

**2000 ANNUAL REPORT AND
STATEMENT OF PROGRAM DIRECTION
RUTGERS/NOAA
COOPERATIVE MARINE EDUCATION AND RESEARCH PROGRAM**



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EXECUTIVE SUMMARY

The Rutgers/NOAA Cooperative Marine Education and Research (CMER) Program is now completing its eighth year. Established in 1993 under a Cooperative Agreement between Rutgers, The State University of New Jersey, and the National Oceanic and Atmospheric Administration (NOAA), the CMER Program combines university and agency expertise to address marine issues affecting the state, region, and nation. Base funds for the Rutgers/NOAA CMER Program are provided by NOAA through the National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center (NEFSC). As of December 2000, cooperative projects funded with base funds through the Rutgers/NOAA CMER Program totaled \$883,000 and supported twenty-two cooperative projects (Table 1). Fourteen faculty from four University departments, seventeen students from six graduate programs, five post-doctoral fellows, and numerous undergraduate students have participated in the first eight years of base funded projects. Numerous NOAA scientists serve as co-principal investigators or advisors on these projects. Additional funds are contributed to the Rutgers/NOAA CMER Program from a variety of sources within and outside the NEFSC to support specific research projects. During the first eight years, the Rutgers/NOAA CMER program received approximately \$4.3million in external funds to support twenty-three projects (Table 1). Base funds available to the CMER Program in 2000 were used to fund three continuing projects and one new project.

The program direction for base and external funded projects during 2000 included: surfclam larval settlement and recruitment; life history of goosefish; role of turbidity in defining fish habitat in shallow estuaries; support of fisheries research experiences for undergraduates; bottom habitat and mapping of the New York Bight using GIS; Bluefish/striped bass ecology and interactions; studies of the effects of multiple stressors and ecological complexity in coastal ecosystems; and field, laboratory, and modeling programs examining eutrophication in coastal ecosystems.

INTRODUCTION

The Rutgers/NOAA Cooperative Marine Education and Research (CMER) Program was established in early 1993 under the aegis of a cooperative agreement between Rutgers the State University of New Jersey and the National Oceanic and Atmospheric Administration (NOAA). The Rutgers Program joins cooperative programs established in 1989 at the University of Massachusetts and the University of Rhode Island. In 2000 a cooperative program was established in Virginia (Hampton University and Virginia Institute of Marine Sciences). All CMER Programs were built upon a long history of cooperation between NOAA and these institutions.

The Rutgers/NOAA CMER Program is intended to foster enhanced interactions between all elements of NOAA and the University; however, special emphasis is placed upon projects of mutual interest to the University and the Northeast Region (NER) of NOAA'S National Marine Fisheries Service (NMFS). The proximity of these institutions offers enhanced opportunities for: (a) joint research involving faculty, students and NOAA personnel; (b) training opportunities for both students and federal employees; and (c) shared use of specialized facilities and equipment. The CMER Program combines university and agency expertise to address marine issues affecting the state, region, and nation.

Graduate research and education are at the core of the Rutgers/NOAA CMER Program. Fourteen faculty from four University departments, seventeen students from six graduate programs, five post-doctoral fellows, and a number of undergraduate students participated in the first eight years of base funded projects.

The CMER program is a truly cooperative program with all parties contributing towards the objectives of the program. A coordinating committee, consisting of two University representatives and two NOAA representatives, determines program direction and funding priorities. A NOAA employee (Dr. Sybil Seitzinger) stationed on the Rutgers campus serves as Program Director. The Director has adjunct faculty status, conducts an active research program, and teaches and supervises graduate students. Dr. Seitzinger is a Visiting Professor at Rutgers and a member of the Graduate Oceanography Program faculty.

The Rutgers/NOAA CMER program has received continuous support from the NEFSC. The program has received a total of approximately \$5 million during the first eight years from NEFSC and external sources. Base funding provided by the NEFSC has ranged from \$67,000 to \$153,000 per year for a total of \$883,600 during the first eight years (Figure 1). In addition to base funds, the Rutgers/NOAA CMER program has received a total of \$4,291,700 in external funding from sources inside and outside the NEFSC. External funding has ranged from \$100,000 to \$955,438 per year (Figure 1). Projects supported by base and external funds encompass a variety of topics including habitat studies, socioeconomics, education and training, fishery products, biology and life history, and studies of pollutants and their effects. Studies of pollutant effects, biology and life history, and habitat account for over 75% of the projects (Figure 2) and funding (Figure 3) in the Rutgers/NOAA CMER program to date.

Figure 1. Base funds and external funds received by the Rutgers/NOAA CMER Program, 1993-2000

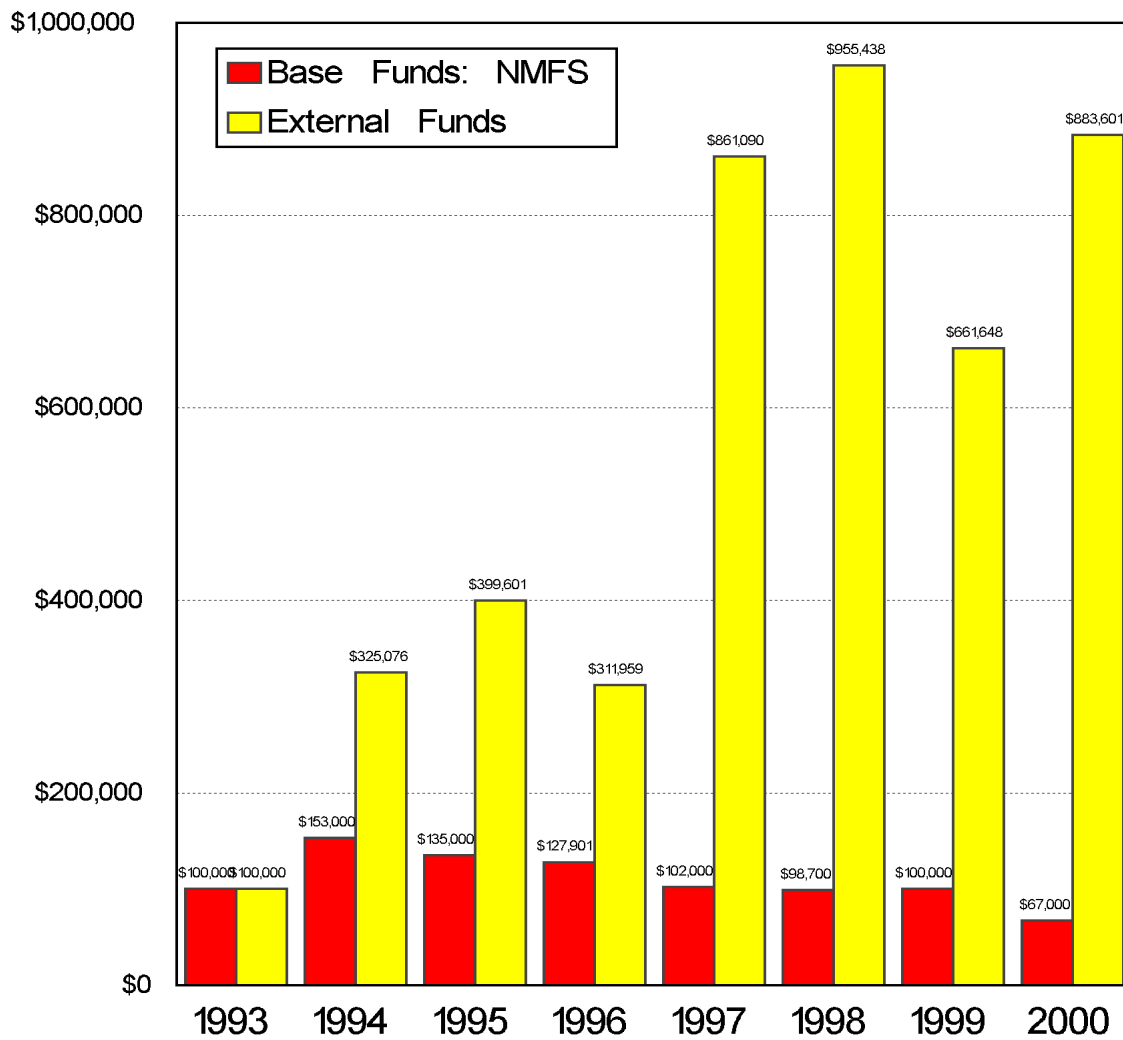


Figure 2. Number of projects in each topic addressed by the Rutgers/NOAA CMER Program, 1993-2000

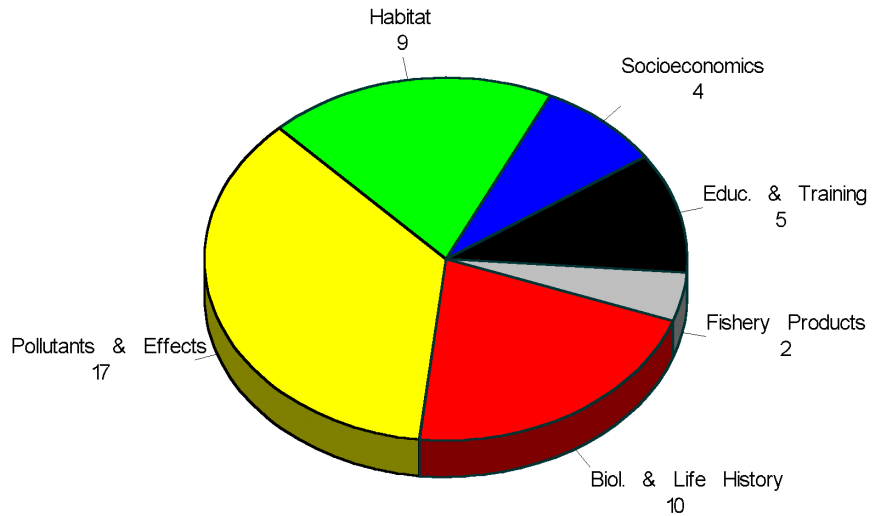
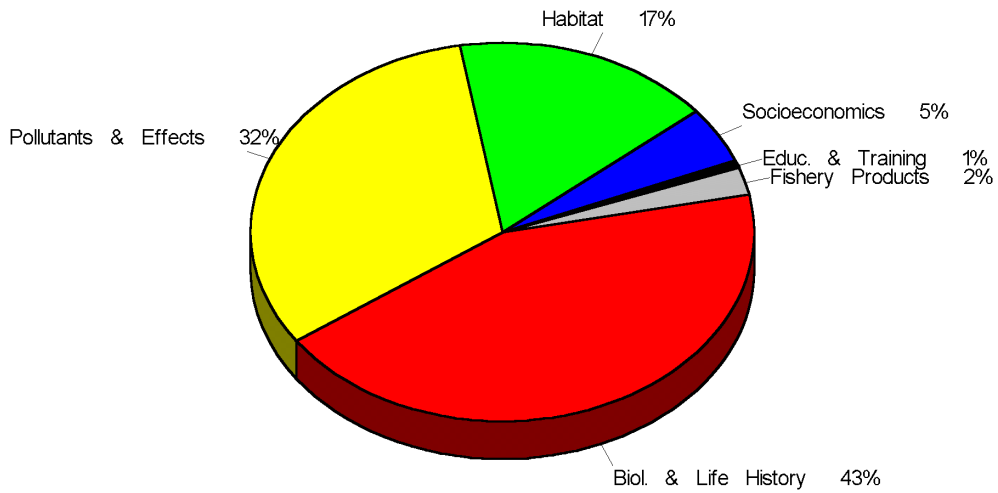


Figure 3. Relative expenditures for each topic addressed by the Rutgers/NOAA CMER Program, 1993-2000



BASE FUNDED PROJECTS IN 2000

Base funding for the CMER Program is provided by NOAA through the Northeast Fisheries Sciences Center. Continuing work under multi-year projects receives high priority for funding, given satisfactory performance in the preceding year. This policy helps to insure continuity of support to graduate students. A listing of students supported by the CMER Projects is provided in Table 2.

All projects involve a high degree of cooperation among University and NOAA personnel. Three of the four base funded projects in 2000 have NOAA employees as advisor or co-principal investigators (Table 1). A brief description of projects supported with 2000 base funds follows.

NEW PROJECTS SUPPORTED WITH 2000 BASE FUNDING

00-04 Essential fish habitat for young-of-the-year Goosefish (*Lophius americanus*) in the Middle Atlantic Bight (Kenneth W. Able, Rutgers Marine Field Station, Tuckerton, NJ and R. Christopher Chambers, NOAA/NMFS, James J. Howard Marine Sciences Laboratory, Highlands, NJ)

Goosefish ranks among the most valuable groundfish fisheries in the region and has the second highest value among all Atlantic finfish. However, there are considerable uncertainties in the status of the goosefish stock. This multi-year project is a collaboration between the fishing industry, Rutgers University scientists, and NMFS scientists to study the biology and habitat use of YOY goosefish in the Middle-Atlantic Bight. Larval size, size at settlement and distribution and abundance for YOY will be measured to determine critical components of their benthic habitat, and the role of predation (cannibalism).

CONTINUING PROJECTS SUPPORTED WITH 2000 BASE FUNDING

99-05 Effects of bottom roughness on surf clam (*Spisula solidissima*) larval settlement and recruitment (Judith P. Grassle and Shannon G. Newby, IMCS, Rutgers University)

This two-year project will examine factors affecting settlement of surf clam larvae. Laboratory studies will be conducted in the racetrack flume at Rutgers. After characterizing the flow fields over ripple beds and shell-hash in the flume, settlement patterns of surfclam larvae will be determined as a function of bottom roughness parameters. The results of these studies will then be compared to field measurements conducted at the LEO-15 site on the continental shelf off Tuckerton, NJ.

99-06 Fish movements in the dynamic ecoscape of a shallow flood dominated estuary (Robert J. Chant, Institute of Marine and Coastal Sciences, Rutgers University and Allan Stoner, The James J. Howard Laboratory, NMFS)

This two-year project will examine aspects of the changing temporal and spatial structure of essential fish habitat by studying the relationships between the dynamic physical environment and movements by fishes in the Navesink River estuary. Turbidity in the estuary exhibits strong temporal (and spatial) patterns due to tidal circulation. The high turbidity areas are hypothesized to serve as a refuge for juvenile winter flounder, bluefish, and blue crabs from their predators. The approach combines time series measurements (tidal time scales) of turbidity, particle size distribution, temperature, salinity, dissolved oxygen and fish distribution (biotelemetry).

99-10 CMER Research Experiences for Undergraduates (Michael P. DeLuca, Institute of Marine and Coastal Sciences - Rutgers Univ.)

This project will fund two summer undergraduate interns in 2001. The interns will be involved in research projects at one of the NEFSC laboratories.

PROJECTS BEING COMPLETED

99-08 Ontogenetic diet shifts of larval and juvenile flatfish: Validating the use of stable-isotope ratios to track changes in feeding behavior (Sam C. Wainright, Institute of Marine and Coastal Sciences, Rutgers University and Christopher Chambers, The James J. Howard Laboratory, NMFS)

This one year study will examine two critical periods in fish early life history: the transition from dependence on a maternal source of nutrition to exogenous sources of nutrition, and the transition from zooplanktivory to piscivory. Laboratory studies will be conducted at the Howard Lab. In the first set of studies, the isotopic signature (N and C) of winter flounder eggs will be determined, as will the isotopically signature of exogenous prey (rotifers). These will be followed throughout the winter flounder yolk-sac stage and through metamorphosis and settlement. Summer flounder studies will be used to examine the dietary transition that occurs later in the early-life history of fish, namely the shift from zooplanktivory to piscivory, again using isotopically distinct prey (zooplankton). The effect of temperature on the time transitions in both of these life-history stages will be examined.

PROJECTS SUPPORTED WITH 2000 EXTRAMURAL FUNDING

In addition to the base funds provided by the Northeast Fisheries Science Center, funds were contributed from a variety of sources within and outside the NEFSC to Rutgers University for the following projects (Table 1). These projects were approved for inclusion in the Rutgers/NOAA CMER Program by the Coordinating Committee.

99-Ex1 Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight (Michael DeLuca, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick,NJ)

Recently, Congress expressed concern with the decline in abundance of bluefish stocks along the Atlantic coast. This decline has been attributed to a variety of factors ranging from competition with other species to dwindling forage species and unusual migratory pathways. Rutgers University is administering a collaborative effort with NMFS scientists to address concerns with the status of bluefish stocks. This project is an extension of 97-Ex1.

99-Ex2 Bottom Habitat Classification and Mapping of the New York Bight (Richard G. Lathrop, Ecology, Evolution and Natural Resources - Rutgers University, New Brunswick, NJ)

The fishery resources of coastal marine habitats are among the most diverse and economically valuable along the East Coast. The diversity, quality, and extent of coastal marine habitats are important determinants of distribution, abundance and diversity of fishery resources. This project will develop and test strategies for remotely mapping the benthic habitats of commercial fish species and investigate the influence of sea floor geology and sea floor disturbance on the distribution, abundance and diversity of fishery resources. Recent high resolution geologic mapping of the sea floor of the New York Bight region provides a new, detailed regional framework for defining sea floor habitats.

98-Ex4 Composition and Bioavailability of Dissolved Organic Nitrogen in Atmospheric Deposition (S. Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ and Monica Mazurek, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

Humans have dramatically altered the Earth's nitrogen (N) cycle by doubling the natural rate of N-fixation and causing atmospheric N deposition rates to increase by three to more than ten fold compared to pre-industrial times. Atmospheric deposition is a major source of nitrogen to many ecosystems: up to 70% of the N inputs to estuarine and coastal marine systems are attributed to atmospheric sources. Marked changes in both terrestrial and aquatic ecosystems are occurring as a result of increased nitrogen (N) deposition from anthropogenic sources. Currently, approximately 80% of the atmospherically deposited N is anthropogenic. To date, most studies of the magnitude, sources and effects of atmospherically deposited N have only considered inorganic N. However, a considerable portion (20 to 85%) of N in rainwater is in the form of organic-N, and almost nothing is known of the chemical composition, sources or ecosystem effects of the bulk of that organic-N. The objectives of this three-year study are to: 1) characterize the chemical composition of dissolved organic nitrogen (DON) in atmospheric deposition in a relatively perturbed site in the Northeastern U.S.; 2) determine how much of the total DON in rainwater is biologically available to coastal plankton communities; and 3) characterize the chemical composition of the DON compound classes that are bio-available and thus contributing to ecological changes in receiving ecosystems. Funding from NSF.

97-Ex4 Estuarine Eutrophication: Seasonal Cycle of the Contribution of Dissolved Organic Nitrogen from Non-Point and Point Sources (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; Monica A. Mazurek, Institute of Marine and Coastal Sciences - Rutgers University; Robert W. Sanders, Temple University, Department of Biology Philadelphia, PA)

This project is evaluating the seasonal differences in the contribution to estuarine eutrophication of dissolved organic nitrogen (DON) from non-point and point sources. DON is a major source of pollutant related N to coastal waters. However, the biological availability of DON in various non-point and point sources, and thus its contribution to eutrophication has received little attention. Traditionally, DON has been considered to be refractory. This project is a continuation of CMER 95-Ex1 in which summer studies of the biological availability of dissolved organic nitrogen in specific non-point and point sources of pollution to estuarine ecosystems were studied. In the current study, the seasonal differences in the bioavailability of DON from various pollutant sources are being examined. Sources included in the study are urban storm water runoff, agricultural runoff, as well as natural sources from forested watersheds. The results of these studies will be made available to state and regional managers for use in the development of nutrient reduction plans and eutrophication models. Funding by NOAA, New Jersey Sea Grant.

95-Ex3 The Importance of Understanding Ecological Complexity to Predicting Effects of Multiple Stressors on Coastal Systems (Denise Breitburg, Academy of Natural Sciences of Philadelphia, Benedict Estuarine Research Laboratory; Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; plus 15 other Principal Investigators from 7 Institutions)

In order to understand the cumulative effects of numerous stressors on coastal ecosystems, the complexity of such systems must be recognized and dealt with. In this six-year study complexity is addressed by studying an estuarine system at multiple levels of organization. The experimental approach includes: 1) a multilevel large-scale experimental study of the effects of stressors on ecological processes within the estuary, 2) an examination of the relationships between land-use patterns, geology and the watershed loadings of stressors, 3) modeling of the ecological effects of stressors from the individual through ecosystem level, including spatially explicit fisheries models, and 4) an economic evaluation of management practices. The principal classes of stressors that are being examined include inorganic toxics and high nutrient inputs. S. Seitzinger's portion of the project focuses on ecosystem level responses (benthic processes, whole system primary production, respiration and net ecosystem metabolism). Funding by NOAA Coastal Ocean Program.

00-Ex1 Model Development and Chemical Characterization of Bioavailable Nitrogen Loading to Coastal Ecosystems (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ and Monica Mazurek, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ)

The overall goal of the proposed research is to provide new tools for environmental managers to more accurately assess the consequences of various development and nutrient management scenarios on coastal eutrophication. Specific objectives of this project are to: 1) develop a model to predict bioavailable N inputs to estuaries that accounts for bioavailable dissolved organic-N (DON) and inorganic-N inputs as a function of land use, 2) apply the model to a number of estuarine watersheds in New Jersey and throughout the east coast of the US, 3) further develop new analytical methodologies for chemically characterizing DON in natural and pollutant sources, and 4) apply those analytical methods to begin to characterize the bioavailable and refractory components of the DON from the non-point and point sources. Funding by NJ Sea Grant.

CMER-SPONSORED PRESENTATIONS (1993-2000):

- Able, K. and R. Rowe. 1999. Essential Fish Habitat for Bluefish (*Pomatomus saltatrix*): Comparison of the Role of Ocean Beaches and Estuarine Habitats. IMCS/NMFS Bluefish Project Symposium, Mystic, CT, November. (CMER Project #97-Ex1)
- Barbeau, S., R.C. Chambers, D. Witting, and K.W. Able. 1998. Effect of relative body size and temperature-dependent growth of juvenile summer flounder on the window of vulnerability to predation by sevenspine bay shrimp. Flatfish Biology Conference, Mystic, CT. Paper. (CMER Project #97-04)
- Barbeau, S., R.C. Chambers, D. Witting, and K.W. Able. 1999. Size-specific predation on juvenile summer flounder, *Paralichthys dentatus*, and the duration of the window of vulnerability. American Fisheries Society - Larval Fish Conference, Beaufort, NC. Paper. (CMER Project #97-04)
- Barbeau, S., R.C. Chambers, D. Witting, and K.W. Able. 1999. Effect of size-dependent predation and temperature-dependent growth on juvenile summer flounder vulnerability to benthic invertebrate predation. CMER Symposium, Falmouth MA. Paper. (CMER Project #97-04)
- Bell, J.L. 1995. Molecular approaches to larval bivalve identification. 1995 Benthic Ecology Meeting, New Brunswick, NJ. Poster. (CMER Project #93-05)
- Bell, J.L. 1995. Probe development for identification of larval bivalves. Molecular Approaches to Marine Ecology and Evolution, Keystone Symposium, Santa Fe, NM (organized by H.R. Lasker, M.A. Coffroth and E. Bermingham). Poster. (CMER Project #93-05)

- Bell, J.L. 1996. Identification of larvae of the surfclam, *Spisula solidissima* from plankton samples. Sixth Science Symposium of the Northeast Fisheries Science Center, National Marine Fisheries Service, NOAA, Falmouth, MA. (CMER Project #93-05)
- Bell, J.L. 1996. Species-specific identification of larval bivalves using an 18S rRNA probe and RFLP analysis. Ocean Sciences Meeting, AGU/ASLO, San Diego, CA. (CMER Project #93-05)
- Bevilacqua, R.A. 1998. Animal-sediment relationships in a mid-Atlantic estuarine system and spatial patterns of benthic community structure in the Navesink River, New Jersey. (CMER Project #98-05)
- Bosley, K.L. and S.C. Wainright. 1997. Turnover rate of nitrogen and carbon in juvenile winter flounder, *Pleuronectes americanus*, as determined by stable isotope ratios. 14th International Conference of the Estuarine Research Federation, Providence, RI. (CMER Project #96-05)
- Bosley, K.L., D.A. Witting, R.C. Chambers, and S.C. Wainright. 1998. Ontogenetic Diet Shifts of Larval and Juvenile Flatfish: Estimating Turnover Rates with Stable-Isotope Ratios. NOAA/NMFS Flatfish Biology Conference, Mystic, CT. (CMER Project #96-05)
- Bosley, K.L., D.A. Witting, R.C. Chambers, and S.C. Wainright. 1999. Ontogenetic Diet Shifts of Larval and Juvenile Fish: Estimating Turnover Rates with Stable Isotopes. 23rd Larval Fish Conference, Beaufort, NC. (CMER Project #96-05)
- Chant, R.J., M.C. Curran, K.W. Able, S.M. Glenn. 1996. Circulation in Little Egg Harbor and its role in larval winter flounder distributions: preliminary results. The Barnegat Bay Ecosystem Workshop. November 14, Toms River, NJ. (CMER Project #96-08)
- Chant, R.J. 1997. Circulation patterns in the Barnegat Bay/Little Egg Harbor/Great Bay estuarine system. Institute of Marine and Coastal Sciences weekly seminar series, June 9. (CMER Project #96-08)
- Chant, R.J. 1997. Low frequency circulation in a multiple inlet/bay system. The Gordon Conference, June 8-12, Colby-Sayer College. (CMER Project #96-08)
- Chant, R. J. 1998. Particle trapping in a stratified flood dominated estuary. Woods Hole Oceanographic Institution, August. (CMER Project #97-03)
- Chant, R.J. 1998. Particle trapping in a stratified flood dominated estuary. National Marine Fishery Service, Sandy Hook, NJ, September. (CMER Project #97-03)
- Chant, R.J. and A. Stoner. 1998. Particle trapping in a stratified flood dominated estuary. Mid-Atlantic Bight Physical Oceanography and Meteorological meeting (MABPOM), St. Michaels, MD, October. (CMER Project #97-03)

- Chant, R.J. 1998. Particle trapping in a stratified flood dominated estuary. IMCS, Rutgers University, New Brunswick, NJ, December. (CMER Project #97-03)
- Chant, R.J. 1999. Low frequency circulation in a multiple inlet/bay system. Estuarine Research Foundation meeting, September 25-30, New Orleans. (CMER Project #97-03)
- Chintala, M. and J.P. Grassle. 1995. Early gametogenesis and spawning in the surfclam, *Spisula solidissima*. National Shellfisheries Association Meeting, San Diego, CA. (CMER Project #93-05)
- Chintala, M. and J.P. Grassle. 1995. Recruitment frequency and growth of surfclams, *Spisula solidissima*, in New Jersey waters. Benthic Ecology Meeting, New Brunswick. (CMER Project #93-05)
- Cole, M. and R. Lathrop. 2001. Spatial relationships of environmental and sonar backscatter-derived variables to fish abundance in the New York Bight. International Association for Landscape Ecology, US Chapter, 16th Annual Meeting, Tempe, AZ. (CMER Project #99-Ex2)
- Conover, D.O., P. Gaffney, and S. Thorrold. 1999. Recruitment of Spring- and Summer-Spawmed Bluefish: Genetic Structure, Cohort Identification, and Relative Contribution to the Adult Stock. IMCS/NMFS Bluefish Project Symposium, Mystic, CT, November. (CMER Project #97-Ex1)
- Cook, M. and C. Chambers. 1998. Temperature effects on age, size, and condition at hatching in windowpane, *Scophthalmus aquosus*. (CMER Project #97-08)
- Cooper, K.R. and R.P. Brown. 1995. Toxic effects of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin (2, 3, 7, 8-TCDD) and related compounds (PCDD/PCDF) on aquatic invertebrate species and specific studies on the soft-shell clam, (*Mya arenaria*). DIOXIN '95 Edmonton, Canada. (CMER Project #93-08)
- Cullen, J.T. and R.M. Sherrell. 1997. Marine biogeochemical cycling of zinc: Importance of the Continental Shelf. Gordon Conference in Chemical Oceanography, Meriden, NH, August. (CMER Project #95-05)
- Curran, M.C., R.J. Chant, K.W. Able, and S.M. Glenn. 1997. The role of estuarine circulation patterns in regulating the settlement of juvenile winter flounder (*Pseudopleuronectes americanus*) in coves near inlets. Benthic Ecology Meeting, April 3-6, Portland, ME. (CMER Project #96-08)
- Curran, M.C., R.J. Chant, K.W. Able, and S.M. Glenn. 1997. The role of estuarine circulation patterns in regulating the settlement of juvenile winter flounder (*Pseudopleuronectes americanus*) in coves near inlets. American Society of Ichthyologists and Herpetologists, June, Seattle, WA. (CMER Project #96-08)

- Curran, M.C., R. J. Chant, K.W. Able, and S.M. Glenn. 1997. The role of estuarine circulation patterns in regulating the settlement of juvenile winter flounder (*Pseudopleuronectes americanus*) in coves near inlets. International Council for the Exploration of the Sea, September 22-24, ME. (CMER Project #96-08)
- Curran, C., R. Chant, S. Glenn, and K. Able. 1998. Evidence of tidal period migration for Winter Flounder (*Pseudopleuronectes americanus*) in a southern New Jersey estuary. Flatfish Biology Workshop, Mystic, CT, December. (CMER Project #97-03)
- Curran, C., R. Chant, S. Glenn, and K. Able. 1998. Vertical migration of winter flounder larvae as a mechanism for tidal retention in a New Jersey estuary. American Fisheries Society Larval Fish Conference. (CMER Project #97-03)
- Curran, C., R. Chant, S. Glenn, and K. Able. 1998. Tidal retention of winter flounder larvae in the vicinity of an inlet: evidence of vertical migration. Benthic Ecology Meeting. (CMER Project #97-03)
- Field, M.P., R.M. Sherrell, J.T. Cullen, and F. Lindsay. 1999. Determination of trace metals in suspended marine particles using sector field inductively coupled plasma mass spectrometry. European Winter Plasma Conference, Pau, France, January. (CMER Project #95-05)
- Gregg, C.S., R.J. Chant, and J.P. Grassle. 1999. Modeling and observational studies of the transport of larval bivalves through a tidal inlet. Benthic Ecology Meeting, Baton Rouge, LA, March. (CMER Project #97-07)
- Gregg, C.S., R. J. Chant, and J.P. Grassle. 1999. Effects of asymmetrical tides on transport of larval bivalves through a tidal inlet. Estuarine Research Foundation meeting, New Orleans, September 25-30. (CMER Project #97-07)
- Houde, E. and D. Secor. 1999. Comparison of Habitat Use by Juvenile Bluefish Between Chesapeake Sub-Estuaries and Maryland's Coastal Bays. IMCS/NMFS Bluefish Project Symposium, Mystic, CT, November. (CMER Project #97-Ex1)
- Juanes, F., J. Buckel, F. Scharf, J. Cowan, Jr., and K. Rose. 1999. Impact of Prey Abundance and Size Structure on Growth of Spring- and Summer-Spawned Juvenile Bluefish in the Hudson River Estuary: An Individual-Based Modeling Approach. IMCS/NMFS Bluefish Project Symposium, Mystic, CT, November. (CMER Project #97-Ex1)
- Lathrop, R.G. and N. Senyk. 2000. Applying landscape concepts to the seafloor: The New York Bight seafloor habitat mapping project. Proceedings 15th Annual Meeting of the U.S. Regional Association of the International Association of Landscape Ecology, Ft. Lauderdale, FL, April, (CMER Project #99-Ex2)

- Liu, H. and K.R. Cooper. 1995. DNA adduct formation of 7, 12-Dimethylbenz (a) anthracene in the embryo of the Japanese medaka (*Oryzias latipes*). Second SETAC World Congress, Vancouver, British Columbia. (CMER Project #93-08)
- Longo, S. 1995. Society of Toxicology, Baltimore, MD. (CMER Project #93-08)
- Neuman, M.J. and K.W. Able. 1994. Spatial and temporal patterns of abundance of larval and juvenile windowpane flounder, (*Scophthalmus aquosus*), in an estuarine/inner continental shelf system. NOAA/NMFS Flatfish Biology Workshop in Mystic, CT. (CMER Project #93-01)
- Neuman, M.J. and K.W. Able. 1996. Overwintering mortality in temperate young-of-the-year fishes. 76th Annual Meeting of the American Society of Ichthyologists and Herpetologists in New Orleans, Louisiana. (CMER Project #93-01)
- Neuman, M.J. and K.W. Able. 1996. Patterns of habitat use by early life history stages of windowpane flounder (*Scophthalmus aquosus*). 76th Annual Meeting of the American Society of Ichthyologists and Herpetologists in New Orleans, Louisiana. (CMER Project #93-01)
- Neuman, M.J. and K.W. Able. 1996. Patterns of habitat use by early life history stages of windowpane flounder (*Scophthalmus aquosus*). Third International Symposium on Flatfish Ecology at the Netherlands Institute for Sea Research (NIOZ), Texel, The Netherlands. Awarded best student oral presentation at the Symposium. (CMER Project #93-01)
- Neuman, M.J. and K.W. Able. 1996. Diel and tidal patterns of distribution of young-of-the-year windowpane, *Scophthalmus aquosus*. NOAA/NMFS Flatfish Biology Workshop, Mystic, Connecticut. (CMER Project #93-01)
- Oliveri, C. 1994. DNF-Adduct studies in *Fundulus heteroclitus* from New Jersey coastal waters. Society of Environmental Toxicologists and Chemists, Denver, CO. (CMER Project #93-08)
- Oliveri, C. 1995. Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin to embryos of the fathead minnow (*Pimephales promelas*). JGPT Student Symposium, Rutgers University. (CMER Project #93-08)
- Oliveri, C. and K.R. Cooper. 1995. Comparative toxicity in developmental stages of fish from 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin. DIOXIN '95. Edmonton, Canada. (CMER Project #93-08)
- Oliveri, C. and K.R. Cooper. 1995. Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin to embryos of the fathead minnow (*Pimephales promelas*). Second SETAC World Congress, Vancouver, British Columbia. (CMER Project #93-08)

- Olivieri, C. 1996. Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-p-Dioxin (TCDD) in embryos and larvae of the fathead minnow (*Pimephales promelas*). Department of Biochemistry and Microbiology Fermentation Seminar Series, Rutgers University. (CMER Project #93-08)
- Price, M.K., P.J. Parks, and J.E. Kirkley. 1998. Sustaining the Atlantic Sea Scallop Fishery: An Economic Analysis of Days-At-Sea. Northeastern Agricultural and Resource Economics Association Annual Meeting, Cornell University, Ithaca, NY. (CMER Project #97-06)
- Price, M.K., P.J. Parks, and J.E. Kirkley. 1998. Sustaining the Atlantic Sea Scallop Fishery: An Economic Analysis of Consolidating Days-At-Sea. Dept. of Agriculture, Food, and Resource Economics, Cook College, September. (CMER Project #97-06)
- Price, M.K., P.J. Parks, and J.E. Kirkley. 1998. Sustaining the Atlantic Sea Scallop Fishery. Woods Hole Institution, December. (CMER Project #97-06)
- Price, M.K., P.J. Parks, and J.E. Kirkley. 1999. Sustaining the Atlantic Sea Scallop Fishery: Viability in a Restricted Industry. American Agricultural Economics Association Annual Meeting, Nashville, TN. (CMER Project #97-06)
- Price, M., P.J. Parks, and J.E. Kirkley. 1999. Sustaining the Atlantic Sea Scallop Fishery: An Economic Analysis of Consolidating Days-At-Sea. Selected paper presented at European Agricultural and Resource Economics Association 1999 Annual Meeting, June, Oslo. (CMER Project #98-04)
- Price, M. and P.J. Parks. 2000. Sustaining the Atlantic Sea Scallop Fishery: Consolidation in a restricted industry. Selected paper presented at American Agricultural Economics Association 2000 Annual Meeting, July, Tampa, FL. (CMER Project #98-04)
- Richards, A., M. Terceiro, and M. Fogarty. 1999. Empirical Modeling of Bluefish Population Fluctuations: Interactions Among Bluefish, Striped Bass and Forage Species. IMCS/NMFS Bluefish Project Symposium, Mystic, CT, November. (CMER Project #97-Ex1)
- Schnitz, A.R. and G.L. Taghon. 1996. Transfer of Benzo(A)pyrene from two invertebrate prey species to the winter flounder, *Pleuronectes americanus*. Poster presented at a meeting of the Society of Environmental Toxicology and Chemistry in Washington, DC. (CMER Project #94-03)
- Schnitz, A.R. and G.L. Taghon. 1997. Vehicle-specific transfer of PAH metabolites from two representative prey species to the winter flounder, *Pleuronectes americanus*. 18th Annual Meeting of the Society of Environmental Toxicology and Chemistry in Washington, DC. (CMER Project #94-03)
- Senyk, N. 2000. Mapping bottom type as part of the New York Bight apex habitat mapping project. New Jersey Academy of Science Annual Meeting, April. (CMER Project #99-Ex2)

- Sherrell, R.M., P. Field, G. Hall, F. Smith, and D. Wiederin. 1996. Direct aspiration of chelating micro-bead suspensions: Evaluation of ICP-MS performance. 1996 Winter Conference on Plasma Spectrochemistry, Ft. Lauderdale, FL, January. (CMER Project #95-05)
- Sherrell, R.M. and M.P. Field. 1997. Spatial/temporal variability of Cu, Ni, Mn, Ba and Pb on the inner shelf off southern New Jersey. Gordon Conference in Chemical Oceanography, Meriden, NH, August. (CMER Project #95-05)
- Sherrell, R.M. 1997. Trace metal dynamics off Southern New Jersey: Seasonal variations and evidence of pollutant, input. Department of Environmental Sciences, Rutgers University, New Brunswick, NJ, November 7. (CMER Project #95-05)
- Sherrell, R.M. 1998. Trace metals and phytoplankton: A bicoastal view. SUNY, Stony Brook, March 12. (CMER Project #95-05)
- Stoner, A.W. 1998. A multidisciplinary approach to fishery biology. South Florida Water Management District, West Palm Beach, FL, May. (CMER Project #99-06)
- Stoner, A.W. 1998. Using habitat maps in managing natural resources. The Conservancy of Southwest Florida, Naples, FL, November. (CMER Project #99-06)
- Stoner, A.W. 1999. What is critical habitat? A multidisciplinary approach with vertebrate and invertebrate species. Invited seminar: Alaska Fisheries Science Center, NMFS, Seattle, WA, May. (CMER Project #99-06)
- Stoner, A.W., J.P. Manderson, B.A. Phelan, R.J. Chant, L.L. Stehlik, and A.J. Bejda. 1999. Considering the ecosystem context of winter flounder nurseries. Flat Fish Symposium, Texel, The Netherlands, October. (CMER Project #99-06)
- Weissberger, E.J. and Judith P. Grassle. 1996. Predator/Prey relationships at the LEO-15 site: the effects on surfclam recruitment. Sixth Science Symposium of the Northeast Fisheries Science Center, National Marine Fisheries Service, NOAA, Falmouth, MA. (CMER Project #93-05)
- Weissberger, E.J. 1998. Effects of timing and magnitude of settlement on recruitment of surfclams: Insights from a model. Benthic Ecology Meeting, March 12-15, Melbourne, FL. (CMER Project #93-05)
- Weissberger, E.J. 2000. The effects of predation on the recruitment of the surfclam *Spisula solidissima*. Rider University Marine Science Colloquium, October 2, Lawrenceville, NJ. (CMER Project #93-05)

Witting, D.A., K.L. Bosley, R.C. Chambers, and S. Wainright. 2000. Experimental evaluation of ontogenetic diet transitions in summer flounder, *Paralichthys dentatus*, using stable isotopes as diet tracers. Flatfish Biology Conference, December 5-6, Mystic, CT. (CMER Project #99-08)

Zhang, H.-Z. and T.-C. Lee. 1995. A novel method for the determination of hexanal by NIR reflectance spectroscopy. 53rd Annual Meeting of the Institute of Food Technologists, California. (CMER Project #93-06)

Zhang, H.-Z. and T.-C. Lee. 1995. A fast and simple NIR method to determine free fatty acid and its application for seafood quality assessment. International 9th World Congress of Food Science and Technology. Budapest, Hungary. (CMER Project #93-06)

Zhang, H.-Z. and T.-C. Lee. 1995. A fast and simple NIR method to determine FFA as chemical marker for quality assessment of fish and other edible oil. Chemical Markers for the Quality of Processed and Stored Food, Chicago. (CMER Project #93-06)

CMER-SPONSORED PUBLICATIONS (1993-2000):

Bell, J.L. and J.P. Grassle. 1997. Preparation of DNA from numerous individual microscopic organisms for PCR-based assays of environmental samples. *BioTechniques* 23: 584-588.

Bell, J.L. and J.P. Grassle. 1998. A DNA probe for identification of larvae of the commercial surfclam (*Spisula solidissima*). *Mol. Mar. Biol. Biotech.* 7: 127-137.

Bosley, K.L., D.A. Witting, R.C. Chambers, and S.C. Wainright. In prep. Estimating the turnover rates of carbon and nitrogen in winter flounder using stable isotopes.

Bosley, K.L., D.A. Whitting, R.C. Chambers, and S.C. Wainright. Submitted. Tissue turnover of carbon and nitrogen in juvenile fish, estimated with stable isotope ratios. *Oecologia*.

Bosley, K.L. and S.C. Wainright. 1999. Effects of preservatives and acidification on the stable isotope ratios (^{15}N : ^{14}N , ^{13}C : ^{12}C) of two species of marine animals. *Can. J. Fish Aquat. Sci.* 56: 2181-2185.

Breitburg, D., J. Sanders, C.G. Gilmour, C.A. Hatfield, R.W. Osman, G.F. Riedel, S.P. Seitzinger, and K.G. Sellner. 1999. Variability in responses to nutrient and trace elements, and transmission of stressor effects through an estuarine food web. *Limnol. Oceanogr.* 44(3) part 2: 837-863.

Breitburg, D., S. Seitzinger, and J. Sanders. (Editors) 1999. Special symposium volume: Effects of Multiple Stressors in Freshwater and Marine Ecosystems. *Limnol. Oceanogr.* 44(3) part 2.

- Castro, M.S., C. Driscoll, T.E. Jordan, W. Reay, S. Seitzinger, R. Styles, W. Boynton, and J. Cable. 2000. Assessment of the contribution made by atmospheric nitrogen deposition to the total nitrogen load to thirty-four estuaries on the Atlantic and Gulf coasts of the United States. *In*: Valigura, R. (editor), *Atmospheric Nitrogen Deposition in Coastal Water Bodies: An Atmospheric Perspective*, Coastal and Estuarine Studies, volume 57, AGU Press.
- Chant, R., M.C. Curran, K. Able, S. Glenn. Submitted. Tidal retention of estuarine larvae in the vicinity of an inlet: Evidence for winter flounder (*Pseudopleuronectes americanus*). *Limnol. and Oceanogr.*
- Chant, R.J. In press. Tidal and subtidal motion in a multiple inlet/bay system. *Journal of Coastal Research*.
- Chant, R., M.C. Curran, K. Able, and S. Glenn. 2000. Delivery of winter flounder (*Pseudopleuronectes americanus*) larvae to settlement habitats in coves near tidal inlets. *Estuarine and Coastal Shelf Science* 51: 529-541.
- Chant, R.J. and A. Stoner. 2001. Particle trapping in a stratified flood-dominated estuary. *Journal of Marine Research* 59: 29-51.
- Chintala, M.M. and J.P. Grassle. 1995. Early gametogenesis and spawning in juvenile Atlantic surfclams, *Spisula solidissima* (Dillwyn, 1819). *Journal Shellfish Research* 14: 301-306.
- Cullen, J.T., T. Lane, F.M.M. Morel, and R.M. Sherrell. 1999. Modulation of cadmium uptake in phytoplankton by seawater CO₂ concentration. *Nature* 402: 165-167.
- Cullen, J.T. and R.M. Sherrell. 1999. Techniques for determination of trace metals in small samples of size-fractionated particulate matter: Phytoplankton metals off central California. *Mar. Chem.* 67: 233-247.
- Field, M.P., J.T. Cullen, and R.M. Sherrell. 1999. Direct determination of 10 trace metals in 50 : L samples of coastal seawater using desolvating micronebulization sector field ICP-MS. *J. Anal. At. Spectrom.* 14: 1425-1431.
- Kremer, J.N., W.M. Kemp, A. Giblin, I. Valiela, S. Seitzinger, E. Hoffman, and D. DiToro. 2000. Linking biogeochemical processes to higher trophic levels. Chapter 10. *In*: Hobbie, J.E. (editor), *Estuarine Science: A Synthetic Approach to Research and Practice*.
- Kroeze, C. and S.P. Seitzinger. 1998. Nitrogen inputs to rivers, estuaries and continental shelves and related nitrous oxide emissions in 1990 and 2050: a global model. *Nutrient Cycling in Agroecosystems* 52: 195-212.
- Kroeze, C. and S.P. Seitzinger. 1998. The impact of land use on N₂O emissions from watershed draining into the Northeastern Atlantic and European Seas. *Environmental Pollution* 102(S1): 149-158.

- Lathrop, R.G., R. Styles, and S. Seitzinger. Submitted. Use of GIS mapping and modeling approaches to examine the spatial distribution of seagrasses in Barnegat Bay, New Jersey. *Estuaries*.
- Laursen, A.E. and S.P. Seitzinger. Submitted. The role of denitrification in nitrogen removal and carbon mineralization in Mid-Atlantic Bight sediments. *Limnology and Oceanography*.
- Laursen, A.E., S.P. Seitzinger, R. Dekorsey, J.G. Sanders, D.L. Breitburg, and R.W. Osman. Submitted. Multiple stressors in an estuarine system: effects of nutrients, trace metals, and trophic complexity on benthic photosynthesis and respiration. *Estuaries*.
- Morse, W.W. and K.W. Able. 1995. Distribution, abundance and growth of windowpane, *Scophthalmus aquosus*, in the western North Atlantic. *Fishery Bulletin* **93**: 675-693.
- Moser, F.C., S.P. Seitzinger, R.J. Murnane, and R.G. Lathrop. In revision. Local and regional nitrogen sources to a shallow coastal lagoon, Barnegat Bay, New Jersey. *Mar. Ecol. Prog. Ser.*
- Paerl, H.W., W.R. Boynton, R.L. Dennis, C.T. Driscoll, H.S. Greening, J.N. Kremer, N.N. Rabalais, and S.P. Seitzinger. 2000. Atmospheric deposition of nitrogen in coastal waters: biogeochemical and ecological implications. *In*: Valigura, R. (editor), *Nitrogen Loading in Coastal Waters Bodies: An Atmospheric Perspective*, Coastal and Estuarine Studies, volume 57, AGU Press.
- Price, M.K., P.J. Parks, and J.E. Kirkley. Sustaining the Atlantic Sea Scallop Fishery: Viability in a Restricted Industry. Submitted to *American Journal of Agricultural Economics*.
- Seitzinger, S.P. 2000. Scaling up: Site specific measurements to global scale estimates of denitrification. Chapter 12: *In*: Hobbie, J.E. (editor), *Estuarine Science: A Synthetic Approach to Research and Practice*. Island Press.
- Seitzinger, S.P., J.P. Malingreau, N.H. Batjes, A.F. Bouwman, J.P. Burrows, J.E. Estes, D. Fowler, M. Frankignoulle, and R.L. Lapitan. 1999. How can we best define functional types and integrate state variables and properties in time and space? *In*: A.F. Bouwman (editor), *Scaling of Trace Gas Fluxes between Terrestrial and Aquatic Ecosystems and the Atmosphere*. Elsevier Science B.V.
- Seitzinger, S.P. and R.W. Sanders. 1999. Atmospheric inputs of dissolved organic nitrogen stimulate estuarine bacteria and phytoplankton. *Limnol. Oceanogr.* **44**: 721-730.
- Seitzinger, S.P. 1998. An analysis of processes controlling N:P ratios in coastal marine ecosystems. *In*: *Effects of Nitrogen in the Aquatic Environment*, KVA Report 1998:1, Kungl. Vetenskapsakademien (Royal Swedish Academy of Sciences), Stockholm, pp. 65-83.

- Seitzinger, S.P. and C. Kroeze. 1998. Global distribution of nitrous oxide production and N inputs in freshwater and coastal marine ecosystems. *Global Biogeochem. Cycles* 12(1): 93-113.
- Seitzinger, S.P. and R.W. Sanders. 1997. Biologically reactive dissolved organic nitrogen inputs from rivers to estuaries. *Mar. Ecol. Prog. Ser.* 159: 1-12.
- Seitzinger, S.P. and A.E. Giblin. 1996. Estimating denitrification in North Atlantic continental shelf sediments. *Biogeochem.* 35: 235-259.
- Seitzinger, S.P., C. Kroeze, and R.V. Styles. 2001. Global distribution of N₂O emissions from aquatic systems: Natural emissions and anthropogenic effects. *Chemosphere: Global Change Science* 2: 267-279.
- Seitzinger, S.P., R.V. Styles, and I.E. Pilling. Accepted. Benthic microalgal and phytoplankton production in coastal lagoons: Microcosm experiments and data synthesis. *Journal of Coastal Research (Special Symposium Volume on the Barnegat Bay - Little Egg Harbor Estuary)*.
- Watts, S. and S. Seitzinger. 2000. Denitrification rates in organic and mineral soils from riparian sites: a comparison of N₂ flux and acetylene inhibition methods. *Soil Biology and Biochemistry* 32: 1383- .
- Weissberger, E.J. In Press. Additive interactions between the moon snail *Euspira heros* and the sea star *Asterias forbesi*, two predators of the surfclam *Spisula solidissima*. *Oecologia*.
- Wiegner, T.N. and S.P. Seitzinger. 2001. Photochemical and microbial degradation of external dissolved organic matter inputs to rivers. *Aquatic Microbial Ecology* 24(1): 27-40.
- Zhang, H.-Z. and T.-C. Lee. 1997. GC/MS analysis of volatile flavor compounds in Mackerel for assessment of fish quality. *American Chemical Society Symposium Book Series "Flavor and Liquid Chemistry of Seafood"*, pp. 55-63, American Chemical Society, Washington, DC.
- Zhang, H.-Z., J. Krzynowek, and T.-C. Lee. 1997. A rapid and nondestructive near-infrared spectroscopic method for the determination of free fatty acid and its application for seafood quality assessment. *Journal of Agricultural Food Chemistry* 45: 3515-3521.
- Zhang, H.-Z., J. Krzynowek, and T.-C. Lee. 1999. A novel silica gel adsorption/near-infrared spectroscopic method for the determination of hexanal as an example of volatile compounds. *Journal of Agric. & Food Chemistry* 45: 3083-3087.
- Zhang, H.-Z., W. Zeng, and T.-C. Lee. 2000. Simultaneous determination of moisture, protein and fat in fish meal using near-infrared spectroscopy. *Journal of Food Science and Technology Research* 6(1): 19-23.

CMER-SPONSORED THESES & DISSERTATIONS (1993-2000):

- Bosley, K.L. 1997. Tissue turnover of carbon and nitrogen in juvenile winter flounder, estimated with stable-isotope ratios, and the effects of preservatives and acidification on the stable-isotope ratios of marine animals. Environmental Science M.S. Thesis. (CMER Project #96-05)
- Chen, C.M. 1994. Evaluation of 2,3,7,8-TCDD, 1,2,3,7,8-TCDD and 2,3,7,8-TCDF in Japanese Medaka (*Oryzias latipes*) using toxicity and enzyme induction as endpoints. Toxicology, Ph.D. Dissertation. (CMER Project #93-08)
- Chintala, M. 1997. Population biology of surfclams, *Spisula solidissima*, in inshore New Jersey waters: factors affecting recruitment success. Ecology and Evolution, M.S. Thesis. (CMER Project #93-05)
- Liu, H. 1995. DNA adduct formation of 7, 12-Dimethylbenz (a) anthracene in the embryo of the Japanese medaka (*Oryzias latipes*). Environmental Science, M.S Thesis. (CMER Project #93-08)
- Longo, S. 1995. Effects of methyl tert-butyl ether and naphthalene on the embryo of the Japanese medaka (*Oryzias Latipes*). Toxicology, M.S. Thesis. (CMER Project #93-08)
- Ma, H. 1997. Time series analyses of meroplankton in moored pump samples at LEO-15: The relationship between the abundance of surfclam larvae and nearshore upwelling events. Oceanography, M.S. Thesis. (CMER Project #93-05)
- Metzger, K.T. 1998. Trace-metal-phytoplankton interactions on the New Jersey inner shelf. George H. Cook Honors thesis (undergraduate) (CMER Project #95-05).
- Neuman, M. 1999. Early life history and ecology of windowpane, *Scophthalmus aquosus*, in the Middle Atlantic Bight: Ontogenetic transitions during the first year of life in a bimodal spawner. Ecology & Evolution, Ph.D. Dissertation (CMER Project # 93-01).
- Olivieri, C. 1996. Toxicity of 2-3-7-8 TCDD in embryos and larvae of the fathead minnow (*Pimephales promelas, rafinesque*). Environmental Sciences, Ph.D. Dissertation. (CMER Project #93-08)
- Price, M.K. 1998. Sustaining the Atlantic Sea Scallop Fishery: Viability in a Restricted Industry. Master's Thesis. (CMER Project #97-06)
- Probasco, P.G. 2000. Dissolved Nitrogen Gas, Ammonium and Nitrate Levels in Groundwater along the Millstone River. George H. Cook Honors Thesis. (CMER Project #96-Ex1)
- Schnitz, A. 1997. Transfer of benzo(a)pyrene from two invertebrate prey species to the winter flounder, *Pleuronectes americanus*. Environmental Sciences, Ph.D. Dissertation. (CMER Project #94-03)

Senyk, N. 2000. Mapping bottom type as part of the New York Bight apex sea floor mapping project. Cook College, Undergraduate Thesis, May 2001. (CMER Project #99-Ex2)

Watts, S.I. 1997. Denitrification, organic matter decomposition, and N mineralization in organic and mineral soils of two riparian ecosystems. Ph.D. Dissertation. (CMER Project #94-Ex3)

ADDITIONAL COOPERATIVE PARTICIPATION OF NOAA OR RUTGERS SCIENTISTS IN SEMINARS, WORKSHOPS AND MEETINGS, AND JOINT USE OF NOAA OR RUTGERS FACILITIES:

Dr. J.P. Grassle (Institute of Marine and Coastal Sciences) participated in the 19th Northeast Regional Stock Assessment Review Committee (SARC), held at the NEFSC in Woods Hole in September 1994.

Dr. T.-C. Lee (Department of Food Science) participated in the NOAA sponsored workshop on Future Emphasis for Research on Atlantic Mackerel held in December 1994.

Dr. L. Kerkhof (Institute of Marine and Coastal Sciences) presented a seminar entitled Developing a specific growth rate assay for a marine bacterium at the James J. Howard Laboratory in November 1994.

Dr. C. Curran (Institute of Marine and Coastal Sciences) presented a seminar entitled Daily Rhythms, Hibernation and Starvation in the Cunner, *Tautoglabrus adspersus*, at the James J. Howard Laboratory 1995.

Dr. K. Keating (Cook College) presented a seminar entitled Natural Products of Phytoplankton: Allelochemicals, Antibiotics (Biotoxins), Probiotics, at the James J. Howard Laboratory, 1995.

Mr. Kim (Environmental Science) spent 4 months during 1995 working with NOAA researchers at the James J. Howard Laboratory learning extraction techniques for lobster tissues.

Dr. C. Reimers (Institute of Marine and Coastal Sciences) used Howard Laboratory facilities to process samples during and after NOAA/NURP funded cruises in the New York Bight apex during the summer of 1995. Howard Laboratory scientists, Andrew Draxler and co-workers, participated in those cruises and made their laboratory space available for sample processing.

Dr. P. Rona (Institute of Marine and Coastal Sciences) presented a seminar entitled Drilling of a Sea Floor Hydrothermal Field, at the James J. Howard Laboratory, 1995.

Dr. K. Smith (Institute of Marine and Coastal Sciences) presented a seminar entitled Processes Regulating Habitat Use by Salt Marsh Nekton in a Southern New Jersey Estuary, at the James J. Howard Laboratory, 1995.

Dr. C. Chambers (NEFSC, James J. Howard Marine Sciences Laboratory, Highlands, NJ) presented a seminar entitled Early life history variation and recruitment processes in marine fishes, at the Institute of Marine and Coastal Sciences, Rutgers University, 1996.

Dr. J.T. Duffy (Rutgers University Marine Field Station) presented a seminar entitled Factors affecting the vital rates of the two sciaenids, the weakfish and the red drum: experiments in field enclosures, at the James J. Howard Laboratory, 1996.

Dr. S. Glenn (Institute of Marine and Coastal Sciences) presented a seminar entitled Observations and models of coastal upwelling off New Jersey, at the James J. Howard Laboratory, 1996.

Dr. R. Tucker (Ecopolity Center, Rutgers University) presented a seminar entitled Policy Issues Related to Dioxin, at the James J. Howard Laboratory, 1996.

Mr. D. Witting (Institute of Marine and Coastal Sciences) presented a seminar entitled Ichthyoplankton community stability: Analysis of a 6-year data set from southern New Jersey, at the James J. Howard Laboratory, 1996.

Dr. Anthony Paulson (James J. Howard Marine Science Laboratory, Northeast Fisheries Science Center) presented a seminar entitled Distributions and modeling of trace metals in Puget Sound, at the Institute of Marine and Coastal Sciences, Rutgers University, 1997.

Dr. C. Reimers (Institute of Marine and Coastal Sciences) used Howard Laboratory facilities to process samples during and after NOAA/NURP funded cruises in the New York Bight apex during the summer of 1997.

Dr. Al Stoner (James J. Howard Marine Science Laboratory, Northeast Fisheries Science Center) presented a seminar entitled The need for multidisiplinary approach to fisheries biology: An example from Bahamian seagrass meadow, at the Institute of Marine and Coastal Sciences, 1997.

Dr. Sam C. Wainright (Institute of Marine and Coastal Sciences) used the R/V Gloria Michelle for a field trip for the Biological Oceanography class (Spring 1996 and Spring 1997).

Dr. Jennifer Francis and Dr. Yuan Gao (Institute of Marine and Coastal Sciences) used Howard Laboratory office space for their research programs (1998-2000).

The Rutgers/NOAA CMER van was used by a number of Rutgers students and faculty for CMER-related projects (1994-2000).

Dr. Judith P. Grassle (Institute of Marine and Coastal Sciences) participated in the SAW-27/SARC held at the NEFSC in Woods Hole in June, 1998.

E.J. Weissberger and J.P. Grassle provided reports on Essential Fish Habitat for three bivalve species: *Arctica islandica*, *Placopecten magellanicus*, and *Spisula solidissima*. These reports were incorporated into the EHF reports developed by the NMFS/NEFC/James J. Howard Laboratory EHF reports, 1998.

Eric Simms (Institute of Marine and Coastal Sciences) organized the Bluefish Symposium at the Atlantic States Marine Fisheries Commission annual meeting in Mystic, CT, November 3, 1999.

COMPLETED PROJECTS FUNDED THROUGH THE RUTGERS/NOAA CMER PROGRAM (Base Funding 1993-2000)

Requests for reprints or information should be directed to the principal investigators.

98-03 Selective Feeding in Post-Larval Winter Flounder (Oscar Schofield and Pat Shaheen, Institute of Marine and Coastal Sciences - Rutgers Univ. and Alan Stoner, NOAA/NMFS, J.J. Howard Lab)

This one-year project addresses the pelagic food resources of post-larval winter flounder. Recent studies have indicated that the relative composition of prey species in the guts of recently settled winter flounder differ from the relative abundance of the prey species (copepods) in the environment, indicating selective feeding. The proposed study had two major components: 1) a spring field study in which the copepod community and post-larval winter flounder gut contents were concurrently characterized and 2) a laboratory feeding study in which the relative abundance of *Acartia* and *Eurytemora* were experimentally manipulated.

98-04 Sustaining the Atlantic Sea Scallop Fishery: Simulating Policy and Management Options (Peter J. Parks/Michael K. Price, Department of Agricultural Economics and Marketing, Rutgers University)

This is for the second year of funding to expand CMER project 97-06 initiated last year. The overall objective of the first year was to develop an analytical framework to help quantify the necessary economic conditions for a sustainable Northeastern sea scallop fishery. The research proposed in the renewal proposal will use this framework to simulate changes in economic, biological or policy conditions, and expand the scope to potentially include the Northeastern scallop fishery.

97-03 Linkages Between Circulation and Distribution of Marine Organisms in a Shallow Well Mixed Estuary: An Observational Approach (Scott Glenn and Robert J. Chant, Institute of Marine and Coastal Sciences - Rutgers Univ.; Alan Stoner, NOAA/NMFS - Howard Lab)

Recent observations in the Navesink/Sandy Hook estuary indicate that the distribution of winter flounder and blue crabs appear to be associated with specific locations within the tidal flow field. Enhanced abundance of these species are found across a broad region of the estuary where several different habitat types occur. Preliminary observations indicate that these areas are regions of particulate organic material accumulation. This project investigated the physical properties (Glenn, Chant) influencing the distribution of fishery resource species (Stoner) in the Navesink by combining a description of the hydrodynamic properties of suspended particles within the estuary, the behavior of the organisms, and a detailed understanding of circulation.

97-04 Environmental Influences on Metamorphosis in Summer Flounder (*Paralichthys dentatus*) (Kenneth W. Able, Institute of Marine and Coastal Sciences - Rutgers Univ.; Chris Chambers, NOAA/NMFS - Howard Lab)

This project addresses the effect of the physiological and ecological challenges imposed during flatfish metamorphosis on recruitment success in summer flounder populations in the northern Middle Atlantic Bight. The hypothesis being tested is that stage duration, which is influenced by temperature, influences the rate of mortality through prolonged exposure to predators during metamorphosis and settlement of summer flounder. Laboratory experiments will manipulate stage duration by controlling temperature, and the resultant effects on survival during late larvae and metamorph stages will be determined, in the presence and absence of predation. The information from this project will clarify the role of winter temperatures on survival and subsequent recruitment of summer flounder to estuaries, which are in the northern part of their range in the Mid-Atlantic Bight.

97-06 Sustaining the Northeastern Sea Scallop Fishery: An Economic Analysis of Consolidating Days-At-Sea (Peter J. Parks and Michael K. Price, Agri. Econ. & Mktg. - Rutgers Univ.; Steve Edwards, NOAA/NMFS - Woods Hole Lab)

An analytical framework was developed to help quantify the necessary economic conditions for a sustainable Northeastern sea scallop fishery. The model can be used to: determine the relationship between days-at-sea (DAS) and average catch size; measure the sensitivity of operational costs to vessel size and capital equipment size; and provide quantitative recommendations for fishermen and regulators that may help sustain the fishery.

97-07 Physical Transport of Bivalve Larvae through a Tidal Inlet: Molecular Probe Applications (Judith P. Grassle, Institute of Marine and Coastal Sciences - Rutgers Univ.)

The flux of commercially important bivalve larvae (*Mercenaria* or *Mya*) through the tidal inlet of the mouth of Great Bay was studied using species-specific molecular probes that allow species level identification of transported larvae. This project was conducted in collaboration with an ongoing CMER project (Haidvogel and Chant, #96-08) in which water exchange between Great Bay/Little Egg Harbor and the coastal ocean is being investigated. Molecular probe techniques developed in this study could be applied to a range of habitats and to other commercially important bivalves.

96-05 Isotopic Turnover Rate and Marginal Growth Increment Validation for Young-of-the-Year Winter Flounder (Sam Wainright, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; Beth Phelan, NOAA/NMFS, Northeast Fisheries Science Center - James J. Howard Laboratory, Highlands, NJ)

A concurrent NOAA/Coastal Ocean Program project examined habitat utilization and trophic linkages between juvenile fish and estuarine habitats in three Northeastern estuaries. A significant component of the study involved confining juvenile winter flounder in cages within different estuarine habitats, yielding habitat-specific growth rates. To establish trophic linkages, stable isotope ratios of tissue samples of the caged fish were measured and compared with stable isotope ratios of prey and vegetation. However, interpretation of the isotopic data requires knowledge of the time required for a fish to acquire the isotopic "label" of its habitat, i.e., turnover time. This study examined the isotopic turnover time for winter flounder.

96-08 Development of a Hydrodynamic/Fishery Recruitment Model of Great Bay-Little Egg Harbor Estuarine System (Dale Haidvogel and Robert Chant, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

A three-dimensional numerical model with the immediate objective of assessing linkages between hydrodynamics and an identified settlement habit of winter flounder *Pseudopleuronectes americanus* in the Great Bay-Little Egg Harbor estuarine system was developed. Efforts focus on the interaction between larval behavior, secondary flows and dispersion in the vicinity of the settlement habitat. The work complemented an ongoing multi-year study of *P. Americanus* that involved scientists at both Rutgers (Ken Able, Sam Wainright) and the National Marine Fisheries (Ann Studholme, Anthony Calabrese) which was funded by NOAA/COP. Results from this work will aid in both the interpretation of sparse biological measurements and in the design of future field campaigns in the Great Bay-Little Egg Harbor Estuarine system. Furthermore, this work is the first step in developing a comprehensive model of fish recruitment processes in shallow estuarine systems.

96-11, 97-08, 98-05, and 99-10 CMER Research Experiences for Undergraduates (Michael De Luca, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

Funding for these projects supported two summer undergraduate interns each year. The interns were involved in research projects at the James J. Howard Laboratory. Each student undertook a research project, the results of which were presented in a written report and in an oral presentation at both the NEFSC Lab and at Rutgers.

95-05 Assimilation of Metals by Phytoplankton in the Mid-Atlantic Bight: Controls on Introduction to the Coastal Marine Food Web (Robert Sherrell, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ; Vincent Zdanowicz, NEFSC - James J. Howard Laboratory, Highlands, NJ)

Uptake of metals by phytoplankton is an important pathway for the introduction of potentially toxic elements into the marine food web. Environmental and physiological controls on the assimilation of dissolved metals, both nutrient and nonessential, have only recently begun to be understood in culture studies. This project combined remote sensing-targeted sampling, *in situ* size-fractionating filtration methods, and state-of-the-art ultra-trace analyses using recent developments of Inductively Coupled Plasma Mass Spectrometry (ICPMS) to examine assimilation of metals by phytoplankton in the Mid-Atlantic Bight. This project used facilities and analytical equipment at the Howard Laboratory, and was integrated with a UMASS CMER funded project.

94-03 Transfer of Xenobiotic Contaminants from Prey to Predator (Gary Taghon, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ)

The potential transfer of oil and oil components (e.g., polycyclic aromatic hydrocarbons - PAHs) through trophic levels and the effect this may have on the structure of the ecosystem were investigated. Experiments were conducted of *in vivo* metabolism and the biological fate and bio-transfer of a carcinogenic PAH in organisms inhabiting marine sediments (softshell clam, *Mya arenaria* and the sand worm, *Neanthes virens*) and in a predator (winter flounder, *Pleuronectes americanus*) on those organisms.

93-01 Life History and Ecology of the Windowpane Flounder (*Scophthalmus aquosus*) in the Mid-Atlantic Bight (Kenneth Able, Marine Field Station, Institute of Marine and Coastal Sciences, Rutgers University, Tuckerton, NJ; Wallace Morse, NEFSC, Howard Laboratory, Highlands, NJ)

The aim of this project was to better understand the life history and ecology of windowpane flounder in order to better manage this resource and contribute to our understanding of flatfishes in the northeastern U.S. The specific objectives of the project were to: 1) determine the patterns of metamorphosis and settlement during the first year of life in the Great Bay/Little Egg Harbor estuarine system; 2) identify the nursery habitats and patterns of distribution through space and time; and 3) compare life history characteristics in Mid-Atlantic Bight populations with those on Georges Bank.

93-05 Studies on Surf Clam (*Spisula solidissima*) Recruitment (Judith Grassle, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ)

This research effort focused on the causes of year-to-year variation in settlement and recruitment success in the surf clam. The temporal and spatial settlement patterns, size distributions, and growth rates of surfclams and their predators were investigated. The death assemblage was used to examine size-preference in predators. The relationship between surfclams and two of their major predators: the moon snail *Euspira heros* and the starfish *Asterias forbesi*, were examined with laboratory experiments. Predation rates, size selectivity, interactions between the two predators, and the possible role of dead surfclam valves as a refuge from predation were examined.

93-06 Identification of Major Chemical Compounds Relating to Quality Determination of Mackerel and Other Fatty Fish by a GC/MS Method; Development of a Novel Rapid and Nondestructive NIR Method to Determine these Compounds and Their Application to Fish Quality Assessment and Processing Improvement (Tung-Ching Lee, Department of Food Science, the Fisheries and Aquaculture TEX Center and the Center for Advanced Food Technology, Rutgers University, New Brunswick, NJ; Judith Krzynowek, NMFS, Gloucester Laboratory, MA)

Gas chromatography/mass spectrometry (GC/MS) and near infrared (NIR) technology, and sensory panel evaluation were used to identify major chemical compounds relating to quality deterioration of mackerel and other fatty fish. Novel rapid and nondestructive methods based on NIR technology were developed to determine these compounds as indicators of quality.

93-08 Evaluation of Toxicity of Dioxins, Furans, and PCBs on Commercially Important Species Inhabiting and Migrating Through the Newark Bay Systems (Keith Cooper, Claudia Olivieri, and Sharon Longo, Department of Biochemistry and Microbiology and Joint Program in Toxicology, Environmental Occupational Health Sciences Center, Rutgers University, New Brunswick, NJ; Sharon McLean, NMFS, Narragansett Laboratory, RI; Anne Studholme NEFSC, Howard Laboratory, NJ)

This effort addressed the hypothesis that the chlorinated pollutants specifically dioxins, furans, PCBs and PAHs present in the Newark/Raritan Bay Estuary are of sufficient levels to impact the fisheries of these areas. This research combined both field and laboratory studies to examine causal relationships between body burdens of these compounds and the impact on the fishery. Histological lesions, selected biomarkers and reproductive success were evaluated in relation to contaminant levels in important fish species.

COMPLETED PROJECTS FUNDED THROUGH THE RUTGERS/NOAA CMER PROGRAM (External Funding 1993-2000)

98-Ex1 Costs of Surf Clamming and Ocean Quohogging (Bonnie McCay, - Department of Human Ecology - Rutgers University, New Brunswick, NJ)

This project is an extension of 96-Ex2 on the costs and earning of the "for hire" charter and party boat fisheries of Maine, New Jersey, and New York. The current project moves from the charter and party boats to the boats engaged in catching surfclams and ocean quahogs (SCOQ), most of which come primarily from Mid-Atlantic ports. The economic analyses of this project will contribute to assessing the extent to which the SCOQ ITQ fishery management regime addresses National Standards 4 (no discrimination between residents of different States) and 8 (importance of fishery resources to fishing communities) of the Magnuson-Stevens Fishery Management and Conservation Act. Funding from NMFS NEFSC.

98-Ex3 Sensors for Direct Observation for use in Stock Assessment (W. Wakefield, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; W. Overholtz and W. Gabriel, NOAA/NMFS, Woods Hole, MA)

This project will initiate development and application of sensors and capabilities of direct observation (e.g., video imaging systems) for use in conjunction with various gears used in stock assessment (acoustics, trawls, and dredges). Specifically it will include a preliminary effort for a self-contained, high-resolution time-lapse video camera system.

This system does not require armored conducting wire, is rather simple and flexible and can be used in a variety of applications to evaluate gear and record direct observations of fish behavior and fish habitat. Many of the main components (e.g., video cameras and lights) may also be used as elements in other future video systems. Funding from NEFSC.

98-Ex5 An Initiative to Gain a Regional Perspective on Coastal Eutrophication (Sybil P. Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ and Tracy N. Wiegner, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

The primary objective of this 1 year development project is to strengthen the relationship among Sea Grant funded research teams from New York to Georgia working on issues surrounding coastal eutrophication. The project brought together Sea Grant funded researchers from New Jersey (Dr. Sybil Seitzinger), Maryland (Dr. Patricia Glibert), Georgia (Dr. Deborah Bronk), and New York (Dr. Julie LaRoche) to begin addressing the contribution of organic nitrogen to coastal eutrophication on a regional scale. Specifically, the team will begin collecting information on the quantity and biological availability of the organic molecules from a variety of rivers throughout the east coast of the United States. Funding from NJ Sea Grant Development Fund.

98-Ex6 Barnegat Bay National Estuary Program Data Synthesis (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; R. Lathrop, Ecology, Evolution & Natural Resources - Rutgers University, New Brunswick, NJ; K.Hunchak-Kariouk, R. Nicholson, and R.E. Hickman, USGS, Water Resources Division, Trenton, NJ)

As part of the Barnegat Bay National Estuary Program, a synthesis of existing information on pollution inputs, land and bay use changes and human activities in the Barnegat Bay watershed region was conducted. This is a joint effort between Rutgers University and the USGS. Funding from the Barnegat Bay NEP.

97-Ex1 Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight (Michael DeLuca, Frederick Grassle and Kenneth Able, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; Sybil Seitzinger, Rutgers/NOAA CMER Program)

Recently, Congress expressed concern with the decline in abundance of bluefish stocks along the Atlantic coast. This decline has been attributed to a variety of factors ranging from competition with other species to dwindling forage species and unusual migratory pathways. Rutgers University is administering a collaborative effort with NMFS scientists to address concerns with the status of bluefish stocks. A workshop was held to prioritize research areas, a call for proposals was issued, and four research projects were funded that address the decline of Atlantic bluefish stocks ("Empirical Modeling of Bluefish Population Fluctuations: Interactions among Bluefish, Striped Bass and Forage Species", Anne Richards, University of Maryland System; "Recruitment of Young-of-the Year Bluefish: Patterns, Pulses and Processes in the Chesapeake Bay Estuarine System", Ed Houde, University of Maryland Center for Environmental Science; "Influence of Coastal Oceanography on Habitat Use and Recruitment Success of Bluefish (*Pomatomus saltrix*) in New Jersey", Ken Able, Rutgers University Marine Field Station; "Recruitment of Spring- and Summer-Spawned Bluefish: Genetic Structure, Cohort Identification, and Relative Contribution to the Adult Stock", David Conover, Florida State University).

97-Ex2 Essential Fish Habitat (Judith P. Grassle and Waldo W. Wakefield, Institute of Marine and Coastal Sciences; Richard G. Lathrop, Ecology, Evolution and Natural Resources - Rutgers University, New Brunswick, NJ; Jeffrey Cross and Anne Studholme, NOAA/NMFS - Howard Lab)

The recent reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (also known as the Sustainable Fisheries Act (SFA)) requires that essential fish habitat (EFH) be identified and described for each species or species assemblage covered by a Fisheries Management Plan (FMP). All Fishery Management Councils are required to submit FMP amendments to implement EFH by October 1998. Responsibility for supporting the New England Fishery Management Council (NEFMC) and Mid Atlantic Fishery Management Council (MAFMC) rests with the Northeast Regional Office and Northeast Fisheries Science Center. The Howard Laboratory at Sandy Hook prepared information on the life history and habitat requirements for species managed by the NEFMC and the MAFMC; the information will be used by the Council/NMFS EFH Teams to write the EFH amendments. The current study was conducted cooperatively between Rutgers University and the Howard Laboratory to develop EFH reports for the following species: Atlantic sea scallop, surf clam, ocean quahog, squid, mackerel, and butterfish. Funding by NEFSC.

97-Ex3 Denitrification and Microbial Dynamics in Continental Shelf Sediments: An Annual Study (Sybil P. Seitzinger, Rutgers/NOAA CMER Program and Lee Kerkhof, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

Nearly 50% of the global marine primary production occurs in continental margin waters, supporting a rich marine fisheries. Nitrogen is an important element controlling this primary production. Processes that affect the availability of nitrogen will likely have a direct impact on the primary productivity within the continental shelf ecosystem, and ultimately influence the associated marine fisheries. Denitrification in continental shelf sediments is important because it can decrease the amount of nitrogen for phytoplankton in the overlying waters. According to current estimates, up to 50% of the total nitrogen input to the oceans is removed from the system through denitrification in continental shelf sediments. However, few direct measurements of denitrification in shelf sediments exist. In the current study methods developed with CMER 96-Ex1 will be used to: 1) assess seasonal variability in denitrification rates at 3 sites on the continental shelf at LEO-15; 2) assess microbial population dynamics on a seasonal basis at the same 3 sites; and 3) investigate physical/chemical/and biological mechanisms/factors controlling denitrification and microbial population dynamics in the continental shelf. The results of this study will provide critical information needed for local and ocean scale N models, global models of nitrous oxide (N₂O), and the overall contribution of denitrification in continental shelf sediments as a global marine N sink. Funding from NOAA/Mid-Atlantic Bight, National Undersea Research Program.

96-Ex1 Denitrification and Microbial Dynamics in Continental Shelf Sediments: Use of *In Situ* Methods (Sybil P. Seitzinger and Lee Kerkhof, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

Nearly 50% of the global marine primary production occurs in continental margin waters, supporting a rich marine fisheries. Nitrogen is an important element controlling this primary production. Processes that affect the availability of nitrogen will likely have a direct impact on the primary productivity within the continental shelf ecosystem, and ultimately influence the associated marine fisheries. Denitrification in continental shelf sediments is important because it can decrease the amount of nitrogen for phytoplankton in the overlying waters. According to current estimates, up to 50% of the total nitrogen input to the oceans is removed through denitrification in continental shelf sediments. However, few direct measurements of denitrification in shelf sediments exist. In the current study a new, high sensitivity method for measuring *in situ* rates of denitrification in continental shelf sediments was developed and the first direct denitrification measurements in Atlantic shelf sediments were made. The preliminary measurements strongly support the original hypothesis that denitrification in shelf sediments is a major removal term for N on both a local, as well as global, scale. In addition, molecular techniques (PCR/probing of nitrous oxide reductase genes) to examine the dynamics of bacterial populations capable of denitrification were developed. The results of this study provided information necessary to begin evaluation of the contribution of denitrification as a global marine N sink. Funding from NOAA/Mid-Atlantic Bight, National Undersea Research Program.

95-Ex1 Estuarine Eutrophication: Contribution of Dissolved Organic Nitrogen from Non-Point and Point Sources (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; Renée Styles, Institute of Marine and Coastal Sciences - Rutgers University; Robert W. Sanders, Academy of Natural Sciences, Division of Environmental Research, Philadelphia, PA)

This project evaluated the contribution of dissolved organic nitrogen (DON) from non-point and point sources to estuarine eutrophication during summer. DON is a major source of pollutant related N to coastal waters. However, the biological availability of DON in various non-point and point sources, and thus its contribution to eutrophication, was not known. Traditionally, DON has been considered to be refractory. This project is a continuation of CMER 94-Ex1 in which DON in major rivers was investigated. In this project summer experiments were conducted to examine the biological availability of dissolved organic nitrogen in urban storm water runoff, agricultural runoff, as well as natural sources from forested watersheds. A substantial portion of the DON from all sources was found to be biologically available to estuarine organisms and resulted in stimulation of bacterial and phytoplankton production. The results have important implications for state and regional management plans and eutrophication models. Funding by NOAA, New Jersey Sea Grant.

95-Ex2 The Bioavailability of Dissolved Organic Nitrogen at the Ocean Boundary of Chesapeake Bay (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ; Robert DeKorsey, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ; Robert W. Sanders, Academy of Natural Sciences, Division of Environmental Research, Philadelphia, PA)

Approximately 40% of the total tracked nitrogen loading to the Chesapeake Bay enters from ocean boundary bottom water, and approximately 90% of the N in ocean boundary bottom water is in the form of organic nitrogen. However, the biological availability of organic N in ocean boundary bottom water was not known; thus, its contribution to eutrophication was unknown. Traditionally, organic N has been considered to be refractory. This study examined the biological availability of organic nitrogen in ocean boundary bottom water and its ultimate contribution to phytoplankton production and eutrophication in the bay. The information was incorporated in eutrophication models of Chesapeake Bay. Funding provided by US Environmental Protection Agency, Chesapeake Bay Program.

95-Ex3 Effects of Fisheries Regulation on the Economic Viability of the Charter and Party Boat Fishing Industry in the Northeast Region of the U.S. (Bonnie McCay, Department of Human Ecology - Rutgers University, New Brunswick, NJ; S. Steinback, NMFS, Woods Hole, MA)

The Northeast Fisheries Science Center (NEFSC) of the National Marine Fisheries Service (NMFS) conducted an economic valuation study of marine recreational anglers in the Northeast region of the U.S. This CMER project was part of a cooperative project among the NEFSC and CMER institutions in the Northeast Region: University of Rhode Island, University of Massachusetts, and Rutgers the State University of New Jersey. Work on the recreational service industry (charter and party boats) is coordinated with work on two other poorly-documented sectors of the Northeast region's fisheries, the "hook" and the small trawler fisheries. The purpose of this cooperative project was to develop a data collection system that will become part of the core statistics collected through NMFS for use by NMFS and the cooperating universities for the assessment of fishery management issues and other fishery economics research needs. Specific objectives included the development of survey instruments to be tested in pilot surveys of the Northeast U.S. hook, small trawler, and recreational party and charter fleets, to compare and statistically validate various survey methods, to design the framework for a possible ongoing cost/earnings data base that will eventually encompass all Northeast fisheries of interest, and to begin building research tools based on these data.

95-Ex4 An Evaluation of Shallow Water Drift Material in the Arthur Kill and Kill van Kull (Kenneth Able and Uwe Kils, Marine Field Station, Institute of Marine and Coastal Sciences - Rutgers University, Tuckerton, NJ; A. Studholme, NEFSC, James J. Howard Laboratory, Highlands, NJ; Gary Taghon, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ)

Throughout the New York Harbor, the removal of deteriorating piers, bulkheads, pilings, derelict vessels and other debris is the objective of a major drift removal program undertaken by the U.S. Army Corps of Engineers. Of special concern are shallow water structures in and around Arthur Kill and Kill van Kull, which are major sources of drift material. While these artificial structures can contribute to habitat degradation, alternatively they may serve to attract migratory and resident fish species, providing essential shelter, a critical factor for highly vulnerable early life history stages. This program evaluated the role that these man-made structures play, particularly as nursery areas of juvenile fishes. Funding by U.S. Army Corps of Engineers.

94-Ex1 Role of Dissolved Organic Nitrogen in Estuarine Eutrophication (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ; Robert W. Sanders, Academy of Natural Sciences, Division of Environmental Research, Philadelphia, PA)

This project was designed to evaluate the contribution to estuarine eutrophication of dissolved organic nitrogen (DON) transported to estuaries by polluted rivers. DON is a major source of pollutant related N to coastal waters. However, the biological availability of DON, and thus its contribution to eutrophication, was not known; traditionally, DON has been considered to be refractory. Inputs of DON from the Hudson and Delaware rivers were quantified and the extent to which the DON from these sources increases algal and microbial production was examined. The results of this study are being used to refine estuarine eutrophication models. Funding by NOAA, New Jersey Sea Grant.

94-Ex2 Inputs and Cycling of Nutrients in NY/NJ Harbor (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ)

The role of sediments in nutrient, trace metal, and oxygen cycling throughout the New York/New Jersey Harbor ecosystem was examined. In addition, external inputs of nutrients (both inorganic and organic) from 41 different point sources were quantified. The biological availability of dissolved and particulate organics in those inputs were studied during spring and summer experiments. The results of this study were used in eutrophication models of the New York/New Jersey Harbor ecosystem. Funding by EPA National Estuaries Program in New York/New Jersey Harbor.

94-Ex-3 Mitigation of Nonpoint Pollution by Riparian Forest Buffers in Agricultural Watershed of the Mid-Atlantic Piedmont (Sybil Seitzinger, Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ; Denis Newbold, Academy of Natural Sciences of Philadelphia; Susan Watts, Institute of Marine and Coastal Sciences, Rutgers University, Camden, NJ)

Buffer strips are used for non-point source nutrient removal, to reduce nutrient runoff from agricultural systems to aquatic ecosystems. Mechanisms responsible for nitrogen and phosphorus retention and removal in riparian buffer strips were examined. The rate of nitrogen removal by denitrification and the overall mass balances of nitrogen and phosphorus were quantified. Factors controlling nutrient removal/retention in the buffer strips were investigated. Both newly planted and mature forested buffer strips were included in this study. Funding by Chesapeake Research Consortium.

93-Ex1 Fish Recruitment in the Northeastern United States: The Role of Estuarine Habitats (Kenneth Able, Sam Wainright, Institute of Marine and Coastal Sciences - Rutgers University, New Brunswick, NJ; Anthony Calabrese, NEFSC, Milford Laboratory, Milford, CT; Anne Studholme, NMFS, James J. Howard Laboratory, Highlands, NJ)

A comprehensive approach was used to identify critical habitats in three northeastern estuaries and to assess functional value as nursery areas for young-of-the-year fishes especially winter flounder (*Pleuronectes americanus*) and tautog (*Tautoga onitis*). This project was related to two CMER funded projects (93-01; 96-05). Funding by NOAA Coastal Ocean Program, Estuarine Habitat Research Program.

Table 1. Projects Supported Through Rutgers/NOAA CMER Program (Base Funding & External Funding 1993-2000):

Year	Project No.	Short Title	Investigator	Amount
1993	93-01	Windowpane Flounder Early Life History and Ecology	K. Able ¹ , W. Morse ²	\$25,041
	93-05	Surf Clam Recruitment	J. Grassle ³	\$17,032
	93-06	Mackerel Quality	T.C. Lee ⁴ , J.Krzynowek ⁵	\$30,658
	93-08	Toxicity of Dioxins, Furans and PCBs	K Cooper ⁶ , S. McLean ⁷ , A.Studholme ²	\$27,269
	93-Ex1	Estuarine Habitats	K. Able ¹ , S. Wainright ³ A.Calabrese ⁸ , A.Studholme ²	\$100,000
1994	93-01	Windowpane Flounder Early Life History and Ecology	K. Able ¹ , W. Morse ²	\$27,480
	93-05	Surf Clam Recruitment	J. Grassle ³	\$33,482
	93-06	Mackerel Quality	T.C. Lee ⁴ , J.Krzynowek ⁵	\$36,164
	93-08	Toxicity of Dioxins, Furans and PCBs	K Cooper ⁶ , S. McLean ⁷ , A.Studholme ²	\$30,292
	94-03	Pollutant Transfer in an Estuarine Food Chain	G. Taghon ³	\$25,582 (2Yr.award)
	93-Ex1	Estuarine Habitats	K. Able ¹ , S. Wainright ³ , A.Calabrese ⁸ , A.Studholme ²	\$100,000
	94-Ex1	Eutrophication and Dissolved Organic Nitrogen	S. Seitzinger ⁹ R. Sanders ¹⁰	\$150,936
	94-Ex2	Inputs and Cycling of Nutrients in NY/NJ Harbor	S. Seitzinger ⁹	\$54,140
	94-Ex3	Nitrogen Removal in Riparian Buffer Strips	S. Seitzinger ⁹ , S.Watts ¹¹	\$20,000
1995	93-01	Windowpane Flounder Early Life History and Ecology	K. Able ¹ , W. Morse ²	\$26,909
	93-05	Surf Clam Recruitment	J. Grassle ³	\$30,731
	93-06	Mackerel Quality	T.C.Lee ⁴ , J.Krzynowek ⁵	\$36,314
	95-05	Controls on Introduction of Trace Metals to Coastal Marine Food Web	R.Sherrell ³ , V.Zdanowicz ²	\$41,046
	95-Ex1	Eutrophication and Dissolved Organic Nitrogen from Non-Point Sources	S. Seitzinger ⁹ , R. Styles ³ , R.W. Sanders ¹⁰	\$81,336

Table 1. Projects Supported Through Rutgers/NOAA CMER Program (Base Funding & External Funding 1993-2000): (cont.)

Year	Project No.	Short Title	Investigator	Amount
1995 (cont.)	95-Ex2	Organic Nitrogen Inputs in Chesapeake Bay Ocean Boundary Water	S. Seitzinger ⁹ , R. DeKorsey ³ , R. Sanders ¹⁰	\$55,000
	95-Ex3	Multiple Stressors and Ecological Complexity in Coastal Ecosystems	D. Breitburg ¹² S. Seitzinger ⁹	\$24,165
	95-Ex4	Evaluation of the Habitat Value of Man-made Structures in Urban Estuaries	K. Able ¹ , U. Kils ¹ , A. Studholme ² , G. Taghon ³	\$239,100
1996	95-05	Controls on Introduction of Trace Metals to Coastal Marine Food Web	R. Sherrell ³ V. Zdanowicz ²	\$28,917
	96-05	Isotopic Turnover Rate and Marginal Growth Increment Validation for Young-of-the-Year Winter Flounder	S. Wainright ³ , B. Phelan ²	\$30,788
	96-08	Development of a Hydrodynamic/Fish Recruitment Model of Great Bay-Little Egg Harbor Estuarine System	D. Haidvogel ³ , R. Chant ³	\$61,606 (2 Years)
	96-11	CMER Research Experiences for Undergraduates	M. De Luca ³	\$6,590
	95-Ex1	Eutrophication and Dissolved Organic Nitrogen from Non-Point Sources	S. Seitzinger ⁹ , R. Styles ³ , R.W. Sanders ¹⁰	\$84,510
	95-Ex3	Multiple Stressors and Ecological Complexity in Coastal Ecosystems	D. Breitburg ¹² S. Seitzinger ⁹	\$32,656
	95-Ex4	Evaluation of the Habitat Value of Man-made Structures in Urban Estuaries	K. Able ¹ , U. Kils ¹ , A. Studholme ² , G. Taghon ³	\$65,450
	96-Ex1	Denitrification and Microbial Dynamics in Continental Shelf Sediments: Use of in situ Methods	S. Seitzinger ⁹ , L. Kerkhof ³	\$69,343
	96-Ex2	Effects of Fisheries Regulation on the Economic Viability of the Charter and Party Boat Fishing Industry in the Northeast Region of the U.S.	B. McCay ¹³ , S. Steinback ¹⁴	\$60,000
1997	97-03	Linkages between Circulation and Distribution of Marine Organisms in a Shallow Well Mixed Estuary: An Observational Approach	Scott Glenn ³ Robert J. Chant ³ Al Stoner ²	\$26,814
	97-04	Environmental Influences on Metamorphosis and Survival in Summer Flounder (<i>Paralichthys dentatus</i>)	Kenneth Able ¹ Chris Chambers ²	\$24,938
	97-06	Sustaining the Atlantic Sea Scallop Fishery: An Economic Analysis of Consolidating Days-At-Sea	Peter Parks ¹⁵ Michael Price ¹⁵ James Kirkley ¹⁶ Steve Edwards ¹⁴	\$31,527
	97-07	Physical Transport of Bivalve Larvae through a Tidal Inlet: Molecular Probe Applications	Judith Grassle ³	\$10,905
	97-08	Research Experiences for Undergraduates – Summer 1998	Michael De Luca ³	\$7,816

Table 1. Projects Supported Through Rutgers/NOAA CMER Program (Base Funding & External Funding 1993-2000): (cont.)

Year	Project No.	Short Title	Investigator	Amount
1997 cont.	95-EX3	Multiple Stressors and Ecological Complexity in Coastal Ecosystems	D. Breitburg ¹² S. Seitzinger ⁹	\$44,223
	96-EX2	Effects of Fisheries Regulation on the Economic Viability of the Charter and Party Boat Fishing Industry	Bonnie McCay ¹³ Scott Steinback ¹⁴	\$60,000
	97-EX1	Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight	Michael DeLuca ³ F. Grassle ³ Kenneth Able ¹ Sybil Seitzinger ⁹	\$442,000
	97-EX2	Essential Fish Habitat	Judith P. Grassle ³ Waldo Wakefield ³ Richard Lathrop ¹⁷ Jeff Cross ² Anne Studholme ²	\$73,000
	97-EX3	Denitrification and Microbial Dynamics in Continental Shelf Sediments: An Annual Study	S. Seitzinger ⁹ L. Kerkhof ³	\$180,366
	97-EX4	Estuarine Eutrophication: Seasonal Cycle of the Contribution of Dissolved Organic Nitrogen from Non-Point and Point Sources	S. Seitzinger ⁹ R. Sanders ¹⁰	\$61,500
1998	97-04	Environmental Influences on Metamorphosis and Survival in Summer Flounder (<i>Paralichthys dentatus</i>)	Kenneth Able ¹ Chris Chambers ²	\$25,942
	98-03	Selective Feeding in Post-Larval Winter Flounder	Oscar Schofield ³ Pat Shaheen ³	\$26,196
	98-04	Sustaining the Atlantic Sea Scallop Fishery	Peter Parks ¹⁵	\$38,030
	98-05	Research Experiences for Undergraduates	Michael De Luca ³	\$8,532
	95-EX3	Multiple Stressors and Ecological Complexity in Coastal Ecosystems	S. Seitzinger ⁹ D. Breitburg ¹²	\$33,508
	97-EX4	Estuarine Eutrophication: Seasonal Cycle of the Contribution of Dissolved Organic Nitrogen	S. Seitzinger ⁹ R. Sanders ¹⁰	\$61,500
	98-EX1	Costs of Surf Clamming and Ocean Quohogging	Bonnie McCay ¹³	\$60,000
	98-EX2	Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight	M. De Luca ³	\$457,000
	98-EX3	Sensors for Direct Observation for use in Stock Assessment	W. Wakefield ³ W. Overholtz ¹⁴ W. Gabriel ¹⁴	\$15,791

Table 1. Projects Supported Through Rutgers/NOAA CMER Program (Base Funding & External Funding 1993-2000): (cont.)

Year	Project No.	Short Title	Investigator	Amount
1998 cont.	98-EX4	Composition and Bioavailability of Dissolved Organic Nitrogen in Atmospheric Deposition	S. Seitzinger ⁹ M. Mazurek ³	\$182,639
	98-EX5	An Initiative to Gain a Regional Perspective on Coastal Eutrophication	S. Seitzinger ⁹ T. Wiegner ³	\$5,000
	98-EX6	Barnegat Bay National Estuary Program Data Synthesis	Sybil Seitzinger ⁹ R. Lathrop ¹⁷ K. Hunchak-Kariouk ¹⁸ R. Nicholson ¹⁸ R.E. Hickman ¹⁸	\$140,000
1999	99-05	Effects of Bottom Roughness on Surf Clam (<i>Spisula Solidissima</i>) Larval Settlement and Recruitment	Judith P. Grassle ³ Shannon G. Newby ³	\$30,612
	99-06	Fish Movements in the Dynamic Ecoscape of a Shallow Flood Dominated Estuary	Robert J. Chant ³ Al Stoner ²	\$28,409
	99-08	Use of Stable-Isotope Ratios to Track Changes in Feeding Behavior of Larval and Juvenile Flatfish	Sam Wainright ³ Keith Bosley ³ Chris Chambers ²	\$30,589
	99-10	Research Experiences for Undergraduates	Michael De Luca ³	\$10,390
	95-EX3	Multiple Stressors and Ecological Complexity in Coastal Ecosystems	S. Seitzinger ⁹ D. Breitburg ¹²	\$12,581
	97-EX4	Estuarine Eutrophication: Seasonal Cycle of the Contribution of Dissolved Organic Nitrogen	S. Seitzinger ⁹ M. Mazurek ³	\$61,500
	99-EX1	Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight	M. De Luca ³	\$457,000
	99-Ex2	Bottom Habitat Classification and Mapping of the New York Bight	Richard Lathrop ¹⁷	\$30,000
	98-EX4	Composition and Bioavailability of Dissolved Organic Nitrogen in Atmospheric Deposition	S. Seitzinger ⁹ M. Mazurek ³	\$87,382
2000	99-05	Effects of bottom roughness on surf clam (<i>Spisula solidissima</i>) larval settlement and recruitment	J. Grassle ³ S. Newby ³	\$30,136
	99-06	Fish movements in the dynamic ecoscape of a shallow flood dominated estuary	R. Chant ³ A. Stoner ²	\$6,106 (plus \$25,634 fr. 99-Ex1)
	99-10	CMER Research Experiences for Undergraduates	M. DeLuca ³	\$1,837
	00-01	Essential fish habitat for young-of-the-year Goosefish (<i>Lophius americanus</i>) in the Middle Atlantic Bight	K.W. Able ¹ C. Chambers ²	\$28,921
	95-Ex3	The Importance of Understanding Ecological Complexity to Predicting Effects of Multiple Stressors on Coastal Systems	S. Seitzinger ⁹ D. Breitburg ¹²	\$5,303
	98-Ex4	Composition and Bioavailability of Dissolved Organic Nitrogen in Atmospheric Deposition	S. Seitzinger ⁹ M. Mazurek ³	\$29,980
	99-Ex1	Bluefish/Striped Bass Interactions in the Mid-Atlantic Bight	M. DeLuca ³	\$550,000

Table 1. Projects Supported Through Rutgers/NOAA CMER Program (Base Funding & External Funding 1993-2000): (cont.)

Year	Project No.	Short Title	Investigator	Amount
2000 cont.	99-Ex2	Bottom Habitat Classification and Mapping of the New York Bight	R. Lathrop ¹⁷	\$30,000
	00-Ex1	Model Development and Chemical Characterization of Bioavailable Nitrogen Loading to Coastal Ecosystems	S. Seitzinger ⁹ M. Mazurek ³	\$61,605

¹Rutgers University, Marine Field Station, Tuckerton, NJ

²NMFS, James J. Howard Laboratory, Highlands, NJ

³Rutgers University, Institute of Marine and Coastal Sciences, New Brunswick, NJ

⁴Rutgers University, Dept. of Food Science, the Fisheries and Aquaculture TEX Center and the Center for Advanced Food Technology, New Brunswick, NJ

⁵NMFS, Gloucester Laboratory, Gloucester, MA

⁶Rutgers University, Dept. of Biochemistry and Microbiology and Joint Program in Toxicology, Environmental Occupational Health Sciences Center, Piscataway, NJ

⁷NEFSC, Narragansett Laboratory, Narragansett, RI

⁸NMFS, Milford Laboratory, Milford, CT

⁹Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, New Brunswick, NJ

¹⁰Temple University, Department of Biology, Philadelphia, PA (formerly at Philadelphia Academy of Natural Sciences)

¹¹Rutgers University, Environmental Sciences, Camden, NJ

¹²Philadelphia Academy of Natural Sciences, Benedict Estuarine Research Lab, St. Leonards, MD

¹³Rutgers University, Department of Human Ecology, New Brunswick, NJ

¹⁴NMFS, Woods Hole, MA

¹⁵Rutgers University, Department of Agricultural Economics and Marketing, New Brunswick, NJ

¹⁶College of William and Mary, Virginia Institute of Marine Science, School of Marine Science, Gloucester Point, VA

¹⁷Rutgers University, Ecology, Evolution & Natural Resources, New Brunswick, NJ

¹⁸USGS, Water Resources Division, Trenton, NJ

Table 2. Participation of Rutgers Faculty and Students in CMER Projects (1993-2000):

Project No.	Short Title	Faculty (Department)	Student/Degree Sought/Program
93-01	Windowpane Flounder	K. Able ¹	Melissa Neuman/Ph.D. (1999) Ecology & Evolution
93-05	Surf Clam Recruitment	J. Grassle ¹	Marnita Chintala/M.S. (1997) Ecology & Evolution Eric Weissberger/Ph.D. (1998) Ecology & Evolution Hongguang Ma/M.S. (1997) Oceanography Gregg Kessler/undergraduate Honors Student Pia Rivera/undergraduate Janice Bell/Post-doc
93-06	Mackerel Quality	T.C. Lee ²	Hui-Zhen Zhang/Ph.D. Food Science H. Liu/M.S. (1995)
93-08	Toxicity of Dioxins, Furans and PCBs	K. Cooper ³	Claudia Olivieri/Ph.D. (1996) Environmental Science S. Longo/M.S. (1995) Toxicology C.M. Chen/Ph.D. (1994) Toxicology M. Kim/Ph.D. (1998) Environmental Science
94-03	Pollutant Transfer	G. Taghon ¹	Ann Schnitz/Ph.D. (1997) Ecology & Evolution
95-05	Assimilation of Metals	R. Sherrell ¹	Yuan Gao/Post-doc J. Cullen/Ph.D. (2001) -Oceanography K. Metzger/B.S. (1998)
95-Ex3	Multiple Stressors	S. Seitzinger ⁷	T. Wiegner/Ph.D. A. Laursen/Post-doc
96-05	Isotopic Turnover Rate	S. Wainright ¹	Keith Bosley/M.S. (1997) Environmental Sci.
96-08	Hydrodynamic/Fish Recruitment Model	D. Haidvogel ¹	Robert Chant/Post-doc
97-03	Circulation and Distribution of Marine Organisms	S. Glenn ¹	Robert Chant/Post-doc Mary Carla Curran/Post-doc
97-04	Summer Flounder	K. Able ⁴	Stephanie Barbeau/M.S., Ecology & Evolution
97-06	Sea Scallop Fishery	P. Parks ⁵	Michael Price/M.S. (1998) Agric. Econ. & Mktg.
97-08	Research for Undergraduates	M. De Luca ¹	Geoffrey Bell/B.S. Michelle Walsh/B.S.
98-03	Winter Flounder	O. Schofield ¹	P. Shaheen/Ph.D., Oceanography
98-05	Research for Undergraduates	M. De Luca ¹	L. Annicchiarico/B.S. K. Tsakiris/B.S.

Table 2. Participation of Rutgers Faculty and Students in CMER Projects (1993-2000): (cont.)

Project No.	Short Title	Faculty (Department)	Student/Degree Sought/Program
98-Ex1	Costs Surf-clamming	B. McCay ⁶	J. O'Neil/non-degree, Human Ecology
98-Ex4	Atmospheric Desposition	S. Seitzinger ⁷ M. Mazurek ¹	M. Deritter/B.S.
98-Ex5	Regional Eutrophication	S. Seitzinger ¹	T. Wiegner/Ph.D., Oceanography
99-05	Surf Clam Larval Recruitment	J. Grassle ¹	S. Newby/Ph.D., Oceanography
99-06	Fish Movement Shallow Estuary	R. Chant ¹	R. Styles/Post-Doc
99-Ex2	Mapping Bottom Type as Part of the New York Bight Apex Sea Floor Mapping Project	R. Lathrop ⁸	N. Senyk/Undergraduate Thesis, May 2001

¹Institute of Marine and Coastal Sciences

²Department of Food Science

³College of Pharmacy

⁴Rutgers Marine Field Station, Tuckerton

⁵Department of Agri. Econ. & Mktg.

⁶Human Ecology

⁷Rutgers/NOAA CMER Program, Institute of Marine and Coastal Sciences, New Brunswick, NJ

⁸Rutgers/Grant F. Walton Center for Remote Sensing & Spatial Analysis