Projects and Progress 1997–2000

Sea Grant
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Thirty Year Anniversary
1969–1999
Serving New Jersey

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MARINE SCIENCES
CONSORTIUM

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Introduction

The National Sea Grant College Program, created by Congress in 1966, is operated by the U. S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). Sea Grant is a unique partnership with public and private sectors combining research, education, and technology transfer for public service. This national network of universities meets changing environmental and economic needs of people in our coastal, ocean, and Great Lakes regions.

Dr. Michael P. Weinstein
President, NJMSC
Director, NJSG

Since 1975, New Jersey Sea Grant has been managed by the New Jersey Marine Sciences Consortium, an alliance of 29 colleges and universities, private organizations, and individuals interested in marine affairs. Having met the high standards and program balance set by the National Sea Grant Program, New Jersey Sea Grant became the 26th program in the nation to earn the status of *Sea Grant College* in 1989.

The value of Sea Grant to New Jersey has grown steadily by addressing the ever-changing challenges and opportunities presented by the state's extensive and invaluable marine and coastal resources. Emphasis on critical coastal problems that focus on coastal ecosystem health, urban oceans, coastal processes, fisheries, and marine biotechnology continue to be at the forefront of current New Jersey Sea Grant research activities.

Scientifically sophisticated, these activities are also relevant to the state's economy. Despite its small size, New Jersey is bounded by more than 127 miles of coastline. Ports commerce is New Jersey's largest coastal economic sector. Tourism is the state's second largest coastal industry, accounting for over $14 billion annually, most of that generated by recreational activities. New Jersey consistently ranks among the top ten in the nation in commercial fishing landings, and along with recreational fishing generates more than two billion dollars income annually.

From Sandy Hook to Cape May and into the shallows of Delaware Bay, New Jerseyans are becoming increasingly aware of the importance of preserving the state's marine resources. They have also come to recognize the leadership of the New Jersey Marine Sciences Consortium and the *New Jersey Sea Grant College Program* in these efforts.

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NJMSC Member Institutions

Academy of Natural Sciences of Philadelphia
Atlantic Community College
Brookdale Community College
Burlington County College
Columbia University*
County College of Morris
Cumberland County College
Drexel University*
Fairleigh Dickinson University
Georgian Court College
Jersey City State College
Kean College of New Jersey
Lehigh University*
Marine Academy of Science and Technology
Middlesex County College
Monmouth College
Montclair State University
New Jersey Institute of Technology*
Princeton University
Ramapo College
Richard Stockton State College
Rider University
Rowan College of New Jersey
Rutgers University*
Saint John's University
Saint Peter's College
Seton Hall University
Stevens Institute of Technology*
Trenton State College
Union County College
University of Medicine and Dentistry of New Jersey*

*Indicates institutions participating in
New Jersey Sea Grant research projects listed in this directory

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Low-frequency Circulation in a Multiple Inlet/Bay System

Project R/M 9801
Principal Investigator:
Dr. Robert J. Chant
Institute of Marine & Coastal Sciences (IMCS)
Rutgers University

Initiation: 3/1/98
Completion: 2/28/99

The east coast of the United States is lined by a series of multiple inlet/bay estuaries. These systems are valuable commercially and recreationally. However, they are stressed by development and extensive commercial and recreational use. Lagoon systems are particularly vulnerable because their flushing times, which are limited to exchange through narrow inlets, can take many months. This exchange occurs on two time scales: a tidal time scale (12-24 hours); and a subtidal time scale (longer than 24 hours). Exchange at the tidal time scale is largely deterministic because it is driven by periodic tidal motion. Subsequently, tidal period exchange exhibits little seasonal or inter-annual variability. On the other hand, subtidal exchange, which is driven by both tides and winds, exhibits significant seasonal and inter-annual variability. Barnegat Bay, along New Jersey's densely-populated coast, is typical of a multiple inlet/bay ecosystem. Previous work has indicated that subtidal exchange contributes significantly to the flushing of Barnegat Bay. This project studies the mechanisms that drive subtidal exchange, and in particular, to what extent the subtidal exchange is driven by tidal forcing. This type of exchange is generated by nonlinear tidal dynamics, a process in which a residual (or mean) flow is generated from the oscillatory tide. These nonlinear processes produce a mean water level elevation set-up in the bay. The magnitude of the set-up is related to the tidal range and inlet morphology. In a multiple inlet/bay system, each inlet would produce different set-ups, driving a flow between the inlets. The strength of the residual motion would modulate over the spring-neap cycle, introducing a low-frequency circulation in these bays at periods of 14 and 29 days. This study utilizes sea level data collected in the Bay, moored current meters, and numerical simulations of the process.

Sea Grant
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Molecular Characterization of Oyster Chromosomes

Project VI-284
Principal Investigator:
Dr Ximing Guo
Haskins Shellfish
Research Laboratory
Rutgers University
Principal Investigator:
Dr. Standish K. Allen, Jr.
Rutgers University
Associate Investigator:
Greg DeBrosse
Rutgers University

Initiation: 3/1/98
Completion: 2/28/00

Oysters are important species for aquaculture in the U.S. and worldwide. Sustainable development of oyster culture increasingly depends on genetic improvement of cultured stocks. Advanced genetic improvement requires detailed knowledge about the genome and genes. Breeding for disease resistance, for example, would be more effective if disease-resistant genes could be identified, located, or isolated. A chromosome is the basic unit of the genome where genes are grouped and stored. The characterization of chromosomes is an important step in genomic analyses and mapping, and in the eventual cloning of important genes. Although oysters have a low haploid number of 10, oyster chromosomes are difficult to characterize because of their similarities in size and shape. Traditional banding techniques in oysters have proved difficult and unreliable. The use of molecular probes through Fluorescence *in situ* Hybridization (FISH), on the other hand, may provide a powerful tool for the identification and mapping of oyster chromosomes.

The goal of this project is to develop techniques and probes for the identification of all oyster chromosomes. FISH protocols on oyster chromosomes have been tested with several types of DNA sequences and probes. The human telomere probe *(TAGGG)n*, produces strong signals at ends of all oyster chromosomes, suggesting that this sequence is also present in oysters. A FISH probe has been developed from the ribosome DNA region and successfully assigned to the second-largest chromosome (Chromosome 2) in the American oyster. Interestingly, the same DNA sequence is located on the smallest chromosome (Chromosome 10) in the Pacific oyster. Anonymous repetitive DNA fragments produce strong signals on multiple chromosomes. Unique sequences from P1 clones are also being tested for chromosome identification.

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Antimicrobial Peptides from Fish Skin

Infectious agents continue to be a major concern both in human medicine and in agriculture. In an attempt to discover new antimicrobial agents that may overcome this problem, this project studies antimicrobial peptides, which are short proteins made by various species as part of their natural host defense, and which have broad-spectrum antibiotic acitivity. Upon examining the skin of the winter flounder (*Pleuronectes americanus*) for the presence of such agents, a peptide from the skin secretions was purified and named Pleurocidin. This peptide exhibits antimicrobial activity against bacteria and may form a first-line of host defense against pathogenic infections. Further examination by this project indicates that Pleurocidin is active against a wide variety of bacteria and fungi, and acts synergistically with conventional antibiotics against a model organism used to study tuberculosis infections. This project is presently attempting to understand the way this peptide kills microorganisms, and comparing this peptides stucture and activity with antimicrobial peptides from other organisms. These results are expected to further develop novel antibiotics for medicine, as well as greater understanding of the ways in which fish naturally fight off infection.

Project R/BT-9801
Principal Investigator:
Dr. Gill Diamond
University of Medicine and Dentistry, NJ

Initiation: 3/1/98
Completion: 2/29/00

BIOTECHNOLOGY

Development and Evaluation of a Pulsed Delivery System: Administration of Bioactive Compounds to Aquaculture Using Alginate, a Renewable Marine Resource

In 20 years, aquaculture has grown from producing 2.5% of the world's fish and shellfish to 25%, and will grow to 40% by the year 2015. Aquaculture remains an inefficient means of protein production. One of the main areas for improvement is in the survival rates during rearing. Disease, especially among high density monocultures is estimated to destroy nearly 25% of the $30 billion annual production. Therapeutic use of antibiotics can lead to over use, and contamination of both fish and water with excess antibiotic can lead to problems of resistant strains and introduction of antibiotic into the food supply. Vaccination of farmed fish by direct injection has greatly increased survival rates and decreased antibiotic use, however, single dosing is inefficient, and multiple staged dosing is costly and stressful. Development of a controlled release vaccine would greatly improve the humoral response to a pathogen challenge and decrease stress. This project investigates the use of alginate as the delivery vehicle. Alginate is not only a renewable marine resource, it is also already approved as a food additive and is classified as a GAS (Generally Accepted as Safe) compound by the FDA. The overall project goal is to develop a method of producing an injectable controlled release vaccine (CRV) for use in the aquaculture industry. The specific objective is to use alginate to produce inherently unstable capsules that will release their contents in a burst at a predetermined time.

Project R/N 9714
Principal Investigator:
Dr. Margaret A. Wheatley
Department of Chemical Engineering
Drexel University

Initiation: 3/1/97
Completion: 2/28/98

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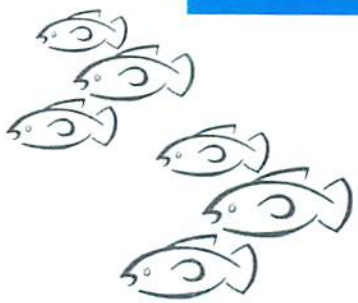
Atmospheric Deposition of Nitrogen and Trace Metals to the New York/New Jersey Harbor Estuary

Project R/E 9704
Principal Investigator:
Dr. Yuan Gao
IMCS
Rutgers University

Initiation: 3/1/97
Completion: 2/28/99

The primary goal of this project is to quantify the atmospheric deposition rates of nitrogen and selected trace metals to the New York/New Jersey harbor estuary. The ultimate goal of this research is to provide the needed atmospheric data for the estuary toxic mass balance model to better manage coastal resources. Field measurements of these airborne pollutants have been carried out at Sandy Hook in northern New Jersey. Both aerosol particulate matter and precipitation have been collected. Preliminary results obtained at Sandy Hook indicate that the atmospheric concentrations of selected trace elements in the New York/New Jersey harbor marine atmosphere were similar or higher, compared to those at several coastal sites in North America. The high atmospheric concentrations of these pollutants will undoubtedly result in high atmospheric fluxes to the New York/New Jersey harbor estuary.



Air-Sea Exchange of PCBs and PAHs in New Jersey Coastal Waters

Project R/E 9704
Principal Investigator:
Dr. Steven J. Eisenreich
Dept. of Environmental Sciences, Cook College
Rutgers University

Initiation: 3/1/97
Completion: 2/28/99

Hazardous Organic Pollutants (HAPs) such as PCBs, PAHs, chlorinated pesticides, and dioxins and furans are delivered to coastal waters by direct discharges, rivers, and atmospheric deposition. Air-water exchange of PCBs and PAHs not only adds chemicals to the water but also enters as a dissolved gas available directly to the base of the aquatic food chain. It is clear from results in the Great Lakes and preliminary data from Chesapeake Bay that these phenomena are widespread throughout coastal waters. With the increased atmospheric emissions in the urban-industrial corridor of New Jersey and New York, net air to water fluxes of atmospheric HAPs could be substantial and represent a significant, previously unmeasured, loading to coastal waters and the aquatic food chain. The results of this study will be extremely relevant to all coastal waters proximate to urban-industrial complexes.

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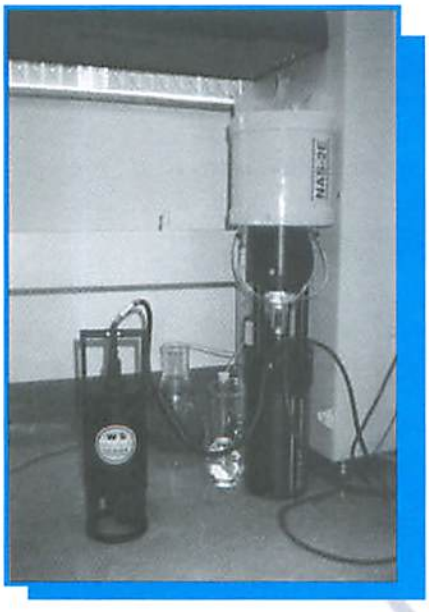
Nitrogen Flux through Barnegat Bay Inlet: Measurement and Analysis of Variability Project

Project R/E 9802
Principal Investigator:
Dr. Qizhong Guo
Dept. of Civil and Environmental Engineering
Rutgers University
Co-Principal Investigator:
Dr. Norbert P. Psuty
Rutgers University

Initiation : 3/1/98
Completion : 2/28/00

One of the major uncertainties in studying eutrophication of Barnegat Bay and other estuaries is nitrogen (N) flux through the ocean-estuary boundary. Barnegat Inlet is the primary opening through which water and materials are exchanged between the ocean and Barnegat Bay. The N flux through Barnegat Inlet has never been measured, and it is a critical data gap for any eutrophication study of Barnegat Bay. To quantify relative N loadings to Barnegat Bay and to develop a eutrophication model for the bay, the N flux through Barnegat Inlet must be quantified. N may be re-suspended from the bottom during ocean upwelling and enter the bay. Ammonia discharged from the sewage treatment plant to the nearshore coastal waters may also enter the bay on the flood tide. However, no data has been collected to quantify the potentially significant influx of nitrogen from the coastal zone. It is the intent of this research project to collect a time series of nitrogen flux data at Barnegat Inlet and to identify the variability of N flux. The results obtained from this project can be used to refine the existing N loading estimates, and to fill the critical data gaps in the knowledge needed for dynamic water quality modeling. To detect the variability of N flux, both water flow and N concentration at Barnegat Inlet need to be measured on a continuous basis. Through an additional grant from the National Science Foundation, two unique pieces of equipment were selected and purchased to measure these two quantities simultaneously and continuously. The first piece of equipment is the current meter, and the second is a nutrient analyzer. The newly-developed nutrient analyzer is essentially an underwater, miniature, wet-chemistry laboratory that takes water samples and analyzes N concentration *in situ* every 10 minutes, or other time intervals as programmed. The readings from the current meter and the nutrient analyzer are stored in hard memory for later retrieval. Operational procedures and performances of both pieces of equipment have been tested at Rutgers University Institute of Marine and Coastal Sciences and were deployed in the field this past winter.



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Atmospheric Nitrogen Deposition to Barnegat Bay Project

The primary goal of this project is to determine the atmospheric deposition rate of nitrogen to the Barnegat Bay system and to investigate the processes that control atmospheric nitrogen deposition. The initial field measurements of atmospheric nitrogen will be conducted at Rutgers Marine Field Station at Tuckerton in southern New Jersey. Both atmospheric wet deposition and dry deposition will be addressed. Results from this research will be used to better understand the linkage between atmospheric deposition of nutrient substances and coastal harmful algal blooms.

Project R/E 9801
Principal Investigator:
Dr. Yuan Gao
IMCS
Rutgers University

Initiation: 3/1/98
Completion: 2/28/00

Estuarine Eutrophicaton: Seasonal Cycle of the Contribution of Dissolved Organic Nitrogen from Non-Point and Point Sources

Increases in population density bring changes to the landscape that in turn change the amount and composition of water entering estuaries from runoff or rain (non-point source discharges) and from wastewater treatment (point source discharges). Nitrogen (N), a plant nutrient, is a component of these discharges. As discharges increase, increasing nitrogen loads can cause problematic changes in the estuarine ecosystem, including algal blooms, depression of oxygen

levels, and even fish kills. Thus, the identification and control of the specific point and non-point source N discharges is an important part of the preservation of the estuarine ecosystem. This research project aims to improve understanding via quantification of the amount of organic nitrogen present in major non-point and point sources; determination of how much of the DON is biologically available in various non-point and point sources; and presentation of this information to environmental managers, industry, citizens, and scientists. The result of this research has implications for the management of point and non-point nitrogen discharges to coastal waters. Reductions in loading of inorganic N alone may be only addressing a portion of the problem. The results of this work will be combined with land use, runoff, and discharge information so that watershed scale estimates of biologically available N loads to coastal waters can be made.

Project R/E 9706
Principal Investigator:
Dr. Sybil P. Seitzinger
IMSC, Rutgers University
Co- Investigators:
Dr. Robert B. Sanders
Temple University (98-99)
Dr. Monica Mazurek (99-00)
Rutgers University

Initiation: 3/1/99
Completion: 2/28/00

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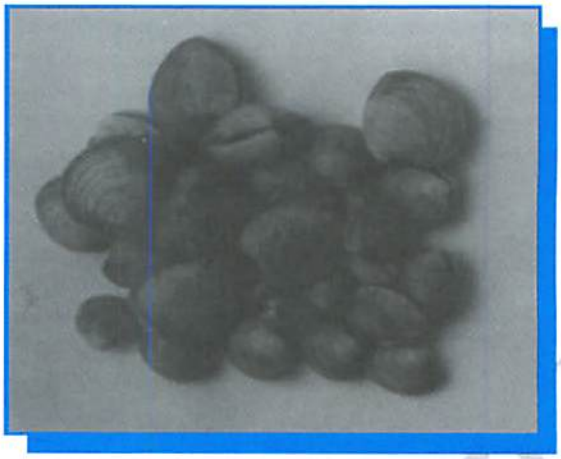
Early Summer Coastal Upwelling: The Effect on Surfclam Larval Abundance and Settlement

Project R/N 9718
Principal Investigator:
Dr. Judith P. Grassle
Institute of Marine and
Coastal Sciences (IMCS)
Rutgers University

Initiation : 3/1/97
Completion : 2/28/98

The New Jersey surfclam fishery had a landed value of $21.8 million in 1993, by far the largest single species fishery for the state, and the source of about 85% of total EEZ surfclam landings. Although recruitment appears to occur in inshore waters every three to four years, the EEZ fishery depends on the single, large cohort that settled in 1976 after a widespread hypoxic event. In the absence of significant recruitment, the fishery is mining a declining resource. Recruitment of successful year classes depends on a combination of oceanographic events, and their interaction with larval settlement, substratum characteristics, and the abundance of key predators of juvenile surfclams. Studies have shown that peak settlement of surfclam larvae usually occurs in July. In June, and continuing through the summer, inshore areas of the New Jersey coast are subject to upwelling events whose frequency and duration vary from year to year. Upwelling occurs when winds blow from the southwest, transporting warm surface water offshore and cold bottom water onshore, changing the temperature as much as 10 °C in two to three days. The goal of this project is to study the effect of seasonal upwelling events on the abundance of surfclam larvae and the larvae of their chief predators, once settlement has occurred: moonsnails (*Euspira heros*), starfish (*Asterias forbesi*), and crab zoeae and mealopae. In this project, surface and bottom water will be sampled with respect to information on near-coastal upwelling events at LEO-15 sites where there are ongoing benthic studies. During upwelling events, the location and timing of quantitative plankton sampling (surface and bottom) will be guided by daily satellite infrared images of sea surface temperature and weekly cross-shelf CTD transects, so as to characterize the abundance of the larvae of interest in the different water masses.



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Influence of Phragmites Invasion on the Structure and Function of Brackish Marsh Fish Nurseries

The common reed, *Phragmites australis*, has become invasive along the U.S. east coast over the last several decades. As a result, many brackish tidal marshes are severely altered when the typically dense, monotypic stands of *Phragmites* take over. These alterations may interfere with the ingress and egress of fishes and thus influence fish habitat use and, as a result, feeding, growth, and potential recruitment. This is problematic because natural *Spartina* salt marshes are generally accepted to be important for fish and fisheries production and this is true for New Jersey polyhaline marshes as well. Unfortunately, much less is known, in New Jersey and elsewhere, about the fish nursery value of brackish marshes. This problem is especially evident throughout New Jersey and Delaware, where extensive marsh restoration, including those altered by *Phragmites*, is underway. The outcome of these alterations on the fish populations cannot be confidently predicted, however, in order to protect habitats that may be critical to beleaguered fishery resources, the problem must be addressed. The long-term objectives of this research are to determine the effects of the common reed, *Phragmites australis*, invasion on marsh fish community structure and function. The specific objectives of this two-year program are to determine the patterns and begin to determine the processes that influence marsh nursery function when they are altered by the invasion of *Phragmites*. This project takes the approach of comparison of juvenile fish species assemblage structure, composition, and fish size and growth between brackish marshes dominated by *Phragmites* versus marshes dominated by *Spartina alterniflora*. During the first year, marsh surface fish population will be sampled with pit traps and block nets every spring tide during the period of expected greatest juvenile fish use, i.e., April to November. During the second year these observations will be continued to begin to estimate an annual variation in fish use. These observations will be extended to investigate diel patterns in fish habitat use by sampling over day/night periods in each habitat type.

Project R/N 9715
Principal Investigator:
Dr. Kenneth B. Able
Director, Marine Field Station
Rutgers University

Initiation : 3/1/97
Completion : 2/28/98

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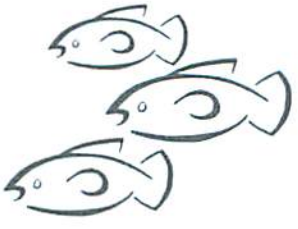
Coordinated Studies of Estuarine Flushing and Fluxes of Larvae of Estuarine and Coastal Bivalves through a Tidal Inlet

Project R/F 9801
Principal Investigator:
Dr. Judith P. Grassle
IMCS
Rutgers University

Initiation: 3/1/99
Completion: 2/28/00

Bivalves (i.e., clams, mussels, scallops) have a larval phase that swims freely in the water until the larvae have matured enough to take up their life on the sea floor. One problem for commercial species of bivalves that thrive in estuaries is that some of their larvae are flushed out of the estuary by tidal currents into the ocean, where the larvae cannot survive. This project has two objectives: determining the role of tidal currents in the transport of larval bivalves in and out of an inlet at Little Egg Harbor, New Jersey; and the development of DNA tests for the accurate identification of small bivalve larvae (shell length 0.070 - 0.200 mm). A model of the estuarine currents developed by Dr. Robert Chant of Rutgers University suggests that during certain phases of the monthly tidal cycle, a combination of flow characteristics and the vertical swimming behavior of the larvae serve to retain the larvae in the estuary. A field study is being conducted in collaboration with Dr. Chant to determine if the model accurately describes these processes. This study includes sampling bivalve larvae at the spring and neap tides, estimating the direction of their net transport through the inlet (into or out of the bay), and comparing these findings to model predictions. Because the different kinds of small bivalve larvae may be difficult to identify by their morphology, the development of DNA tests for accurate identification includes finding DNA sequences unique to certain species of bivalves common at the study site, having DNA probes manufactured for these species, and using the probes to unequivocally identify the very small larvae. At this time, DNA probes for identifying larvae of hard clams (*Mercenaria mercenaria*) and surfclams (*Spisula solidissima*), both commercially important species in New Jersey, have been developed and tested. The DNA sequences to create probes for other commercially and ecologically important bivalve species, such as soft-shelled clams (*Mya arenaria*), bay scallops (*Argopecten irradians*), and ocean quahogs (*Arctica islandica*), have been acquired. The results of this project will be useful to managers in charge of replenishing depleted stocks of estuarine bivalves. In addition, the development of DNA probes will allow accurate identification of larval bivalves in future studies tracking their dispersal.



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The Horseshoe Crab Fishery in Delaware Bay, NJ: Early Life History and Recruitment

Project R/F 9719
Principal Investigator:
Dr. Mark L. Botton
Department of Natural Science
Fordham University
Co-Principal Investigator:
Dr.Robert E. Loveland
Rutgers University

Initiation: 3/1/97
Completion: 2/28/00

Fisheries managers have stated the need for better biological data on which to develop an appropriate management strategy for the horseshoe crab. In the first year of this two-year study, the survival of horseshoe crab "trilobite" larvae and age (0) juveniles through their first summer in Delaware Bay, N.J., were examined. This study was specifically interested in finding out the probability of a horseshoe crab trilobite surviving two crucial transition states: 1) emergence from intertidal beach to the plankton; and 2) settlement from the plankton to the benthos. The density of trilobite larvae within beach sediments was determined by sampling along transects from the high water mark to the beach break, at every three meters, with replication, at depths from 0-25 cm at 5 cm intervals. This was coupled with plankton samples taken at high tide +/- 90 minutes, along 60 m transects parallel to the shoreline, and with benthic samples of the intertidal sand flats.

Dynamic Mixing Zone Analysis and Biological Study to Evaluate the Effects of Chlorinated Municipal Wastewater on the Marine Environment

Project R/M 9802
Principal Investigator:
Dr. Richard L. Hires
Stevens Institute of Technology
Co-Principal Investigator:
Dr. Keith R. Cooper
Rutgers University
Co-Principal Investigator:
Christopher Obropta, P.E.
Omni Environmental Corp.

Initiation: 3/1/98
Completion: 2/29/00

A dynamic mixing model is being developed to conduct a probabalistic analysis of outfall mixing in the near shore areas off the New Jersey coast. The model is being written in Microsoft Visual Basic 5.0 for Windows. A user interface has been developed so that data can be entered directly into the model or read from a file. This model will be used to predict acute and chronic dilution factors for a variety of averaging period and exceedance probabilities. The model will be validated by physical field measurements such as long-term dye release experiments and data collection. Ambient receiving water data will be collected using a bottom-mounted Acoustic Doppler Current Profiler (ADCP). These data will be collected throughout the entire year to determine the seasonal variation in receiving water conditions in the vicinity of the outfalls. Studies are also being carried out to examine the toxicity associated with sewage treatment plants that discharge into the near shore areas off the New Jersey coast. Biological testing of the effluents include studies examining the acute toxicity of two sewage outfalls on Mysid shrimp, American oyster larvae, and fish embryos and larvae. In the first year, studies are being conducted to establish dosage response relationships for each of the effluents. The effects observed in these studies will be compared to the potential dilution of the effluent entering the ocean. The dilution of the effluent is being mapped using a dye that can be detected at very low levels. The environmental impact, if any, of the effluent on the biota inhabiting the areas near the ends of the pipes are being evaluated. In the second and subsequent years, transplant studies will be carried out at varying concentrations of the effluent in the ocean using the American oyster as the test species. By combining the biological effects with the dilution model, it is anticipated impacts can be predicted under specific effluent dilution scenarios. This information will enable a better ecological risk assessment to be carried out on sewage plants discharging into near shore areas.

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Dune Development and FEMA Standards: A Test and Application

Project R/S 9702
Principal Investigator:
Dr Norbert P. Psuty
IMCS
Rutgers University
Co-Investigator:
Dr. Paul A. Gares
Department of Geography
East Carolina University
Associate Investigator:
Mark Mauriello
NJ Department of
Environmental Protection

Initiation: 3/1/97
Completion: 2/28/98

Coastal foredune response to storms is part of the natural system of sediment exchange in the beach/dune profile. The dimensional changes related to storm events and the attempts to relate scales of changing to scales of storms has been of scientific and technical interest for years. The coastal engineering community has been trying to provide more precision in determining the dimensional changes because of emerging FEMA guidelines related to dune-crest elevations and sand volumes needed to protect against catastrophic storms. Although there is progress in estimating these dimensional values, there are indications that the values may not be appropriate in the developed coastal areas because of cultural modifications of the foredunes. The focus of the FEMA studies has been on high magnitude events that produce the most dramatic consequences to shoreline inhabitants, but the performance of the dunes as buffers against these storms is affected by their response to lower magnitude/higher frequency storms. This project strives to address the issue of dimensional changes of the foredune in developed areas, and to focus on the higher frequency (lower magnitude) storm events through empirical data gathering. The project looks at the local spatial variation of the foredune response at individual sites and examines regional differences in the response along a 120 km stretch of the New Jersey shoreline. Analysis of response to the higher frequency events, those within the traditional planning intervals of several years to tens of years rather than decades to a century, will place the stress on the importance of the local situation and contribute to the FEMA objective of supporting mitigation efforts at the local/state level to reduce the effects of natural hazards.

Sea Grant New Jersey

New Jersey Sea Grant Extension Program *A/S-1*

E. Bochenek, NJMSC

One of New Jersey Sea Grant College Program's main objectives is providing marine-related information to people who depend on coastal and ocean resources for their livelihoods or for recreational purposes. SGEP staff members are generalists, but also have special areas of expertise. These areas include commercial and recreational fisheries, marine recreation and safety, aquaculture, coastal law, recreation and safety, coastal law, seafood marketing, and marine and coastal pollution. Working daily with residents and other organizations, SGEP staff members deliver the latest marine information and related research results. They also bring to program management new or potential problems and needs that should be addressed by research and education. Through this project, residents and target user groups have access to and benefit from program-generated information about managing, utilizing, and conserving the state's marine and coastal resources.

New Jersey Sea Grant Communications Program *A/S-2*

K. Kosko, NJMSC

Communications plays a key role in the NJ Sea Grant College Program. Information about research, SGEP, and education activities is distributed and publicized through brochures, fact sheets, newsletters, print and electronic news media, technical reports, conferences, workshops, and other outlets. Communications develops, produces, distributes, and organizes these products or events. Scientists, educators, legislators, industry, the news media, and the general public use and benefit from Communications' products and services.

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New Jersey Sea Grant Program Management *M/M-1*

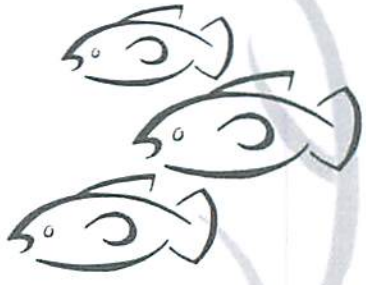
Dr. Michael P. Weinstein, NJMSC

Through this project, the Director and staff of the New Jersey Sea Grant College Program manage the program by planning, coordinating, and evaluating activities. These efforts maintain and improve both the program and its relationship with educational institutions, federal, state and local agencies, and marine and coastal businesses and industries.

New Jersey Sea Grant Program Development *M/M-2*

Dr. Michael P. Weinstein, NJMSC

The project funds associated with M/M-2 are used to provide support for research and other activities that respond to the needs of the state, industry, and businesses on short notice. Information obtained from activities supported through program development is then used for long-range planning and often encourages the submission of future proposals to address these needs. The projects on the pages that follow are being supported with development dollars during the 1997-1998 and 1998-2000 funding cycles.



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Awards and Recipients

Mr. Jay Cullen
"The Relationship Between Beam-Attenuation and Particulate Organic Carbon (POC) in Optically-Complex Water"
R/D-9801, $4993
Rutgers, The State University
New Brunswick, New Jersey

Dr. Steven J. Eisenreich
"Proposal to Fund Shiptime for Air-Water Exchange Measurements in the NY/NJ Harbor Estuary"
R/D-9804, $5000
Rutgers, The State University
New Brunswick, New Jersey

Dr. Gregory B. Hecht
"Genetics of Zn2+ Uptake by Marine Bacteria"
R/D-9802, $3262
Rowan University
Glassboro, New Jersey

Dr. Daniel A. Kreeger
"Concepts and Controversies in Tidal Marsh Ecology: Developing a New Consensus"
R/D-9705, $5000
Academy of Natural Sciences
Philadelphia, Pennsylvania

Dr. Bonnie Lustigman
"Isolation, Identification and Purification of Antimicrobial Substances Derived from Unique Marine Bacteria"
R/D-9803, $4680
Montclair State University
Upper Montclair, New Jersey

Dr. Karl F. Nordstrom
"An Educational Program to Enhance Learning about Resource Management in Coastal Resort Communities"
R/D-9805, $4213
Rutgers, The State University
New Brunswick, New Jersey

Dr. Karl F. Nordstrom
"Reestablishment of Natural Environments in Developed Coastal Communities to Enhance Ecological and Human-Resource Values"
R/D-9702, $4175
Rutgers, The State University
New Brunswick, New Jersey

Dr. Norbert P. Psuty
"Development and Application of a Decision-Theoretic Model to Public Policy Issues Concerning the Provision of Shore Protection in NJ"
R/D-9806, $5000
Rutgers, The State University
New Brunswick, New Jersey

Dr. Norbert P. Psuty
"Spatial-Temporal Sediment Sequences at the Margin of Barnegat Bay"
R/D-9807, $5000
Rutgers, The State University
New Brunswick, New Jersey

Dr. Sybil P. Seitzinger
"An Initiative to Gain a Regional Perspective on Coastal Eutrophication through a Collaboration of Sea Grant - Funded Researchers"
R/D-9808, $5000
Rutgers, The State University
New Brunswick, New Jersey

Dr. Dirk Vanderklein
"Short-Term Variation in Productivity of Edaphic Algae"
R/D-9704, $4550
Montclair State University
Upper Montclair, New Jersey

Dr. Sam Wainright
"Quantitative Importance of Horseshoe Crab (*Limulus polyphemus*) Eggs and Salt Marsh Habitats to Migrating Shorebirds"
R/D-9701 $4827
Rutgers, The State University
New Brunswick, New Jersey

Dr. Douglas Wilson
"Data Gathering System to Aid Bluefish Management"
R/D-9703, $4977
Rutgers, The State University
New Brunswick, New Jersey

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New Jersey Sea Grant Directory

The following directory includes NJ Sea Grant staff, researchers, and useful e-mail addresses related to current projects. For information regarding a specific project or activity, please contact the people or departments listed on the following pages.

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New Jersey

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Sea Grant on the World Wide Web

The National Sea Grant College Program has developed a significant Internet presence with thousands of pages of information. The following web site addresses link to useful resources.

The National Sea Grant Media Resource Center

http://www.mdsg.umd.edu/seagrantmediacenter/

This site serves as the "front door" to all Sea Grant College Program Network sites, and includes news, guides, maps, addresses, publications directories, calendars of events, a photo and illustration library, a direct link to *The National Sea Grant Depository* holding 72,000 Sea Grant publications, and links to hundreds of non-Sea Grant marine and ocean-related sites.

Northeast Region:

Regional web server:

http://wwseagrant.gso.uri.edu/region

Connecticut Sea Grant College Program

http://www.ucc.uconn.edu/~wwwsgo

Maine/New Hampshire Sea Grant College Program

http://www.seagrant.unh.edu/home.htm

MIT Sea Grant College Program

http://web.mit.edu/seagrant/www/

New York Sea Grant

http://flounder.seagrant.sunysb.edu

Rhode Island Sea Grant Program

http://seagrant.gso.uri.edu/riseagrant/

WHOI Sea Grant Program

hppt://www.whol.edu/seagrant/

Mid-Atlantic Region:

Regional web server:

http://www.mdsg.umd.edu

University of Delaware Sea Grant College Program

http://www.ocean.udel.edu/seagrant

Maryland Sea Grant College Program

http://www.mdsg.umd.edu/MDSG

New Jersey Sea Grant College Program

http://www.mdsg.umd.edu/NJSG.index.html

North Carolina Sea Grant College Program

http://www2.ncsu.edu/sea_grant/seagrant.html

Virginia Sea Grant Program

http://www.people.virginia.edu/~gmsc-web/

Southeast Region:

Regional web server for Southeast & Gulf of Mexico:

http://gnv.ifas.ufl.edu/~seaweb/homepage/seagul.htm

Florida Sea Grant College Program

http://flseagrant.org

Georgia Sea Grant College Program

http://www.marsci.uga.edu/gaseagrant.html

Puerto Rico Sea Grant College Program

http://gnv.ifas.ufl.edu/~seaweb/homepage/upr.htm

South Carolina Sea Grant Consortium

http://www.csc.noaa.gov/SCSeaGrant/

Gulf Region:

Regional web server for Southeast & Gulf of Mexico regions:

http://gnv.ifas.ufl.edu/~seaweb/homepage/seagul.htm

Louisiana Sea Grant

htttp://www.lsu.edu/guests/wwwosgd

Mississippi/Alabama Sea Grant Consortium

http://www.waidsoft.com/seagrant

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Gulf region, con't.

Texas Sea Grant

hppt://texas-sea-grant.tamu.edu

Great Lakes Region:

Regional web server:

http://h2o.seagrant.wisc.edu/greatlakes/glnetwork/glnetwork.html

Illinois/Indiana Sea Grant College Program

http://www.ansc.purdue.edu/il-in-sg/

Michnigan Sea Grant College Program

http://www engin.umich.edu/seagrant

Minnesota Sea Grant

http://www.d.umn.edu/seagr/

Ohio Sea Grant College Program

http://www sg.ohio-state.edu/

Wisconsin Sea Grant College Program

http://www.seagrant.wisc.edu

Pacific Region:

Alaska Sea Grant College Program

http://www.uaf.alaska.edu/seagrant/

California Sea Grant College System

http://www-csgc.ucsd.edu/

University of Southern California Sea Grant

http://www.usc.edu/dept/seagrant.htm

Hawaii Sea Grant

http://www.soest.hawaii.edu/SEAGRANT/

Oregon Sea Grant

http://seagrant.orst.edu

Washington Sea Grant Program

http://www.wsg.washington.edu

Other Sea Grant Internet Resources

Sea Grant's Coastal Recreation and Tourisism Site, Marina Net

http://wwwseagrant.orst.edu/crt/

Florida Bay Research Program

Southwest Florida Anchorage Management

http://gnv.ifas.ufl.edu/~seaweb/homepage/anchor.htm

AquaNIC (Aquaculture Network Information Center)

http://ag.ansc.purdue.edu/aquanic/

SGNIS (Sea Grant Nonindigenous Species)

http://www.ansc.purdue.edu/sgnis/

Pfiesteria Information Site

http://www.mdsg.umd.edu/fish-health/pfiesteria

National Sea Grant Network Directory Page

http://www.seagrant.wisc.edu/National/national.html

National Sea Grant Depository

http://nsgd.gso.uri.edu/

NOAA/National Sea Grant Office

http://www.mdsg.umd.edu/NSGO/index.html

Coastwatch

http://www.coastwatch.msu.edu

El Nino Workshop Online for Educators

http://www.tmn.com/exploration/elnino/

Marine Education Bibliography

http://texas-sea-grant.tamu.edu/MarineEd.html

Fisheries Statistics

http://remora.ssp.nmfs.gov/

The National Marine Fisheries Service (NMFS) and NOAA website offer statistics, trade data bases, and commercial landing data.

National Fisheries Institute

http://www.nfi.org

Seafood industry news, statistics, trends, recipes, promotions, and links to other seafood resources on the Internet.

National Sea Grant Depository (Pell Marine Science Library, University of Rhode Island)

http//nsgd.gsouri.edu

Archive of all Sea Grant publications nationwide, including a simple, searchable database.

National Sea Grant Office Home Page

http://www.ndsg.umd.edu/nsgo/index.html

Staff directory, research, and funding information.

New Jersey Marine Trades Association

http://www.ameri-com.com/mtanj/default.html

Membership directory, business and trade show listings, recreational boating links.

New Jersey State Legislature

http://www.njleg.state.nj.us

Legislative roster, Bill text, legislative calendar.

Ocean and Coastal Resources

http://seagrant.orst.edu.otherwww.html/

Includes links to dozens of Internet resources related to ocean and coastal issues. One of the most informative, interesting pages to date.

Wetlands, Oceans, and Watersheds

http://www.epa.gov/OWOW

EPA newsletters, fact sheets, brochures, press releases, regulations, order EPA publications, Congressional testimony, water quality data.

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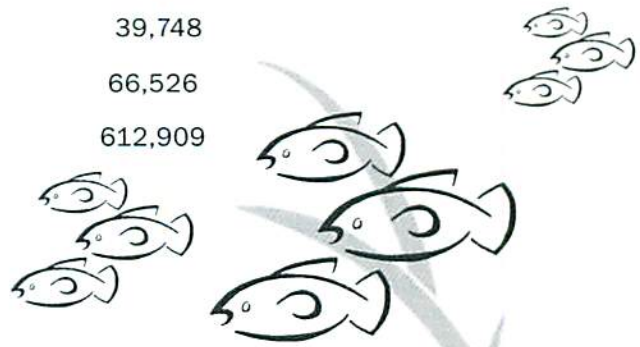
Program Year 1997-1998

Project	Sea Grant Funds	Matching Funds
Ecosystems Research	109,700	86,439
Fisheries and Aquaculture	140,064	83,953
Marine Biotechnology	92,913	56,411
Coastal Management	46,488	47,309
Education	39,987	20,592
Management and Development	257,853	211,931
Communications	72,720	39,748
Sea Grant Extension	125,000	66,526
TOTAL	884,725	612,909



Program Year 1998-2000

Project	Sea Grant Funds	Matching Funds
Ecosystems Research	389,269	239,941
Environmental Models	178,713	208,568
Fisheries and Aquaculture	183,939	110,037
Marine Biotechnology	191,719	88,627
Biotechnology	123,310	93,613
Education	78,212	67,620
Management and Development	558,363	435,860
Communications	186,588	79,745
Sea Grant Extension	250,000	133,052
TOTAL	2,139,933	1,457,063

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New Jersey

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Sea Grant is a unique partnership with public and private sectors combining research, education, and technology transfer for public service. This national network of universities meets changing environmental and economic needs of people in our coastal, ocean, and Great Lake regions.

If you would like more information about New Jersey Sea Grant's activities and publications, please contact

NJ Sea Grant Communications

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