NYSG's 2006 Research Projects

R/CE-26 "The Potential of the Ribbed Mussel *Geukensia demissa* in Regulating Toxic and Small-Form Phytoplankton in Coastal Ecosystems" Cerrato/ Lonsdale
After centuries of abuse, marshes are now recognized for their importance as nursery grounds for fish and crustaceans, buffer zones for erosion, treatment systems that remove particulate organic and inorganic wastes from runoff, and key participants in the global cycling of carbon, nitrogen, and sulfur. The ribbed mussel *Geukensia demissa*, is recognized for its ability to stabilize the edges of marshs and enhance *Spartina* production by creating biodeposits that ultimately transfer nutrients from the water column to the sediment. This research team will assess the potential of ribbed mussels in reducing the incidence of blooms of harmful and/or nuisance species of algae and in regulating less desirable small form phytoplankton that are inefficiently filtered by many other suspension feeding bivalves. These activities would improve general water quality as well as the quality of food for other shellfish species. These results will help provide resource managers with a new option to help improve water quality, the quality of food for other shellfish and possibly provide a new brown tide mitigation strategy.

R/CTP-37 "Evaluation of Environmental and Biological Factors which Promote Toxic Cyanobacteria Blooms in New York's Great Lakes" Gobler
Toxic cyanobacteria blooms currently represent a serious threat to drinking and recreational waters in New York. The threat of poisoning resulting from fish consumption may be equally serious. An understanding of the conditions that favor the growth and proliferation of toxic cyanobacteria is crucial to the development of management strategies for New York's Great Lakes. This research project will use field and laboratory experiments to examine the ecological, molecular and chemical aspects of cyanobacteria proliferation and toxin production.

R/XG-15 "Development and Application of a Quantitative PCR Technique to Establish QPX Dynamics in Clams and in the Environment" Allam/ Collier
The protistan pathogen known as Quahog Parasite Unknown (QPX) emerged as a serious threat to New York's hard clam (*Mercenaria mercenaria*) fishery in 2002. The management of this shellfishery will require continued monitoring of QPX in New York hard clams. In support of this monitoring effort, this team of researchers will develop a Quantitative Real-Time PCR (Polymerase Chain Reaction) technique for the research and diagnosis of the QPX organism in clams and in environmental samples.

R/CTP-38 "Deployment of an Automated System for the Detection of Cyanobacteria" Boyer
Toxic blue-green algae blooms are a national and international problem of growing significance, and an issue of paramount public concern in both inland waters and the great lakes. Often these blooms occur and dissipate quickly, making it difficult to impossible to reliably detect them using discrete sampling methods. A network of autonomous samplers offers the possibility of near real time detection of these blooms. This project will develop a prototype optical sensor system and test platform that can distinguish cyanobacteria from other "algal" blooms. This system will eventually form the core optical sensors for the more extensive monitoring system. Such a buoy-or shore based remote monitoring system will be of interest to Sea Grant Extension, NOAA-GLERL researchers, DEC managers and health agencies as they determine the best ways to monitor blooms and inform the public about the risks. This approach would provide real time results on water quality and give early warning of toxin occurrence.

R/CTP-40 "Submarine Groundwater Discharge into Jamaica Bay, New York: Fluxes of Water and Contaminants into the Bay" Cochran/ Bokuniewicz
Management decisions about water quality based on budgets of nutrients and contaminants to Jamaica Bay will factor in submarine groundwater discharge (SGD) as a possible significant source of these chemical species to the Bay. The research team will study the fluxes, or changes, of nutrient and contaminants in the Bay.

New York Sea Grant is part of a nationwide network of 30 university-based programs working with coastal communities through the National Oceanic Atmospheric Administration (NOAA). Sea Grant research and outreach programs promote better understanding, conservation, and use of America's coastal resources. Sea Grant is funded in New York through SUNY and Cornell University and federally through NOAA.

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R/CCP-12 "Modeling of Nearshore Wave Characteristics for the New York Metropolitan Region" Buonaiuto/ Colle/ Wilson/ Bowman/ Flagg
The south shore of Long Island is a moderately exposed coast where northeast storms and hurricanes can produce strong currents that often lead to catastrophic erosion of beaches and barrier islands. To better understand water levels along the coast and determine potential for flooding and breaching of vulnerable low lying areas, this research team will model nearshore wave characteristics for the NY metropolitan region including Long Island Sound and Great South Bay.

R/CTP-41 "Dynamic Simulation of the Transport of Contaminants in the Waterways of Metropolitan NY Under Extreme Conditions" Bowman/ Wilson/ Flood/ Colle/ Hill/ Buonaiuto
This project will investigate the water quality impacts of using storm surge barriers to protect metropolitan New York area from sever storm surges. The project will develop and test an integrated mesoscale weather/3D hydrodynamic/water quality model to investigate water quality consequences of deploying storm surge barriers. The research will help to address the water quality issues of having water pool within the perimeter of the protected region. This prevents flushing of the protected region while the barriers are closed and causes build up contaminants and nutrients that come from water treatment plants, CSO's, and surface runoff. The project will help answer several questions such as are additions of elevated levels of nutrients accumulating in an enclosed harbor temporarily cut off from the sea going to lead to seriously degraded water quality? How long will it take to flush these excess contaminants out to sea after the storm passes and the barriers are re-opened? Are there summer versus winter water quality issues in using storm surge barriers?

R/FBF-19 "Effects of Changing Light Levels on Alewife-Mysid Interactions in Lake Ontario" Rudstam/ Mills/ Loew
This project will investigate the effect of light levels on the interaction between alewife and opossum shrimp (*Mysis relicta*) through physiological measurements, laboratory experiments, and field observations. The expected outcome is a better understanding of alewife production in a changing Lake Ontario ecosystem providing managers with information about prey abundance to complement estimates of predatory demand.

R/XG-16 "Genetic Make-up of *Fallopia* Plant Species Invading Novel Coastal Habitats" Pigliucci/ Richards
This new project seeks to determine the genetic make-up and degree of hybridization of the highly invasive *Fallopia* species of plants on Long Island. Information about the genetic make up and differences of LI *Fallopia* populations from Eupoean and Japanese populations along with how hybridization and selection impact the degree of invasiveness into novel habitats will help managers to predict and prevent the spread of these plants into our important coastal habitats.

R/FBM-31 "Effect of LIS Environmental Stressors on Defense Against Disease in the American Lobster, *Homarus americanus*" Factor
This new project aims to determine the physiological impact on the immune system of American lobster after sublethal exposure to the environmental stresses of high temperature and reduced oxygen using in vivo laboratory techniques.

Results from the project are expected to provide information for managers, agencies, and public that will help explain the physiological basis for the LIS lobster mortalities by determining the mechanism of impact on the immune system. The project will provide additional evidence and insight about the role of natural environmental stress and climate change in the health of Long Island Sound lobsters and the long-term prospects for the LIS lobster fishery.

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R/FBF-18 "The Lake Ontario Pelagic Foodweb: A Modeling Synthesis of Salmonine Recruitment and Prey-Fish Population Dynamics" Ringler/ Stewart/ O'Gorman
This new project will synthesize data from several sources responsible for Lake Ontario research and management and update an existing lake-wide predator/prey model. Plus generate new data and synthesize existing information on wild production of salmonines from Lake Ontario tributaries. Fisheries scientists and managers will have available updated information on predator/prey dynamics in Lake Ontario along with updated information about wild recruitment and updated modeling tools for use in assessing the outcomes of changing climate and/or stocking levels and different management actions.

R/FTD-9 "Acoustics Unpacked: Analysis of the Combined Error Structure in Acoustic Surveys in the Great Lakes" Sullivan/ Rudstam
This new project will provide a synthesis of acoustic survey methods for all three of New York's large lakes (Erie, Ontario and Champlain) into a form that is portable and general to almost any aquatic system. The expected outcome will be a tool that integrates all the steps in deriving calculations of forage abundance and distribution in a unified way to obtain acoustic survey estimates that reflect the real precision in abundance estimates.

R/FBM-32 "Impact of Predation by the Ctenophore *Mnemiopsis leidyi* on Larval Mortality of *Mercenaria mercenaria*" Lonsdale/ Cerrato
The abundance and economic importance of hard clams, *Mercenaria mercenaria*, have declined significantly in New York waters in the last 30 years, and stock re-establishment efforts are underway. Since there is less feeding pressure from benthic filter feeders on planktonic populations, their populations have increased.

In the open water, zooplankton such as ctenophores are considered "keystone" predators. In the north and south shores of Long Island, the timing of hard clam spawning (July - August) overlaps that of highest abundance of the ctenophore *Mnemiopsis leidyi*. Thus, larval predation may hinder attempts to increase clam recruitment through stock enhancement. There is a need to know more about sources of larval mortality and their impacts relative to other factors (e.g., brown tide) in regulating hard clam recruitment. This research team will examine predation by the ctenophore *Mnemiopsis leidyi* on planktonic larvae of the bivalve *Mercenaria mercenaria* in Long Island embayments. Using field and laboratory experiments, this research team will determine the natural diets and feeding rates of individual ctenophores of various sizes on hard clam larvae using methodologies which minimize artifacts normally associated with laboratory studies of ctenophore predation. They will also utilize information on hard clam larvae, ctenophore abundances and ctenophore dietary data to determine total ctenophore ingestion rates on bivalve larvae and larval mortality rate in the field.

R/CTP-39 "The Importance of Metal Storage in Prey and Digestion in Predators to Metal Trophic Transfer in Estuarine Food Chains" Wallace
This project will utilize field sampling and laboratory experiments to understand and predict how subcellular partitioning of metal within prey and digestion by a predator influence metal trophic transfer to mummichogs. Understanding the relationship between subcellular metal storage within prey and metal solubilization by a predator would allow managers to estimate dietary bioavailable metals to predators ingesting metal-contaminated prey.

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