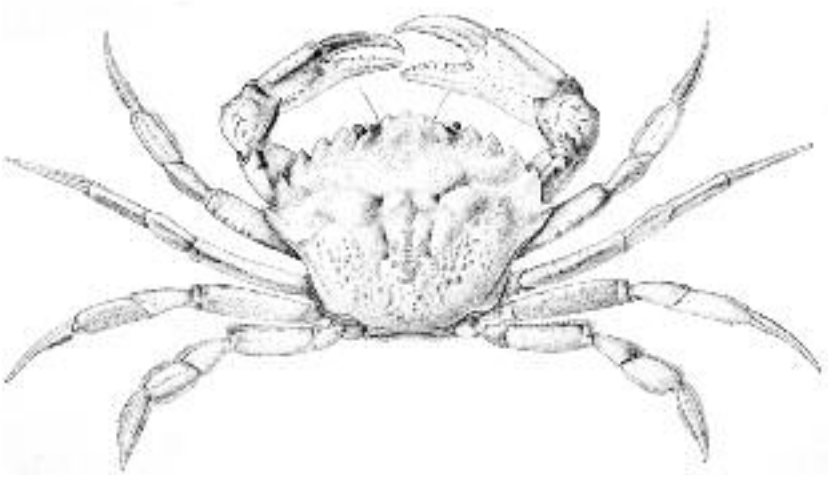
Meredith Kratzmann gathered statistics on Fire Island National seashore and assessed the impact of beach scraping. As part of her Master's from University of Rhode Island, Kratzmann digitized beach profile data using ArcGIS, analyzed beach width and volume changes spatially and temporally, and used historical data to establish shoreline change rates in the area.

George H. Leonard (1995)

Positive Interactions in the New England Intertidal Zone
Brown University

In New England, cool rainy summers and periods of persistent fog allow barnacles to thrive above the regular plant zone, whereas high temperatures and occasional fog threaten barnacles with severe desiccation in southern New England.

As part of his doctoral research in Ecology at Brown University (1995), George Leonard compared the interactions of barnacles and seaweeds at different latitudes in New England. Leonard chose four open coast sites in the high and low intertidal zone in Rhode Island and Maine. He manipulated seaweed canopies, which prevent young recruit barnacles from settling on the rocks, and evaluated the changes in barnacle survival, growth, and fecundity. Using variable-recording thermistors attached to the surface of rocks, Leonard collected temperature data and defined a temperature gradient between northern and southern New England.



Leonard found that negative (competitive) interactions with seaweeds shaped barnacle communities in the Maine intertidal zone. The seaweed canopies reduced barnacle recruitment, lowered reproduction rates, and harbored barnacle predators. At the Rhode Island sites, seaweed canopies reduced barnacle recruitment and reproduction, but increased barnacle survival by providing cover and reducing thermal stress. Overall, there was a positive interaction between barnacles and seaweed in southern New England. Leonard's research provided a greater understanding of how species are affected by climate and how these interactions vary laterally. His work

offered insights into how community structure might respond to global warming.

Andrew M. Lohrer (1996, 1998)

Impacts of a Non-Native Crab Invader, Hemigrapsus sanguineus, *on Long Island Sound Biota*
University of Connecticut at Avery Point

The Japanese Shore Crab, *Hemigrapsus sanguineus,* is a small crab introduced in southern New Jersey. The crab was first spotted in Long Island Sound in 1988, and is an abundant crustacean predator in the lower intertidal zone. The presence of *Hemigrapsus sanguineus* may influence biodiversity and community structure along the shores of New England.

Andrew Lohrer, a Ph.D. candidate in Marine Ecology at the University of Connecticut at Avery Point, studied the impacts of a non-native crab invader on Long Island Sound. Lohrer taught, identified, counted, and measured crabs along the Long Island Sound intertidal zone to determine baseline information in 1996. He quantified abundance, determined vertical distribution, and described crab population size structure at five study sites finding that more than 30% of the crabs were *H. sanguineus.* After analyzing gut contents of caught Asian Shore Crabs, Lohrer discovered that they are omnivores, feeding mainly on brown and red algae, barnacles, snails, polychaete worms, and Blue Mussels *(Mytilus edulis)* a commercially important species. He discovered that *H. sanguineus* also preys upon and competes with European Green Crabs *(Carcinus maenus).*

Lohrer continued this study in 1998, and focused on the effects of *H. sanguineus* as a predator of Green Crab recruits and juvenile Blue Mussels. Using the rocky shoreline at Millstone Point, Connecticut as a test site, he deployed traps for Green Crab recruits, fit the traps with cage tops, and either included or excluded *H. sanguineus.* Lohrer also collected juvenile Blue Mussels and let them attach to rocks in the laboratory. When there were 50 mussels per rock, he placed them in cages along the shore and again either included or excluded *H. sanguineus.* Control cages were also used in each experiment and were left partially open. Lohrer found that *H. sanguineus* could lower Green Crab recruitment and juvenile Blue Mussel populations. His study is relevant as *H. sanguineus* could pose a threat to other commercial fisheries such as softshell clams and scallops.

Stacy Myers and Mary Morgan (2006)

Removing and Composting Hemigrapsus sanguineus *in Long Island Sound*
Cornell Cooperative Extension of Suffolk County

The Asian Shore Crab *(Hemigrapsus sanguineus)* was first sighted on the coasts of New Jersey in 1988. Since that time the Asian Shore Crab has outcompeted native crab species and has become a common crustacean on the Atlantic shores of the United States.

Stacy Myers and Mary Morgan, youth educators from the Cornell Cooperative Extension of Suffolk County, used a work force of public school students (from Suffolk County) to help detect, remove, and compost *H. sanguineus* at four different sites on Long Island Sound. Twenty students at each site were led by a Cornell Cooperative Extension educator and thousands of *H. sanguineus* were caught. The collected data was used to develop an invasion probability model for the species, and may help future *H. sanguineus* removal projects by identifying their habitat preferences.

Christine Newton (2012)

Invasion Strategy of the Red Algae, Heterosiphonia japonica *across a Biogeographical Barrier*
Northeastern University Marine Science Center

The red algae *Heterosiphonia japonica* is an invasive species in the Western Atlantic and poses a critical threat to native biodiversity and ecosystem functioning in this area. The algae was first recorded in Rhode Island in 2009 and has since spread north to Cape Ann, Massachusetts. Today the algae comprises as much as 90% of the macroalgal biomass which drifts onto the beaches and shores of Cape Ann. Invasive populations of *H. japonica* are also found in the Eastern Atlantic, and this current distribution gives the algae the potential to invade an area stretching from Florida to Newfoundland.

Christine Newton wished to determine the geographic extent of the *H. japonica* invasion in the Western Atlantic and to examine the invasive algae's effects on existing communities. To this end, subtidal surveys of communities were conducted at twenty-five sites from Rockport, MA to Branford, CT, within the algae's known range, and at twenty sites beyond its known range. Through her research, Newton attempted to quantify site characteristics that lead to susceptibility to an invasion.

Second, Newton examined the abiotic and biotic factors that led to *H. japonica*'s success as a marine invader across a biogeographical barrier. Preliminary data suggests that *H. japonica* grows faster and has fewer predators than do the native species of the area. Newton's study compared the growth rate and palatability of *H. japonica* and its associated non-native species to determine if *H. japonica* is uniquely suited to invasion across biogeographical barriers.

Nancy J. O'Connor (1999, 2002, 2015)

Do Biofilms on Mesh Netting Used in Bivalve Aquaculture Stimulate Settlement and Molting of Crab Larvae?
University of Massachusetts, Dartmouth

Dr. Nancy O'Connor, Assistant Professor of Biology at the University of Massachusetts at Dartmouth, directed a long-term project to test the hypothesis that native and resident crab populations are decreasing as the invasive *Hemigrapsus sanguineus* population increases. O'Connor monitored the spread of this species in New England since 1993.

In 1999, O'Connor hired students to monitor native crab and *H. sanguineus* populations. Those students measured all species of crab from two m^2 quadrats in the lower intertidal of several sites in coastal Massachusetts and one site in Narragansett Bay, Rhode Island. O'Connor continued her monitoring project in 2002 by sampling populations in Bristol, Rhode Island, and two students completed individual research projects on the Asian Shore Crab as well. One student, Kelly Simmons, examined competition for shelter between *H. sanguineus* and the native Mud Crab. The initial results showed that the Asian Shore Crab often locates shelter before the Mud Crab and Simmons indicated that this could allow the Shore Crab to displace native species

from a portion of their native habitat. Another student, Johanna Blasi, continued her study of the predatory relationship between intertidal amphipods and *H. sanguineus*. O'Connor's long-term monitoring project provided information on population dynamics of resident and non-native crab populations in New England.

In the sounds of Southern New England in 2015, the non-native Asian shore crab (Hemograpsus sanguineus) has become very abundant. Native mud crabs have declined in numbers where they overlap in habitat with the Asian shore crab. Both Asian shore crabs and native mud crabs prey on a variety of bivalve molluscs in coastal areas. Crabs have a complex lifestyle, during which they could be attracted to bivalves at several stages. After reproducing, female crabs release larvae that develop in coastal waters. The last swimming larval stage, the megalopa, selects an area for settlement at the bottom and metamorphoses to the first crab stage. Chemical cues from organisms associated with the bottom habitat are important in this process of habitat selection. Clean plastic mesh used in aquaculture stimulates molting of Asian shore crab megalopae, but not mud crab megalopae. Mesh netting placed in natural environments during aquaculture develops biofilm coating composed of bacteria and other microorganisms. Do biofilms on the mesh stimulate settlement and molting of crab larvae?

This question will be answered by creating biofilms on three types of mesh netting used to house shellfish spat or juveniles in aquaculture operations: mesh used to create bags for bivalve spat, and polyethylene and polypropylene mesh netting used to construct cages. The different types of mesh netting will be suspended in areas close to and distant from bivalve aquaculture operations, then brought to the UMass Dartmouth lab where molting responses of Asian shore crab and mud crab megalopae will be tested in controlled experiments. The molting time of megalopae exposed to different cues will be compared to determine if biofilms on mesh netting stimulate settlement and molting. Results of the project will help gain better understanding of the attraction of crabs to potential shellfish prey, especially through materials used in aquaculture operations.

Don Riepe (2002-2009, 2012)

International Coastal Cleanup – Long Island Sound Component. New York
American Littoral Society

Since 1986, the American Littoral Society has coordinated beach cleanups on Long Island Sound as part of the annual International Coastal Cleanup (ICC). The ICC, sponsored by The Ocean Conservancy, takes place on the third weekend in September in over 100 countries worldwide. It is the largest volunteer effort to collect data on the marine environment in the world.

The Northeast Chapter of the America Littoral Society, led by Don Riepe, calls on thousands of volunteers like beach captains from local businesses, schools, scout leaders, public service directors, diving clubs, and civic associations to participate in the ICC on Long Island Sound and statewide in New York. From 2002-2007, nearly 400,000 lbs. of debris were collected from over 400 miles of shoreline along Long Island Sound in New York. In 2012 alone, 36,193 pounds of debris were removed from 67 miles of coastline.

Nicole Rohr (2007)

Impacts of Marine Algal Epiphytes on the Recruitment of an Herbivorous Snail, Lacuna vincta, *in Rhode Island Sound*
Department of Biological Sciences, University of Rhode Island

Nearshore marine communities often contain a diversity of algal and invertebrate species. The production of invasive species has altered native biodiversity in numerous marine communities, including those of Rhode Island Sound. Nicole Rohr examined the relationship between a native herbivorous snail, *Lacuna vincta (Lacuna),* and two species of epiphytic algae with which it commonly occurs, the native *Ceramium virgatum* and the invasive *Neosiphonia harveyi.*

Recruitment of the perennial algal epiphytes mentioned above coincides with the summertime recruitment periods of *Lacuna.* The relationship between these three species is not well defined, but the synchronization of their recruitment periods may benefit *Lacuna* and the macroalgal host by providing food and protection for the *Lacuna,* while reducing negative impacts that epiphytes exert on their host. Rohr investigated several aspects of this relationship. She documented ways in which *Lacuna* influences epiphyte recruitment, growth, and survival. Experiments that manipulated *Lacuna* abundance with relation to epiphytes were performed in Narragansett Bay, Rhode Island. Nicole also assessed whether the presence or differences in abundance of epiphytes influenced *Lacuna* recruitment, and identified the preferred species of epiphyte to which *Lacuna* recruits. The study helps to define the relationship between these species and evaluate the impact on the local biodiversity and productivity of the intertidal zone in this region. The results are included in Rohr's doctoral thesis.

Peter Wells (2008)

Long-Shore Sediment Transport and Shoreline Change in Vineyard Sound
Waquoit Bay National Estuarine Research Reserve

Shoreline change in the form of coastal erosion and deposition is an increasing concern for coastal communities. The obstacle to local prediction of sediment motion has been that it is difficult to characterize the complex hydrodynamic environment that exists in the near-shore zone. However, long-term erosion rates for various sections of the shoreline and geomorphological features are definite indicators for long-term net sediment transport.

Peter Wells, with the Waquoit Bay National Estuarine Research Reserve, proposed a pilot study in eastern Vineyard Sound using National Buoy Data Center data. The sediment transport estimates were compared with the record of shoreline change in the area to create a framework for predicting future sediment transport using wind and wave patterns. The study on the long-shore sediment transport and shoreline change allows coastal communities to assess the vulnerability or resiliency of their shorelines to erosion or deposition. The Waquoit Bay National Estuarine Research Reserve shared the results of this study with the public on their website and in presentations, and also presented them at a scientific conference held at the New England Estuarine Research Society.

Subtidal Zone

THE SUBTIDAL ZONE, or sub-littoral zone, extends seaward from the level of the lowest low tide. The subtidal zone is not exposed by the receding tide and it supports a rich diversity of marine organisms. As with other ecosystems along the Sounds, grantees have pursued greater knowledge of its ecology. The following abstracts note the research of grantees as they explore the last frontier and to identify methods to mitigate its anthropogenic disturbance.

Brad Agius (2002-2003)

Shifting Subtidal Community Structure: Effects of Environmental Change and Invasive Ascidians
Northeastern University

Brad Agius, a Master's candidate in Biology at Northeastern University, examined how global climate change may facilitate the introduction and success of invasive species to new communities. Agius studied two dominant invasive species of ascidians, *Botrylloides violaceus* and *Diplosoma listerianum,* invaders to the subtidal floor of coastal Massachusetts. Agius designed his research to assess the impact of water temperature on the survival and growth of native and invasive ascidians. Research was conducted in the laboratory and at three field locations representing a broad thermal and geographic range of ascidian growth dynamics.

Laboratory growth experiments indicated that a moderate increase in seawater temperature (+1.8°C) facilitates the proliferation of *D. listerianum* colonies by 53%, but elicited no response in B. violaceus. In addition, *B. violaceus* and *D. listerianum* exhibited rapid, two-week growth rates (21 and 37 fold, respectively) during the summer months at the field sites. In the warmest periods (late summer and early fall) invasive ascidians are at their highest percent cover, and have a significant impact in benthic communities.

Agius found that increasing surface seawater temperature allows for successful invasion by ascidians, and exacerbates the cumulative impacts of invasions on benthic communities. This study added to the research on non-native species invasions and interaction with native species.

John S. Barclay (2010)

Collect and Identify Plankton (Barnacle Larvae) from Near-Shore Blooms – Measure for Heavy Metals and Possible PCBs
University of Connecticut, Avery Point – The Wildlife Conservation Research Center

In the winter of 2010-2011, Barclay ventured out on Long Island Sound and, over a range of 39 nautical miles round trip east to west, made six very productive plankton tows between Southport and Stratford Point. Several hundred to over a thousand water birds (mostly gulls, scaup ducks, black ducks, and Atlantic brant), were observed feeding in the areas where they obtained the plankton. They obtained substantial amounts of barnacle larvae (cyprids) in the tows to process for analyses, along with excellent backup data on locations, distance of tows, speed, tide and weather conditions and the like. For this project, Barclay plans to get out at least one more time in the spring to obtain plankton off the Branford and East Haven area if possible.

Eric Brazer Jr. (2004)

Reproductive Life History and Essential Fish Habitat Mapping of Western Georges Bank Cod: Protocol Design
Nicholas School of the Environment
Duke University

The once active cod fisheries in Maine and Massachusetts declined dramatically between 1990 and 1999. A better comprehension of the benthic and pelagic habitats needed for egg, larvae, and juvenile survival is crucial to the management effort of cod in New England. Local fishermen have long maintained that Western Georges Bank is home to a fall spawning cod stock. Eric Brazer worked with the Cape Cod Commercial Hook Fishermen's Association to conduct a pilot study and to create a protocol for the use of bongo nets for collecting progeny of spawning Western Georges Bank cod.

Brazer, a Master's candidate in Environmental Management at Duke University, created GIS maps to document the geographic location of pelagic and demersal habitats utilized by adult spawning and progeny life history stages of Western Georges Bank cod. The maps were given to fishermen and researchers. Additionally, progeny samples were analyzed to determine size, stage of development, and genetic dispersal patterns of the stock population of cod. The results of the study were shared with collaborating institutions and researchers.

Matthew Cacopardo (2003)

Accumulation of Contaminant Metals by Marine Bivalves in New Haven Harbor
Southern Connecticut State University

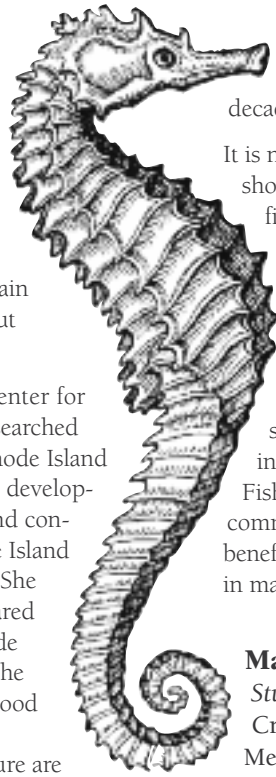
Matthew Cacopardo, an undergraduate at Southern Connecticut State University, examined contaminant metals in Eastern Oysters *(Crassostrea virginic)* and Blue Mussels *(Mytilus edulis)* in New Haven Harbor, Connecticut. Studies have indicated that

sediments in the inner harbor have high metal concentration from past and current discharge of municipal and industrial wastewater.

Cacopardo collected oysters of similar size from the contaminated mouth of the Quinnipiac River and from an uncontaminated oyster bed near Savin Rock in West Haven, Connecticut. Every two months, he compared bivalve tissue and sediment samples from each site and analyzed them for copper, chromium, lead, iron, and zinc by flame and graphite furnace atomic absorption spectrophotometry. The study provided information for decision-makers to assess the impact of electric transmission cables, natural gas pipelines, and dredging projects on economically important living marine resources.

Kristen M. Cammarata (1997)

Mapping Potential Mariculture Sites in Narragansett Bay
Brown University



Rhode Island has strong cultural ties to fishing and its 420-mile coastline, including the highly productive Narragansett Bay, has the potential to support a successful mariculture sector. While mariculture industries are substantial in neighboring Connecticut and Massachusetts, they are almost non-existent in Rhode Island. If managed correctly, mariculture practices can maintain fishing as a way of life and provide food without depleting natural populations.

As a Master's student at Brown University's Center for Environmental Studies, Kristen Cammarata researched the viability of marine-based aquaculture in Rhode Island by focusing on the socio-cultural barriers to its development. Cammarata observed public meetings and conducted in-dept interviews to assess how Rhode Island fishermen perceive marine-based aquaculture. She found that the source of public conflict is a shared sense of ownership. Participants cited the Rhode Island Constitution, which grants the right to the "free and common fishery," commonly understood to mean unrestricted and unregulated fishing. Supporters hoping to get involved in aquaculture are wary of the political process, and small shell fishermen fear that large-scale development will exclude them.

Cammarata concluded the lack of clear parameters and effective regulatory agencies represent the barrier to the development of mariculture, not the commercial fishermen. She is confident that there is an opportunity for an aquaculture sector that will accommodate all user groups. Cammarata noted that if aquaculture is controlled in a sustainable way, it can increase larval populations, improve water quality, and contribute to the ecological vitality of Narragansett Bay.

James T. Carlton (2010)

Shifts in Shrimp Communities: Detecting Introductions and Range Expansions of Estarine Shrimp in Long Island Sound
The Maritime Studies Program, Williams College – Mystic Seaport
Long Island Sound, New York

The goal of this project was to document the extent of the new invasion of a Korean shrimp in Long Island Sound, and to assess the extent of excursions of southern shrimp species into southern New England. In recent years, the invasive Asian shrimp *Palaemon macrodactylus* has become established in the New York City area. This shrimp can become a major component of the inshore nekton and a potentially important competitor of the native New England shrimp, *Palaemonetes* spp. At the same time, increased incursions of southern penaeid shrimp *(Penaeus* spp.*)* have been detected in the Sound, likely influenced, in part, by climate change. The combined effects of these new invasions portended potentially critical shifts in estuarine trophodynamics, but required quantitative studies to document their extent in order to provide foundation data for the decades to come.

It is not known how far *Palaemon* has extended up Connecticut shores. *Palaemonetes, Palaemon,* and *Penaeus,* to the uncritical field eye, can easily be confused, and thus new arrivals are likely under-reported given the assumptions that most small shrimp are the native "grass shrimp." Carlton and colleagues had recently documented the extent of both range shifts and introductions against a background of climate change, yielding a clear pattern of new waves of biotic flow. With the cooperation of marina owners, the strategy of this project was to deploy replicated shrimp traps in the summer of 2010 between Bridgeport CT and the Fishers Island NY area to determine the composition of shrimp communities. Conservation biologists and fisheries managers benefit from this information, as a current understanding of shifts in marine biodiversity is fundamental to future policy decisions.

Margaret A. Carroll (2008)

Study of Metal Accumulations in Tissues of the Oyster, Crassostrea virginica, *in Jamaica Bay, New York*
Medgar Evers College, The City University of New York

Jamaica Bay, New York, was once a site of extensive oyster beds and shellfish culture leases that supported a significant fishery. Over-harvesting of shellfish, industrial and urban expansion led to a deterioration of water quality resulting in declining populations of shellfish. Although efforts have reduced pollution, in 2008, substantial quantities of metals and other pollutants remain at levels higher than New York Water Quality Standards. Studies have indicated that oysters tend to reflect local contaminant concentrations and are good indicators of water quality.

In 2008, Margaret Carroll, a Professor of Biology, transplanted *Crassostrea virginica* to Jamaica Bay and has noted their growth and survival despite the pollution. She measured the bioaccumulation of heavy metals in these oysters to provide information to the Environmental Protection Agency and other regulatory organizations dealing with the water quality of the Bay.

Amy Costa (2012-2013)
A Collaborative Nantucket Sound Water Quality Monitoring Program
Provincetown Center for Coastal Studies

With Nantucket Sound's economic and environmental importance, and the increasing tourism to the region, it is essential to ensure a healthy coastal environment in order to maintain a healthy economy. Experts estimate that Cape Cod towns will need to spend $4-8 billion on wastewater management to reduce the flow of nitrogen into the Sound. It is essential to establish baseline scientific data to guide the upcoming wastewater planning initiatives, and to monitor these waters to track changes, analyze trends, and evaluate the overall condition of Nantucket Sound.

The Provincetown Center for Coastal Studies partnered with nine other Cape Cod organization to seek long-term support to establish a water quality-monitoring program in the Nantucket Sound. Data collected enabled scientists and decision makers to track changes, analyze trends, and evaluate the overall conditions of the Sound. The information will assist in wastewater planning initiatives and give regional authorities the ability to address and identify problems.

The Sounds Conservancy again helped to fund this project in 2013, when applicant Dr. Amy Costa focused on the dangers of pharmaceuticals, which are not filtered out of wastewater, in Nantucket Sound. Overall objectives of the program are to establish a water quality-monitoring program that gives baseline data, and gains unbiased science that can influence decision making and increase public awareness.

Inga M. Fredland (1999)
Reproductive Ecology of the Northern Pipefish,
Syngnathus fuscus
Marine Program, Boston University

Sea Horses and Pipefish are described with the "sex role reversed" because both courtship and parental roles are reversed from that of most animals. Northern Pipefish *(Syngnathus fuscus)* females transfer eggs to the males, which inseminate and nourish them in a specialized ventral brood pouch. Sea Horses and Pipefish are heavily traded for use in traditional Chinese medicines or as curiosity.

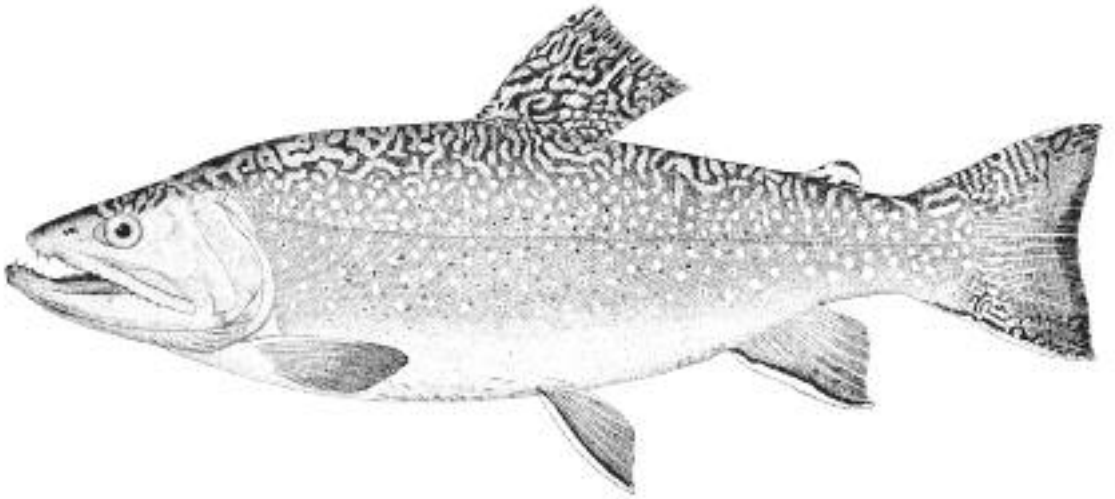
While some information is known about the reproductive nature of the Northern Pipefish, the mating pattern and operational sex ratio of *Syngnathus fuscus,* the eastern North Atlantic's only native pipefish, remains a mystery. While a Master's student in Boston University's Marine Program, Inga Fredland studied the reproductive ecology of the Northern Pipefish as part of her thesis research. She conducted a combination of field surveys and laboratory experiments in Nantucket Sound and examined the species' social structure, mating patterns, courtship behavior, and sex role reversal.

Her research on the Northern Pipefish indicated: the density of males decreased during the reproductive season; the female reproductive rate exceeded that of the male; the operational sex ratio grew increasingly female bias; gravid males were much less active than females; and females were more active in courtship using a colorful ornament to increase her attractiveness to males. Fredland's research broadens awareness of the diversity of life that exists in local waters.

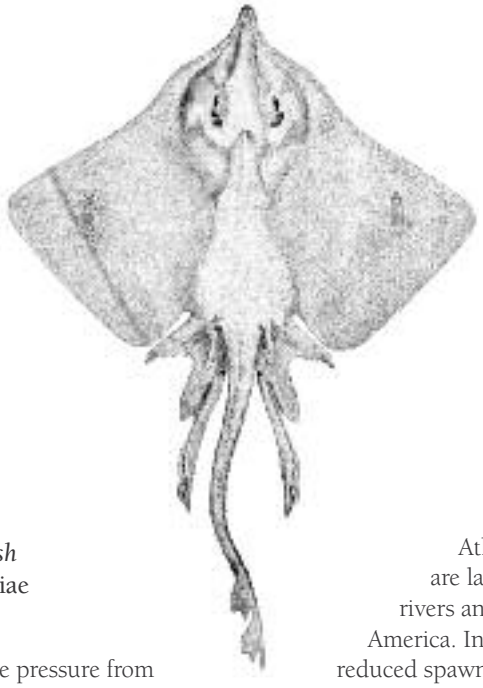
Aaren S. Freeman (1998)
Grazing Pressure on an Introduced Algae in the Northeastern Atlantic, Contrasted with a Native Pacific Conspecific
Northeastern University

A marine algae, *Codium fragile tomentosoides,* was introduced to Long Island Sound in 1956 and has since invaded areas of the Atlantic Coast from North Carolina to the Gulf of St. Lawrence. The algae can damage shellfish beds and replace native flora. It is not known why the algae successfully invade some areas but are absent from others. In the eastern Pacific, for example, the distribution of a closely related endemic species is limited to low intertidal areas, and perceived as a result of grazing intensity in the subtidal.

Aaren Freeman, a Master's student in Science at Northeastern University, focused on the Green Sea Urchin, which grazes on the invasive algae in the Atlantic, and the sea slug, which feeds on native algae in the Pacific. Three field sites in New England



were chosen that exhibited low, intermediate, and high densities of *C.f. tomentosoides.* The algae were transplanted from an area of high abundance to a nearby area of low abundance to assess grazing limitation. Similar tests had been conducted in the San Juan Islands to provide a comparison to Freeman's study. By comparing data collected from the east and west coasts, Freeman identified possible limiting factors to invading species that may help control their spread. This is essential with the continuous threat of exotic species introduced into Long Island Sound from ship ballast water.



Eric Gauger (2000)

Susceptibility of Commercially Important Fish Species to Disease Caused by Vibrio carchariae
University of Rhode Island

Aquaculture has many benefits as it can relieve pressure from over fishing, give a controlled food supply, and provide employment. However, as aquaculture has expanded, environmental risks have become apparent. Pathogens can cause problems in aquaculture operations and can be spread to neighboring wild fish stocks. One pathogen, *Vibrio carchariae,* is commonly found in warm marine and brackish water and has depleted aquaculture stocks.

Eric Gauger, a Master's student at the University of Rhode Island, studied the potential threat that *Vibrio carchariae* poses to local fish species. The species chosen for the study were Black Sea Bass (*Centropristes striatus)*, Tautog *(Tautoga onitis),* Mummichog *(Fundulus heteroclitus),* Atlantic Salmon *(Salmo salar),* and Rainbow Trout *(Oncorhynchus mykiss).* These species were chosen due to their importance in commercial, recreational, and aquaculture fisheries. The results of Gauger's experiments demonstrated that the virulence of *Vibrio carchariae* to the five species examined was lower than observed in Summer Flounder. The results indicated that *Vibrio carchariae* in a Summer Flounder operation is unlikely to pose a threat to neighboring populations of species included in the study.

Nancy Haley (1996)

Atlantic Sturgeon Concentrations in Long Island Sound
University of Massachusetts Amherst

Atlantic Sturgeon *(Acipenser oxyrinchus)* are large, anadromous fish that inhabit major rivers and waters along the shorelines of North America. In 1996, the Hudson River supports a reduced spawning population of this species. The decline of sturgeon populations prompted managers to curtail their harvest and begin extensive research of its basic biology and life history.

Nancy Haley, a Ph.D. candidate at the University of Massachusetts at Amherst, further documented Atlantic Sturgeon concentrations in Long Island Sound. On a multi-day trawl, she tagged 60 sturgeon and obtained length and weight data to determine size structure of congregations. Haley collected tissue samples from a number of sturgeon for genetic typing. The collection, measuring, and tagging that Haley performed identified offshore concentration areas, described stock characteristics, and assessed sturgeon movements. The information meets the critical research needs identified in the 1990 Atlantic Sturgeon Fishery Management Plan developed by the Atlantic States Marine Fisheries Commission.

Valerie A. Hall (2007)

Contribution of Fall-Spawning to the Reproduction of Bay Scallops, Argopecten irradians, *in Nantucket Harbor*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Valerie Hall's Ph.D. dissertation focused on the fall-spawned, or "nub" Bay Scallop and its contribution to the overall population of Bay Scallop in Nantucket Harbor. While the Bay Scallop ranges from Maine to Mexico, Nantucket Harbor

has the only commercial fishery sustained by a wild population. Due to the short lifespan of the Bay Scallop (around 2 years), population fluctuations are common and landings are unpredictable. "Nub" scallops grow insignificantly before cessation of shell growth in the winter and are sometimes found in abundance during the commercial scalloping season (1 Nov – 31 March). However, there is debate whether they should be harvested during this time as "nub" scallops have not spawned before this season.

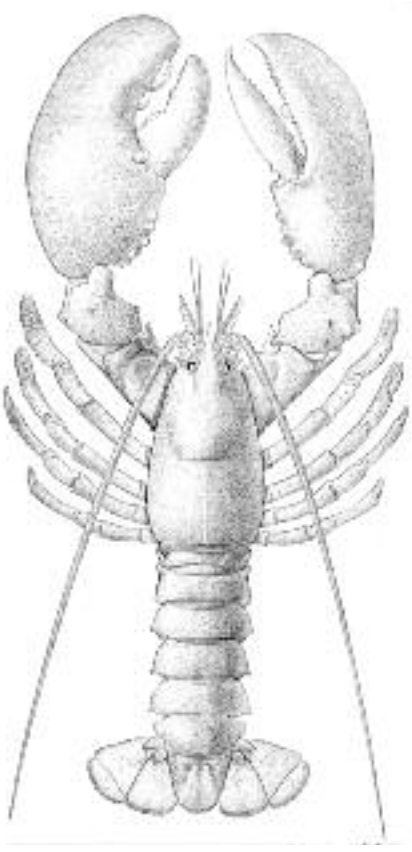
Hall compared the reproductive contributions of summer-spawned and "nub" scallops to the overall Bay Scallop population through gross observations of gonad condition, gonad index, Rapid Stain for presence of sperm, and histological analysis of gonad (Sastry stages, mean oocyte diameter, and percent fullness of gonad). The results of this study may assist in resolving the controversial issue behind the harvest of "nub" scallops benefiting shellfishermen. The study was presented before the Milford Aquaculture Seminar and the Northeast Aquaculture Conference and Exposition, and publicized in peer-reviewed journals such as the *Journal of Shellfish Research.*

Kari B. Heinonen (2005)

The Impacts of the Invasive Crab Hemigrapsus sanguineus *on a Crustacean-Eating Guild of Fishes in Long Island Sound*
Department of Marine Sciences
University of Connecticut

The Asian Shore Crab *(Hemigrapsus sanguineus)* was introduced to the shores of New Jersey in 1988. Since that time, this invasive species has managed to outcompete other species of crab and is commonly in the intertidal zone of New England. The Asian Shore Crab is expanding into shallow subtidal habitats in Long Island Sound where it has the potential to change the food web structure of the organisms in this ecosystem. To determine the importance of native versus non-native prey in the feeding habits of nearshore fishes, Kari B. Heinonen, a Ph.D. candidate in Oceanography at the University of Connecticut, performed gut analysis and prey selectivity tests on three species of fish: Tautog *(Tautoga onitis),* Cunner *(Tautogolabrus adspersus),* and Little Skate *(Leucoraja erinacea)*.

Alimentary tracts were removed from the fish and the contents were identified to the lowest possible taxonomic level. Similarities were used to determine which prey species drives diet composition. The selectivity of fishes for native and introduced prey was determined by concurrently offering *H. sanguineus* and native prey to fish held in a re-circulating aquarium. Preferences for certain prey were evident when more of one prey type was consumed than others. It is critical to understand how communities respond to changes in the food web structure so that management can be properly designed. The results helped reveal the role that *H. sanguineus* plays in the structure of the subtidal food web and the impact on the fishes in Long Island Sound.



Nichola Meserve (2005)

Increasing Stakeholder Participation in a Cooperative Research Project
Duke University and Cape Cod Commercial Hook Fishermen's Association

The Cape Cod Commercial Hook Fishermen's Association (CCCHFA) is a non-profit organization founded in 1991 by Cape Cod fishermen concerned of the viability to fisheries management. In 2005, CCCHFA developed and implemented a tagging program for Atlantic Haddock *(Melanogrammus aeglefinus)*. By drawing upon resources from the Gulf of Maine Research Institution (GMRI), 20 benthic long-line vessels including their captains and crew and 15 fishermen served as tagging technicians for the study. Nichola Meserve, a Master's candidate for Environmental Management at Duke University, helped in the implementation of this project, increasing the participation level of stakeholders involved in the project. Since the project relied on fishermen to both deploy tags on haddock and return the tags to the Gulf of Maine Research Insititution, the project's success was contingent on their cooperation.

The Atlantic Haddock tagging project tested existing assumptions about the spatial distribution of fish stocks in New England waters. Some scientists and fishermen believe that year round closures of the fishery have revitalized haddock populations of the Atlantic, but information on haddock movements between the different stocks in the Gulf of Maine and Georges Bank is needed to affirm these hypotheses. This project was a two-year effort and it is estimated that at least 20,000 haddock were tagged using longline gear.

Eric Morgan (2006)

Food Web Behavior of PCBs in Narragansett Bay
Graduate School of Oceanography, University of Rhode Island

Sediment in Narragansett Bay, Rhode Island, has been contaminated with highly toxic hydrophobic organic contaminants, the majority of which are polychlorinated biphenyls (PCBs). Although PCBs have been banned, sediments in the Bay contain con-

taminants due to former runoff events and atmospheric deposition. Resuspension of PCBs from sediment remains a threat and fish containing high levels of PCBs have been found in harvests. Additional research would be required to determine species most vulnerable to toxins.

Eric Morgan, a Master's candidate at the University of Rhode Island, studied the pollutant behavior in the food web of bottom dwelling fish to provide insight on how PCBs are transferred between organisms and the marine estuary. He took tissue samples of various bottom dwelling fish from Narragansett Bay and used stable isotopes to reveal their diets, thereby determining which organisms consume the most biomaterial and contribute substantial levels of PCBs to organisms higher in the food chain. The findings of the study helped identify the sources of toxins.

Christine Van Orsouw (2002)

The Effects of Hypoxia on the Behavior of Early Benthic Phase Lobsters (Homarus americanus) *and the Ability to Detect and Avoid Low Oxygen*
University of Rhode Island

Episodes of hypoxia have become a common occurrence throughout many of New England's estuaries, and Narragansett Bay, Rhode Island experiences periodic hypoxia during the summer months. Larval settlement of the American Lobster *(Homarus americanus)* also occurs during the summer, a critical time for a lobster's survival. As hypoxic conditions are often found near the substrate, lobsters may encounter oxygen levels that are below normal. Early benthic phases of lobster are also at greater risk of impaired growth and mortality from hypoxia than adults.

Christine Van Orsouw, a Master's student of Biology at the University of Rhode Island, observed the effects of hypoxia on the behavior of recently settled lobsters in the laboratory, and investigated their ability to detect low levels of oxygen. Lobsters were observed for one and a half-hours and six behaviors were recorded. Van Orsouw found that early benthic lobsters displayed significant changes in behavior under hypoxic conditions (20% and 6% oxygen saturations), but did not change their behavior significantly under the two highest concentration levels of oxygen saturation (100% and 54%). Van Orsouw also found that as oxygen levels decrease, energetic activities such as walking, swimming, and digging decrease in frequency. In the lowest oxygen level, the lobsters made no attempts to dig in the substrate and made very little attempt to vacate the area. This experiment was performed in the laboratory, but if similar behavior changes were to occur in the wild, young lobsters would be more prone to predation, and hypoxic conditions could have a significant, negative long-term effect on the population of lobsters.

Katherine J. Papacostas (2012)

Generalists or Individual Specialists? A Comparison of Resource Use Among Native and Invasive Crabs in Long Island Sound
Temple University Biology Department

Two major threats to native biodiversity are habitat degradation and invasive species. These are pressing issues in Long Island Sound, negatively affecting native species of ecological and economic importance. In order to inform sustainable fishing, conservation efforts and effective invasive species management policies, as well as an improved understanding of the resource use of both native and invasive species, are critical.

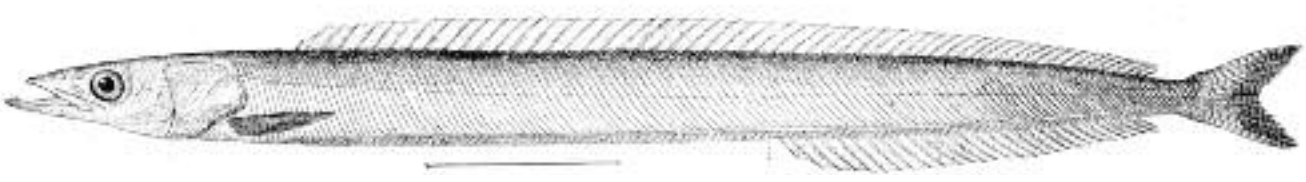
Native species are sometimes known to exhibit individual specialization within species, or variation resource use among individuals, increasing the breadth of that species' niche. Invasive species are assumed to be generalist, using a wide variety of resources, but the degree of any individual specialization is unknown. Two commercially important crabs in Long Island Sound, *Callinectes sapidus* and *Cancer borealis*, and two invasive crabs, *Hemigrapsus sanguineus* and *Carcinus maenas*, are considered generalists, but the extent to which individual specialization contributes to the breadth of the species' diets is unclear.

In a study based in Long Island Sound, Katherine Papacostas examined individual diet specialization in these native and invasive crab species. To do so, she conducted diet analyses on the four species. Crabs were collected in eastern Long Island Sound and placed in ethanol. Gut contents were then examined to the lowest taxonomic level possible, in order to examine diet breadth within crab species. Findings could aid conservation efforts of the two native species and inform management and protection of their resources. Further, an understanding of the resources utilized by the invasive species could inform invasive species management policies.

James F. Reinhardt (2007)

Ontogenetic Changes in the Material Properties of the Colonial Sea Squirt Didemnum*, a Recent Invader to Long Island Sound*
Department of Marine Sciences
University of Connecticut at Avery Point

James Reinhardt's Ph.D. research is focused on the mechanisms used by the Colonial Sea Squirt *(Didemnum sp.)* for dispersal. *Didemnum* is a recent invader to the Long Island Sound ecosystem and exhibits unique and devastating properties when compared to similar colonial ascidians. It has the ability to cover large areas of benthic habitat and has created large mats in eastern Long Island Sound. Considering the importance of the benthic fisheries in the area, it is essential to understand how



Didemnum invades new habitats.

In his research, Reinhardt used preliminary studies to deduce that as *Didemnum* colonies become reproductive, the material strength of the colony's tunic is weakened. Therefore, gravid colonies are more likely to fragment, providing an enhanced mechanism for dispersal. Additionally, tendrils produced by developing *Didemnum* are subject to drag and acceleration forces which may also increase the possibility of breakage. To test his hypothesis, samples were collected from the field and reattached to PVC panels for marking and photographic records in order to track the growth and age of each colony. In two-week intervals, observations of his samples identified reproductive state and included counts of zooid, spicule and larval density. Reinhardt then performed tensile strength and peel tests upon cross sections of his samples in order to determine any changes due to reproductive development. Reinhardt's studies advanced scientific research on the *Didemnum*.

Erika L. Rogers and Michael S. Berger (1996)

A Guide to Ascidian and Bryozoan Recruits of Eastern Long Island Sound
University of Connecticut at Avery Point

Larval ascidians and bryozoans are among the free-floating plankton of Long Island Sound. As adults, they settle and attach to hard surfaces such as rocks or boats and are known as fouling communities. Because ascidians and bryozoans undergo dramatic morphological changes as they mature, existing adult identification keys often fail to focus on recruit stages and largely ignore the bryozoans.

Erika Rogers, a Master's candidate in Marine Science at the University of Connecticut at Avery Point, and Michael Berger, an undergraduate, filled in this gap by creating a taxonomic guide to Long Island Sound ascidian and bryozoan recruits.

Rogers and Berger collected recruits at four sampling sites around Pine Island from suspended plastic panels to which the recruits could attach. They recorded morphological features and photographed all recruits, keeping the organisms for two weeks. Once the plankton had matured, Rogers and Berger were able to confirm the identities using adult keys. They also identified recruits by forcing a stream of water directly at each organism using a pipette. Different species show differing levels of resistance to this procedure and therefore, it may be helpful in the identification of these organisms.

The guide contains photographs of seven ascidian and nine bryozoan species in the recruit stage. The accompanying text describes each organism's size, shape, visible internal and external structures, and pigmentation. Marine researchers studying plankton populations in Long Island Sound may now identify common species as well as exotic invading species. The guide is being used to train new staff at the Avery Point marine research lab, and has applications for marine industries in identifying fouling communities.

Rodney Rountree (2001, 2006)

Identification of Soniferous Fishes of Cape Cod and Martha's Vineyard Sound
Marine Ecology and Technology Applications, Inc.

The identification of fish nursery habitat is essential in the management of marine fisheries as the sustainability of many fish populations is contingent upon the health of their nursery habitats. Essential Fish Habitats (EFH) are defined as "those waters and substrate necessary for fish for spawning, feeding or growth to maturity." Scientists have been using passive acoustics to help identify Essential Fish Habitats for soniferous fishes (those that produce sounds).

Rodney Rountree's study (2001) was initially designed to catalogue the diversity of soniferous fishes in the Cape Cod region and to provide data to validate the association of specific calls with specific species. However, early observations focused on the Striped Cusk-eel *(Ophidion marginatum),* an organism originally thought to inhabit waters further to the south. The Striped Cusk-eel produced the most frequently heard and widely distributed sounds of any fish observed during the study. Since this fish was not known to regularly inhabit these waters, the results demonstrated the effectiveness of passive acoustics as a supplement to traditional species surveys.

In 2006, Rountree set out to further examine the distribution of the Striped Cusk-eel and also identify some of the unknown sounds occurring in Vineyard Sound. Calibrated acoustic recorders were used to identify the source levels of the sounds and fish were captured in the vicinity of the recorded sounds. Captured fish were held briefly in holding pools at the Waquoit Bay National Estuarine Research Reserve and observed for sound production. Examples of fish sounds were posted on the Fishecology website and will be published in primary literature. The findings of this study support proposals to use passive acoustics to determine the habitat use patterns of estuarine and coastal marine fishes in New England.

Rodney A. Rountree (2010)

Undersea Soundscape of New England Coastal Waters; Are Soniferous Fishes Important?
University of Massachusetts, Amherst
Cape Cod, Massachusetts

Continuing his study of soniferous fish, Rodney Rountree set out in 2010 to develop a soundscape of New England coastal waters. The importance of anthropogenic noise and its effects on marine mammals is widely known, but has only recently begun to be acknowledged and studied for fishes and invertebrates. Despite this growing concern, virtually no data exists for estuaries in the northeastern United States. Not only is there no information on anthropogenic noise in New England estuaries, there is precious little data on biological sound production. In the interest of remedying this situation, Rodney Rountree proposed to conduct the first pilot study to document the underwater soundscape of estuaries in New England from Cape Cod, Massachusetts to the Canadian border. The major goal of Rountree's study was to document the presence or absence of fish sounds and to obtain preliminary data on the underwater noise levels found in coastal

estuaries of New England. This was accomplished through an intensive sampling "road-trip" during the summer of 2010.

Rountree stopped at various water access sites (boat ramps, bridges, piers, jetties, etc) along the route, dropped a hydrophone into the water, and recorded sounds to a laptop. A handheld GPS was used to record sampling locations, while a digital camera and digital video camera were used to document local habitat characteristics. Rountree also established a public web page that used GPS data to track his progress on the trip. Selected sound clips, video and photographs, together with Rountree's comments, were posted to the project website daily. The web page was hosted on his popular research web page http://www.fishecology.org, averaging over 3000 hits per day. This strategy has great promise of capturing the imagination and interest of the public and will be invaluable in educating the public on the importance of the underwater soundscape to our coastal ecosystem.

Sara Jane Sampieri (2009)

Resource Guide to Common Benthic Macrofauna in Southeastern Massachusetts Estuaries
School for Marine Science and Technology
University of Massachusetts Dartmouth

From 2003 to 2009, the Massachusetts Estuaries Project, a collaborative effort by the Executive Office of Environmental Affairs and the University of Massachusetts School for Marine Science and Technology, collected water quality and hydrodynamic information from 89 estuaries in Southeastern Massachusetts in an effort to improve nitrogen management. The data was combined through the use of a linked watershed/estuary model that predicts water quality changes resulting from land use management decisions, allowing managers to see the impacts of land use on water quality before they make decisions. Technical reports (which include water quality data, ecological health, and plant and animal communities present) were created for each estuary/embayment to facilitate management and scientific efforts. Although the research of this project was thorough, the habitat information provided in the reports is a basic overview and overlooks many specifics on benthic communities.

While a Master's student at the University of Massachusetts-Dartmouth, Sara Jane Sampieri used the abundant water quality and habitat data already collected by the Coastal Systems Program to create a resource manual of common benthic macrofauna found in Southeastern Massachusetts' estuaries. The most common benthic macrofauna were identified and photographed, and relevant species information (i.e. physical description, life history and taxonomic information, and identification) was compiled for each species. The manual was created to encourage an interest in the benthic organisms of Southeastern Massachusetts.

Lauren Stefaniak (2007-2008)

Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
Department of Marine Sciences
University of Connecticut at Avery Point

Previously unrecorded populations of superficially similar species of colonial tunicates of the genus *Didemnum* have been discovered in many temperate coastal regions throughout the world. The ability of these new populations to grow rapidly, compete with native species, and overgrow and cement cobble/gravel substrates, has caused great concern to marine scientists. Identifying this species has been difficult. Researchers have indicated that the invading population is composed of seven different species of *Didemnum* and, in contrast, that it is one species. Identification of any species of *Didemnum* is challenging because many of the diagnostic characters used in standard taxonomy are at the level of the zooid, which is extremely small in the genus of *Didemnum.*

Lauren Stefaniak, as part of her doctorate work for the University of Connecticut, set out to identify the species in question using molecular markers as independent characters to support or refute a single species hypothesis. This method allows samples that would be unidentifiable using standard taxonomy to be genetically positively identified. Samples of *Didemnum sp. A* (the species in question) were provided to Lauren by Gretchen Lambert, of Friday Harbor Laboratories at the University of Washington, from several locations around the world. Phylogenic analysis of both mitochondrial (col) and nuclear (tho2) genes strongly indicate that *Didemnum sp. A* is a single species possibly resident to the western Pacific Ocean that has become established globally. Taken in conjunction with morphological evidence, Stefaniak has determined that the proper name for the species that is invading Long Island Sound is *Didemnum vexillum.*

Stefaniak continued her work on this species in 2008 by investigating its methods of dispersal and reproduction that may have facilitated its ability to invade. She identified the length of the maturation period of new recruits by sampling settled colonies on a weekly basis while looking for the presence of reproductive structures. Her initial work was presented at the International Invasive Sea Squirt Conference-II at Brunell River in Prince Edward Island, Canada, and a manuscript of the conference proceedings was published in the *Journal of Invasions.* Her additional research leads to better management of this species and a healthier marine environment in New England.

Jessica Tallman (2005)

Oyster Grow-Out Cages as Artificial Reefs for Temperate Fishes
University of Rhode Island

Aquaculture is the fastest growing sector of the fishing industry and most often takes place in facilities close to the coast. This area of the ocean provides nursery habitat to many species of fish, and the study of how aquaculture facilities affect the natural native fish population is needed to fully understand the far-reaching impact of aquaculture on the natural ecosystem. Oyster grow-out cages (aquaculture sites) are colonized by fish normally

associated with rocky reefs and may be valuable habitat for these species.

In order to determine habitat preference, Jessica Tallman, a Master's candidate in Environmental Science at the University of Rhode Island, compared fish abundance, growth, and disappearance rates (mortality plus emigration) on three grow-out sites, six natural reefs, and one artificial reef purposely built for fish habitat. Cunner *(Tautogolabrus adspersus)* were more abundant on the natural reefs and the artificial reef, while Scup *(Stenotomus chrysops)* and Tautog *(Tautoga onitis)* were most abundant at the aquaculture sites. Tallman found that the oyster grow-out cages provide quality habitat for fish that typically inhabit hard bottom areas of coastal waters, and that habitat restoration programs for these fish should consider the use of grow-out cages or other artificial reefs.

Erica Weiss (2000)
The Effects of Water Column and Sediment Characteristics on the Growth Rates of Quahogs (Mercenaria mercenaria*) and Soft-Shell Clams* (Mya arenaria*)*
Marine Program, Boston University

Coastal development along Cape Cod has resulted in increased land-derived nitrogen to many of its estuaries. Increased nitrogen loading may alter food supplies and cause changes in sediment types, which could have a negative impact on the health and growth rate of shellfish. However, an increase in nitrogen may also enhance growth rates of Quahogs *(Mercenaria mercenaria)* and Softshell Clams *(Mya arenaria),* two of the most commercially important shellfish species harvested on Cape Cod. Understanding how the combined effects of nitrogen loading impact shellfish is important for developing management guidelines for this economically and ecologically valuable resource.

Erica Weiss, a Master's student in Marine Biology at the Boston University Marine Program, designed an experiment to assess the relative impacts of water column and sediment characteristics on growth rates of Quahogs and Softshell Clams. Weiss mapped and characterized sediment types (sand, sandy-mud, or mud) in three estuaries of Waquoit Bay, Massachusetts, and then transplanted juvenile shellfish from one sediment type to the other. Weiss analyzed the water and sediment chemistry at each transplant site and measured the growth rates of the Quahogs and Softshell Clams during the growing season for two consecutive years. This data, used in conjunction with a complementary study by Ruth Herrold, allowed for definitive information on the impact of land-driven nitrogen on Quahogs and Softshell Clams.

Education

ENVIRONMENTAL EDUCATION, civic engagement, and community leadership is intrinsic in marine research and conservation, community-based conservation, and sustainable development. Sounds Conservancy grantees have made a difference in their community where knowledge of marine environments and conservation is shared and passed from one generation to the next.

Lee Ann Beauchamp (2001)

S.W.E.L.L. (SoundWaters Environmental Learning Lab) Internship
SoundWaters

SoundWaters is a non-profit environmental education organization headquartered in Cove Island Park in Stamford, Connecticut. Programs offered by SoundWaters vary from seminars and activities in a classroom setting to educational trips aboard their 80 ft. schooner. SoundWaters Environmental Learning Lab is a summer program that introduces the concepts of coastal ecology and stewardship for the environment to five- to eight-year-old children.

In order to run the Environmental Learning Lab, SoundWaters hired an intern to help conduct summer camp programs, lead beach walks of Cove Island Park, and feed and care for the animals in the SoundWaters aquaria. The intern acquired information about the history and ecology of Long Island Sound and gained valuable experience in the education of young children. Through this type of education, SoundWaters provides people with an understanding and awareness of the changes they can make in their lives and communities to restore, protect, and preserve Long Island Sound.

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)

Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

The Coalition for Buzzards Bay was founded in 1987 and is supported by more than 1,500 individuals, families, and businesses. The Coalition works throughout the entire Buzzards Bay Watershed to protect the region's coastal, river, and drinking water quality and the upland forests, wetlands, and streams that support the watershed/bay ecosystem.

As part of the Citizen's Water Quality Monitoring Program, the coalition recruits and trains over 70 volunteers to collect water samples and monitor 28 embayments. The monitoring program incorporates methodologies accredited by the Environmental Protection Agency and serves as a model for other monitoring programs around the country.

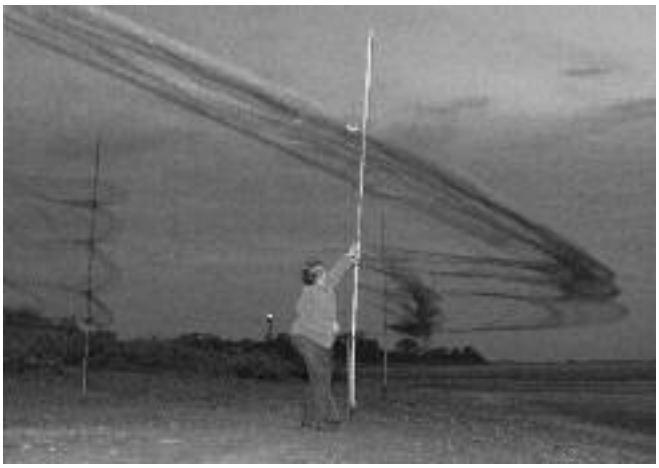
In 1997, the Coalition for Buzzards Bay updated and distributed the revised data in a publication called *Baywatchers.* The report contains benchmark information for assessing the health of the Bay. Communities around the Bay use *Baywatchers* monitoring data to choose and evaluate projects aimed at improving water quality in Buzzards Bay. For instance, monitoring data supports the need for sewer extensions and demonstrates that remediated stormwater systems are improving dissolved oxygen levels in some areas.

In 2000, the Coalition launched the Buzzards BayKeeper Program to expand their role in protection and restoration of Buzzards Bay. Through the use of a new vessel, the *R/V Buzzards BayKeeper,* the BayKeeper Program helped remove sewage and polluted runoff from the Bay, improved oil spill prevention and response, assisted in water quality monitoring, responded to pollution concerns, and participated in several on-the-water events. Additionally, a new publication, *A Guide to Clean Boating on Buzzards Bay,* increased outreach and education to the boating public.

The Coalition created the *Buzzards Bay Care Guide* in 2001, designed to educate the general public about the hazardous impacts that common household practices can have on water quality. The publication focused on household cleaning and housekeeping practices, specifically, alternatives to toxic cleaners for household use, environmentally-friendly lawn and garden practices, and proper maintenance of septic systems.

In 2002, the Coalition created the Buzzards Bay Baywatchers Program, a coastal monitoring effort in Massachusetts. Volunteer Baywatchers are trained and equipped, and monitor 30 coves and harbors for basic parameters such as dissolved oxygen, temperature, salinity, and water clarity. As an extension of this initiative, 100 signs were placed at public access points to Buzzards Bay featuring the Bay Health Index Rankings based upon compiled water quality testing data from the past. This project has continued since 1992 and is used to make informed science-based decisions about the restoration and protection of Buzzards Bay while getting the public involved.

In 2005, the Coalition for Buzzard's Bay hired a summer intern to assist with programs related to improving the health of Buzzard's Bay. The intern worked to expand the Coalition's water quality sampling program which has been conducted for the past 15 years, and also helped to pump 1,167 gallons of sewage from Cuttyhunk Harbor, ensuring that Buzzard's Bay maintains its designation as a no discharge zone for marine waste.



Candace Cochrane (1996)
The Sounds – A Living Portrait
Harvard Graduate School of Education

The publication, *The Sounds – A Living Portrait*, describes the Sounds of New York and New England using the words of The Sounds Conservancy founder Chris Percy and Quebec Labrador Foundation President Larry Morris. Candace Cochrane's photographs captured the beauty and diversity of the Sounds.

The Sounds – A Living Portrait remains a signature publication of the Sounds Conservancy.

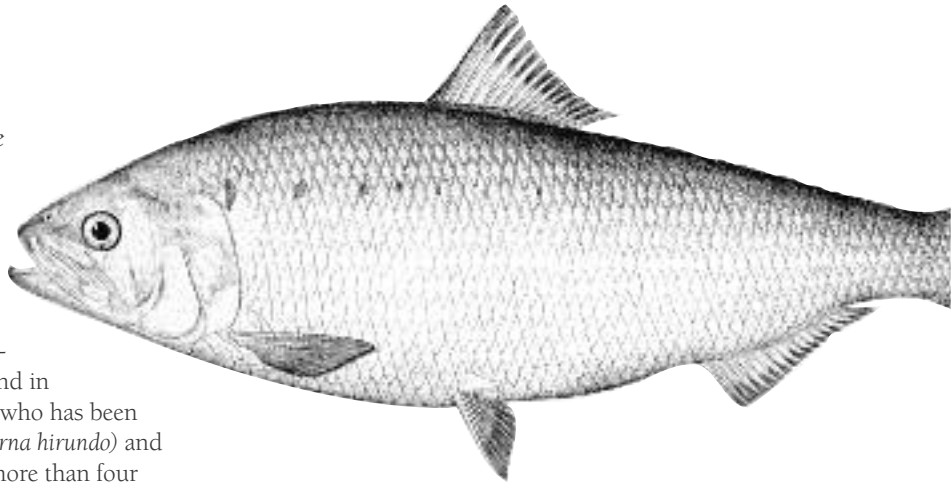
Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

The Westport River Watershed Alliance is a nonprofit group formed in 1976 to protect the natural resources of the Westport River and its 100 square mile watershed. The Westport River is confronted with serious problems associations with its water quality and status of habitat: bacterial contamination, excessive nutrient loading and the spread of invasive plants. For seventeen years, WRWA has conducted consistent fecal coliform bacteria monitoring of the Westport River providing water quality data to the public and town agencies. Seasonal nutrient monitoring has been done for several years and monitoring of declining horseshoe crab populations will begin this spring. The data collected by WRWA has provided a picture of the health of the river.

The intern will work under the Education Director and Water Quality Coordinator, assisting with projects to support the WRWA mission. WRWA's primary purpose and goals are to promote the environmental integrity of the Westport River watershed and its environs on Buzzards Bay and Rhode Island Sound. WRWA advocates for the wise use and preservation of natural resources for the aesthetic, recreational and economic benefit of watershed citizens, and to educate the general public about the interrelationship of our water, soils, plants, animals and people. WRWA's school-based education program, the Watershed Education Program (WEP), is an interdisciplinary, environmental literacy program for students grades K-9. WEP consists of grade specific field studies, curricula, museum quality kits, teacher workshops and classroom visits. WRWA's intern will assist with teaching programs to offer learning experiences in topics such as coastal ecology, wetland ecology, dune restoration and aquaculture. The intern will also conduct fieldwork to monitor fish and water quality.

Lindsay B. Counsell (2007)
Signage for Dead Neck Island
Three Bays Preservation, Inc.

Dead Neck Island is an 86-acre island on Nantucket Sound to the south of Osterville, Massachusetts. This island is a nesting area for threatened and endangered species of coastal water birds including Piping Plovers and terns. In 1996, the island was rapidly disappearing due to erosion. A group of citizens concerned with recent shellfish closures, algal blooms, and the erosion of the island, came together to form Three Bays Preservation. Dead Neck Island has since been the beneficiary of more than 250,000 cubic yards of material deposited on the island and the return of several pairs of nesting birds due to support from Three Bays. In 2005, the title to the island was donated to the organization, but much of the success achieved on Dead Neck was fleeting due to educational efforts going awry. In years past, Three Bays' educational signs, sensitive area border fences, and even bird boxes have been destroyed and stolen. Additionally, predation upon young chicks devastated one season's promising number of offspring. In 2007, efforts were taken to improve upon the fences and signage by using more durable materials and updated information so that the public can understand the importance of this island. Three Bays Preservation worked with the Massachusetts Audubon Society in an attempt to limit predation. Continued efforts of the Three Bays Preservation will ensure the protection of Dead Neck Island and its wildlife population for years to come.



Greig Cranna (2007-2008)
Documenting the Research of Helen Hays on the Migratory Patterns of the Common and Roseate Tern
Freelance Photojournalist
Great Gull Island, New York; Punta Rasa, Argentina

Greig Cranna, a freelance photographer and photojournalist, made his first trip to Great Gull Island in 2001 to meet with and photograph Helen Hays, who has been monitoring and banding The Common Tern *(Sterna hirundo)* and Roseate Tern *(Sterna dougallii)* on the island for more than four decades (as of 2010). Cranna wrote about his experience in Quebec Labrador Foundation's *Compass* magazine that year and has been making annual trips to the island ever since. Cranna has been integral to covering QLF's work for 30 years and is especially interested in seabird conservation and research. When the Sounds Conservancy came under the aegis of QLF, it was only natural that he would begin to cover TSC programs as well.

In 2007, Cranna joined Hays (and the terns) on her annual trip to Punta Rasa, Argentina to document the international cooperation that has evolved between Hays' Great Gull Island team and their Argentine counterparts in documenting the migration of Common and Roseate Terns.

Aline Euler (2007, 2014)
Little Neck Bay – Long Island Sound Festival
Alley Pond Environmental Center

In a direct extension of their mission, the Alley Pond Environmental Center hosted the Little Neck Bay/Long Island Sound Festival as part of National Estuaries Day (September 2007). The festival was designed to form a coalition of various groups to learn about, protect and become stewards of local coastal wetland ecosystems — estuaries, salt marshes, and other coastal areas. Objectives of this festival included public awareness and promoting a sense of stewardship along Long Island Sound.

Under the direction of Aline Euler, the Alley Pond Environmental Center strives to educate youth about basic ecological concepts and the importance of proper environmental caretaking. This festival not only served to meet this goal, but also allowed Alley Pond to reach out to several organizations in the area to gain support for a community-wide event. This partnership expanded the reach of Alley Pond's environmental education initiative.

In 2014, Euler applied for funding to support the development of a school estuary program: "YES," which was to form part of the larger festival event. This program was intended to foster an understanding among the younger generation of the plight and pollution of the Sound, and to encourage participation in pollution remediation. Through YES, the Alley Pond Environmental Center selected ten fourth grade classes to participate in the one and half hour YES presentation.

Jason Garnett (2013)
Soundkeeper Curb Marker Project
Soundkeeper, Inc.

Soundkeeper, dedicated to the protection and preservation of Long Island Sound, aims to increase awareness of the destination of polluted storm water and reduce illegal dumping into storm drains by environmental education of the general public. According to a 2006 survey by Stony Brook University, residents use the Sound heavily and value living near it, but have a potential to engage in harmful watershed-related behaviors if they are not well-informed with environmental knowledge. One of the key findings of the survey indicates that there is poor local knowledge about the destination of water in storm drains, and residents are generally unaware polluted storm water runoff is a major source of water pollution in the Sound. While most residents are concerned about the health of the Sound, most do not think that they are doing anything to worsen conditions, but would change something in their behavior if it would improve the water quality.

Working on this information, Soundkeeper developed customized curb markers that discourage the dumping of toxic waste and other pollutants down street level storm drains. The markers include information on contacting Soundkeeper to report dumping, and give directions on how to get a boat's waste tank pumped out, a free surface provided in the area with the help of federal funding. Information on the project will be posted on Soundkeeper's website at www.soundkeeper.org, and a press release was developed to inform residents of the project. The curb marker project benefitted those who live, work and play in the Sound's waters with cleaner water that can only be achieved through raising awareness in the people who live, work and play on the Sound.

Jason Garnett (2014)
Soundkeeper Purple Martin Birdhouse
Soundkeeper, Inc.

Purple Martins are the largest North American swallow. They nest in cavities, either natural or artificial, and in the east they are almost completely dependent on humans to supply their nest boxes in order to breed. American Indians once provided hollowed out gourds for nesting sites, and now Purple Martins east of the Rockies nest in birdhouses. These birds are becoming rarer in the Northeastern US, and Soundkeeper hopes to increase their population growth in this area. In this interest,

Jason Garnett requested funding to build a large and comprehensive nesting system designed by an ornithologist, the founder and director of the Purple Mountain Conservation Association. After construction of the birdhouse, Soundkeeper would manage the nests in order to maintain healthy breeding pairs.

Jason Garnett (2013-2014)

Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.

Rain gardens are green areas that absorb and filter stormwater before it can carry its contaminants into a body of water. Jason Garnett of Soundkeeper proposed to build a rain garden at The Farm at Stratford, a Soundkeeper project on town-owned land that includes 90 community garden plots and over 120 fruit trees. The rain garden would be placed at the bottom of the slope of the community gardens, in front of a creek, preventing excess nutrients and pesticides from running into the creek and being carried to Long Island Sound.

The garden, besides filtering contaminants, would add aesthetic appeal to the landscape and be relatively low-cost. Further, placed as it would be in a highly visible residential area directly across from the biggest high school in town, the rain garden would provide an opportunity to educate residents of the area about stormwater and pollution issues. Since much of the toxic runoff and increased nutrient content in the Sound is due to maintenance on water-front properties, helping the public to understand the effect they have on the Sound will be essential to the preservation of this ecosystem into the future.

Jason Garnett (2015)

SoundScaping Booklet Printing and Distribution
Project Administrator, Soundkeeper, Inc.

The objective of the SoundScaping project is to increase the environmental awareness of property owners living within the Long Island Sound watershed area. Homeowners must be made aware that their actions have an impact on the Sound with regards to the way that they design and maintain the land on their properties. The goal is to change the implementation and maintenance behavior of property owners to be "Sound-friendly" through increased implementation of landscaping features and low impact maintenance practices that protect the Sound through reduced polluted storm water runoff and increases habitat area for native flora and fauna. Homeowners can benefit from SoundScaping through lowered costs for fertilizers and pesticides, reduced water usage, and a healthier lawn independent of excessive chemicals. Swimmers, boaters and fishermen benefit from property owner's increased use of Sound-friendly landscaping practices that will leave coastal waters cleaner with less toxicity and lowered nutrient levels after rain events.

SoundScaping will educate boaters and Soundkeeper members on the benefits of "*SoundScaping*" their property. Boaters who use the Pumpout Program to properly empty their waste tanks will be able to request a *SoundScaping* booklet to be placed on their boat upon completion of their requested pumpout. Within the booklet are steps that property owners can take to keep their lawns and gardens "Sound-friendly" through maintenance and design techniques. Soundkeeper will utilize a fleet of three pumpout boats, covering the coastal areas from Westport,

Connecticut to New Rochelle, New York, as a unique way to distribute SoundScaping booklets while visiting boats to pumpout their waste tanks. The Soundkeeper website will be another way to distribute booklets through emailed requests and member email blasts.

Joanne M. Jarzobski (2007)

MassSail Cape Cod Community Maritime Days
Provincetown Center for Coastal Studies

The preservation of the marine environment is integral to the efforts of the Provincetown Center for Coastal Studies (PCCS). In addition to conducting scientific research on marine mammals of the western North Atlantic and on coastal and marine habitats and resources of the Gulf of Maine, the Center also promotes stewardship and work in education to encourage the responsible use of coastal and marine areas to include MassSail, a marine education program conducted aboard the 125 ft. schooner Spirit of Massachusetts. These voyages range in length from one day to two weeks and promote pubic awareness and understanding of the rich marine environment and heritage.

MassSail has celebrated Nantucket Sound since 2005 and along with the 14th Annual Cape Cod Maritime Days, the Provincetown Center for Coastal Studies offered a unique sailing adventure to Harwich High School students in 2007. This day of sailing aimed to give first-hand education to children that might not otherwise have the opportunity to learn about the heritage and marine life of Nantucket Sound.

Captain David Johnson (2013)

Coastal Steward
Costal Steward Investigations (CSI) Program

The Coastal Steward Investigations (CSI) Program was created to take the data collected from the Adopt-A-Beach Program and quantify the results by analyzing the different types of debris removed. As the part of the CSI program, a power-point presentation describing types, sources, and quantities of debris, trends of debris types, and new types of debris found, was created and presented to the public.

Over the past ten years plus the Coastal Steward has documented the different types of debris removed during beach cleanups. This information can be used to educate the public about pollution, its sources, how long it takes to decompose and how it affects the organisms that live on our coastal beaches. The power-point presentation can be found on the Coastal Steward website.

Margarett L. Jones (2009-2011, 2013)

Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center

The Denison Pequotsepos Nature Center is a year-round environmental education institution which aims to "inspire and nurture appreciation of the natural world and foster a personal environmental ethic." Through science based programs, publications and services, the Center works to improve scientific and environmental literacy in the community and throughout the region. Margarett Jones, the Executive Director of the Center, set up drop-in coastal ecology programs that attracted a variety of participants, children and adults alike. These programs emphasized the importance of protecting the integrity of coastal ecosystems through activities geared towards learning about the key faunal and floral inhabitants and their respective roles within the ecosystem. The Center also continued their Nature Summer Camp, attended by more than 1,200 children, and used some of the Sounds Conservancy Grant to give scholarships for this summer program. Participants of the camp explored the coast from Rocky Neck State Park in East Lyme, Connecticut, to Ninigret National Wildlife Refuge in Charlestown, Rhode Island.

An additonal grant from The Sounds Conservancy in 2011 helped to fund the reprinting of several of the reference materials and field guides used by the DPNC, and a grant in 2013 supported the purchase of nets and waders for a Long Island Sound research program.

Thomas Maloney (1998)

Anadromous Fisheries Restoration Manual
Connecticut River Watershed Council

Anadromous fish such as Alewife *(Alosa pseudoharengus),* Blue-back Herring *(Alosa aestivalis),* and American Shad *(Alosa sapidissima),* annually migrate from marine environments to vital spawning habitats in rivers. In New England, many fish runs used by these species are either severely limited or have been extirpated by human-placed barriers. Simply removing the barrier is the preferred method for restoring fish runs, but often this is not desirable at historic milldams. The best restoration alternative is to install fishways at dams, culverts, and other barriers.

The Connecticut River Watershed Council is a non-profit organization founded in 1952 and dedicated to promoting the restoration, conservation, wise development, and use of the Connecticut River's natural, scenic, and community resources. The Council, in close partnership with biologists from the National Park Service and Fisheries Division of the Connecticut Department of Environmental Protection, published a fishway manual. The manual combined a "cookbook" approach to design and engineering considerations, permitting, and the operation and management of fishways with critical ecological information such as life history, habitat requirements, and the vital role of anadromous fish in aquatic food chains.

The comprehensive information contained in the manual helped communities and landowners restore anadromous fish runs in their area and affirmed the ecological role of migratory fish.

Susan McNamara (2009)

Marine Science Day
Long Island Sound Foundation

Since 2003, Susan McNamara, the Executive Director of the Long Island Sound Foundation, has organized an annual Marine Science Day, an outreach program for middle school children. In May 2009, the Long Island Sound Foundation hosted students at the University of Connecticut at Avery Point from all over the

state to participate in activities that ranged from squid dissection to the consequences of oil and fuel spills on Long Island Sound.

Teresa McKinley (2000)

Narrow River Restoration: Public Education & Information
Narrow River Preservation Association

The Narrow River, also known as the Pettaquamscutt River, is located in southern Rhode Island and is a narrow tidal inlet that opens into the Atlantic Ocean at Narragansett Beach. The watershed of the river is only made up of one small section of Rhode Island, but the biodiversity of plants and animals found here is greater than all other areas of the state combined. Population growth in southern Rhode Island has damaged many habitats of the watershed, and pollution from faulty septic systems, pet waste, and waterfowl are of increasing concern.

In 2000, Teresa McKinley, Executive Director of The Narrow River Preservation Association, collaborated with the Rhode Island Department of Environmental Management on a detailed bacteria study of the Narrow River. The mission of the Narrow River Preservation Association is to restore, protect, and preserve the quality of the natural environment and communities within the Narrow River watershed. The Association incorporated these findings into a public education project on the water quality of Narrow River.

Christopher Neil (2012)

Falmouth Association Concerned with Estuaries and Salt Ponds: Stormwater Education Project
Falmouth, Massachusetts

FACES Stormwater Education Project (SEP) aimed at increasing public awareness about stormwater runoff, providing citizens with information on how to reduce their contributions to it, and assisting the town in addressing the problem by engaging citizens in the identification of runoff hotspots and clogged drains. When stormwater, the product of rain, snowmelt or irrigation, does not percolate in the ground, it runs over impermeable surfaces such as streets, collecting substances such as motor oil, pesticides, pet litter, and construction waste. These pollutants are ultimately deposited, untreated, into a body of water. The US Environmental Protection Agency recognizes runoff as the largest non-point source of pollution to coastal health.

FACES used a four-pronged approach, as follows. 1) Developing and disseminating stormwater 'kits', which outline strategies for reducing contributions to runoff and pollution to neighborhood associations, businesses and community organization. 2) Incorporating a stormwater pollution and prevention overview into pre-existing sewer social modules, developing a video PSA on stormwater pollution, to be shown on local TV, used in outreach efforts and made available to schools and community organizations. 3) Identifying hotspots for storm water runoff, and 4) using Falmouth using citizen 'scientists'. The project educated the community about threats to water quality posed by stormwater pollution and strategies for minimizing the problem. This education of local communities ultimately translates into less stormwater pollution and healthier water for everyone.

New London Maritime Society (2013)

Custom House Maritime Museum
Susan Tamulevich, Director

The New London Maritime Society is a nonprofit charitable organization established inn 1983 by a group of citizens who wished to preserve New London's U.S. customs house. Today, the building is both the oldest continuously-operating U.S. Custom House and the Custom House Maritime Museum/New London Maritime Society is an educational organization. In 2010, the organization took on stewardship of the still-active New London Harbor Light, the first lighthouse built on Long Island Sound. Further, through exhibitions and educational programs, the museum actively promotes, protects and interprets the maritime history and current life of the port of New London and the surrounding region. The mission of the New London Maritime Society's (NLMS) Custom House Maritime Museum is to protect and preserve New London's U.S. Custom House and New London Harbor Light and to promote and interpret the rich maritime life and history of the port of New London and the surrounding region through museum exhibitions and educational programs.

The Custom House Maritime Museum works to illustrate the maritime connections among us by presenting the stories of our neighbors. The museum has become something of a social center, where people of all walks of life meet to talk, tell stories, hold meetings, and play cribbage. "Jibboom Roundtables" – panel discussions featuring individuals who share a common maritime interest or experience, are also hosted here. Recent roundtable topics have included tugboat workers, design of New London's Parade, and oyster farming in Long Island Sound. The museum develops 'cabinet' exhibitions drawn from members' personal experiences, and brings attention to the people and events that have made our region great. A recent exhibition on Rod Johnstone, designer of the J/Boats, is such a show. To get the word out, the museum produces quarterly newsletters and a program on local cable television: Custom House Maritime Matters.

Susan Nickerson (2010)

Boaters Guide Project
Cape Cod Commercial Hook Fishermen's Association
Nantucket Sound

The Cape Cod Commercial Hook Fisherman's Association requested funding from The Sounds Conservancy Grants Program to support the printing and distribution of 12,000 copies of the 2010 Boaters Guide to Nantucket Sound and Cape Cod Bay. The Boaters Guide Project seeks to promote the health and wellbeing of Nantucket Sound and Cape Cod Bay by providing useful information to a variety of user groups.

Both the Sound and Cape Cod Bay, bordering the south and north shores of Cape Cod, respectively, are threatened by a multitude of pollution sources and degrading activities that are damaging their vitality and resource value. Among the chief threats to these waters are direct and indirect wastewater discharges, stormwater inputs, excessive use of lawn and turf fertilizers in close proximity to the shore, and certain commercial fishing and dredge operations that impact important fisheries habitat.

Nantucket Soundkeeper's mission is to provide for the long-term protection and preservation of Nantucket Sound. In 2010, for the first time, Soundkeeper collaborated with the Provincetown Center for Coastal Studies to produce a guide that benefitted water quality and habitat on both sides of Cape Cod.

The booklet aims to educate the public and boaters about environmental boating as well as to clearly lay out the environmental laws and regulations in the region.

Suzanne O'Connell (2006)

Complexities of Community-Based Conservation: Environmental Decision Making in the Lower Connecticut River
Department of Earth and Environmental Sciences
Wesleyan University

In 2006, Wesleyan University offered a new course, "Complexities of Community Based Conservation: Environmental Decision Making in the Lower Connecticut River" on the role of science, people, communities, and governments in developing and implementing conservation strategies. Course Director, Suzanne O'Connell, felt that the course would be more effective if a positive working relationship was developed between her students and representatives of several conservation groups, eight individual towns in the lower Connecticut River watershed, and citizens living in these towns.

The Riverquest, a 4 ft. passenger vessel docked at the Connecticut River Museum, was chartered so that students and representatives from conservation organizations could discuss the watershed while experiencing it. Additionally, large maps that identified land use and open space opportunities within the townships were produced and presented to the eight townships focused upon in the course. At the end of the semester, each student gave a presentation at the Connecticut River Museum on the watersheds and open spaces in the eight Connecticut River towns. These projects evaluated community-based conservation strategies of the area and also developed a summary of successful strategies for publication.

Daniel Orchard (2005)

Commercial Fisheries Road Show
The Commercial Fisheries Center of Rhode Island

In 2005, the Commercial Fisheries Center of Rhode Island proposed to increase public knowledge of fisheries through a presentation program set up for schools, universities, and community groups.

The Commercial Fisheries Center of Rhode Island is home to non-profit commercial fishing organizations and serves as headquarters to bring fishermen, scientists, managers, and elected officials together to discuss issues. The Road Show program allowed experienced fishermen to teach young students about fish and fishermen by using models of fishing nets and traps, by showing videos and photographs of fishing, and by passing around preserved fish. At the college level, fishermen speak to the management of fisheries and marine ecosystems, often ensued by open discussions and debates. This two-way exchange of dialogue and shared information has been applied to the benefit of other New England coastal communities.

Kathleen O'Sullivan (2007-2008)

Bayless Boat Shed and Educational Programs
Long Island Seaport & Eco Center

The Mission of the Long Island Seaport and Eco Center is to promote an appreciation of maritime heritage and to foster an awareness and understanding of the marine environment. Located at Harborfront Park in Port Jefferson, New York, LISEC is carrying out this mission through the Long Island Seaport and Eco Center.

Harborfront Park was formerly the Bayless Boat Yard from 1835-1900 where great wooden seagoing vessels were built. The new Bayless Boat Shed (2008) will provide a center for wooden boat building projects to continue. This building will become the home of marine environmental education programs and will be available to area schools, libraries, community groups, and visitors, with a loft dedicated to the storage and distribution of educational materials. The Bayless Boat Shed will allow the Long Island Seaport and Eco Center to reach larger

populations with its historical and environmental programs and focus their marine educational efforts on schools and scout groups in the area.

Kathy Parsons and David McGlinchey (2010)

Manomet Center Energy Outreach Program
Manomet Center for Conservation Sciences
Manomet, Massachusetts

A transition from fossil fuels to clean renewable energy sources is crucial if we wish to live sustainably on this Earth into the future. Yet a sustainable transition can only take place if the communities that will host renewable energy projects understand the benefits and impact of those technologies. Thus, the Manomet Center for Conservation Sciences Energy Program launched a new program to help New England communities understand the issues and science surrounding wind power development. As part of this effort, the Center worked extensively with coastal and island communities to explain the impacts and benefits of offshore wind power.

The Energy Program aims to educate communities on the benefits and impact of wind power. Manomet gives communities a trusted, objective information source to help them evaluate and discuss the merits and impact of wind energy projects. This education and outreach leads to a more efficient and productive wind power debate and more community support for appropriate wind energy development.

Manomet uses a three-part approach to further its education an outreach, consisting of an online information resource, an annual conference, and an on-the-ground, grassroots education program. The online resource seeks to answer commonly asked questions about wind energy and will solicit additional questions that can be addressed by Manomet researchers. The annual conference brings together developers and community leaders to discuss productive methods of discussing wind energy projects. The on-the-ground education includes educational forums in partner communities, delivered by Manomet experts to both decision makers and the general public. The Manomet Center for Conservation Sciences has a long-standing tradition of building science-based, cooperative solutions to environmental problems, and hopes to develop wind energy with the support and understanding of local communities.

Tamara Rich (2001)

A River in Our Own Backyard
Mystic Art Association

The Mystic Art Association was established in 1913 to foster the creation, understanding, appreciation, and enjoyment of the visual arts through exhibitions and education programs. In 2001, the Association conducted a summer workshop for children, *A River in Our Own Backyard – A summer workshop for children ages eight – twelve culminating in the creation of a mural depicting the Mystic River in our own backyard.* The workshop was designed to demonstrate the connection between art and ecology and the ways the Mystic River connects people and communities to the Sound. Lessons developed from this program were shared with local teachers through in-service training and fieldtrips to the Association.

In 2001, Tamara Rich, Education Coordinator for the Mystic Art Association, chose five locations to give young people an opportunity to see how the river changes from the headwaters to where it empties in the Sound. The class visited the sights to observe, record, and learn about the flora and fauna of each location. Students in the workshop photographed the shoreline and made notes of the many residential, recreational, and commercial activities the river supports. Each day the students returned to the studio and worked on a mural illustrating different activities taking place on the Mystic River.

Lisabeth White (2011) and Shelli Costa and Ami Aroujo (2012-2014)

Watershed Advocacy Internship
Westport River Watershed Alliance, Westport, Massachusetts

Lisabeth White successfully applied for funding for the WRWA's internship program in 2011, and Shelli Costa did so in 2012, 2013, and 2014.

Melissa Ryan (2008)

Maritime Careers and Long Island Sound
Ocean Technology Foundation

Southeastern Connecticut is home to marine organizations that focus on trade, research, technology development, naval operations, maritime industry, public education and outreach centered on Connecticut's relationship to Long Island Sound.

The Ocean Technology Foundation is an undersea research and education service organization with activities that support its own projects to developing deepwater technologies and research programs. In the effort to provide information about the types of careers and opportunities available in the marine science, technology, and environmental fields, Ocean Technology Foundation has developed web-based resources that present opportunities in the marine industry and the education needed to pursue these careers.

Jay Sargent (2010)

Dolphin and Human Interaction: A Personal History
Turks and Caicos; Middletown, Rhode Island

Bottlenose dolphins exist in every ocean of the world, yet the public's understanding of their behavior has been shaped primarily by for-profit amusement parks and the lingering "Flipper effect". For the last ten years, Sargent has had the opportunity to snorkel and develop a relationship with a wild bottlenose dolphin, JoJo. During this time the dolphin led her to heavily polluted areas as has "introduced" her to other bottlenose dolphins, including females and their newborn calves. To the best of Sargent's knowledge, this behavior, particularly the interaction with the mothers and calves, had never before been documented. Sargent has also had the unique experience of snorking with humpback females and their newly born offspring. The interaction was remarkable in many ways; not the least of which was the fact that the females were totally tolerant of Sargent's presence with their young calves.

The intent of Jessie Sargent's project was twofold: to increase public awareness and understanding of the behavior of bottlenose dolphins and humpback whales and to increase the public's awareness of some of the effects of pollution in their environment.

The hunting and killing of whales and dolphins sanctioned by various governments continues today, while the capture of wild dolphins and orcas for use in amusement parks is also prevalent. Sargent hoped that publishing her personal experiences in journal form, supplemented with pictures and videos, would increase public awareness and understanding of these Cetaceans. Through this project, she hoped to help change the public impression of dolphins from trained "water dogs" doing tricks to intelligent, sensitive mammals with whom we share a planet. The record of interaction with the humpback whales may also serve to increase the public's sensitivity to their continued threats from whaling.

Jay Sargent (2013)

JoJo Book II

Jay Sargent's second book, as well as describing the migration of Humpback whales from the Stellwagon Bank to the Silver Bank, tells of the continuing relationship she has developed with JoJo the wild dolphin. Sargent and JoJo had, as of the book's publication, been swimming together for fourteen years. As their relationship evolved, JoJo introduced Sargent to other dolphins, perhaps members of JoJo's family. Sargent now knows about ten different dolphins, among whom two mothers and calves accept her whether JoJo is there or not. The mother of one particularly friendly calf allows Sargent to swim along with the dolphins like a pod member. Though Sargent has spent much time swimming with wild dolphins, she is strongly against "swim with dolphins" programs in areas such as Turks and Caicos, which would domesticate wild dolphins. Sargent believes that wild dolphins should remain in the wild.

William Sargent (2010-2011)

Illustrations for Book on the Sounds of Cape Cod
Sounds of Cape Cod, Massachusetts

For the past 30 years, Bill Sargent has been collecting biological, geological, and human stories about the Sounds of Southern New England. The goal of this project was to incorporate that material into an illustrated children's book about Pleasant Bay, Nantucket and Vineyard Sounds.

The book investigates sea level rise, ORV's, endangered species, barrier beaches and the flora and fauna of the Cape's many bays, beaches and estuaries.

Julia Purinton is a noted landscape artist. She was the illustrator for *Lilly and Minot Dig Ipswich Clams, Lilly and Minot Visit the New Orleans Oil Spill* and *Lilly and Minot Investigate Polar Bears and Global Warming.* With this project, she also became the illustrator for Sargent's *Lilly and Minot Visit Cape Cod.*

William Sargent (2010-2011)

Daily Erosion Forecasts off Chatham, Massachusetts
The Coastlines Project
Chatham, Massachusetts

In April of 2007 an inlet broke through Chatham's North Beach, placing three villages and 36 barrier beach homes at risk. Since that time the Coastlines Project has used weather reports, tide charts, and a web camera to provide daily erosion forecasts for homeowners, state and local managers and the general public. From 2007 to 2011, 14 beach houses were lost. The site's daily reports helped homeowners and local officials make informed fact-based decisions about demolishing, moving the structures to safer areas or simply letting the structures wash away. Each decision has different financial and environmental costs and benefits.

Starting two weeks out, the reports provide homeowners with a daily closing window of opportunity so they might have "between 5 and 8 days," then "3 and 6 days" before their house is in imminent danger. They have accurately come within a single tide cycle for the last 12 houses lost. The reports have also helped five homeowners to retreat in the face of sea level rise by deciding to move their camps further up the beach or to the mainland. This work was written up in Sargent's book "Sea Level Rise, The Chatham Story," published by Schiffer Press, and was presented in a videotape scheduled to be released in the summer of 2010. It has also been covered in local papers and on Channel 5's Chronicle Magazine.

Sargent gives between 10 and 20 lectures about this program every year. In November, 2009, he presented the findings at the Aquarium of the Pacific in Long Beach California and at NOAA's Sea Level Rise Community Workshop in Leesberg, Virginia. Officials from several other coastal communities expressed interest in the program.

William Sargent (2012)

Beach Wars: Ten ThousanÏd Years on a Barrier Beach

Bill Sargent is a science writer, director of the Coastline Project in Ipswich, Massachusetts, and former member of both the New England Biolabs Foundation and The Associated Scientists at Woods Hole. He is currently working on coastal issues with a grant from the Sounds Conservancy of the Quebec-Labrador Foundation. He has been an originator and consultant on several NOVA programs on PBS.

The Sounds Conservancy grant enabled Bill to publish, "Beach Wars," a book about the many conflicts that have enveloped the Nauset Beach system since the barrier beach started growing ten thousand years ago. In a series of evocative chapters, the book discusses the geology and biology of the beach. The book chronicles the use of the beach by Paleo-Indians, pirates, rum-runners, hunters, hayers, scientists, ORV enthusiasts, beach camp owners, and endangered native species. It ends with the Cape Cod National Seashore's recent decision to remove 5 camps threatened by sea level rise. The book has been widely distributed online, at lectures and in bookstores throughout Southern New England.

William Sargent (2013-2014)

Islands in the Storm
The Coastlines Project

Science writer William Sargent writes about the effects of sea level rise in his column for *Wicked Local,* "Islands in the Storm." Among the topics discussed in these columns is the shared plight of Plum Island residents, whose shorefront homes on this low barrier island are being swallowed by the rising sea. Sargent discusses the problems coastal communities face, and with his Coastlines Program as well as his column, he strives to help

coastal towns deal with the effects of sea level rise, the most obvious effect of global warming.

William Sargent (2015)

Notes from the Energy Patch
The Coastlines Project

In 2012, Bill Sargent started writing a weekly column about science and the environment. These appeared in several New England papers through Gate House media and on the Coastlines blog. The newspapers reached 30,000 people, and the blog has had over 98,000 hits. The first two years of articles covered the situation before, during and after Hurricane Sandy. They were released as the book Islands in the Storm in 2014.

Bill Sargent aims to author another book and year of articles about the energy transformation that is enveloping our nation, especially in New England. The book will explore a carbon sequestration site in Texas, offshore wind farms in New England, the largest solar farm in New England and a local wind turbine in Massachusetts. Sargent will test-drive an all-electric Tesla, the pedal powered Elf and visit a local farm that composts food scraps from many of New England's colleges and towns. These stories will be interweaved with chapters on drilling for oil off of Siberia and chapters about meetings in the White House and amongst OPEC leaders. Through these essays that author will try to describe the energy transformation that is rapidly changing our lives, and may save our planet to boot.

Jennifer E. Saunders (1997)

Save the Sound Education Internship
Save the Sound

Save the Sound, located in Stamford, Connecticut, is a non-profit organization dedicated to the restoration, protection, and appreciation of Long Island Sound and its watershed through education, research, and advocacy. The education component of Save the Sound expanded its reach in the mid-nineties. Over 5,000 children and adults participated in hands-on learning about the Sound and their impact upon it in 1993, and by 1996, the number of participants rose to more than 19,000. Approximately 200 children attended the summer sea camp and special vacation day programs during that year. The program was expanded in 1997 to include four cities where elementary students could be educated about the Sound and teachers could be trained in environmental activities.

Jennifer Saunders, summer intern (1997), helped expand the education program by conducting two projects designed to increase public awareness of Long Island Sound's environmental needs. She prepared written material for educators who use Save the Sound's workshops and classes in their curricula. Saunders also created a portable exhibit with hands-on activities that accompanied Save the Sound's touch tank of marine mammals on trips to schools and fairs. Save the Sound shared the results of the internship with other environmental educators at meetings of Long Island Sound educators.

Save the Bay (2006)

Sunset Educational Series – Public Awareness Program
Narragansett Bay, Rhode Island

Save the Bay is an environmental non-profit organization dedicated to protecting and preserving the natural state of Narragansett Bay's ecosystems by creating restoration projects and educating the public. In 2005, Save the Bay initiated a public awareness program, "Sunset Educational Series," designed to educate the public on the conservation and stewardship of Narragansett Bay and its watershed. The program expanded the organization's volunteer base, and participants gained a new appreciation for the Bay and its resources.

The goal for 2006 was to expand the "Sunset Educational Series" to combine lectures, slide shows, and discussions with cruises on the Bay. Lecturers focused on salt marsh restoration, storm-water management, green building development, climate warming, and safe energy alternatives. This program spread awareness of environmental problems to the citizens of Narragansett Bay, and served as a blueprint for future educational programs.

Diane Selditch (1999)

Senior Ecology Workshop
SoundWaters

In 1999, SoundWaters conducted a Senior Ecology Workshop for senior citizens in Stamford and nearby towns. SoundWaters, an 80 ft. three-masted schooner, hosted approximately 80 people for the Floating Classroom program which teaches about many aspects of the Sounds' ecology and biology. Other guided outdoor activities took place at Tod's Point in Greenwich, Mianus River Gorge, the Stamford Nature Center, and Cove Island Park, just to name a few. Two indoor programs at the Stamford Senior Center drew upon experts in geology, history, and Native American background to create a picture of a past Long Island Sound. Seniors shared what they learned in the various programs by exploring coastal habitats with fourth and fifth grade students from urban Stamford, Connecticut.

Engaging and educating citizens on the ecology and environmental issues has proven to be effective. Environmental initiatives often need support from a broad audience in order to be effective, and the SoundWaters' Senior Ecology Project serves as a model for any community bordering Long Island Sound.

Patricia Sheppard (2003, 2007-2008)

Watershed Watch and Turn the Tide Education Program
Lloyd Center for the Environment

The Lloyd Center for the Environment (Dartmouth, Massachusetts) promotes the long-term conservation of natural resources through education and research, and inspires and empowers citizens to make wise environmental choices. Patricia Sheppard, Educational Director of the Lloyd Center for the Environment, focused on ways to teach students about local watersheds and how they affect Buzzards Bay. In 2003, she expanded the Watershed Watch Program: a two-part, hands-on classroom experience designed for elementary students. Using both Enviroscape, a model that defines and illustrates a watershed, and a ground water flow model, participating students were able to see how water moves through a watershed and filters through soil. The program was specifically tailored for school districts, providing maps, fact sheets, and information on the source of each districts' drinking water.

Turn the Tide is a collaborative partnership of the University of Massachusetts at Dartmouth, School for Marine Science and Technology, the town of Dartmouth, and the Coalition for Buzzards Bay, designed to enhance the environmental health of Buzzards Bay, Massachusetts. The Turn the Tide Education Program is the Lloyd Center's contribution to the partnership and teaches students about estuarine food webs, water pollution, local species information, biomagnifications, and the impacts that humans have on local estuaries. The program uses hands-on activities to identify species diversity, perform water quality tests, and discover unique coastal habitats. In 2007, this program was used in every fifth-grade classroom in the Dartmouth Public School System and in three from the Fairhaven District. The Coastal Exploration Program, a condensed version of Turn the Tide, reached every fifth grade classroom in Fall River, Massachusetts, in 2008.

Kelly Simmons (2001)

Bridging the Gap Between School Curriculum, Kids, and Coastal Awareness, Buzzards Bay
University of Massachusetts Dartmouth

While a Master's student at the University of Massachusetts Dartmouth, Kelly Simmons designed a project to educate elementary school students about the two types of coastal ecosystems common to southeastern Massachusetts: rocky intertidal zones and salt marshes. Students received an informative and interactive lecture on coastal ecosystems common to the area. On a few occasions, students were taken to a salt marsh and intertidal zone. The study of rocky intertidal zones and salt marshes was accomplished through this comprehensive approach.

Jasmine Smith-Gillen (2010)

Estuary and Whales
Lloyd Center for the Environment
Southeastern New England

The mission of the Lloyd Center for the Environment is to promote an understanding and appreciation of coastal, estuarine and watershed environments in southeastern New England. The educational staff teaches approximately 15,000 students every year throughout several coastal communities, including Westport, Dartmouth, and Fall River. The Estuary and Whales program introduces second graders to live estuary organisms and the diversity of whales. Lloyd Center naturalist-educators teach students about life in the estuary and how animals adapt to survive in a brackish marine environment. By handling and examining live specimens and shells, students discover which organisms inhabit local shores.

Lloyd Center naturalist-educators also discuss the diversity of whale species. Students discover the differences and similarities between baleen and toothed whales, and discuss adaptations for survival, including blubber, blowholes, and behaviors such as echolocation and breaching. Children also listen to audio clips of whale sounds, and examine bones of several species for up-close comparison.

Children must learn about the natural world around them in order to value, protect, and conserve the environment. Marine organisms, small and large, are fascinating and awe-inspiring; this program is an innovative way to teach children about the coastal area where they live. Further, due to the urban setting of Fall River, many of these children would otherwise have limited access to estuaries and the animals that live there.

Jasmine Smith-Gillen (2013)

Climate Science Learning Project
Lloyd Center for the Environment

The Lloyd Center for the Environment, which previously received a Sounds Conservancy grant for its Estuary and Whales program, aims to promote understanding and appreciation of coastal, estuarine and watershed environments in southeastern New England. More broadly, the Lloyd Center strives to instill a life-long respect and affection for nature in citizens of all ages through research, education and community outreach, and to advance a scientific and public understanding of coastal ecosystems and the need to protect them. According to Northeast Climate Data, the average temperature of the southern New England coast is expected to rise by as much as 4 degrees, increasing the growing season, maximum ambient temperatures, and precipitation levels. These changes will affect all residents in all South Coast Massachusetts communities, as well as the environment on which they depend for recreation and health. Significant gaps n knowledge of the area's ecology, however, will likely hamper timely planning and action for environmental protection and problem mitigation, if not corrected.

The Lloyd Center's Climate Science Learning Project (CSLP) addresses these problems through a 5-year initiative, launched in 2011. The program engages over 4,750 students in southeastern New England, who work to document the impact of climate change on local wildlife, and assist in producing a web-based climate science education/planning tool for use by students interested in the potential effects of climate change on southeastern Massachusetts. The CSLP will continue to strengthen science education and understanding of the region's ecology among area residents in 2013, with a focus on engaging a diverse group of participants in collecting data about local fauna and their habitats in the watersheds of the Slocum and Westport rivers. The CLSP is an exciting and critical project, as both baseline data and tracking changes in species' presence and abundance, are needed.

Susan Snider (2007, 2009, 2013)

Sheffield Island Lighthouse "Linking the Past to the Present"
Wild and Scenic Film Festival
Norwalk Seaport Association

Linking the Past to the Present was a series of seminars run by the Norwalk Seaport Association (2007). The series addressed Long Island Sound, its environmental issues, coastal habitat restoration and management, wildlife topics, and the history of Norwalk Harbor. Organizations including the Connecticut Audubon Society, Westport Outfitters, and Save the Sound were provided the opportunity to share their expertise as guest speakers on seminars in the winter months.

In January of 2009, the Norwalk Seaport Association hosted The Wild and Scenic Environmental Film Festival. Films were selected for their relevance to issues that can affect the Norwalk River and Long Island Sound. The event was successful and helped The Norwalk Seaport Association raise awareness of environmental issues and also inspired environmental activism on a local level.

2013 marked the second year that Friends of the Norwalk Islands hosted Wild and Scenic Film Festival. This film festival, nationally sponsored by Patagonia, presents environmental and adventure films that illustrate the Earth's beauty, the challenges facing our planet, and the work communities are doing to protect the environment. Through these films, Wild and Scenic both informs people about the state of the world and inspires them to take action. To emphasize and spread their message, Friends of the Norwalk Islands hosted local exhibitors at the event, displaying environmental initiatives directly related to Long Island Sound. The Sounds Conservancy, as it had also done in 2009, helped to sponsor this event with a grant to the Friends of the Norwalk Islands.

Susan Snider (2012)

Let's Go Outside
Friends of the Norwalk Islands, Inc.

The bond between nature and our children is breaking. Children spend half as much time outside as their parents did. With the tug of technology, nature has become less relevant in children's lives; leading to a so-called "nature deficit." Studies have shown that this phenomenon contributes to epidemic obesity, attention deficit disorder, and other health issues in children.

The objective of Let's Go Outside was to provide interactive, direct experience of the Norwalk Islands and Long Island Sound. The program strove to provide a primary point of early exposure to nature and natural resources to inspire future scientists and conservation leaders. Let's Go Outside was an after-school program for 4th and 5th graders, and to date over 100 children have participated. Each session is held once a week for six weeks. Through activities such as photography, Let's Go Outsides teaches children to get up close and embrace nearby nature, while learning of other habitats. Children share their experiences with their peers and discuss ways they have discovered nature; which, in many cases, is right in their backyard.

Jonathan Stone (2013)

Save The Bay: Salt Marsh Restoration/ Education Program for Youth
Save The Bay, Inc.

Jonathan Stone's Salt Marsh Restoration/Education Program for Youth project, as part of the Save The Bay (STB) Salt Marsh Nursery program, partners with area schools to connect students to the restoration of Narragansett Bay's Salt Marshes. Students grow *Spartina alterniflora,* saltmarsh cordgrass, in their classrooms for salt marsh restoration projects. Students also learn about salt marshes and the role of *Spartina* as a keystone species in the marsh ecosystem while taking an active role in restoring Bay habitats. Salt marshes are one of the most important habitats within the Narragansett Bay, and STB has been working to protect and restore salt marshes throughout Rhode Island and southeastern Massachusetts since the mid 1990s through community-based restoration projects.

With funding support from The Sounds Conservancy, STB can provide hands-on, experiential learning experiences, allowing students to see a project through from seed collection, to growing plants in the classroom, to planting their seedlings in a salt marsh that is under restoration. The students collect seeds in the fall, overwinter the seeds in salt water, plant the seeds in the classroom nursery, water, fertilize and acclimate the seedlings to salt water for approximately 12 weeks, and then plant the *Spartina* plants at a salt marsh restoration site. Thus, the students not only get to learn about salt marshes and the important role they play in the health of the Bay, they also take an active role in saving the Bay by becoming restoration practitioners.

Peter C. Stone (2010-2012)

Pilot Education Program: Dreams to the Sounds of the Sea: The Art and Science of Coastal Ecosystems
Pete C. Stone Studios
Marion, Massachusetts

As an educator, author and artist Peter C. Stone's work has involved curriculum design, content institutes for educators, graduate level teacher institutes, lower, middle, and upper school workshops, and the role of Arts and Sciences advisor to the Connecting Oceans Academy, New Bedford Ocean Explorium. Over the years of his extensive experience, Stone has chronicled a general lack among the public both of systems understanding and awareness of human roles in coastal ecosystems. Educational priorities in local schools often do not allow for in-depth recognition or exploration of coastal ecosystems and the roles we play in them. Further, our elementary, middle, and high schools have limited resources and initiative for programming that addresses these critical environments.

In response to this situation, Stone developed the Symbolic Literacy Initiative: a scholarship and literary project for children and adults that introduced systems thinking and the language of symbolism in living systems through art and science. Stone's books explored the way in which the language of mythological symbolism mirrors the principals of living systems, such as Interdependence, System Integrity, and Cooperation and Partnership. The SLI was inspired by the wisdom of indigenous

traditions around the world whose stewardship of local land bases and languages of mythological symbolism have always supported and reflected each other. SLI utilizes science, art, and systems thinking to observe, explore, examine and explain the lands, water, flora and fauna that sustain, and that, in turn, must be restored and stewarded. Students of the project develop strong foundations in symbolic recognition, practical observation skills, conservational use of the language of seeing and, above all, excitement for the learning process.

The objective of this program was to introduce ecological and sustainable practice systems awareness to selected schools for a variety of student age groups, backgrounds and programs. Further, the program met curriculum requirements for its host states in science, art, and language arts and established and renewed local links between students, teachers, schools, and existing conservation groups in the interest of advocating place-based programs. Stone worked to facilitate follow-up and to establish mechanisms for offering this program to department heads in other schools and regional school systems. He also hoped to utilize this pilot program to secure funding from other sources for expanding these educational outreach initiatives to other school systems in southern New England.

Peter C. Stone (2013)

Pilot Education Program: The Art & Science of Nature Journaling: Coastal Marine Environments
Oceans Academy
Ocean Explorium

As part of his Symbolic Literacy Initiative, Peter C. Stone developed a Nature Journaling program that nurtures life skills for attention, inner calm, and reflection, while teaching critical drawing and writing skills for Science, Art, and Language Arts, including observation, intuition, inference, expression, and systems thinking. Participants develop strong foundations in symbolic recognition, new awareness, delight, and connections with the natural world.

Thomas A. Stone (2014)

Ocean Acidification and Southern New England: A Conference
Woods Hole Research Center

Global warming, ocean acidification, and ocean de-oxygenation are major threats to global ecosystems and the world at large. Thomas A. Stone and the Woods Hole Research Center hopes to shed light on these threats at a regional conference, for which Stone sought funding from The Sounds Conservancy. At the conference, Stone and the WHRC planned to raise awareness of the above issues and seek mitigations and solutions by presenting current science, engaging stakeholders (which include fishing communities and coastal residents) and examining policy options. The WHRC hoped to achieve more widespread awareness of the issues, and to begin to develop viable policy options for mitigation.

Patricia Sullivan (2007)

Development and Implementation of Public Awareness Program for Responding to Distressed Marine Animals of the Sound
Marine Animal Survival Team – Cetacean Society International
Long Island, Fishers Island, and Block Island

The annual number of marine mammals that come ashore exceeds the capacity of existing facilities that care for them, causing many to perish before responders can assist. As the 2007 Education Director of Cetacean Society International, Patricia Sullivan established the Marine Animal Survival Team to raise public awareness and provide outreach and assistance through educational programs and materials regarding proper protocol for handling first encounters with distressed, injured, or stranded sea animals such as sea whales, dolphins, porpoises, seals, turtles, and sea birds.

The program was to provide educational materials to citizens in shoreline and seasonally populated communities such as along Long Island, Fishers Island, Block Island and the coastlines adjacent to Connecticut and New York; offer workshops in shoreline marinas, bait and fishing supply stores, marine supply shops, schools, and senior citizen centers of populated areas; and to join with other organizations with similar initiatives to form a strong network. The collective knowledge base and experience of organizations such as the Cape Cod Stranding Network, The New York Whale and Dolphin Action League, The Mystic Aquarium and the Riverhead Foundation, with the Marine Animal Survival Team should have enhanced prevention of marine mammal fatality.

Thaxter Tewksbury (2009)

Building New England Connections
Interdistrict Committee for Project Oceanology

In 1987, the National Estuary Program identified Long Island Sound as an "Estuary of National Significance."

Building New England Connections, a project launched by Project Oceanology, engages students form Connecticut, Rhode Island and Massachusetts in investigative activities concerning the health and preservation of Long Island Sound. Building New England Connections makes a direct connection to marine, estuarine, and aquatic environment on Long Island Sound. The project allows for students to participate in data collection, observation, and analysis, giving the students a unique opportunity to explore the watersheds and coastal environment of southern New England.

Richard Tiani (2006)

Active Waterfront Education Program (AWE)
Executive Director – Groundwork Bridgeport, Inc.

Groundwork Bridgeport (Connecticut) is a non-profit organization founded in 1998 as a collaborative effort by the Environmental Protection Agency, the National Park Service, the city of Bridgeport, and Groundwork USA to improve and manage the environment of Bridgeport and to empower citizens to provide its wellbeing and stewardship.

Among the projects, Groundwork Bridgeport trained a group of ten high school students to conduct both written surveys and focus groups to learn what water recreational activities and educational services students in Bridgeport would like to have access to. The results of the survey were presented to the Mayor of Bridgeport, who committed a site at Seaside Park on Long Island Sound.

Kristen Van Wagner (2007-2008, 2010)

Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Audubon Society of Rhode Island
Narragansett Bay Research Reserve

The Narragansett Bay Research Reserve is part of a national system of reserves dedicated to protecting land and water resources around estuaries, and to conduct long-term research, education, and stewardship. The Reserve provides habitat for wildlife; educates students, teachers and the public; and serves as a living laboratory for scientists. Research and monitoring conducted by the Reserve supports effective coastal resource management practices and policies and is applied toward resource protection and management. Cultivation of knowledge and awareness of coastal resources through education is combined with the Coastal Training Program to create a network of informed citizens as well as policy makers to protect natural resources.

For several years, the Narragansett Bay Research Reserve has produced a tide calendar that is useful for commercial and recreational fishermen, boaters, surfers, birders, beachcombers, and other coastal groups. The calendar not only provides detailed tide information but also interprets the Reserve's research, education, and stewardship programs. Topics included in the 2009 and 2010 calendars included monitoring global climate change impacts on salt marshes and storm/flooding frequency, water quality monitoring, oyster cultivation and restoration in the Bay, marine science summer camps, and monitoring local benthic ecology. The 2011 calendar focused on 12 species of plant and animal that play critical roles in a variety of coastal resource topics.

Johan C. Varekamp and Ellen Thomas (2008)

Block Island, Rhode Island: A Microcosm for the Study of Anthropogenic and Natural Environmental Change
Department of Earth and Environmental Sciences
Wesleyan University

Block Island's geography offers opportunities for integrative research in environmental science. Within its perimeter, sea level rise and anthropogenic pollution can be studied within the framework of climate and environmental change over centuries to thousands of years. Salt marshes and fresh water bogs that developed on the island over the last few millennia contain natural records of the past and provide the opportunity for extensive research.

Johan Varekamp and Ellen Thomas, Professors at Wesleyan University, have worked on Long Island Sound's paleoenvironmental history of the last 1,000 years through core studies in sites using chemical, foraminiferal, and physical parameters. Each worked with undergraduate students form the Keck College Consortium to study mercury pollution, sea level rise, and water quality of Great Salt Pond on Block Island.

Sandra Walczyk (2002)

Educational Brochure: Enjoy and Protect Our Water and Wildlife
Volunteers for Wildlife

As a high school student volunteer and part time staff member for Volunteers for Wildlife on Long Island, Sandra Walczyk created an educational brochure to inform the public about the harmful aspects of feeding waterfowl. While working at Volunteers for Wildlife, Walczyk saw the results of the public feeding waterfowl such as malnutrition, tameness, nuisance behavior, disease, and debilitating deformities. The brochures were made available at parks, beaches, and marinas on Long Island to discourage feeding from points where it most commonly occurs.

Michael Weiss, Colleen Cook, Eric Goodman (2001)

So You Want to Grow Some Scallops: A High School Research Project to Reintroduce and Sustain a Scallop Population in Oyster Bay, Long Island
Friends Academy

Oyster Bay is an inlet on the North Shore of Long Island. This is the only location on the North Shore where commercial shellfishing was practiced but the fishery remained in jeopardy due to declining shellfish populations. The main goal of "So You Want to Grow Some Scallops" was to teach students about the importance and basics of shellfish aquaculture on Long Island Sound.

Following a series of demonstrations and lectures, three students from the Friends Academy in Locust Valley, New York devised a plan to reintroduce and cultivate a scallop population in Oyster Bay. Michael Weiss, Eric Goodman, and Colleen Cook grew scallops to market size from seed using several different grow out methods. They also began building a hatchery in Oyster Bay in which they planned to conduct future aquaculture research. Collectively, they maintained a population of scallops in a laboratory environment to be used for future spawn, introduced into Oyster Bay, and helped supplement and restore the shellfishery.

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)

Education and Water Quality Monitoring

The Westport River watershed covers 100 square miles at the entrance to Buzzards Bay, in Westport, Massachusetts, and 85% of the area drains into two branches of the Westport River. Comprised of two major estuaries that are connected to Buzzards Bay by a single inlet, the Westport River is a coastal asset in both habitat quality and scenic beauty. The Westport River Watershed Alliance, a non-profit citizen's group established in 1976, runs several projects in support of the watershed that focuses on three main goals: to promote environmental integrity; advocate stewardship of the watershed's natural resources; and educate the general public about the interrelationship of water, soil, plants, animals, and people. Since 1991, the Alliance has monitored the Westport River to determine its suitable uses and to pinpoint sources of pollution. Indicators including dissolved oxygen, temperature, salinity, pH, turbidity, and fecal coliform bacteria have all been tested regularly and the data has been used to keep town officials informed as to the current health status of the river. This monitoring regime has also been incorporated in its Watershed Education Program.

In 1997, Jessica Harris, Education Coordinator for the Westport River Watershed Alliance, introduced a combination of outdoor programs and field trips to children of all ages to enhance the Watershed Education Program. During the summer, Harris ran a two-week program for children (ages seven to ten) that consisted

of hands-on learning activities focused on coastal habitats. During the school year, she led field trips showing middle school students the environmental challenges that face dune vegetation, and explained life in the lower estuary to second graders. In addition, she distributed interdisciplinary environmental education curricula kits to over 300 teachers and 4,000 students to enhance classroom education. She then held a two-week workshop with educators from southeastern Massachusetts to provide them with background information and activities on water and watersheds.

The ninth grade component of the Watershed Education Program is called Adopt-a-Watershed. Once a week, Harris took ninth graders out to monitor water quality in the Westport River watershed and collect data on nutrient analysis of water samples. The Adopt-a-Watershed Program was continued by Dawn Lavendier in 1998 and by Matthew Tweedie in 1999.

Nicole Vance was brought on as an intern in 2003 to continue the educational and monitoring work of the Alliance. She focused on school programs and field studies in the Westport Public Schools and helped teach four, week-long educational summer camps based on river and beachfront awareness. In 2006, Patricia Brousseau led groups of students from local schools in activities involving watershed biodiversity, soil science, wetland plant biology, barrier beach ecology, and water monitoring. Jennifer Wimmer followed in Brousseau's footsteps and revised the Field Study Program and also led parts of the Summer Explorer Program in 2007.

Most recently, Executive Director Gay Gillespie, Educational Coordinator Shelli Costa, and Science and Communications Coordinator Roberta Carvalho are all working to continue to improve and expand upon the educational efforts made in the past. They believe that the key to successful pollution prevention and preservation of the watershed is to provide the future stewards of the region with the awareness, knowledge, and skills needed to become effective decision-makers.

Lillian Willis (2006-2008)

New York State Adaption and Printing of Brochure "How to Manage and Landscape Your Property"
Norwalk River Watershed Association

Many point sources of pollution in the watershed of Long Island Sound have been addressed, although fecal coliform counts, adverse impacts on fish and shellfish, and pollution have increased the need for qualifying the impact of non-point source pollution. In 1999, The Environmental Protection Association established a storm water management program and issued a General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4). Six minimum control measures were required by this permit with three addressing public education, public involvement, and pollution prevention.

The Norwalk River Watershed Association published a brochure in 2006, *How to Manage and Landscape Your Property,* specifically aimed at residents of the Norwalk River watershed, to give suggestions on how they can improve local water quality and lessen the impacts of storm water runoff. To serve as part of the minimum control measures laid out in MS4, this brochure accompanied June tax bills to property and/or automobile owners in the Connecticut towns of New Canaan, Redding, Ridgefield, and Weston reaching over 41,000 homes with an additional 6,000 residents reached in a newsletter in Wilton, Connecticut. The goal of this project in 2007 was to amend the brochure to include information targeted toward New York residents and to reprint the brochure for extended education within the Norwalk River Watershed. In 2008, the Norwalk River Watershed Association updated their website to include this information to allow users to access information on environmental issues.

Laurel Wing (2004)

Production of a Training Video on a Rhode Island Commercial Fishing Method
University of Rhode Island

The University of Rhode Island provides training to fishery managers at the National Marine Fisheries Service Northeast Regional Office and the Northeast Fishery Science Center. In 2004, Laurel Wing, an undergraduate student in film at the University of Rhode Island, produced a training video that illustrates the five major commercial fishing methods used in Rhode Island: bottom trawling, lobster trapping, gillnetting, and floating fish traps. This video is used for the training of fisheries managers.

The video footage was taken aboard commercial fishing vessels during daily operations and should help identify procedures used in fishing practices. According to Wing, many federal and state fishery managers in the northeast region have little or no experience with fishing methods, and a well made video helps them to better understand what actually happens in the industry.

Sandra Wyatt (1999)

Allin's Cove Neighborhood Coalition Newsletter
Allin's Cove Neighborhood Coalition

Industrial pollution, shoreline erosion, pesticide and herbicide runoff, and dredge spoils have degraded Allin's Cove in West Barrington, Rhode Island, resulting in the loss of ecologically valuable marshland habitat. The Allin's Cove Neighborhood Coalition (formed in 1998) hopes to restore Allin's Cove and the surrounding salt marsh by halting erosion, removing dredge spoils, cleaning up Annawamscutt Creek, and minimizing storm drain and sewer-pipe runoff into the Cove.

Sandra Wyatt, President of the Coalition, published and distributed a newsletter to the community of Allin's Cove salt marsh. The quarterly Allin's Cove Newsletter was mailed to homes, local, state, and federal agencies, environmental organizations, and schools and libraries within the area. The newsletter informed the community about Allin's Cove salt marsh and its significance to the health of the larger marine and wildlife ecosystem of Narragansett Bay. Feedback received from the community was positive and greater public participation in the preservation and restoration efforts of Allin's Cover was achieved.

Species Conservation

Many Sounds Conservancy grantees have dedicated their field research to species conservation. In the following abstracts, you will read about the work of grantees who have focused their studies as such along the Sounds of southern New York and New England.

Katie Anderson (2003)
*Study of the Distribution and Behavior of the Striped Cusk-Eel (*Ophidion marginatum*) in Vineyard Sound*
University of Massachusetts Amherst

Katie Anderson, a Fisheries conservation student at University of Massachusetts Amherst (2003), worked with Dr. Rodney Rountree on a soniferous fish survey of the coastal water of Cape Cod, Massachusetts. Anderson focused her work on the Striped Cusk-eel *(Ophidion marginatum)* in New Bedford, Massachusetts. This eel was not known to live further north than Block Island until Rountree discovered the Striped Cusk-eel in several sites around Cape Cod. Little is known about the Striped Cusk-eel due to its cryptic behavior. They are nocturnal, and spend daylight hours burrowed tail first into sand or muddy sediments in shallow, coastal habitats. They feed on a variety of foods, but primarily crustaceans and fish.

During her research with Rountree, Anderson discovered possible correlations between temperature of the water and the frequency and number of pulses in their calls. Anderson recorded water temperature and used an underwater camera and hydrophone simultaneously to record audio and video during the night to better characterize their call. Anderson found that the time of year had a significant effect on the number of pulses, frequency, pulse period, and pulse repletion of the Striped Cusk-eel call and hypothesized that this is due to the change in temperature from May to September. Anderson hopes that future studies will document the full spawning period of the Striped Cusk-eel.

Allison Andrews (2009)
Conservation of Diamondback Terrapins on Cape Cod
Wheaton College

The Diamondback Terrapin *(Malaclemys terrapin)* is the only species of turtle that inhabits the brackish water of the coastal marshes of North America. Terrapin populations are unstable due to habitat destruction and pollution, leading policy makers to classify the terrapin as "threatened" in Massachusetts and "endangered" in Rhode Island. Information on how human behavior might affect the life cycle and habitat of the terrapin is needed in order to make a better effort at conserving the populations of these rare turtles.

Allison Andrews, a student at Wheaton College (2009), partnered with her advisor Barbara Brennessel in a number of terrapin conservation efforts in New England. During this summer internship, Andrews searched for terrapin nesting areas on Cape Cod, Massachusetts, and Stamford, Connecticut to protect and monitor the species. She also continued the tagging and recapturing study led by Dr. Brennessel to study the population of terrapins in Cape Cod Bay.

Margaret Arbuthnot (2010)
Coastal New England Cottontail Habitat Restoration in Rhode Island
Yale School of Forestry & Environmental Studies
Rhode Island

The New England cottontail rabbit, extinct in Vermont and present in only a handful of places in New England, is a candidate species for listing under the Endangered Species Act. Cooperative conservation efforts are underway in each state, but most lack the capacity to effect the change that is needed to reverse the cottontail's decline. The goal of Margaret Arbuthnot's project was to provide that extra capacity.

Habitat loss is considered one of the greatest threats to the survival of the cottontail. In Rhode Island, partners from the Wildlife Management Institute, Rhode Island Department of Environmental Management, Audubon Society of Rhode Island, USDA Natural Resources Conservation Service, and The Nature Conservancy were willing to work together to restore habitat for the imperiled cottontail, but there is no effective arena for working out the complex details and logistics of such an intensive recovery effort. Thus the Sounds Conservancy grant was proposed for travel costs that were necessary to bring partners together to discuss and coordinate habitat restoration projects at the restoration sites. Cottontails need habitat areas of at least 25 acres in size in order to sustain populations and their required habitats of dense thickets and shrublands are largely absent from the Rhode Island landscape, especially in patches of sufficient size.

The New England cottontail is becoming an increasingly high-profile species as its decline brings it closer to federal listing. Private landowners and government agencies all stand to benefit from the prevention of listing the cottontail under the Endangered Species Act, since the listing would result in increased regulations of the use of land that could be considered cottontail habitat. Informational workshops, brochures, and pamphlets are being created to inform the public about ongoing restoration efforts and the status of the rabbit's decline.

Teresa Ayala (2002)
*A Study of the Feeding Habits of the Diamondback Terrapin (*Malaclemys terrapin*) in Long Island Sound*
Mt. Sinai High School

Diamond Terrapins *(Malaclemys terrapin)* are native to Long Island Sound and live in low to moderate saline estuaries. Stomach content and fecal analysis have revealed qualitative data on the ecology of the terrapin, but quantitative data on its feeding habits is minimal (2002).

Dr. Matthew Droud of Long Island University has focused some of his research on Diamondback Terrapins. He served as a mentor to Teresa Ayala of Mt. Sinai High School in Brookville,

New York. They collected turtles from Oyster Bay, New York as part of an ongoing ecological study and housed them in a lab for 96 hours. After collecting their feces, the remains of the mollusk and crustacean prey species were dried, the species were identified, and weighed. Droud and Ayala used a gnathodynamometer to measure bite force of male and female terrapins, which allowed them to determine all possible prey of this species and to examine the potential ecological role of the Diamondback Terrapin in the estuarine food web.

Thomas R. Baptist (2002)

The Great Captains Island Heron and Egret Rookery Study
Connecticut Audubon Society
Great Captains Island

Colonial waterbirds, which include such wading birds as herons and egrets, have attracted the attention of conservationists, researchers, and the public since the late 19th century when plume hunters nearly drove many species to extinction. After their disappearance from the Northeast, they did not resume nesting in Connecticut until the 1960s. Great Captains Island, one and a half miles from Greenwich, Connecticut, ilone of the few sites where state threatened egrets and herons nest, and contains the largest rookery of these wading birds in the state. Estimates in 2002 indicate there are 250 pairs of egrets and herons nest annually on this 17-acre island.

The Connecticut Audubon Society has conducted a three-year research project on the island to gather information about four of the colonial waterbird species that use the rookery: the Great Egret *(Ardea alba),* the Snowy Egret *(Egretta thula),* the Black-crowned Night Heron *(Nycticorax nycticorax),* and the Little Blue Heron *(Egretta caerulea).* The primary goals of this three-year research project were to estimate population sizes, calculate nesting success rates, and identify key foraging areas for the four species.

Adam Scott Barkley (2008)

Discard Mortality of Yellowtail Flounder in the Southern New England Trawl Fishery
School for Marine Science and Technology
University of Massachusetts Dartmouth

Despite the efforts to restore the population of the southern New England Yellowtail Flounder *(Limanda ferruginea),* the species is still overfished due to by-catch during trawl fishing for other species.

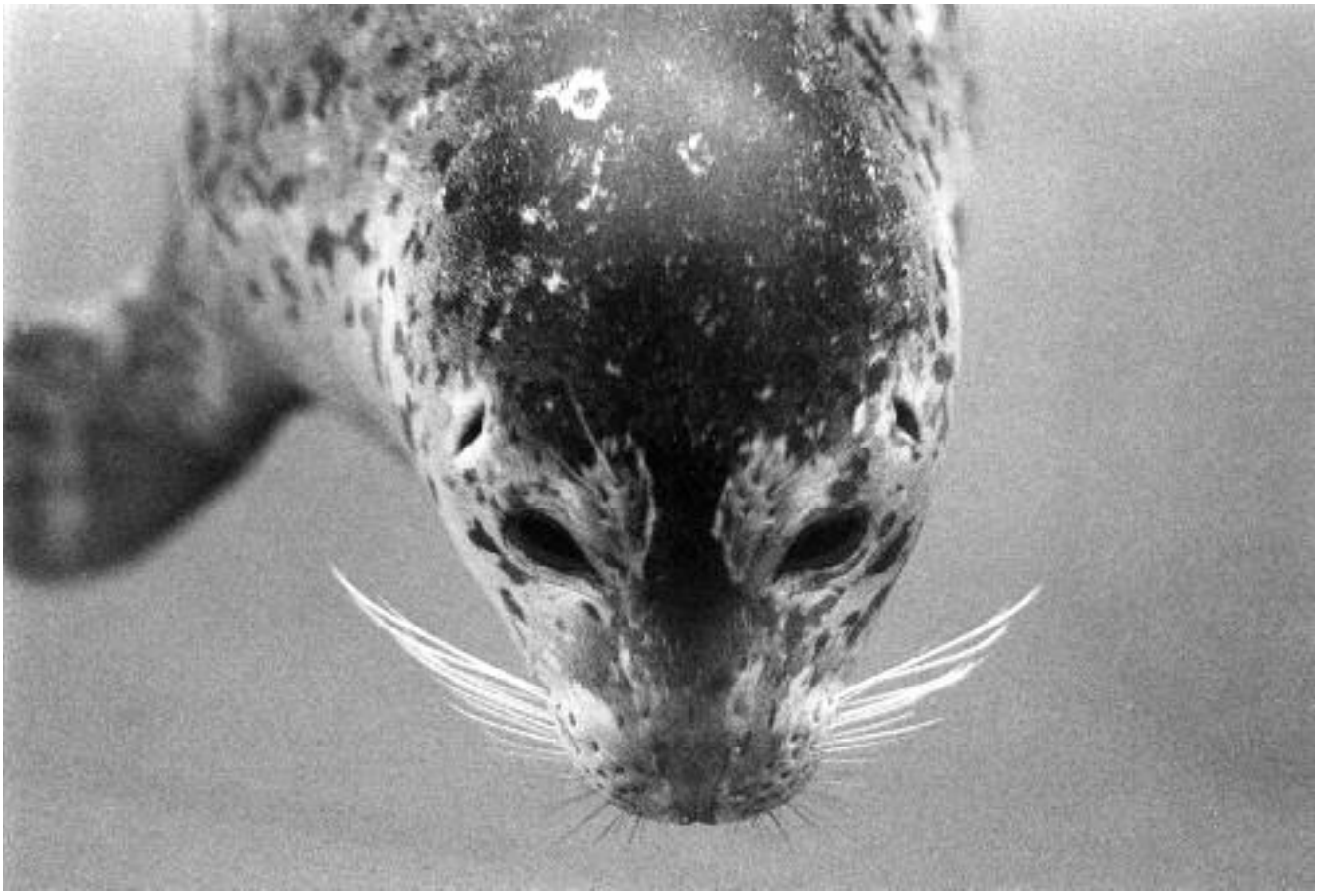
A relatively new approach to assessing by-catch mortality rates called Reflex Action Mortality Predictors (RAMP) evaluates the relationship between fish reflex impairment and delayed mortality. Adam Barkley, a Master's student at University of Massachusetts Dartmouth (2008), studied this method for its effectiveness. He performed a holding study that applied a various number of stresses to Yellowtail Flounder, focusing on tow time of a simulated trawl and air exposure. Barkley also examined water temperature, air temperature, oxygen levels, and fish size in relation to mortality rates of stressed individuals. Barkley used the various RAMP indicators to assess mortality rates during representative trawl catches from a variety of actual fishing conditions. His analysis included both the holding study and field tests to estimate discard mortality in the fishery.

Barbara Bauer (2004)

Conservation and Management of Diamondback Terrapins in Long Island Sound
Long Island University

Diamondback Terrapins *(Malaclemys terrapin)* are native to Long Island Sound. Their impact is significant in shaping the benthic communities of filter feeding mollusks, snails, and small crustaceans. Although they are no longer on the New York list of Species of Special Concern (2004), resource agencies are aware of the fragile state of many terrapin populations within the Sound. Several gaps in life-history knowledge about the terrapin exist, and managers are interested in gathering data upon which to base conservation practices to ensure the recovery of this unique and valuable turtle species.

Although terrapin hatchlings emerge from the nest and set out for their spot in the marsh, they are vulnerable to predation and the elements. Barbara Bauer, a Master's of Biology student at Long Island University (2004), used radio-tracking to divulge information about this key period for terrapin survival. Along with two other researchers, Bauer excavated terrapins immediately after hatching, affixed radio tags, and re-buried them in their natal nest chamber. Once the terrapins emerged, they radio-located each individual at hourly intervals for the entire time period in which they were moving from nest to marsh.



Trina Schneider Bayard (2008)
Behavioral Mechanisms of Habitat Selection in a Salt Marsh Obligate Breeder
Department of Ecology and Evolution
University of Connecticut Storrs

Up to half of the global breeding population of the saltmarsh Sharp-tailed Sparrow *(Ammodramus caudacutus)* is estimated to breed in the marshes of southern New England. This is a species of national and global conservation concern, and the ability to predict its nesting site selection in response to habitat change and social cues is lacking. Trina Bayard investigated how social cues obtained from conspecifics influence habitat selection in the hopes to resolve some of the uncertainty surrounding the saltmarsh Sharp-tailed Sparrow.

Bayard's study identified and characterized social cues; determined the relationship between cues and reproductive parameters; and as asserted the social cues and settlement patterns in habitat areas; and measured reproductive success. She also experimentally manipulated auditory and reproductive information cues to test social cues and their stimulatory effect.

The study broadened the conceptual understanding of habitat selection behavior and avian distribution patterns and assists to advance conservation and restoration science. Bayard plans to set up a volunteer-driven monitoring program that can be used to estimate the status and population trends of salt marsh birds across North America.

Karen Beattie (2009)
A Monitoring Project to Document Feral Cat Predation Impacts to Rare Beach-Nesting Shorebirds at Eel Point on Nantucket Island
Nantucket Conservation Foundation

Eel Point is a 123-acre barrier beach located in the Northwestern corner of Nantucket Island, and is owned and managed by the Nantucket Conservation Foundation, a non-profit land trust. This beach is a significant nesting site on Nantucket for several species of rare shorebirds, including the Least Tern *(Sternula antillarum),* Common Tern *(Sterna hirundo),* Piping Plover *(Charadrius melodus),* American Oystercatcher *(Haematopus palliates),* and the endangered Roseate Tern *(Sterna dougallii).* In recent years evidence of Feral Cat (or stray cat) predation on these shorebirds has been observed.

The Nantucket Conservation Foundation worked with the local branch of the Massachusetts Society for the Prevention of Cruelty to Animals to develop an effective and humane strategy for easing cat predation impacts on Eel Point. The strategies included live trapping, spaying and neutering, and relocating. The Nantucket Conservation Foundation also used grant funding to set up three infrared, motion sensing digital cameras to monitor specific sites on the property to help identify individual cats and document their impacts on the shorebird populations. This project helped the Nantucket Conservation Foundation develop a management plan to mitigate impacts to multiple shorebird species of conservation concern caused by these feral cats.

Andrea Bogomolni (2002)
Cytochrome P450 Activity and CYP1A Induction in Gray, Harbor, and Harp Seals of Cape Cod
Marine Program, Boston University

Gray, Harbor, and Harp Seals are three of the five pinniped species found in New England waters. The Gray Seal *(Halichoerus grypus)* is the largest seal, the Harbor Seal *(Phocvitulina)* is the most commonly spotted on Cape Cod, and the Harp Seal *(Pagophilus groenlandicus)* is abundant in the western North Atlantic. Like humans, the high trophic position of these seals makes them especially vulnerable to persistent contaminants, such as PCBs and PAHs, which are believed to cause reproductive failure and decreased immune responses. It is important to determine the contaminant burden found in seemingly healthy populations of these animals for future conservation management.

Andrea Bogomolni, a Master's candidate in Biology at Boston University's Marine Program (2002), studied the contaminant load in these three pinniped species. She used induction of the cytochrome P450 (CYP1A protein) as a biomarker to assess how seal tissue reacts to persistent contaminants, a known method for defining contaminant levels. Greater induction indicated a higher level of contamination. Bogomolni collected seal tissue samples for a year and then spent the next summer and fall in the lab identifying and analyzing contaminants in organ tissue and blubber. The resulting data support the idea that all three species feed at a similar trophic level. However, she found that Harbor Seals have a greater exposure to contaminants causing them to exhibit a greater CYP1A induction than other seal species.

Andrea Bogomolni (2010)
Epidemiology and Ecology in Assessing Population Dynamics of Northeast U.S. Pinnipeds
University of Connecticut, Storrs
Cape Cod, Massachusetts

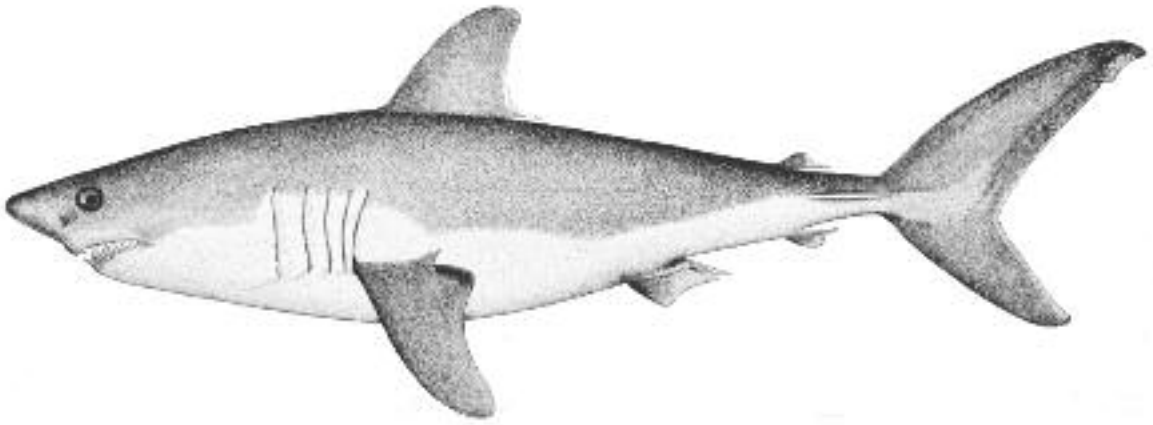
Marine mammals have long been recognized as sentinels of environmental health; therefore a rapid and unexpected decline in populations prompts urgency in understanding the cause behind the events. In 2006 such an event took place, when grey and harbor seal mortalities in Maine and Massachusetts were traced to the phocine distemper virus, representing the first case of clinical disease and death associated with PDV in seals in North America. Grey seals were noticeably affected, as were harbor seals.

The research from Andrea Bogomolni's project aimed to test the hypothesis that all species of pinnipeds in the northeast U.S. are equally susceptible to phocine distemper virus. The objectives of the proposed research were to develop the tools and conduct the research needed to explain the differences seen in infection and mortality of seals in the Cape Cod and Gulf of Maine region. The objectives were based on three components: ecology, epidemiology and pathobiology of disease, specifically the strain of phocine distemper virus (PDV) isolated in 2006. The overall goal was to gain a greater understanding of the ecology of seals in the Cape Cod, Massachusetts region; including their movement, health status and population structure; to gain insight into epidemiological parameters needed to assess disease transmission by determining contact rates, distribution, area usage and species susceptibility; and specifically to understand the receptors and modes of entry of the PDV into immune cells of seals and understand the susceptibility of the most common seal species at risk.

Andrea Bogomolni (2013)
Phocine Distemper Virus and PCBs in Seals of the Northeast U.S: Do Persistent Contaminants Alter Host Susceptibility?
University of Connecticut

Gray seal *(Halichoerus gyprus)* and harbor seal *(Phoca vitulina)* mortalities in New England during 2006 were confirmed to be the result of a North American isolate of phocine distemper virus, representing the first cases of clinical disease and death associated with an isolated strain of PDV in North American seals. Evidence from natural pinniped exposures to the US PDV strain in 2006 and the European strains in 1988 and 2002 suggests that a difference exists in seal species susceptibility to infection. Further, during the European PDV events in 1988 and 2002, seals that died had higher body burdens of persistent contaminants than did those that survived.

Results of a previous study found differences in cell fractions after PDV infection between grey seal and harp seal monocytes.



Researchers thus proposed that the difference in the course of infection together with the frequency, distribution and intensity of infection could affect the outcome of PDV infection in seals. Andrea Bogomolni next wished to determine how viral infection could by altered by the contaminants the seals were exposed to. Harbor seals in the Northeast U.S. are known to be exposed to PCBs at levels above the threshold level of adverse immune effect; therefore, Bogomolni wished to determine if harbor seal susceptibility is altered when the seal is exposed to PCBs.

During the study, harbor seal blood samples from seals previously captured and sampled in Massachusetts, Maine and New York were infected. Viruses such as PDV have caused significant die-offs in seal populations. This study will shed light on the effects of contaminants on seal disease susceptibility, and thus perhaps inform future legislative efforts toward seal conservation.

Joanna D. Borucinska, Ph.D. (2004-2005, 2008, 2010-2014)

Health Status of Sharks within the Coastal Waters of New England: Morphological and Molecular Studies of Cancerous Lesions in Sharks

University of Hartford - Department of Biology
Montauk Point, New York

A worldwide increase in the harvesting of sharks has occurred in the recent past, primarily due to the hypothesis that sharks are highly resistant to cancer and that their liver oil and cartilage can be used as anti-cancer preparations. Since very few sharks have been observed with tumors, scientists believed that they held the cure for cancer, and research on the matter was strongly supported and funded because of public pressure to find a cure. Additionally, while overfishing puts pressure on shark populations, their top predatory position coupled with the reproductive maturity and long life span makes sharks exceedingly vulnerable to environmental pressures.

In 2004, Dr. Joanna Borucinska, an American Professor of Biology at the University of Hartford, studied the general health status of sharks in the coastal waters of New England. During three days of collection at three shark fishing tournaments, she collected tissue samples from 51 sharks. After preparing and studying slides made from the tissue samples, Dr. Borucinska determined that seemingly healthy sharks can harbor lesions of various origins in their internal organs. She then set out to provide scientific data to help stop the irrational harvesting of sharks for anti-cancer drugs. In 2005, Dr. Borucinska gathered archival tissue and organ samples from ten adult male blue sharks caught during the summer months between 2000 and 2006 by recreational fishermen. Immunocytochemistry was used to detect cellular markers associated with cancer and among the cancerous lesions found were a testicular capsular mesothelioma, three liver tumors, and a gingival fibropapilloma. For the first time, the results of this research provided scientifically conclusive evidence that sharks are not immune to cancer.

Dr. Borucinska has continued her study of sharks, and in 2008 she examined the livers and gonads of 35 sharks collected at fishing tournaments. She used light microscopy to collect histopathological and morphometric data. A long-term study of these sharks is important to Borucinska's study. Years into the project, Borucinska can examine injuries, such as trauma due to fishhooks, over the years and interpret the effects of change in policy regarding the types of fishing hooks used for sharks to improve their survival in the catch and release program. The wider purpose of Borucinska's program continues to be the preservation of sharks.

Matthew Boser (2009)

Sampling Migrating Black Terns on Cape Cod

Eastern Connecticut State University

The Black Tern *(Chlidonias niger)* is common to many areas of the world and breeds in wetlands across North America and Eurasia. Recent population declines of the Black Tern have sparked concern amongst scientists and conservationists, leading to the research of the role of habitat quality and disturbance in the population declines of the species. Past studies of its migration patterns and dispersal rates using mark and recapture study techniques have shown that this species has low site tenacity, meaning that they often do not return to a previous nesting ground. It is unknown if this low rate of re-siting is due to mortality or to dispersal to other regions.

Using genetic analysis from blood samples of Black Tern migrating through Cape Cod, Matthew Boser worked alongside his advisor, Dr. Patricia Szczys, to quantify genetic variability within populations and to estimate genetic exchange between breeding populations. This approach allowed them to estimate the number of distinct breeding populations represented on Cape Cod to test for signs of population change and also to estimate effective population sizes for each of the breeding populations sampled in previous studies. This pilot study allows the initiation of further discovery and study of other migration stopover sites in the sounds region of New England.

Barbara Brennessel (2003, 2006)

Conservation of Diamondback Terrapins in the Northeast

Wheaton College

Diamondback Terrapins are medium-sized, brackish water turtles that inhabit coastal waters and estuaries in southern New England. Although populations have recovered from near extinction in the early 1900s, new anthropogenic pressures like habitat loss due to development and road mortality are once again decimating terrapin populations. Dr. Barbara Brennessel, Professor of Biology at Wheaton College, has studied terrapin populations on Cape Cod and in Pleasant Bay for many years, and has found that terrapins face severe threats, and conservation efforts are needed to support the rejuvenation of their population.

Dr. Brennessel recruited interns for the spring, summer, and fall of 2003 to help raise terrapins from hatchlings to study their early growth and behaviors, including their responses to stimuli such as light and heat. Before the hatchlings were released in their natal marshes, she attached radio transmitters to follow their travels throughout their summer activity cycle.

In 2006, Brennessel met with the Northeast Division of the National Organization the Diamondback Terrapin Working Group and created a Diamondback Terrapin conservation manual. The manual is a non-technical explanation of terrapin con-

servation and was distributed to agencies and planning boards in towns located along the coast where Diamondback Terrapins can be found, and includes genetic analyses and various ecology and behavioral examinations of the turtle.

Stephen Brown (2003)

American Oystercatcher Nesting Success and Migration Patterns in New England
Manomet Center for Conservation Sciences

The orange-red bill and contrasting black and white pattern of the American Oystercatcher give this shorebird a distinctive appearance. As the name implies, oystercatchers use their large bill to feed on oysters, clams, and other mollusks. This specialized diet restricts American Oystercatchers to coastal areas that support intertidal shellfish beds, allowing them to inhabit coastline from southern New England to the Yucatan Peninsula.

Stephen Brown, Director of the Shorebird Conservation Research Program at Manomet Center for Conservation Sciences, monitored the nesting success of the American Oystercatcher at the Monomoy National Wildlife Refuge on Cape Cod, Massachusetts. The study measured nest survival times and documented causes of nest loss, as well as nesting behavior in response to beach traffic. According to Brown, the American Oystercatcher was once an abundant species that declined dramatically during the last century and is only now slowly returning to the Northeast.

Regina Campbell-Malone (2003)

Gestational and Post Partum Swelling in Right Whale Flukes
Woods Hole Oceanographic Institution

Of all the large whale species, the North Atlantic Right Whale is the most endangered. In 1935, the Right Whale *(Eubalaena glacialis)* was the first whale species to receive international protection, but its numbers remain low. Recent observations of Right Whales and Grey Whales in late stage pregnancy or postpartum birth have shown an increased fluke width or swelling in their tails. Regina Campbell-Malone, a graduate student at the Woods Hole Oceanographic Institution, set out to explain this phenomenon and determine its significance.

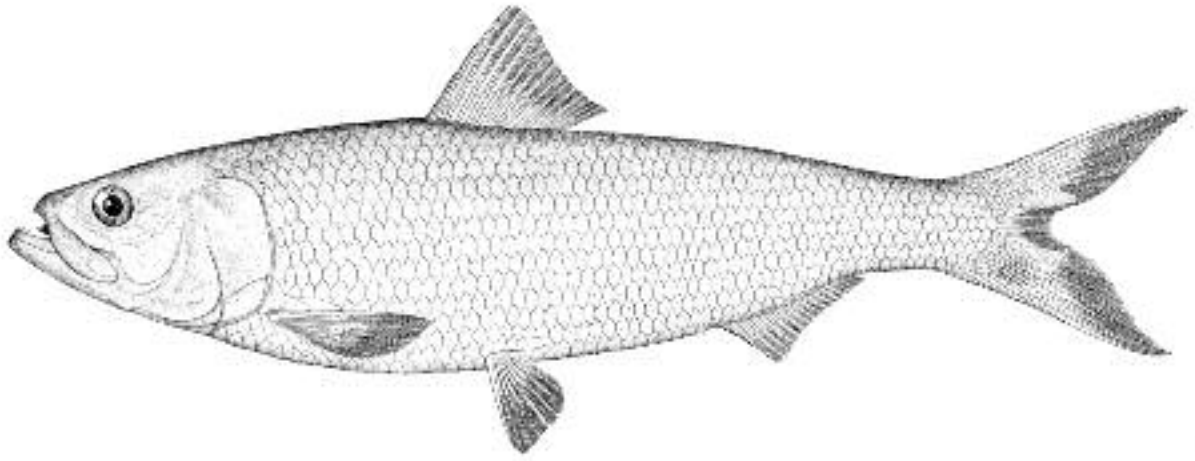
To conduct the study, Campbell-Malone collected samples and data from a number of individual Right and Grey Whales and was able to perform necropsies on two mature female North Atlantic Right Whales that were lost to ship strikes. However, there was insufficient historical data on Right Whales to produce a statistically viable data set. Instead she investigated how widespread the fluke swelling phenomenon was in the marine world. Cape Cod is the scene of stranding events by toothed whales, such as the White-sided Dolphin *(Lagenorhynchus acutus),* the Long-finned Pilot Whale *(Globicephala melas),* and the Harbor Porpoise *(Phocoena phocoena)*. After researching these three organisms, Campbell-Malone found no clear linkage to explain swelling in Right Whale flukes. Continued investigations will be focused on fluke function/performance, including propulsion and thermoregulation in the North Atlantic Right Whale.

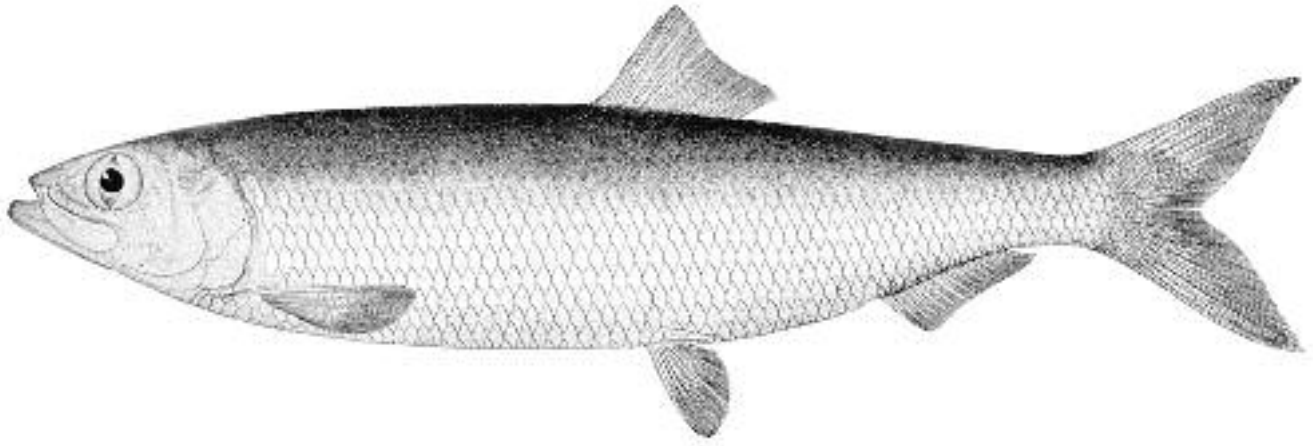
Coastal Waterbird Program (2003-2008)

Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Threats to coastal waterbirds and their habitat remain high as predation, coastal development, commerce, and recreational activities increase. The Massachusetts Audubon Society began the Coastal Waterbird Program (CWP) in 1987 in response to the decline of populations of Piping Plovers and several species of terns on the coast of Massachusetts. The main goal of CWP is to protect federally and state-listed endangered waterbirds and preserve their coastal habitats, focusing on endangered species as a first priority. The program monitors more than 100 nesting sites on the Massachusetts coastline and protects much of the habitat of the federally threatened Piping Plover, the Least Tern, and the American Oystercatcher in Massachusetts.

The goals of CWP are accomplished through a field program, which employs 25-30 seasonal staff and upwards of 50 volunteers. Field staff and interns directly protect nesting, feeding, and resting areas by using signs, rope, fence, and by monitoring the sites throughout the nesting season. An annual census is conducted at all of the sites, including the location and number of nests, the survival of nests and young, and the causes for nest or young loss. Resulting data are submitted to Massachusetts





Wildlife's Natural Heritage and Endangered Species Program. The program has also expanded its research to coordinate with regional collaborators such as U.S. Geological Survey, U.S. Fish and Wildlife Service, and National Audubon Society Seabird Restoration Project, in the hopes of enhancing their capacity to conserve coastal waterbird populations throughout the region.

During the last 20 years since the inception of CWP, the population of threatened coastal waterbirds has increased in Massachusetts. The Piping Plover population has quadrupled, there are two to three times as many Least Terns, and nesting pairs of American Oystercatchers are approximated to be 200 from what used to be a handful of breeding pairs. Although the progress is excellent, Least Terns have recently shown a decline, and Piping Plovers are reproducing below replacement levels. This emphasizes the need for further monitoring and research in the near future.

Shelli Costa (2009)

Osprey Tracking Project
Westport River Watershed Alliance

The Westport River has always been a suitable habitat for Osprey *(Pandion haliaetus)*, but declining water quality in the river has put stress on the survival bird of prey. In the early 70s, the pesticide DDT destroyed much of the Osprey population in the Westport River. Since the ban of DDT in 1972 and with the help of local residents, the Ospreys have made a recovery. Today, the Osprey remains a good indicator for the overall health of the Westport River.

To learn more about the local Osprey population, the Westport River Watershed Alliance established an Osprey tracking program. In the spring and summer of 2009, the Westport River Watershed Alliance put satellite tracking devices on three adult males and one juvenile to study migratory patterns on the Westport River.

The data gathered are useful to those studying the life cycle and migratory patterns of the Osprey, and were made available on the Westport River Watershed Alliance's website.

Robert Crafa (2004)

Developing a Sustainable Hatchery
The Waterfront Center

Robert Crafa, resident of the north shore of Long Island and Executive Director of The Waterfront Center, found Oyster Bay an ideal location for developing a sustainable community shellfish hatchery, which provides innumerable benefits for the Sound's ecosystem as well as the local fishery. A shellfish hatchery (in Oyster Bay) could support student research, provide vocational training for baymen, and increase shellfish abundance through seeding. The Waterfront Center developed and is managing a sustainable shellfish hatchery/wet lab and Floating Upwelling System: a raft where shellfish are grown out on Oyster Bay's western waterfront.

This project was a continuation upon the work of Friends Academy students Michael Weiss, Colleen Cook, and Eric Goodman, who reintroduced and sustained a Bay Scallop population in Oyster Bay from 2001-2004. This project provided students with expanded research opportunities, baymen with vocational training and shellfish seed, the public with an educational opportunity, and Long Island Sound with enhanced shellfish resources.

Brian Eltz (2009)

Underwater Fishway Video Camera
Town of Greenwich Conservation Commission

The Alewife *(Alosa pseudoharengus)* and Blueback Herring *(Alosa aestivalis)*—collectively referred to as River Herring—have endured drastic population declines over the past two decades. While Massachusetts, Connecticut, and Rhode Island have closed the River Herring fishery, there is little evidence of a rebound. The Connecticut Department of Environmental Protection (DEP) has transplanted healthy adult River Herring from healthy runs to streams with depleted runs, removed dams, and built fishways to restore the population. In order to monitor River Herring stocks, the Connecticut DEP installed underwater cameras and electronic fish counters in fishways throughout the state.

In 1993, the Town of Greenwich partnered with the Connecticut DEP and constructed the Alaskan steeppass fishway to allow the herring access to spawning habitat. In 2005, the Connecticut DEP installed an electronic fish counter in the exit pool of the fishway to determine the health of the stock, but the counter did not distinguish between fish species, and could not discern between fish travelling upstream and those going downstream. During the summer of 2009, the Mianus River Watershed Council partnered with the Town of Greenwich to install an underwater video camera attached to a video recording system that enabled the town to distinguish between fish species, and led to a greater knowledge of the health of the River Herring stocks in the Mianus River Watershed.

Christopher Field (2006)

Lighthouse Point Park "Important Bird Area" Conservation Plan
University of Connecticut

Lighthouse Point Park, a popular destination for tourists and residents alike, is located between the east shore of New Haven Harbor and Long Island Sound. In 2001, the park was recognized by Connecticut Audubon as one of the state's 26 Important Bird Areas (IBA). Connecticut's IBA program is part of a global effort to determine sites that are most important to birds and aims to engage landowners and other partners in conservation activities to preserve the natural and recreational resources at these sites.

Due to the popularity of Lighthouse Point Park (100,000 visitors a year), it has the potential to become a center for conservation education. Christopher Field, a Master's candidate at the University of Connecticut, developed a conservation plan for Lighthouse Point Park. His objectives were to realize the potential of the Park as a center for conservation education as well as to restore sections of the Morris Creek salt marsh. Field worked with scientists, stakeholders, and citizens to develop marsh restoration plans and used volunteers and interested visitors as the backbone of monitoring, management, and outreach program activities at the park. Field's work has benefited the Park and the surrounding environment. The park has developed as a center for conservation education and enables visitors to leave with a greater understanding of coastal conservation.

Allison S. Mass Fitzgerald (2010-2012)

The Effects of Chronic Habitat Degradation on the Physiology of Eastern Oysters, Crassostrea Virginica*/ The Use of Cellular Biomarkers in Assessing Restored Oyster Reefs in New York City*
CUNY – College of Staten Island Biology Department
Western Long Island Sound and Jamaica Bay, New York

Eastern oyster (*Crassostrea Virginica*) restoration within New York City has come to the forefront of environmental planning activities over the past decade. New York City, including areas of the Western Long Island Sound (WLIS) and Jamaica Bay, was once home to several large oyster reefs, and efforts have begun in recent years to restore this important bivalve to its original habitat. Success of oyster restoration, however, is dependent on adequate information on the suitability of a potential habitat. While oysters may have been plentiful in these bays in the past, decades of contaminant inputs and habitat destruction have changed the bays and altered where the oysters may survive. Thus research is needed to determine suitability of various areas.

The success of an oyster reef is dependent on the accretion of the reef. To accomplish this, the oysters must grow and reproduce, and new spat must settle on top of old shells. Habitat degradation and contaminants may impact the growth and reproduction of oysters, and affect restoration initiatives. Contaminants contributed to the bay through human activity are known to impact oyster physiology. Further, as changes in feeding and digestion may lead to alterations in the energy budget of the oyster in which less energy is spent on growth or reproduction and more on defense, it is important to know if metals are altering energy budgets and if this will influence oyster restoration.

In her study, Allison Mass Fitzgerald examined the effects of chronic habitat degradation on the physiology of oysters. Two-year-old oysters were placed at two field sites (Bronx River-WLIS, and Jamaica Bay) in June of 2010. Oysters were subsampled bimonthly until October 2011. Water quality parameters were taken at the sites, and oysters were sampled to determine overall condition, biochemistry and select metal body burdens. The data was compared to measurements on oysters from a clean reference site. Fitzgerald aimed to increase understanding of the physiology and energetics of the Eastern oyster, which should lead to more informed decisions concerning the placement of reconstructed reefs. The reestablishment of oyster reefs within New York City offers many small organizations the opportunity to educate the public about water quality, preservation and restoration of urban estuaries. The data itself is also intended to educate the public on the effects of habitat degradation on local fauna.

Benjamin Gahagan (2009)

Estimating Natal Stream Homing Rates of Anadromous River Herring Stocks from Otolith Microchemistry
University of Connecticut

River Herring are anadromous species found in the northwestern Atlantic Ocean. They are ecologically significant forage fish that provide vital marine derived nutrients to freshwater ecosystems. The populations of two species of river herring, both Alewife *(Alosa pseudoharengus)* and Blueback Herring *(Alosa aestivalis)*, have declined precipitously in the past 15-30 years despite widespread conservation efforts, including the closure of the River Herring fisheries in Connecticut, Rhode Island, and Massachusetts. Further management efforts of these species has been hindered by a lack of detailed information

concerning their life history and biology, including fidelity to their natal spawning areas and the importance of their early life history to their overall development and reproductive success.

Using otilith microchemistry techniques, Benjamin Gahagan of the University of Connecticut created empirical estimates for how many fish return to their natal streams to spawn. Using the unique chronological properties of otoliths, Gahagan also examined the effects of juvenile emigration timing and their subsequent health, development, and reproductive success. This project stands to benefit the restoration planning and management of River Herring stocks.

Heather Giddings (2004)

Rhode Island Hard Clam Health Study
University of Rhode Island

Bivalves are an important food source for many species of fish and crustaceans, and the shells of deceased organisms create shelter and useful substrate for many marine species. Bivalves are filter feeders that strain plankton from the water causing a reduction of suspended solids, significantly augmenting visibility. This feeding strategy makes them important indicators of environmental health, since they accumulate pathogenic bacteria and heavy metals.

A clam disease, Quahog Parasite Unknown (QPX), was recognized on Prince Edward Island, Canada in 1994, and is characterized by gaping, inflammation, excessive mucous production, mantle retraction, and chipping of the shell, resulting in 100% mortality rates. In Rhode Island, the first outbreak of QPX occurred at a quahog aquaculture lease in 2003. This deeply concerned scientists because QPX could not only cripple the Quahog aquaculture industry and fishery, but it could decimate wild populations of Quahogs as well.

Heather Giddings, a Master's student of Aquatic Pathology at the University of Rhode Island, collected data on the health of Quahogs by sampling individuals and sediment from the affected lease, the adjacent wild Quahog population and at other sites around Rhode Island. Samples were analyzed for the presence of QPX, and the resulting data was made available to coastal environmental managers, aquaculturists, and the Quahog fishery. Giddings presented her work at local and regional shellfish and aquaculture conferences.

Corey Grinnell (1999-2000)

Combined Effects of Erosion Control and Habitat Use on Roseate Tern Productivity
Department of Natural Resources Conservation
University of Massachusetts Amherst

Falkner Island is three miles south of Guilford, Connecticut, and is the only vegetated marine island in Connecticut. It is part of the Stewart B. McKinney National Wildlife Refuge and is host to the fourth largest colony of endangered Roseate Terns *(Sterna dougallii)* in the Northeastern United States. A shoreline protection project was completed in 2001 by the Army Corps of Engineers to protect a historically significant lighthouse commissioned by Thomas Jefferson sitting atop a severely eroding bank. This project destroyed much of the tern nesting habitat that existed on the island.

Grinnell, a Master's candidate at the University of Massachusetts at Amherst, collected baseline information on tern habitat use so that the erosion control program could simultaneously create new, suitable nesting habitats. Beginning in 1999 and continuing through 2000, he focused his research on the behavior and habitat use of adults during the period of nest site selection, the behavior and habitat use of chicks during development, and the characterization of rock crevices used as shelter by Roseate Terns. Grinnell's work was crucial in determining how the rock revetment used for erosion control would affect tern productivity.

Rebecca Harris, Ph.D. (2008-2010)

Protection of Coastal Waterbirds and Their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon
Cummaquid, Massachusetts

The Coastal Waterbird Program (CWP) of Massachusetts Audobon reached its 25th year in 2012. The program was designed to expand the tradition of coastal bird conservation that was the impetus for the founding of the first Audubon Society (Massachusetts Audubon). The CWP works to protect species perilously close to disappearing, and their recovery is due to the efforts and resources of hundreds of CWP staff, volunteers, and donors. In 2008, the CWP monitored and protected more nesting sites for Piping Plovers than any other entity in the world, and sustained approximately half of the state's breeding Piping Plovers (266 pairs) and Least Terns (at least 2,300 pairs). The state's Piping Plover population was higher than ever recorded in 2008 and again in 2009, due to the expansion of Piping Plovers into new nesting sites, including the urban beaches of Winthrop and Revere. CWP now monitors and protects 15% of the entire Atlantic coast Piping Plover population as well as American Oystercatchers, Spotted Sandpipers, Willets, Common Terns, and migrating shorebirds. Many species would rapidly decline without intensive and adaptive management, so

the CWP has educated the public about their role in threatened species conservation and worked to minimize anthropogenic threats such as vandalism of protective fencing, fireworks, bonfires, and disturbances on popular beaches. Program staff worked with over 160 landowners to manage and monitor 97 active nesting sites and patrolled 143 sites for nesting activity.

The Coastal Waterbird Program is a model for other states and countries, as its reach has gone beyond the beaches that Massachusetts Audubon monitors and protects. Efforts to protect these flagship species also helped to secure the preservation of the state's coastal beaches, salt marshes, and tidelands. Program staff completed a second successful year of applied research with regional collaborators (U.S. Geological Survey, U.S. Fish and Wildlife Service, and National Audubon Society Seabird Restoration Project) and conducted Least Tern feeding studies at three colonies on Cape Cod. With partners at Antioch New England, the National Park Service, and the U.S. Geological Survey at Patuxent Wildlife Research Center (USGS), the program is in its third year (2009) of intensive study to understand the movements of the federally endangered Roseate Tern, after breeding and before migration to South America. Findings indicated that the majority of the population spends this critical staging period at a handful of sites in the Cape Cod/ Massachusetts south shore region, and the CWP is in the process of interpreting data on movements from site to site. Through the program, there have been over 600 observations of at least 70 uniquely banded Oystercatchers, as part of an Atlantic coastwide effort to track Oystercatcher movements, survival, and population size.

Bart H. Harrison (1998)

Settlement of the Bay Scallop, Argopecten irradians, *to Eelgrass,* Zostera marina, *in the Presence of Macrophytic Algal Fouling*
University of Massachusetts Dartmouth

Efforts made by many coastal towns to replenish the Bay Scallop (*Argopecten irradians)* stocks often failed because of unsatisfactory environmental conditions. In Westport, Massachusetts, the Water Works Group successfully reared scallops in hatcheries to replenish natural populations through the Bay Scallop Restoration Project. This research project focused on learning more about propagation techniques and interactions between the Bay Scallop and its habitat in the Westport River Estuary.

Larval Bay Scallops settle primarily on Eelgrass (*Zostera marina)* but through a process known as biological fouling, algae often shade and suffocate Eelgrass beds. Bart Harrison, a Master's student in Marine Biology at the University of Massachusetts at Dartmouth, investigated the relationship between heavily fouled Eelgrass blades and settlement patterns at six sites in the Westport River Estuary. He transplanted clean and fouled Eelgrass into the laboratory, introduced hatchery-reared larval scallops (provided by the Water Works Group), and planned to monitor the settlement patterns of the scallops. However, two days after larvae introduction, the air supply to his experimental tanks failed and the water cooled from 75°F to 45°F for more than a day. The end result of this was that the fouling component of his experiment was gone and only clean blades were present for larval settlement. He noted a strong correlation between blade height and settlement height.

Helen Hays (1995-2015)

Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History
Great Gull Island, New York

The Great Gull Island Project is a study of the population dynamics of two species of terns nesting on Great Gull Island at the eastern end of Long Island Sound. The island is the site of one of the largest concentrations of Common Terns in the world (8,500 pairs) and the largest nesting concentration of Roseate Terns (1,600 pairs) in the hemisphere. During the study, the number of Roseate Terns (an endangered species) has increased; and the number of Common Terns (threatened) has more than doubled. Great Gull Island is owned by the American Museum of Natural History, New York City, and the study is led by Helen Hays of the Museums' Department of Ornithology.

When the study began, no records indicated where Roseate Terns spent the non-breeding season. Hays discovered roosting concentrations of both Roseate and Common Terns along the east and off the south coasts of Brazil in 1995. In addition, the largest concentration of Common Terns, that year or any year since, was found at Punta Rasa, Argentina. Esteban Bremer, Conservation Officer of the Fundación Vida Silvestre Argentina, was netting terns at Punta Rasa, so Hays invited him to Great Gull Island for the tern breeding season. This led to an ongoing cooperative study working with common terns at both ends of their range during the non-breeding and breeding periods. Radio tags were attached to Common Terns in the roost at Punta Rasa. Tom Cormons, one of many students who has worked on this project over the years, followed the birds off shore, by plane, to discover that they were feeding in open water during the day. From 2000 to the present, Esteban has brought students to Great Gull Island during the last two weeks of June, the period when most of the chicks hatch and the busiest time for Hays, to help mark nests, band chicks, and trap adults.

Hays expanded the study to include the north coast of Brazil, where it was discovered that villagers were capturing these terns and stripping them of their radio tag bands with which to make necklaces. Hays has worked with an NGO in the state of Ceara on a successful community-based conservation outreach effort to protect the terns.

Hays' research with an international group of scientists may ensure the stable future of the Roseate and Common Terns. The database that resulted from more than 30 years of study has begun to answer many of the questions about the life history of these birds and should prove to be very useful in the management of these species for years to come.

George Jackman (2008)

The Decline of the Winter Flounder: Which Nurseries Matter?
Ecology, Evolution, and Behavior Sub-program
Queens College, The City University of New York

Thirty years ago, the Winter Flounder *(Pseudopleuronectes americanus)* supported significant commercial and recreational fisheries in the waters of New York, Connecticut, and Rhode Island. For unknown reasons, the flounder stocks crashed and only a minimal, recreational fishery remains. However, with information from recent surveys, it is clear that flounder still reproduce in western Long Island Sound and other New York waters. The few that survive to adulthood show phenomenal growth rates as they are presumably occupying a vacant niche.

George Jackman, a doctoral student at Queens College, conducted research to find the causes of the flounder stock depletion and also the current status of the population. He compared mid-20th century growth statistics with contemporary data, and also found the nursery habitat of older specimens. The elemental composition of otoliths (earbones) from adult and pre-migratory flounder were used to determine their age and eventually, origin, which enabled Jackman to determine the nurseries that are most successful in supporting the current population.

The particular nurseries that are shown to be highly represented in this study should be considered for strong habitat protection. Conversely, if other historical nurseries are not well represented in the study, this work will raise questions about the health of these habitats. Jackman's research stands to serve local economies, public interest, and Winter Flounder stocks alike.

George Jackman (2012)

Determining Habitat Usage, Life History Patterns, and Population Structuring of Winter Flounder Through Otolith Microchemistry
Biology Department
Queens College, The City University of New York

George Jackman uses state-of-the-art laser ablation inductively coupled mass spectroscopy (LA ICPMS) applied to otoliths (ear bones) to track the life history patterns and habitat usage of winter flounder. This study allows Jackman to discern population structure and critical habitat in need of protection, as well as to determine patterns of elemental uptake between otolith pairs within the same fish. The winter flounder has large economic and ecological importance, but its population has taken a severe downturn, largely due to human-driven habitat degradation and over-exploitation. The ecological impact of winter flounder decline is unknown but is likely considerable, since winter flounder are both predator and prey in the region. In 2009, the Atlantic States Marine Fisheries Commission deemed southern New England and Massachusetts stock to be highly depleted, and placed the stock under commercial moratorium. The ASMFC also restricted recreational bag limits in an effort to rebuild stock.

George Jackman's strategy was to use otolith chemistry in conjunction with LA ICPMS technology to examine chronological patterns of elemental uptake from New York Harbor, Long Island Sound, and Georges Bank. A major assumption when describing movements of fish based on profiles of otolith signatures is that otolith chemical composition changes with environmental parameters such as water chemistry, temperature, and salinity. Symmetrical testing between otolith pairs was also conducted to determine if the ambient environment influences elemental uptake in winter flounder differently than in pelagic fish, since winter flounder have one side immersed in the sediments and the other in contact with the water column.

Jackman's research provides much-needed information to stock managers and researchers regarding winter flounder's seasonal movements, spawning habitat, and natal nursery habitat in need of protection to ensure future recruitment for the depleted SNE/MA winter flounder stock.

Loren Kellogg (2007)

River Herring Restoration Project
Coalition for Buzzards Bay

The Buzzards Bay River Herring (*Alosa pseudoharengus)* or Alewife, faces threats in each of its essential habitats. Freshwater passage impediments, habitat alterations, and pollution have all led to declining populations.

The Coalition for Buzzards Bay considers River Herring an important biological indicator of its ecosystem, and the Coalition has since been monitoring River Herring runs using fish counters on the Agawam and Wankinco Rivers in Wareham, Massachusetts. The Coalition installed a fish counter on the Acushnet River in Fairhaven to investigate possible techniques for monitoring downstream emigration of juveniles and post-spawn adults while gauging survival rates at passage impediments. CBB also believes that it is crucial to analyze existing information, such as scientific papers and technical documents that address conditions affecting current and historic populations of herring. After reviewing this information, CBB identified variables likely to influence survival, evaluated whether habitat differences for Alewife and Blueback Herring suggest species specific threats, and determined the impact of predator/prey relationships on River Herring populations.

With direction from Dr. Loren Kellogg and the use of existing research and ongoing studies, CBB will work with herring managers to determine their priority concerns in order to design and implement a scientifically sound and comprehensive Buzzards Bay River Herring restoration plan. CBB also aims to develop short and long term advocacy agendas that address the decline of River Herring in Buzzards Bay and promote regional restoration efforts.

Michele J. Kuter (2001-2004)

Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
Falkner Island Tern Project
USGS Patuxent Wildlife Research Center

Falkner Island, south of Guilford, Connecticut, and Great Gull Island, on the northeast end of Long Island, New York, are the

two major colony sites of Common and Roseate Terns in the greater Long Island Sound ecosystem. In 2001, Michele Kuter, with the USGS Patuxent Wildlife Research Center and the Connecticut Audubon Society, compared several components of tern productivity between these two sites in an effort to reveal more information about both species.

The Army Corps of Engineers constructed a rock revetment (similar to a retaining wall) on Falkner Island in 2001 as part of a shoreline protection project. The revetment impacted the nesting habitat of three Roseate Tern subcolonies on the island and during the breeding season of 2001, it became clear that traditional observation methods were inadequate with the new revetment in place. In 2002, Kuter established and tested the feasibility of tracking tern chicks using radio transmitters. She investigated the possible negative effects that this method had on Common Tern chicks, and found that radio transmitters provide a safe and reliable way to locate chicks in a variety of habitats and recommended their use on Roseate Tern chicks at least 17 days of age.

In 2003, then a Master's candidate in Biology at the College of William and Mary, Kuter continued her assessment of radio tracking practices and investigated the impact of the revetment on Roseate Tern productivity. Her research results were used immediately at Falkner Island and may be applied to other shoreline protection projects throughout the region. In 2004, Kuter hypothesized that predation was a significant factor in the decreased production of the Roseate Tern. She set up a continuous monitoring system with 16 infrared cameras to determine foraging behavior of predatory Black-crowned Night Herons. This study led to a better understanding of nocturnal predator-prey relationships and aided in the development of more efficient and less impacting research and conservation management methods.

Alicia Landi (2010)

Selection of Spawning Habitats by Horseshoe Crabs along the Complex Connecticut Coastline
University of Connecticut

The Atlantic horseshoe crab *(Limulua polyphemus)* is a multiple-use resource under environmental conflict. Horseshoe crabs are valuable to the biomedical industry, as bait for commercial fisheries, as generalist predators, and as a food source for migratory shorebirds. From May to July the crabs emerge onto estuarine beaches to spawn, simultaneously supporting the migration of red knots, which must consume millions of horseshoe crab eggs to refuel for their journey. Red knots recently exhibited steep decline in numbers, corresponding with a decline in the horseshoe crab population itself, especially in Delaware Bay. The Atlantic States Marine Fisheries Commission developed a fishery management plan that established a conservative, risk-averse approach to protecting horseshoe crab spawning; measures that allowed the Delaware Bay population to rebound. Yet a lack of sufficient coast-wide information on horseshoe crab populations hinders the assessment of the species' status as a whole.

Horseshoe crabs are a major source of bait in commercial fisheries, and the majority of horseshoe crab harvesting for bait occurs though hand-harvesting on beaches, when crabs are spawning. Thus, a better understanding of the optimal spawning habitat is essential to maximize the effectiveness of conservation efforts to restrict harvesting areas. The Connecticut DEP, Marine Fisheries Division, funded a project through the State Wildlife Grants program to define and map the areas along the Connecticut coast that are most suitable for horseshoe crab spawning and to provide information to aid in the development of a statistically robust, long-term monitoring program.

Alicia Landi characterized spawning habitats along the north shore of Long Island Sound by various traits (i.e., beach slope, sediment composition, wave energy) using remote sensing and GIS technologies. Field surveys of a subsample of 21 beaches were conducted over two summers in which spawning crabs were counted along the length of each beach at high tide. A resource selection function was developed based on beach traits and spawning crab abundances and used to produce a map of the coast portraying the predicted level of use of the beaches by spawning crabs. Finally, crab counts were statistically resampled to investigate the precision of monitoring schemes that vary in frequency, length, and timing within the season.

Maura Leahy (2004)

Great Gull Island Bird Nesting Habitat Restoration Research
Yale School of Forestry & Environmental Studies

Great Gull Island on Long Island Sound hosts large nesting colonies of the endangered Roseate Tern *(Sterna dougallii)* and the threatened Common Tern *(Sterna hirundo),* and has been a site of extensive ornithological research since the 1960s. Native and invasive plants both threaten tern reproduction by covering bare ground that the birds require for nesting. The two plants that threaten habitat most significantly are Oriental Bittersweet *(Celastrus orbiculatus)* and Wild Radish *(Raphanus raphanistrum).*

While a Master's candidate in Environmental Sciences at Yale University, Leahy researched the ways to eliminate these plants from nesting areas and to keep them from returning. She learned that with unusual ecological conditions on the island and the presence of nesting terns during the most favorable period for management (summer), vegetation management would be extremely challenging on Great Gull Island.

Leahy wrote a thorough environmental history of the area indicating how these conditions developed. This project helps researchers at similar nesting colonies to form restoration management plans to address preventative measures for this type of issue.

Ken M. Leonard III (1998)

Genetic Variation in Hatchery Populations and Wild Populations of Argopecten irradians *in New England*
University of Rhode Island

Bay Scallops *(Argopecten irradians)* are an integral part of the New England fishing industry. In the last 20 years (since the mid-1970s), Bay Scallop populations have fluctuated in New England's estuaries and have become relatively scarce in Narragansett Bay.

In 1993, the Water Works Group, in Westport, Massachusetts, began the Bay Scallop Restoration Project (BSRP), and has successfully enhanced the public shellfish beds of the Westport

River. As in any restoration project, it is important to quantify how much the hatchery is contributing to the success of the wild populations, and genetic studies could help distinguish stock populations from wild ones.

Ken Leonard III worked with BSRP to identify a genetic marker that distinguishes hatchery-grown from wild scallop populations. Despite numerous snorkeling trips throughout Narragansett Bay, Leonard did not see any scallops so he collected farm-raised and wild Eastern Oysters *(Crassostrea virginica)* from several locations throughout Rhode Island. He froze the oysters with liquid nitrogen, isolated the DNA, and created an Eastern Oyster DNA bank. These techniques can be modified and fine-tuned so that they may be used with Bay Scallops and other species. A better understanding of shellfish genetics is important for aquaculture and fisheries management. Leonard's information is used to monitor scallop population trends over time, which in turn improves marine and coastal management policies.

Don Lewis (2010)

Turtle Research, Rescue, and Conservation
Cape Cod Consultants
Cape Cod to Mount Hope Bay

Don Lewis, Executive Director of the Massachusetts Association of Conservation Districts, runs a team of Cape Cod Consultants dedicated to the conservation and rescue of critically endangered sea turtles. In November and December, the team rescues stranded sea turtles from the beaches of Cape Cod. In 2010, a major stranding year for cold-stunned sea turtles, QLF's grant helped to support this effort. More than 100 endangered turtles were tossed on Cape Cod beaches in November and December of this year, and required rescue and/or rehabilitation.

The research, rescue, conservation and education/outreach mission of Cape Cod Consultants continues year-round. In order to inform the many volunteers, supporters, contributors, colleagues, media and all interested parties, Don Lewis and his team maintain an ongoing report of their findings and their work online at Turtle Journal, www.turtlejournal.com. Reporting of research and rescue operations directly from the field comes through their Twitter feed at www.twitter.com/turtlejournal. Supplementary video reports can be found on their YouTube channel: www.youtub.com/dmcquadelewis.

Nadine Lysiak (2004-2007)

Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns (2004-2006); Investigations into the Foraging Ecology of Atlantic Sei Whales (2007)
Marine Program, Boston University
Woods Hole Oceanographic Institution

Despite being one of the first species of whale to be internationally protected (1937), the North Atlantic Right Whale *(Eubalaena glacialis)* remains endangered with a total population of around 300 individuals. Anthropogenic disturbances have hindered the recovery of species as they continue to be hit by shipping vessels or entangled in fishing gear. Whaling records, sightings, and satellite tags suggest that its annual distribution extends beyond their protected area, and continuous, multi-annual records are needed to determine the species distribution. Much remains unknown about the range, habitat use, and movement patterns of the species.

From 2004 to 2006, Nadine Lysiak, as a Master's and subsequently a Ph.D. candidate at Boston University, researched the movement patterns of Right Whales by using stable isotope analyses. Stable isotope ratios have a spatial structure, stratifying in the environment due to salinity, temperature, and nutrient gradients. These natural isotope ratios are transferred from the environment into the tissues of animals. To track migration patterns of the Right Whale, Lysiak sampled baleen plates of several whales by drilling holes at 2 cm. intervals and then analyzed the resulting powder for stable isotope ratios of various elements. The isotope ratios of carbon, nitrogen, oxygen, and hydrogen found in the baleen plates were compared with natural ratios found in known Right Whale habitats to produce a comprehensive look into the habitat use and movement patterns of the Right Whale.

In 2007, Lysiak used similar methods to investigate the foraging ecology of the Atlantic Sei Whale *(Balaenoptera borealis)*. This species is also endangered, and there are currently no reliable estimates regarding stock size or population trends, and little is known about its foraging ecology. In addition to baleen samples, Lysiak used isotope ratios from tissue samples taken by biopsy darts and zooplankton samples from waters nearby feeding whales to perform this study. Lysiak's research was shared with the scientific community through reports, and lectures.

Erin McClean (2014)

The Effect of Ocean Acidification on the Molting Process of Homarus americanus
University of Rhode Island

The oceans absorb a large amount of total CO2 emissions, thus mitigating warming effects, but this process has resulted in a decrease of ocean pH. Ocean acidification has the potential to cause widespread harmful effects, posing a danger to fisheries like the lobster fishery, which represents 80% of Maine's economy. Erin McClean undertook a study of the effects of ocean acidification on the molting process of lobsters. She hypothesized that this acidification would slow the process of molting and hardening of the new shell. Further, she hypothesized that overall lobster growth would be hampered by increased CO2 concentrations, and that the mineral content of the shell (specifically calcium and magnesium levels) would change.

During her study, Erin McClean obtained year-old specimens from a lobster hatchery and kept these lobsters in laboratory tanks at the University of Rhode Island's Graduate School for Oceanography for six months at a time. She placed lobsters under three different CO2 treatments: 400 ppm, representing current conditions, 1000 ppm, representing potential conditions by 2100, and 2000 ppm, representing potential conditions by 2200. She took measurements of length, weight, and hemolymph pH of all lobsters every five days, and measured the mineral content of molts.

Mark Mello (2014)
Inventory of Rare Lepidoptera in Dune and Salt Marsh Systems of Essex County, MA
Lloyd Center for the Environment

The Massachusetts Endangered Species Act (MESA) protects Lepidoptera biodiversity, but has no records for the thirty-eight butterfly and eight moth species protected by the Act in its database. In an attempt to rectify this situation, Mark Mello undertook a survey of butterfly and moth species in Cape Ann in 2013 and 2014. Specifically, Mello surveyed species living in the following habitats: barrier beaches, maritime shrubland, scrub oak barrens, bog, and Atlantic white cedar swamp. These habitats are in decline due to development, and are listed by the MESA as essential protected habitats. Mello applied for funds from The Sounds Conservancy in 2014 in order to target barrier dune and upper salt marsh habitats that had not been previously sampled. During the study itself, Mello set up light traps at dusk, retrieved them at dawn, and examined and recorded all species collected in the interim.

Amy Munson (2004)
Significance of Matrix metalloproteinases *in Disease Resistant and Non-Resistant Oyster Species of the Genus* Crassostrea
University of Rhode Island

The *Crassostrea* Oyster genus, which includes the Eastern Oyster *(Crassostrea virginica)* and the Pacific Oyster *(Crassostrea gigas),* are ecologically and economically important to many states along the eastern seaboard. Oysters provide shelter and substrate for other species, can be used as an indicator species of environmental health. Due to overfishing, destruction of habitat, changing weather conditions, and disease, oyster populations were in free-fall. One of the biggest threats to these bivalves came from the protozoan parasite *Perkinsus marinus,* which causes a chronic wasting disease, Dermo, and *Haplosporidium nelson,* a pathogen of oysters, the cause of the deadly disease MSX.

Research has shown that the Pacific Oyster is resistant to Dermo and MSX but little is known about the mechanisms by which it is able to fight off these diseases. Matrix metalloproteinases (MMPs), a family of enzymes that are responsible for many physiological and pathological processes, were thought to be responsible for the immune response of oysters to Dermo. Amy Munson, a Master's candidate in Fisheries, Animal and Veterinary Science at the University of Rhode Island, illustrated the extent at which MMPs may be involved in immune responses to these parasites through genetic coding and characterization of MMPs in the Eastern Oyster. Munson's research has contributed to the genetic development of a more disease resistant strain of the oyster.

Owen C. Nichols (2008-2009, 2011-2012, 2015)
*High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (*Loligo pealeii*) Occurrence in Nantucket Sound / Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

The emerging concept of Ecosystem-based Fishery Management is largely based on the relationship between ocean and climate processes, the distribution and abundance of commercially exploited marine species, and the spatiotemporal scales at which such relationships exist. Nantucket Sound harbors a seasonal fishery of Longfin Inshore Squid (*Loligo pealeii)*. Understanding the relationship between the environmental factors and variability in squid catch in the Sound will contribute vital knowledge necessary for management and sustainable harvest in the squid fishery.

During the summer of 2008, Owen Nichols, a graduate research assistant and Ph.D. candidate at University of Massachusetts Dartmouth, conducted a sampling study of squid at a commercial fish weir in Nantucket Sound. He used a Dual-Frequency Identification Sonar (DIDSON) to monitor squid occurrence and used a data logger to record water temperature and salinity. Wind speed/direction, ambient light, and tidal phase in nearby waters were recorded. Comparison of the occurrence data with oceanic and climatic conditions provided insight into the squid fishery status within Nantucket Sound.

In dialogue with local fishermen working in the inshore waters of Nantucket Sound, Nichols found that fishermen were concerned that egg mops (groups of eggs laid by Longfin Inshore Squid on the bottom) could be damaged by fishing gear. In a continuation of this research, Nichols monitored embryonic development within individual egg capsules to document hatch timing and also to record the associated oceanographic conditions.

Further sampling was conducted in northeastern Nantucket Sound from May-July of 2009 in collaboration with commercial fishermen. Samples were chilled and sent to a wetlab for microscopic examination, where the embryonic development rates and environmental conditions were compared to other lab- oratory studies to assess environmental effects on egg development. Knowledge of Longfin Inshore Squid and environmental impact is essential for the longevity of this fishery.

In 2012, Owen Nichols continued his study on squid development, with a focus on the paralarval phase following hatching. Models currently applied to marine fish and invertebrates, combined with data collected on the spatiotemporal distribution of squid spawning, could be applied to resolve questions regarding paralarval dispersal from spawning areas. Still, little information exists regarding the vertical distribution of the squid *L. pealeii* in the time immediately following hatching, although laboratory studies and fishermen's observations suggest that *L. pealeii* paralarvae move toward sunlight, contributing to daytime surface distribution.

Owen Nichols expanded monitoring of embryonic development in order to confirm temperature effects on growth. He conducted sampling in Nantucket Sound from April to July of 2013, during the squid spawning season. A vertical pump sampler was used to measure vertical distribution of newly hatched paralarvae, while embryonic development was monitored with a device that tested the water column above a tethered egg mass. Study results will help to quantify the contribution of the Nantucket Sound inshore spawning area to squid population, with direct implications for management of the fishery.

Cate O'Keefe (2004)

Effects of Varying Environmental Parameters on the Survivorship of Embryonic and Larval Alewife
Marine Program, Boston University

The Alewife is a small herring that is important as forage for gamefish in many inland waters along the Atlantic Coast. They can be found from Newfoundland to South Carolina. Despite their importance to commercial and recreational fisheries, much is unknown about the early life-history stages of the Alewife.

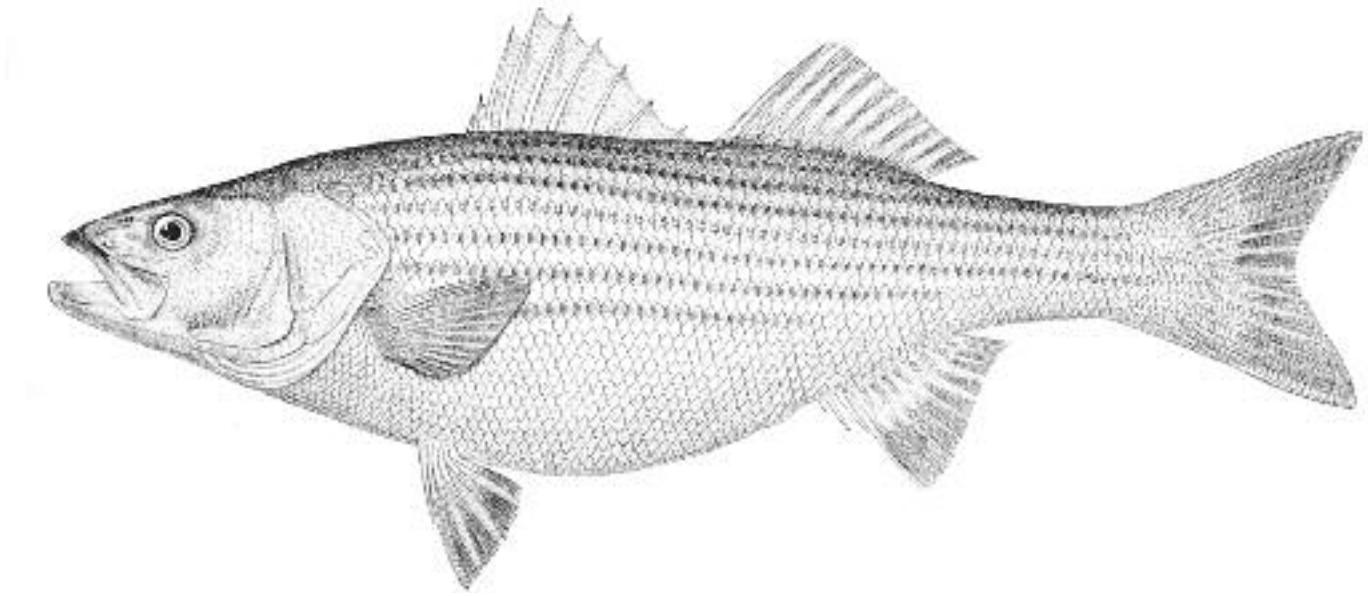
Cate O'Keefe, a Master's student in Local Fisheries Conservation, Boston University Marine Program, conducted experiments to discover the thermal and salinity tolerances of Alewife larvae. The objectives of her study were to find the optimal temperature and salinity for the development of Alewife larvae and to determine the suitability of Edgartown Great Pond on Martha's Vineyard, and East Harbor in Provincetown, Massachusetts, as spawning habitat. O'Keefe found that while embryonic Alewives clearly exhibit an optimal thermal and salinity range, they survive in conditions outside of that range. Additionally, the tidal influence on Great Pond and East Harbor minimizes spawning habitat, but both provide areas in which Alewife can survive. O'Keefe states that adjusting the timing of tidal inundation of these ponds to accommodate the spring spawning run and fall-out migration of Alewife juveniles could help stabilize the population.

Cate E. O'Keefe, Ph.D. (2015)

Northeast Multispecies Fishery Flatfish Bycatch Avoidance Program
School for Marine Science and Technology
University of Massachusetts, Dartmouth

Low allocation of yellowtail flounder as bycatch have resulted in the stock becoming a choke species, constraining targeting of healthy Southern New England and Georges Bank stocks. Windowpane flounder have also become a constraining bycatch species for targeting healthy stocks. In 2014, high levels of Windowpane bycatch in previous fishing years triggered measures that restricted access for gears that effectively catch healthy flatfish in large areas of Southern New England. Surveys indicate that Windowpane stocks are stable or increasing, which could exacerbate bycatch issues in the absence of measures to try to avoid catch of the non-targeted species.

Collaboratively with groundfish industry members and the Northeast Multispecies Fishery Flatfish Bycatch Avoidance



Program, work will be done to clarify issues related to bycatch of yellowtail and windowpane flounder when targeting healthy fish stocks in Southern New England. Existing data sources will be examined to identify patterns of seasonal and spatial distribution, areas of species overlap, and environmental indicators of bycatch hotspots. In order to visualize focal areas for potential real time bycatch avoidance approaches, maps will be developed. Further, a suite of bycatch avoidance approaches will be created to implement on participating vessels in the 2015 fishing year, and will evaluate the various approaches by comparing bycatch rates and amounts to previous performance. Results will be shared through outreach events with the general public, fishing industry, scientists and managers, and will be submitted for publication in a peer-reviewed scientific journal.

Adrienne Pappal (2005)

Habitat Preferences of Juvenile Winter Flounder in the Presence of Cobble
School for Marine Science and Technology
University of Massachusetts Dartmouth

Winter Flounder *(Psuedopleuronectes americanus)* populations in New England have been in decline. Juvenile survival is crucial to maintaining a stable population, and therefore, the study of the preferred habitat of this life stage is important. Existing monitoring programs focus on smooth, sandy or muddy substrate, although Winter Flounder have often been sighted off cobble beaches in Rhode Island Sound.

Adrienne Pappal, a Master's candidate in Biological Oceanography at the University of Massachusetts Dartmouth, investigated the habitat preferences of age-0 and age-1 Winter Flounder by placing four cobble treatments—100% cobble, 50% cobble, 25% cobble, and 0% cobble (sand)—in seven tanks at a flow-through seawater facility. Pappal found that juvenile Winter Flounder prefer cobble habitat to sand habitat, and that this preference is related to their age. This study raised questions about conservation methods, and the need for field studies to assess the importance of this habitat to Winter Flounder.

Katharine Parsons, Ph.D. (2012-2015)

Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

Mass Audubon's Coastal Waterbird Program (CWP) aimed to protect the state's plovers, terns, and other coastal nesting birds, and to attain enhanced breeding populations of these species. CWP worked in cooperation with partner organizations, federal, state, and local governing bodies, private and public landowners, and the public, monitoring approximately 150 sites on the Massachusetts coastline and protecting approximately 40% of Massachusetts' Piping Plover, 30% of the state's least terns, and 20% of its American Oystercatcher, as well as nesting sites for Common Terns and Roseate Terns. Past efforts have led to success in establishing breeding birds, yet the challenge remains to recruit birds to sustain future populations.

The CWP core season activities include locating, censusing and monitoring Piping Plover nests and tern colonies, posting signs and placing fencing to provide the nests with protection from predators and vandalism, and working to educate the public about the need to protect the nests. Mass Audubon is also compiling and analyzing management information from a 25-year dataset, as well as collected and incorporated data from other conservation partners, to develop a landscape-scale management framework state-wide, as well as a regional strategic approach to shorebird and habitat management. Mass Audubon hopes these efforts will lead to increased protection of vulnerable coastal nesting birds.

Adriana Picariello (2004, 2007)

Conservation of the Diamondback Terrapin, Malaclemys terrapin, *in Cape Cod, Massachusetts*
Terrapin Research Group, Wheaton College

The Diamondback Terrapin *(Malaclemys terrapin)* is the only species of North American turtle that can be found in salt mashes along the coast of Cape Cod, Massachusetts. Coastal development is one of the major threats to the Diamondback Terrapin, and efforts to preserve this species are based upon the preservation of its habitat and a better understanding of its genetic diversity.

In 2003, Adriana Picariello joined Barbara Brennessel of Wheaton College as an intern in Brennessel's ongoing terrapin research project. She was in charge of hatchling monitoring in the marshes of Wellfleet Bay. In 2004, Picariello expanded on this experience by taking several trips to other possible breeding locations on Cape Cod. That year she also collected blood and tissue samples from the Wellfleet Bay population of terrapins and conducted a tracking study on terrapins released on Indian Neck in Wellfleet, Massachusetts. The tracking study showed that hatchlings do not stray far from the marsh, confirming the need for stringent marshland protection.

As a Biology Laboratory Instructor at Wheaton College in 2007, Picariello trained Wheaton interns and coordinated the collection of blood and tissue samples from terrapin populations along the south coast of Massachusetts and Rhode Island. Genetic analysis was performed on these samples and on archived samples from Wellfleet Bay in the labs of Dr. Brennessel and Dr. Tracy Spoon (University of Massachusetts Boston). The genetic variations found in these two populations were analyzed to provide a better understanding of the diversity of this species on the New England coast.

Tracy Pugh (2012)

Alternative Mating Strategies in American Lobster: is Intermolt Mating a Viable Compensatory Strategy?
University of New Hampshire

Fisheries currently operate by protecting spawning females while removing large males. Evidence suggests, however, that sperm limitation is a potential concern in several exploited crustacean species. With harvest protection the American Lobster has a female dominated population. Mating of the American Lobster takes place within 24 hours following the female's molt. Male aggression is reportedly vital to the success of intermolt mating suggesting that the male must be larger than the female, but with the male population being exploited and truncated size distribution it is not reasonable for this to continue.

Tracy Pugh tested intermolt mating in naturalistic aquaria to determine if it was a realistic alternative mating strategy. Hard-shelled, intermolt male and female lobsters were obtained from local fishermen, and the females' seminal receptacles were examined for presence of a sperm plug. Multiple females were placed in a tank with multiple shelters. Video cameras recorded female to male interactions and the female's responses to male copulation attempts.

If Tracy Pugh discovered that intermolt mating was a realistic alternative mating strategy, she could conclude that management strategies that differentially protect females might in fact be effective. Thus, these strategies could be considered as rebuilding strategies for the depleted Southern New England stock.

Katie Pugliares (2009)

Genetic Relatedness of Mass Stranded Atlantic White-Sided Dolphins on Cape Cod

Marine Science Graduate Program, University of New England

Little is known about why whales, dolphins, and other species of marine life beach themselves on shore in large numbers, especially in the case of the lesser-studied Atlantic White-sided Dolphin *(Lagenorhynchus acutus)*.

Katie Pugliares of the University of New England Marine Science Graduate Program investigated the level of relatedness of mass stranded Atlantic White-sided Dolphins on Cape Cod from 1999 to 2009 to determine if kinship is a factor. DNA from the skin of the cetaceans was genotyped, and the degree of relatedness within and among stranded groups was compared with samples from single stranded individuals in the same region. The study considered factors that can influence group dynamics such as sex ratio, age demographics, season, size of stranding group, and the proximity among individuals on the shore at the time of stranding. Results of this study were shared with the scientific community.

Anthony Rafferty (2007)

Investigation as to Whether Current Onboard Catch Handling Methods Induce Mortality of Marine Mammals and Fish

Nicholas School of the Environment and Earth Sciences
Duke University
Cape Cod Commercial Hook Fisherman Association

Working in collaboration with the Cape Cod Commercial Hook Fishermen's Association and a group of Cape Cod gillnet fishermen, Anthony Rafferty of Duke University carried out a study to establish whether current handling practices of discarding fish and marine mammals from commercial catches impact the survival rates of various species encountered. Monitoring has been in place to determine the number of discards associated with given catches, but post-release survival rates are not well documented.

Anthony Rafferty used electronic tagging and tracking, video footage, and observation of handling methods to estimate post encounter mortality. This project aimed to decrease post encounter fatalities of bycatch at Georges Bank, a productive fishery located 100 kilometers off the eastern shore of Cape Cod. As a result, recommendations were made to the New England Fishery Management Council.

Julie Richmond (2008)

Using the Somatotropic Axis as a Model to Predict Nutritional Status in Free-Ranging Harbor Seal Pups in Southern New England

Department of Animal Science, University of Connecticut

The post-weaning period for many species is characterized by high mortality due to high rates of growth combined with insufficient independent foraging experience. By investigating the factors that link nutrition and growth, it is possible to assess the impact of decreased nutrient intake or nutritional stress on growth, which may affect survival. The somatotropic axis, based upon hormone and protein analysis, is a bridge between growth physiology, developmental age, and nutritional stress. Julie Richmond and Steven Zinn have developed a model to evaluate nutritional stress using the somatotropic axis on the rehabilitated Harbor Seal *(Phoca vitulina)* at Mystic Aquarium. They hope this model will work with free-ranging Harbor Seals as well.

Richmond and Zinn, Ph.D. student and teacher at the University of Connecticut respectively, collaborated with the University of Maine to evaluate the nutritional status of 40 free-ranging Harbor Seal pups in the Gulf of Maine using the somatotropic axis. The abundance of seals in this region was crucial to this study as it allowed them to recapture and evaluate individuals on three separate occasions. The current Harbor Seal population in southern New England is small, but the Gulf of Maine provides a suitable region for evaluation, and the data collected during this research was used by managers to evaluate the overall health status of the Harbor Seal population in New England. The collaborative nature of this research allowed Richmond to integrate her research with other institutions to support a common educational focus. Results were displayed at Mystic Aquarium and the University of Connecticut to educate students and visitors about the nutritional status of the Harbor Seal.

Dr. Jennifer Seavey (2015)

Monitoring the Harbor and Gray Seal Population at the Isles of Shoals

Executive Director, UNH Foundation

From 2011 to 2014, the Shoals Marine Laboratory (SML) has conducted boat-based surveys of the harbor seal (*Phoca vitulina*) and gray seal (*Halichoerus grypus*) populations at the Isles of Shoals, a cluster of islands eight miles off the shore of Portsmouth, NH. The purpose of this work is to establish baseline population data, document human interactions and individual seal movements to understand the importance of the Isles of Shoals for seals in the Northwest Atlantic. The harbor and gray seal are the two most common seal species found in New England coastal waters (Gilbert and Guldager 1998). Human-seal interactions, including vessel strike, fishing gear entanglements, and harassment by humans are issues of growing concern as populations of seals in U.S. waters have increased in recent years. Furthermore, phocine distemper virus (PDV) and avian influenza (H3N8) have been isolated during unusual mortality events in harbor seals found on or near the Isles of Shoals

(Anthony et al. 2012, Earle et al. 2011). The identification of population-wide health issues and human-seal interactions make long-term monitoring of seal haulouts in the Northwest Atlantic all the more necessary.

Visual surveys, mark-recapture and photo-identification were implemented to address abundance and health of harbor and gray seals at the Isles and Shoals. The initial findings from previous surveys indicate a surprisingly high abundance of seals at Duck Island and the surrounding ledges. In an area of only 0.385 km2 , counts of over 700 gray and harbor seals were estimated in both 2012 and 2013. Observations included individual seals identifiable by their distinctive fur patterns, scars, entanglements, lesions and tags. Since 2011, there have been 1,265 unique sightings, which have been recorded in the Isles of Shoals Seal Photo ID Catalog. The most common human-seal interactions were monofilament fishing gear entanglements. Given these initial findings, it is clear that there is a need for long term monitoring of seals at the Isles of Shoals. Results suggest that monitoring the population is important to increase understanding of habitat use of seals in the area, as well as to provide an educational opportunity to mitigate human interactions that are occurring every year.

Jonathan Stone (2014)

Eelgrass Restoration Program
Save the Bay Inc.

Eelgrass beds are a primary source of food and shelter for an extensive variety of marine life, including finfish and shellfish that represent economically important fisheries. An estuary's health can be measured by the vitality of its eelgrass beds. In Rhode Island, however, eelgrass is quickly disappearing. In an effort to mitigate this problem, Save the Bay has undertaken efforts to protect and restore this essential habitat since 2001.

Jonathan Stone sought a grant from The Sounds Conservancy to support Save the Bay's study of eelgrass health, and its transplant efforts. During a transplant, eelgrass is harvested from a donor bed, sorted, and placed in bamboo skewers, which are secured in the sediment by divers. Divers later return to observe and record survival of transplanted eelgrass beds.

Sally Ann Sims (2011)

*Effect of Sea Level Rise on Piping Plover (*Charadrius melodus*) Nesting Habitat Availability in Rhode Island*
Antioch University New England, Rhode Island

Southern New England sandy beach piping plover habitat is particularly vulnerable to sea level rise, and plover reproductive success is already under threat from land development and nest disturbance. In future years, nesting beaches will most likely migrate in response to sea level rise where not constrained by development, creating a new set of wildlife conservation management challenges. Plover nesting habitat in Rhode Island comprises primarily short, narrow beaches frequently close to heavily developed areas. Because Rhode Island's beaches consist of more constrained habitats than the more productive, less-developed Massachusetts beaches, long-term conservation of plover habitat in Rhode Island is crucial.

During this project, Sally Ann Sims created a habitat map (from latitude/longitude GPS measurements) delineating the upper habitat boundary and the mean high tide line on the six most highly productive plover breeding beaches in Rhode Island. Sims recorded paved areas, buildings, seawalls, jetties, and hardened breachways from recent orthophotographs and incorporated elevation data from 2007 LiDAR dataset. Next, Sims and her team projected low, medium, and high sea level rise scenarios and determined changes in areal extent of habitat.

Sims shared her results with Piping Plover management staff at USFWS, which had provided her with data and beach access, and intended to explore outreach options to organizations such as the Weekapaug Foundation for Conservation. As beach configurations change in the coming decades, this information contributes to decision-making regarding land development and conservation, as well as to efforts to protect piping plover habitat.

Todd Tupper (2003)

Abiotic and Biotic Factors that Contribute to Site Occupancy of the Fowler's Toad (Bufo fowleri) *of Lower Cape Cod, Massachusetts*
Department of Environmental Science and Policy
George Mason University

In New England and along the Sounds, the population of the Fowler's Toad *(Bufo fowleri)* has been compromised due to extensive pesticide use.

Todd Tupper, a Ph.D. candidate at George Mason University, studied 80 ponds on Cape Cod from Eastham to Provincetown, Massachusetts that had healthy Fowler's Toad populations in an effort to investigate the toad's life history. He studied the influences of abiotic and biotic factors at each site and used anuran calling surveys (where audible calls are used to identify toads) to sample for Fowler's Toad. Tupper then used the data gathered to quantify relationships between abiotic/biotic factors and the presence of the Fowler's Toad. The study provided insight on the health of the Fowler's Toad in New England.

Dr. Richard Veit (2004)

Establishment and Conservation of Roseate Terns on Muskeget Island
College of Staten Island, The City University of New York

Muskeget Island is located between Martha's Vineyard and Nantucket. In 1875, it was a breeding colony for 200,000 Common, Roseate, and Arctic Terns. During the 1880s and 1890s, the Muskeget colony was heavily exploited for their plumes. In addition, Herring Gulls and Great Black-backed Gulls *(Laurus marinus)* expanded their ranges south arriving at the island earlier in the season than terns, occupying their nest sites.

Professor Richard Veit from the College of Staten Island attempted to re-establish Muskeget Island as a nesting colony of both Common and Roseate Terns. To accomplish this, he discouraged gulls from nesting using a trained dog in early spring to scare gulls off nests, attracted terns by using decoys and broadcast vocalizations, and monitored the tern colony to estimate production and discourage predators from entering the colony.

Lisa White (2007)
Value of Sea Turtles in Tourism
Nicholas School of the Environment and Earth Sciences
Duke University

Several species of sea turtle that frequent the Sounds of New England have diminished populations and are considered endangered or threatened. The endangered Leatherback Sea Turtle and the threatened Green Turtle and Loggerhead Sea Turtles all use the Atlantic coast of Florida as primary nesting grounds and often migrate to the Sounds region during the warmer months. Lisa White set out to determine ways to improve public awareness and conservation of these endangered species.

Education and outreach to the public has been central to successful endangered species conservation campaigns. White studied the value of sea turtles in U.S. tourism to gain insight into the extent of education and public awareness surrounding these species. She conducted her project on the Atlantic coast of Florida through a willingness-to-pay survey implemented via mail and through visits to dive shops in the area. Assessing the results of this survey allowed White to determine the best ways to improve public awareness and lessen human impact to these species. The results of this study were shared with dive shop owners in Florida, local Chambers of Commerce, and the public through Oceana's website.

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York at Stony Brook

Striped Bass *(Morone saxatilis)* commonly aggregate at thermal discharges north of New Jersey in the winter. The LILCO Northport Power Plant attracts Striped Bass in the winter months. Striped Bass schooling in thermal plumes may have a negative effect on their physiology, reproductive capacity, growth and feeding, and annual migrations.

Kimberly Williams, a Master's student in Marine Environmental Science at the State University of New York at Stony Brook, began collecting data on the large aggregation of Striped Bass wintering in the warm water discharge of the LILCO Northport Power Plant on Long Island Sound (1995). Over the next two years, Williams tagged, measured, weighed, and checked the condition and hatchery status of more than 2,000 wintering Striped Bass. She found large numbers of bass in Long Island Sound, not just in the thermal plume. The wintering Bass are primarily female (7:1). Williams searched for answers to why the fish are schooling at Northport and whether it is a temporary or seasonal refuge for the bass. Bass tagged by Williams were later recaptured in the cold water of Massachusetts, Rhode Island, and Maryland. She believes the fish were not trapped in the thermal plume but moved in and out over the course of the winter. Her results provided the first scientific examination of a widespread phenomenon: the reliance by large numbers of Striped Bass on artificial thermal discharges for winter survival.

Chester B. Zarnoch (2008)
The Use of Selectively-Bred and Wild Hard Shell Clams for Stock Enhancement
Baruch College, The City University of New York

Long Island town governments have responded to diminished natural sets and intensive harvesting of hard clams (*Mercenaria mercenaria)* by funding the construction and operation of marine hatcheries and the planting of juvenile clams or "seed." Towns raise *M. mercenaria var. notata* through a growing season and plant the seed in public waters on the marine floor in the fall. Notata Clams have a brown band that makes them distinguishable from Wild Clams, and show improved growth performance, which is believed to minimize mortality due to predation and overwintering. However, anecdotal evidence suggests that Notata Clams may have thinner valves as a result of energy allocation to shell growth, and shell breakage is common during harvest. This tradeoff may be limiting the effectiveness of notata seeding.

Chester Zarnoch, an Assistant Professor of Environment at Baruch College, conducted a comparative analysis of the two clam types to measure the differences in characteristics important to stock enhancement. These characteristics included growth, metabolism, and shell thickness, and identified the strengths and weaknesses of each type for stock enhancement.

James M. Zingo (1999)
Foraging Ecology and Reproductive Success of Endangered Roseate Terns
University of Massachusetts Amherst

Availability of small prey fish may be the most important limiting factor to the reproductive success of the endangered Roseate Terns *(Sterna dougallii)* in Connecticut. These fish are also an important food source for many other waterbirds and predatory sport fish. Locating and protecting the foraging sites and prey fish of terns could have positive implications for many other organisms within the marine ecosystem.

James Zingo, a Ph.D. candidate in Wildlife and Fisheries Conservation at the University of Massachusetts Amherst, is researching foraging habits in central Long Island Sound and on the Falkner Island Unit of the Stewart B. McKinney National Wildlife Refuge. Zingo radio-tagged and dye-marked 40 adult and fledgling terns and tracked them using an automated data-logging receiving station. Using data, he described distances between Roseate Tern foraging and nesting sites. This research enables managers to determine which aquatic areas and prey fish stocks are in the greatest need of protection in terms of successful Roseate Tern nesting. In addition, Zingo monitored nests and chicks daily, recording nest attendance, and chick provisioning using field observations and 24-hour video surveillance. This research may extend benefits to several species of marine animals by preserving crucial foraging areas and fish stocks.

Marine Legislation

Commercial ventures, coastal development, and overfishing threaten the ecological integrity of the Sounds and its coastal waters. The following abstracts note conservation strategies, marine reserve management, and fisheries management designed to complement marine legislation for the conservation and protection of the Sounds.

Dean Anson (2006)

Developing a Comprehensive Ecosystem Health and Program Effectiveness Analysis for the Long Island Sound National Estuary Program Office
Nicholas School of the Environment and Earth Sciences
Duke University

The Long Island Sound (LIS) office of the National Estuary Program (NEP) is in charge of rejuvenating and protecting its estuaries and watersheds.

Dean Anson, a Master's candidate in Environmental Management at Duke University, worked with the LIS NEP office to develop an integrated approach to measure their success in protecting the health of Long Island Sound. He worked with other NEP offices, partner organizations, and local stakeholders to synthesize information provided by the Pew Oceans Commission, the U.S. Commission on Ocean Policy, and the Heinz Center to make recommendations on how best to proceed with the restoration and protection of Long Island Sound estuaries and watersheds. Anson said of the project, "It has the potential to benefit not only stakeholders throughout the LIS watershed, but also those individuals who live in areas managed by other NEP offices."

Alison Armstrong (2000)

The National Invasive Species Act of 1996: A Proposal for Successful Re-authorization of Ballast Water Legislation
Department of Marine Affairs, University of Rhode Island

Along with international trade, aquatic nuisance species are transported to the States. These species can displace native species and affect marine ecosystems. Alison Armstrong, a Master's student of Marine Affairs at the University of Rhode Island, focused her thesis on the National Invasive Species Act of 1996, centered on ballast water and invasive species. Armstrong studied ballast water legislation and potential improvement in the future legislation.

Armstrong found that regulation of ballast water discharge and non-indigenous species need to be addressed. Armstrong stated in her thesis that it will be up to researchers to impress upon the public the importance of this consensus.

Kimberly Barbour (2015)

Marine Meadows Habitat Restoration and Stewardship Initiative
Cornell Cooperative Extension of Suffolk County

Cornell Cooperative Extension of Suffolk County's Marine Meadows Program represents a collaboration of a successful scientific restoration program with an effective public involvement campaign and stewardship initiative. Through this program, residents, school groups, and community groups are provided with educational and hands-on opportunities to restore coastal habitat, which is essential to maintain biodiversity and protect shorelines from erosion.

There are three main objectives of this project. The first objective is to increase awareness and understanding of the importance of coastal plant communities, or marine meadows, to our aquatic, wetland and dune ecosystems. Next, the project aims to connect individuals to opportunities to help restore dune grass, marsh grass, and submerged aquatic vegetation through the Marine Meadows Program. Finally, Kimberly Barbour hopes to expand the coastal plant-growing network by training students and community members to cultivate native varieties of ecologically important species for use in coastal restoration projects.

There will be both a school based component and a community based component. In the school-based component, classroom and place based programming will be delivered to schools and community groups. Some topics covered will be the introduction to the Long Island Sound watershed and estuary ecosystem, salt marsh ecology, wetland and dune systems, biodiversity and invasive species, and coastal plant cultivation. The community-based component consists of the establishment of a coastal plant-growing site. Coastal plant growing locations will be established and utilized to cultivate marsh grass (*Spartina alterniflora*) and beach grass (*Ammophila breviligulata*). Plants will be utilized in restoration projects at designated receiving areas in the Long Island Sound Watershed.

Further, there will be a series of Marine Meadows workshops led by Cornell Cooperative Extension's educators. Topics covered will be seed collection and propagation of marsh grass, beach grass propagation and care, and planting workshops for marsh and dune grasses. There will also be a multi-media awareness campaign in which a series of multimedia pieces will be developed, highlighting the work of the Marine Meadows Program and the students and community members involved. Students will develop PSA's as a part of their classroom based programming, and footage of plant cultivation and restoration plantings will be documented and featured in CCE's news magazine show, On the Water and In the Field, which airs on HamptonsTV, Public Access channels, and Vimeo.

Sarah Cahill (1998)

Institutional Frameworks and the Use of Riparian Buffers for Nonpoint Source Pollution Reduction in Southern New England
University of Rhode Island

Formulating and implementing policies to reduce non-point source pollution are difficult in part because of the inherently diffuse nature of this type of pollution, and subsequent difficulties in identifying individual polluters. Land use management is one way of improving water quality without specifically identifying polluters, and the Conservation Reserve Enhancement Program (CREP) is one of these types of programs. It uses a voluntary land retirement program that provides farmers and ranchers with sound financial packages for conserving and enhancing the natural resources of farms.

While a Master's student in the Department of Marine Affairs at the University of Rhode Island, Sarah Cahill identified the environmental and institutional needs of Connecticut, Rhode Island, and Massachusetts to participate in CREP. Considering that land must be located within a national or state conservation priority area, and that land must be used for highly beneficial environmental practices, Cahill determined that Connecticut would be the state most capable of facilitating interagency coordination. Connecticut contributes waters to Long Island Sound, one of the four national conservation priority areas, and has land suited for

riparian buffer zones. Connecticut's agriculture contributes only a small percentage of nitrogen and phosphorus to receiving waters, and farmland represents a small percentage of the total land, but there are areas in the state that could qualify for the CREP. Cahill created a map of agencies in each state and their potential roles in CREP. She hopes that her findings aid in developing viable policy options for controlling non-point source pollution.

James T. Carlton (1998)

Environmental and Policy Research in the Long Island Sound Region
The Maritime Studies Program, Williams College and Mystic Seaport

The Williams College-Mystic Seaport Maritime Studies Program (Mystic, Connecticut) allows undergraduates to study Marine Science, Marine Policy, Maritime History, and Literature of the Sea. Twenty-four students from a variety of schools spend a semester at Mystic Seaport.

James Carlton, Professor of Marine Sciences at Williams College, directs the program and enables students to continue their research on Long Island Sound environmental science and policy issues during the summer field season. All projects focus on critical environmental science and/or policy issues in the Long Island Sound region. Examples of projects supported include Andrew Chang and Elizabeth Wellis, *Marine Bioinvasions: The Role of Fishing Vessel Wet Wells in Transporting Living Marine Organisms within, to and from Long Island Sound*; Joshua A. Goldstein, *Phytoplankton Response to Storm-induced Nutrient and Physiochemical Pulses in a Subestuary of Long Island Sound*; and *Amber Marra, Size and Distribution Patterns of a Salt Marsh Amphipod* (Orchestia grillus) *in Barn Island Marsh, Connecticut.*

Chase Gruber (2013)

Economic Evaluation of Seal Depredation on Cape Cod Groundfish Sector Fishery
Nicholas School of the Environment and Earth Sciences
Duke University

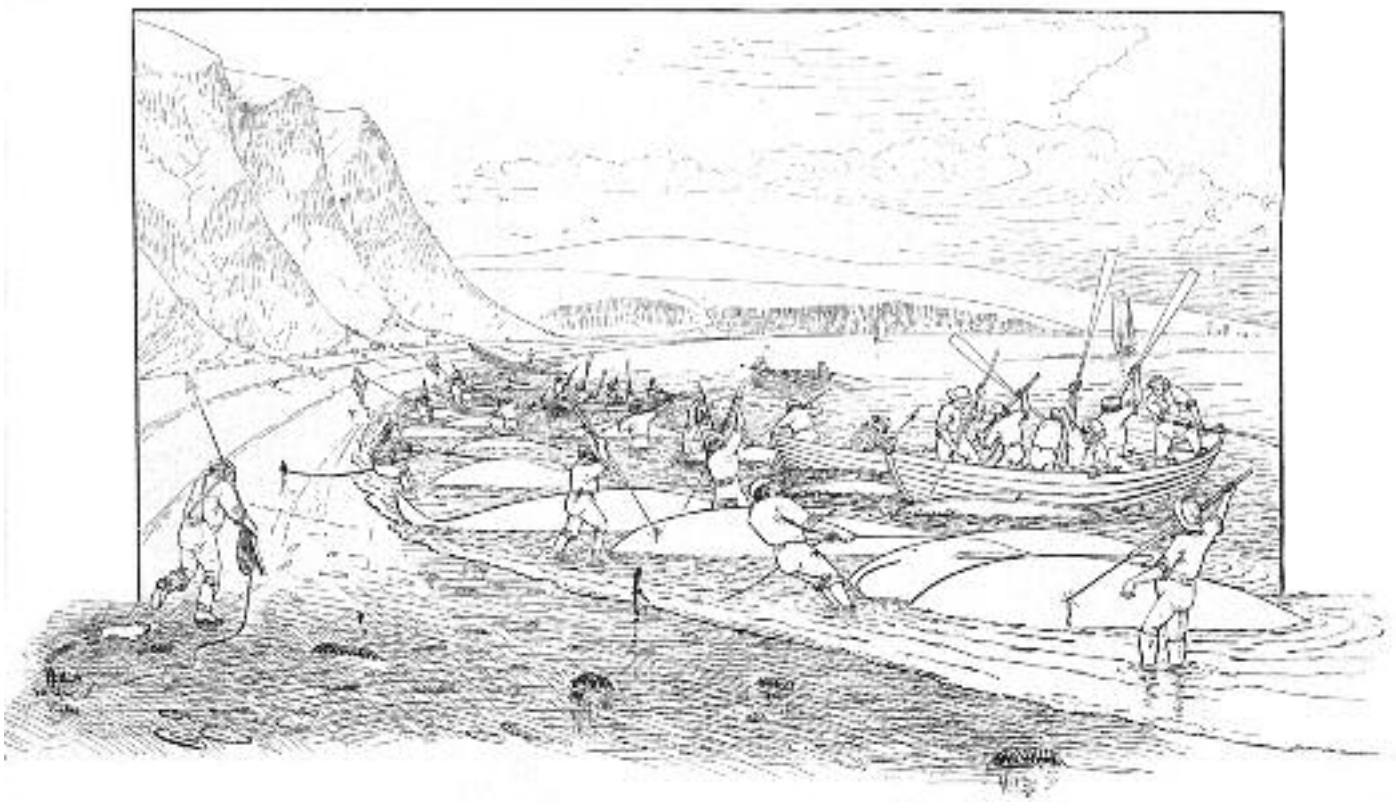
Chase Gruber, a student at Duke University's Nicholas School of the Environment, requested funding from the Sounds Conservancy for his internship at the Cape Cod Commercial Hook Fishermen's Association (CCCHFA) in the summer of 2013. During his internship, Gruber studied the economic effects of seal depredation on the Cape's fishing fleet. Protection provided to gray seals since the inception of the Marine Mamal Protection Act of 1972 has led to the proliferation of the species. This surge in seal population, however, has had an adverse affect on the fishing hauls of commercial fishermen on the Cape.

Gruber developed an economic survey for fishermen to complete each year, quantifying monetary losses incurred due to seal depredation on catches and entanglement in fishing gear. Gruber hoped that a widely distributed survey would lead to the development of effective fishery management and policy recommendations to mitigate the negative effects of grey seals, thus benefiting the fishermen of Cape Cod.

Dr. Noel Healy (2013)

Developing a Citizen Scientist Guide to Coastal and Marine Spatial Planning
Geography Department, Salem State University

Dr. Noel Healy, working with Dr. Wesley Flannery, focused on the development of Coastal and Marine Spatial Planning (CMSP); a critical area of focus for coastal communities. CMSP



affords communities the opportunity to participate in the development of plans, and acknowledges the importance of incorporating local knowledge. It does not, however, envisage a role for citizen-based, locally developed scientific knowledge. Citizen science is the process whereby citizens are involved in science as researchers, and has also been referred to as community science. This project, therefore, explored the way in which citizen science could be used at various points of the CMSP process, from objective-setting, to plan implementation and monitoring.

The National Ocean Policy Implementation Plan, while envisaging a vital role for coastal communities in developing and implementing marine plans, suggests that the flow of scientific knowledge will be top-down. Thus, Healy's project explored the potential for citizen-based science in CMSO, ultimately developing a citizen scientist guide to CMSP. Healy hoped that his project would assist in a greater understanding of the socio-economic and ecological benefits of citizen scientist CMSP processes. The development of a Citizen Scientist Guide would also contribute to CMSP literature and call to increase the use of bottom-up, user-driven research to inform conservation decision-making.

Chiu-Yen Kuo (2008)

The Effect of Spatial Scale on the Estimation of Fish Diversity and Implications for Marine Reserve Management
Marine Sciences, University of Connecticut

Reserves protect marine habitats and prevent the collapse of marine ecosystems, and the importance of species diversity has attracted an interest in reserve designation to maintain a stable system. However, patterns of species diversity and the dominant factors associated with these patterns vary with differing spatial scales. Understanding the distribution of biological diversity across a range of spatial scales is important to maximize efficiency when selecting areas for protected status.

Chiu-Yen Kuo used existing data to estimate spatial patterns of fish diversity and analyzed associated factors in the Gulf of Maine. Using Geographic Information Systems (GIS), Kuo, a doctoral student at University of Connecticut at Storrs, illustrated how species diversity hotspots and species distribution patterns vary with the spatial scale of observation. She determined the importance of how the environment correlates with fish diversity. Kuo's work allowed managers to allocate reserves of proper size and location throughout the marine environment. The benefits of this study include maintaining the complexity and quality of fish habitat, increasing the abundance and size of exploited species inside reserves, conserving biodiversity, maintaining fishery sustainability, enhancing fecundity, and providing educational research opportunity.

Catherine Latanich (2006)

An Evaluation of the Use of Catch Limits in Fisheries Management Policy
Cape Cod Commercial Hook Fishermen's Association
Duke University

The Cape Cod Commercial Hook Fishermen's Association (CCCHFA) is a member-based non-profit organization started by commercial fishermen and coastal residents of the Cape concerned with preserving ocean resources. Working with CCCHFA, Catherine Latanich, a Master's of Environmental Management at Duke University, produced a catalogue of domestic and foreign fisheries currently managed under hard TAC (total allowable catch) limits. (Hard TAC limits are caps on the total annual harvest from a fishery and help to prevent overfishing while enabling fishermen to maximize the value of their harvest and minimize wasteful regulatory discards.)

Latanich examined the range of management techniques implemented by the

United States' regional fishery councils, met with representatives of these councils, and identified aspects of catch-limit management systems that are effective. She characterized participants and harvesting techniques by examining the ways in which knowledge and values are passed between generations of fishermen. The final catalogue was distributed to funders and used in CCCHFA's effort to educate the public about the need to incorporate catch limits into New England fisheries.

Susan McNamara (2010)

Long Island Sound Research Conference
Long Island Sound Education

The Long Island Sound Research Conference started in 1992 as a biennial conference bringing scientists together to discuss their research and findings on Long Island Sound. Participants have also published *Proceedings* volumes from each conference on the research presented. Each conference has brought together individuals from Connecticut, New York, Long Island, Rhode Island, Washington, and Massachusetts. The goal is to gather new data on Long Island Sound, to educate attendees, and to bring awareness of issues to inhabitants of the Long Island Sound area. Since 1992, approximately 150 people have attended each day-and-a-half long conference.

The conference for 2010 was held at the University of Connecticut, Stamford campus on Friday, October 29 and Saturday, October 30. The program continued with oral presentations and a poster session. QLF's grant helped to support the continuation of these annual meetings, which are integral to the continued support of New England's Sounds.

Christine A. O'Connell (2008)

Marine Zoning: An Ecosystem-Based Approach to Conservation and Management of Long Island Sound
School of Marine and Atmospheric Science
Stony Brook University

Commercial ventures, coastal development, overfishing, loss of habitat, and climate change threaten the integrity of Long Island Sound. Christine O'Connell, a Ph.D. student at Stony Brook University, believes that with increasing coastal development pressure and new interest in commercial development of local marine resources, marine zoning is an important and timely management tool for Long Island Sound.

O'Connell studied ways in which an ecosystem-based comprehensive zoning plan can be implemented in Long Island Sound as a part of her doctorate research. She explored the theoretical and conceptual basis of marine planning and proposed methods of implementation while considering existing efforts, jurisdictional efforts, and social constraints. O'Connell designed a governmental framework for her suggestions and explained how zoning can help sustain biodiversity and ecosystem health. Her work serves as a guide for discussions among communities, scientists, the Long Island Sound Study, and various governmental agencies.

Elizabeth J. Pillsbury (2006)

Turbulent Waters: The Transformation of Long Island Sound
Department of History, Columbia University

The coastal land surrounding Long Island Sound is heavily populated, and the residents of this area use the Sound for many different purposes. It is a site for recreational boating, fishing, waste disposal, industrial transportation, and is the depository of a watershed that drains land in six states and hundreds of cities and towns.

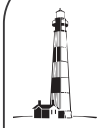
Elizabeth Pillsbury is a Ph.D. candidate in History at Columbia University. Pillsbury used oral histories, state archival sources, scientific studies, environmental organization records, and new accounts to trace the developments that led to an effort in the late 1980s to Save the Sound from the perils of pollution. Her project examined the conflicting demands put upon the Sound by its many users and the questions they have raised at how best to protect the ecology of this susceptible body of water. By explaining environmental crises of the past and methods used to remediate them, she brought increased attention to the need for far-sighted management programs and conservation efforts in and around Long Island Sound.

Elizabeth J. Pillsbury Ph.D. (2010)

American Bouillabaisse: The Ecology, Politics and Economics of Fishing around New York City, 1870-present
Stony Brook University - Horace Mann School
New York City, New York

A day of fishing has come to represent "the good life" in the American psyche, as well as the adventure of the American Dream. Yet this vision of American popular culture belies the reality of sport fishing in the United States, which has become a business generating billions of dollars in sales and employing more than a million people across the country. Just as the sales of tackle, bait, boats, and gear add up as one fisherman joins forty-four million others, so too does their collective ecological impact. As coastal resources continued to decline over the course of the twentieth century, both sport fishermen and the businesses that profit from them have long fought to protect fish populations along with their ability to continue fishing. Understanding the complex scientific, political, economic and ecological history of fisheries politics is critical to developing better policies in the future.

Pillsbury's book argues that the rise of a saltwater sport fishing industry along the Atlantic Coast undermined efforts for meaningful marine conservation policies from the late nineteenth century until the present day. The breakdown of a former alliance between sportsmen and small-scale market fishermen resulted in deep political and social divisions that prevented the enactment of effective regulatory policies to prevent over-fishing and habitat destruction. The politicization of competing fishing interests coupled with opposing theories in marine science resulted in legislation that fueled the expansion of the sport fishing industry and large-scale commercial operations with little protections for fish populations. The resultant marine policies undermined coastal fishing communities and coastal ecologies up and down the Seaboard, particularly around the waters of Long Island Sound.



Pillsbury analyzed scientific reports, transcripts of governmental hearings, and the newsletters and magazines of various interests groups to research the effects of the establishment in the seventies of modern fisheries management. She also conducted interviews with fishermen in Southern New England and the Northern Mid-Atlantic, in order to more fully understand attitudes of the region's fishermen toward state regulation, the marine environment, and fishing generally.

Michelle Portman (2005-2006)

Marine Conservation Strategies from Land-Based Experience
University of Massachusetts Boston

Little research has been done on zoning as a marine conservation tool, and virtually none has considered the multi-jurisdictional aspects of zoning implementation in marine and coastal areas. For the first part of her research leading up to her Ph.D. dissertation on Marine and Coastal Conservation, Michelle Portman examined a model of multi-jurisdictional zoning put in place on the Cape Cod National Seashore in Massaschusetts. This model required the six townships of the outer Cape to adopt specific zoning by-laws for private properties that existed within the park boundaries when it was established. In theory this would allow continued private use of the land while adhering to the federal conservation goals of the park. Portman, studying at University of Massachusetts Boston's McCormack Graduate School of Policy Studies, found that implementation of the model varied between towns and that historical records were not definitive in the description of what existed at the time of the park's inception. She suggests that this confirms the importance of long-term planning and information technologies (i.e. mapping) in applying this type of legislation to marine environments.

Considering the institutional and physical differences between land and sea, Portman wanted to determine whether NGOs, particularly land trusts, are able to use their experience with land protection to develop marine programs. In 2006, she examined three land-trusts that have branched out to include marine protection: The Long Island Chapters of the Nature Conservancy (LIC), Dorset Wildlife Trust (DWT), and the Bahamas National Trust (BNT). Portman found that the use of certain conservation tools often relate to the organizational characteristics of the land trust. Portman also expressed the need to track the degree of success that land trusts and other NGOs have while implementing various forms of marine protection.

Dr. Michelle Portman (2009)

Public Perception and Environmental Impact Assessment of Offshore Wind Farms
Marine Policy Center, Woods Hole Oceanographic Institution

Climate change and renewable energy projects and technology have captured the world's attention. Among the most promising

of these projects are offshore wind farms. Proponents of offshore renewable energy technologies and members in the environmental community believe that Europe, primarily the U.K., Denmark, and Germany, have more rapidly approved offshore wind projects than compared to the U.S.

During the fall of 2009, Dr. Portman researched issues of concern to U.S. and German stakeholder communities regarding offshore wind projects, and prioritized them to better understand public perception for these types of projects. U.S. offshore wind projects, especially the Cape Wind Project off the shores of Cape Cod, Massachusetts, have drawn public dissent, encumbering the process of their implementation. Portman sent questionnaires to German and U.S. stakeholders, targeting the public, environmental agency officials, industry representatives, and academics who are involved in the permitting of Cape Wind in Nantucket Sound. Results compared the perceptions of German and U.S. stakeholders on offshore wind projects and informed the debate about environmental impact analysis of these projects, and the aspects of the environment that are of most concern among stakeholders.

Save The Bay, Inc (2011)

Save the Bay's Bi-State Water Quality Coordination Initiative
Pawcatuck River Estuary and Little Narragansett Bay, Rhode Island

The Pawcatuck River estuary and Little Narragansett Bay (LNB) serve as the natural border between Rhode Island and Connecticut. Shared management of these waters has been lax over the years and bacterial and nutrient impairments are still major factors in water quality. Indeed, a recent study by the Rhode Island Department of Environmental Management (RIDEM) noted that, "every segment of the Pawcatuck River and LNB waters…violate one or both parts of the fecal coliform standard during dry and or wet weather." Sources of bacterial contamination in the estuary include wastewater, stormwater, septic systems and cesspools, waterfowl and pets, effectively closing shellfishing in the area entirely or in part since 1942. In 1993, The National Oceanic and Atmospheric Administration (NOAA) recommended that a management plan was needed to foster cooperation between Rhode Island and Connecticut, yet little has been done since then.

With 40+ years of successful advocacy, Save The Bay created a multi-year plan to establish a working group of representatives from federal, state and local agencies to address the water quality in the Pawcatuck River estuary and LNB to work to improve the lines of communication between each state; to create economic incentives and physical solutions; to develop a supportive regulatory and legal framework; and to generate public support for local policies and projects to bring real movement towards the goal of fishable, swimmable waters. QLF's grant supported ongoing workshops and public outreach materials needed to build both municipality and community support. Deliverables included regularly scheduled meetings, workshops to address specific issues, educational materials, and community education and outreach.

Save The Bay's first convening meeting was recently held. Representative from USEPA, US Fish and Wildlife, RIDEM, CT Department of Environmental Protection, RI Coastal Resources Management Council, RI Department of Transportation, URI, UCONN, Connecticut Bureau of Agriculture, Westerly, Watch Hill Fire District, Stonington, the Stonington Shellfish Commission and Clean Up Stonington Harbor, Watch Hill Conservancy, Westerly Land Trust and the Wood-Pawcatuck Watershed Association met for a daylong conference to discuss stormwater, shellfishing, water quality monitoring, waterfowl and education. This plan will become model for collaborative partnerships and a strong watershed approach to finding solutions.

Lisa Sette (2011)

Monitoring Seal Depredation in the Nantucket Sound Weir Fishery
Seal Studies Program – Provincetown Center for Coastal Studies

The weir fishery in northeastern Nantucket Sound uses sustainable fishing gear to harvest squid and finfish with minimal impact on the environment (unwanted catch is released alive, often without leaving the water). This fishery has faced declining catches over the past decade and is now experiencing frequent depredation by gray seals, which consume, damage, or drive out catches of squid and fish. Through a working group of fishermen and scientists, gear modifications have been identified as a possible means to reduce catch losses due to gray seal depredation. However, it is necessary to first fully characterize the behavior of the seals in relation to the fishing gear and target species in order to develop such modifications.

This project proposed monitoring in the weir fishery in Nantucket Sound as a joint project with the Provincetown Center for Coastal Studies and local fishermen. Their goal was to conduct boat-based observations and use photo-identification to determine if random individuals raid the weirs or if there is individual specialization by a select few. As part of the project, Sette proposed the use of underwater video to monitor seal behavior in relation to fishing gear and prey. Sampling of weir landings and partially consumed prey were conducted to determine preferred seal prey types. A hydrophone was used to record ambient noise and sounds produced by fishing activity, fish, and seals to characterize the acoustics of interactions.

The benefits of the project included a unique and timely opportunity to pool the resources and knowledge of experts to build on previous work to help a struggling sustainable fishery survive by developing innovative non-harmful gear modifications or acoustic deterrents to reduce seal depredation. Sette intends to share the data collected with experts worldwide in order to inform the development of methods to reduce depredation. Results of this study will be presented at conferences and submitted for publication in a peer-reviewed scientific journal.

Appendix – GRANTEES LISTED BY SOUND

LONG ISLAND SOUND

Dean Anson (2006)
Developing a Comprehensive Ecosystem Health and Program Effectiveness Analysis for the Long Island Sound National Estuary Program Office
Nicholas School of the Environment and Earth Sciences
Duke University

Maria Iliana Ayala (1996)
Protozoans as Indicators of Pollution Level
Yale School of Forestry and Environmental Studies

Teresa Ayala (2002)
A Study of the Feeding Habits of the Diamondback Terrapin (Malaciemys terrapin) *in Long Island Sound*
Mt. Sinai High School

Karen Baar (2011)
Green Infrastructure Project 2011
Connecticut Fund for the Environment/ Save the Sound
New Haven and Bridgeport, Connecticut

Karen Baar (2008)
Clean Up Your Act: Watershed Cleanup
Save the Sound, Connecticut Fund for the Environment

Carlos Ballon (2015)
The parasite Cryptocotyle lingua *reduces consumption rate of* Littorina littorea
Adelphi University

Thomas R. Baptist (2002)
The Great Captain's Island Heron and Egret Rookery Study
Connecticut Audubon Society
Great Captain's Island

Kimberly Barbour (2015)
Marine Meadows Habitat Restoration and Stewardship Initiative
Cornell Cooperative Extension of Suffolk County

John S. Barclay
Collect and Identify Plankton (Barnacle Larvae) *from Near-Shore Blooms – Measure for Heavy Metals and Possible PCBs*
University of Connecticut, Avery Point
The Wildlife Conservation Research Center

Barbara Bauer (2004)
Conservation and Management of Diamondback Terrapins in the Long Island Sound
Long Island University

Lee Ann Beauchamp (2001)
SoundWaters Environmental Learning Lab Internship
SoundWaters Inc.

Sara Owen Bisson (2004)
Assessment of Heavy metal Contaminant Levels, Transport Mechanisms, and Potential Health Impacts of Polluted Sediments at the Mouth of the Quinnipiac River in New Haven, Connecticut
Yale School of Forestry & Environmental Studies

Abigail Bockus (2014)
The Physiological Consequences of Climate-Induced Acidification and Warming on Metabolism and Acid-Base Balance in the Spiny Dogfish (Squalus acanthias)*: Northeast Fishery and Ecosystem Instability in Response to Climate Change*
University of Rhode Island

Kate Boicourt (2008)
Refining Restoration Strategies: Assessing M-Type Phragmites australis *Removal in Long Island Sound*
Yale School of Forestry & Environmental Studies

Jane Brawerman (2007)
Conduct Comprehensive Inventory/Assessment of Natural Communities and Unique Features of Salt Island Overlook
Connecticut River Coastal Conservation

Matthew Cacopardo (2003)
Accumulation of Containment Metals by Marine Bivalves in New Haven Harbor
Southern Connecticut State University

Mark Carabetta (2000)
Patterns and Rates of Phragmites australis *Expansion and Retreat*
Connecticut College

James T. Carlton (2010)
Shifts in Shrimp Communities: Detecting Introductions and Range Expansions of Estarine Shrimp in Long Island Sound
The Maritime Studies Program, Williams College and Mystic Seaport

James Robert Collins (2010)
Controls on Nutrient Flux and Productivity in Long Island Sound: Variation Over Multiple Time Scales
Yale School of Forestry & Environmental Studies

Jennifer Cooper (2000)
Erosion of Sensitive Coastal Wetlands at the Charles E. Wheeler Wildlife Sanctuary, Milford Point, Physical Mechanisms and Long-term Rates of Change
Southern Connecticut State University
Connecticut Coastal Audubon Center

Dr. Cynthia Coron and Dr. Thomas Fleming (2003, 2005, 2010-2011)
Monitoring the Contaminant Budget into Long Island Sound From Milford, Connecticut Tidal Marshes
Southern Connecticut State University

Sean Corson (2000)
West River Anadromous Fish Study
Yale School of Forestry & Environmental Studies

Robert Crafa (2004)
Developing a Sustainable Hatchery
The Waterfront Center

Jessica Darling (2005)
The Role of Nutrients in Marsh Drowning in Long Island Sound
Yale School of Forestry & Environmental Studies

Henry Scott DeBey and Gaboury Benoit, Ph.D. (2010)
Developing an Approach for Coastal and Marine Spatial Planning (MSP) of the Long Island Sound
Yale University

Aline Euler (2007, 2014)
Little Neck Bay – Long Island Sound Festival
Alley Pond Environmental Center

Christopher Field (2006)
Lighthouse Point Park "Important Bird Area" Conservation Plan
University of Connecticut

Debora Fillis (2004)
Application and Evaluation of a Rapid Assessment Technique for New England Salt Marshes
Yale School of Forestry & Environmental Studies

Allison S. Mass Fitzergerald (2010-2012)
The Effects of Chronic Habitat Degradation on the Physiology of Eastern Oysters, Crassostrea virginica/ *The Use of Cellular Biomarkers in Assessing Restored Oyster Reefs in New York City*
Biology Department, College of Staten Island, CUNY

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University

Christina Garabedian (1999)
Hypoxia Dynamics in Long Island Sound
Save the Sound

Jason Garnett (2009)
Sampling, Analyzing, and Communicating Hypoxia in Southwestern Connecticut
Soundkeeper, Inc.

Jason Garnett (2013)
Soundkeeper Curb Marker Project
Soundkeeper, Inc.

Jason Garnett (2014)
Soundkeeper Purple Martin Birdhouse
Soundkeeper, Inc.

Jason Garnett (2013-2014)
Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.

Jason Garnett (2015)
SoundScaping Booklet Printing and Distribution
Project Administrator, Soundkeeper, Inc.

Corey M. Grinnell (1999-2000)
Effects of a Shoreline Protection Project on Roseate Terns
University of Massachusetts Amherst

Nancy Haley (1996)
Atlantic Sturgeon Concentrations in Long Island Sound
University of Massachusetts Amherst

Torrance Hanley (2007)
Ecological Stoichiometry and Predation: Examining Life History Trade-offs in Daphnia
Department of Ecology and Evolutionary Biology
Yale University

Kari B. Heinonen (2005)
Impacts of the Invasive Crab Hemigraspus sanguineus *on a Crustacean-Eating Guild of Fishes in Long Island Sound*
Marine Sciences, University of Connecticut

Troy Hill (2007)
The Effect of Nutrient Enrichment on Carbon Dynamics in Long Island Sound Salt Marshes
Yale School of Forestry & Environmental Studies

Tim Hoffman (1998)
Geomorphic Processes and Evolution of Wildlife Habitat at the Charles E. Wheeler Wildlife Management Area at the Mouth of the Housatonic River
Southern Connecticut State University

Julia Hyman (2007-2008)
Stamford Harbor Monitoring Project
Soundkeeper, Inc.

George Jackman (2008)
The Decline of Winter Flounder: Which Nurseries Matter?
Ecology, Evolution, and Behavior Sub-program
Queens College, CUNY

George Jackman (2012)
Determining Habitat Usage, Life History Patterns, and Population Structuring of Winter Flounder Through Otolith Microchemistry
Biology Department, Queens College, CUNY

Xiaodong Jiang (2008)
The Evolution of Zooplankton Resistance to Harmful Algae Blooms
Marine Science Research Center, Stony Brook University

Captain David Johnson (2004, 2006, 2008, 2010)
Port Jefferson Harbor Shellfish Restoration Project
Long Island Seaport and Eco Center

Captain David Johnson (2006-2010, 2013)
Coastal Steward
Costal Steward Investigations (CSI) Program

Margarett L. Jones (2009-2011, 2013)
Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center

Michelle J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
Patuxent Wildlife Research Center
Connecticut Audubon Society

Anne LaFleur(1996)
Chester Creek Vegetation Survey and Management Guide
Chester Land Trust

Alicia Landi (2010)
Selection of Spawning Habitats by Horseshoe Crabs along the Complex Connecticut Coastline
University of Connecticu

Maura Leahy (2004)
Great Gull Island Bird Nesting Habitat Restoration
Yale School of Forestry & Environmental Studies

Thomas Maloney (1998)
Anadromous Fisheries Restoration Manual
Connecticut River Watershed Council

Jennifer R. McCann (1995)
The Lieutenant River Watershed: Environmental Impacts and Monitoring Plan
Antioch University New England

Susan McNamara (2010)
Long Island Sound Research Conference
Long Island Sound Education

Susan McNamara (2009)
Marine Science Day
Long Island Sound Foundation

Sandra Millan-Tripp (2006, 2008)
Video Production of the Natural Flow Hatchery Pilot Project for the Atlantic Salmon Restoration at Mill Brook, Old Lyme, Connecticut; Atlantic Salmon Incubation Tray WebCam
Tributary Mill Conservancy, Inc.

Stacy Myers and Mary Morgan (2006)
Removing and Composting Hemigrapsus sanguineus *in Long Island Sound*
Cornell Cooperative Extension of Suffolk County

Christine A. O'Connell (2008)
Marine Zoning: An Ecosystem-based Approach to Conservation and Management of Long Island Sound
School of Marine and Atmospheric Sciences,
Stony Brook University

Suzanne O'Connell (2006)
Complexities of Community-Based Conservation: Environmental Decision Making in the Lower Connecticut River
Department of Earth and Environmental Sciences
Wesleyan University

Kathleen O'Sullivan (2007-2008)
Bayless Boat Shed and Educational Programs
President Long Island Seaport & Eco Center

Eric Palkovacs (2004)
Fishways as a Method for Anadromous Alewife Restoration in Connecticut
Yale University

Katherine J. Papacostas (2012)
Generalists or Individual Specialists? A Comparison of Resource Use Among Native and Invasive Crabs in Long Island Sound
Temple University Biology Department

Laurie L. Perino (2008)
Short and Long-term Effects of Harmful Algae on Three Important Bivalve Species
Marine Science Research Center, Stony Brook University

Sara Petrochic (2007)
The Ecological Role of Diamondback Terrapins in the Structure and Dynamics of Benthic Communities in Oyster Bay Harbor
Long Island University

Elizabeth J. Pillsbury (2006)
Turbulent Waters: The Transformation of Long Island Sound
Columbia University

Suzanne Polmar (2002)
A Study of the Restoration of Anadromous Fish in the West River Watershed
Yale School of Forestry & Environmental Studies

Jessica R. Price (2010)
The Effect of Fiddler Crab Behaviors on Salt Marsh Ecosystem Function in the Presence or Absence of Avian Predation
Yale School of Forestry & Environmental Studies

James F. Reinhardt(2007)
Ontogenetic Changes in the Material Properties of the Colonial Sea Squirt Didemnum, a Recent Invader to LIS
Department of Marine Sciences, University of Connecticut

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Erika L. Rogers and Michael S. Berger (1996)
A Guide to Ascidian and Bryozoan Recruits of Eastern Long Island Sound
University of Connecticut – Avery Point

Melissa Ryan (2008)
Maritime Careers and Long Island Sound
Ocean Technology Foundation

Jennifer E. Saunders (1997)
Save the Sound Education Internship
Save the Sound

Rebecca A. Schultz (2013)
Differentiating Drivers of Marsh Loss in Long Island Sound
Yale School of Forestry & Environmental Studies

Diane Selditch (1999)
Senior Ecology Workshop
SoundWaters, Inc.

William P. Shadel and Aubrey McMahon (2002-2003)
Save the Sounds Water Quality Monitoring Program
Save the Sounds

Susan Snider (2007, 2009, 2013)
Sheffield Island Lighthouse "Linking the Past to the Present"
Wild and Scenic Film Festival
Norwalk Seaport Association

Susan Snider (2012)
Let's Go Outside
Friends of the Norwalk Islands, Inc.

Jonathan Stone (2014)
Eelgrass Restoration Program
Save the Bay Inc.

Richard Tiani (2006)
Active Waterfront Education Program (AWE)
Groundwork Bridgeport, Inc.

Marcia J. Tobin (1995)
Effect of Tide Gates on Sedimentation Rates in Tidal Wetlands
Yale School of Forestry & Environmental Studies

Cornelia W. Twining (2011)
The Ecological History of Coastal Connecticut's Watersheds
Yale School of Forestry & Environmental Studies
Coastal Watersheds of Connecticut

Dr. Lucy Vlietstra (2004)
Potential Implications of Unusual Early Ctenophore Blooms for the Fisheries of Long Island Sound
U.S. Coast Guard Academy

Sandra Walczyk (2002)
Educational Brochure: Enjoy and Protect Our Water and Wildlife
Volunteers for Wildlife

John Waldman (2010)
Publish Results of Kimberly Williams Master's Thesis Research (Striped Bass Wintering at Power Plants) in the Northeastern Naturalist – Aspects of the Wintering Biology of Striped Bass at a Power Plant Discharge
CUNY

Annika Walters (2006)
The Impacts of Anadromous Alewife on Nutrient Loading in Coastal Streams
Yale University

Beth Weinman (2002)
The Geochemical Significance of the Breakwater in Flushing Bay: The Effects of Reoxidation on Sulfide-bound Metals
Department of Geology, Queens College

Michael Weiss, Colleen Cook, Eric Goodman (2001)
So You Want to Grow Some Scallops: A High School Research Project to Reintroduce and Sustain a Scallop Population in Oyster Bay, Long Island
Friends Academy

William Jerry West Jr.(1996)
Quinnipiac River Biodiversity Inventory
Yale School of Forestry and Environmental Studies

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York at Stony Brook

Lillian Willis (2006-2008)
Property Brochure: "How to Manage and Landscape Your Property"
Norwalk River Watershed Association

Chester B. Zarnoch (2008)
The Use of Selectively-Bred and Wild Hard Clams for Stock Enhancement
Baruch College, CUNY

James M. Zingo (1999)
Foraging Ecology and Reproductive Success of Endangered Roseate Terns
University of Massachusetts Amherst

FISHERS ISLAND SOUND

Donald M. Anderson (1999)
The Impact of Dredging Operations on Toxic Cyst Distributions and Subsequent Red Tide Blooms
Woods Hole Oceanographic Institution

John Bean (2000)
The Importance of Organic Forms of Nitrogen to Coastal Pollution
University of Connecticut – Avery Point

Michael Bednarski (2006)
Biology of the Thames River's Unique Wintering Aggregation of Striped Bass
Queens College

Lenny Bellet (1997)
The Effects of Nitrogen Loading on Two Fringing Marshes in the Mystic River Estuary
Connecticut College

James T. Carlton (1998)
Environmental and Policy Research in the Long Island Sound Region
The Maritime Studies Program, Williams College and Mystic Seaport

Julianna Connolly (2000)
Organic Carbon and Nitrogen Cycling in Coastal Soils
Williams College

Margaret L. Jones (2009-2011)
Coastal Ecology Programs and Scholarships for Summer Nature Camp
Denison Pequotsepos Nature Center
Mystic, Connecticut

Andrew M. Lohrer (1996, 1998)
Impacts of a Non-native Crab Invader, Hemigrapsus sanguineus*, on Long Island Sound Biota*
University of Connecticut – Avery Point

Rachel Neurath (2008)
Recent Sea level Rise Recorded at Barn Island Salt Marsh in Connecticut
The Maritime Studies Program, Williams College and Mystic Seaport

Tamara Rich (2001)
A River in Our Own Backyard
Mystic Art Association

Erika Schielke (2006)
Effects of Anadromous Alewife Restoration on Food Web Structure and Mercury Transfer
Ecology and Evolutionary Biology
Yale University

Lauren Stefaniak (2007-2008)
Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
University of Connecticut

BLOCK ISLAND SOUND

Lori K. Benoit(1995)
Impact of the Spread of Phragmites *on Populations of Tidal Marsh Birds in Connecticut*
Connecticut College

Leslie Katz (1999)
Watershed Management Plan for the Great Salt Pond, Block Island, Rhode Island, Present Status, and Projections for the Future
Center for Environmental Studies, Brown University

Teresa McKinley (2000)
Narrow River Restoration: Public Education and Information
Narrow River Preservation Association

Riley Young Morse (1996)
Habitat Selectivity and Movement of Young-of-the-year Winter Flounder
University of Rhode Island

Patricia Sullivan (2007)
Development and Implementation of Public Awareness Program for Responding to Distressed Marine Animals of the Sound
Marine Animal Survival Team
Cetacean Society International

Johan C. Varekamp and Ellen Thomas (2008)
Block Island, RI: A Microcosm for the Study of Anthropogenic and Natural Environmental Change
Earth and Environmental Sciences
Wesleyan University

RHODE ISLAND SOUND

Andrew Altieri (2005)
Assessing the Full Impact of Oxygen Depletion on the Narragansett Bay Estuarine Community
Brown University

Margaret Arbuthnot (2010)
Coastal New England Cottontail Habitat Restoration in Rhode Island
Yale School of Forestry & Environmental Studies
Rhode Island

Peter August and Janice Sasi (2015)
Ecological Reconnaissance of the Napatree Lagoon
Chair, Watch Hill Conservancy and Manager,
Napatree Point Conservation Area, Watch Hill Conservancy

Rebecca Barnes (2004)
Managing Nitrogen in Narragansett Bay: A Stable Isotope Approach
Yale School of Forestry and Environmental Studies

John F. Bruno (1997)
Species Composition and Large-scale Distribution of Cobble Beach Plant Communities in Narragansett Bay, Rhode Island
Brown University

Sarah Cahill (1998)
Institutional Frameworks and the Use of Riparian Buffers for Nonpoint Source Pollution Reduction in Southern New England
University of Rhode Island

Kristen M. Cammarata (1997)
Mapping Potential Mariculture Sites in Narragansett Bay
Brown University

Monica Candal (2004)
Nutrient Analysis for Eelgrass Restoration
Brown University

Jessica E. Conover (2010)
Decomposition Characteristics of Macroalgae Species in a Eutrophic Estuary
University of Rhode Island

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Nicole A. Dobroski (2000, 2002)
Geographic Variation in Claw Form and Function in an Invading Crab Predator & Ecological Role of a Highly Mobile Introduced Predator: The Foraging Behavior of Juvenile Crabs on a Temperate Rocky Shore
Northeastern University and University of Rhode Island

Daisy Durant, Ph.D. (2011)
Assessment of the Benthic Infaunal Community at Three Long-Term Water Quality Monitoring Sites within the Narragansett Bay Research Reserve
Narragansett Bay National Estuarine Research Reserve
Prudence Island, Rhode Island

Lindsey Fields (2009)
An Annual Mass Balance of Silica in Narragansett Bay, Rhode Island
Graduate School of Oceanography, University of Rhode Island

Eric Gauger (2000)
Susceptibility of Commercially Important Fish Species to Disease Caused by Vibrio carchariae
University of Rhode Island

Heather Giddings (2004)
Rhode Island Hard Clam Health Study
University of Rhode Island

Michele Guidone (2009-2010)
Examination of the Abundance and Relative Palatability of Select Ulva Species in Rhode Island/ Herbivore Impact on Macroalgal Blooms in Narrangansett Bay, RI
University of Rhode Island

Bart H. Harrison (1998)
Settlement of the Bay Scallop, Argopecten irradians, *to Eelgrass,* Zostera marina, *in the Presence of Macrophytic Algal Fouling*
University of Massachusetts Dartmouth

Emily Jones (2005-2006)
Impacts of Invasive Marine Algal Hosts on Epiphyte Species Diversity, Growth, and Survival
University of Rhode Island

Melissa Lage (2002)
Impact of Anthropogenic Disturbance on the Composition and Ecosystem Functioning of Microbial Communitiesin New England Salt Marshes
Brown University

George H. Leonard (1995)
Positive Interactions in the New England Intertidal Zone
Brown University

Ken M. Leonard III (1998)
Genetic Variation in Hatchery Populations and Wild Populations of Argopecten irradians *in New England*
University of Rhode Island

Ivan Mateo (2008)
Identification of Critical Habitat for Tautog by Otolith Chemistry
Department of Fisheries, Animal and Veterinary Science
University of Rhode Island

Mark Mello (2000)
It's Your River: The Slocums/ Paskamansett River Restoration Project
Lloyd Center for Environmental Research

Pia Moisander (2013)
Spatio-temporal Distributions of Brown Tide Causing Harmful Algal Species Cochlodinim polykrikoides *in Buzzard's Bay*
Biology Department, University of Massachusetts Dartmouth

Eric Morgan (2006)
Using Stable Isotopes to Assess Bioaccumulation in Narragansett Bay
University of Rhode Island Graduate School of Oceanography

Amy Munson (2004)
Significance of Matrix metalloproteinase *in Disease Resistant and Non-resistant Oyster Species of the Genus* Crassostrea
University of Rhode Island

Christine Newton (2009-2010)
Effects of Drift Macroalgae on Saltmarsh Communities/ Can Algae Save Our Salt Marshes?
Department of Biological Sciences, University of Rhode Island

Nancy J. O'Connor (1999, 2002, 2015)
Do Biofilms on Mesh Netting Used in Bivalve Aquaculture Stimulate Settlement and Molting of Crab Larvae?
University of Massachusetts Dartmouth

Daniel Orchard (2005)
Commercial Fisheries Road Show
The Commercial Fisheries Center of Rhode Island

Elaine Potter (2013)
Life Cycle Dynamics of the Bloom-Forming Macroalga Ulva rigida
University of Rhode Island

Nicole Rohr (2007)
Impacts of Marine Algal Epiphytes on the Recruitment of an Herbivorous Snail, Lacuna vincta, *in Rhode Island Sound*
Biological Sciences, University of Rhode Island

Nicole Rohr (2010)
Predatory Effects of Hemigraphsus sanguineus *on* Littorina littorea
Department of Biological Sciences, University of Rhode Island

Save The Bay, Inc (2011)
Save the Bay's Bi-State Water Quality Coordination Initiative
Pawcatuck River Estuary and Little Narragansett Bay, Rhode Island

Save the Bay, Inc. (2006)
Sunset Educational Series – Public Awareness Program
Narragansett Bay, Rhode Island

Sally Ann Sims (2011)
Effect of Sea Level Rise on Piping Plover (Charadrius melodus) *Nesting Habitat Availability in Rhode Island*
Antioch University New England

Patricia Sheppard (2003, 2007-2008)
Watershed Watch, Turn the Tide Education Program
Lloyd Center for Environmental Studies

Larry Sickels (2002)
Colonization of a Restored Rhode Island Salt Pond by Winter Flounder (Pseudopleuronectes americanus)
Roger Williams University

Kelly Simmons (2001)
Bridging the Gap between School Curriculum, Kids, and Coastal Awareness
University of Massachusetts Dartmouth

Jonathan Stone (2013)
Save The Bay: Salt Marsh Restoration/ Education Program for Youth
Save The Bay, Inc.

Jessica Tallman (2005)
Oyster Grow-out Cages as Artificial Reefs for Temperate Fishes
University of Rhode Island

Christine Van Orsouw (2002)
The Effects of Hypoxia on the Behavior of Early Benthic Phase Lobsters (Homarus americanus) *and the Ability to Avoid Low Oxygen*
Biological Sciences, University of Rhode Island

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Audubon Society of Rhode Island
Narragansett Bay Research Reserve

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Lisabeth White (2011)
Watershed Advocacy Internship
Westport River Watershed Alliance
Westport, Massachusetts

Laurel Wing (2004)
Production of a Training Video on a Rhode Island Commercial Fishing Method
University of Rhode Island

Sandra Wyatt (1999)
Allin's Cove Neighborhood Coalition Newsletter
Allin's Cove Neighborhood Coalition

VINEYARD SOUND

Barbara Brennessel (2003, 2006)
Conservation of Diamondback Terrapins in the Northeast
Wheaton College

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards Bay Keeper; Production of the Buzzards Bay Care Guide; Baywatchers– Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Jennifer Culbertson (2004-2005)
Examination of Methyl mercury Magnification in a New England Salt Marsh
Boston University Marine Program

Rebecca Harris, Ph.D. (2008 – 2009)
Protection of Coastal Waterbirds and their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon

Jennifer Anne Hauxwell (1997)
Interaction Between Grazing and Nutrients as Controls of Macrophyte Biomass and Community Structure in Shallow Estuaries
Boston University Marine Program

Anita Kim (2001)
Fundulus majalis *as a Potential Predator of the Invasive Crab Species* (Hemigrapsus sanguineus)
University of Massachusetts Dartmouth

Kevin D. Kroeger (1999)
Assessment of Groundwater and Streamwater Nitrogen Contamination from the Ashumet Valley Wastewater Plume
Boston University Marine Program

Catherine Latanich (2006)
An Evaluation of the Use of Catch Limits in Fisheries Management Policy
Cape Cod Commercial Hook Fishermen's Association
Nicholas School of the Environment and Earth Sciences
Duke University

Melinda Loberg (2011)
Owen Little Way Rain Garden-Bioswale
Tisbury Waterways, Inc.
Vineyard Haven, Massachusetts

Cate O'Keefe (2004)
Effects of Varying Environmental Parameters on the Survivorship of Embryonic and Larval Alewife
Boston University Marine Program

Adrienne Pappal (2005)
Habitat Preferences of Juvenile Winter Flounder in the Presence of Cobble
School for Marine Science and Technology
University of Massachusetts Dartmouth

Rodney Rountree (2001, 2006, 2010)
Identification of Soniferous Fishes of Cape Cod and Martha's Vineyard Sound
Senior Ecologist, Marine Ecology & Technology Applications, Inc.

Andrea Shriver (2001)
Effects of Coastal Eutrophication on the Food Supply and Growth of the Bay Scallop (Argopecten irradians)
Boston University Marine Program

Gregory Shriver (2000)
New England Salt Marsh Bird Survey
Massachusetts Audubon Society

Sarah M. Thompson (1997)
Use of Land-Derived and Recycled Nitrogen in Cladophora vagabunda *in Waquoit Bay*
Boston University Marine Program

Peter Wells (2008)
Long-shore Sediment Transport and Shoreline Change in Vineyard Sound
Waquoit Bay National Estuarine Research Reserve

William Wilcox (2003)
Water Quality Assessment of James Pond, Martha's Vineyard, Massachusetts
Martha's Vineyard Commission

NANTUCKET SOUND

Brad Agius (2002-2003)
Shifting Subtidal Community Structure: Effects of Environmental Change and Invasive Ascidians
Northeastern University

Katie Anderson (2003)
Study of the Distribution and Behavior of the Striped Cusk-eel (Ophidion marginatum)
University of Massachusetts Amherst

Brendan Annett (2003)
Anodromy and Genetic Relationships in Remnant Anadromous Brook Trout Populations
Massachusetts Department of Environmental Management

Karen Beattie (2009)
A Monitoring Project to Document Feral Cat Predation Impacts to Rare Beach-Nesting Shorebirds at Eel Point on Nantucket Island
Nantucket Conservation Foundation

Andrea Bogomolni (2002)
Cytochrome P450 Activity and CYP1A Induction in Gray, Harbor, and Harp Seals of Cape Cod
Boston University Marine Program

Andrea Bogomolni (2010)
Epidemiology and Ecology in Assessing Population Dynamics of Northeast U.S. Pinnipeds
University of Connecticut, Storrs

Andrea Bogomolni (2013)
Phocine Distemper Virus and PCBs in Seals of the Northeast U.S: Do Persistent Contaminants Alter Host Susceptibility?
University of Connecticut

Lindsay Brin (2007)
Land Derived Nitrogen Loads and Estuarine Sediment Denitrification: Tracking Human Inputs to Algal Blooms in a Cape Cod Estuary
Boston University Marine Program

Stephen Brown (2003)
American Oyster catching Nesting Success and Migration Patterns in New England
Manomet Center for Conservation Sciences

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and Their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Amy Costa (2012-2013)
A Collaborative Nantucket Sound Water Quality Monitoring Program/ Tracking the Presence and Persistence of Pharmaceuticals in Nantucket Sound
Provincetown Center for Coastal Studies

Lindsay B. Counsell (2007)
Signage for Dead Neck Island
Three Bays Preservation, Inc.

Jessica Mulready Dominguez (2006)
Addressing Community Value in Wetland Restoration on Cape Cod
Marine Affairs, University of Rhode Island

Inga M. Fredland (1999)
Reproductive Ecology of the Northern Pipefish, Syngnathus fuscus
Boston University Marine Program

Sara Grady (2004)
Population Structure of Horseshoe Crabs in Cape Cod Estuaries
Boston University Marine Program

Valerie A. Hall (2007)
Contribution of Fall-spawning to the Reproduction of Bay Scallops, Argopecten irradians*, in Nantucket Harbor*
School for Marine Science and Technology,
University of Massachusetts Dartmouth

Jason Hyatt (2002)
OPSaFE: The Oyster Pond Salt Flux Experiment
MIT/WHOI Program

Joanne M. Jarzobski (2007)
MassSail Cape Cod Maritime Community Days
Provincetown Center for Coastal Studies

Erin Kinney (2007)
^{15}N Profiles in Salt Marsh Sediments: Calibrations Using Decadal Scale N Loads
Boston University Marine Program

Micheline S. Labrie (2015)
Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality
School for Marine Science and Technology Coastal Systems Program, University of Massachusetts Dartmouth

Mark Lever (2001)
The Importance of Nutrients and Grazing by Macro herbivores In Controlling Microphyto benthic Biomass
Boston University Marine Program

Pia Moisander (2011)
Toxin Production of Cyanobacteria on Nantucket Island
University of Massachusetts Dartmouth
Nantucket Island, Massachusetts

Rita Oliveira Monteiro (2008)
Effects of Land Use on Alewife Growth and Recruitment Using Biogeochemical Tracers in New England Estuaries
College of Environmental Science and Forestry
State University of New York

Eric Montie (2003)
Environmental Contaminants and Neurodevelopment in Marine Mammals in Nantucket and Vineyard Sounds
Woods Hole Oceanographic Institution

Owen C. Nichols (2008-2009, 2011-2012, 2015)
High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (Loligo pealeii) *Occurrence in Nantucket Sound/ Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Susan Nickerson (2010)
Boaters Guide Project
Cape Cod Commercial Hook Fishermen's Association

Ylva Olsen (2005-2006)
Human Driven Loss of Seagrass Habitat: Effect on Food and Cover for Fish and Invertebrates
Boston University Marine Program

Adriana Picariello (2004, 2007)
Conservation of a Diamondback Terrapin on Cape Cod
Terrapin Research Groups at Wellfleet Bay

Michelle Portman (2005-2006)
Marine Conservation Strategies from Land-Based Experience
University of Massachusetts Boston

Justin K. Rivera (2006)
Nantucket Sound Water Quality Monitoring
Nicholas School of the Environment and Earth Sciences
Duke University

Melissa Sanderson (2007)
Lower Cape Cod Stream Restoration: Cedar Pond Rehabilitation
Cape Cod Commercial Hook Fishermen's Association

Lisa Sette (2011)
Monitoring Seal Depredation in the Nantucket Sound Weir Fishery
Seal Studies Program – Provincetown Center for Coastal Studies

Todd Tupper (2003)
Abiotic and Biotic Factors that Contribute to Site Occupancy of the Fowler's Toad (Bufo fowleri) *of lower Cape Cod, Massachusetts*
Department of Environmental Science and Policy
George Mason University

Dr. Richard Veit (2004)
Establishment and Conservation of Roseate Terns on Muskeget Island
The College of Staten Island, CUNY

Erica Weiss (2000)
The Effect of Water Column Characteristics and Sediment Type on the Growth Rates of Quahogs (Mercenaria mercenaria) *and Soft-shell Clams* (Mya arenaria)
Boston University Marine Program

Joanna York (2000)
The Role of Iron in Controlling Shallow Estuarine Primary Production
Boston University Marine Program

Benjamin Zuckerberg (2001)
Grassland Restoration on Nantucket Island: The Effects of Habitat Restoration on Grassland and Shrubland Songbirds in Island Ecosystems
Massachusetts Audubon Society

ATLANTIC OCEAN

Dr. Joanna Borucinska (2004-2005, 2008, 2010-2014)
Health Status of Sharks
University of Hartford

Regina Campbell-Malone (2003)
Gestational and Post Partum Swelling in Right Whale Flukes
Woods Hole Oceanographic Institution

Margaret A. Carroll(2008)
Study of Metal Accumulations in Tissues of the Oyster Crassastrea virginica *in Jamaica Bay, New York*
Medgar Evers College, CUNY

Aaren S. Freeman (1998)
Grazing Pressure on an Introduced Algae in the Northeastern Atlantic, Contrasted with a Native Pacific Conspecific
Northeastern University

Chiu-Yen Kuo (2008)
The Effect of Spatial Scale on the Estimation of Fish Diversity and Implications for Marine Reserve Management
Marine Sciences, University of Connecticut

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns (2004-2006); Investigations into the Foraging Ecology of Atlantic Sei Whales (2007)
Boston University Marine Program
Woods Hole Oceanographic Institute

Cate E. O'Keefe, Ph.D. (2015)
Northeast Multispecies Fishery Flatfish Bycatch Avoidance Program
School for Marine Science and Technology
University of Massachusetts Dartmouth

Elizabeth J. Pillsbury, Ph.D. (2010)
American Bouillabaisse: The Ecology, Politics and Economics of Fishing around New York City, 1870-present
Stony Brook University – Horace Mann School

Dr. Michelle Portman (2009)
Public Perception and Environmental Impact Assessment of Offshore Wind Farms
Marine Policy Center, Woods Hole Oceanographic Institution

Anthony Rafferty (2007)
Investigation as to Whether Current Onboard Catch Handling Methods Induce Mortality of Marine Mammals and Fish
Cape Cod Commercial Hook Fishermen's Association
Duke University

Julie Richmond (2008)
Using the Somatotropic Axis as a Model to Predict Nutritional Status in Free-ranging Harbor Seal Pups in Southern New England
Department of Animal Sciences
University of Connecticut

Dr. Jennifer Seavey (2015)
Monitoring the Harbor and Gray Seal Population at the Isles of Shoals
Executive Director, UNH Foundation

Christina Senft (2008)
Saxiphilin: A Possible Pathway to PSP Toxin Resistance in Calanoid Copepods
University of Connecticut at Avery Point

Lisa White (2007)
Value of Sea Turtles in Tourism
Nicolas School of the Environment and Earth Sciences
Duke University

OTHER AREAS

Allison Andrews (2009)
Conservation of Diamondback Terrapins on Cape Cod
Wheaton College

Alison Armstrong (2000)
The National Invasive Species Act of 1996: A Proposal for Successful Re-authorization of Ballast Water Legislation
Department of Marine Affairs, University of Rhode Island

Adam Scott Barkley (2008)
Discard Mortality of Yellowtail Flounder in the Southern New England Trawl Fishery
School for Marine Science and Technology
University of Massachusetts Dartmouth

Diana Barrett (2015)
Effects of Abiotic Stressors and Soil Microbiota on the Zonation of Dune Plants
University of Massachusetts Dartmouth

Trina Schneider Bayard (2008)
Behavioral Mechanisms of Habitat Selection in a Salt Marsh Obligate Breeder
Department of Ecology and Evolution
University of Connecticut Storrs

Holly K. Bayley (2011)
*Testing the Resilience of Genetically Distinct Eelgrass (*Zostera marina L.*) Populations for Improved Management and Restoration*
University of New Hampshire

Holly K. Bayley (2012)
Assessing the Influence of Donor Population on Eelgrass Restoration Success
University of New Hampshire

Johanna Blasi (2001)
*Predatory Relationship Between Intertidal Amphipods and the Non-indigenous Crab (*Hemigrapsus sanguineus*) Along the Massachusetts Coast*
University of Massachusetts Dartmouth

Matthew Boser (2009)
Sampling Migrating Black Terns on Cape Cod
Eastern Connecticut State University

Eric Jr. Brazer (2004)
Reproductive Life History and Essential Fish Habitat Mapping of the Western Georges Bank Cod: Protocol Design
Nicholas School of the Environment
Duke University

Wendi Buessler (2012)
Improving Nutrient Sampling and Data to Keep Oyster Pond Healthy
Oyster Pond Environmental Trust
Oyster Pond Environmental Trust Inc.

Candace Cochrane (1996)
The Sounds – A Living Portrait
Harvard Graduate School of Education

Shelli Costa (2009)
Osprey Tracking Report
Westport River Watershed Alliance

Shelli Costa and Ami Aroujo (2012-2015)
WRWA Intern Scholarship
Westport River Watershed Alliance
Education Director

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Greig Cranna (2007-2008)
Documenting the Research of Helen Hays on the Migratory Patterns of Common and Roseate Terns
Freelance Photojournalist
Great Gull Island, New York; Punta Rasa, Argentina

Brian Eltz (2009)
Underwater Fishway Video Camera
Town of Greenwich Conservation Commission

Benjamin Gahagan (2009)
Estimating Natal Stream Housing Rates of Anadromous River Herring Stocks from Otolith Microchemistry
University of Connecticut

Chase Gruber (2013)
Economic Evaluation of Seal Depredation on Cape Cod Groundfish Sector Fishery
Nicholas School of the Environment and Earth Sciences
Duke University

Torrance Hanley (2014)
*Predicting the Effects of the Invasive European Green Crab (*Carcinus maenas*): A Comparison of Key Traits Across Habitats in New England*
Northeastern University

Kathryn Hanrahan (2014)
Short Term Study on the Impacts of Carcinus maenas *on Ecosystem Functioning in a Massachusetts Salt Marsh*
Massachusetts Coastal Zone Management

Rebecca Harris, Ph.D. (2008-2010)
Protection of Coastal Waterbirds and Their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon
Cummaquid, Massachusetts

Henry Hatch (2008)
Writer and Editor, The Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Helen Hays (1995-2015)
A Study of Common and Roseate Terns on Great Gull Island
American Museum of Natural History

Dr. Noel Healy (2013)
Developing a Citizen Scientist Guide to Coastal and Marine Spatial Planning
Salem State University- Geography Department

Ipswich River Watershed Association (2015)
Purchase and Operation of an Underwater Video Camera to Monitor River Herring and Other Fish during Spring Migration
The Voice of the River

Andrew W. Jones (2011)
Testing the Effects of Density and Resource Ability on Juvenile Alewife Foraging Patterns
Yale University
Lakes across New England

Loren Kellog (2007)
River Herring Restoration Project
Coalition for Buzzards Bay

Meredith Kratzmann (2007)
Assessing the Impacts of Beach Scraping to Barrier Island Morphology
Department of Geosciences, University of Rhode Island

Claire de Lacvivier (2008)
Research, The Sounds Conservancy 15th Anniversary Publication

Don Lewis (2010)
Turtle Research, Rescue, and Conservation
Cape Cod Consultants
Cape Cod to Mount Hope Bay

Timothy Marshall (2008)
Writer and Editor of The Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Erin McClean (2014)
The Effect of Ocean Acidification on the Molting Process of Homarus americanus
University of Rhode Island

Mark Mello (2014)
Inventory of Rare Lepidoptera in Dune and Salt Marsh Systems of Essex County, MA
Lloyd Center for the Environment

Nichola Meserve (2005)
Increasing Stakeholder Participation in a Cooperative Research Project
Cape Cod Commercial Hook Fishermen's Association
Duke University

Alexandria Moore (2015)
Importance of Community Structure in Tidal Wetland Restoration
School of Forestry & Environmental Studies

Swathi Mummini (2011)
The Effect of Summer Environmental Stressors on the Metabolism of Eastern Oysters in the Bronx River
CUNY Hunter
Bronx River, New York

Christopher Neil (2012)
Falmouth Association Concerned with Estuaries and Salt Ponds: Stormwater Education Project
Falmouth, Massachusetts

New London Maritime Society (2013)
Custom House Maritime Museum
Susan Tamulevich, Director

Christine Newton (2012)
Invasion Strategy of the Red Algae, Heterosiphonia japonica, *across a biogeographical barrier*
Northeastern University Marine Science Center

Alyssa Novak, Ph.D. (2013)
Test-Transplanting Genetically Differentiated Eelgrass Donor Populations Along Cape Cod National Seashore to Identify Those Most Suitable for a Successful Restoration
University of New Hampshire

Chris O'Book (2009)
Editor of the Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Katharine Parsons, Ph.D. (2012-2015)
Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

Kathy Parsons and David McGlinchey (2010)
Manomet Center Energy Outreach Program
Manomet Center for Conservation Sciences
Manomet, Massachusetts

Tracy Pugh (2012)
Alternative Mating Strategies in American Lobster: is Intermolt Mating a Viable Compensatory Strategy?
University of New Hamsphire

Katie Pugliares (2009)
Genetic Relatedness of Mass Stranded Atlantic White-Sided Dolphins on Cape Cod
Marine Science Graduate Program, University of New England

Tara Rajaniemi (2009)
Recovery of Ecosystem Structure and Function in a Restored Salt Marsh
University of Massachusetts Dartmouth

Emily Russell (2010)
WRWA Internship
Bates College
Westport, Massachusetts

Sara Jane Sampieri (2009)
Resource Guide to common Benthic Macrofauna *in Southeastern Massachusetts Estuaries*
School for Maine Science and Technology
University of Massachusetts Dartmouth

Jay Sargent (2013)
JoJo Book II

Jay Sargent (2010)
Dolphin and Human Interaction: A Personal History
Turks and Caicos; Middletown, Rhode Island

William Sargent (2012)
Beach Wars: Ten Thousand Years on a Barrier Beach

William Sargent (2010-2011)
Daily Erosion Forecasts off Chatham, Massachusetts
The Coastlines Project
Chatham, Massachusetts

William Sargent (2010-2011)
Illustrations for Book on the Sounds of Cape Cod
Sounds of Cape Cod, Massachusetts

William Sargent (2013-2014)
Islands in the Storm
The Coastlines Project

William Sargent (2015)
Notes from the Energy Patch
The Coastlines Project

Kaitlyn Shaw (2011)
Assessing Spatial Accumulations of Opportunistic Macroalgae in S.E. Massachusetts Estuaries
University of Massachusetts
S.E. Massachusetts Estuaries

Jasmine Smith-Gillen (2013)
Climate Science Learning Project
Lloyd Center for the Environment

Jasmine Smith-Gillen (2010)
Estuary and Whales
Lloyd Center for the Environment
Southeastern New England

Peter C. Stone (2010-2012)
Pilot Education Program: Dreams to the Sounds of the Sea: The Art and Science of Coastal Ecosystems
Pete C. Stone Studios
Marion, Massachusetts

Peter C. Stone (2013)
Pilot Education Program: The Art & Science of Nature Journaling: Coastal Marine Environments
Oceans Academy
Ocean Explorium

Thomas A. Stone (2014)
Ocean Acidification and Southern New England: A Conference
Woods Hole Research Center

Thaxter Tewksbury (2009)
Building New England Connections
Interdistrict Committee for Project Oceanology

Johan C. Varekamp, Ph.D. (2010)
Modern Marsh Growth Processes at Jarvis Creek, Guilford, Connecticut
Department of Earth & Environmental Sciences
Wesleyan University
Guilford, Connecticut

Jonathan P. Velotta (2011)
Evolutionary Changes to the Osmoregulatory System in Alewives (Alosa pseudoharongu) *Adaptive Physiological Responses to the Loss of Anadromy*
University of Connecticut
Storrs, Connecuticut

GRANTEES LISTED BY SUBJECT

Note: If no Sound is denoted, study took place in an area outside of the six Sounds

COMMON TERNS AND ROSEATE TERNS

Matthew Boser (2009)
Sampling Migrating Black Terns on Cape Cod
Eastern Connecticut State University

Michelle J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
Patuxent Wildlife Research Center
Connecticut Audubon Society
Long Island Sound

Maura Leahy (2004)
Great Gull Island Bird Nesting Habitat Restoration
Yale School of Forestry & Environmental Studies
Long Island Sound

Corey M. Grinnell (1999-2000)
Effects of a Shoreline Protection Project on Roseate Terns
University of Massachusetts Amherst
Long Island Sound

Helen Hays (1995-2015)
A Study of Common and Roseate Terns on Great Gull Island
American Museum of Natural History

Katharine Parsons, Ph.D. (2012-2015)
Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

Dr. Richard Veit (2004)
Establishment and Conservation of Roseate Terns on Muskeget Island
The College of Staten Island, CUNY
Nantucket Sound

James M. Zingo (1999)
Foraging Ecology and Reproductive Success of Endangered Roseate Terns
University of Massachusetts Amherst
Long Island Sound

RIVER FISH SPECIES

Brendan Annett (2003)
Anodromy and Genetic Relationships in Remnant Anadromous Brook Trout Populations
Massachusetts Department of Environmental Management
Nantucket Sound

Michael Bednarski (2006)
Biology of the Thames River's Unique Wintering Aggregation of Striped Bass
Queens College
Fishers Island Sound

Sean Corson (2000)
West River Connecticut Fish Ladder Feasability Study
Yale School of Forestry & Environmental Studies

Robert Crafa (2004)
Developing a Sustainable Hatchery
The Waterfront Center
Long Island Sound

Brian Eltz (2009)
Underwater Fishway Video Camera
Town of Greenwhich Conservation Commission

Benjamin Gahagan (2009)
Estimating Natal Stream Housing Rates of Anadromous River Herring Stocks from Otolith Microchemistry
University of Connecticut

Nancy Haley (1996)
Atlantic Sturgeon Concentrations in Long Island Sound
University of Massachusetts Amherst

Ipswich River Watershed Association (2015)
Purchase and Operation of an Underwater Video Camera to Monitor River Herring and Other Fish during Spring Migration
The Voice of the River

Andrew W. Jones (2011)
Testing the Effects of Density and Resource Ability on Juvenile Alewife Foraging Patterns
Yale University
Lakes across New England

Loren Kellog (2007)
River Herring Restoration Project
Coalition for Buzzards Bay

Thomas Maloney (1998)
Anadromous Fisheries Restoration Manual
Connecticut River Watershed Council
Long Island Sound

Rita Oliveira Monteiro (2008)
Effects of Land Use on Alewife Growth and Recruitment Using Biogeochemical Tracers in New England Estuaries
College of Environmental Science and Forestry
State University of New York
Nantucket Sound

Cate O'Keefe (2004)
Effects of Varying Environmental Parameters on the Survivorship of Embryonic and Larval Alewife
Boston University Marine Program
Vineyard Sound

Erika Schielke (2006)
Effects of Anadromous Alewife Restoration on Food Web Structure and Mercury Transfer
Department of Ecology and Evolutionary Biology
Yale University
Fishers Island Sound

Jonathan P. Velotta (2011)
Evolutionary Changes to the Osmoregulatory System in Alewives (Alosa pseudoharongu) *Adaptive Physiological Responses to the Loss of Anadromy*
University of Connecticut, Storrs, Connecticut

Annika Walters (2006)
The Impacts of Anadromous Alewife on Nutrient Loading in Coastal Streams
Department of Ecology and Evolutionary Biology
Yale University
Long Island Sound

MARINE FISHERIES

Adam Scott Barkley (2008)
Discard Mortality of Yellowtail Flounder in the Southern New England Trawl Fishery
School for Marine Science and Technology
University of Massachusetts Dartmouth

Abigail Bockus (2014)
*The Physiological Consequences of Climate-Induced Acidification and Warming on Metabolism and Acid-Base Balance in the Spiny Dogfish (*Squalus acanthias*): Northeast Fishery and Ecosystem Instability in Response to Climate Change*
University of Rhode Island

Eric Brazer Jr. (2004)
Reproductive Life History and Essential Fish Habitat Mapping of the Western Georges Bank Cod: Protocol Design
Nicholas School of the Environment and Earth Sciences
Duke University

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University
Long Island Sound

Inga M. Fredland (1999)
Reproductive Ecology of the Northern Pipefish, Syngnathus fuscus
Boston University Marine Program
Nantucket Sound

Eric Gauger (2000)
Susceptibility of Commercially Important Fish Species to Disease Caused by Vibrio carchariae
University of Rhode Island
RHODE ISLAND SOUND

Chase Gruber (2013)
Economic Evaluation of Seal Depredation on Cape Cod Groundfish Sector Fishery
Nicholas School of the Environment and Earth Sciences
Duke University

George Jackman (2012)
Determining Habitat Usage, Life History Patterns, and Population Structuring of Winter Flounder Through Otolith Microchemistry
Biology Department, Queens College, CUNY
Long Island Sound

Chiu-Yen Kuo (2008)
The Effect of Spatial Scale on the Estimation of Fish Diversity and Implications for Marine Reserve Management
Marine Sciences, University of Connecticut
Atlantic Ocean

Micheline S. Labrie (2015)
Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality
School for Marine Science and Technology Coastal Systems Program, University of Massachusetts Dartmouth

Catherine Latanich (2006)
An Evaluation of the Use of Catch Limits in Fisheries Management Policy
Nicholas School of the Environment and Earth Sciences
Duke University
Cape Cod Commercial Hook Fishermen's Association

VINEYARD SOUND

Ivan Mateo (2008)
Identification of Critical Habitat for Tautog by Otolith Chemistry
Department of Fisheries, Animal and Veterinary Science
University of Rhode Island
RHODE ISLAND SOUND

Erin McClean (2014)
The Effect of Ocean Acidification on the Molting Process of Homarus americanus
University of Rhode Island

Sandra Millan-Tripp (2006, 2008)
Video Production of the Natural Flow Hatchery Pilot Project for the Atlantic Salmon Restoration at Mill Brook, Old Lyme, Connecticut; Atlantic Salmon Incubation Tray WebCam
Tributary Mill Conservancy, Inc.
Long Island Sound

Cate E. O'Keefe, Ph.D. (2015)
Northeast Multispecies Fishery Flatfish Bycatch Avoidance Program
School for Marine Science and Technology
University of Massachusetts Dartmouth-
Atlantic Ocean

Michelle Portman (2005-2006)
Marine Conservation Strategies from Land-based Experience
University of Massachusetts Boston
Nantucket Sound

Anthony Rafferty (2007)
Investigation as to Whether Current Onboard Catch Handling Methods Induce Mortality of Marine Mammals and Fish
Cape Cod Commercial Hook Fishermen's Association
Duke University
Atlantic Ocean

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York at Stony Brook
Long Island Sound

DIAMONDBACK TERRAPINS

Allison Andrews (2009)
Conservation of Diamondback Terrapins on Cape Cods
Wheaton College

Teresa Ayala (2002)
*A Study of the Feeding Habits of the Diamondback Terrapin (*Malaciemys terrapin*) in Long Island Sound*
Mt. Sinai High School
Long Island Sound

Maria Iliana Ayala (1996)
Protozoans as Indicators of Pollution Level
Yale School of Forestry & Environmental Studies
Long Island Sound

Barbara Bauer (2004)
Conservation and Management of Diamondback Terrapins in the Long Island Sound
Long Island University
Long Island Sound

Barbara Brennessel (2003, 2006)
Conservation of Diamondback Terrapins in the Northeast
Wheaton College
Vineyard Sound

Sara Petrochic (2007)
The Ecological Role of Diamondback Terrapins in the Structure and Dynamics of Benthic Communities in Oyster Bay Harbor
Long Island University
Long Island Sound

Adriana Picariello (2004, 2007)
Conservation of the Diamondback Terrapin on Cape Cod
Terrapin Research Groups at Wellfleet Bay
Nantucket Sound

ASIAN SHORE CRAB

Johanna Blasi (2001)
Predatory Relationship Between Intertidal Amphipods and the Non-indigenous Crab (Hemigrapsus sanguineus*) Along the Massachusetts Coast*
University of Massachusetts Dartmouth

Kari B. Heinonen (2005)
Impacts of Invasive Crab on Crustacean-eating Guild of Fishes in Long Island Sound
Marine Sciences, University of Connecticut
Long Island Sound

Kari B. Heinonen (2005)
The Impacts of the Invasive Crab Hemigrapsus sanguineus *on a Crustacean-Eating Guild of Fishes in Long Island Sound*
Department of Marine Sciences
University of Connecticut

Anita Kim (2001)
Fundulus majalis *as a Potential Predator of the Invasive Crab Species* (Hemigrapsus sanguineus)
University of Massachusetts Dartmouth
Vineyard Sound

Ken M. Leonard III (1998)
Genetic Variation in Hatchery Populations and Wild Populations of Argopecten irradians *in New England*
University of Rhode Island
Rhode Island Sound

Andrew M. Lohrer (1996, 1998)
Impacts of a Non-native Crab Invader, Hemigrapsus sanguineus*, on Long Island Sound Biota*
University of Connecticut – Avery Point
Fishers Island Sound

Nancy J. O'Connor (1999, 2002)
Bio-invasion of the Asian Shore Crab, Hemigrapsus sanguineus*, in Southern New England: Tracking Changes in Crab Population*
University of Massachusetts Dartmouth
Rhode Island Sound

Nancy J. O'Connor (1999, 2002, 2015)
Do Biofilms on Mesh Netting used in Bivalve Aquaculture Stimulate Settlement and Molting of Crab Larvae?
University of Massachusetts Dartmouth
Rhode Island Sound

Katherine J. Papacostas (2012)
Generalists or Individual Specialists? A Comparison of Resource Use Among Native and Invasive Crabs in Long Island Sound
Temple University Biology Department
Long Island Sound

Nicole Rohr (2010)
Predatory Effects of Hemigraphsus sanguineus *on* Littorina littorea
Department of Biological Sciences, University of Rhode Island
Rhode Island Sound

PHRAGMITES

Kate Boicourt (2008)
Refining Restoration Strategies: Assessing M-Type Phragmites australis *Removal in Long Island Sound*
Yale School of Forestry & Environmental Studies
Long Island Sound

Lori K. Benoit (1995)
Impact of the Spread of Phragmites *on Populations of Tidal Marsh Birds in Connecticut*
Connecticut College
Block Island Sound

Mark Carabetta (2000)
Patterns and Rates of Phragmites australis *Expansion and Retreat*
Connecticut College
Long Island Sound

BIVALVES

Andrew Altieri (2005)
Assessing the Full Impact of Oxygen Depletion on the Narragansett Bay Estuarine Community
Brown University
Rhode Island Sound

Matthew Cacopardo (2003)
Accumulation of Containment Metals by Marine Bivalves in New Haven Harbor
Southern Connecticut State University
Long Island Sound

Margaret A. Carroll (2008)
Study of Metal Accumulations in Tissues of the Oyster Crassastrea virginica *in Jamaica Bay, New York*
Medgar Evers College, CUNY
Atlantic Ocean

Allison Mass Fitzgerald (2010-2012)
The Effects of Chronic Habitat Degradation on the Physiology of Eastern Oysters/The Use of Cellular Biomarkers in Assessing Restored Oyster Reefs in New York City
Biology Department, The College of Staten Island, CUNY
Western Long Island Sound and Jamaica Bay, New York
Long Island Sound

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University

Heather Giddings (2004)
Rhode Island Hard Clam Health Study
University of Rhode Island
Rhode Island Sound

Valerie A. Hall (2007)
Contribution of Fall-spawning to the Reproduction of Bay Scallops, Argopecten irradians*, in Nantucket Harbor*
School for Marine Science and Technology,
University of Massachusetts Dartmouth
Nantucket Sound

Bart H. Harrison (1998)
Settlement of the Bay Scallop, Argopecten irradians*, to Eelgrass,* Zostera marina*, in the Presence of Macrophytic Algal Fouling*
University of Massachusetts Dartmouth
Rhode Island Sound

Micheline S. Labrie (2015)
Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality
School for Marine Science and Technology Coastal Systems Program
University of Massachusetts Dartmouth
Nantucket Sound

Swathi Mummini (2011)
The Effect of Summer Environmental Stressors on the Metabolism of Eastern Oysters in the Bronx River
CUNY Hunter
Bronx River, New York

Amy Munson (2004)
Significance of Matrix metalloproteinase *in Disease Resistant and Non-resistant Oyster Species of the Genus* Crassostrea
University of Rhode Island
Rhode Island Sound

Laurie L. Perino (2008)
Short and long-term Effects of Harmful Algae on Three Important Bivalve Species
Marine Science Research Center, Stony Brook University
Long Island Sound

Andrea Shriver (2001)
*Effects of Coastal Eutrophication on the Food Supply and Growth of the Bay Scallop (*Argopecten irradians*)*
Boston University Marine Program
Vineyard Sound

Erica Weiss (2000)
*The Effect of Water Column Characteristics and Sediment Type on the Growth Rates of Quahogs (*Mercenaria mercenaria*) and Soft-shell Clams (*Mya arenaria*)*
Boston University Marine Program
Nantucket Sound

Michael Weiss, Colleen Cook, Eric Goodman (2001)
So You Want to Grow Some Scallops: A High School Research Project to Reintroduce and Sustain a Scallop Population in Oyster Bay, Long Island
Friends Academy
Long Island Sound

Chester B. Zarnoch (2008)
The Use of Selectively-bred and Wild Hard Clams for Stock Enhancement
Baruch College, CUNY
Long Island Sound

SHOREBIRDS

Thomas R. Baptist (2002)
The Great Captain's Island Heron and Egret Rookery Study
Connecticut Audubon Society
Long Island Sound

Karen Beattie (2009)
A Monitoring Project to Document Feral Cat Predation Impacts to Rare Beach-Nesting Shorebirds at Eel Point on Nantucket Island
Nantucket Conservation Foundation
Nantucket Sound

Lori K. Benoit (1995)
Impact of the Spread of Phragmites *on Populations of Tidal Marsh Birds in Connecticut*
Connecticut College
Block Island Sound

Stephen Brown (2003)
American Oystercatcher Nesting Success and Migration Patterns in New England
Manomet Center for Conservation Sciences
Nantucket Sound

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and Their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society
Nantucket Sound

Shelli Costa (2009)
Osprey Tracking Report
Westport River Watershed Alliance

Christopher Field (2006)
Lighthouse Point Park "Important Bird Area" Conservation Plan
University of Connecticut
Long Island Sound

Rebecca Harris, Ph.D. (2008 – 2010)
Protection of Coastal Waterbirds and their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon
Vineyard Sound

Katharine Parsons, Ph.D. (2012-2015)
Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

Sally Ann Sims (2011)
*Effect of Sea Level Rise on Piping Plover (*Charadrius melodus*) Nesting Habitat Availability in Rhode Island*
Antioch University New England
Rhode Island Sound

Gregory Shriver (2000)
New England Salt Marsh Bird Survey
Massachusetts Audubon Society
Vineyard Sound

Benjamin Zuckerberg (2001)
Grassland Restoration on Nantucket Island: The Effects of Habitat Restoration on Grassland and Shrubland Songbirds in Island Ecosystems
Massachusetts Audubon Society
Nantucket Sound

HYPOXIA AND NITROGEN LOADING NITROGEN PRESENCE IN ECOSYSTEMS

Rebecca Barnes (2004)
Managing Nitrogen in Narragansett Bay: A Stable Isotope Approach
Yale School of Forestry & Environmental Studies
Rhode Island Sound

John Bean (2000)
The Importance of Organic Forms of Nitrogen to Coastal Pollution
University of Connecticut – Avery Point
Fishers Island Sound

Lenny Bellet (1997)
The Effects of Nitrogen Loading on Two Fringing Marshes in the Mystic River Estuary
Connecticut College
Fishers Island Sound

Lindsay Brin (2012)
Coastal Nitrogen Removal in the Face of Global Change: Environmental Regulation of the Temperature Response of Denitrifier Communities
Maine Biological Laboratory
Brown University
Rhode Island Sound

Lindsay Brin (2007)
Land Derived Nitrogen Loads and Estuarine Sediment Denitrification: Tracking Human Inputs to Algal Blooms in a Cape Cod Estuary
Boston University Marine Program
Nantucket Sound

Julianna Connolly (2000)
Organic Carbon and Nitrogen Cycling in Coastal Soils
Williams College
Fishers Island Sound

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University
Long Island Sound

Christina Garabedian (1999)
Hypoxia Dynamics in Long Island Sound
Save the Sound
Long Island Sound

Julie Goodness (2009)
Efficiency of Wet Pond Best Management Practices in Removal of Nitrogen from Connecticut Stormwater
Yale University School of Forestry & Environmental Studies

Kevin D. Kroeger (1999)
Assessment of Groundwater and Streamwater Nitrogen Contamination from the Ashumet Valley Wastewater Plume
Boston University Marine Program
Vineyard Sound

Micheline S. Labrie (2015)
Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality
School for Marine Science and Technology Coastal Systems Program
University of Massachusetts Dartmouth
Nantucket Sound

Sarah M. Thompson (1997)
Use of Land-Derived and Recycled Nitrogen in Cladophora vagabunda *in Waquoit Bay*
Boston University Marine Program
Vineyard Sound

Christine Van Orsouw (2002)
The Effects of Hypoxia on the Behavior of Early Benthic Phase Lobsters (Homarus americanus) *and the Ability to Detect and Avoid Low Oxygen*
Biological Sciences, University of Rhode Island
Rhode Island Sound

EROSION

Diana Barrett (2015)
Effects of Abiotic Stressors and Soil Microbiota on the Zonation of Dune Plants
University of Massachusetts Dartmouth

Jennifer Cooper (2000)
Erosion of Sensitive Coastal Wetlands at the Charles E. Wheeler Wildlife Sanctuary, Milford Point, Connecticut: Physical Mechanisms and Long-term Rates of Change
Southern Connecticut State University
Connecticut Coastal Audubon Center

Meredith Kratzmann (2007)
Assessing the Impacts of Beach Scraping to Barrier Island Morphology
Department of Geosciences, University of Rhode Island
Long Island Sound

Tim Hoffman (1998)
Geomorphic Processes and Evolution of Wildlife Habitat at the Charles E. Wheeler Wildlife Management Area at the Mouth of the Housatonic River
Southern Connecticut State University
Long Island Sound

Anne LaFleur (1996)
Chester Creek Vegetation Survey and Management Guide
Chester Land Trust
Long Island Sound

Peter Wells (2008)
Long-shore Sediment Transport and Shoreline Change in Vineyard Sound
Waquoit Bay National Estuarine Research Reserve
Vineyard Sound

FISH WAYS/FISH LADDERS

Sean Corson (2000)
West River Anadromous Fish Study
Yale School of Forestry & Environmental Studies
Long Island Sound

Torrance Hanley (2007)
Ecological Stoichiometry and Predation: Examining Life History Trade-offs in Daphnia
Department of Ecology and Evolutionary Biology
Yale University
Long Island Sound

Ipswich River Watershed Association (2015)
Purchase and Operation of an Underwater Video Camera to Monitor River Herring and Other Fish during Spring Migration
The Voice of the River

Owen C. Nichols (2008-2009, 2011-2012, 2015)
High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (Loligo pealeii) *Occurrence in Nantucket Sound / Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Eric Palkovacs (2004)
Fishways as a Method for Anadromous Alewife Restoration in Connecticut
Yale University
Long Island Sound

Suzanne Polmar (2002)
A Study of the Restoration of Anadromous Fish in the West River Watershed
Yale School of Forestry & Environmental Studies
Long Island Sound

SALT MARSH RESTORATION

Carlos Ballon (2015)
The parasite Cryptocotyle lingua *reduces consumption rate of* Littorina littorea
Adelphi University

Trina Schneider Bayard (2008)
Behavioral Mechanisms of Habitat Selection in a Salt Marsh Obligate Breeder
Department of Ecology and Evolution
University of Connecticut Storrs

Kate Boicourt (2008)
Refining Restoration Strategies: Assessing M-Type Phragmites australis *Removal in Long Island Sound*
Yale School of Forestry & Environmental Studies
Long Island Sound

Jennifer Cooper (2000)
Erosion of Sensitive Coastal Wetlands at the Charles E. Wheeler Wildlife Sanctuary, Milford Point, Connecticut: Physical Mechanisms and Long-term Rates of Change
Southern Connecticut State University
Connecticut Coastal Audubon Center
Long Island Sound

Jennifer Culbertson (2004-2005)
Examination of Methyl mercury Magnification in a New England Salt Marsh
Boston University Marine Program
Vineyard Sound

Jessica Darling (2005)
The Role of Nutrients in Marsh Drowning in Long Island Sound
Yale School of Forestry & Environmental Studies
Long Island Sound

Debora Fillis (2004)
Application and Evaluation of a Rapid Assessment Technique for New England Salt Marshes
Yale School of Forestry and Environmental Studies
Long Island Sound

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University
Long Island Sound

Troy Hill (2007)
The Effect of Nutrient Enrichment on Carbon Dynamics in Long Island Sound Salt Marshes
Yale School of Forestry & Environmental Studies
Long Island Sound

Erin Kinney (2007)
^{15}N Profiles in Salt Marsh Sediments: Calibrations Using Decadal Scale N Loads
Boston University Marine Program
Nantucket Sound

Melissa Lage (2002)
Impact of Anthropogenic Disturbance on the Composition and Ecosystem Functioning of Microbial Communitiesin New England Salt Marshes
Brown University
Rhode Island Sound

Alexandria Moore (2015)
Importance of Community Structure in Tidal Wetland Restoration
Yale University, School of Forestry & Environmental Studies

Jessica Mulready Dominguez (2006)
Addressing Community Value in Wetland Restoration on Cape Cod
Marine Affairs, University of Rhode Island
Nantucket Sound

Christine Newton (2009-2010)
Effective Drift Macroalgae on Saltmarsh Communities/ Can Algae Save Our Salt Marshes?
Department of Biological Sciences, University of Rhode Island
Rhode Island Sound

Tara Rajaniemi (2009)
Recovery of Ecosystem Structure and Function in a Restored Salt Marsh
University of Massachusetts Dartmouth

Rebecca A. Schultz (2013)
Differentiating Drivers of Marsh Loss in Long Island Sound
Yale School of Forestry & Environmental Studies
Long Island Sound

Jonathan Stone (2013)
Save The Bay: Salt Marsh Restoration/ Education Program for Youth
Save The Bay, Inc.
Rhode Island Sound

Johan C. Varekamp, Ph.D. (2010)
Modern Marsh Growth Processes at Jarvis Creek, Guilford, Connecticut
Department of Earth & Environmental Sciences
Wesleyan University
Guilford, Connecticut

WATER QUALITY MONITORING

Peter August and Janice Sasi (2015)
Ecological Reconnaissance of the Napatree Lagoon
Chair, Watch Hill Conservancy and Manager, Napatree Point Conservation Area, Watch Hill Conservancy
Rhode Island Sound

Sara Owen Bisson (2004)
Assessment of Heavy metal Contaminant Levels, Transport Mechanisms, and Potential Health Impacts of Polluted Sediments at the Mouth of the Quinnipiac River in New Haven, Connecticut
Yale School of Forestry & Environmental Studies
Long Island Sound

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards Bay Keeper; Production of the Buzzards Bay Care Guide; Baywatchers– Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay
Vineyard Sound

Dr. Cynthia R. Coron and Dr. Thomas H. Fleming (2003-2005, 2010-2011)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut, Title Marshes (Phase 3)
Southern Connecticut State University
Long Island Sound

Amy Costa (2012-2013)
A Collaborative Nantucket Sound Water Quality Monitoring Program/ Tracking the Presence and Persistence of Pharmaceuticals in Nantucket Sound
Provincetown Center for Coastal Studies
Nantucket Sound

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Daisy Durant, Ph.D. (2011)
Assessment of the Benthic Infaunal Community at Three Long-Term Water Quality Monitoring Sites within the Narragansett Bay Research Reserve
Narragansett Bay National Estuarine Research Reserve
Prudence Island, Rhode Island
Rhode Island Sound

Jason Garnett (2009)
Sampling, Analyzing, and Communicating Hypoxia in Southwestern Connecticut
Soundkeeper Inc.
Long Island Sound

Julie Goodness (2009)
Efficiency of Wet Pond Best Management Practices in Removal of Nitrogen from Connecticut Stormwater
Yale University School of Forestry & Environmental Studies

Kevin D. Kroeger (1999)
Assessment of Groundwater and Streamwater Nitrogen Contamination from the Ashumet Valley Wastewater Plume
Boston University Marine Program
VINEARD SOUND

Christopher Neil (2012)
Falmouth Association Concerned with Estuaries and Salt Ponds: Stormwater Education Project
Falmouth, Massachusetts

Justin K. Rivera (2006)
Nantucket Sound Water Quality Monitoring
Nicholas School of the Environment and Earth Sciences
Duke University
Nantucket Sound

William P. Shadel and Aubrey McMahon (2002-2003)
Save the Sounds Water Quality Monitoring Program
Save the Sounds
Long Island Sound

Beth Weinman (2002)
The Geochemical Significance of the Breakwater in Flushing Bay: The Effects of Reoxidation on Sulfide-bound Metals
Department of Geology, Queens College
Long Island Sound

William Wilcox (2003)
Water Quality Assessment of James Pond, Martha's Vineyard, Massachusetts
Martha's Vineyard Commission
Vineyard Sound

EDUCATION

Dean Anson (2006)
Developing a Comprehensive Ecosystem Health and Program Effectiveness Analysis for the Long Island Sound National Estuary Program Office
Nicholas School of the Environment and Earth Sciences
Duke University
Long Island Sound

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Daniel Orchard (2005)
Commercial Fisheries Road Show
The Commercial Fisheries Center of Rhode Island
Rhode Island Sound

Jason Garnett (2013)
Soundkeeper Curb Marker Project
Soundkeeper, Inc.
Long Island Sound

Jason Garnett (2014)
Soundkeeper Purple Martin Birdhouse
Soundkeeper, Inc.

Jason Garnett (2013-2014)
Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.
Long Island Sound

Jason Garnett (2015)
SoundScaping Booklet Printing and Distribution
Project Administrator, Soundkeeper, Inc.
Long Island Sound

Margarett L. Jones (2009-2011, 2013)
Coastal Ecology Programs and Scholarships for Summer Nature Camp/Books and Materials for Outreach Program
Denison Pequotsepos Nature Center
Fishers Island Sound

Teresa McKinley (2000)
Narrow River Restoration: Public Education and Information
Narrow River Preservation Association
Block Island Sound

Susan McNamara (2010)
Long Island Sound Research Conference
Long Island Sound Education
Long Island Sound

Susan Nickerson (2010)
Boaters Guide Project
Cape Cod Commercial Hook Fishermen's Association
Nantucket Sound

Daniel Orchard (2005)
Commercial Fisheries Road Show
The Commercial Fisheries Center of Rhode Island
Rhode Island Sound

Kathleen O'Sullivan (2007-2008)
Bayless Boat Shed and Educational Programs
President Long Island Seaport & EcoCenter
Long Island Sound

Tamara Rich (2001)
A River in Our Own Backyard
Mystic Art Association
Fishers Island Sound

William Sargent (2015)
Notes from the Energy Patch
The Coastlines Project

Jennifer E. Saunders (1997)
Save the Sound Education Internship
Save the Sound
Long Island Sound

Save the Bay (2006)
Sunset Educational Series – Public Awareness Program
Narragansett Bay, Rhode Island
Rhode Island Sound

Diane Selditch(1999)
Senior Ecology Workshop
SoundWaters
Long Island Sound

Kelly Simmons (2001)
Bridging the Gap between School Curriculum, Kids, and Coastal Awareness
University of Massachusetts Dartmouth
Rhode Island Sound

Patricia Sheppard (2003, 2007-2008)
Watershed Watch, Turn the Tide Education Program
Lloyd Center for Environmental Studies
Rhode Island Sound

Jasmine Smith-Gillen (2013)
Climate Science Learning Project
Lloyd Center for the Environment

Jasmine Smith-Gillen (2010)
Estuary and Whales
Lloyd Center for the Environment
Southeastern New England

Susan Snider (2013)
Wild and Scenic Film Festival
Friends of the Norwalk Islands
Long Island Sound

Peter C. Stone (2010-2012)
Pilot Education Program: Dreams to the Sounds of the Sea: The Art and Science of Coastal Ecosystems
Pete C. Stone Studios
Marion, Massachusetts

Peter C. Stone (2013)
Pilot Education Program: The Art and Science of Nature Journaling: Coastal Marine Environments
Oceans Academy
Oceans Emporium

Thomas A. Stone (2014)
Ocean Acidification and Southern New England: A Conference
Woods Hole Research Center

Patricia Sullivan (2007)
Development and Implementation of Public Awareness Program for Responding to Distressed Marine Animals of the Sound
Marine Animal Survival Team
Cetacean Society International
Block Island Sound

Richard Tiani (2006)
Active Waterfront Education Program (AWE)
Groundwork Bridgeport, Inc.
Long Island Sound

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Audubon Society of Rhode Island
Narragansett Bay Research Reserve
Rhode Island Sound

Sandra Walczyk (2002)
Educational Brochure: Enjoy and Protect Our Water and Wildlife
Volunteers for Wildlife
Long Island Sound

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring
Rhode Island Sound

Lillian Willis (2006-2008)
Property Brochure: "How to Manage and Landscape Your Property"
Norwalk River Watershed Association Inc.
Long Island Sound

CONSERVATION EFFORTS AND COMMUNITY INVOLVEMENT

Karen Baar (2011)
Green Infrastructure Project 2011
Connecticut Fund for the Environment/ Save the Sound
New Haven and Bridgeport, Connecticut
Long Island Sound

Karen Baar (2008)
Save the Sound – Clean Up Your Act: Watershed Cleanup
Director of Grants for Save the Sound/Connecticut Fund for the Environment
Long Island Sound

Kimberly Barbour (2015)
Marine Meadows Habitat Restoration and Stewardship Initiative
Cornell Cooperative Extension of Suffolk County

Lee Ann Beauchamp (2001)
SoundWaters Environmental Learning Lab Internship
SoundWaters Inc.
Long Island Sound

James T. Carlton (1998)
Williams College-Mystic Seaport Maritime Studies Program: Environmental and Policy Research in the Long Island Sound Region
The Maritime Studies Program, Williams College and Mystic Seaport
Fishers Island Sound

Shelli Costa and Ami Aroujo (2012-2014)
WRWA Summer Internship
Westport River Watershed Alliance
Education Director

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Lindsay B. Counsell (2007)
Signage for Dead Neck Island
Three Bays Preservation, Inc.
Nantucket Sound

Aline Euler (2007, 2014)
Little Neck Bay – Long Island Sound Festival
Alley Pond Environmental Center
Long Island Sound

Jason Garnett (2013-2014)
Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.
Long Island Sound

Jason Garnett (2015)
SoundScaping Booklet Printing and Distribution
Project Administrator, Soundkeeper, Inc.
Long Island Sound

Joanne M. Jarzobski (2007)
MassSail Cape Cod Maritime Community Days
Provincetown Center for Coastal Studies
Nantucket Sound

Captain David Johnson (2004, 2006, 2008, 2010)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2008)
Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Eco Center

Captain David Johnson (2013)
Coastal Steward
Costal Steward Investigations (CSI) Program
Long Island Sound

Don Lewis (2010)
Turtle Research, Rescue, and Conservation
Cape Cod Consultants
Cape Cod to Mount Hope Bay

Melinda Loberg (2011)
Owen Little Way Rain Garden- Bioswale
Tisbury Waterways, Inc.
Vineyard Haven, Massachusetts
Vineyard Sound

Jennifer R. McCann (1995)
The Lieutenant River Watershed: Environmental Impacts and Monitoring Plan
Anitoch University New England
Long Island Sound

Susan McNamara (2009)
Marine Science Day
Long Island Sound Foundation
Long Island Sound

Mark Mello (2000)
It's Your River: The Slocums/Paskamansett River Restoration Project
Lloyd Center for Environmental Research
Rhode Island Sound

Nichola Meserve (2005)
Increasing Stakeholder Participation in a Cooperative Research Project
Duke University and Cape Cod Commercial Hook Fishermen's Association

New London Maritime Society (2013)
Custom House Maritime Museum
Susan Tamulevich, Director

Suzanne O'Connell (2006)
Complexities of Community-Based Conservation: Environmental Decision Making in the Lower Connecticut River
Department of Earth and Environmental Sciences
Wesleyan University
Long Island Sound

Christine A. O'Connell (2008)
Marine Zoning: An Ecosystem-Based Approach to Conservation and Management of Long Island Sound
School of Marine and Atmospheric Sciences,
Stony Brook University
Long Island Sound

Kathy Parsons and David McGlinchey (2010)
Manomet Center Energy Outreach Program
Manomet Center for Conservation Sciences
Manomet, Massachusetts

Dr. Michelle Portman (2009)
Public Perception and Environmental Impact Assessment of Offshore Wind Farms
Marine Policy Center, Woods Hole Oceanographic Institution
Atlantic Ocean

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component
American Littoral Society
Long Island Sound

Emily Russell (2010)
WRWA Internship
Bates College
Westport, Massachusetts

Melissa Sanderson (2007)
Lower Cape Cod Stream Restoration: Cedar Pond Rehabilitation
Cape Cod Commercial Hook Fishermen's Association
Nantucket Sound

Save The Bay, Inc. (2011)
Save the Bay's Bi-State Water Quality Coordination Initiative
Pawcatuck River Estuary and Little Narragansett Bay,
Rhode Island
Rhode Island Sound

Dr. Jennifer Seavey (2015)
Monitoring the Harbor and Gray Seal Population at the Isles of Shoals
Executive Director, UNH Foundation

Susan Snider (2012)
Let's Go Outside
Friends of the Norwalk Islands, Inc.
Long Island Sound

Thaxter Tewksbury (2009)
Building New England Connections
Interdistrict Committee for Project Oceanology

Lisabeth White (2011)
Watershed Advocacy Internship
Westport River Watershed Alliance
Westport, Massachusetts
Rhode Island Sound

Sandra Wyatt(1999)
Allin's Cove Neighborhood Coalition Newsletter
Allin's Cove Neighborhood Coalition
Rhode Island Sound

GEOLOGY AND ECOSYSTEM STUDY

Brad Agius (2002-2003)
Shifting Subtidal Community Structure: Effects of Environmental Change and Invasive Ascidians
Northeastern University
Nantucket Sound

Peter August and Janice Sasi (2015)
Ecological Reconnaissance of the Napatree Lagoon
Chair, Watch Hill Conservancy and Manager, Napatree Point Conservation Area, Watch Hill Conservancy
Rhode Island Sound

Diana Barrett (2015)
Effects of Abiotic Stressors and Soil Microbiota on the Zonation of Dune Plants
University of Massachusetts Dartmouth

Jane Brawerman (2007)
Salt Island Overlook –Conduct Comprehensive Inventory/ Assessment of Natural Communities and Unique Features of SIO
Connecticut River Coastal Conservation
Long Island Sound

John F. Bruno (1997)
Species Composition and Large-scale Distribution of Cobble Beach Plant Communities in Narragansett Bay, Rhode Island
Brown University
Rhode Island Sound

Sarah Cahill (1998)
Institutional Frameworks and the Use of Riparian Buffers for Nonpoint Source Pollution Reduction in Southern New England
University of Rhode Island
Rhode Island Sound

Kristen M. Cammarata (1997)
Mapping Potential Mariculture Sites in Narragansett Bay
Brown University
Rhode Island Sound

Henry Scott DeBey and Gaboury Benoit, Ph.D. (2010)
Developing an Approach for Coastal and Marine Spatial Planning (MSP) of the Long Island Sound
Yale University
Long Island Sound

Lindsey Fields (2009)
An Annual Mass Balance of Silica in Narragansett Bay, Rhode Island
Graduate School of Oceanography, University of Rhode Island

Kathryn Hanrahan (2014)
Short Term Study on the Impacts of Carcinus maenas *on Ecosystem Functioning in a Massachusetts Salt Marsh*
Massachusetts Coastal Zone Management

Dr. Noel Healy (2013)
Developing a Citizen Scientist Guide to Coastal and Marine Spatial Planning
Geography Department, Salem State University

Leslie Katz (1999)
Watershed Management Plan for the Great Salt Pond, Block Island, Rhode Island, Present Status, and Projections for the Future
Center for Environmental Studies, Brown University
Block Island Sound

Alexandria Moore (2015)
Importance of Community Structure in Tidal Wetland Restoration
Yale University, School of Forestry & Environmental Studies

Rachel Neurath (2008)
Recent Sea level Rise Recorded at Barn Island Salt Marsh in Connecticut
The Maritime Studies Program
Williams College and Mystic Seaport
Fishers Island Sound

Jessica R. Price (2010)
The Effect of Fiddler Crab Behaviors on Salt Marsh Ecosystem Function in the Presence or Absence of Avian Predation
Yale School of Forestry & Environmental Studies
Long Island Sound

Nicole E. Rohr (2007)
Impacts of Marine Algal Epiphytes on the Recruitment of an Herbivorous Snail, Lacuna vincta*, in Rhode Island Sound*
Biological Sciences, University of Rhode Island
Rhode Island Sound

Rodney A. Rountree (2001, 2006, 2010)
Undersea Soundscape of New England Coastal Waters: Are Soniferous Fishes Important?
University of Massachusetts Amherst
Cape Cod, Massachusetts

William Sargent (2010-2011)
Daily Erosion Forecasts off Chatham, Massachusetts
The Coastlines Project
Chatham, Massachusetts

Marcia J. Tobin (1995)
Effect of Tide Gates on Sedimentation Rates in Tidal Wetlands
Yale School of Forestry & Environmental Studies
Long Island Sound

Johan C. Varekamp and Ellen Thomas (2008)
Block Island, RI: A Microcosm for the Study of Anthropogenic and Natural Environmental Change
Earth and Environmental Sciences
Wesleyan University
Block Island Sound

BOOKS

Candace Cochrane (1996)
The Sounds – A Living Portrait
Harvard Graduate School of Education

Henry Hatch (2008)
Writer and Editor, The Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Claire de Lacvivier (2008)
Research, The Sounds Conservancy 15th Anniversary Publication

Timothy Marshall (2008)
Writer and Editor of The Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Chris O'Book (2009)
Editor of the Sounds Conservancy 15th Anniversary Publication
The Sounds Conservancy

Elizabeth J. Pillsbury Ph.D. (2010)
American Bouillabaisse: The Ecology, Politics and Economics of Fishing around New York City, 1870-present
Stony Brook University – Horace Mann School
Atlantic Ocean

Elizabeth J. Pillsbury (2006)
Turbulent Waters: The Transformation of Long Island Sound
Columbia University
Long Island Sound

Sara Jane Sampieri (2009)
Resource Guide to common Benthic Macrofauna in Southeastern Massachusetts Estuaries
School for Maine Science and Technology
University of Massachusetts Dartmouth

Jay Sargent (2010)
Dolphin and Human Interaction: A Personal History
Turks and Caicos; Middletown, Rhode Island

Jay Sargent (2013)
JoJo Book II

William Sargent (2012)
Beach Wars: Ten Thousand Years on a Barrier Beach

William Sargent (2010-2011)
Illustrations for Book on the Sounds of Cape Cod
Sounds of Cape Cod, Massachusetts

William Sargent (2013-2014)
Islands in the Storm
The Coastlines Project

William Sargent (2015)
Notes from the Energy Patch
The Coastlines Project

Cornelia W. Twining (2011)
The Ecological History of Coastal Connecticut's Watersheds
Yale School of Forestry & Environmental Studies
Coastal Watersheds of Connecticut
Long Island Sound

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Narragansett Bay Research Reserve
Audubon Society of Rhode Island
Rhode Island Sound

John Waldman (2010)
Publish Results of Kimberly Williams Master's Thesis Research (Striped Bass Wintering at Power Plants) in the Northeastern Naturalist – Aspects of the Wintering Biology of Striped Bass at a Power Plant Discharge
CUNY
Long Island Sound

MARINE SPECIES STATUS AND BEHAVIOR

Katie Anderson (2003)
Study of the Distribution and Behavior of the Striped Cusk-eel (Ophidion marginatum)
University of Massachusetts Amherst
Nantucket Sound

Andrea Bogomolni (2002)
Cytochrome P450 Activity and CYP1A Induction in Gray, Harbor, and Harp Seals of Cape Cod
Boston University Marine Program
Nantucket Sound

Andrea Bogomolni (2010)
Epidemiology and Ecology in Assessing Population Dynamics of Northeast U.S. Pinnipeds
University of Connecticut, Storrs
Cape Cod, Massachusetts

Andrea Bogomolni (2013)
Phocine Distemper Virus and PCBs in Seals of the Northeast U.S: Do Persistent Contaminants Alter Host Susceptibility?
University of Connecticut
Nantucket Sound

Dr. Joanna Borucinska (2004-2005, 2008, 2010-2014)
Health Status of Sharks within the Coastal Waters of New England; Morphological and Molecular Studies of Cancerous Lesions in Sharks
University of Hartford
Atlantic Ocean

Regina Campbell-Malone (2003)
Gestational and Post Partum Swelling in Right Whale Flukes
Woods Hole Oceanographic Institution
Atlantic Ocean

James T. Carlton (2010)
Shifts in Shrimp Communities: Detecting Introductions and Range Expansions of Estarine Shrimp in Long Island Sound
The Maritime Studies Program, Williams College and Mystic Seaport
Long Island Sound

Sara Grady (2004)
Population Structure of Horseshoe Crabs in Cape Cod Estuaries
Boston University Marine Program
Nantucket Sound

Alicia Landi (2010)
Selection of Spawning Habitats by Horseshoe Crabs along the Complex Connecticut Coastline
University of Connecticut
Long Island Sound

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns (2004-2006); Investigations into the Foraging Ecology of Atlantic Sei Whales (2007)
Boston University Marine Program
Woods Hole Oceanographic Institute
Atlantic Ocean

Eric Montie (2003)
Environmental Contaminants and Neurodevelopment in Marine Mammals in Nantucket and Vineyard Sounds
Woods Hole Oceanographic Institution
Nantucket Sound

Riley Young Morse (1996)
Habitat Selectivity and Movement of Young-of-the-year Winter Flounder
University of Rhode Island
Block Island Sound

Owen C. Nichols (2008-2009, 2011-2012, 2015)
High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (Loligo pealeii) *Occurrence in Nantucket Sound / Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth
Nantucket Sound

Cate E. O'Keefe, Ph.D. (2015)
Northeast Multispecies Fishery Flatfish Bycatch Avoidance Program
School for Marine Science and Technology
University of Massachusetts Dartmouth
Atlantic Ocean

Adrienne Pappal (2005)
Habitat Preferences of Juvenile Winter Flounder in the Presence of Cobble
School for Marine Science and Technology
University of Massachusetts Dartmouth
Vineyard Sound

Tracy Pugh (2012)
Alternative Mating Strategies in American Lobster: Is Intermolt Mating a Viable Compensatory Strategy?
University of New Hampshire

Katie Pugliares (2009)
Genetic Relatedness of Mass Stranded Atlantic White-Sided Dolphins on Cape Cod
Marine Science Graduate Program, University of New England

Julie Richmond (2008)
Using the Somatotropic Axis as a Model to Predict Nutritional Status in Free-ranging Harbor Seal Pups in Southern New England
Department of Animal Sciences, University of Connecticut
Atlantic Ocean

Rodney Rountree (2001, 2006, 2010)
Identification of Soniferous Fishes of Cape Cod and Martha's Vineyard Sound
Senior Ecologist, Marine Ecology & Technology Applications, Inc.
Vineyard Sound

Lisa Sette (2011)
Monitoring Seal Depredation in the Nantucket Sound Weir Fishery
Seal Studies Program – Provincetown Center for Coastal Studies
Nantucket Sound

Lisa White (2007)
Value of Sea Turtles in Tourism
Nicholas School of the Environment and Earth Sciences
Duke University
Atlantic Ocean

ALGAE AND PLANKTON

Donald M. Anderson (1999)
The Impact of Dredging Operations on Toxic Cyst Distributions and Subsequent Red Tide Blooms
Woods Hole Oceanographic Institution
Fishers Island Sound

John S. Barclay (2010)
Collect and Identify Plankton (Barnacle Larvae) from Near-Shore Blooms – Measure for Heavy Metals and Possible PCBs
University of Connecticut, Avery Point
The Wildlife Conservation Research Center

Jessica E. Conover (2010)
Decomposition Characteristics of Macroalgae Species in a Eutrophic Estuary
University of Rhode Island
Narragansett Bay, Rhode Island
Rhode Island Sound

Aaren S. Freeman (1998)
Grazing Pressure on an Introduced Algae in the Northeastern Atlantic, Contrasted with a Native Pacific Conspecific
Northeastern University
Atlantic Ocean

Michele Guidone (2009-2010)
Examination of the Abundance and Relative Palatability of Select Ulva Species in Rhode Island/ Herbivore Impact on Macroalgal Blooms in Narrangansett Bay, RI
University of Rhode Island
Rhode Island Sound

Jennifer Anne Hauxwell (1997)
Interaction Between Grazing and Nutrients as Controls of Macrophyte Biomass and Community Structure in Shallow Estuaries
Boston University Marine Program
Vineyard Sound

Xiaodong Jiang (2008)
The Evolution of Zooplankton Resistance to Harmful Algae Blooms
Marine Science Research Center, Stony Brook University
Long Island Sound

Emily Jones (2005-2006)
Impacts of Invasive Marine Algal Hosts on Epiphyte Species Diversity, Growth, and Survival
University of Rhode Island
Rhode Island Sound

Mark Lever (2001)
The Importance of Nutrients and Grazing by Macro herbivores in Controlling Microphyto benthic Biomass
Boston University Marine Program
Nantucket Sound

Pia Moisander (2013)
Spatio-temporal Distributions of Brown Tide Causing Harmful Algal Species Cochlodinim polykrikoides *in Buzzard's Bay*
Biology Department, University of Massachusetts Dartmouth
Rhode Island Sound

Pia Moisander (2011)
Toxin Production of Cyanobacteria on Nantucket Island
University of Massachusetts Dartmouth
Nantucket Island, Massachusetts
Nantucket Sound

Christine Newton (2009)
Effects of Drift Macroalgae on Salt Marsh Communities/ Can Algae Save our Marshes?
University of Rhode Island
Rhode Island Sound

Christine Newton (2012)
Invasion Strategy of the Red Algae, Heterosiphonia japonica *across a biogeographical barrier*
Northeastern University Marine Science Center
Rhode Island Sound

Elaine Potter (2013)
Life Cycle Dynamics of the Bloom-Forming Macroalga
Ulva rigida
University of Rhode Island
Rhode Island Sound

James F. Reinhardt (2007)
Ontogenetic Changes in the Material Properties of the Colonial Sea Squirt Didemnum, a Recent Invader to LIS
Department of Marine Sciences, University of Connecticut
Long Island Sound

Erika L. Rogers and Michael S. Berger (1996)
A Guide to Ascidian and Bryozoan Recruits of Eastern
Long Island Sound
University of Connecticut – Avery Point
Long Island Sound

Kaitlyn Shaw (2011)
Assessing Spatial Accumulations of Opportunistic Macroalgae in S.E. Massachusetts Estuaries
University of Massachusetts
S.E. Massachusetts Estuaries

Dr. Lucy Vlietstra (2004)
Potential Implications of Unusual Early Ctenophore Blooms for the Fisheries of Long Island Sound
U.S. Coast Guard Academy
Long Island Sound

SEAGRASS AND EELGRASS

Holly K. Bayley (2011-2012)
*Testing the Resilience of Genetically Distinct Eelgrass (*Zostera marina L.*) Populations for Improved Management and Restoration*
Assessing the Influence of Donor Population on Eelgrass Restoration Success
University of New Hampshire

Monica Candal (2004)
Nutrient Analysis for Eelgrass Restoration
Brown University
Rhode Island Sound

Alyssa Novak, Ph.D. (2013)
Test-Transplanting Genetically Differentiated Eelgrass Donor Populations Along Cape Cod National Seashore to Identify Those Most Suitable for a Successful Restoration
University of New Hampshire

Ylva Olsen (2005-2006)
Human Driven Loss of Seagrass Habitat: Effect on Food and Cover for Fish and Invertebrates
Boston University Marine Program
Nantucket Sound

Jonathan Stone (2014)
Eelgrass Restoration Program
Save the Bay Inc.

INVASIVE SPECIES

Alison Armstrong (2000)
The National Invasive Species Act of 1996: A Proposal for Successful Re-authorization of Ballast Water Legislation
Department of Marine Affairs, University of Rhode Island

Nicole A. Dobroski (2000, 2002)
Geographic Variation in Claw Form and Function in an Invading Crab Predator & Ecological Role of a Highly Mobile Introduced Predator: The Foraging Behavior of Juvenile Crabs on a Temperate Rocky Shore
Northeastern University and University of Rhode Island
Rhode Island Sound

Aaren S. Freeman (1998)
Grazing Pressure on an Introduced Algae in the Northeastern Atlantic, Contrasted with a Native Pacific Conspecific
Northeastern University
Atlantic Ocean

Torrance Hanley (2014)
Predicting the Effects of the Invasive European Green Crab (Carcinus maenas)*: A Comparison of Key Traits Across Habitats in New England*
Northeastern University

Lauren Stefaniak (2007-2008)
Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
University of Connecticut
Fishers Island Sound

OTHER

Margaret Arbuthnot (2010)
Coastal New England Cottontail Habitat Restoration in Rhode Island
Yale School of Forestry & Environmental Studies
Rhode Island
Rhode Island Sound

Wendi Beussler (2012)
Improving Nutrient Sampling and Data to Keep Oyster Pond Healthy
Oyster Pond Environmental Trust
Oyster Pond Environmental Trust Inc.

James Robert Collins (2010)
Controls on Nutrient Flux and Productivity in Long Island Sound: Variation Over Multiple Time Scales
Yale School of Forestry & Environmental Studies
Long Island Sound

Greig Cranna (2007-2008)
Documenting the Research of Helen Hays on the Migratory Patterns of Common and Roseate Terns
Freelance Photojournalist
Great Gull Island, New York; Punta Rasa, Argentina

Jason Hyatt (2002)
OPSaFE: The Oyster Pond Salt Flux Experiment
MIT/WHOI Joint Program
Nantucket Sound

Julia Hyman (2007-2008)
Stamford Harbor Monitoring Project
Soundkeeper, Inc.
Long Island Sound

George H. Leonard (1995)
Positive Interactions in the New England Intertidal Zone
Brown University
Rhode Island Sound

Mark Mello (2014)
Inventory of Rare Lepidoptera in Dune and Salt Marsh Systems of Essex County, MA
Lloyd Center for the Environment

Eric Morgan (2006)
Food Web Behavior of PCBs in Narragansett Bay
Graduate School of Oceanography, University of Rhode Island
Rhode Island Sound

Stacy Myers and Mary Morgan (2006)
Removing and Composting Hemigrapsus sanguineus *in Long Island Sound*
Cornell Cooperative Extension of Suffolk County
Long Island Sound

Melissa Ryan (2008)
Maritime Careers and Long Island Sound
Ocean Technology Foundation
Long Island Sound

Christina Senft (2008)
Saxiphilin: A Possible Pathway to PSP Toxin Resistance in Calanoid Copepods
University of Connecticut at Avery Point
Atlantic Ocean

Larry Sickels (2002)
Colonization of a Restored Rhode Island Salt Pond by Winter Flounder (Pseudopleuronectes americanus)
Roger Williams University
Rhode Island Sound

Susan A. Snider (2007)
Sheffield Island Lighthouse
Norwalk Seaport Association, Inc.
Long Island Sound

Jessica Tallman (2005)
Oyster Grow-out Cages as Artificial Reefs for Temperate Fishes
University of Rhode Island
Rhode Island Sound

Todd Tupper (2003)
Abiotic and Biotic Factors that Contribute to Site Occupancy of the Fowler's Toad (Bufo fowleri) *of lower Cape Cod, Massachusetts*
Department of Environmental Science and Policy
George Mason University
Nantucket Sound

William Jerry West Jr. (1996)
Quinnipiac River Biodiversity Inventory
Yale School of Forestry and Environmental Studies
Long Island Sound

Laurel Wing (2004)
Production of a Training Video on a Rhode Island Commercial Fishing Method
University of Rhode Island
Rhode Island Sound

Joanna York (2000)
The Role of Iron in Controlling Shallow Estuarine Primary Production
Boston University Marine Program
Nantucket Sound

GRANTEES LISTED BY YEAR

1995

Lori K. Benoit (1995)
Impact of the Spread of Phragmites *on Populations of Tidal Marsh Birds in Connecticut*
Connecticut College

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

George H. Leonard (1995)
Positive Interactions in the New England Intertidal Zone
Brown University

Jennifer R. McCann (1995)
The Lieutenant River Watershed: Environmental Impacts and Monitoring Plan
Antioch University New England

Marcia J. Tobin (1995)
Effect of Tide Gates on Sedimentation Rates in Tidal Wetlands
Yale School of Forestry & Environmental Studies

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York Stony Brook

1996

Maria Iliana Ayala (1996)
Protozoans as Indicators of Pollution Level
Yale School of Forestry & Environmental Studies

Candace Cochrane (1996)
The Sounds – A Living Portrait
Harvard Graduate School of Education

Nancy Haley (1996)
Atlantic Sturgeon Concentrations in Long Island Sound
University of Massachusetts Amherst

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Anne LaFleur (1996)
Chester Creek Vegetation Survey and Management Guide
Chester Land Trust

Andrew M. Lohrer (1996, 1998)
Impacts of a Non-Native Crab Invader, Hemigrapsus sanguineus, *on Long Island Sound Biota*
University of Connecticut – Avery Point

Riley Young Morse (1996)
Habitat Selectivity and Movement of Young-of-the-Year Winter Flounder
University of Rhode Island

Erika L. Rogers and Michael S. Berger (1996)
A Guide to Ascidian and Bryozoan Recruits of Eastern Long Island Sound
University of Connecticut – Avery Point

William Jerry West, Jr. (1996)
Quinnipiac River Biodiversity Inventory
Yale School of Forestry & Environmental Studies

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York Stony Brook

1997

Lenny Bellet (1997)
The Effects of Nitrogen Loading on Two Fringing Marshes in the Mystic River Estuary
Connecticut College

John Bruno (1997)
Species Composition and Large-Scale Distribution of Cobble Beach Plant Communities in Narragansett Bay, Rhode Island
Brown University

Kristen M. Cammarata (1997)
Mapping Potential Mariculture Sites in Narragansett Bay
Brown University

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Jennifer Anne Hauxwell (1997)
Interaction between Grazing and Nutrients as Controls of Macrophyte Biomass and Community Structure in Shallow Estuaries
Boston University Marine Program

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Jennifer E. Saunders (1997)
Save the Sound Education Internship
Save the Sound

Sarah M. Thompson (1997)
Use of Land-Derived and Recycled Nitrogen in Cladophora vagabunda *in Waquoit Bay*
Boston University Marine Program

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Kimberly R. Williams (1995-1997)
Fishery and Ecology of Striped Bass Wintering in the Thermal Plume of the LILCO Northport Power Plant
State University of New York at Stony Brook

1998

Sarah Cahill (1998)
Institutional Frameworks and the Use of Riparian Buffers for Nonpoint Source Pollution Reduction in Southern New England
University of Rhode Island

James T. Carlton (1998)
Environmental and Policy Research in the Long Island Sound Region
The Maritime Studies Program
Williams College and Mystic Seaport

Aaren S. Freeman (1998)
Grazing Pressure on an Introduced Algae in the Northeastern Atlantic, Contrasted with a Native Pacific Conspecific
Northeastern University

Bart H. Harrison (1998)
Settlement of the Bay Scallop, Argopecten irradians*, to Eelgrass,* Zostera marina*, in the Presence of Macrophytic Algal Fouling*
University of Massachusetts at Dartmouth

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Tim Hoffman (1998)
Geomorphic Processes and Evolution of Wildlife Habitat at the Charles E. Wheeler Wildlife Sanctuary at the Mouth of the Housatonic River
Southern Connecticut State University

Ken M. Leonard III (1998)
Genetic Variation in Hatchery Populations and Wild Populations of Argopecten irradians *in New England*
University of Rhode Island

Andrew M. Lohrer (1996, 1998)
Impacts of a Non-Native Crab Invader, Hemigrapsus sanguineus*, on Long Island Sound Biota*
University of Connecticut – Avery Point

Thomas Maloney (1998)
Anadromous Fisheries Restoration Manual
Connecticut River Watershed Council

Westport River Watershed Alliance
(1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

1999

Donald M. Anderson (1999)
The Impact of Dredging Operations on Toxic Cyst Distributions and Subsequent Red Tide Blooms
Woods Hole Oceanographic Institution

Inga M. Fredland (1999)
Reproductive Ecology of the Northern Pipefish, Syngnathus fuscus
Boston University Marine Program

Christina Garabedian (1999)
Hypoxia Dynamics in Long Island Sound
Save the Sound

Corey Grinnell (1999-2000)
Combined Effects of Erosion Control and Habitat Use on Roseate Tern Productivity
Department of Natural Resources Conservation,
University of Massachusetts Amherst

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Leslie Katz (1999)
Watershed Management Plan for the Great Salt Pond, Block Island, Rhode Island: Environmental History, Present Status, and Projections for the Future
Center for Environmental Studies, Brown University

Kevin Kroeger (1999)
Assessment of Groundwater and Streamwater Nitrogen Contamination from the Ashumet Valley Wastewater Plume
Boston University Marine Program

Nancy J. O'Connor (1999, 2002, 2015)
Do Biofilms on Mesh Netting Used in Bivalve Aquaculture Stimulate Settlement and Molting of Crab Larvae?
University of Massachusetts Dartmouth

Diane Selditch (1999)
Senior Ecology Workshop
SoundWaters

Westport River Watershed Alliance
(1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Sandra Wyatt (1999)
Allin's Cove Neighborhood Coalition Newsletter
Allin's Cove Neighborhood Coalition

James M. Zingo (1999)
Foraging Ecology and Reproductive Success of Endangered Roseate Terns
University of Massachusetts Amherst

2000

Alison Armstrong (2000)
The National Invasive Species Act of 1996: A Proposal for Successful Re-authorization of Ballast Water Legislation
Department of Marine Affairs, University of Rhode Island

John Bean (2000)
The Importance of Organic Forms of Nitrogen to Coastal Pollution
University of Connecticut – Avery Point

Mark Carabetta (2000)
Patterns and Rates of Phragmites australis *Expansion and Retreat*
Connecticut College

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Julianna Connolly (2000)
Organic Carbon and Nitrogen Cycling in Coastal Soils
Williams College

Jennifer Cooper (2000)
Erosion of Sensitive Coastal Wetlands at the Charles E. Wheeler Wildlife Sanctuary: Physical Mechanisms and Long-Term Rates of Change
Southern Connecticut State University
Connecticut Coastal Audubon Center

Sean Corson (2000)
West River Connecticut Fish Ladder Feasibility Study
Yale School of Forestry and Environmental Studies

Nicole A. Dobroski (2000, 2002)
Geographic Variation in Claw Form and Function in an Invading Crab Predator & Ecological Role of a Highly Mobile Introduced Predator: The Foraging Behavior of Juvenile Crabs on a Temperate Rocky Shore
Northeastern University and University of Rhode Island

Eric Gauger (2000)
Susceptibility of Commercially Important Fish Species to Disease Caused by Vibrio carchariae
University of Rhode Island

Corey Grinnell (1999-2000)
Combined Effects of Erosion Control and Habitat Use on Roseate Tern Productivity
Department of Natural Resources Conservation
University of Massachusetts Amherst

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Teresa McKinley (2000)
Narrow River Restoration – Public Education & Information
Narrow River Preservation Association

Mark Mello (2000)
It's Your River: The Paskamansett/Slocums River Restoration Project
Lloyd Center for Environmental Studies

Gregory Shriver (2000)
New England Salt Marsh Bird Survey
Massachusetts Audubon Society

Erica Weiss (2000)
The Effects of Water Column and Sediment Characteristics on the Growth Rates of Quahogs (Mercenaria mercenaria) *and Soft-Shell Clams* (Mya arenaria)
Boston University Marine Program

Joanna York (2000)
The Role of Iron in Controlling Shallow Estuarine Primary Production
Boston University Marine Program

2001

Lee Ann Beauchamp (2001)
SoundWaters, Inc. Environmental Learning Lab
SoundWaters, Inc.

Johanna Blasi (2001)
Predatory Relationships Between Intertidal Amphipods and the Non-indigenous Crab (Hemigrapsus sanguineus) *Along the Massachusetts Coast*
University of Massachusetts Dartmouth

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Anita Kim (2001)
Fundulus majalis *as a Potential Predator of the Invasive Crab Species* (Hemigrapsus sanguineus)
University of Massachusetts Dartmouth

Michele J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
USGS Patuxent Wildlife Research Center
Falkner Island Tern Project

Mark Lever (2001)
The Importance of Nutrients and Macrograzers in Controlling the Biomass of Benthic Microphytes
Boston University Marine Program/Marine Biology Laboratory

Tamara Rich (2001)
A River in Our Own Backyard
Mystic Art Association

Rodney Rountree (2001, 2006, 2010)
Identification of Soniferous Fishes of Cape Cod and Martha's Vineyard Sound
Marine Ecology & Technology Applications, Inc.

Andrea Shriver (2001)
Effects of Coastal Eutrophication on the Food Supply and Growth of the Bay Scallop (Argopecpen irradians)
Boston University Marine Program

Kelly Simmons (2001)
Bridging the Gap Between School Curriculum, Kids, and Coastal Awareness, Buzzards Bay
University of Massachusetts Dartmouth

Michael Weiss, Colleen Cook, Eric Goodman (2001)
So You Want to Grow Some Scallops: A High School Research Project to Reintroduce and Sustain a Scallop Population in Oyster Bay, Long Island
Friends Academy

Benjamin Zuckerberg (2001)
Grassland Restoration on Nantucket Island: The Effects of Habitat Restoration on Grassland and Shrubland Birds in Island Ecosystems
Massachusetts Audubon Society

2002

Brad Agius (2002-2003)
Shifting Subtidal Community Structure: Effects of Environmental Change and Invasive Ascidians
Northeastern University

Teresa Ayala (2002)
A Study of the Feeding Habits of the Diamondback Terrapin (Malaclemys terrapin) *in Long Island Sound*
Mt. Sinai High School

Thomas R. Baptist (2002)
The Great Captains Island Heron and Egret Rookery Study
Connecticut Audubon Society

Andrea Bogomolni (2002)
Cytochrome P450 Activity and CYP1A Induction in Gray, Harbor, and Harp Seals of Cape Cod
Boston University Marine Program

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Nicole A. Dobroski (2000, 2002)
Geographic Variation in Claw Form and Function in an Invading Crab Predator & Ecological Role of a Highly Mobile Introduced Predator: The Foraging Behavior of Juvenile Crabs on a Temperate Rocky Shore
Northeastern University and University of Rhode Island

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Jason Hyatt (2002)
OPSaFE: The Oyster Pond Salt Flux Experiment
MIT/WHOI Joint Program

Michele J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
USGS Patuxent Wildlife Research Center
Falkner Island Tern Project

Melissa Lage (2002)
Impact of Anthropogenic Disturbance on the Composition and Ecosystem Functioning of Microbial Communities in New England Salt Marshes
Brown University

Nancy J. O'Connor (1999, 2002)
Do Biofilms on Mesh Netting used in Bivalve Aquaculture Stimulate Settlement and Molting of Crab Larvae?
University of Massachusetts Dartmouth

Suzanne Polmar (2002)
A Study of the Restoration of Anadromous Fish in the West River Watershed
Yale School of Forestry and Environmental Studies

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

William P. Shadel and Aubrey McMahon (2002-2003)
Water Quality Monitoring Program
Save the Sound

Larry Sickels (2002)
Colonization of a Restored Rhode Island Salt Pond by Winter Flounder (Pseudopleuronectus americanus)
Roger Williams University

Christine Van Orsouw (2002)
The Effects of Hypoxia on the Behavior of Early Benthic Phase Lobsters (Homarus americanus) *and the Ability to Detect and Avoid Low Oxygen*
University of Rhode Island

Sandra Walczyk (2002)
Educational Brochure: Enjoy and Protect Our Water and Wildlife
Volunteers for Wildlife

Beth Weinman (2002)
The Geochemical Significance of the Breakwater in Flushing Bay: The Effects of Reoxidation on Sulfide-Bound Metals
Queens College

2003

Brad Agius (2002-2003)
Shifting subtidal Community Structure: Effects of Environmental Change and Invasive Ascidians
Northeastern University

Katie Anderson (2003)
Study of the Distribution and Behavior of the Striped Cusk-Eel (Ophidion marginatum) *in Vineyard Sound*
University of Massachusetts Amherst

Brendan Annett (2003)
Anadromy and Genetic Relationships in Remnant Anadromous Brook Trout Populations
Boston University Marine Program

Barbara Brennessel (2003, 2006)
Conservation of Diamondback Terrapins in the Northeast
Wheaton College

Stephen Brown (2003)
American Oystercatcher Nesting Success and Migration Patterns in New England
Manomet Center for Conservation Sciences

Matthew Cacopardo (2003)
Accumulation of Contaminant Metals by Marine Bivalves in New Haven Harbor
Southern Connecticut State University

Regina Campbell-Malone (2003)
Gestational and Post Partum Swelling in Right Whale Flukes
Woods Hole Oceanographic Institution

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Dr. Cynthia Coron and Dr. Thomas Fleming (2003-2005, 2010, 2011)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut Tidal Marshes
Southern Connecticut State University

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Michele J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
USGS Patuxent Wildlife Research Center
Falkner Island Tern Project

Eric Montie (2003)
Environmental Contaminants and Neurodevelopment in Marine Mammals in Nantucket and Vineyard Sounds
Woods Hole Oceanographic Institution

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

William P. Shadel and Aubrey McMahon (2002-2003)
Water Quality Monitoring Program
Save the Sound

Patricia Sheppard (2003, 2007-2008)
Watershed Watch and Turn the Tide Education Program
Lloyd Center for the Environment

Todd Tupper (2003)
Some Abiotic and Biotic Factors that Contribute to Site Occupancy of the Fowler's Toad (Bufo fowleri) *of Lower Cape Cod, Massachusetts*
Department of Environmental Science and Policy
George Mason University

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

William Wilcox (2003)
Water Quality Assessment of James Pond, Martha's Vineyard, Massachusetts
Martha's Vineyard Commission

2004

Rebecca Barnes (2004)
Managing Nitrogen in Narragansett Bay: A Stable Isotope Approach
Yale School of Forestry & Environmental Studies

Barbara Bauer (2004)
Conservation and Management of Diamondback Terrapins in Long Island Sound
Long Island University

Sara Owen Bisson (2004)
Assessment of Heavy Metal Contaminant Levels, Transport Mechanisms, and Potential Health Impacts of Polluted Sediments
Yale School of Forestry & Environmental Studies

Joanna Borucinska (2004-2005, 2008, 2010-2014)
Health Status of Sharks within the Coastal Waters of New England; Morphological and Molecular Studies of Cancerous Lesions in Sharks
University of Hartford

Eric Brazer Jr. (2004)
Reproductive Life History and Essential Fish Habitat Mapping of Western Georges Bank Cod: Protocol Design
Nicholas School of the Environment, Duke University

Monica Candal (2004)
Nutrient Analysis for Eelgrass Restoration
Save the Bay, Rhode Island

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Dr. Cynthia Coron and Dr. Thomas Fleming (2003-2005, 2010, 2011)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut Tidal Marshes
Southern Connecticut State University

Robert Crafa (2004)
Developing a Sustainable Hatchery
The Waterfront Center

Jennifer Culbertson (2004-2005)
Examination of Methylmercury Magnification in a New England Salt Marsh
Boston University Marine Program

Debora Fillis (2004)
Application and Evaluation of a Rapid Assessment Technique for New England Salt Marshes
Yale School of Forestry & Environmental Studies

Heather Giddings (2004)
Rhode Island Hard Clam Health Study
University of Rhode Island

Sara Grady (2004)
Population Structure of Horseshoe Crabs in Cape Cod Estuaries
Boston University Marine Program

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Captain David Johnson (2004, 2006, 2008, 2010)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2008, 2010) Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Ecology Center

Michele J. Kuter (2001-2004)
Common and Roseate Tern Colony Studies on Falkner Island, Connecticut and Great Gull Island, New York
USGS Patuxent Wildlife Research Center
Falkner Island Tern Project

Maura Leahy (2004)
Great Gull Island Bird Nesting Habitat Restoration Research
Yale School of Forestry & Environmental Studies

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns (2004-2006); Investigations into the Foraging Ecology of Atlantic Sei Whales (2007)
Boston University Marine Program
Woods Hole Oceanographic Institution

Amy Munson (2004)
Significance of Matrix metalloproteinases *in Disease Resistant and Non-Resistant Oyster Species of the Genus* Crassostrea
University of Rhode Island

Cate O'Keefe (2004)
Effects of Varying Environmental Parameters on the Survivorship of Embryonic and Larval Alewife
Boston University Marine Program

Eric Palkovacs (2004)
Fishways as a Method for Anadromous Alewife Restoration in Connecticut
Yale University

Adriana Picariello (2004, 2007)
Conservation of the Diamondback Terrapin, Malaclemys terrapin, *in Cape Cod, Massachusetts*
Terrapin Research Group
Wheaton College

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Dr. Richard Veit (2004)
Establishment and Conservation of Roseate Terns on Muskeget Island
The College of Staten Island, CUNY

Dr. Lucy Vlietstra (2004)
Potential Implications of Unusual Early Ctenphore Blooms for the Fisheries of Long Island Sound
United States Coast Guard Academy

Laurel Wing (2004)
Production of a Training Video on a Rhode Island Commercial Fishing Method
University of Rhode Island

2005

Andrew Altieri (2005)
Assessing the Full Impact of Oxygen Depletion on the Narragansett Bay Estuarine Community
Brown University

Joanna Borucinska (2004-2005, 2008, 2010-2014)
Health Status of Sharks within the Coastal Waters of New England; Morphological and Molecular Studies of Cancerous Lesions in Sharks
University of Hartford

The Coalition for Buzzard's Bay (1997, 2000-2002, 2005)
Buzzards BayKeeper; Production of the Buzzards Bay Care Guide; Baywatchers – Citizens' Water Quality Monitoring; Buzzard's Bay Intern Program
The Coalition for Buzzard's Bay

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Cynthia Coron and Thomas Fleming (2003-2005)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut Tidal Marshes
Southern Connecticut State University

Jennifer Culbertson (2004-2005)
Examination of Methylmercury Magnification in a New England Salt Marsh
Boston University Marine Program

Jessica Darling (2005)
The Role of Nutrients in Marsh Drowning in Long Island Sound
Yale School of Forestry & Environmental Studies

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Kari B. Heinonen (2005)
The Impacts of the Invasive Crab Hemigrapsus sanguineus *on a Crustacean-Eating Guild of Fishes in Long Island Sound*
Marine Sciences, University of Connecticut

Emily Jones (2005-2006)
Impacts of Invasive Marine Algal Hosts on Epiphyte Species Diversity, Growth, and Survival
University of Rhode Island

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns (2004-2006); Investigations into the Foraging Ecology of Atlantic Sei Whales (2007)
Boston University Marine Program
Woods Hole Oceanographic Institution

Nichola Meserve (2005)
Increasing Stakeholder Participation in a Cooperative Research Project
Cape Cod Commercial Hook Fishermen's Association
Duke University

Ylva Olsen (2005-2006)
Human Driven Loss of Seagrass Habitat: Effect on Food and Cover for Fish and Invertebrates
Boston University Marine Program

Daniel Orchard (2005)
Commercial Fisheries Road Show
The Commercial Fisheries Center of Rhode Island

Adrienne Pappal (2005)
Habitat Preferences of Juvenile Winter Flounder in the Presence of Cobble
School for Marine Science and Technology
University of Massachusetts Dartmouth

Michelle Portman (2005-2006)
Marine Conservation Strategies from Land-Based Experience
University of Massachusetts Boston

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Jessica Tallman (2005)
Oyster Grow-Out Cages as Artificial Reefs for Temperate Fishes
University of Rhode Island

2006

Dean Anson (2006)
Developing a Comprehensive Ecosystem Health and Program Effectiveness Analysis for the Long Island Sound National Estuary Program Office
Nicholas School of the Environment and Earth Sciences
Duke University

Michael Bednarski (2006)
Biology of the Thames River's Unique Wintering Aggregation of Striped Bass
Queens College

Barbara Brennessel (2003, 2006)
Conservation of Diamondback Terrapins in the Northeast
Wheaton College

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Jessica Mulready Dominguez (2006)
Addressing Community Value in Wetland Restoration on Cape Cod
Marine Affairs, University of Rhode Island

Christopher Field (2006)
Lighthouse Point Park "Important Bird Area" Conservation Plan
University of Connecticut

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Captain David Johnson (2004, 2006, 2008, 2010)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2008)
Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Eco Center

Emily Jones (2005-2006)
Impacts of Invasive Marine Algal Hosts on Epiphyte Species Diversity, Growth, and Survival
University of Rhode Island

Catherine Latanich (2006)
An Evaluation of the Use of Catch Limits in Fisheries Management Policy
Cape Cod Commercial Hook Fishermen's Association
Duke University

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns ('04-'06); Investigations into the Foraging Ecology of Atlantic Sei Whales ('07)
Boston University Marine Program
Woods Hole Oceanographic Institution

Sandra Millan-Tripp (2006 and 2008)
Video Production of the Natural Flow Hatchery Pilot Project for the Atlantic Salmon Restoration at Mill Brook
Tributary Mill Conservancy Inc.

Eric Morgan (2006)
Food Web Behavior of PCBs in Narragansett Bay
Graduate School of Oceanography, University of Rhode Island

Stacy Myers and Mary Morgan (2006)
Removing and Composting Hemigrapsus sanguineus *in Long Island Sound*
Cornell Cooperative Extension of Suffolk County

Suzanne O'Connell (2006)
Complexities of Community-Based Conservation: Environmental Decision Making in the Lower Connecticut River
Earth and Environmental Sciences, Wesleyan University

Ylva Olsen (2005-2006)
Human Driven Loss of Seagrass Habitat: Effect on Food and Cover for Fish and Invertebrates
Boston University Marine Program

Elizabeth J. Pillsbury (2006)
Turbulent Waters: The Transformation of Long Island Sound
Department of History, Columbia University

Michelle Portman (2005-2006)
Marine Conservation Strategies from Land-Based Experience
University of Massachusetts Boston

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Justin K. Rivera (2006)
Nantucket Sound Water Quality Monitoring
Nicholas School of the Environment and Earth Sciences
Duke University

Rodney Rountree (2001, 2006, 2010)
Identification of Soniferous Fishes of Cape Cod and Martha's Vineyard Sound
Marine Ecology & Technology Applications, Inc.

Save the Bay (2006)
Sunset Educational Series – Public Awareness Program
Narragansett Bay, Rhode Island

Erika Schielke (2006)
Effects of Anadromous Alewife Restoration on Food Web Structure and Mercury Transfer
Department of Ecology and Evolutionary Biology
Yale University

Richard Tiani (2006)
Active Waterfront Education Program (AWE)
Groundwork Bridgeport Inc.

Annika Walters (2006)
The Impacts of Anadromous Alewife on Nutrient Loading in Coastal Streams
Department of Ecology and Evolutionary Biology
Yale University

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Lillian Willis (2006-2008)
New York State Adaption and Printing of Brochure "How to Manage and Landscape Your Property"
Norwalk River Watershed Association

2007

Jane Brawerman (2007)
Conduct Comprehensive Inventory/Assessment of Natural Communities and Unique Features of Salt Island Overlook
Connecticut River Coastal Conservation District

Lindsay Brin (2007)
Land Derived Nitrogen Loads and Estuarine Sediment Denitrification: Tracking Human Inputs to Algal Blooms in a Cape Cod Estuary
Boston University Marine Program

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Lindsay B. Counsell (2007)
Signage for Dead Neck Island
Three Bays Preservation, Inc.

Greig Cranna (2007-2008)
Documenting the Research of Helen Hays on the Migratory Patterns of the Common and Roseate Tern
Freelance Photojournalist
Great Gull Island, New York; Punta Rasa, Argentina

Aline Euler (2007, 2014)
Little Neck Bay – Long Island Sound Festival
Alley Pond Environmental Center

Valerie A. Hall (2007)
Contribution of Fall-Spawning to the Reproduction of Bay Scallops, Argopecten irradians*, in Nantucket Harbor*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Torrance Hanley (2007)
Ecological Stoichiometry and Predation: Examining Life History Trade-Offs in Daphnia
Department of Ecology and Evolutionary Biology,
Yale University

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Troy Hill (2007)
The Effect of Nutrient Enrichment on Carbon Dynamics in Long Island Sound Salt Marshes
Yale School of Forestry & Environmental Studies

Julia Hyman (2007-2008)
Stamford Harbor Monitoring Project
Soundkeeper, Inc.

Joanne M. Jarzobski (2007)
MassSail Cape Cod Community Maritime Days
Provincetown Center for Coastal Studies

Loren Kellogg (2007)
River Herring Restoration Project
Coalition for Buzzards Bay

Erin Kinney (2007)
^{15}N Profiles in Salt Marsh Sediments: Calibrations Using Decadal Scale N Loads
Boston University Marine Program

Meredith Kratzmann (2007)
Assessing the Impacts of Beach Scraping to Barrier Island Morphology
Geosciences Department
University of Rhode Island

Nadine Lysiak (2004-2007)
Developing Multi-Isotope Tracers to Determine North Atlantic Right Whale Habitat Use, Range, and Movement Patterns ('04-'06); Investigations into the Foraging Ecology of Atlantic Sei Whales ('07)
Boston University Marine Program
Woods Hole Oceanographic Institution

Kathleen O'Sullivan (2007-2008)
Bayless Boat Shed and Educational Programs
Long Island Seaport & Eco Center

Sara Petrochic (2007)
The Ecological Role of Diamondback Terrapins in the Structure and Dynamics of Benthic Communities in Oyster Bay Harbor
Long Island University

Adriana Picariello (2004, 2007)
Conservation of the Diamondback Terrapin, Malaclemys terrapin*, in Cape Cod, Massachusetts*
Terrapin Research Group, Wheaton College

Anthony Rafferty (2007)
Investigation as to whether Current Onboard Catch Handling Methods Induce Mortality of Marine Mammals and Fish
Nicholas School of the Environment and Earth Sciences
Duke University
Cape Cod Commercial Fishermen Hook Association

James Reinhardt (2007)
Ontogenetic Changes in the Material Properties of the Colonial Sea Squirt Didemnum*, a Recent Invader to Long Island Sound*
Marine Sciences, University of Connecticut – Avery Point

Don Riepe (2002-2010, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Nicole Rohr (2007)
Impacts of Marine Algal Epiphytes on the Recruitment of an Herbivorous Snail, Lacuna vincta*, in Rhode Island Sound*
Biological Sciences, University of Rhode Island

Melissa Sanderson (2007)
Lower Cape Cod Stream Restoration: Cedar Pond Rehabilitation
Cape Cod Commercial Hook Fishermen's Association

Patricia Sheppard (2003, 2007-2008)
Watershed Watch and Turn the Tide Education Program
Lloyd Center for the Environment

Susan Snider (2007, 2009, 2013)
Sheffield Island Lighthouse "Linking the Past to the Present"
Wild and Scenic Film Festival
Norwalk Seaport Association

Lauren Stefaniak (2007-2008)
Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
Marine Sciences, University of Connecticut – Avery Point

Patricia Sullivan (2007)
Development and Implementation of Public Awareness Program for Responding to Distressed Marine Animals of the Sound
Marine Animal Survival Team
Cetacean Society International

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Narragansett Bay Research Reserve
Audubon Society of Rhode Island

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Lisa White (2007)
Value of Sea Turtles in Tourism
Nicholas School of the Environment and Earth Sciences
Duke University

Lillian Willis (2006-2008)
New York State Adaption and Printing of Brochure "How to Manage and Landscape Your Property"
Norwalk River Watershed Association, Inc.

2008

Karen Baar (2008)
Clean Up Your Act: Watershed Cleanup
Save the Sound Connecticut Fund for the Environment

Adam Scott Barkley (2008)
Discard Mortality of Yellowtail Flounder in the Southern New England Trawl Fishery
Dartmouth School for Marine Science and Technology
University of Massachusetts

Trina Schneider Bayard (2008)
Behavioral Mechanisms of Habitat Selection in a Salt Marsh Obligate Breeder
Department of Ecology and Evolution
University of Connecticut Storrs

Kate Boicourt (2008)
Refining Restoration Strategies: Assessing M-type Phragmites australis *Removal in Long Island Sound*
Yale School of Forestry & Environmental Studies

Joanna Borucinska (2004-2005, 2008, 2010-2014)
Health Status of Sharks within the Coastal Waters of New England; Morphological and Molecular Studies of Cancerous Lesions in Sharks
Department of Biology, University of Hartford

Margaret A. Carroll (2008)
Study of Metal Accumulations in Tissues of the Oyster Crassostrea virginica *in Jamaica Bay, New York*
Medgar Evers College, CUNY

Coastal Waterbird Program (2003-2008)
Protection of Coastal Waterbirds and their Habitats on the South Shore of Cape Cod
Massachusetts Audubon Society

Greig Cranna (2007-2008)
Documenting the Research of Helen Hays on the Migratory Patterns of the Common and Roseate Tern
Freelance Photojournalist
Great Gull Island, New York; Punta Rasa, Argentina

Rebecca Harris, Ph.D. (2008-2010)
Protection of Coastal Waterbirds and their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Julia Hyman (2007-2008)
Stamford Harbor Monitoring Project
Soundkeeper Inc.

Xiaodong Jiang (2008-2009)
The Evolution of Zooplankton Resistance to Harmful Algal Blooms
Marine Science Research Center, Stony Brook University

George Jackman (2008)
The Decline of the Winter Flounder: Which Nurseries Matter?
Ecology, Evolution, and Behavior Sub-Program
Queens College, CUNY

Captain David Johnson (2004, 2006, and 2008)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2006, 2008, 2010)
Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Eco Center

Chiu-Yen Kuo (2008)
The Effect of Spatial Scale on the Estimation of Fish Diversity and Implications for Marine Reserve Management
Marine Sciences, University of Connecticut

Ivan Mateo (2008)
Identification of Critical Habitat for Tautog by Otolith Chemistry
Department of Fisheries, Animal, and Veterinary Science
University of Rhode Island

Sandra Millan-Tripp (2006, 2008)
Video Production of the Natural Flow Hatchery Pilot Project for the Atlantic Salmon Restoration at Mill Brook
Tributary Mill Conservancy Inc.

Rita Oliveira Monteiro (2008)
Effects of Land Use on Alewife Growth and Recruitment Using Biogeochemical Tracers in New England Estuaries
College of Environmental Science and Forestry
State University of New York

Rachel Neurath (2008)
Recent Sea Level Rise Recorded at Barn Island Salt Marsh in Connecticut
The Maritime Studies Program, Williams College and
Mystic Seaport

Owen C. Nichols (2008-2009, 2011-2012, 2015)
*High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (*Loligo pealeii*) Occurrence in Nantucket Sound/ Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Christine A. O'Connell (2008)
Marine Zoning: An Ecosystem-Based Approach to Conservation and Management of Long Island Sound
School of Marine and Atmospheric Science
Stony Brook University

Kathleen O'Sullivan (2007-2008)
Bayless Boat Shed and Educational Programs
Long Island Seaport & Eco Center

Laurie L. Perino (2008)
Short and Long-Term Effects of Harmful Algae on Three Important Bivalve Species
Marine Science Research Center, Stony Brook University

Julie Richmond (2008)
Using the Somatotropic Axis as a Model to Predict Nutritional Status in Free-Ranging Harbor Seal Pups in Southern New England
Department of Animal Science, University of Connecticut

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Melissa Ryan (2008)
Maritime Careers and Long Island Sound
Ocean Technology Foundation

Christina Senft (2008)
Saxiphilin: A Possible Pathway to PSP Toxin Resistance in Calanoid Copepods
University of Connecticut – Avery Point

Patricia Sheppard (2003, 2007-2008)
Watershed Watch and Turn the Tide Education Program
Lloyd Center for the Environment

Lauren Stefaniak (2007-2008)
Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
Marine Sciences, University of Connecticut – Avery Point

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Narragansett Bay Research Reserve
Audubon Society of Rhode Island

Johan C. Varekamp and Ellen Thomas (2008)
Block Island, Rhode Island: A Microcosm for the Study of Anthropogenic and Natural Environmental Change
Earth and Environmental Sciences, Wesleyan University

Peter Wells (2008)
Long-Shore Sediment Transport and Shoreline Change in Vineyard Sound
Waquoit Bay National Estuarine Research Reserve

Westport River Watershed Alliance (1997-1999, 2003, 2006-2008)
Education and Water Quality Monitoring

Lillian Willis (2006-2008)
New York State Adaption and Printing of Brochure "How to Manage and Landscape Your Property"
Norwalk River Watershed Association, Inc.

Chester B. Zarnoch (2008)
The Use of Selectively-Bred and Wild Hard Shell Clams for Stock Enhancement
Baruch College, CUNY

2009

Allison Andrews (2009)
Conservation of Diamondback Terrapins on Cape Cod
Wheaton College

Karen Beattie (2009)
A Monitoring Project to Document Feral Cat Predation Impacts to Rare Beach-Nesting Shorebirds at Eel Point on Nantucket Island
Nantucket Conservation Foundation

Matthew Boser (2009)
Sampling Migrating Black Terns on Cape Cod
Eastern Connecticut State University

Shelli Costa (2009)
Osprey Tracking Project
Westport River Watershed Alliance

Brian Eltz (2009)
Underwater Fishway Video Camera
Town of Greenwich Conservation Commission

Lindsey Fields (2009)
An Annual Mass Balance of Silica in Narragansett Bay, Rhode Island
Graduate School of Oceanography
University of Rhode Island

Benjamin Gahagan (2009)
Estimating Natal Stream Homing Rates of Anadromous River Herring Stocks from Otolith Microchemistry
University of Connecticut

Jason Garnett (2009)
Sampling, Analyzing, and Communicating Hypoxia in Southwestern Connecticut
Soundkeeper Inc.

Julie Goodness (2009)
Efficiency of Wet Pond Best Management Practices in Removal of Nitrogen from Connecticut Stormwater
Yale School of Forestry & Environmental Studies

Michele Guidone (2009-2010)
Examination of the Abundance and Relative Palatability of Select Ulva Species in Rhode Island/
Herbivore Impact on Macroalgal Blooms in Naragansett Bay, RI.
University of Rhode Island

Rebecca Harris, Ph.D. (2008-2010)
Protection of Coastal Waterbirds and their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

Xiaodong Jiang (2008-2009)
The Evolution of Zooplankton Resistance to Harmful Algal Blooms
Marine Science Research Center, Stony Brook University

Margarett L. Jones (2009-2013)
Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center

Susan McNamara (2009-2010)
Marine Science Day
Long Island Sound Foundation

Christine Newton (2009-2010)
Effects of Drift Macroalgae on Salt Marsh Communities/ Can Algae Save Our Marshes?
University of Rhode Island

Owen C. Nichols (2008-2009, 2011-2012, 2015)
High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (Loligo pealeii) *Occurrence in Nantucket Sound Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Dr. Michelle Portman (2009)
Public Perception and Environmental Impact Assessment of Offshore Wind Farms
Marine Policy Center, Woods Hole Oceanographic Institute

Katie Pugliares (2009)
Genetic Relatedness of Mass Stranded Atlantic White-Sided Dolphins on Cape Cod
Marine Science Graduate Program, University of New England

Tara Rajaniemi (2009)
Recovery of Ecosystem Structure and Function in a Restored Salt Marsh
University of Massachusetts Dartmouth

Don Riepe (2002-2009, 2012)
International Coastal Cleanup – Long Island Sound Component, New York
American Littoral Society

Sara Jane Sampieri (2009)
Resource Guide to Common Benthic Macrofauna in Southeastern Massachusetts Estuaries
School for Marine Science and Technology
University of Massachusetts Dartmouth

Susan Snider (2007, 2009, 2013)
Sheffield Island Lighthouse "Linking the Past to the Present" Wild and Scenic Film Festival
Norwalk Seaport Association

Thaxter Tewksbury (2009)
Building New England Connections
Interdistrict Committee for Project Oceanology

2010

Margaret Arbuthnot (2010)
Coastal New England Cottontail Habitat Restoration in Rhode Island
Yale School of Forestry & Environmental Studies
Rhode Island

John S. Barclay (2010)
Collect and Identify Plankton (Barnacle Larvae) from Near-Shore Blooms – Measure for Heavy Metals and Possible PCBs
University of Connecticut – Avery Point
The WildlifeConservation Research Center

Andrea Bogomolni (2010)
Epidemiology and Ecology in Assessing Population Dynamics of Northeast U.S. Pinnipeds
University of Connecticut, Storrs
Cape Cod, Massachusetts

Joanna D. Borucinska, Ph.D. (2004-2005, 2008, 2010-2014)
Health Status of Sharks within the Coastal Waters of New England: Morphological and Molecular Studies of Cancerous Lesions in Sharks
Department of Biology, University of Hartford
Montauk Point, New York

James T. Carlton (2010)
Shifts in Shrimp Communities: Detecting Introductions and Range Expansions of Estarine Shrimp in Long Island Sound
The Maritime Studies Program, Williams College – Mystic Seaport
Long Island Sound, New York

James Robert Collins (2010)
Controls on Nutrient Flux and Productivity in Long Island Sound: Variation Over Multiple Time Scales
Yale School of Forestry & Environmental Studies

Jessica E. Conover (2010)
Decomposition Characteristics of Macroalgae Species in a Eutrophic Estuary
University of Rhode Island
Narragansett Bay, Rhode Island

Dr. Cynthia Coron and Dr. Thomas Fleming (2003-2005, 2010, 2011)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut Tidal Marshes
Department of Earth Sciences
Southern Connecticut State University

Henry Scott DeBey and Gaboury Benoit, Ph.D. (2010)
Developing an Approach for Coastal and Marine Spatial Planning (MSP) of the Long Island Sound
Yale University

Michele Guidone (2009-2010)
Herbivore Impact on Macroalgal Blooms in Narrangansett Bay, RI
University of Rhode Island
Narragansett Bay, Rhode Island

Rebecca Harris, Ph.D. (2008-2010)
Protection of Coastal Waterbirds and Their Habitats in Massachusetts
Coastal Waterbird Program, Massachusetts Audubon
Cummaquid, Massachusetts

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History
Great Gull Island, New York

Captain David Johnson (2004, 2006, and 2008)
Port Jefferson Harbor Shellfish Restoration Project (2004, 2006, 2008, 2010)
Coastal Steward Investigations Program (2006-2010)
Long Island Seaport & Eco Center

Margarett L. Jones (2009-2011)
Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center

Alicia Landi (2010)
Selection of Spawning Habitats by Horseshoe Crabs along the Complex Connecticut Coastline
University of Connecticut
Connecticut Coastline

Don Lewis (2010)
Turtle Research, Rescue, and Conservation
Cape Cod Consultants
Cape Cod to Mount Hope Bay

Allison S. Mass (2010-2011)
The Effects of Chronic Habitat Degradation on the Physiology of Eastern Oysters, Crassostrea Virginica
College of Staten Island Biology Department, CUNY
Western Long Island Sound and Jamaica Bay, New York

Kathy Parsons and David McGlinchey (2010)
Manomet Center Energy Outreach Program
Manomet Center for Conservation Sciences
Manomet, Massachusetts

Susan McNamara (2010)
Long Island Sound Research Conference
Long Island Sound Education

Christine Newton (2009-2010)
The Effects of Drift Macroalgae on Salt Marsh Communities/ Can Algae Save Our Salt Marshes?
Department of Biological Sciences, University of Rhode Island
Narragansett Bay, Rhode Island

Susan Nickerson (2010)
Boaters Guide Project
Cape Cod Commercial Hook Fishermen's Association
Nantucket Sound

Elizabeth J. Pillsbury Ph.D. (2010)
American Bouillabaisse: The Ecology, Politics and Economics of Fishing around New York City, 1870-present
Stony Brook University – Horace Mann School
New York City, New York

Jessica R. Price (2010)
The Effect of Fiddler Crab Behaviors on Salt Marsh Ecosystem Function in the Presence or Absence of Avian Predation
Yale School of Forestry & Environmental Studies
Guilford, Connecticut

Nicole Rohr (2007)
Predatory Effects of Hemigraphsus Sanguineus on Littorina Littorea
Department of Biological Sciences, University of Rhode Island

Rodney A. Rountree (2001, 2006, 2010)
Undersea Soundscape of New England Coastal Waters; Are Soniferous Fishes Important?
University of Massachusetts Amherst
Cape Cod, Massachusetts

Emily Russell (2010)
WRWA Internship
Bates College
Westport, Massachusetts

Jay Sargent (2010)
Dolphin and Human Interaction: A Personal History
Turks and Caicos; Middletown, Rhode Island

William Sargent (2010-2011)
Daily Erosion Forecasts off Chatham, Massachusetts
The Coastlines Project
Chatham, Massachusetts

Jasmine Smith-Gillen (2010)
Estuary and Whales
Lloyd Center for the Environment
Southeastern New England

Peter C. Stone (2010-2011)
Pilot Education Program: Dreams to the Sounds of the Sea: The Art and Science of Coastal Ecosystems
Pete C. Stone Studios
Marion, Massachusetts

Kristen Van Wagner (2007-2008, 2010)
Narragansett Bay Tide Calendars: Reaching Coastal Audiences
Audubon Society of Rhode Island
Narragansett Bay Research Reserve

Johan C. Varekamp, Ph.D. (2008, 2010)
Modern Marsh Growth Processes at Jarvis Creek, Guilford, Connecticut
Wesleyan University - Earth & Environmental Sciences
Guilford, Connecticut

John Waldman (2010)
Publish Results of Kimberly Williams Master's Thesis Research (Striped Bass Wintering at Power Plants) in the Northeastern Naturalist – Aspects of the Wintering Biology of Striped Bass at a Power Plant Discharge
CUNY
Long Island Sound, New York

2011

Holly K. Bayley (2011)
*Testing the Resilience of Genetically Distinct Eelgrass (*Zostera marina L.*) Populations for Improved Management and Restoration*
University of New Hampshire
Southern New England and New York

Karen Baar (2008, 2011)
Green Infrastructure Project 2011
Connecticut Fund for the Environment/ Save the Sound
New Haven and Bridgeport, Connectictu

Joanna D. Borucinska, PhD. (2004, 2005, 2008, 2010-2014)
Health Status of Sharks in the Coastal Northwestern Atlantic
Department of Biology, University of Hartford
Coastal Northwestern Atlantic

Dr. Cynthia R. Coron and Dr. Thomas H. Fleming (2003-2005, 2010-2011)
Monitoring the Contaminant Budget into Long Island Sound from Milford, Connecticut, Title Marshes
Southern Connecticut State University

Daisy Durant, Ph.D. (2011)
Assessment of the Benthic Infaunal Community at Three Long-Term Water Quality Monitoring Sites within the Narragansett Bay Research Reserve
Narragansett Bay National Estuarine Research Reserve
Prudence Island, Rhode Island

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History
Great Gull Island, New York

Andrew W. Jones (2011)
Testing the Effects of Density and Resource Ability on Juvenile Alewife Foraging Patterns
Yale University
Lakes across New England

Margarett L. Jones (2009, 2011)
Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center

Melinda Loberg (2011)
Owen Little Way Rain Garden-Bioswale
Tisbury Waterways, Inc.
Vineyard Haven, Massachusetts

Allison S. Mass (2010-2011)
The Use of Cellular Biomarkers in Assessing Restored Oyster Reefs in New York City
CUNY – College of Staten Island Biology Department
Western Long Island Sound and Jamaica Bay, New York

Pia Moisander (2011)
Toxin Production of Cyanobacteria on Nantucket Island
University of Massachusetts Dartmouth
Nantucket Island, Massachusetts

Swathi Mummini (2011)
The Effect of Summer Environmental Stressors on the Metabolism of Eastern Oysters in the Bronx River
CUNY Hunter
Bronx River, New York

Owen C. Nichols (2008-2009, 2011-2012, 2015)
*High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (*Loligo pealeii*) Occurrence in Nantucket Sound / Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

William Sargent (2010-2011)
Illustrations for Book on the Sounds of Cape Cod
Sounds of Cape Cod, Massachusetts

Save The Bay, Inc.
Save the Bay's Bi-State Water Quality Coordination Initiative
Pawcatuck River Estuary and Little Narragansett Bay
Rhode Island

Lisa Sette (2011)
Monitoring Seal Depredation in the Nantucket Sound Weir Fishery
Seal Studies Program – Provincetown Center for Coastal Studies

Kaitlyn Shaw (2011)
Assessing Spatial Accumulations of Opportunistic Macroalgae in S.E. Massachusetts Estuaries
University of Massachusetts
S.E. Massachusetts Estuaries

Sally Ann Sims (2011)
*Effect of Sea Level Rise on Piping Plover (*Charadrius melodus*) Nesting Habitat Availability in Rhode Island*
Antioch University New England
Rhode Island

Peter C. Stone (2010-2011)
Aquaneers Pilot Education Program
Connecting Oceans Academy, New Bedford Ocean Explorium
New Bedford, Massachusetts

Cornelia W. Twining (2011)
The Ecological History of Coastal Connecticut's Watersheds
Yale School of Forestry and Environmental Studies
Coastal Watersheds of Connecticut

Jonathan P. Velotta (2011)
*Evolutionary Changes to the Osmoreaulatory System in alewives (*Alosa pseudoharongu*) Adaptive Physiological Responses to the Loss of Anadromy*
University of Connecticut
Storrs, Connecuticut

Lisabeth White (2011)
Watershed Advocacy Internship
Westport River Watershed Alliance
Westport, Massachusetts

2012

Holly K. Bayley (2012)
Assessing the Influence of Donor Population on Eelgrass Restoration Success
University of New Hampshire

Wendi Buessler (2012)
Improving Nutrient Sampling and Data to Keep Oyster Pond Healthy
Oyster Pond Environmental Trust
Oyster Pond Environmental Trust Inc.

Joanna D. Borucinska, Ph.D. (2004-2005, 2008, 2010-2014)
Health Status of Sharks in the Northwestern Atlantic
University of Hartford – Department of Biology
Montauk Point, New York

Lindsay Brin (2012)
Coastal Nitrogen Removal in the Face of Global Change: Environmental Regulation of the Temperature Response of Denitrifier Communities
Maine Biological Laboratory
Brown University

Shelli Costa and Ami Aroujo (2012-2014)
Westport River Watershed Alliance
Education Director

Amy Costa (2012-2013)
A Collaborative Nantucket Sound Water Quality Monitoring Program
Provincetown Center for Coastal Studies

Allison Mass Fitzgerald (2010-2012)
The Effects of Chronic Habitat Degradation on the Physiology of Eastern Oysters, Crassostrea Virginica*/The Use of Cellular Biomarkers in Assessing Restored Oyster Reefs in New York City*
The College of Staten Island, CUNY

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History

George Jackman (2012)
Determining Habitat Usage, Life History Patterns, and population Structuring of Winter Flounder Through Otolith Microchemistry
Queens College Biology Department, CUNY

Don Riepe (2002-2009, 2012)
International Coastal Cleanup- Long Island Sound Component
American Littoral Society
Chapter Director

Christopher Neil (2012)
Falmouth Association Concerned with Estuaries and Salt Ponds: Stormwater Education Project
Falmouth, Massachusetts

Christine Newton (2012)
Invasion Strategy of the Red Algae, Heterosiphonia japonica *across a biogeographical barrier*
Northeastern University Marine Science Center

Owen C. Nichols (2008-2009, 2011-2012, 2015)
*High-resolution Monitoring of Environmental Effects on Longfin Inshore Squid (*Loligo pealeii*) Occurrence in Nantucket Sound / Squid Paralarval Distributional Ecology in Nantucket Sound*
School for Marine Science and Technology
University of Massachusetts Dartmouth

Katherine J. Papacostas (2012)
Generalists or Individual Specialists? A Comparison of Resource Use Among Native and Invasive Crabs in Long Island Sound
Temple University Biology Department

Katharine Parsons, Ph.D. (2012-2015)
Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

Tracy Pugh (2012)
Alternative Mating Strategies in American Lobster: is Intermolt Mating a Viable Compensatory Strategy?
University of New Hampshire

William Sargent (2012)
Beach Wars: Ten Thousand Years on a Barrier Beach

Susan Snider (2012)
Friends of the Norwalk Islands, Inc.

Peter C. Stone (2012)
The Symbolic Literacy Initiative-Aquaneers Pilot Education Program

2013

Andrea Bogomolni (2013)
Phocine Distemper Virus and PCBs in Seals of the Northeast U.S: Do Persistent Contaminants Alter Host Susceptibility?
University of Connecticut
Nantucket Sound

Joanna D. Borucinska, Ph.D. (2004-2005, 2008, 2010-2014)
Health Status of Sharks in the Northwestern Atlantic
University of Hartford – Department of Biology
Montauk Point, New York
Atlantic Ocean

Amy Costa, Ph.D. (2012-2013)
A Collaborative Nantucket Sound Water Quality Monitoring Program
Provincetown Center for Coastal Studies

Shelli Costa (2012-2015)
WRWA Summer Internship
Westport River Watershed Alliance

Jason Garnett (2013)
Soundkeeper Curb Marker Project
Soundkeeper, Inc.

Jason Garnett (2013-2014)
Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.
Long Island Sound

Chase Gruber (2013)
Economic Evaluation of Seal Depredation on Cape Cod Groundfish Sector Fishery
Nicholas School of the Environment, Duke University

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History
Great Gull Island, New York

Dr. Noel Healy (2013)
Developing a Citizen Scientist Guide to Coastal and Marine Spatial Planning
Geography Department
Salem State University

Captain David Johnson (2013)
Coastal Steward
Costal Steward Investigations (CSI) Program
Long Island Sound

Margarett L. Jones (2009, 2011)
Coastal Ecology Programs & Scholarships for Summer Nature Camp/ Books and Materials for Outreach Programs
Denison Pequotsepos Nature Center
Long Island Sound

Pia Moisander (2013)
Spatio-temporal Distributions of Brown Tide Causing Harmful Algal Species Cochlodinim polykrikoides *in Buzzard's Bay*
Biology Department, University of Massachusetts Dartmouth
Rhode Island Sound

New London Maritime Society (2013)
Custom House Maritime Museum
Susan Tamulevich, Director

Alyssa Novak, Ph.D. (2013)
Test-Transplanting Genetically Differentiated Eelgrass Donor Populations Along Cape Cod National Seashore to Identify Those Most Suitable for a Successful Restoration
University of New Hampshire

Elaine Potter (2013)
Life Cycle Dynamics of the Bloom-Forming Macroalga Ulva rigida
University of Rhode Island

Katherine Parsons (2012-2015)
Protection of Plovers, Terns, and other Coastal Nesting Birds and their Habitats in Massachusetts
Coastal Waterbird Program Director
Massachusetts Audubon Society

Jay Sargent (2013)
JoJo Book II

William Sargent (2013-2014)
Islands in the Storm
The Coastlines Project

Jasmine Smith-Gillen (2013)
Climate Science Learning Project
Lloyd Center for the Environment

Susan Snider (2013)
Wild and Scenic Film Festival
Friends of the Norwalk Islands

Jonathan Stone (2013)
Save The Bay: Salt Marsh Restoration/ Education Program for Youth
Save The Bay, Inc.

Peter C. Stone (2013)
Pilot Education Program: The Art & Science of Nature Journaling; Coastal Marine Environments
Oceans Academy
Ocean Explorium

Rebecca A. Schultz (2013)
Differentiating Drivers of Marsh Loss in Long Island Sound
Yale School of Forestry & Environmental Studies

2014

Abigail Bockus (2014)
*The Physiological Consequences of Climate-Induced Acidification and Warming on Metabolism and Acid-Base Balance in the Spiny Dogfish (*Squalus acanthias*): Northeast Fishery and Ecosystem Instability in Response to Climate Change*
University of Rhode Island

Joanna D. Borucinska, Ph.D. (2004-2005, 2008, 2010-2014)
Health Status of Sharks Within the Coastal Waters of New England; Morphological and Molecular Studies of Cancerous Lesions in Sharks
University of Hartford- Department of Biology
Montauk Point, New York

Shelli Costa and Ami Aroujo (2012-2015)
Watershed Advocacy Internship
Westport River Watershed Alliance
Westport, Massachusetts

Aline Euler (2007, 2014)
Little Neck Bay–Long Island Festival
Alley Pond Environmental Policy

Jason Garnett (2014)
Soundkeeper Purple Martin Birdhouse
Soundkeeper, Inc.

Jason Garnett (2013-2014)
Soundkeeper Rain Garden Demonstration Project
Soundkeeper, Inc.

Torrance Hanley (2014)
*Predicting the Effects of the Invasive European Green Crab (*Carcinus maenas*): A Comparison of Key Traits Across Habitats in New England*
Northeastern University

Kathryn Hanrahan (2014)
Short Term Study on the Impacts of Carcinus maenas *on Ecosystem Functioning in a Massachusetts Salt Marsh*
Massachusetts Coastal Zone Management

Helen Hays (1995-2015)
A Study of Common and Roseate Terns on Great Gull Island
American Museum of Natural History

Erin McClean (2014)
The Effect of Ocean Acidification on the Molting Process of Homarus americanus
University of Rhode Island

Mark Mello (2014)
Inventory of Rare Lepidoptera in Dune and Salt Marsh Systems of Essex County, MA
Lloyd Center for the Environment

Katharine Parsons, Ph.D. (2012-2015)
Protection of Coastal Waterbirds and their Habitats in Coastal Massachusetts
Massachusetts Audubon Society: Coastal Waterbird Program

William Sargent (2013-2014)
Islands in the Storm
The Coastlines Project

Jonathan Stone (2014)
Eelgrass Restoration Program
Save the Bay Inc.

Thomas A. Stone (2014)
Ocean Acidification and Southern New England: A Conference
Woods Hole Research Center

2015

Peter August and Janice Sasi (2015)
Ecological Reconnaissance of the Napatree Lagoon
Chair, Watch Hill Conservancy and Manager, Napatree Point Conservation Area, Watch Hill Conservancy

Carlos Ballon (2015)
The parasite Cryptocotyle lingua *reduces consumption rate of* Littorina littorea
Adelphi University

Kimberly Barbour (2015)
Marine Meadows Habitat Restoration and Stewardship Initiative
Cornell Cooperative Extension of Suffolk County

Diana Barrett (2015)
Effects of Abiotic Stressors and Soil Microbiota on the Zonation of Dune Plants
University of Massachusetts Dartmouth

Shelli Costa (2015)
Westport River Watershed Alliance (WRWA) Summer Internship for Joy Smith- Raise Student and Adult Awareness of WRWA's Coastal Resources through Educational Programs, Field Sampling of Local Ponds and Field Collection of Water Quality Data on the Westport River
Education Director, Westport River Watershed Alliance

Allison Fitzgerald (2015)
Reproduction and Restoration: How to Create a Sustainable Population
New Jersey City University

Jason Garnett (2015)
SoundScaping Booklet Printing and Distribution
Project Administrator, Soundkeeper, Inc.

Helen Hays (1995-2015)
Migratory Studies of the Common and Roseate Tern in the Northern and Southern Hemispheres, Great Gull Island Project
American Museum of Natural History
Great Gull Island, New York

Ipswich River Watershed Association (2015)
Purchase and Operation of an Underwater Video Camera to Monitor River Herring and Other Fish during Spring Migration
The Voice of the River

Micheline S. Labrie (2015)
Quantifying Impacts of Oyster Aquaculture on Estuarine Nitrogen Related Water Quality
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Yale School of Forestry & Environmental Studies
Long Island Sound

Seavey, Dr. Jennifer (2015), p.96
Monitoring the Harbor and Gray Seal Population at the Isles of Shoals
Executive Director, UNH Foundation

Selditch, Diane (1999), p.73
Senior Ecology Workshop
Sound Waters
Long Island Sound

Senft, Christina (2008), p.29
Saxiphilin: A Possible Pathway to PSP Toxin Resistance in Calanoid Copepods
University of Connecticut at Avery Point
Atlantic Ocean

Sette, Lisa (2011), p.105
Monitoring Seal Depredation in the Nantucket Sound Weir Fishery
Seal Studies Program – Provincetown Center for Coastal Studies
Nantucket Sound

Shadel, William P. and Aubrey McMahon (2002-2003), p.29
Save the Sounds Water Quality Monitoring Program
Save the Sounds
Long Island Sound

Shaw, Kaitlyn (2011), p.29
Assessing Spatial Accumulations of Opportunistic Macroalgae in S.E. Massachusetts Estuaries
University of Massachusetts
S.E. Massachusetts Estuaries

Sheppard, Patricia (2003, 2007-2008), p.74
Watershed Watch, Turn the Tide Education Program
Lloyd Center for Environmental Studies
Rhode Island Sound

Shriver, Andrea (2001), p.29
Effects of Coastal Eutrophication on the Food Supply and Growth of the Bay Scallop (Argopecten irradians)
Boston University Marine Program
Vineyard Sound

Shriver, Gregory (2000), p.43
New England Salt Marsh Bird Survey
Massachusetts Audubon Society
Vineyard Sound

Sickels, Larry (2002), p.30
Colonization of a Restored Rhode Island Salt Pond by Winter Flounder (Pseudopleuronectes americanus)
Roger Williams University
Rhode Island Sound

Sims, Sally Ann (2011), p.97
Effect of Sea Level Rise on Piping Plover (Charadrius melodus) *Nesting Habitat Availability in Rhode Island*
Antioch University New England
Rhode Island Sound

Simmons, Kelly (2001), p.74
Bridging the Gap between School Curriculum, Kids, and Coastal Awareness
University of Massachusetts Dartmouth
Rhode Island Sound

Smith-Gillen, Jasmine (2013), p.74
Climate Science Learning Project
Lloyd Center for the Environment

Smith-Gillen, Jasmine (2010), p.74
Estuary and Whales
Lloyd Center for the Environment
Southeastern New England

Susan Snider (2007, 2009, 2013), p.75
Sheffield Island Lighthouse "Linking the Past to the Present"
Wild and Scenic Film Festival
Norwalk Seaport Association

Snider, Susan A. (2012), p.75
Let's Go Outside
Friends of the Norwalk Islands, Inc.
Long Island Sound

Stefaniak, Lauren (2007-2008), p.61
Analysis of the Genetic Population Structure of the Putatively Invasive Tunicate, Didemnum
University of Connecticut
Fishers Island Sound

Stone, Jonathan (2014), p.97
Eelgrass Restoration Program
Save the Bay Inc.

Stone, Jonathan (2013), p.75
Save The Bay: Salt Marsh Restoration/ Education Program for Youth
Save The Bay, Inc.
Rhode Island Sound

Stone, Peter C. (2010-2012), p.75
Pilot Education Program: Dreams to the Sounds of the Sea: The Art and Science of Coastal Ecosystems
Pete C. Stone Studios
Marion, Massachusetts

Stone, Peter C. (2013), p.76
Pilot Education Program: The Art & Science of Nature Journaling; Coastal Marine Environments
Oceans Academy
Ocean Explorium

Stone, Thomas A. (2014), p.76
Ocean Acidification and Southern New England: A Conference
Woods Hole Research Center

Sullivan, Patricia Ann (2007), p.76
Development and Implementation of Public Awareness Program for Responding to Distressed Marine Animals of the Sound
Marine Animal Survival Team
Cetacean Society International
Block Island Sound

Tallman, Jessica (2005), p.61
Oyster Grow-out Cages as Artificial Reefs for Temperate Fishes
University of Rhode Island
Rhode Island Sound

Tewksbury, Thaxter (2009), p.76
Building New England Connections
Interdistrict Committee for Project Oceanology

Thompson, Sarah M. (1997), p.30
Use of Land-Derived and Recycled Nitrogen in Cladophora vagabunda *in Waquoit Bay*
Boston University Marine Program
Vineyard Sound

Tiani, Richard (2006), p.76
Active Waterfront Education Program (AWE)
Groundwork Bridgeport, Inc.
Long Island Sound

Tobin, Marcia J. (1995), p.44
Effect of Tide Gates on Sedimentation Rates in Tidal Wetlands
Yale School of Forestry & Environmental Studies
Long Island Sound

Willis, Lillian (2006-2008), p.78
Property Brochure: "How to Manage and Landscape Your Property"
Norwalk River Watershed Association Inc.
Long Island Sound

White, Lisa (2007), p.98
Value of Sea Turtles in Tourism
Nicholas School of the Environment and Earth Sciences
Duke University
Atlantic Ocean

Wyatt, Sandra (1999), p.78
Allin's Cove Neighborhood Coalition Newsletter
Allin's Cove Neighborhood Coalition
Rhode Island Sound

York, Joanna (2000), p.31
The Role of Iron in Controlling Shallow Estuarine Primary Production
Boston University Marine Program
Nantucket Sound

Zarnoch, Chester B. (2008), p.98
The Use of Selectively-Bred and Wild Hard Clams for Stock Enhancement
Baruch College, CUNY
Long Island Sound

Zingo, James M. (1999), p.98
Foraging Ecology and Reproductive Success of Endangered Roseate Terns
University of Massachusetts Amherst
Long Island Sound

Zuckerberg, Benjamin (2001), p.44
Grassland Restoration on Nantucket Island: The Effects of Habitat Restoration on Grassland and Shrubland Songbirds
Massachusetts Audubon Society
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Glossary of Terminology

A

Abiotic – Relating to anything in the environment that is non-living; i.e. soil, rocks, weather, and water

Algal blooms – Dense growth of algae often triggered by high nutrient levels in water bodies

Alimentary tract – passage that functions in digestion and absorption of food and elimination of residual waste

Anadromous – Migrating up rivers from the sea to breed in fresh water

Anoxia – Absence of deficiency of oxygen

Anthropogenic – The study of the origin of humans; of or relating to human influence

Anuran calling survey – Used to document species richness and relative abundance

Aquaculture – The cultivation of fresh-water and marine species

Aquifer – A water bearing rock, rock formation, or a group of rock formations

Ascidian – Any of various saclike marine animals of the class Ascidiacea, including sea squirts

Assay – The qualitative or quantitative analysis of a substance; an analysis or examination

Assimilation – The process by which nourishment is changed into living tissue

B

Baseline data – Information gathered to serve as a reference point for future research

Beach scraping – A process where sand is moved from the beachfront to the back beach to create an artificial foredune between the waterfront properties and the ocean

Below replacement level – Total fertility rate that is not high enough to replace an area's population

Benthic – Of or relating to the bottom of a body of water

Bioaccumulation – The accumulation of substances, such as pesticides (DDT as an example), methylmercury, or other organic chemicals in an organism or part of an organism

Biogeochemical tracer – Identifying a chemical compound unique to one area from an organism to trace where that organism has been

Biomagnification – The increase in the concentration of bioaccumulated toxic chemicals in organisms higher on the food chain due to preferential storage of the toxic chemical in edible body parts

Biomarker – A biologically derived indicator of a process, event or condition

Biomass – The amount of living matter in an area

Biome – An entire community of living organisms in a single major ecological region

Biotic factors – Relating to life or specific life conditions; i.e. plants, animals, fungi, and their products

Bottom trawling – A type of fishing whereby a net is placed and dragged across the ocean floor

Brackish – A mix of freshwater and salt water

Breakwater – A barrier protecting a harbor or shore from the impact of waves

Bryozoans – Any of various small aquatic organisms of the phylum Bryozoa that reproduce by budding and form mosslike or branching colonies

Buffer – One that protects by intercepting or moderating adverse pressures of influences

Bycatch – Unwanted fish caught in nets while fishing for other species

C

Cetacean – Any of an order *(cetacea)* of aquatic mostly marine mammals including whales, dolphins, and porpoises

Chlorophyll – Green pigments found in photosynthetic organisms

Colonize – To establish a new settlement

Community – A group or plants and animals living in a particular region under more or less similar conditions

Conservation – Controlled use and systematic protection natural resources, as forests and waterways

Conspecifics – Of the same species

Consumers – Organisms in a food chain, who are unable to synthesize their own food, that ingest other organisms or organic matter

Ctenophore bloom – Rapid population growth of small marine animals resembling jellyfishes

Culvert – A sewer or drain running under a road or embankment; many facilitate partial of full tidal flow of water in coastal ecosystems

Cysts – An abnormal membranous sac containing a gaseous, liquid, or semisolid substance

Cytochrome P450 – Very large and diverse group of proteins found in all organisms

D

Data – Information organized for analysis or used as the basis for decision making

Dead zone – Area in a body of water where eutrophication has caused it to be uninhabitable

Decomposition – The act of breaking down into component parts

Demersal – Living near, deposited on, or sinking to the bottom of the sea

Denitrification – A process by which nitrogen is removed from a material or chemical compound, as in bacterial action on soil

Desiccation – To dry out thoroughly

Dike – An embankment built to prevent floods

Dinoflagellate – Minute, chiefly marine protozoans of the class Dinoflagellata, having two flagella (filamentous whiplike extensions used in locomotion) and a cellulose outer envelope and forming a primary constituent of plankton

Disappearance rate – Mortality plus emigration

Dissimilatory nitrate reduction – A process where reduction from nitrate to ammonium occurs

Dissolved oxygen – The oxygen freely available to organisms in water; considered to be an important factor in determining water quality

E

Ecosystem – An ecological community with its physical environment

Embayment – A bay or bay like shape

Endangered – Threatened with extinction

Endemic – Native or limited to a certain region

Epiphyte – A plant that grows on another plant on which it depends for mechanical support but not for nutrients

Estuary – The wide lower course of a river where its current is met by the tides; often

extremely productive region

Eutrophication – The process by which high nutrient levels and low dissolved oxygen content produces an environment that favors plant over animal life

Exclosure studies – Field study in which certain animals are excluded from experimental plots

Exotic – From another part of the world

F

Fauna – Animals, especially those of a specific region or period

Fecal coliform – Bacteria that are passed through the fecal excrement of humans, livestock and wildlife; considered to be an important measure of water quality and safety

Fecundity – Fruitful in offspring or vegetation

Feral Cat – An abandoned domesticated cat made wild

Fish kills – Widespread mortality of marine life due to a sudden depletion of oxygen in water

Fish ladder (fishway) – Gradually declining water trough next to a dam; one way of allowing fish passage beyond obstructions

Fish weir – A fence or enclosure set in a waterway for taking fish

Flora – Plants, especially those of a specific region or period

Food web – A complex of interrelated food chains in an ecological community

Foraging – Looking or searching for fodder or provisions

Foraminiferal – Pertaining to marine rhizopods with calcareous shells that often are perforated with minute holes

Fouling communities – A community of various organisms that attach themselves to other objects in the environment

Fragmentation – Breaking up communities into smaller sections; as in clear cutting and highway building

Frustules – Cell walls of diatoms

G

Gamefish – Fish of interest to recreational fishermen

Gastropods – Any of a large class of mollusks with a univalve shell

Genetic diversity – Variability in the genetic makeup of a population

Geochemistry – A science that deals with the chemical composition of and chemical changes in the solid matter of the earth

Geographic Information Systems (GIS) – "Integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information"

Geomorphic – Of or like the earth or its shape or surface configuration

Gillnetting – Use of a vertical net that allows fish to pass through but entangles gills upon withdrawl

Gnathodynamometer – A device used to measure biting pressure

Gonad – Any of the reproductive glands that produce gametes

Graphite Furnace Atomic Absorption Spectrophotometry – An analytical technique designed to perform the quantitative analysis of metals in a wide variety of samples

Gravid – Pregnant

Gristmill dam – A dam created to power a mill for grinding grain

Groundwater – Water beneath the earth's surface between saturated soil and rock that supplies wells and springs

H

Heavy metals – Any metallic chemical element that has a relatively high density and is toxic, highly toxic or poisonous at low concentrations

Histology – A branch of anatomy that deals with the minute structure of animal and plant tissues as discernible with the microscope

Hydrology – A science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere

Hydrometer – An instrument for determining specific gravity of a fluid

Hydroperiod – The duration for which a coastal system is inundated with water

Hypoxia – Deficiency in the amount of oxygen reaching bodily tissues

I

Immunocytochemistry – Techniques for staining cells or tissues using antibodies against the appropriate antigen

Indicator species – Species whose health status can be used to make implications about the state of the environment; Often species who are sensitive to degrading environments

Influent – Flowing in or into

Inorganic – Involving neither organic life nor the products of organic life; Not made up of organic matter

Interspecific competition – Competition arising between species

Interstitial water – Water situated in but not restricted to a particular organ or tissue

Intertidal zone – The region located between high and low tide marks

Invasive – A non-native species in an ecosystem that spreads and displaces other native species

Invertebrate – Lacking a backbone or spinal column

Isotope ratios – Ratios of the various forms (masses) of elements in the environment

K

Keystone species – Species that play a significant role in an ecosystem

L

Landscape – A view or vista of scenery on land

Limiting nutrient – Often nitrogen in water bodies, the nutrient that controls and limits productivity of an ecosystem

M

Macroalgae – Large aquatic photosynthetic plants

Macrophyte – A member of the macroscopic plant life esp. of a body of water

Mariculture – Cultivation of marine organisms in their natural habitats

Marsh accretion – Loss of marshland habitat due to sea level rise

Mass balance – A system/process that accounts for material entering and leaving a system to determine unknown factors

Mass spectrometry – Analytical technique that measures the mass-to-charge ratio of charged particles

Mass Stranding – A group of cetaceans that beach or are trapped

Matrix Metalloproteinases (MMPs) – play a major role in cell behaviors like migration, differentiation

Megalopae – Post larval stage of a crab

Mesocosm experiment – An experimental system that simulates real-life conditions as closely as possible, whilst allowing the manipulation of environmental factors

Mesohaline – Moderately brackish water with a salinity range of 5-18 ppt

Microalgae – Microscopic aquatic photosynthetic plants

Microphyte – Microscopic photosynthetic algae and bacteria that grow on sediments of aquatic ecosystems

Mineralization – Conversion of metal into a mineral by oxidation

N

Native species – Species that are indigenous to an area

Nitrate – the most commonly detected groundwater pollutant

Nitrogen cycle – The continuous sequence of events by which atmospheric nitrogen and nitrogenous compounds in soil are converted into substances that can be used by green plants.

Non-point vs point source – General sources of pollution (i.e. watersheds) vs. specific sources of pollution (i.e. sewer drains)

Nutrient loading – The process of elevated levels of nutrients reaching bodies of water

Nutrient pollution – Excess nutrients in an ecosystem leading to adverse effects

O

Organic – Of, relating to, or derived from living organisms

Organochlorines – Any of various hydrocarbon pesticides, as DDT, that contain chlorine

Otolith – A calcareous concretion in the internal ear o a vertebrate or in the otocyst of an invertebrate

Oxidation – A reaction in which an element's valence is increased as a result of losing electrons

P

Paralytic Shellfish Poisoning (PSP) – PSP toxins accumulate in shellfish and cause neurological damage to the organisms as well as humans that consume shellfish containing PSP- also referred to as "red tide"

PCBs (polychlorinated biphenyls) – Any of a family of industrial chemical compounds produced by chlorination of biphenyl, noted as an environmental pollutant that accumulates in animal tissue with resultant pathogenic and teratogenic effects (Webster's QLF)

Peel Test – The Peel Test measures the strength required to pull apart a bonded surface

Pelagic – Of, or relating to, or living in open seas or oceans rather than waters adjacent to land or inland waters

Percent cover – Percent of quadrat (an area) covered by a specific organism

Pervious surface – A permeable surface

Phenotype – The visible properties of an organism that are produced by the interaction of the genotype and the environment

Phragmites – A genus of tall grasses found in marshy areas

Phylogenic analysis – Analysis of the evolution of a genetically related group of organisms as distinguished from the development of the individual organism

Phytoplankton – Small aquatic plant organisms that can grow rapidly and cause an algal bloom which is harmful to other water organisms

Pinniped – Any of a suborder of aquatic carnivorous mammals with all four limbs modified into flippers

Plankton – The passively floating or weakly swimming minute plant and animal life in a body of water

Polychlorinated biphenyls – Pollutant found in many coolants and insulation material that is known to cause health problems in humans and animals

Porewater – Water filling the spaces between grain and sediment

Primary productivity – The amount of organic material produced by organisms from inorganic material

Producers – An organism that produces their own organic compound from simple precursors (CO2, inorganic nitrogen) many of which are food sources for other organisms

Progeny – Offspring of animals or plants

Protozoans – Any of a phylum or subkingdom (Protozoa) of minute protoplasmic acellular or unicellular animals which have varied morphology and physiology and often complex life cycles which are represented in almost every kind of habitat

Q

Quadrat – A square/rectangular plot of land that is isolated to sample and examine vegetation and organisms within

R

Radiometric dating – A method for determining the age of earth materials by the amount of decay experienced by radioactive elements

Red Tide – a brownish-red discoloration of marine waters caused by the presence of microscopic flagellatesthat often produce a potent neurotoxin that accumulates in the tissues of shellfish, making them poisonous when eaten by humans and other vertebrates

Reoxygenation – To enrich with oxygen

Respiration – The physical and chemical processes by which an organism supplies its cells with oxygen

Revetment – A facing of stone or concrete used to sustain an embankment

Rhizome – Mass of foots at the stem at is thickened by deposits of reserve food material

Riparian buffer zones – An area along a stream, river, or shoreline that is managed to maintain the integrity of the waterway, to reduce pollution, and to provide food, habitat, and thermal protection for fish and wildlife.

River basin – Valley or depression in which a river flows

Rookery – A breading place for birds

Runoff – Precipitation on land that eventually reaches streams

S

Salinity – The amount of salt found in a solution

Saprobic Index – Abundance of protozoan species

Saxitoxin – A nitrogen compound responsible for PSP

Sediment profile – An image that shows the physical properties of sediment on the marine floor

Somatotrophic axis – Major hormonal system regulating post natal growth in mammals

Spawning – The act of producing young

Species composition – The types of species that are present in an area

Spicule – One of the minute calcareous or siliceous bodies that support the tissue of various invertebrates

Stable isotope – A form of an element that is not radioactive

Stakeholders – Individuals that are invested in a project and can either be positively or negatively impacted by that project

Stoichiometry – A branch of science that deals with the application of the laws of definite proportions and of the conservation of matter and energy to chemical activity

Subtidal zone – The zone of the shoreline that is below low tide and is always covered by water

Sub-colony – A satellite group of organisms originated from a bigger colony

Sub-estuary – A section of a coastal body of water that has one or more freshwater streams or rivers flowing into it

Subsidence – The act of sinking or falling to the bottom

T

Taxonomy – The study of the general principles of scientific classification

Temperature gradient – Rate of change of temperature with distance

Temporal – Of or relating to a time as opposed to eternity

Tendril – A leaf, stipule, or stem modified into a slender spirally coiling sensitive organ serving to attach a plant to its support

Tensile strength – The resistance of a material to a force tending to tear it apart, measured as the maximum tension the material can withstand without tearing

Threatened – Something that is in danger of becoming extinct

Tidal creek – Portion of a stream that is affected by the tide

Tidal restriction – When a physical structure obstructs tidal flow

Transect- A strip of land isolated to sample and examine vegetation and organisms within

Trophic cascades – An occurrence whereby one organism suppresses the abundance of their prey thereby freeing the next lower tropic level from predation

Trophic position – The position in a food-chain of an organism

Tunicate – Any of a subphylum of specialized or degenerate marine chordate animals that have clefts in the vascular walls of the pharyngeal gills

Turbidity – The amount of sediment or other materials in water

V

Valuation – The act or process of valuing

W

Water quality – Physical, biological, and chemical characteristics of water in relationship to a set of standards

Watershed – A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water

Wet pond – Area where storm runoff displaces old water that flows away from the pond; new runoff stored until next heavy rainfall

Wild population – Population of a particular organism in the wild

X

Xenobiotics – A chemical compound that is foreign to a living organism

Z

Zonation – Distribution of kinds of organisms in biogeographic zones

Zooid – One of the asexually produced individuals of a compound organism

Zooplankton – Animal life of plankton

References: PHOTOGRAPHY AND ILLUSTRATION

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TOP IMAGE *Chris Percy, Founder, The Sounds Conservancy*
QLF Archives

LOWER IMAGE *Narrow River, Narragansett, Rhode Island*
Larry Morris

PAGE 5
Caribou with Long Range Mountains in background, Western Newfoundland. This mountain range, an extension of the Appalachian chain, is the spine of Newfoundland's Great Northern Peninsula. For forty years QLF staff, Interns, and Volunteers have worked in nearly every community on the Great Northern Peninsula—from Gros Morne National Park north to St. Anthony.
Candace Cochrane

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The Pamet River, Truro, Massachusetts, flows into Cape Cod Bay, Massachusetts.
QLF Archives

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Marshgrass along the Pamet River, Truro, Massachusetts
Chris Percy

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Shad (Alosa sapidissima)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Atlantic Menhaden (Brevoortia tyrannus)

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Salmon, Foodcollection
Getty Images

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Footbridge over salt water pond, Rhode Island
Candace Cochrane

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Edible Mussel (Mytilus edulis)
Dorling Kindersely, Getty Images

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Eelgrass meadows, Waquoit Bay Estuarine Research Reserve, Waquoit, Massachusetts.
The Reserve is part of the Massachusetts State Parks system and is one of 27 sites in the U.S. that comprise the National Estuarine Research Reserve System. The Waquoit Bay Reserve is administered by the Massachusetts Department of Conservation and Recreation in partnership with the National Oceanic and Atmospheric Administration.
Rick Crawford, National Oceanic and Atmospheric Administration
Estuarine Research Reserve Collection

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Horsehoe Crab (Limulus polyphemus)
Christian Delbert, Shutterstock Images

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Saddle Oyster (Pododesmus patelliformis)
De Agostini Picture Library, Getty Images

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Flatfish or Winter Flounder (Pleuronectes americanus)
National Oceanic and Atmospheric Administration
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Harvested Quahogs (Mercenaria mercenaria)
Tom and Louise Kane
National Oceanic and Atmospheric Administration
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Scallop (Portunus pelagicus) *illustration with fan-shaped shell*
Dorling Kindersley, Getty Images

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Eelgrass, Waquoit Bay Estuarine Research Reserve, Waquoit, Massachusetts.
Rick Crawford, National Oceanic and Atmospheric Administration
Estuarine Research Reserve Collection

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Traditional farm prevalent along the Sounds
Candace Cochrane

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Phragmites (Phragmites australis)*, the common reed, is a large perennial grass found in wetlands throughout temperate and tropical regions of the world. In New England wetlands, Phragmites borders rivers and coastal shorelines.*
Chris Percy

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Coastal marsh, Rhode Island
Candace Cochrane

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Agricultural farms border the coastal waters of the Sounds some of which may have an impact on adjacent watershed
Candace Cochrane

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Lady Crab (Ovalipes ocellatus)
National Oceanic and Atmospheric Administration
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Beach at low tide leaves an artistic footprint
Candace Cochrane

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A Long Island University graduate student is using acoustic telemetry to track Diamondback Terrapins in Long Island Sound, part of a research project supported by The Sounds Conservancy Grants Program.
Barbara Bauer

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Oystercatchers wade in the marsh grass
Mary Hollinger, National Oceanic and Atmospheric Administration
American's Coastlines Collection

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Coastal marsh
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Narrow River, Narragansett, Rhode Island
Candace Cochrane

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Green Crab (Carcinus maenas)
National Oceanic and Atmospheric Administration
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Vineyard Sound
Candace Cochrane

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TOP IMAGE: *Atlantic Tom Cod* (Gadus morhua)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

LOWER IMAGE: *Dressing cod*
H.W. Elliott and Capt. J.W. Collins
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Sea Horse (Hippocampus bargibanti)
Dorling Kindersley, Getty Images

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Speckled Trout (Salvelinus fontinalis)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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TOP IMAGE: *Barn-Door Skate* (Dipturus laevis)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

LOWER IMAGE: *Traditional commercial fisherman's shack that survived the 1928 hurricane off Vineyard Sound, Menemsha, Martha's Vineyard, Massachusetts*
Candace Cochrane

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Lobster (Homarus americanus)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Sand Cusk (Ophidium marginatum)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Sand dunes along the coastal waters of the Sounds
Dorothy Kerper Monnelly

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Fellows from Punta Rasa, Argentina, under the direction of Helen Hays of the American Museum of Natural History on Great Gull Island off the coast of Niantic, Connecticut coast. The Sounds Conservancy provides support to Helen Hays who is now in her 42nd year studying the migration of the Common Tern (Sterna hirundo) *and Roseate Tern* (Sterna dougallii) *on Great Gull Island.*
Greig Cranna

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Vineyard Sound lighthouse
Candace Cochrane

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TOP IMAGE: *QLF's Sounds Conservancy grantee Helen Hays fights the wind to get mist nets unfurled for the night's tern banding, Punta Rasa, Argentina. Helen Hays is now tracking Common and Roseate Terns on their annual migration from Great Gull Island, off the coast of Connecticut, to South America.*
Greig Cranna

LOWER IMAGE: *In 2007, Greig Cranna, QLF Photojournalist, traveled to Punta Rasa, Argentina with Sounds Conservancy grantee Helen Hays of the American Museum of History. For nearly a decade, Helen Hays has directed this international effort with a team of researchers from the United States and Argentina to track Common and Roseate Terns on their annual migration from Great Gull Island, Long Island Sound, New York, to South America. Here, on location in Punta Rasa, researchers set mist nets for tern banding at night.*
Greig Cranna

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Shad (Alosa sapidissima)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Rhode Island fishing vessel
Larry Morris

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Low tide leaves its artistic trace
Dorothy Kerper Monnelly

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QLF Alumna, Elizabeth Cundill, leading environmental education camps for youth, Harrington Harbour, Quebec North Shore (1995). Historically, QLF and its programs including The Sounds Conservancy have provided leadership opportunities for undergraduate and graduate students. Working with future generations is central to the Mission of the Quebec-Labrador Foundation and *The Sounds Conservancy.*
Greig Cranna

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Common Tern (Sterna hirundo)
Greig Cranna

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Sounds Conservancy grantee Helen Hays with researchers on Great Gull Island, Long Island Sound. 2009 marks the 42nd year Helen Hays has directed The Great Gull Island Project where she monitors the populations of the endangered Roseate Tern and the threatened Common Tern nesting on this 17-acre island. In 2009, there are an estimated 1,600 pairs of Roseate Terns nesting on the island; the largest of all the colonies in Canada, Northeast U.S., Florida, and the Caribbean; and 10,500 pairs of Common Terns, the largest colony of this species in the world.
Greig Cranna

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Diamondback Terrapin (Malaclemys terrapin)
Joe Chadwick

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Great Egret (Ardea alba)
Enrique Aguirre, Getty Images

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Integral to her research, 2002 Sounds Conservancy grantee, Andrea Bogomolni, studied the contaminant load in Harbor, Harp and Gray Seals off Cape Cod,
Vineyard Sound.
Candace Cochrane

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Mackerel Shark (Lamna cornubica)
Fleming, National Oceanic and Atmospheric Administration, Historic Fisheries Collection

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Right Whale (Eubalaena glacialis)
Dorling Kindersely, Getty Images

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Inland Alewife or Skipjack (Clupea chrysochloris)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Herring (Clupea harengus)
National Oceanic and Atmospheric Administration
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Sounds Conservancy Grantees tracking Roseate Terns on Fishers Island Sound
Greig Cranna

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Helen Hays on site, Great Gull Island
Greig Cranna

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Scallop
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Razor Clam
National Oceanic and Atmospheric Administration
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Common Squid (Loligo pealei)
National Oceanic and Atmospheric Administration
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Bottlenose Dolphin (Tursiops truncates)
Dorling Kindersley, Getty Images

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Common Tern (Sterna hirundo) *returns to its nesting site on Great Gull Island*
Greig Cranna

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Striped Bass or Rockfish (Roccus lineatus)
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Homeward bound, Point Judith, Rhode Island
Larry Morris

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The capture of a school of blackfish in Cape Cod Bay, Massachusetts
National Oceanic and Atmospheric Administration
Historic Fisheries Collection

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Menhaden steamer
National Oceanic National Marine Sanctuaries, National Archives

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Traditional lighthouses line New England coastlines marking hazardous shoals and safe entries to harbors. Operational lighthouses, once imperative for use as a navigational aid, have been replaced by electronic navigation.
Candace Cochrane

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Traditional sand dune fence along the New England coast
Candace Cochrane

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The intertidal zone is the area along a coastline that is underwater at high tide and above the water at low tide. Clams, mussels, oysters, crabs, fish, and microscopic plants best adapt to the environment of coastal marshes or wetlands that are protected from the ocean.
Candace Cochrane

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Fishing lures at rest
Candace Cochrane

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A variety of plant life along the water's edge protects the land from erosion.
Candace Cochrane