New York Sea Grant 2007-2008 Project Descriptions with Budgets

Total Federal Funds for these 11 research projects for 2007-2008: $1,360,815
Total Matching Funds 2007-2008: $790,643

Note: The amount of the award coming to the District may not match these figures. Part of the award will also pay for program related administration, extension and communication.

[The order of these projects is based on NYSG’s project categories]

Project No. R/FBM-33
Investigations of Environmental Factors Affecting QPX Disease Development and Resulting Mortalities in the Hard Clam,

Investigators:
Allam Basam, Jackie L. Collier, Alister D.M. Dove
Affiliation: Marine Science Research Center, Stony Brook University, Stony Brook, NY

Debra A Barnes
Affiliation: Shellfish Management Unit, New York State Department of Environmental Conservation

2007-2008 Federal Funds: $128,927
2007-2008 Matching Funds: $62,933

Project Summary:
Short: The hard clam pathogen known as Quahog Parasite Unknown (QPX) is a serious threat from Canada to Virginia. Laboratory experiments will be used to investigate the impact of environmental factors (temperature, salinity & dissolved oxygen) on the interaction between QPX and hard clams. Resource managers and aquaculturists could use this information to develop risk management strategies for transplant fisheries and in helping to choose aquaculture or restoration field sites.

Long: The protistan pathogen known as Quahog Parasite Unknown (QPX) is a serious threat to hard clams (Mercenaria mercenaria) from Canada to Virginia. Recent studies suggest that factors other than the presence of the QPX organisms may determine when and where QPX outbreaks occur. Field observations combined with laboratory data on the growth of the host and pathogen suggest that temperature, salinity, and dissolved oxygen may be critical factors. This research team will investigate the impact of these factors on the interaction between host and pathogen by using controlled laboratory experiments to monitor the progression of QPX disease in both naturally and experimentally QPX-infected clam treatments. The experimental clams will also be used to investigate whether and how environmentally-driven changes in clam immune defense function might underlie the development of QPX epizootics. Resource managers and aquaculturists could use this information to develop risk management strategies for...
transplant fisheries, in helping to choose aquaculture or restoration field sites and these results can provide valuable data for hard clam population models.

**Project No. R/CE-27**
**Great Lakes Resource Shed Delineation**

**Investigators:**
Joseph F. Atkinson  
Affiliation: Civil, Structural and Environmental Engineering, University at Buffalo

David F. Raikow, Thomas E. Croley II  
Affiliation: Great Lakes Environmental Research Laboratory

**2007-2008 Federal Funds:** $75,260  
**2007-2008 Matching Funds:** $61,174

**Project Summary:**
**Short:** This project seeks to develop the concept of resource sheds to help scientists and managers better understand the large scale physical processes that are the forcing factors that underlie many important Great Lakes issues such as hypoxic zones, contamination spread, population declines and disease outbreaks. The resource sheds will be defined by linking several different models and integrating data into GIS and present results for managers and researchers.

**Long:** The purpose of this study is to create new tools for ecosystem-based management and study of coastal ecosystems and relevant environmental issues through the definition, methodological development and large-scale delineation of resource sheds in the Great Lakes. The plan is to define resource sheds by combining several modeling techniques and combine the information with GIS to create a number of resource shed maps. Specifically the research team plans to adapt a linked hydrodynamic and particle tracking model for Lake Ontario and Lake Erie to delineate circulation patterns in the lake. Then the team plans adapt a lumped-parameter large basin runoff model to indicate source locations within a tributary watershed for water leaving the river mouth at specified times as determined by spatial precipitation patterns. Finally the output of the two models is linked so that resource sheds may be tracked into a tributary watershed (when appropriate). Model output will be analyzed with GIS so that resource shed maps based on average circulation patterns can be produced. The maps are to be presented on a website and made available for researchers and managers for use in their projects.

**Project No. R/FTD-10**
**Freshwater Adaptation and Early Invasion of Viral Hemorrhagic Septicemia Virus into the Great Lakes Basin**

**Investigators:**
Paul R. Bowser, James W. Casey, Rodman G. Getchell  
Affiliation: Department of Microbiology and Immunology, Cornell University, Ithaca, NY
John M. Farrell  
Affiliation: Faculty of Environmental and Forest Biology, SUNY College of ESF, Syracuse, NY

2007-2008 Federal Funds: $181,406  
2007-2008 Matching Funds: $93,666

Project Summary:
Short: A recently discovered freshwater isolate of the viral hemorrhagic septicemia virus (VHSV) poses a potential health threat to wild Great Lakes fishes. This project plans to develop a new assay that will help detect the presence of the virus in water or tissue samples.
Long: A freshwater isolate of the viral hemorrhagic septicemia virus (VHSV) was diagnosed in a fish kill of freshwater drum found on the Canadian shore of Lake Ontario and from diseased muskellunge from Lake St. Claire, Michigan. There has also been VHSV isolated in round goby from the St. Lawrence River near Cape Vincent, NY and from Lake Ontario near Rochester, NY. The finding of this virus in new fish species in a new freshwater environment (North America) indicates a major adaptation of VHSV. There remains the question of what the magnitude of the impact of these new isolates will have on Great Lakes fishes. For example the finding of diseased muskellunge is a major concern since New York State has a highly prized muskellunge sport fishery, most notably in the St. Lawrence River, the Niagara River and Chautauqua Lake. This project aims to develop a new assay that will help detect the presence of the virus in water or tissue samples. This will be valuable for assessing the health of fish species such as muskellunge and other valued species. The research team plans to use a two fold approach to develop the new technology. First, is to develop an improved diagnostic capability for the detection of VHSV infection that augments cell culture techniques. Second is to characterize the biology of the recent Great Lakes freshwater VHSV isolates by assessing their stability in different freshwater environments compared with saltwater isolates. The team plans to develop assays using quantitative RT-PCR (qRT-PCR) to directly monitor virus in water as well as an assay to quantitate viral transcripts in tissue.

Project No. R/FHD-11  
Great Lakes Sportfishing Participation and Economic Impacts: Synthesis and Outlook

Investigators:
Tommy L. Brown and Nancy A. Connelly  
Affiliation: Natural Resources, Cornell University, Ithaca, NY

2007-2008 Federal Funds: $56,755  
2007-2008 Matching Funds: $28,475

Project Summary:
Short: This research team will synthesize and model the past 30 years of Lake Ontario fisheries angler (human and biological) data to develop the best possible understanding of
the factors that have most strongly influenced the fisheries in the past and model those factors for the next 3-5 years. Agency personnel (e.g., NYSDEC and NYSG extension staff) can convey this information to stakeholders, who can use that information to do risk assessment for their businesses.

Long: In the fisheries community, fisheries professional and stakeholders react to changes in fishing participation with limited understanding of the underlying causes and without placing these changes in a broader societal context. Obtaining a better understanding of the relative importance of the human and biological factors that affect angler effort is important for management, for forecasting purposes that are useful to stakeholders as well as managers, and for establishing priorities for future research goals. This research team will synthesize and model the past 30 years of Lake Ontario fisheries angler data to develop the best possible understanding of the factors that have most strongly influenced the fisheries in the past and model those factors for the next 3-5 years. Agency personnel (e.g., NYSDEC and NYSG extension staff) can convey this information to stakeholders, who can use that information to do risk assessment for their businesses.

Project No. R/CCP-14
Wave Forecasting for Long Island Coastal Waters

Investigators:
Frank S. Buonaiuto
Affiliation: Department of Geography, Hunter College of CUNY

Malcolm J. Bowman, Brian A. Colle, Robert E. Wilson
Affiliation: Marine Science Research Center, Stony Brook University, Stony Brook, NY

2007-2008 Federal Funds: $59,689
2007-2008 Matching Funds: $54,975

Project Summary:
Short: Building on previously NYSG funded research, this project will examine the inclusion of elevated water levels along the coast and in bays within the existing Stony Brook Storm Surge Model. Utilizing this modeling system, the National Weather Service and local emergency managers can predict storm surges and plan for barrier breach mitigation and erosion hazards.

Long: Long Island and New York City's coastal lands are vulnerable to elevated water levels, or wave set up, from storm surges due to hurricanes and Nor'easters. Building on previous NYSG funded research validating the use of the Simulating Waves Nearshore (SWAN) wave generation and propagation model for the south shore of Long Island, this project will focus on automating and operating the wave model in forecast mode and provide wave forcing data to storm surge models. This research team will examine the inclusion of wave set up along the coast and in bays within the Stony Brook Storm Surge Model. Incorporation of the SWAN model into the already developed 60-hr storm-surge forecasting model, will improve predicted water levels along coastal areas, advance scientific understanding of flooding around barrier island systems and facilitate
investigations of local rip current events. Utilizing this modeling system, the National Weather Service and local emergency managers can predict storm surges and plan for barrier breach mitigation and erosion hazards.

Project No. R/CCP-13
Improving Coastal Flood Forecasts Along the South Shore of Long Island Through Real-Time Monitoring and Simulation of Past Major Hurricane Events

Investigators:
Brian A. Colle, Malcolm J. Bowman, Robert E. Wilson
Affiliation: Marine Science Research Center, Stony Brook University, Stony Brook, NY
Frank S. Buonaiuto
Affiliation: Department of Geography, Hunter College of CUNY

2007-2008 Federal Funds: $65,081
2007-2008 Matching Funds: $61,673

Project Summary:
Short: Bordered by water, New York City and Long Island's coastal lands are extremely vulnerable to storm surges from hurricanes and Nor'easters. Utilizing a state-of-the-art atmospheric model linked with a high-resolution ocean model, this research team will evaluate historical and real-time storm event data to improve real-time storm surge forecasting capabilities. By forecasting water levels, the National Weather Service and local emergency managers can anticipate the potential flooding along coastal areas.

Long: New York City, Long Island and adjacent areas are surrounded by rivers, estuaries and other waterways that are greatly influenced by tides, runoff and weather. Bordered by water, these coastal lands are extremely vulnerable to storm surges from hurricanes and Nor'easters. It is critically important to understand storm surges in highly-populated coastal environments so that better strategies can be developed to prevent future flooding, devise evacuation strategies and improve short term forecasting. Utilizing a state-of-the-art atmospheric model linked with a high-resolution ocean model, this research team will evaluate historical and real-time storm event data to improve real-time storm surge forecasting capabilities along the south shore of Long Island, New York. By forecasting water levels along Long Island's south shore, the National Weather Service and local emergency managers can anticipate the potential flooding along coastal areas. Details of coastal circulation patterns will allow Government agencies (e.g., NYSDEC and USEPA) to better plan for infrastructure hardening and facilitate redesign in anticipation of rising water level and damaging storm events.

Project No. R/EMS-10
New Design Methods for Breakwater and Safety Evaluation

Investigator:
Philip L.-F. Liu
Affiliation: School of Civil and Environmental Engineering, Cornell University, Ithaca, NY
Project Summary:
Short: Based on the state-of-art knowledge on wave-structure-foundation interactions this new project proposes to develop a computational model, which can be used as an engineering tool to design a new breakwater and assess the safety of existing breakwaters.
Long: Coastal Engineering mainly deals with the interactions of water waves, currents, wind, and sea water level with coastal structures, sediments, pollutants and living species in coastal zone. The primary responsibility of a coastal engineer is to understand these interactions in order to develop engineering solutions for maintaining the health of coastal zone. To perform these tasks, coastal engineers need tools or models. This project seeks to develop new tools for engineers to use for design and testing of breakwaters. Breakwaters are engineered coastal structures that are commonly used for protecting coastal area from ocean waves, storm surge and flooding. Results from this project will help coastal engineers improve breakwater design leading to improved protection from coastal hazards.

Project No. R/FBF-20
Assessing barriers to round goby invasion of Great Lake tributary streams

Investigator:
Christopher M. Pennuto
Affiliation: Biology Department and Great Lakes Center, Buffalo State College

Project Summary:
Short: The exotic round goby had a significant impact in the Great Lakes and is expanding its range. There is concern over its ecological impact to tributary streams and how readily the goby will expand upstream. This new project aims to measure the physical limits and necessary substrate and flow conditions allowing round gobies to pass existing structures in Great Lake tributary streams.
Long: The round goby has had a significant impact in the Great Lakes since its invasion less than 15 years ago and it is now expanding into tributary streams. The impacts to stream communities and ecosystem functions will likely be greater than those documented within the Lakes. Little is known about the ability of this fish to by-pass barriers (e.g., waterfalls, fish ladders, lowhead dams), preventing accurate assessment of streams at risk to invasion or whether proposed fish by-pass structures might facilitate its upstream invasion. This project aims to document the physical limits and necessary substrate and flow conditions allowing round gobies to pass existing structures in Great Lake tributary streams. This will help in predicting the rate of goby expansion and the most likely tributaries most vulnerable.
Project No. R/CCP-15
The Size-Resolving Sediment Transport Model in the Upper Hudson River

Investigators:
Nicole Riemer, Dong-Ping Wang, Roger D. Flood
Affiliation: Marine Sciences Research Center, Stony Brook University, Stony Brook, NY

2007-2008 Federal Funds: $148,996
2007-2008 Matching Funds: $84,879

Project Summary:
Short: This project will improve the traditional sediment modeling approach using the upper Hudson River as an example. By taking into account the size distribution of sediment particles as well as microphysical processes such as flocculation and breakup, sediment associated contamination can be predicted. Agency and regulatory personnel (e.g., NYSDEC and EPA) can use this modeling tool to predict the estuarine depositional evolution, guide future contaminated sediment clean up and emergency managers could model storm related watershed erosion and dredge materials.
Long: Navigational dredging, coastal construction and sediment removal activities release sediments into the water column where the finer-grained particles, such as clay and silts that adsorb contaminants, can remain in suspension potentially being transported great distances down stream. Current models are insufficient to quantitatively predict the fate of suspended particles from activities such as dredging. This research team will improve the traditional modeling approach by taking into account the size distribution of the sediment particles as well as microphysical processes such as flocculation and breakup. A size-resolved sediment module will be developed for the Regional Ocean Model System (ROMS). The resulting model predictions will be compared to observed sediment distribution patterns in the upper Hudson River. Agency and regulatory personnel (e.g. NYSDEC and EPA) can use this modeling tool to predict the estuarine depositional evolution, guide future contaminated sediment clean up and emergency managers could model storm related watershed erosion and dredge materials.

Project No. R/CHD-7
Nature and heritage tourism in the Hudson River Valley: Enhancing and sustaining community engagement and destination competitiveness

Investigators:
Rudolf Schuster, Diane Kuehn
Affiliation: Faculty of Forest and Natural Resource Management, SUNY College of Environmental Science and Forestry
Duarte Morais
Department of Recreation, Park, and Tourism Management, Penn State University

2007-2008 Federal Funds: $126,800
2007-2008 Matching Funds: $75,338
Project Summary:

Short: This new project will study the attitudes and values of residents and visitors in Hudson Valley tourist communities to determine the best way to promote tourism. Results will hopefully balance the needs and desires of local residence with the need to develop tourism for long term sustainability.

Long: Nature based and heritage tourism in the Hudson River Valley is increasing in popularity. Many coastal communities face challenges in retaining stable local economies. Many communities have come to depend on recreation and tourism as the basis for community and economic sustainability. Understanding image offers a focus for entrepreneurial activity, government investment, and local identity. Research has found that when cultural traits are marketed to tourists the desired local traits are in danger of becoming transformed to meet market demands and are often lost. An understanding of which attributes of the nature/heritage tourism experience are attractive and valued by tourists will facilitate marketing efforts, increase visitation, and enable market positioning among other communities. Understanding what is valued by local residents will facilitate the engagement of the host communities in the tourism industry which is considered critical for long term sustainability.

Project No. R/XG-17

Stock Structure of Winter Flounder Using Two Complementary Nuclear DNA Approaches

Investigator:
Isaac I. Wirgin
Affiliation: Environmental Medicine, NYU School of Medicine

2007-2008 Federal Funds: $218,000
2007-2008 Matching Funds: $111,144

Project Summary:

Short: This project will determine the stock structure of winter flounder locally in New York and New Jersey estuaries and coast wide based on sensitive modern molecular techniques. Plus provide an estimate of the gene flow among identified stocks. This will test the assumption that is used now to manage the fishery that there are three distinct winter flounder stocks present in the area.

Long: This project will determine the stock structure of winter flounder locally in New York and New Jersey estuaries and coast wide based on sensitive modern molecular techniques. Plus provide an estimate of the gene flow among identified stocks. This will test the assumption that is used now to manage the fishery that there are three distinct winter flounder stocks present in the area. This will provide up to date stock structure information for state and federal fisheries managers to effectively manage this species on much finer scale. Such finer scale management will be more effective in restoration of the species to the benefit of the ecosystem and the fishing community by modifying management as necessary to each local stock characteristic.
**Project No. R/XG-18**

**Sponsorship of the *Aureococcus* Genome Consortium Symposium**

**Principal Investigators:** Christopher J. Gobler

**Sea Grant 2007-2008: $8,000**

Project Summary:
Human impacts of coastal ecosystems have been accompanied by an increase in the incidence and severity of harmful algal blooms (HABs), which have caused significant economic and ecological harm worldwide in recent decades. These blooms are often caused by algal species that use many different nutrients or synthesize compounds which discourage zooplankton or shellfish from eating them. However, a complete understanding of factors which cause HABs has been lacking, in part because the precise biochemical pathways which permit rapid growth of these algae, or deter their predators, have yet to be identified. This project examined the genome of the harmful alga, *Aureococcus anophagefferens*, and compared it to those of phytoplankton species it co-occurs with in New York estuaries. *A. anophagefferens* possesses more genes involved in nutrient acquisition and metabolism and light capture than competing phytoplankton, which may allow it to grow rapidly under the widely variable environmental conditions found in New York estuaries. Enzymes involved in the degradation of many forms of complex organic matter found in *A. anophagefferens*, but not other species, allow this organism to utilize these compounds for nutrition. Genes for the synthesis of multiple grazing deterrents likely facilitate the proliferation of this species with minimal predation losses. The *A. anophagefferens* genome contains more proteins that contain the trace element selenium than any other organism sequenced to date. Because these enzymes carry out reactions quicker than enzymes without selenium, they may give brown tides an advantage in selenium-rich environments such as New York estuaries. The ability of HABs such as *A. anophagefferens* to thrive in estuarine environments with varying levels of light and organic and inorganic nutrients while deterring herbivorous grazing allows them dominate phytoplankton communities for extended periods.

**Project No. R/CBM-31**

**Assessing the effects of nutrients on the bloom dynamics and toxicity of *Alexandrium*, the causative agent of Paralytic Shellfish Poisoning (PSP), in Long Island's south shore and east end tributaries**

**Principal Investigators:** Christopher J. Gobler

**Sea Grant 2007-2008: $8,000**

Project Summary:
Blooms of the genus *Alexandrium*, which produce saxitoxins, the causative agent of paralytic shellfish poisoning (PSP), plague the northeast coast from Massachusetts to Maine every year costing shellfish industries millions of dollars. This project seeks to
elucidate bloom dynamics and causes in tributaries on the south shore (Forge River, Quantuck Bay, Weesuck Creek) and eastern end of Long Island (Meetinghouse Creek, Peconic River), where blooms of Alexandrium have been detected. Since nutrient loading has been linked to bloom occurrence in some northeast US coastal systems, this project will assess the effects of nutrients on cell abundance and toxicity of Alexandrium using both experimental and observational approaches. Results will be used to assess the relationship among cells, toxin, nutrients, and shellfish toxicity in each system in order to help managers such as, the NYSDEC, make decisions regarding shellfish closures of toxic areas as well as plans regarding nutrients loads to bloom prone systems.