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Virginia Institute of Marine Science 1998-2000 Biennial Report

Virginia Institute of Marine Science

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WILLIAM & MARY



VIRGINIA INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE

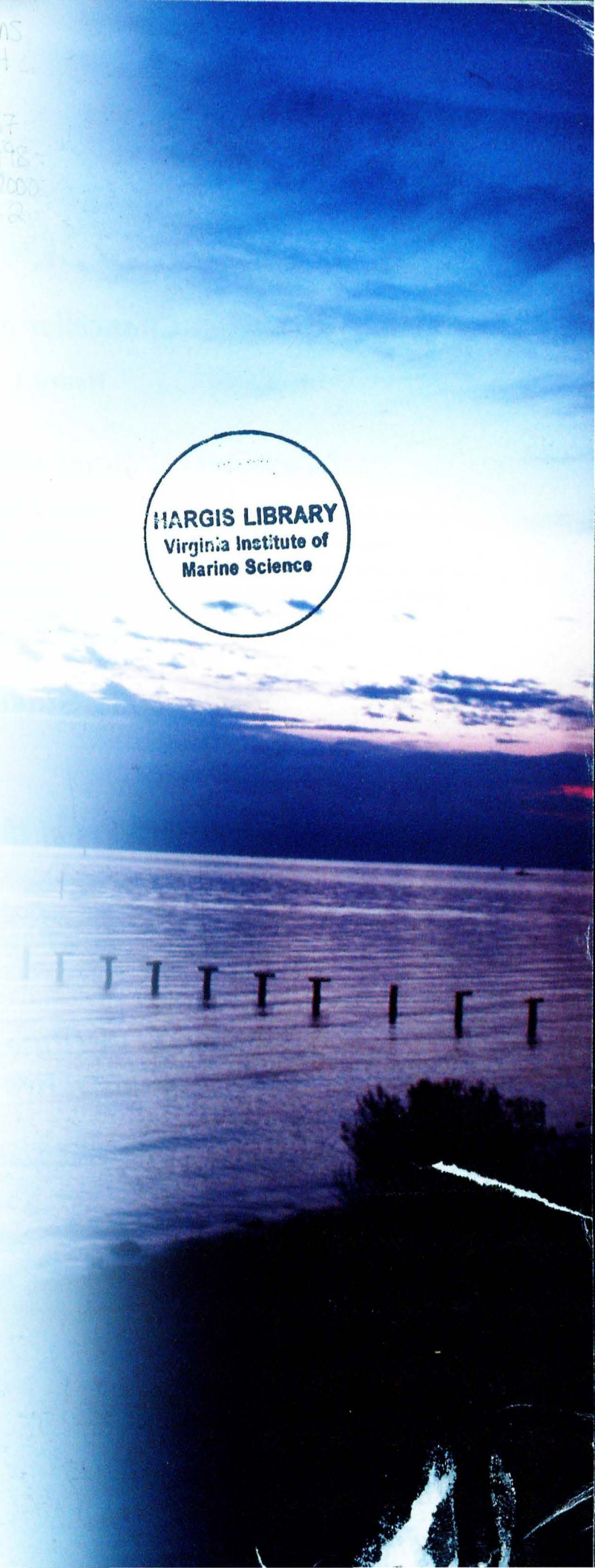
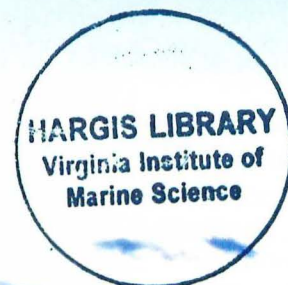
Biennial Report 998-2000

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Virginia Institute of Marine Science Council

Established in 1982, the Virginia Institute of Marine Science Council is an advisory and supportive body composed of business and industry leaders as well as private citizens interested in the continuing vitality of VIMS. Council members serve the institute through their participation on standing committees that include Government Relations, Industry Relations, Public Relations, and Development.

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Dr. James A. Wesson
Mr. Douglas K. Woolfolk
Mr. George A. Zahn, Jr.

Highlights... 1998-2000

NSF Career Award

Dr. Carl Friedrichs, Assistant Professor, Department of Physical Sciences, received a highly competitive National Science Foundation award to combine his research on sediment related issues in estuaries with mentoring of undergraduate and high school students. This award is the highest honor given to scientists and engineers in the early stages of their independent research careers. Friedrichs was one of four oceanographers among the 56 recipients of this prestigious award.



1998-2000 Capital Accomplishments

The Institute received funds for and began planning and design work on a \$4.2 million renovation and expansion of Byrd Hall creating new saltwater labs, and \$0.8 million for replacement of the seriously deteriorated bulkhead in the Gloucester Point boat basin. The Institute also completed the \$0.3 million replacement of the bulkhead on the Wachapreague campus.

Several parcels of property adjacent to the Gloucester Point campus were acquired, which provide for future campus expansion and a buffer between the Institute and the surrounding community.

Maintenance Reserve funds were used for repairs and improvements that included replacing several roofs, major repairs to the aquarium, improved exterior lighting, new heating and cooling systems in several buildings, and upgrading the sewer pump station.

VIMS began a project to modernize the Institute's information technology infrastructure to meet increasing demands for information exchange including systems to carry voice, data, and video, and to make distance learning possible.

Economic Development Initiative

As a result of studies initiated more than two years ago, a Center for Applied Marine Science and Technology has been created at VIMS. This center involves a partnership among VIMS, Old Dominion University's Center for Coastal Physical Oceanography, Gloucester County's Economic Development Office and Industrial Development Authority, and the Hampton Roads Partnership. Larry Wilkinson of Gloucester County was hired to spearhead and coordinate the efforts and stay abreast of emerging technology in marine science. Scientists at VIMS are making significant progress in areas such as aquaculture, acoustics, software development, environmental consultancies, and robotics that have potential for economic development in the private sector.

Acuff Professor



Dr. John A. Musick, Department of Fisheries Science, was named the *Marshall A. Acuff, Sr. Professor in Marine Science* in 1999. During his 30 years at VIMS, Musick has published 89 peer-reviewed publications, three edited volumes, and co-authored two books. In addition he has served on 39 advisory panels at the state, regional, federal, and international level. He has achieved international prominence for his efforts to apply biological expertise to the conservation of sea turtles and sharks. Musick has also received the Thomas Ashley Graves Award for Sustained Excellence in Teaching. The Acuff chair is endowed by Marshall A. Acuff, Jr. and his wife Dana in memory of Marshall A. Acuff Sr.

New Faculty

As a result of recent and upcoming retirements, the Institute has completed national searches for faculty in three departments. We are very pleased with the extremely talented new faculty that will be joining the VIMS community over the next year. Each brings expertise and experience that will broaden and enhance our research and academic programs.

Dr. Deborah A. Bronk

Associate Professor
Physical Sciences

B.S., *University of Miami*
Ph.D., *University of Maryland,*
Horn Point Environmental
Laboratory

Dr. Bronk's research focuses on the cycling of nitrogen in marine and estuarine environments. Specific research includes the role of dissolved organic nitrogen (DON) in microbial food webs, and the utilization of marsh-derived and phytoplankton-derived DON as a nitrogen source for phytoplankton and bacteria.

Dr. Jesse E. McNinch

Assistant Professor
Physical Sciences

B.S. *University of Southwestern*
Louisiana
M.S. *University of North*
Carolina at Chapel Hill
Ph.D. *University of North*
Carolina at Chapel Hill

Dr. McNinch's research interests are the observation and prediction of shoreface and shoreline changes in response to underlying geology; physical and sedimentary processes on cape-associated shoals, and other inner-shelf sedimentary features.

Dr. Ratana Chuenpagdee

Assistant Professor

Coastal & Ocean Policy
M.Sc. *Fisheries Biology, Univer-*
sity of Wales, Bangor Fishery
Management and Economics,
Michigan State University
Ph.D., *Resource Management and*
Environmental Studies, Univer-
sity of British
Columbia

Dr. Chuenpagdee is currently working as a Research Associate for the Institute for Resources and Environment of the University of British Columbia, Vancouver, where she is participating in an ongoing project to develop public decision-making processes for resource management and policies. From 1987 to 1992 she served as a lecturer at the Kasetsart University, Bangkok, Thailand and taught undergraduate and graduate courses in fishery management, fishery economics, integrated water resource management, and research methodology in applied and social sciences.

Dr. Robert L. Hicks

Assistant Professor
Coastal & Ocean Policy

B.A. *North Carolina State Univer-*
sity
Ph.D. *University of Maryland,*
Department of Agricultural and
Resource Economics

Dr. Hicks' major research interests are environmental and resource economics, non-market valuation, natural resource damage assessment, and the economics of commercial and recreational fisheries. Hicks has been with the National Marine Fisheries Service for the past three years.

Dr. Rochelle D. Seitz

Research Assistant
Professor

Biological Sciences
B.A., *Colgate University*
M.S., *The College of William and*
Mary
Ph.D., *The College of William and*
Mary

Dr. Seitz's research interests center around benthic community ecology, particularly changes in benthic invertebrate diversity with environmental stress, predator-prey dynamics, top-down versus bottom-up control of benthic systems, and conservation biology.

Dr. Courtney K. Harris

Assistant Professor
Physical Sciences

B.S. *University of Virginia*
M.S. *University of California at*
Berkeley
Ph.D. *University of Virginia*

Dr. Harris' research interests include 3-D modeling of river plume, wave resuspension, and wind-driven circulation effects on flood deposits; as well as quantification and prediction of shelf and estuarine sediment transport over contrasting temporal and spatial scales. She comes to VIMS from the US Geological Survey in Woods Hole.

Dr. Deborah Steinberg

Associate Professor
Biological Sciences

B.A., *University of California,*
Santa Barbara
Ph.D., *University of California,*
Santa Cruz

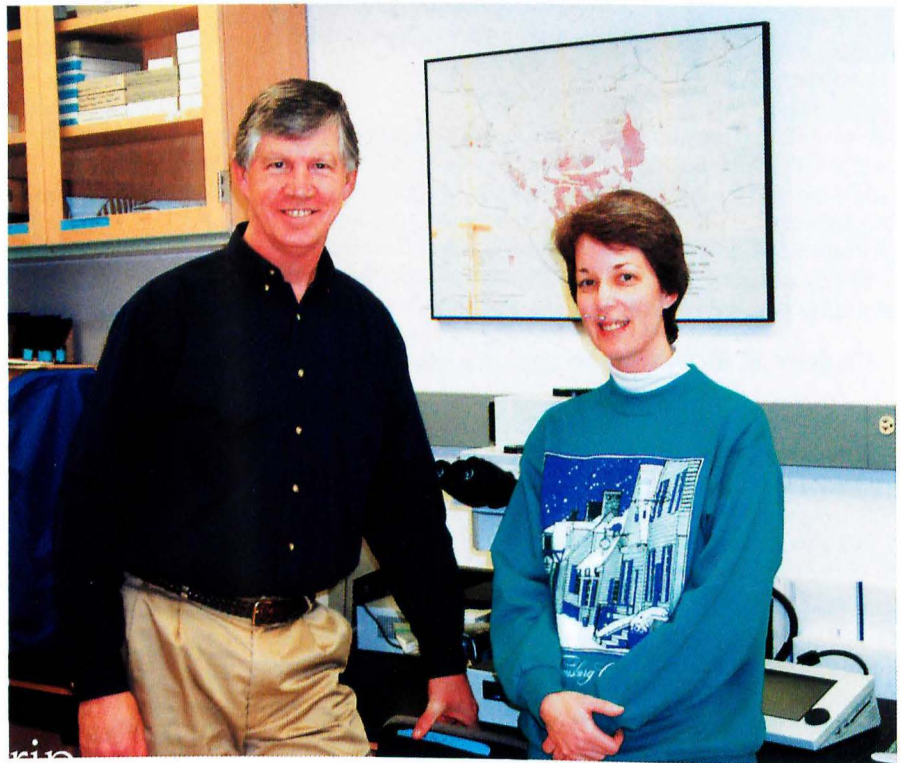
Dr. Steinberg is interested in zooplankton ecology and physiology, coastal and deep-sea food webs, nutrient cycling, and marine detritus ("marine snow"). She comes to VIMS from the Bermuda Biological Station for Research (BBSR) where she coordinated the Bermuda Atlantic Time-series Study, as part of the Joint Global Ocean Flux Study (JGOFS).

New Fisheries Faculty Position

The National Marine Fisheries Service (NMFS) selected VIMS and Hampton University to become the fourth site for their Cooperative Marine Education and Research (CMER) Program. This innovative partnership provides a senior level NMFS scientist to serve as a full-time visiting professor. The scientist will teach classes at VIMS and Hampton University, mentor students and serve as a liaison for the schools and federal programs. In addition to funding the faculty position, the program also provides annual research funds to support work in areas of specific interest to NMFS. The CMER Program also facilitates access to NOAA vessels for teaching and fieldwork. Dr. Mike Vecchione, Director of NMFS Systematics Lab, is currently at VIMS to initiate the program.



Research Highlights



Mystery of Origin of Oyster Disease Solved

Dr. Gene Burreson and Marine Scientist Senior Nancy Stokes, Dept. of Fisheries Science, published the results of several years of research that proved the oyster pathogen *Haplosporidium nelsoni* known to be responsible for the disease MSX in native oysters, was introduced to the east coast from the Japanese oyster *Crassostrea gigas*. While the pathogen is not harmful to the Japanese oyster, it has caused extensive and continuing mortality in *Crassostrea*

virginica, the eastern oyster, since it first made its appearance in Chesapeake Bay in 1959. Burreson and staff developed molecular (DNA) probes that enabled them to identify the parasite. It had been speculated that the Japanese oyster was the host for the pathogen, but there was no way to prove it until molecular technology enabled researchers to develop the specific DNA diagnostic tools.

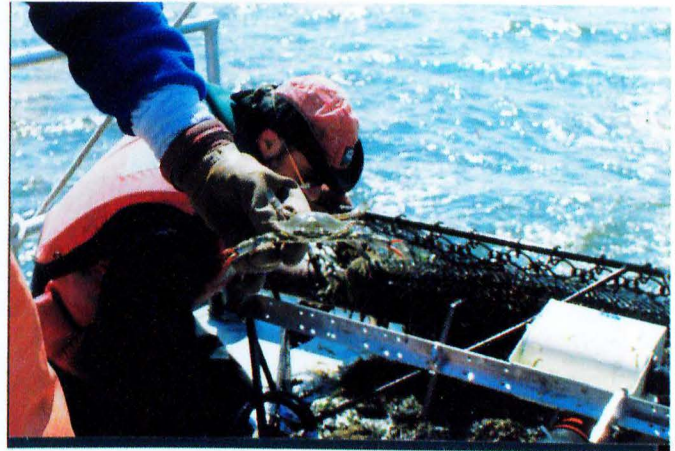


VIMS' Scientists First To Spawn Popular Finfish

Mike Oesterling, Fisheries/Aquaculture Specialist with the Sea Grant Marine Advisory Program at VIMS, became the first in the country and possibly the world to successfully spawn the marine finfish cobia in a recirculating water system. Cobia are highly prized both as a food fish and a recreational trophy fish. They are considered prime candidates for aquaculture development because of their fast growth rate as juveniles and an expanding demand for them in the seafood marketplace.

Crab Sanctuary Policy Based On VIMS Research

Based on research and a sanctuary plan developed by Dr. Rom Lipcius, Dept. of Fisheries Science, a 100-mile sanctuary for blue crabs in the Virginia portion of Chesapeake Bay was established by the Virginia Marine Resources Commission. Research by Lipcius over the past several years has suggested a declining blue crab population.



VIMS Scientist On Task Force To Study Contaminant

Dr. Rob Hale, Dept. of Environmental Sciences, and colleagues discovered that toxic brominated diphenyl ethers (BDEs) have become dispersed throughout the Roanoke and Dan rivers in South Central Virginia. The chemical is a widely used fire retardant and recently has caused considerable concern in Europe. The BDEs were detected during a study supported by, and in collaboration with, Virginia's Department of Environmental Quality while examining the extent of chemical contamination in edible fish from state tributaries. Although the full effects of the contaminant are not clearly understood, it is known that BDEs are persistent and bioaccumulate to high levels. Hale has been appointed to a task force that includes VIMS, DEQ, Virginia Health Department and several other state and federal agencies to continue investigating the pollutant.



New Research on the Horizon



International Sand Transport Study

In collaboration with scientists at the New Zealand Institute of Water and Atmospheric Research, Drs. Don Wright and Carl Friedrichs, S.C. Kim and Harry Wang recently received funding from the National Science Foundation to begin a two-year study. The studies will include both field and numerical modeling. The team will measure sand transport at sites in New Zealand that have comparable shoreface characteristics but different environmental conditions than sites being studied on the Virginia coast. The data will be used to develop computational models that will have applications in both countries.

Scott Hardaway, Department of Physical Sciences, and Lyle Varnell, Center for Coastal Resources Management, are working to classify dune systems in the Virginia Chesapeake Bay. Dune resources in the lower bay previously have not been fully identified, enumerated, or classified. Their work is examining the extent of the existing dune system around Chesapeake Bay, the morphologic changes and factors that influence the evolution of the dunes, and the development of a geology-based classification system.



Drs. Jeffrey Shields, Wolfgang Vogelbein, Larry Haas, and Howard Kator have been awarded a three-year grant from the Environmental Protection Agency to examine the relationship between lesions on menhaden, the toxic dinoflagellate, *Pfiesteria piscicida*, and the fungus *Aphanomyces* sp. that has been found in lesions on the fish. The goal of their work is to identify the environmental and biological conditions that contribute to the development and progression of the lesions.

Biological Sciences



Major Programs

Benthic Ecology

Studies focus on the major processes governing the structure and function of benthic systems. Component processes are addressed using a variety of approaches, ranging from molecular genetic studies of evolutionary relationships among species to interdisciplinary studies of organisms or communities interacting with their environment. In most cases research is focused on benthic systems of the land-sea margins, including tidal freshwater, estuarine and coastal regions. On-going research programs include studies of processes influencing recruitment, growth and production of benthic organisms; linkages between benthic and pelagic systems through processes such as nutrient cycling and trophic transfer; functional role of benthic communities in the transport and fate of materials such as sediments, organic matter and contaminants.

Ecosystem Modeling

Modeling activities have been directed towards developing and using digital computer simulation models as integrative and synthetic tools in ecosystem analysis. Current programs include modeling studies of both temperate and tropical seagrasses, the dynamics of littoral zones in estuaries, estuarine plankton-nutrient interactions, and watershed nutrient cycling processes with an emphasis on spatial heterogeneity. Working with hydrodynamic and water quality modelers, a general goal of the program is to develop linked models that address both basic and applied ecological management questions.

Macrophyte Ecology

Research in macrophyte ecology concentrates on submersed and emergent macrophyte species that dominate shallow subtidal and intertidal marine, brackish, and freshwater areas. Current research includes studies on plant distribution and abundance, restoration ecology, plant dispersal mechanisms, plant response to environmental variability, plant growth and productivity, carbon and nitrogen cycling and ecosystem simulation modeling. The program encourages multi-investigator and multi-institutional collaborative efforts.

Nutrient Cycling

This program focuses on processes which regulate water quality and production in intertidal, shallow subtidal, estuarine, coastal, and oceanic habitats. Current studies are focused on processes in shallow, coastal ecosystems which either remove or transform dissolved inorganic and organic nutrients during their transport across the land margin. Other studies are examining the impacts of nutrient cycling processes on the food web.

Physical Biology

Interdisciplinary studies investigate benthic-pelagic coupling, organismal biomechanics including aquatic locomotion, and ecosystem metabolism using innovative instrumentation, including Autonomous Underwater Vehicles.

Plankton Processes

Plankton research addresses processes of primary production by phytoplankton and secondary consumption by bacteria, protozoans and zooplankton in estuarine, coastal, shelf, and open ocean systems. System-wide and both short- and long- term responses to cultural eutrophication are addressed. Collaborative research aimed at understanding the links between plankton dynamics and recruitment of economically important fish are also pursued. The ecology of harmful algal blooms is of particular interest, as is the role of plankton in regulating carbon and nitrogen cycling.

Faculty

Richard L. Wetzel (Chair)
Professor
Iris C. Anderson
Professor
Robert J. Diaz
Professor
Hugh W. Ducklow
*Loretta and Lewis
Glucksman Professor*
J. Emmett Duffy
Associate Professor

Leonard W. Haas
Associate Professor
Kenneth A. Moore
*Research Assistant
Professor*
Robert J. Orth
Professor
Mark R. Patterson
Associate Professor
Linda C. Schaffner
Associate Professor

Rochelle D. Seitz
*Research Assistant
Scientist*
Walker O. Smith, Jr.
Professor
Deborah K. Steinberg
Associate Professor
Helen L. Quinby
*Faculty Research
Associate*

Emeritus Faculty

Michael Castagna
Professor Emeritus
George C. Grant
Professor Emeritus
William J. Hargis, Jr.
Professor Emeritus
Kenneth L. Webb
*Chancellor Professor
Emeritus*

Environmental Sciences



Major Programs

Environmental Chemistry

Sources, transport, fate and bioavailability of pollutants in aquatic systems are focal points. Research addresses issues such as degradation and partitioning in the environment and emerging contaminants of concern. Other interests include modeling the spatial distribution of environmental contaminants using GIS and the application of modern computer techniques to data analysis and interpretation. New techniques are being developed to separate, purify, and identify anthropogenic compounds and their breakdown products. Contaminants of particular interest include petroleum hydrocarbons, antifoulants such as tributyltin, pesticides, fire retardants, and detergents.

Aquatic Toxicology

Toxicity effects are measured as 1) responses of individuals and populations to contaminated water and sediment, 2) uptake and elimination of pollutants by individual organisms, and 3) cellular, histological, subcellular, and molecular mechanisms of uptake, internal distribution, biotransformation, and clearance of hazardous chemicals.

Pathobiology

Major projects focus on infectious and non-infectious diseases of fish and shellfish. A variety of immunological, cytological, histological, biochemical, and molecular techniques are applied to determine the mechanism(s) by which pathogens cause disease in the host organisms. These tools are also used to help investigate host-defense mechanisms, and to develop diagnostics, therapeutics, and vaccines for use in aquaculture.

Ecological Risk Assessment

Risk assessment tools are applied to evaluate the risk associated with exposure to hazardous chemicals, pathogens and bacterial agents, both individually and collectively in complex mixtures. The goal is to provide a conceptual framework that will improve environmental management by allowing resource agencies to focus their resources on those issues of greatest importance and those most likely to be improved measurably by effective management.

Environmental Microbiology

This diverse program 1) focuses on the consequences of introduced indicator microorganisms (bacteria and virus) and human pathogens in waters used for recreation, aquaculture, and shellfish industries; 2) seeks to develop and validate methods for detection of allochthonous microorganisms of public health significance and to understand their fate and autecology in aquatic environments; 3) studies processes that contribute to eutrophication and microbial contamination of receiving waters; and 4) engages in collaborative research to understand the role of bacteria in diseases of feral and cultured fish.

Faculty

Morris H. Roberts, Jr.
Professor (Chair)

Michael C. Newman
Professor

Stephen L. Kaattari
Professor

Fu-Lin Chu
Professor

Mohamed Faisal Abdel-
Kariem
Professor

Howard I. Kator
Associate Professor

Robert C. Hale
Associate Professor

Peter A Van Veld
Associate Professor

Wolfgang K. Vogelbein
Associate Professor

Craig L. Smith
Associate Professor
(Deceased, Jan, 1999)

Michael A. Unger
Assistant Professor

Jeffrey D. Shields
Assistant Professor

Martha W. Rhodes
Instructor

Drew Luellen
Research Associate

Margaret Mulvey
Research Associate

Shaban L. Kotob
Research Associate

Ilsa Kaattari
Research Associate

Eric Lund
Post-Doctoral

Research Associate

Yasunari Kiryu
Post-Doctoral

Research Associate

Emeritus Faculty

Henry Aceto, Jr.
Professor Emeritus

Rudolf H. Bieri
Professor Emeritus

William J. Hargis, Jr.
Professor Emeritus

Robert J. Huggett
Professor Emeritus

J. Ernest Warriner
Professor Emeritus



Fisheries Science



Major Programs

Anadromous Fishes

Research and monitor the abundance, reproductive ecology, life history and exploitation of important migratory species such as striped bass and American shad that spawn in Virginia's tidal fresh waters.

Aquaculture Genetics & Breeding Technology Center

Research includes development of brood stocks in shellfish species, including selective breeding (especially for disease resistance), chromosome set manipulation, and evaluation of non-native species.

Aquaculture Molecular Genetics

Research interests include molecular genetic analyses of aquaculture species and disease organisms. Emphasis is on oyster genomics, molecular phylogenetics, population genetics, and the development of molecular diagnostics for protozoan pathogens.

Bivalve Ecology

Studies focus on recruitment of bivalves, particularly oysters, and the effects of the environment on physiology and behavior of larval oysters and other bivalves; oyster population assessments; and the development of disease-resistant hybrids.

Commercial Fisheries Development

Research includes gear selectivity and bycatch as well as management and regulatory strategies for seafood production, processing, and utilization.

Crustacean Ecology

Studies examine the behavioral ecology, population dynamics and recruitment mechanisms of the blue crab in the Chesapeake Bay and spiny lobster in the Caribbean. Emphasis on predator-prey interactions, population and fisheries modeling, ecology of natural and artificial reef systems, and ecology of tropical fish and queen conch.

Finfish Ecology

Studies of the dynamics, recruitment, stock structure and life history of marine, estuarine and anadromous fishes based on surveys, tagging, and sampling fisheries landings, studies. Data generated by this program are directly applied to stock assessment and fisheries management by state and regional agencies.

Fish and Shellfish Pathology

Ongoing research focuses on the systematics, life cycles, ecology, pathology and control of important disease agents in the Chesapeake Bay region. Current emphasis is on protozoan parasites of oysters, blue crabs, and fishes.

Fisheries Genetics Ecology

Examines the application of molecular genetic techniques to address problems in fisheries science. Studies focus on analysis of stock structure, use of molecular characteristics to identify early life-history stages of marine organisms; and the evaluation of taxonomic and biogeographic hypotheses with molecular genetic information.

Fisheries Oceanography

Focuses on the effects of environmental variables (weather and climate) on the survival, recruitment, and distribution of fishes and other marine organisms.

Marine Vertebrate Methodology

Continuing studies into the comparative morphology, reproduction, and population dynamics of sharks; long-term research on the distribution, migration, abundance, ecology, and energetics of sea turtles; and investigations of the life history of finfish.

Stock Assessment

Involves the systematic evaluation of stock-assessment procedures and the development of new mathematical models and statistical methods for studying populations and their responses to exploitation. Tagging, survey, and landings data are used to estimate population size, mortality rates, components of mortality, yield, spawning potential, and effects of changes in fishery regulations. Applications include invertebrates and vertebrates in temperate and tropical sport and commercial fisheries.

Systematics and Taxonomy

Taxonomically diverse studies that focus on the morphology, evolution, taxonomy and zoogeography of various vertebrate and invertebrate groups. The program promotes a total-evidence approach to phylogenetic research, including molecular techniques and morphological studies of larval, juvenile, and adult forms.

Faculty

John E. Graves (Chair)
Professor
Standish K. Allen, Jr.
Professor
Herbert M. Austin
Professor
Eugene M. Burreson
Professor
Mark E. Chittenden, Jr.
Professor
William D. DuPaul
Professor

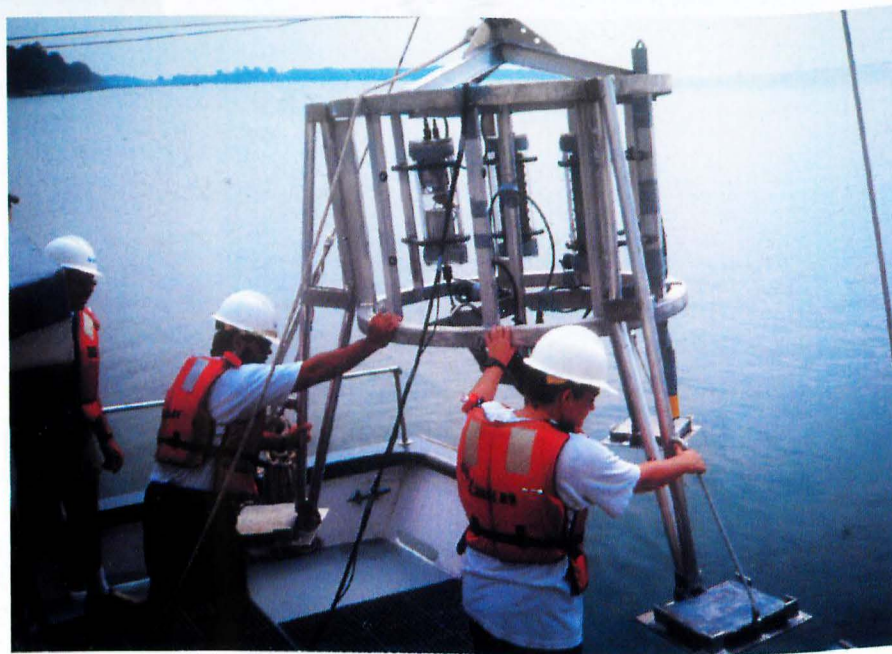
John M. Hoenig
Professor
Romuald N. Lipcius
Professor
Mark W. Luckenbach
Associate Professor
Jon A. Lucy
Instructor
Roger L. Mann
Professor
John A. Musick
Professor

John E. Olney
Associate Professor
Jacques van Montfrans
Instructor
Kimberly S. Reece
Assistant Professor
Quanqi Zhang
Post-Doctoral
Research Assistant

Emeritus Faculty

Jay D. Andrews
Professor Emeritus
Dexter S. Haven
Professor Emeritus
Joseph G. Loesch
Professor Emeritus
Frank O. Perkins
Professor Emeritus
Willard A. Van Engel
Professor Emeritus
Frank J. Wojcik
Professor Emeritus

Physical Sciences



Major Programs

Chemical Fate and Transport

Examines the physical-chemical properties, and the naturally occurring transport and transformation pathways, for chemical contaminants within aquatic ecosystems.

Surface Geochemistry

Studies focus on reactions of man made and natural products at the interface between minerals, sediment, and suspended particles.

Biogeochemistry

Studies focus on interdisciplinary science and chemistry of the Earth's surface, including interactions among the atmosphere, oceans, crustal minerals, and living organisms.

Nitrogen & Carbon Cycling

Investigates marine and estuarine biogeochemistry of nitrogen and carbon using stable isotope techniques.

Organic Geochemistry

Examines organic matter, including factors controlling its production, transformation, and ultimate fate.

Small Scale Physical Processes

Studies focus on coastal fronts, internal waves (including internal tides), and the development and breakdown of density stratification to understand vertical and horizontal fluxes in estuaries and on the shelf.

Continental Shelf Dynamics

Emphasis is on understanding the physical mechanisms that cause across-shelf transport of particles.

Estuarine Dynamics

Addresses both large-scale, long-term transport processes and smaller scale, often localized, short-term processes, using observation, and theoretical and computational tools.

Sediment Geochemistry and Geochronology

Studies seabed processes that determine the ultimate fate of particulate materials and chemicals in estuarine and coastal environments.

Sediment Transport Modeling

Focuses on quantifying and predicting shelf and estuarine sediment transport and spatial scales employing 3-D modeling techniques.

Shoreline Studies and Stratigraphy

Works toward developing proper responses to shoreline erosion at specific sites via beach nourishment and/or stabilization to avoid the loss of highly valued coastal property, and in some cases, living coastal resources.

Dispersal of River Sediments

Focuses on the transfer processes and fate of river-derived sediment in coastal seas.

Sediment Erosion and Deposition Processes

Employs various methods to quantify the erosion and deposition rates of sediment at the water-sediment interface.

Coastal and Estuarine Numerical Modeling

Emphasizes the use of computer models to simulate current, water levels, salinity, and temperature and their effects on environmental conditions such as water quality, sediment, and larval transport.

Water Waves

Focuses on transformation processes and nearshore wave climate prediction.

Bottom Boundary Layer Dynamics

Conducts observational and theoretical studies of turbulence, mixing, stress, stratification, and sediment and velocity profiles within the lowest few meters of the water column.

Coastal Geology

Makes observations and predictions of shoreface and shoreline changes in response to underlying geology; and studies sedimentary processes affecting inner-shelf features (e.g., cape-associated shoals), scour structures, and burial artifacts.

Faculty

Steven A. Kuehl (Chair)
Professor
James E. Bauer
Associate Professor
John D. Boon, III
Professor
John M. Brubaker
Associate Professor
Deborah Bronk
Associate Professor
Elizabeth A. Canuel
Associate Professor
Catherine J. Chisholm-Brause
Assistant Professor
Rebecca M. Dickhut
Associate Professor

David A. Evans
Associate Professor
Carl T. Friedrichs
Assistant Professor
Carl H. Hobbs, III
Associate Professor
Sung-Chan Kim
Research Assistant Professor
Albert Y. Kuo
Professor
Jerome P.-Y. Maa
Associate Professor
William G. MacIntyre
Professor
Jesse E. McNinch
Assistant Professor

John D. Milliman
Professor
Harry Wang
Assistant Professor
L. Donelson Wright
Chancellor Professor
Robert A. Gammisch
Marine Science Supervisor
C. Scott Hardaway
Marine Science Supervisor

Incoming Faculty

Courtney K. Harris
Assistant Professor

Emeritus Faculty

Robert J. Byrne
Professor Emeritus
Maynard M. Nichols
Professor Emeritus
Evon P. Ruzecki
Professor Emeritus

Coastal & Ocean Policy



The Department of Coastal and Ocean Policy was recently reorganized . Formerly the Department of Resource Management and Policy, the reorganization facilitates the expansion of both research and academic interests, as well as, advisory activities. Expansion of departmental faculty is expected to increase interests and expertise in a broad range of research and academic areas.

Major Programs

Coastal Ecosystems

The program emphasizes the development of field and remote sensing models and algorithms necessary to assess coastal ecological phenomena. A major component of this program involves monitoring stress and long-term changes in vascular-plant communities of tidal and non-tidal wetlands, and the relationship of those changes to changes in environmental parameters within a watershed. Another major component is to determine the role of environmental conservation and sustainable development in several developing nations.

Marine Resources

Research in this program focuses on determining the management and utilization of coastal and marine resources, that is optimum for society but consistent with scientific recommendations. Research interests include resource and environmental economics, resource management, statistics, game theory, risk and uncertainty, contingent valuation, valuing non-market goods and services, operations research analysis, resource allocation, international trade, coastal-zone management, the social and economic ramifications of offshore oil and gas exploration and production, aquaculture, economic impact assessment, and fisheries.

Ocean and Coastal Law

Major research activities of this program involve determining the appropriate role of government in public decision-making, and assessing the feasibility of using various property-rights regimes to manage marine and coastal resources and the environment. OCL faculty often engage in collaborative research with faculty from the William and Mary Law School, the School of Business Administration, the School of Arts and Sciences, and the Environmental Sciences Cluster.

Coastal Zone Planning

This program focuses on applying an interdisciplinary approach to integrating science, policy, and communities in the use and management of coastal areas.

Coastal Wetlands

The Coastal Wetlands program conducts extensive research on the structure, function, and optimum use of wetlands and coastal lands. Results from the research is widely applied and has earned worldwide recognition.

Faculty

James E. Kirkley (Chair)
Associate Professor
Thomas A. Barnard, Jr.
Assistant Professor
Ratana Chuenpagdee
Assistant Professor
Carl H. Hershner
Associate Professor

Robert L. Hicks
Assistant Professor
Kevin P. Kiley
Programmer/Analyst
Dr. Maurice (Mo) Lynch
Professor
James E. Perry III
Research Associate
Professor

Walter J. Priest
Marine Science
Supervisor
Dr. William G. Reay
Research Assistant
Professor
Gene M. Silberhorn
Professor
Dennis L. Taylor
Professor

Emeritus Faculty

Bart Thebarg
Professor
(Dept. of Resource
Management and
Policy)

Marine Advisory Program

The role of the Marine Advisory Program (MAP) is to respond to the needs of the marine industry and the general public, and to provide information that will increase the public's awareness of the marine environment. MAP is associated with the Sea Grant program, a state/federal program administered through the National Oceanic and Atmospheric Administration.



Major Programs

Marine Recreational Fisheries

This program focuses on the issues and concerns associated with recreational fisheries management. Current efforts reflect the needs of a growing number of recreational users and an expanding coastal population, and focus on communicating such needs to fisheries researchers and managers.

Marine Business and Coastal Development

This program provides requisite support for all commercial and recreational watercraft owners—a broad constituent base whose members support the economies of Virginia's coastal cities, rural areas, and towns. Emphasis is on economic development initiatives, providing technical assistance, and acting as a liaison between the marine-trade industry and coastal resource management and regulatory agencies.

Commercial Fisheries and Aquaculture

Research and advisory services are directed toward helping individuals and organizations engaged in the commercial harvesting, culturing, processing, and distribution of fisheries products. Staff also conduct applied studies on shellfish and marine finfish aquaculture in cooperation with the commercial fisheries industry.

Marine Education

The marine education program is multi-faceted and serves a variety of audiences. Built on the content and expertise of research and academic programs, the program focuses on bridging the gap between researchers and educators and employs the technologies of distance learning to maximize impact. Projects are organized into three areas: K-12 teaching and learning; seafood education; and development of a state-of-the-art marine education center.

Communications & Public Relations

Communications staff employ a variety of media and methods to disseminate science- and advisory-based information to the people of Virginia and the Chesapeake Bay region. These include the *Marine Resource Bulletin*, published quarterly and the award marine education website the *Bridge*. The *Virginia Marine Resource Bulletin* and technical advisories form the foundation of research information delivery. Additionally, program support materials are produced in response to client needs.

Staff

Dr. William DuPaul
Professor,
Dept. of Fisheries Science
Sea Grant Extension
Program Leader,
VA Sea Grant College
Program, MAS
Cheryl Teagle
Business Manager
Barbara Kriete
Office Services Specialist
Thomas Murray
Marine Business and
Coastal Development
Specialist

Harrison Bresee
Marina Technical
Advisory Specialist
Robert Fisher
Commercial Fisheries
Specialist
Michael Oesterling
Commercial Fisheries
Specialist
John Olney, Jr.
Aquaculture Specialist
David Rudders
Commercial Fisheries
Specialist

Jeffrey Tellock
Marine Aquaculture
Specialist
Sally Mills
Communicator
Vicki Clark
Marine and Seafood
Education Specialist
Susan Haynes
Marine Education
Specialist
Lee Larkin
Marine Education
Leader

Lisa Lawrence
Marine Education
Specialist
Jon Lucy
Marine Recreation
Specialist
Carol Rideout
Bay Team Teacher
Laura Rose
Marine Education
Specialist



Chesapeake Bay National Estuarine Research Reserve in Virginia

The Chesapeake Bay National Estuarine Research Reserve in Virginia (CBNERRVA) maintains ecological sites in the Bay watershed for long-term estuarine research and monitoring, environmental education and conservation of key estuarine resources. CBNERRVA is a branch of NOAA's National Estuarine Research Reserve System and is developed and managed through VIMS.

CBNERRVA maintains reserves at the Goodwin Islands, the Catlett Islands, Taskinas Creek, and Sweet Hall Marsh in the York River basin, and will eventually add sites on the Potomac, Rappahannock, and James River basins, the mainstem of the Bay, and the Eastern Shore.

Investigators from VIMS and other institutions are involved in more than 20 research projects on the CBNERRVA sites, including monitoring of plants, birds, water quality, and estuarine debris. Future work will include monitoring fishes, amphibians, reptiles, and invertebrates. The research sites also serve as *outdoor classrooms* for local schools, environmental organizations and state agencies.

CBNERRVA is designated a Sister Reserve to the Tianjin Paleocoastal and Wetland Nature Reserve, Tianjin, Peoples



Republic of China through a memorandum of Understanding between the National Ocean Services (NOS) of the U.S. National Oceanic and Atmospheric Administration (NOAA) and the People's Republic of China, State Oceanic

Administration (SOA), under the US-China Science and Technology Agreement of 1997.

In 1999, the Commonwealth established a Virginia Estuarine and Coastal research Reserve System to be managed and operated by VIMS in coordination with CBNERRVA.

Staff

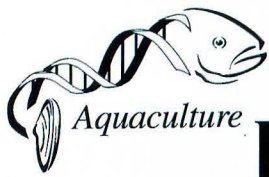
Dr. Maurice (Mo) Lynch
Professor
Manager, CBNERRVA

Dr. William G. Reay
Research Assistant
Professor
Research Coordinator/
Assistant Manager

Dr. David Niebuhr
Research Assistant
Professor, School of
Education
Education Coordinator

April Bahen
Assistant Education/
Communications
Coordinator
Eric Wooden
Monitoring Coordinator

Carolyn Gardner
Administrative Assistant



Aquaculture Genetics and Breeding Technology Center

In 1997, Virginia legislators established the Aquaculture Genetics and Breeding Technology Center (ABC) at VIMS. The Center is one of the first dedicated centers for breeding shellfish. ABC focuses on selective breeding and genetic engineering of shellfish - making them more uniform, like agricultural crops. ABC primarily works with shellfish because of their economic importance to Virginia and the region.



Major Programs

- Disease-resistant oysters are under development and two varieties have been released to commercial hatcheries for seed production. Breeding for disease resistance will help to revitalize natural oyster populations and enhance the development of an oyster aquaculture industry. These same strains of oysters will also be useful in restoring of oyster reefs.
- ABC's Clam Breeding Project is comparing commercial strains of clams in support of the \$15M a year clam aquaculture industry. Our role will be to define the value of these strains, and refine them through selective breeding, improving Virginia's competitive edge through superior strains.
- ABC's molecular genetics program is developing unique markers for oyster species. At the local level, these markers will be used for accelerating selection for disease resistance. At the international level, ABC is helping to define the range and extent of genetic resources in oyster species worldwide. ABC is evaluating some of these resources.
- Non-native oysters are a valuable source of genetic material for breeding, for understanding comparative physiology, and potentially for providing alternative species for aquaculture.
- ABC is pioneering 21st century technology to evaluate and develop techniques for reducing the risk of introducing non-native oysters in Chesapeake Bay.

Staff

Dr. Standish K. Allen, Jr.
Professor
Director of Center
Peggy Cooney
Administrative Assistant
Ann Arseniu
Hatchery & Research
Manager, Gloucester Point

Dan Sennett
Assistant Hatchery &
Research Manager,
Gloucester Point
Aimee Howe
Laboratory Specialist
A.J. Erskine
Laboratory Specialist

Dr. Kim Reece
Assistant Professor
Karen Hudson
Laboratory Specialist
Wendi Ribeiro
Marine Scientist
Nate Geyerhahn
Field and Research Manager,
Eastern Shore

Tim Rapine
Hatchery and Research
Manager, Eastern Shore

Center for Coastal Resource Management



The Comprehensive Coastal Inventory Program (CCI) undertakes inventory and monitoring projects for wetlands, shoreline, and associated natural and cultural resources in the coastal plain; applied research in GIS and image processing; and applied research in resource management based on inventory information.

The Coastal Watershed Program undertakes projects to support management and planning of local and regional watersheds. The program synthesizes information from many disciplines in response to requests for technical assistance from state agencies, local governments, local watershed organizations, and industry groups. The primary focus is understanding the impacts of land-use practices on water quality and habitat functions in coastal watersheds.

The Wetlands Program undertakes basic and applied research; advisory support of tidal and nontidal wetlands management programs; graduate education; and outreach education projects.

Staff

Carl H. Hershner
Associate Professor
Director of Center
Kirk Havens
Assistant Director
Agnes Lewis
Business Manager
Dawn Fleming
Executive Secretary

Comprehensive Coastal Inventory

Marcia Berman
Harry Berquist
Sharon Dewing
Julie Glover
Tamia Rudnicki
Dan Schatt
Dave Weiss

Wetlands

Thomas A. Barnard, Jr.
Patty Clancy
Cary Coppock
Karen Duhring
Kirk Havens
Pamela Mason
Anne Newsom
Walter I. Priest, III

William Roberts
Gene M. Silberhorn
Becky J. Thomas
Lyle Varnell

Eastern Shore Laboratory



The VIMS Eastern Shore Laboratory (ESL), is located in the seaside village of Wachapreague. This field station is uniquely suited for field research into coastal processes, and provides convenient access to the eastern portion of the Chesapeake Bay and the barrier island, salt marsh-lagoonal systems along Virginia's Atlantic shore.

Facilities at the ESL include seawater laboratories, quarantine hatchery facilities, a seawater flume laboratory and classroom, and laboratory teaching facilities. Office and laboratory space for visiting investigators and a dormitory are also located here.

Current research activities include investigations into nitrogen cycling in salt marshes, disease transmission between mollusks, population dynamics of finfish and shellfish, and a large-scale research project on habitat restoration of oyster reefs and seagrass beds.

Staff

Mark Luckenbach
*Professor, Director Eastern
Shore Laboratory*
Francis O'Beirn, Ph.D.
Marine Scientist
Al Curry
Laboratory Specialist
Gretchen Arnold
Laboratory Specialist
P.G. Ross
Laboratory Specialist

Stephanie Bonniwell
Laboratory Technician Senior
Celia Cackowski
Laboratory Technician Senior
Kari Bagdasarian
Laboratory Technician Senior
Reade Bonniwell
*Buildings and Grounds
Supervisor*

Nancy Lewis
*Program Support
Technician*
Nate Geyerhahn
*Aquaculture Genetics and
Breeding
Technology Center*
Tim Rapine
*Aquaculture Genetics and
Breeding
Technology Center*

School of Marine Science

Currently about 125 students are enrolled in the graduate program. They are roughly equally divided between Master of Science and Ph.D. candidates. Students are drawn from colleges and universities worldwide. International students constitute about 12% of the student body. Because coastal and estuarine research requires an interdisciplinary understanding of the environment, first-year students take a series of five core courses designed to provide broad-based knowledge in Marine Science.



Advanced students may take a wide variety of lecture, seminar, and laboratory courses, in their field of research interest. In addition, William and Mary programs, such as the College's Environmental Science and Policy Cluster, provide opportunities for students to work directly with faculty in the Law School, the Public Policy Institute, and other groups within the social and natural sciences. Graduates find work at academic and research institutes; management and regulatory agencies at the local, state and federal level; and in the corporate and private sector.



Degrees Awarded

1998-1999

Doctor of Philosophy

Heidi Banford	Fisheries Science
Vincent Buonaccorsi	Fisheries Science
Giancarlo Cicchetti	Biological Sciences
David Carlini	Fisheries Science
William Coles	Fisheries Science
Anamarija Franki	Resource Mgt. & Policy
James Gelslechter	Fisheries Science
Steven Goodbred, Jr.	Physical Sciences
Monica Lara	Fisheries Science
David Niebuhr	Resource Mgt. & Policy
Martha Nizinski	Fisheries Science
Gary Schultz, Jr.	Biological Sciences
Yongsik Sin	Biological Sciences
Geoffrey Trussell	Biological Sciences
Peter van den Hurk	Environmental Sciences

Master of Science

Eva Bailey	Biological Sciences
Michael Campana	Resource Mgt. & Policy
Matthew Church	Biological Sciences
Robyn Draheim	Biological Sciences
Colleen Fennessy	Environmental Sciences
Richard Kraus	Fisheries Science
Ai Ning Loh	Physical Sciences
Alfonso Lombana	Biological Sciences
John Parker	Biological Sciences
Jennifer Reid	Resource Mgt. & Policy
David Rudders	Fisheries Science
Wendy Rose	Environmental Sciences
Melissa Southworth	Fisheries Science
Eric Wooden	Biological Sciences

1999-2000

Doctor of Philosophy

Ian Bartol	Fisheries Science
Soraya Bartol	Fisheries Science
Martin Cavalluzzi	Fisheries Science
Thomas Chisholm	Physical Science
Jan Cordes	Fisheries Science
Timothy Dellapenna	Physical Sciences
Juliana Harding	Fisheries Science
Matthew Harwell	Biological Sciences
Kevin Hovel	Fisheries Science
Michelle Neubauer	Biological Sciences
Peter Raymond	Physical Sciences
Mary Rybitski	Environmental Sciences
Craig Tobias	Biological Sciences

Master of Science

Megan Bohlen	Physical Sciences
Meredith Bostrom	Fisheries Science
Peter Countway	Biological Sciences
Michael Arendt	Fisheries Science
Rebecca Countway	Physical Sciences
Brett Falterman	Fisheries Science
John Galler	Physical Sciences
Thomas Ihde	Fisheries Science
Kenneth Macdonald	Biological Sciences
Jacques Oliver	Environmental Sciences
John Walter, III	Fisheries Science
Haili Zhang	Environmental Sciences

Awards

Tami Lunsford	2000, Best Poster Award, Atlantic Estuarine Research Society
Christine Conrad	1999, National Science Foundation Graduate Research Fellowship, \$15,000 stipend and \$10,000 tuition/year for three years

Elizabeth Mountz 2000, Virginia Space Grant
Consortium Aerospace Graduate
Research Fellowship, \$5000.00

Additional Education Programs

Summer Interns

Undergraduates from around the country learned about



coastal marine science as part of the VIMS Summer Intern Program. During the last biennium, VIMS faculty mentored 25 rising junior and senior college students in

one-on-one research experiences on topics ranging from oyster biology to sediment transport. This program, coordinated by Dr. Linda Schaffner of the Department of Biology, is one of 22 such competitive entry programs funded through the National Science Foundation, Division of Geosciences as part of the Research Experience for Undergraduates (REU) program.

Female Initiation Into Research, Science & Technology (F.I.R.S.T.)

Supported by funds from the Ocean Sciences Division of the National Science



Foundation, the F.I.R.S.T. Program is designed to provide research experience in fields such as chemical and geological oceanography, where females have been traditionally underrepresented. The F.I.R.S.T. Program sponsored 24 high school girls during the past four summers. The girls came primarily from Virginia including public and private schools in the cities of Richmond, Virginia Beach, Newport News, Hampton, and Williamsburg as well as Franklin, York, Gloucester, and Matthews Counties. The FIRST Program involved women faculty, staff, and graduate students in the Physical Sciences, Environmental Sciences, Coastal Ocean Policy and Biological Sciences departments. A few FIRST alumni extended their projects beyond the FIRST program and received scholarships from the Virginia Junior Academy

of Science. Several currently attend prestigious colleges and universities in Virginia and throughout the country including an Echols Scholar at the University of Virginia. Dr. Elizabeth Canuel, Associate Professor, Dept. of Physical Science, developed and coordinates the program.

Mini-School of Marine Science

This public education series expanded to include sessions on Virginia's marine resources and environmentally sensitive landscaping techniques. These were presented in Richmond, Newport News, Gloucester Point and Williamsburg over the past year. More than 350 people participated in the series. Two sessions were presented on the Eastern Shore, the first session was held at the VIMS Eastern Shore Laboratory with more than 60 attendees. Additional sessions are planned for the Northern Neck, Northern Virginia, Portsmouth, and Chesapeake.

Governor's School Program

VIMS Governor's School is a five-week summer residential school administered by the VIMS Sea Grant Marine Advisory Program in cooperation with the Virginia Department of Education. For 16 years, this program has been serving high-achieving high school students from throughout Virginia and providing participants with experiences in marine research. During the summer of 2000 six exceptional students from across the state spent five intensive weeks in laboratories and in the field working with faculty, staff, and graduate students in VIMS' Departments of Fisheries Science, Environmental Sciences, and Physical Oceanography, and the Center for Coastal Resources Management.

Projects included a study of the differences in clam density by habitat and location in the York River, a study



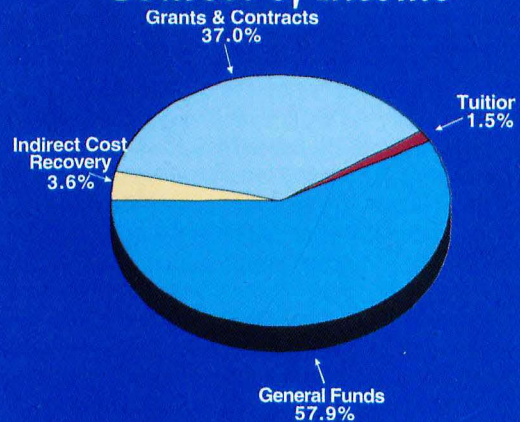
of the vegetation and community structure of the VIMS marsh, and producing quicksand in preparation for acoustic sediment analysis. The students assist with VIMS research projects by assuming responsibility for specific research duties and reporting on this work in a scientific seminar at the end of the session.

Financial Activity

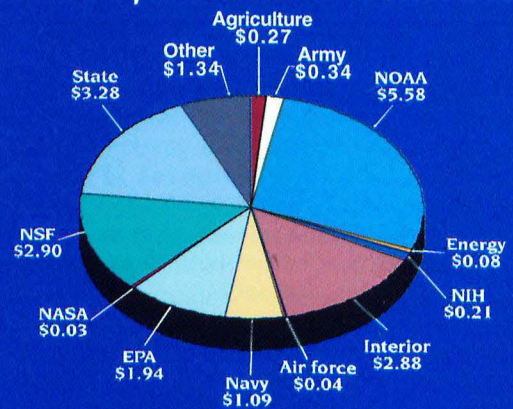
The 1998-2000 biennium brought both challenge and opportunity to the Institution. Resources were aligned to support the growing research, advisory, and instructional missions while decreasing the portion of the institutional budget allocated to administrative and support services. In addition, several major capital projects afforded VIMS an opportunity to substantially increase and improve research facilities.

Private funds play an important role in supporting the mission of the institute. These funds support endowed professorships, student scholarship and research. An investor's report is available upon request.

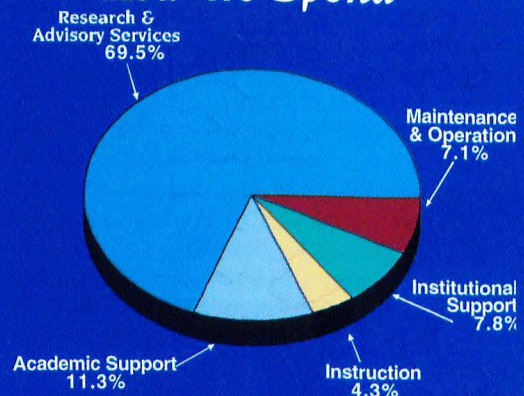
Sources of Income



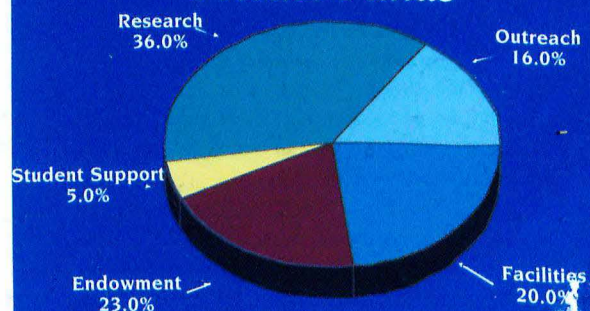
Sources of Grants & Contracts



How We Spend



Private Funds



Publications

Journal and Book Contributions

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1966. **Hargis**, William J., Jr, **Haven**, Dexter S., 1999. Chesapeake oyster reefs, their importance, destruction and guidelines for restoring them. In Luckenbach, Mark W., Roger Mann and James A. Wesson, eds. *Oyster Reef Habitat Restoration: A Synopsis and Synthesis of Approaches Gloucester Pt., VA, VIMS Press: 1999, Chapter 23: p. 329-358.*
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2052. **Maa**, Jerome P.-Y., **Hobbs**, Carl H., III, 1998. Physical impact of waves on adjacent coasts resulting from dredging at Sandbridge Shoal, Virginia. *Journal of Coastal Research* 14: 525-536.
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2082. **Armknrecht**, Susan L., **Kaattari**, Stephen L., **Van Veld**, Peter A., 1998. An elevated glutathione S-transferase in creosote-resistant mummichog (*Fundulus heteroclitus*). *Aquatic Toxicology* 41: 1-16.
2084. **Wright**, L. Donelson, **Kim**, Sung-Chan, **Friedrichs**, Carl T., 1999. Across-shelf variations in bed roughness, bed stress and sediment suspension on the northern California shelf. *Marine Geology* 154: 99-115.
2080. Robinson, Michael, Gallagher, Dan, **Reay**, William G., 1998. Field observations of tidal and seasonal variations in ground, water discharge to tidal estuarine surface water. *Groundwater Monitoring & Remediation* 18: 83-92.
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2091. **Perry**, James E., Ware, Donna M.E., McKenney-Mueller, Amanda, 1998. *Aeschynomene indica* L. (Fabaceae) in Virginia. *Castanea* 63: 191-194.
2093. **Gelsleichter**, James, Cortes, E., Manire, C.A., Hueter, R.E., **Musick**, John A., 1998. Evaluation of toxicity of oxytetracycline on growth of captive nurse sharks, *Ginglymostoma cirratum*. *Fishery Bulletin* 96: 624-627.
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2105. **Driscoll**, Susan B. Kane, **Schaffner**, Linda C., **Dickhut**, Rebecca M., 1998. Toxicokinetics of fluoranthene to the amphipod, *Leptocheirus plumulosus*, in water-only and sediment exposures. *Marine Environmental Research* 45: 269-284.
2106. **Padma**, Tiruponithura V., **Hale**, Robert C., **Roberts**, Morris H., Jr., 1998. Toxicity of water-soluble fractions derived from whole creosote and creosote-contaminated sediments. *Environmental Toxicology and Chemistry* 17: 1606-1610.
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2110. **van den Hurk**, Peter, **Roberts**, **Morris H.**, Jr., **Faisal**, Mohamed, 1998. Interaction of cadmium and benzo[a]pyrene in mummichog (*Fundulus heteroclitus*): Biotransformation in isolated hepatocytes. *Marine Environmental Research* 46: 529-532.
2111. **Varnell**, Lyle M., 1998. The relationship between inundation history and bald cypress stem form in a Virginia floodplain swamp. *Wetlands* 18: 176-183.
2112. **Nestlerode**, Janet A., **Diaz**, Robert J., 1998. Effects of periodic environmental hypoxia on predation of a tethered polychaete, *Glycera americana*: implications for trophic dynamics. *Marine Ecology Progress Series* 172: 185-195.
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