2012-2013 New York Sea Grant
Omnibus Research Projects
(Listed by Institution)

Total Federal Funds for these 9 research projects for 2012:	$1,549,811
Total Matching Funds 2012:	$1,044,311
Total Funds 2012:	**$2,594,122**

School of Marine and Atmospheric Sciences, Stony Brook University (SoMAS)
Stony Brook, New York

Title: Mercury and Nutrients in Commercial Seafood: Local and National Trends and Mechanisms (**Project #:** R/SHH-17)
Principal Investigator: Nicholas S., Fisher, SOMAS
Co-Principal Investigator: Roxanne Karimi, SOMAS
Total Sea Grant Funds: $196,005
Total Cost-Share Funds: $104,926

Mercury (Hg) is one of the most hazardous substances in the US food supply due to its potential threat to human health. However, human exposure to Hg through fish consumption remains unclear, primarily due to the lack of comprehensive up to date data on methylmercury (MeHg) concentrations in commercial fish. Improved estimates of Hg concentrations in commercial fish will provide more accurate assessments of potential exposure and will help dispel misperceptions regarding the types and amounts of fish that are safe to eat. This project aims to address this issue by analyzing trends in Hg concentrations in commercial seafood through the largest compilation of available data including datasets from multiple federal agencies (EPA, FDA, NOAA), multiple state agencies (e.g., VA, AK, DE) and the scientific literature. Then using this compiled data along with additional fish data and data analysis to create an overhauled mercury database that is more comprehensive, accurate, and useful for evaluating Hg monitoring efforts. The goal is to produce an internet-based version of the Hg database for public use by research scientists and public officials, thereby providing thorough, up-to-date information on mercury in commercial seafood.

Title: Effects of Low Toxicity, High Concentration *Alexandrium fundyense* Blooms on Growth and Condition of *Mercenaria mercenaria* and *Mya arenaria* (**Project #:** R/FBM-35)
Principal Investigator: Robert M. Cerrato, SoMAS
Co-Principal Investigator: V. Monica Bricelj, Institute of Marine and Coastal Science, Rutgers University
Total Sea Grant Funds: $255,828
Total Cost-Share Funds: $152,801

Paralytic shellfish toxin (PST) produced by the dinoflagellate *Alexandrium fundyense* is an important public health concern due to PST showing up in locally commercially important bivalve species, such as the hard clam *Mercenaria mercenaria* and softshell clam *Mya arenaria*. The Northport-Huntington Bay estuary (NHB), Long Island (LI), NY, has experienced particularly high density *Alexandrium fundyense* blooms compared to those found in other local estuaries. In addition these high density blooms are of lower toxicity compared to blooms of more northern Atlantic latitudes and the west coast of the US. In this unusual case, where the bloom toxicity is low but densities are high compared to other locations provides an interesting scientific question and a challenge to local managers and officials. This project will study the impact on the productivity of hard clam and softshell clam from high density low toxicity blooms. Negative effects on shellfish can lengthen the time to reach legal size, leading to greater vulnerability to predation at small sizes, and also affect size-dependent fecundity. Information from this project will aid coastal managers (e.g., NYSDEC), shellfish growers, and harvesters with management decisions.

Title: Towards an Integrated Multi-model Storm Surge Prediction System for Coastal New York (**Project #:** R/CCP-18)
Principal Investigator: Malcolm J. Bowman, SoMAS
Co-Principal Investigator: Brian A. Colle, SoMAS
Total Sea Grant Funds: $118,499
Total Cost-Share Funds: $88,553

Several groups such as the National Weather Service (NWS), universities, and technical institutes are currently running storm surge models, but there has been little inter-comparison or integration of these models. Since each storm has its own peculiar characteristics and behavior, no one model is always the most accurate at predicting surge events. This project aims to address this issue by constructing an ensemble of three model outputs that will produce a forecast with the most reliable predictor for a wide range of storm event scenarios. These improvements should increase current predictive capability by creating an enhanced ensemble forecasting system that can be used consistently by NWS and regional offices of emergency management for better outcomes in dealing with extreme weather events, including coastal flooding events.

Title: Using Plant Traits to Predict How Plant Community Changes will Affect Denitrification in Wetlands (**Project #:** R/CMC-10)
Principal Investigator: Stephen B. Baines, SoMAS
Total Sea Grant Funds: $89,340
Total Cost-Share Funds: $79,659

Excess nitrate loading has long been widely linked to environmental problems in coastal marine environments. In waters of New York and elsewhere, movement of excess fixed nitrogen from terrestrial systems into nitrogen-limited coastal ecosystems results in eutrophication, hypoxia, and harmful algal blooms, all of which may have severe consequences for the economy and human health. Nitrate is removed naturally from surface waters by a process known as denitrification, an anaerobic respiratory process performed by bacteria that transforms nitrate into the inert gas N_2 which returns to the atmosphere. Wetlands play an important role in removing nitrate from surface and groundwater because they are sites of intense denitrification. Because wetland plants vary in traits that may influence nitrate removal, changes in wetland plant community structure could result in substantial differences in sediment denitrification rates. This study will examine how changes in wetland plant communities that may result from sea level rise, climate change, species invasions and management activities may affect the ability of wetland ecosystems to remove nitrate from surface and groundwater. A goal of the proposed research is to develop a robust model that can predict the amount of denitrification occurring in a wetland based on the vegetation and community structure. Such predictions are essential if the consequences of changes to wetland communities resulting from sea-level rise, climate change or species invasions are to be understood and addressed.

Title: A Test of Acoustic Telemetry and Radio Frequency Identification Tagging Methods to Evaluate the Success of Fish Passage Restorations for Alewife, American eel and Brook Trout in the Carman's River (**Project #:** R/FTD-12)
Principal Investigator: Matthew Sclafani, Marine Program, Cornell Cooperative Extension-Suffolk Co.
Co-Principal Investigator: Michael, G. Frisk, SoMAS
Total Sea Grant Funds: $238,941
Total Cost-Share Funds: $166,640

Several species of Atlantic coast diadromous (migratory between salt and fresh water) fishes are listed as *endangered, threatened* or of special concern. Dams have had the most significant impact on diadromous populations by blocking access to habitats and altering ecosystem structure and function. Though ecosystem-wide restoration by dam removal is possible and often desirable, impounded waters become economically or socially valuable to local communities. To balance the social/recreational value of small ponds with the need to halt diadromous population declines, managers have become reliant on fish passageways to reconnect habitats. Unfortunately, management agencies must decide on ecological trade-offs between costs and benefits of fishway installation with little scientific guidance and with limited data to support decisions. The need for a framework to judge effectiveness of small river restoration exists. This project will evaluate the success of fish passage restorations in small river systems by determining whether: 1) targeted species are effectively utilizing the existing fish passage and 2) if restored habitat increases fish productivity. The results will benefit agencies that have management plans for fish populations in small rivers.

Cornell University
Ithaca, New York

Title: Determination of Effective Combinations of Bactericidal and Bacteriostatic Growth Inhibitor Treatments against *Listeria monocytogenes* on Cold Smoked Salmon (**Project Number:** R/SHH-16)
Principal Investigator: Martin Wiedmann, Food Science, Cornell University
Co-Principal Investigator: Teresa M. Bergholz, Food Science, Cornell University
Total Sea Grant Funds: $99,738
Total Cost-Share Funds: $83,444

Listeria monocytogenes typically contaminates food in low numbers, but it can grow to levels that can lead to human disease during refrigerated storage of many ready-to-eat (RTE) foods, including cold smoked salmon. This project will address one of the last major issues that must be included in a complete *Listeria* control strategy, i.e. the need to utilize effective bactericidal agents (to kill *Listeria*) on RTE seafood products. The goal of this project is to combine phenotypic growth data with a genomics based approach to predict effective combinations of bactericidal agents and growth inhibitors for *L. monocytogenes* on cold smoked salmon. The results should provide salmon food processors cheaper and more effective control measures and increase seafood safety for consumers.

Title: Genomic Analysis of Oyster Dispersal and Recruitment Success (**Project Number:** R/XG-22)
Principal Investigator: Matthew P. Hare, Department of Natural Resources, Cornell University
Total Sea Grant Funds: $201,891
Total Cost-Share Funds: $125,921

The eastern oyster (*Crassostrea virginica*), has suffered declines in the Hudson/Raritan estuaries (HRE) compared to historical times. Oyster reefs have been an important component of the estuary ecosystem and are one of eleven unique habitats prioritized for restoration in the HRE to improve overall environmental quality of the estuary for the benefit of the region. Oyster reefs are valuable habitat used by many species; they help stabilize shorelines and help filter particulates from the water during feeding. Success in restoration efforts will be beneficial to the health of estuary environment. This study will contribute to restoration efforts by developing a new strategy for both optimizing restoration design and evaluating restoration success using cutting-edge genomic methods to track larval dispersal patterns. This will help interpret the causes of restoration failures (e.g. low survivorship or recruitment on a particular reef), and what broodstock are genetically optimum for achieving restoration goals across the diverse HRE environments. Results may suggest alternative hatchery breeding strategies that could increase survivorship of restoration 'seed' planted on reefs.

State University of New York College of Environmental Science and Forestry Syracuse, New York

Title: Contribution of Marina Activities to the Algal Growth of Sodus Bay, Lake Ontario (**Project Number:** R/CTP-47)
Principal Investigator: Gregory L. Boyer, Department of Chemistry, SUNY College of Environmental Science and Forestry
Co-Principal Investigator: Joseph F. Atkinson, Department of Civil, Structural and Environmental Engineering, University at Buffalo
Total Sea Grant Funds: $192,381
Total Cost-Share Funds: $150,913

Sodus Bay Lake Ontario suffers from extensive benthic and pelagic algal blooms. In August 2010, an extensive toxic cyanobacterial bloom (*Microcystis* sp.) occurred in the bay, resulting in extensive economic impacts to the region. Observations seemed to indicate greater algal concentration near waterfronts and marinas. In order to determine the possible impacts of marinas on algal blooms in the bay this project aims to develop a coupled biological and physical growth model to measure algal dynamics and to collect environmental samples and weather data to determine parameters to drive the model and validate its output. The results of the project will provide better understanding of the nutrient and algal dynamics of the bay and will further aid decision making for management of the Bay.

Cary Institute of Ecosystem Studies
Millbrook, New York

Title: Effect of Salinity Intrusion on Hudson River Wetland Nitrogen Cycling (**Project #:** R/CMC-11)
Principal Investigator: Stuart E.G. Findlay, Cary Institute of Ecosystem Studies
Co-Principal Investigator: Melody J. Bernot, Department of Biology, Ball State University
Total Sea Grant Funds: $157,188
Total Cost-Share Funds: $91,454

Sea level rise associated with climate change will cause saline waters to intrude further up the tidal Hudson River. Freshwater tidal marshes of the Hudson are documented to be important sites of nitrate removal during tidal exchanges and the literature suggests that this function will decline under a higher salinity regime. This study will conduct lab and field experiments to address the impact of salinity on tidal marsh ecological functions. The results of this project will inform managers and land stewards about the current functioning of brackish water wetlands of the Hudson and provide information crucial for future management/restoration plans.