



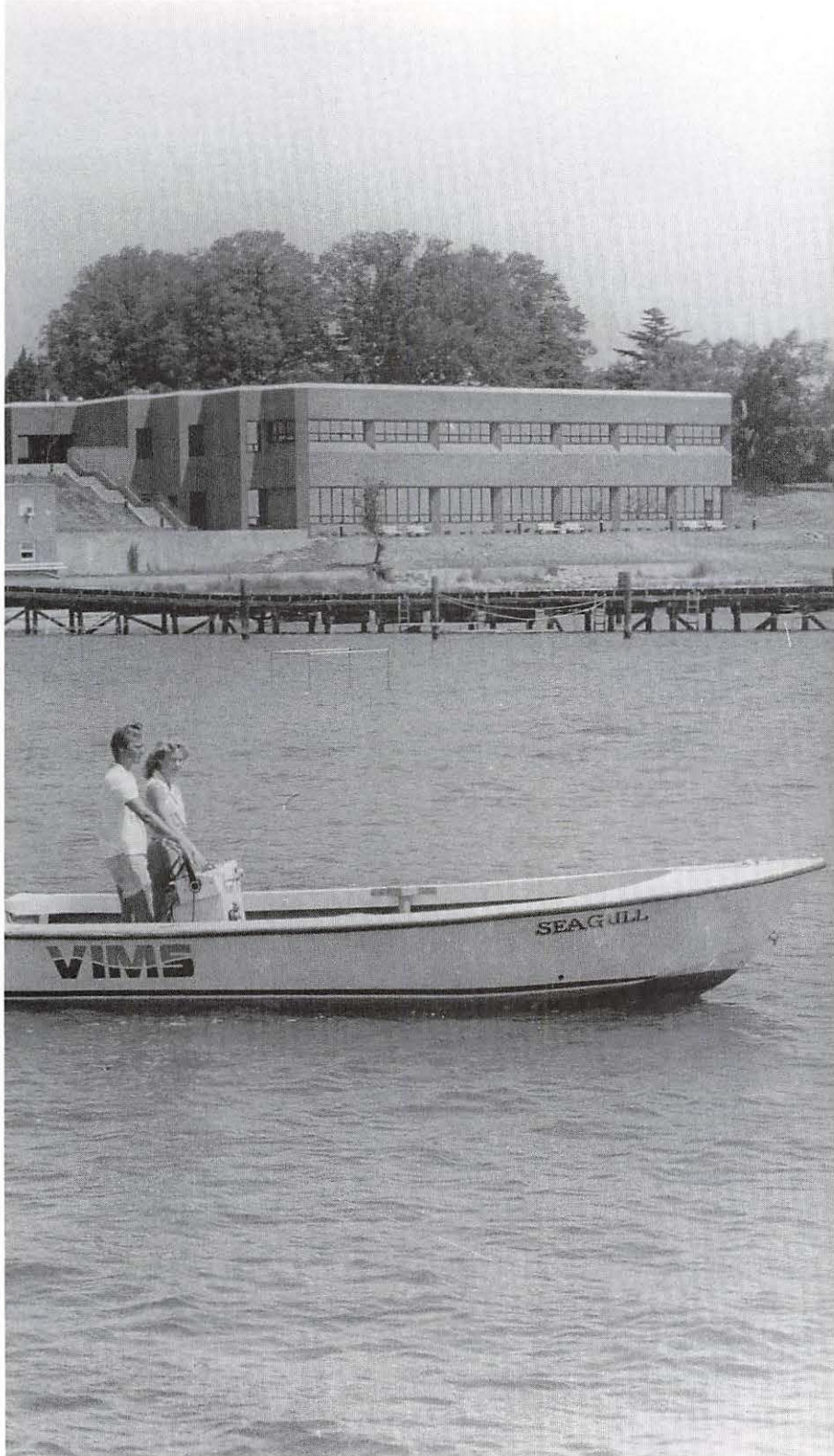
*The College of
William & Mary*

RESOURCE MANAGEMENT AND POLICY

School of
Marine Science

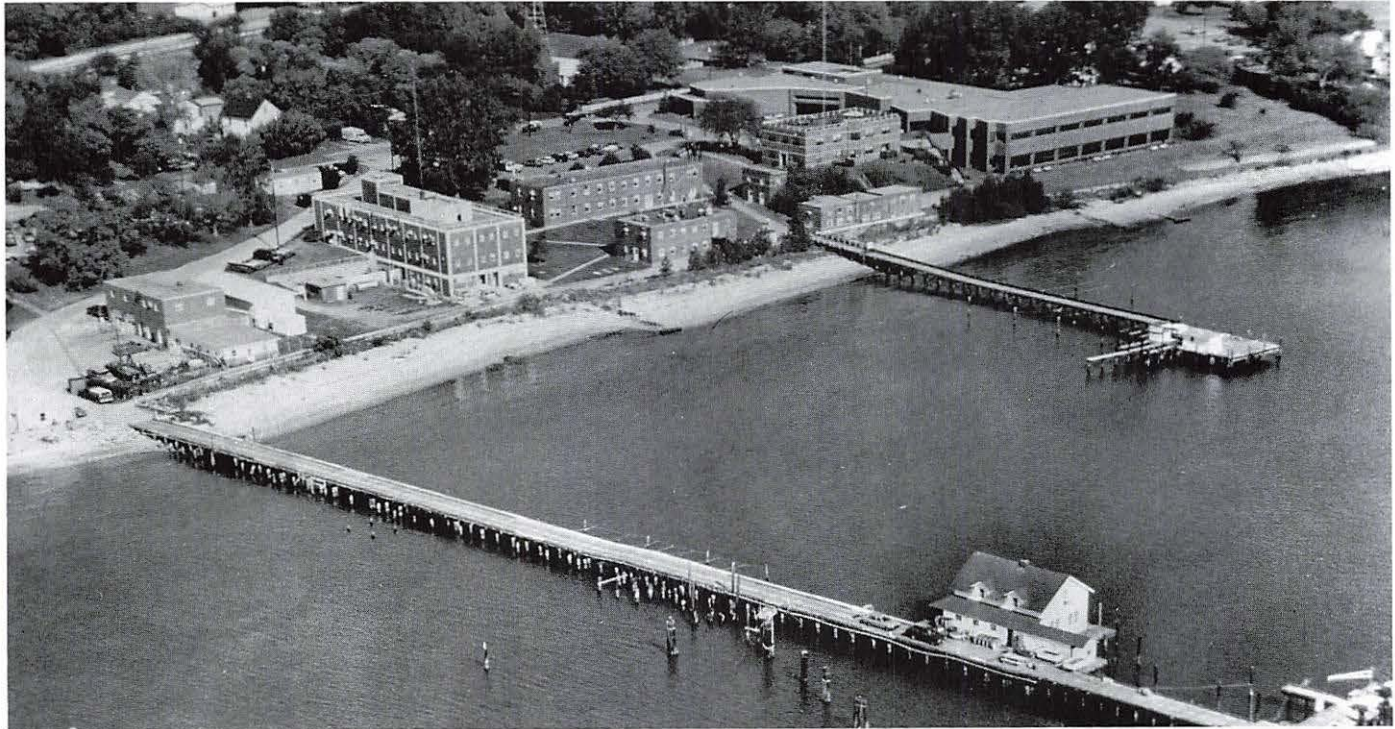
Virginia Institute
of Marine Science





*The School of
Marine Science is
one of four professional
graduate schools of the
College of William & Mary.*

*The objective of the
educational program is
to provide a fertile and
stimulating learning
environment for students
preparing for careers in
marine science.*



The School of Marine Science/Virginia Institute of Marine Science occupies the site of Gloucester Town, a colonial settlement established in 1680. The remains of military fortifications from both the Revolutionary War and the Civil War reflect Gloucester Point's strategic location at the mouth of the York River.

Chartered in 1940, the School of Marine Science/Virginia Institute of Marine Science (SMS/VIMS), has a tripartite mission of research, education, and advisory service in marine science. This mandate established an institution that is uniquely prepared to educate the highly qualified researchers, resource managers, and educators needed for the future. Today, SMS/VIMS is the third largest marine research and education center in the country.

The School awards both Master of Arts and Doctor of Philosophy degrees. Graduate studies are offered in five areas:

- Biological Sciences**
- Environmental Sciences**
- Fisheries Science**
- Physical Sciences**
- Resource Management & Policy**

Academic programs are closely allied to the research and advisory programs of the Virginia Institute of Marine Science enabling students to participate in basic and applied science. Faculty scientists are involved in collaborative research with scientists from other institutes both nationally and internationally. In addition, researchers work closely with marine industries, policy makers, and regulatory agencies.

The Institute accommodates the interdisciplinary investigation that is essential to understanding and addressing the complex issues of

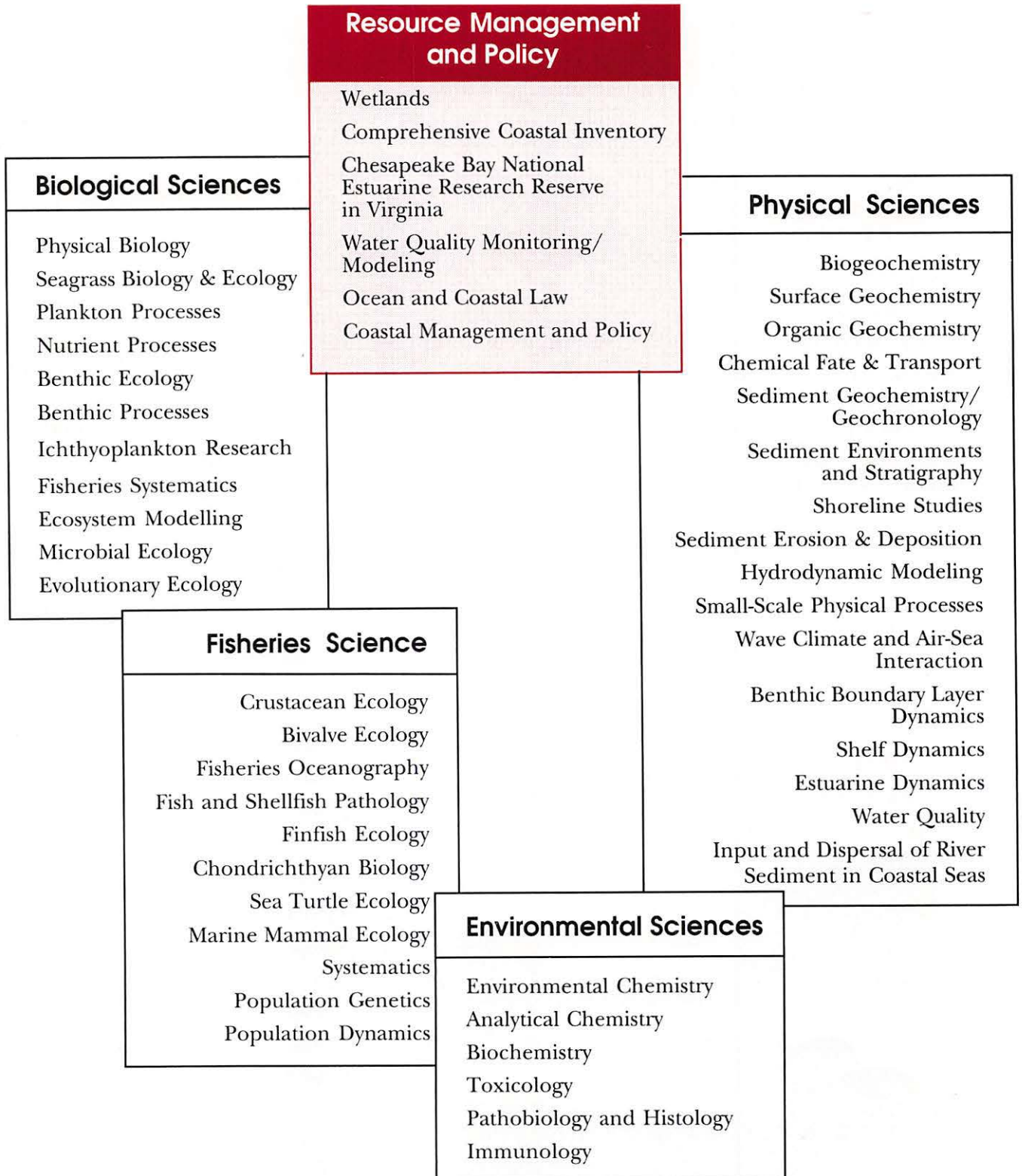
modern marine science. Faculty, researchers, and students maintain a primary affiliation in one of the five departments. However, programs and research within departments are often carried out in association with scientists from other departments. Students with specific interests in areas outside their department may arrange crossover study and research. This interactive approach enables students to work with various members of the diverse faculty and provides access to all facilities at the Institute.

*In a society
that is
increasing
its pressure
on the environment
and natural
resources,
the coastal,
estuarine, and marine
environment
has become
an area of
critical
concern.*



Research at SMS/VIMS encompasses all elements—land, sea, and air—that affect marine ecosystems.

Major Programs



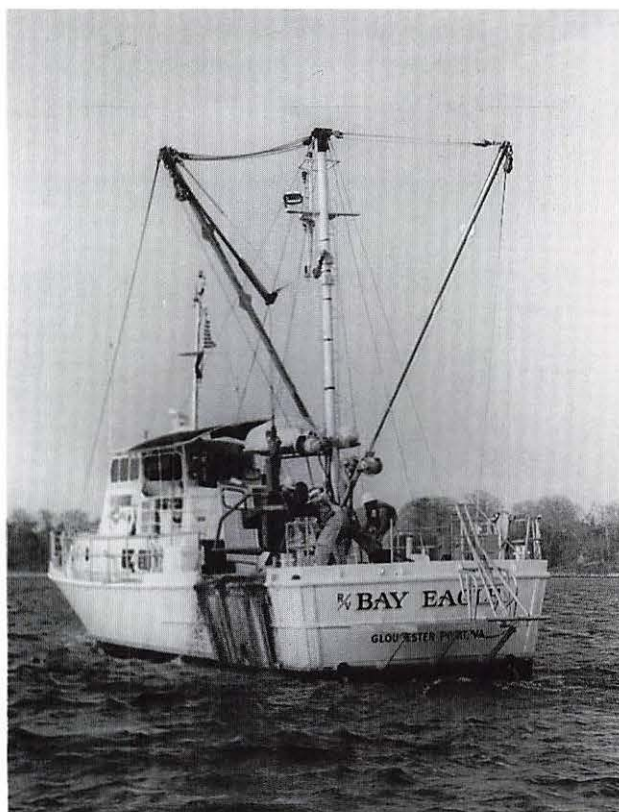
Located in Gloucester Point at the mouth of the York River, the campus has easy access to Virginia's estuaries, tidal and non-tidal wetlands as well as the Chesapeake Bay and Atlantic Ocean. The Wachapreague campus, on Virginia's Eastern Shore, is surrounded by embayments, salt marshes, barrier beaches, and coastal waters. Both locations provide ideal settings for research and teaching.

The thirty-five acre Gloucester Point campus houses six buildings with flow-through salt water systems and various laboratories that are well equipped for basic as well as specific project research. Equipment in-

cludes: a mass spectrometer, scanning and transmission electron microscopes, hydraulic flumes, an underwater video system, acoustic doppler current profilers, electromagnetic current meters, and a Geographic Information System.

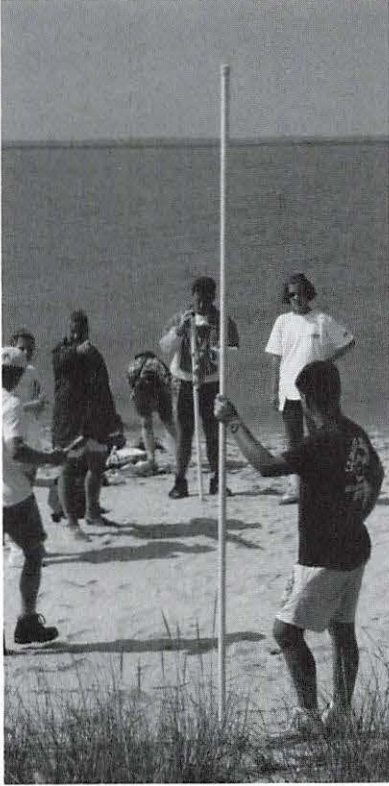
A 60,000 square foot laboratory is scheduled for completion in the fall of 1995. The facility will house highly-specialized labs for advanced research in chemistry, geochemistry, toxicology, pathobiology, microbiology, genetics, physiology, planktonology, nutrient cycling, and parasitology.

*The Institute
is the
largest marine
center in
the U.S. that
is focused
on coastal
and
estuarine
science.*



Institute scientists have monitored natural, commercial, and industrial effects on the Chesapeake Bay and its estuaries for more than fifty years.

EASTERN SHORE LABORATORY



Students from Virginia Polytechnic Institute & State University utilize facilities at the Eastern Shore Lab.

The VIMS Eastern Shore Laboratory, located in the seaside village of Wachapreague, serves as a field station for research, teaching, and advisory activities of SMS/VIMS.

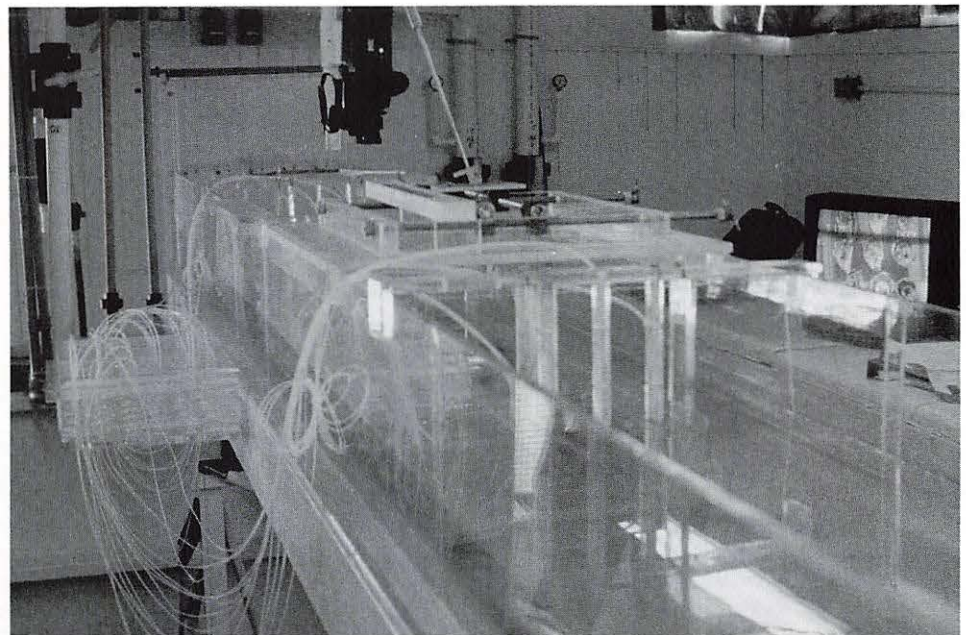
Along the approximately 100 km of its Atlantic shoreline, the Virginia Eastern Shore remains one of the least developed coastal regions in the United States, with essentially no development on its barrier islands. This pristine area is uniquely suited for field research into coastal processes. The location provides convenient access to the eastern portion of the Chesapeake Bay and the barrier island, salt marsh-lagoonal systems along Virginia's Atlantic shore.

Widely recognized for its contributions to research in bivalve aquaculture, the Lab also supports activities of scientists and students from the Gloucester Point campus

and other institutions. Recent research activities at the facility include: investigations into nitrogen cycling in salt marshes, disease transmission between mollusks, population dynamics of finfish and shellfish, chemical induction of settlement in invertebrates, and hydrodynamic characteristics of seagrass seeds.

Extensive wet laboratory facilities include running seawater tables and large holding tanks. A small hatchery for the culture of marine and estuarine organisms is especially well suited for mollusk culture. An on-site flume laboratory permits investigation of processes (hydrodynamic, sedimentological, and biological) in the benthic boundary layer.

Office and dry laboratory space are available to students and visiting investigators. An on-site dormitory can accommodate up to 28 visitors.



The seawater flume laboratory was designed and built by the Eastern Shore Lab faculty and staff.



More than 600 dives are logged annually by the 40-member dive team.

VESSELS CENTER

The vessels center maintains and operates a fleet of 40 vessels. The 65-foot *R/V Bay Eagle* is outfitted with a wet lab containing a flow-through seawater system, a dry lab housing electronics, and project-oriented equipment. Similarly outfitted is the 44-foot *R/V Langley*. Both vessels have Loran interface for downloading information to on board computers. In 1990, the 29-foot *R/V Fish Hawk* was especially designed and equipped to perform trawl surveys. A sizeable trailerable fleet supports estuarine and tributary research. Electronic systems can be transferred to these smaller boats, enabling precise scientific surveys to be conducted on board. A new diving facility includes a diver training room and classrooms to support the 40-member VIMS dive team. The VIMS diving program is an organizational member of the American Academy of Underwater Sciences.

LIBRARY

The library supports the Institute's mission by collecting and providing access to marine science literature, with emphasis on estuaries and the coastal zone. Currently the collection includes 521 journal subscriptions, 44,000 volumes and 19,200 titles in addition to topographic maps, nautical charts, and scientific archives. Access is provided through the card catalog as well as through the circulation terminal and personal computers. On-line networks provide access to marine science literature through *Aquatic Sciences and Fisheries Abstracts* and the *Chesapeake Bay Bibliography*, and Swem Library on the Main Campus in Williamsburg. The library workstation is networked to computers in the student User's Room.

MARINE ADVISORY SERVICES/SEA GRANT

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

Specialists from MAS work closely with businesses, governmental agencies, educational organizations, and individuals to provide information and advice on a wide range of marine-related programs and activities.

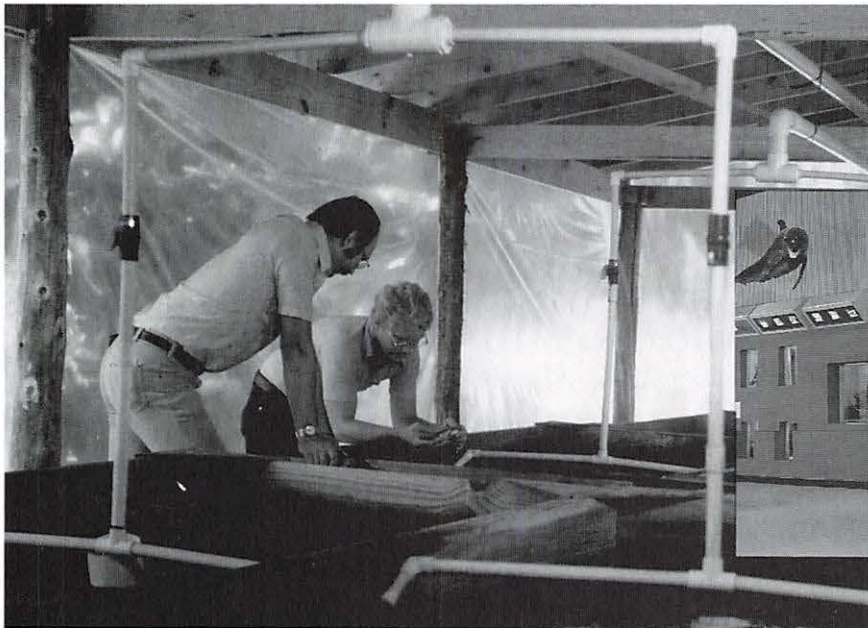
The direction of MAS research is dictated by industry and government needs. Research has ranged from gear selectivity experiments and sea scallop biology, to technology for soft crab shedding and clam relay-

ing. MAS works extensively with the recreational fishery, marine trades, and the offshore pelagic fishery.

In the past few years, changing needs and opportunities—driven in part by enacted or pending regulatory measures—have presented new challenges to MAS in the areas of seafood processing, water quality, and mariculture development.

Students at MAS are generally associated with Fisheries Science or Resource Management departments. Their research has been diverse. Projects have included sea scallop biology, the socioeconomics of Virginia's recreational fishery, the food/feeding habits and trophic interaction of tuna species in Virginia's offshore waters, and the biology of recreational reefs.

Advisory scientists work closely with industry, in this case the operator of a blue crab shedding facility.



MAS maintains the aquarium that attracts more than 5,000 visitors each year.



CHESAPEAKE BAY NATIONAL ESTUARINE RESEARCH RESERVE

Since 1987, Virginia Institute of Marine Science has been the lead agency for the Reserve System in Virginia. Reserve sites are preserved for estuarine research, monitoring, education, and conservation of key resources in relatively pristine settings. Establishment of four sites began a system that will include sites on the York, Pamunkey, Potomac, Rappahannock, and James rivers, the mainstem of the Bay and the Eastern Shore. Sites of activity today are the Goodwin Islands, the Catlett Islands, Taskinas Creek, and Sweet Hall Marsh. More than 20 research projects involving investigators from several colleges and universities are currently underway. The program provides study areas for numerous graduate research projects, "outdoor classrooms" and ecology presentations.



Taskinas Creek is one of the four Reserve Sites for estuarine research.

FISH COLLECTIONS

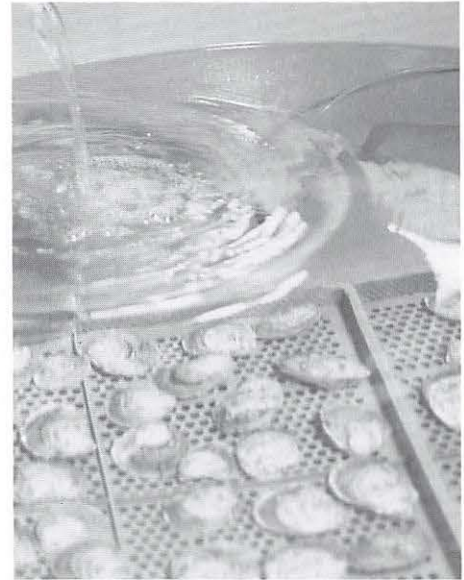
Nunnally Hall, completed in 1992, houses the extensive ichthyology collection that includes approximately 85,000 specimens in 247 families from Chesapeake Bay and contiguous waters, the continental slope and abyssal plain of the western Atlantic, and freshwater species of the southern Appalachians. More than 13,000 catalogued lots are stored on specially constructed shelving that provides access to the entire collection. The Institute also maintains a growing collection of marine and estuarine ichthyoplankton from Chesapeake Bay, Mid-Atlantic Bight, and Caribbean waters as well as a number of exotic species including a 5-foot female coelacanth from the Comoros Island in the Indian Ocean. There are facilities for processing acquisitions, x-ray studies, and performing necropsies on large fishes, sea turtles and cetaceans.



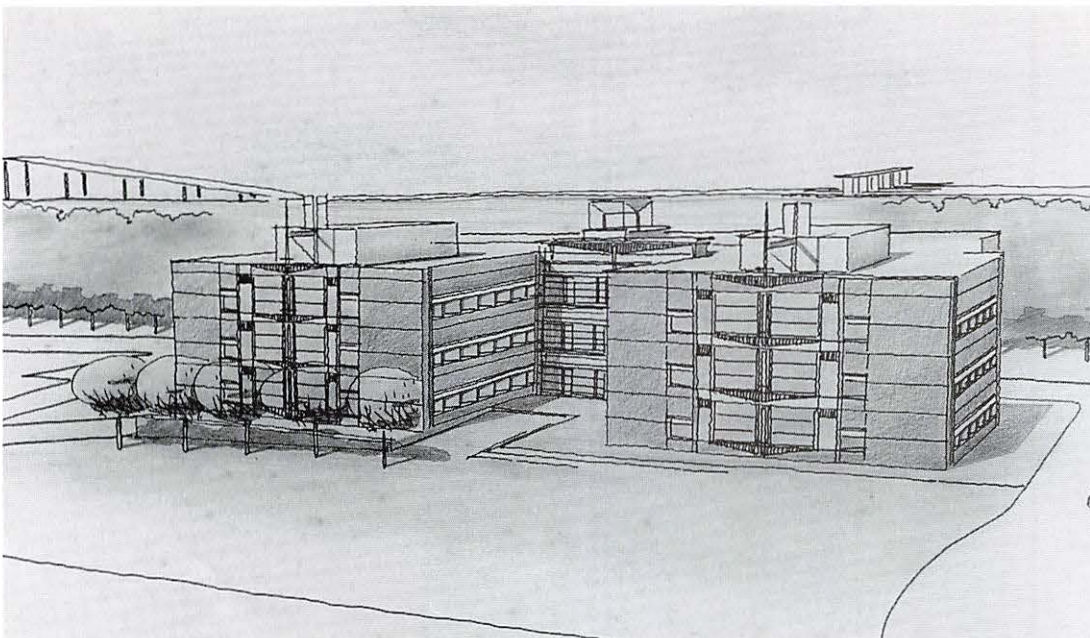
The Institute houses one of the most extensive fisheries collections on the East Coast.

OYSTER HATCHERY

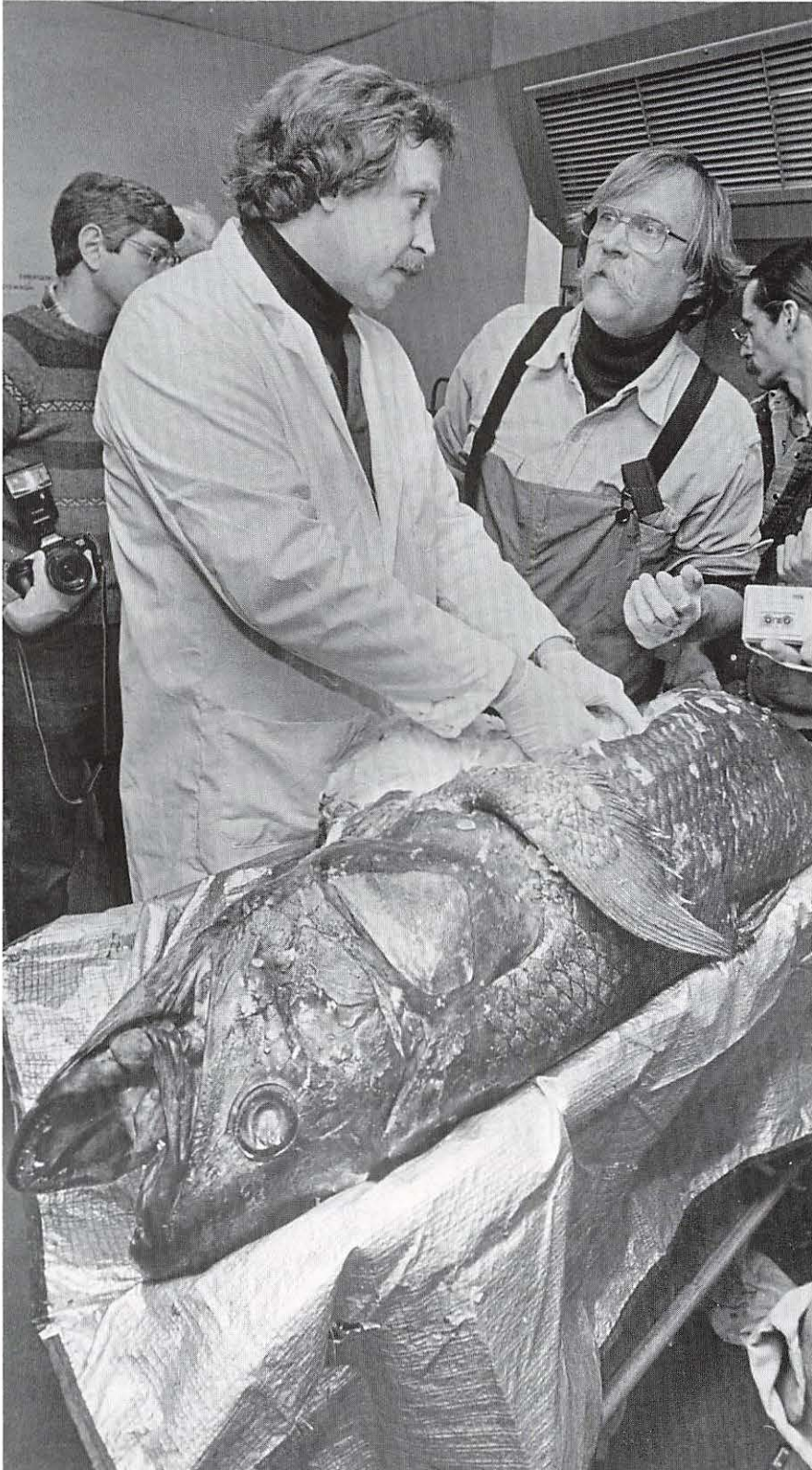
Established in 1985, the Oyster Hatchery provides breed stock (up to 2,000 at any given time) for research, conditioning, and selective breeding experiments. Specimens of any specified size are provided for class labs on a year-round basis. The hatchery is equipped with setting tanks for fertilization and a temperature controlled environment for development from larval to spat stage. Grow-out spats for oyster aquaculture are produced by the hatchery as well. In addition, the laboratory houses the largest algae culture lab on the East Coast. Four 1,000-gallon tanks, four 400-gallon tanks, state-of-the-art water temperature control and filtering systems enable the lab to produce vast quantities of virtually any kind of algae required for research or as a food source.



Oyster research ranges from cell cultures of the Perkinsus protozoan, to developing disease-resistant hybrids and oyster aquaculture.



The Marine Chemistry and Toxicology building will house specialized laboratories designed for biological and chemical research to examine the fate and effects of organic pollutants.



*The diverse faculty
is the cornerstone
of the Institute's
nationally and
internationally
recognized
education
and
research
programs.*



School of Marine Science

Dennis L. Taylor, Dean and Acuff Professor of Marine Science. B.A., University of Pennsylvania; Ph.D., DSc., University of Wales. Biological Sciences.

John D. Milliman, Dean of Graduate Studies and Professor of Marine Science. B.S. University of Rochester; M.S., University of Washington (Seattle); Ph.D., University of Miami. Physical Sciences.

Henry Aceto, Jr., Associate Dean of Graduate Studies, Professor of Marine Science, and Professor of Biology. B.S., State University of New York, Albany; M.S., University of California, Berkeley; Ph.D., University of Texas. Environmental Sciences.

Herbert M. Austin, Professor of Marine Science. B.S., Grove City College; M.S., University of Puerto Rico; Ph.D., Florida State University. Fisheries Science.

John D. Boon, III, Professor of Marine Science. B.A., Rice University; M.A., Ph.D., College of William and Mary. Physical Sciences.

Eugene M. Bureson, Professor of Marine Science. B.S., Eastern Oregon College; M.S., Ph.D., Oregon State University. Fisheries Science.

Robert J. Byrne, Director for Research and Advisory Services and Professor of Marine Science. M.S., Ph.D., University of Chicago. Physical Sciences.

Mark E. Chittenden, Jr., Professor of Marine Science. B.A., Hobart College; M.S., Ph.D., Rutgers University. Fisheries Science.

Hugh W. Ducklow, Loretta & Lewis Glucksman Professor of Marine Science. A.B. Harvard College; A.M., Ph.D., Harvard University. Biological Sciences.

William D. DuPaul, Professor of Marine Science. B.S., Bridgewater State College; M.A., Ph.D., College of William and Mary. Fisheries Science.

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Robert J. Orth, Associate Professor of Marine Science. B.A., Rutgers University; M.A., University of Virginia; Ph.D., University of Maryland. Biological Sciences.

Mark R. Patterson, Associate Professor of Marine Science. A.B., Harvard College; A.M., Ph.D., Harvard University. Biological Sciences.

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Beverly A. Weeks-Perkins, Associate Professor of Marine Science. B.A., Winthrop College; M.S., Tulane University; Ph.D., North Carolina State University. Environmental Sciences.

James E. Bauer, Assistant Professor of Marine Science. B.A., Boston University; M.S., State University of New York, Stonybrook; Ph.D., University of Maryland. Physical Sciences.

Elizabeth A. Canuel, Assistant Professor of Marine Science. B.S., Stonehill College; Ph.D., University of North Carolina. Physical Sciences.

Catherine J. Chisholm-Brause, Assistant Professor of Marine Science. B.A., Harvard University; M.S., Ph.D., Stanford University. Physical Sciences.

Rebecca M. Dickhut, Assistant Professor of Marine Science. B.S., St. Norbert College; M.S., Ph.D., University of Wisconsin, Madison. Physical Sciences.

Linda C. Schaffner, Assistant Professor of Marine Science. B.A., Drew University; M.A., Ph.D., College of William and Mary. Biological Sciences.

Peter Van Veld, Assistant Professor of Marine Science. B.S., University of North Carolina, Chapel Hill; M.A., College of William and Mary; Ph.D., University of Georgia. Environmental Sciences.

Wolfgang Vogelbein, Assistant Professor of Marine Science. B.S., Southampton College; M.S., California State University; Ph.D., Louisiana State University. Environmental Sciences.

Virginia Institute of Marine Science

All School of Marine Science faculty are also Virginia Institute of Marine Science faculty.

Iris C. Anderson, Professor of Marine Science. B.S., Colby College; S.M., Massachusetts Institute of Technology; Ph.D., Medical College of Virginia, Virginia Commonwealth University. Biological Sciences.

Leonard W. Haas, Associate Professor of Marine Science. A.B., Dartmouth College; M.S., University of Rhode Island; Ph.D., College of William and Mary. Biological Sciences.

Mark W. Luckenbach, Associate Professor of Marine Science. B.S., University of North Carolina; Ph.D., University of South Carolina. Biological Sciences.

Craig L. Smith, Associate Professor of Marine Science. A.B., The Johns Hopkins University; Ph.D., University of Florida. Environmental Sciences.

Thomas A. Barnard, Jr., Assistant Professor of Marine Science. B.A., Milligan College; M.A., College of William and Mary. Resource Management and Policy.

J. Emmett Duffy, Assistant Professor of Marine Science. B.S. Spring Hill College; M.S. University of Maine; Ph.D. University of North Carolina at Chapel Hill. Biological Sciences.

Carl H. Hobbs, III, Assistant Professor of Marine Science. B.S., Union College; M.S., University of Massachusetts. Physical Sciences.

John E. Olney, Assistant Professor of Marine Science. B.S., M.A., College of William and Mary. Biological Sciences.

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Michael A. Unger, Assistant Professor of Marine Science. B.S., Michigan State University; M.S., Ph.D., College of William and Mary. Environmental Sciences.

Kevin P. Kiley, Instructor in Marine Science. B.S., Tufts University; M.A., College of William and Mary. Resource Management and Policy.

Jon A. Lucy, Instructor in Marine Science. B.S., University of Richmond; M.A., College of William and Mary. Fisheries Science.

Robert J. Lukens, Instructor in Marine Science. B.S., Massachusetts Institute of Technology. Physical Sciences.

Kenneth A. Moore, Instructor in Marine Science. B.S., Pennsylvania State University; M.S., University of Virginia. Biological Sciences.

Walter I. Priest, III, Instructor in Marine Science. B.S., Virginia Military Institute; M.S., Old Dominion University. Resource Management and Policy.

Martha W. Rhodes, Instructor in Marine Science. B.S., Virginia Polytechnic Institute and State University; M.A., Medical College of Virginia, Virginia Commonwealth University. Biological Sciences.

Jacques van Montfrans, Instructor in Marine Science. B.S., Florida State University; M.S., Florida Atlantic University. Fisheries Science.

Gary F. Anderson, B.S., Southampton College of Long Island University; M.A., College of William and Mary. Physical Sciences.

C. Scott Hardaway, B.A., M.S., East Carolina University. Physical Sciences.

John N. Posenau, B.A., Christopher Newport College. Physical Sciences.

Emeritus

Jay D. Andrews, Professor Emeritus of Marine Science. B.S., Kansas State College; M.A., Ph.D., University of Wisconsin. Fisheries Science.

Rudolf H. Bieri, Professor Emeritus of Marine Science. Dr.rer.nat. Johann Gutenberg University. Environmental Sciences.

Michael Castagna, Professor Emeritus of Marine Science. B.S., M.S., Florida State University. Biological Sciences.

George C. Grant, Professor Emeritus of Marine Science. B.S., University of Massachusetts; M.A., College of William and Mary; Ph.D., University of Rhode Island. Biological Sciences.

William J. Hargis, Jr., Professor Emeritus of Marine Science. A.B., M.A., University of Richmond; Ph.D., Florida State University. Biological Sciences.

Dexter S. Haven, Professor Emeritus of Marine Science. B.S., M.S., Rhode Island State College. Fisheries Science.

Maynard M. Nichols, Professor Emeritus of Marine Science. B.S., Columbia University; M.S., Scripps Institution of Oceanography; Ph.D., University of California at Los Angeles. Physical Sciences.

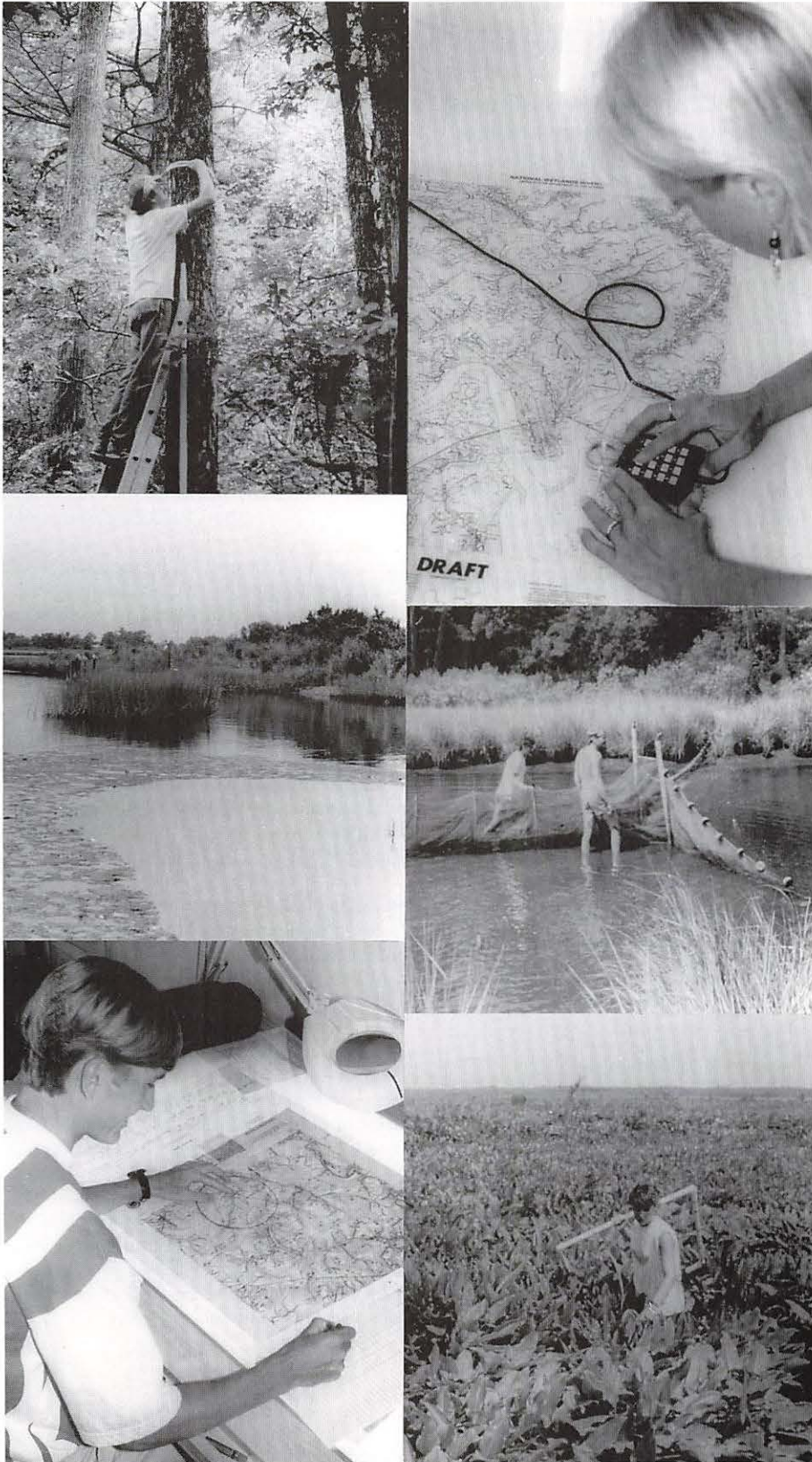
Willard A. Van Engel, Professor Emeritus of Marine Science. Ph.B., Ph.M., University of Wisconsin. Fisheries Science.

J. Ernest Warinner, III, Assistant Professor Emeritus of Marine Science. B.S., M.A., College of William and Mary. Environmental Sciences.

Frank J. Wojcik, Assistant Professor Emeritus of Marine Science. B.S., University of Massachusetts; M.S., University of Alaska. Fisheries Science.

The specially equipped DeHavilland-Beaver aircraft logged 300 hours in 1993 to support various research.





The Department of Resource Management and Policy's interdisciplinary research covers the spectrum of basic and applied science on coastal resources. Scientists work closely with estuarine and marine industries, the public, and state and federal agencies to integrate sound scientific principles into the management of coastal resources. Research in the Department is conducted by both faculty and professional scientific staff.



**Thomas A.
Barnard, Jr.**

*Assistant Professor of
Marine Science*

*B.A., Milligan College;
M.A., College of William & Mary*

RESEARCH INTERESTS

My research interests are directly related to state-mandated advisory activities providing technical advice to federal, state, and local resource managers dealing with wetlands, water quality and subaqueous lands. I am involved in a long term study and evaluation of wetland creation and restoration. We have monitored primary production, plant community structure dynamics and nekton utilization of an 8 acre, constructed tidal marsh since 1983. The primary goal of this effort is to collect information which will aid in the design and construction of anthropogenic wetlands. To date, such created wetlands have a poor track record for successful incorporation into their respective watershed systems. As a result they remain problematic for state and federal regulatory programs. I am also interested in the feasibility and implementation of compensatory mitigation as a wetland management tool and specifically in the policy implications of wetland mitigation banking. Perspectives on the use of these concepts in the regulatory arena range from "mortgaging our wetlands future" to making a significant contribution to the goal of "no net loss" of wetlands. Other interests include the role of science in resource management and in policy development; environmental impact assessment (risk assessment) and resource use-conflict resolution.

CURRENT PROJECTS

- Long term monitoring of Goose Creek wetlands bank. Virginia Department of Transportation.
- Design and monitoring of Virginia Department of Transportation (VDOT) compensatory mitigation sites. Funded by VDOT.

- Needs identification for nontidal wetlands technical advisory activities to support the Virginia Water Protection Permit Program. Funded by EPA.
- Nonstructural alternatives for shoreline stabilization (Publication) Funded by Virginia Coastal Resources Management.

SELECTED PUBLICATIONS

Barnard, T. A. Jr. and C. H. Hershner. 1993. Science and wetlands management: the Virginia model. Presented at the second international conference on the Environmental Management of Enclosed Coastal Seas (EMECS). November, 1993. Baltimore, MD.

Barnard, T. A. Jr. and W. I. Priest, III. 1993. Nekton utilization of an anthropogenic, brackish water wetland bank. Presented at the annual meeting of the Society of Wetland Scientists, Edmonton, Alberta, Canada. June, 1993.

Priest, W.I., III and T. A. Barnard, Jr. 1993. Development of the plant community structure in a tidal marsh wetland bank. Presented at the annual meeting of the Society of Wetland Scientists, Edmonton, Alberta, Canada. June, 1993.

Barnard, T. A. Jr. (ed.) 1991. Virginia Wetlands Management Handbook. Virginia Institute of Marine Science, College of William and Mary. Gloucester Point, VA.

Barnard, T. A. Jr. and P. A. Mason. 1990. A survey of compensatory mitigation within the tidal wetlands of Virginia. Final contract report presented to the Virginia Council on the Environment, Coastal Resources Management Program. 40 pages two appendices.

Barnard, T. A. Jr., W. I. Priest, III and T. K. Watkinson. 1987. Report of the VMRC/VIMS subcommittee on wetlands mitigation-compensation policy. Final Report. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA.

RESEARCH INTERESTS

My primary research interests are in tidal and nontidal wetlands ecology, landscape ecology and resource management/policy issues. I have active interests in resource inventory procedures, habitat restoration protocols, resource management "expert system" development, and science-policy interactions. Much of my current activity involves integrated resource management and the development of supporting scientific rationale. This work involves collaboration with colleagues in other disciplines such as economics, law and government. I am also interested and involved in management program analysis at all levels of government.

CURRENT PROJECTS

- Structure and function of nontidal wetlands in the coastal plain
- Interjurisdictional resource planning for the York River Basin
- Resource use conflict analysis and policy development
- Natural and cultural resource risk assesment for barrier island parks of the National Park Service
- Shoreline development project assessment and decision framework analysis

CURRENT STUDENTS

Julie Herman, Ph.D., York River watershed sediment budgets and the role of wetlands

Laura Grignano, M.A., Analysis of conflict between submerged aquatic vegetation and shellfish aquaculture

Dan Redgate, M.A., Hydrologic budget for forested nontidal wetland systems in the coastal plain

Megan Griener, M.A., Role of wetlands in phosphorus transport through a coastal watershed

Melissa Chaun, M.A., Analysis of functional assessment methods for coastal plain wetlands

Chris Perle, M.A., Analysis of barrier island tidal wetlands under sea level rise scenarios

John Buie, M.A., Risk assessment of barrier island beaches under climate change scenarios

Stacy Nelson, M.A., Error analysis in tidal wetland inventory change detection

Orelia Merchant, M.A., Protocol development for shellfish culture area designation

Rebecca Boger, new student, topic to be decided

Katie Hopkins, new student, topic to be decided

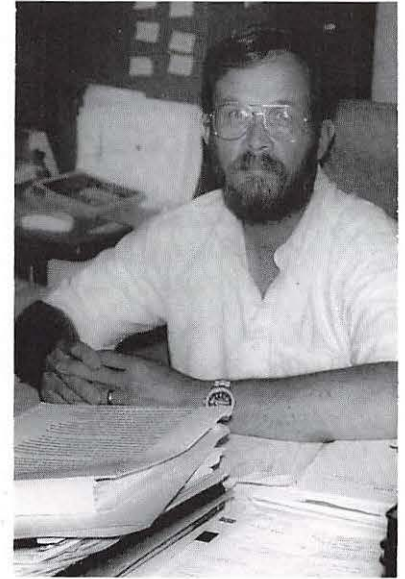
Amanda McKenney, new student, topic to be decided

SELECTED PUBLICATIONS

Hershner, C. and K.J. Havens. 1994. Landfill environmental impacts in the coastal zone. A report prepared for the Virginia House of Delegates.

Hershner, C. 1992. Nontidal wetland functions and values. *In: Perspectives on Chesapeake Bay, 1992: Advances in Estuarine Sciences*. Scientific and Technical Advisory Committee, Chesapeake Bay Program. Chesapeake Research Consortium, Solomons, MD, p. 1-16.

Rheinhardt, R. and C. Hershner. 1992. The relationship of below-ground hydrology to canopy composition in five tidal freshwater swamps. *Wetlands* 12(3):208-216.

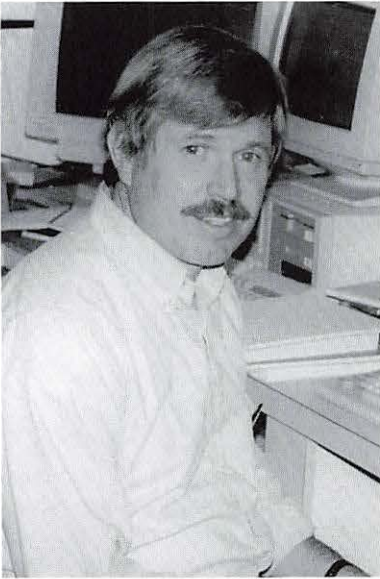


Carlton H. Hershner, Jr.

Chair of Department

Associate Professor of Marine Science

*B.S., Bucknell University;
Ph.D., University of Virginia*



Kevin P. Kiley

Instructor in Marine Science

*B.S., Tufts University; M.A.,
College of William & Mary*

RESEARCH INTERESTS

My interests include small aircraft remote sensing and vertical aerial photography, meteorological satellite imagery, and image processing.

CURRENT PROJECTS

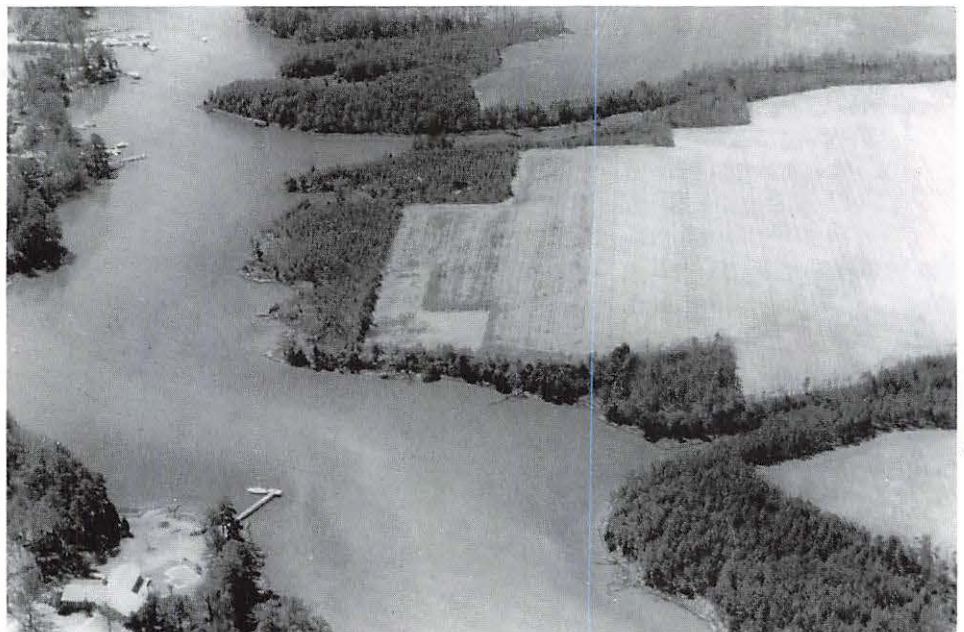
- Small aircraft and research vessel services provided in support of a scanning low frequency microwave radiometer: a remote sensing system for measuring estuarine and coastal ocean surface salinity
- Remote sensing study of chlorophyll distribution in Chesapeake Bay based on weekly (spring to fall) low altitude aerial radiometric survey data
- Remote sensing feasibility study of surface chlorophyll detection and quantification in Chesapeake Bay tributaries based on low altitude aerial radiometric survey data
- Implementation/operation of NOAA's CoastWatch meteorological satellite image display and analysis system for analysis of surface water temperature and turbidity

SELECTED PUBLICATIONS

Kiley, K. P., Use of personal computer based image analysis software and hardware for dredge material disposal monitoring. Report submitted to the Environmental Laboratory, Waterways Experiment Station, U.S. Army Corps of Engineers, Vicksburg, MS., June 1990, 44 pp.

Kiley, K., A. Frisch, R. Orth, and K. Moore. Feasibility of the map and image processing system (MIPS) as a device for the collection and display of information on the distribution and abundance of submerged aquatic vegetation from aerial photographs. Report submitted to the Virginia Council on the Environment, Richmond, VA and Maryland Department of Natural Resources, Annapolis, MD, February 1990, 85 pp.

Harding, L., E. Itsweire, W. Esaias, C. Bostater, and K. Kiley. Report to the Chesapeake Bay Remote Sensing Work Group (CBRSWG): Demonstration project using NASA's ocean data acquisition system (ODAS) in Chesapeake Bay, Summer 1988, Johns Hopkins University/Chesapeake Bay Institute, Shady Side, MD, 1989.



Low level aerial photography is used to inventory and monitor shoreline conditions and adjacent upland land uses.

RESEARCH INTERESTS

My research interests encompass: the use of scientific information in the resource and environmental management decision making process and how new scientific information becomes known to decision makers. Organizational arrangements for transfer of information using data bases are of specific interest.

The natural variability of serum and tissue constituents under conditions of natural stress and their potential for development as indices of physiological condition has been an area of continuing activity for me.

Much of my attention is directed to special management areas involving the National Estuarine Research Reserve and National Marine Sanctuary programs. My particular interests include the role of protected areas in preservation of biological diversity in coastal and marine areas; the use of protected areas in long term monitoring; and the integration of research and monitoring results into education programs.

I also investigate the history of coastal and estuarine science - management infrastructure. One goal is understanding why marine and estuarine science in the Chesapeake Bay region has developed to a much greater extent than in other estuarine regions.

CURRENT STUDENTS

Stacey Nelson, M.A., Error analysis in tidal wetland inventory change detection

Anamarija Frankic-Bandula, Ph.D., Coastal and environmental resources management and planning

CURRENT PROJECTS

- Variability of serum constituents in Decapod Crustaceans from the Mid-Atlantic outer continental shelf
- The role of "grey literature" and "peer reviewed literature" in the environmental decision making process
- New approaches for science/management communications. (Use of conceptual model development as a tool for better manager scientist communication)
- Trends in coastal and estuarine scientific productivity

SELECTED PUBLICATIONS

Cronin, L. E., M. P. Lynch, and M. J. Karweit. 1978. Data importance in relation to Chesapeake Bay pollution. *CODATA Bulletin* 29:41-49. International Council of Scientific Unions, Committee on Data for Science and Technology.

Dillon, T. M. and M. P. Lynch. 1981. Physiological responses as determinants of stress in marine and estuarine organisms. In: G. W. Barrett and R. Rosenberg (eds.), *Stress effects on natural ecosystems*. John Wiley and Sons Inc., Sussex, England, pp. 227-241.

Lynch, M. P. and G. C. Ray. 1985. Preserving the Diversity of Marine and Coastal Ecosystems. In: *Technologies to Maintain Biological Diversity*, Vol. II, Contract Papers, Office of Technology Assessment, U.S. Congress. National Technical Information System.

Curtis, C. N. and M. P. Lynch. 1987. The site selection process for a Chesapeake Bay National Estuarine Research Reserve System. In: *Estuarine and Coastal Management - Tools of the Trade*. Volume 2. Proceedings of the Tenth National Conference of The Coastal Society, Bethesda Md, pp. 621-630.

Lynch, M. P. and B. Crowder. 1994. Editors, *Organizing for the Coast*. Proceedings of the 13th International Conference of the Coastal Society (1992). The Coastal Society, Gloucester, MA. 806 pp.



Maurice P. Lynch

**Professor of
Marine Science**

**Manager, Chesapeake Bay
National Estuarine Research
Reserve in Virginia**

**A.B., Harvard University;
M.A., Ph.D. College of William
& Mary**



Bruce J. Neilson

*Professor of
Marine Science*

*B.A., M.S.E., M.A., Princeton
University; Ph.D., The Johns
Hopkins University*

Dr. Neilson died as this publication went to press. In his absence his research pursuits are being continued by his colleagues.

RESEARCH INTERESTS

Management of water quality in estuaries, shellfish and water quality, and quality assurance of water quality programs.

CURRENT PROJECTS

- Development of a modelling approach to assess the cumulative impacts of development on marine waters

SELECTED PUBLICATIONS

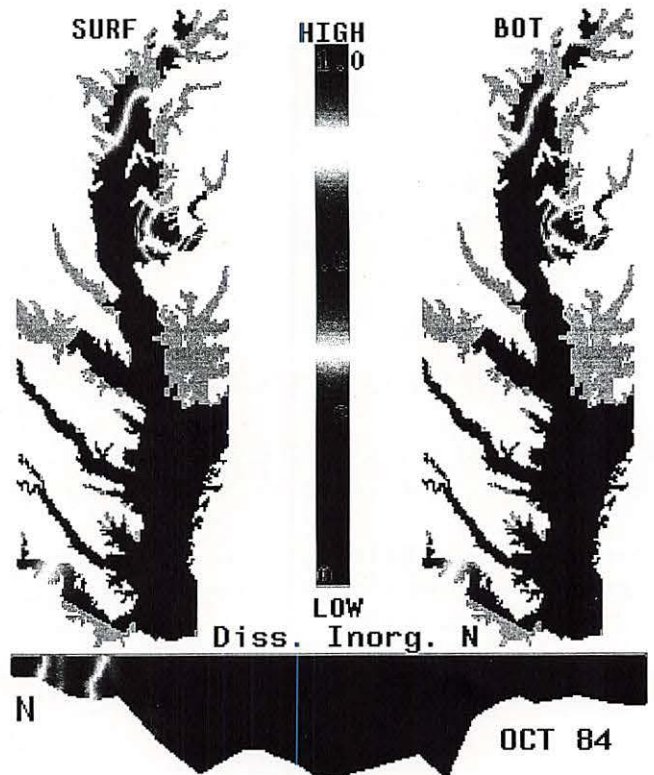
Man versus Mollusk: Studies of Water Quality Problems, How They Affect Shellfish and Shellfish Harvesting, and How the Commonwealth Should Address these Problems. Shellfish Enhancement Task Force report. April 1992.

Weight and Salinity Effects on Zinc Uptake and Accumulation for the American Oyster. Cheol Mo and Bruce Neilson, Environmental Pollution 82:(1993) 191-196.

Rinsing Effects on Particulate Nutrient Measurements. Bruce Neilson and Betty Salley, a report to the Analytical Methods and Quality Assurance Workgroup, September 1993.

Waste Load Allocation for Eutrophic Tidal Waters. Bruce J. Neilson, Albert Y. Kuo and Kyeong Park, presented at Joint CSCE-ASCE Conference on Environmental Engineering, Montreal, Quebec, July 1993.

A Guide to Wastewater Management for Seafood Processors. 1994. Virginia Sea Grant, Marine Resource Advisory No. 48, VSG-93-11.



Surface and bottom concentration contours and the concentration contours for the "vertical slice" running from the Susquehanna River to the Atlantic Ocean. This image portrays dissolved inorganic nitrogen during the month of October 1984.

RESEARCH INTERESTS

My primary research interest lies in monitoring the long term changes in vascular plant communities of the tidal wetlands of the Chesapeake Bay, and the relationship of those changes to changes in the environmental parameters within the Bay (e.g. salinity and inundation). We currently have several years of baseline vegetation data from local CBNERRS-VA sites. The data is being used to describe the existing dominant vegetation communities of the Chesapeake Bay tidal wetlands and to depict the temporal and spatial trends within each vegetation community. My other research interests include the establishment of monitoring protocols for determining the “success” of created wetlands. We are currently involved in a five year study to determine the most effective methods available for determining the “success” of created wetlands constructed within the coastal plain and piedmont region of Virginia. I am interested in, and conduct research on, the life history, distribution and abundance, and threats to endangered tidal wetland vascular plants of the Chesapeake Bay.

CURRENT PROJECTS

- Temporal and spatial changes in tidal wetland vascular plant communities. Funded by NOAA and EarthWatch
- Development of a monitoring protocol for determining the success of nontidal created wetlands. Funded by VDOT
- Needs identification for nontidal wetland technical advisory activities to support the Virginia Water Protection Program. Funded by EPA

- Investigation and long term monitoring of invasive plant species within Virginia’s created wetlands. Funded by EPA
- Establishment of an association for state wetland professionals

SELECTED PUBLICATIONS

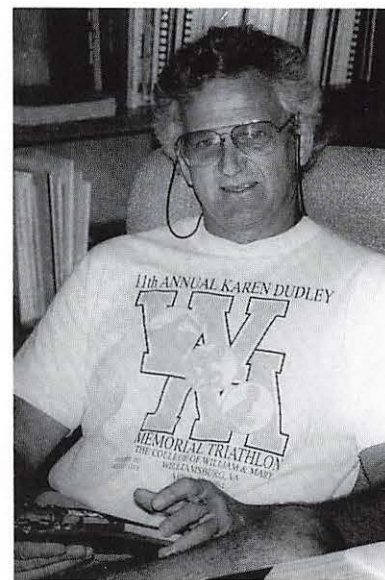
Perry, James E. 1994. Temporal and spatial changes in plant diversity in Chesapeake Bay tidal wetlands: Management implications. In: Estuarine and Coastal Management: Organizing for the Future, Proceedings of Eleventh National Conference. The Coastal Society, Bethesda, MD (in press).

Perry, James E. and R.A. Atkinson. 1993. Notes on plant diversity along a salinity gradient: York and Pamunkey Rivers, Virginia. *Castanea* (in press).

Atkinson, R. L. and James E. Perry. 1993. Use of created wetland delineation and weighted averages as a component of assessment. *Wetlands* 13(3).

Rheinhardt, R.D. and James E. Perry. 1993. Effects of nutrient enrichment on natural and transplanted salt marshes in Virginia: a literature review with management recommendations. Final Report, CMAP-5. Center for Coastal Management and Policy, Virginia Institute of Marine Science, The College of William and Mary, Gloucester Point, VA.

Perry, James E. and C.H. Hershner. 1990. Potential endangered plants of Virginia’s Northern peninsula. *The Nature Conservancy*, Charlottesville, VA.



James E. Perry, III

*Assistant Professor of
Marine Science*

*B.S., Murray State University;
Ph.D., College of William & Mary*



Walter I. Priest, III

Instructor in Marine Science

*B.S., Virginia Military Institute;
M.S., Old Dominion University*

RESEARCH INTERESTS

My primary interests are in coastal resource management issues including: the evaluation of wetland mitigation/compensation projects, the cumulative impact of construction activity on estuarine resources and water quality, the classification and evaluation of tidal and non-tidal wetlands and the beneficial uses of dredged material.

CURRENT PROJECTS

- Monitoring plant community development and nekton utilization of tidal wetland bank
- Development of intertidal oyster rock using dredged material
- Beneficial uses of dredged material from the waterway on the coast of Virginia
- Long-term monitoring of invasive plant species in created wetlands
- Treatment of stormwater runoff with planted wetlands

SELECTED PUBLICATIONS

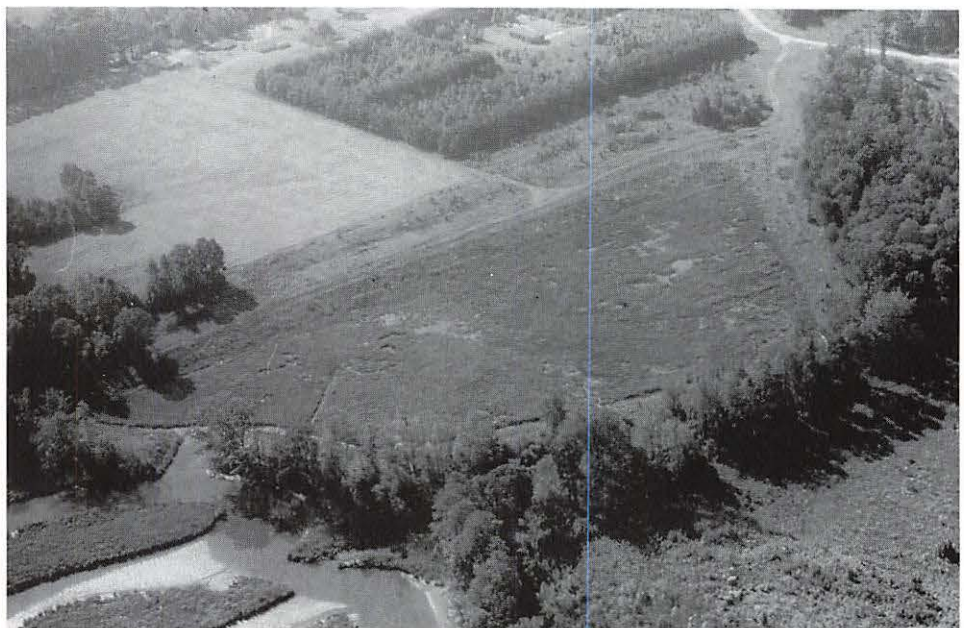
Priest, W. I. and S. Dewing. 1991. The marshes of Back Bay, Virginia. Marshall, H. G. and Norman, M. D. (eds.). Proceedings of the Back Bay Ecological Symposium; November 2-3, 1990; Old Dominion University, Norfolk, VA.

Priest, W. I., K. J. Havens, T. A. Barnard, J. G. Bradshaw and M. A. Wohlgenuth. 1990. Cumulative impacts of shoreline construction activity on tidal wetlands in Virginia. 1988 Permit Database, Pilot Program. VIMS Wetlands Program Technical Report 90-3. Gloucester Point, VA.

Priest, W. I. 1989. Wetlands mitigation evaluation—Vegetation studies, Monkey Bottom disposal area. Final Report to the City of Norfolk, VIMS, Gloucester Point, VA, 20 pp.

Theberge, N. B., T. A. Barnard, Jr., W. I. Priest, III, J. E. Perry, S. W. Carter and H. L. McGuire. 1988. A study of the advantages and disadvantages of Virginia assuming 404 regulatory authority under the Federal Clean Water Act. A Report to the U.S. Environmental Protection Agency, 116 pp. VIMS, Gloucester Point, VA.

Priest, W. I., R. J. Byrne, B. J. Neilson and G. R. Thomas. 1987. Cabin Point Creek channelization study. Final report to the National Marine Fisheries Service (Contract NA80FAC00030) VIMS, Gloucester Point, VA, 244 pp.



Goose Creek Wetland Mitigation Bank

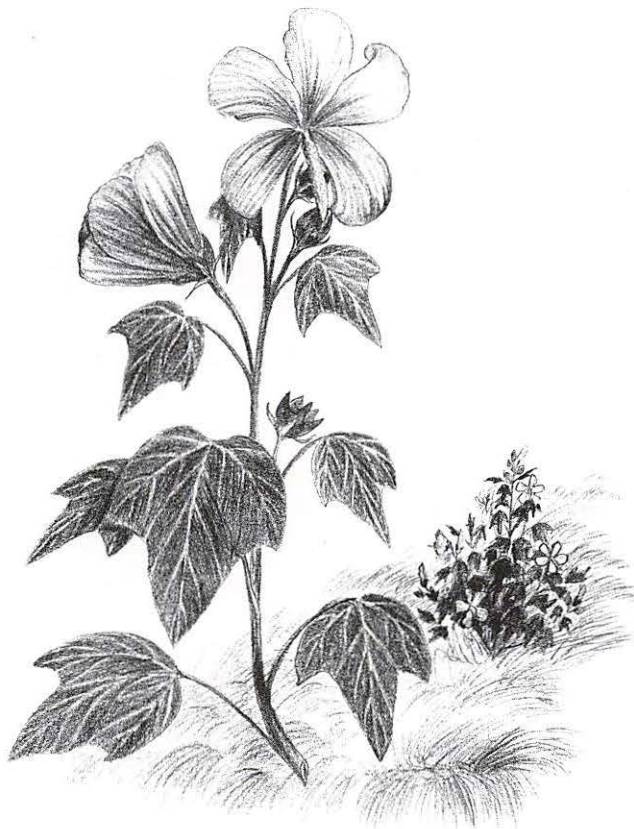
This 8 acre wetland, constructed by the Virginia Department of Transportation, has been the subject of Wetlands Program research since 1983.

RESEARCH INTERESTS

My research focuses on plant community structure and dynamics of a broad range of coastal ecosystems: tidal and nontidal wetlands, dune swales and maritime forests.

CURRENT PROJECTS

- Assessing nontidal wetlands in coastal Virginia using a three parameter approach - hydrophytic vegetation, hydrology and hydric soils
- Develop a rapid method of assessing the ecological functions and vegetational community structure of nontidal wetlands for wetland managers (Co-PI J. Bradshaw)
- Effects of reduced groundwater on nontidal wetlands
- Reproductive ontogeny of submerged aquatic vegetation



Marsh Mallow
Kosteletzkya virginica (L.) Presl

by Rita Llanso

CURRENT STUDENT

David R. Spencer, new student, topic to be decided

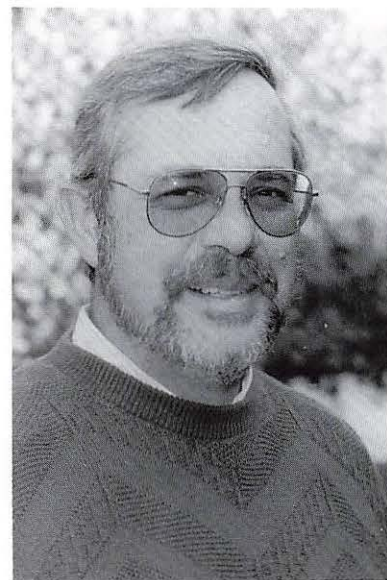
SELECTED PUBLICATIONS

Silberhorn, G. M. 1994. Characterization of the plant community structure of palustrine forested wetlands in coastal Virginia. *Proceedings: Saturated Forested Wetlands in the Mid-Atlantic Region: State of the Science*.

Doumlele, D.E., B.K. Fowler, and G.M. Silberhorn. 1985. Plant community structure of a tidal freshwater swamp in Virginia. *Wetlands* 4:129-145.

Silberhorn, G.M., R. Orth, and K. Moore. 1983. Anthesis and seed production in *Zostera marina* L. from lower Chesapeake Bay, Virginia. *Aquatic Botany* 15:133-144.

Silberhorn, G.M. 1982. Common plants of the Mid-Atlantic coast: a field guide. Johns Hopkins University Press, Baltimore, MD. 256p.



Gene M. Silberhorn

*Professor of
Marine Science*

*B.S., Eastern
Michigan University;
M.S., West Virginia University;
Ph.D., Kent State University*



**N. Bartlett
Theberge, Jr.**

*Professor of
Marine Science*

*B.S., J.D., College of William &
Mary; LL.M., University of Miami*

RESEARCH INTERESTS

My primary areas of study/research are ocean and coastal law and policy and marine resource management.

I am interested in and have been involved in the development and improvement of regulations and statutes affecting the management of marine resources. Recently I investigated the legal and regulatory status of the Northeast United States oyster industry. This research involved the identification and summarization of twenty-one states' laws and regulations, federal laws and regulations, international treaties and agreements, as well as federal and state court decisions specifically impacting the oyster industry. Over the past five years I have worked closely with the General Assembly, the Secretary of Natural Resources, state agencies, local governments, private groups, and the Chesapeake Bay Commission in conducting research identifying and inventorying unknown state-owned lands on Virginia's Eastern Shore. This intensive inventory has identified over 28,000 acres of previously unknown state-owned coastal lands. As a result of this inventory, I am currently identifying and addressing issues regarding the management of these lands. This research led to the introduction of two pieces of legislation in the General Assembly.

CURRENT PROJECTS

- An investigation of issues raised in relation to an inventory of state-owned lands in Tidewater Virginia. Funded by the Chesapeake Bay Commission
- The development of a state wetlands conservation program for Virginia's ungranted marshes, meadowlands, beaches, and commons in the coun-

ties of Accomack and Northampton. Funded by EPA

- An analysis of mechanisms to improve local intergovernmental decision making over shared resources or impacts

RECENT PUBLICATIONS

Theberge, N.B. and R. Simmons, 1993, A Report in Response to House Joint Resolution 520 - A Study of Issues Raised in Relation to State Owned Lands in Accomack and Northampton Counties, 17 pp., prepared for the Chesapeake Bay Commission.

Theberge, N.B., 1993, Inventory of State Owned Lands in Accomack and Northampton Counties and Recommendations for Future Action, 13 pp., prepared for the Chesapeake Bay Commission.

Theberge, N.B., 1992, An Analysis of the Legal and Regulatory Status of the Northeast United States Oyster Industry, 201 pp., prepared for the National Marine Fisheries Service.

Theberge, N.B., 1991, Kingdom of the Third Day, Review, *Oceanus*, 34/2:93-94.

Theberge, N.B., 1990, The Results of a Partially Completed Inventory of State Owned Lands in Accomack and Northampton Counties with Recommendations for Future Action, 4 pp., prepared for the Chesapeake Bay Commission.

Catallo, W.J., N.B. Theberge and M.E. Bender, 1989, Sea Level Rise and Hazardous Wastes in the Coastal Zone: An Ecological Perspective, *Coastal Zone* 89:1407-1420.

RESEARCH INTERESTS

My research interests include beach dynamics, coastal and resource management, remote sensing, and shoreline mapping. Specific interest is the application of automated mapping and remote sensing techniques to address local and regional management issues in the Coastal Plain.

CURRENT PROJECTS

- Development of a shoreline risk assessment for the barrier island parks of the National Park Service.
- Applications of shoreline response models to assess the impacts of sea level rise to open ocean coasts.
- Cross-jurisdictional watershed planning for the York River Basin.
- Environmental sensitivity mapping for managing potential adverse impacts

to critical habitat as a result of oil spill and sewage discharge in estuarine waters.

SELECTED PUBLICATIONS

Berman, M.R.. 1994. Natural and Cultural Resource Risk Assessment for Climate Change Impacts, Cape Hatteras and Cape Lookout National Seashores - Annual Report, Submitted to the Department of the Interior, National Park Service, Southeast Regional Office, Atlanta, Georgia.

Berman, M.R.. 1994. Using Photography for Mapping. The Virginia Wetlands Report, No. 94-2, Wetlands Program, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia.

Berman, M.R., Smithson, J.B., and Kenne, A.K. 1993. Guidelines for Quality Assurance and Quality Control. Center for Coastal Management and Policy, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia.



Marcia Berman

Program Manager

Comprehensive Coastal Inventory Program

*B.S., Northeastern University;
M.S., Old Dominion University*

RESEARCH INTERESTS

Development, integration and analysis of Global Positioning System (GPS) surveying, remote sensing and image processing techniques as related to coastal and wetland mapping activities.

CURRENT PROJECTS

- Water resources management plan for Colonial National Historical Park
- Shoreline risk assessment for the barrier island parks
- Virginia comprehensive coastal inventory, Gloucester County

SELECTED PUBLICATIONS

Berquist, H. E., and M. R. Berman. 1994. GIS/GPS Applications - An Integrated Approach to Shoreline Studies. Abstract for Annual Convention of the ASPRS/ACSM.

Berquist, H. E. 1988. Mission Planning for GPS Surveying. Proceedings, GPS Conference, ASCE.

Berquist, H. E., 1987. A GPS Case Study - The Padre Dam Municipal Water District, Proceedings, GPS Conference, California Land Surveyors Association.

Berquist, H. E., 1986, Practical Considerations in Using Inertial Survey Systems, Proceedings, XVII FIG Congress.

Berquist, H. E. and Moynihan, R. 1984. Innovative Approach to Teaching Construction Surveying, Proceedings, FIG Commission 6 Engineering Surveys Conference.



Harry Berquist

Comprehensive Coastal Inventory Program

Certificate, State University of New York



Julie G. Bradshaw

Wetlands Program

B.S., College of William and Mary; M.E.M., Duke University, School of Forestry and Environmental Studies

RESEARCH INTERESTS

My research interests are in the areas of wetland ecology and management, functional assessment, and avian ecology.

CURRENT PROJECTS

- Ongoing development of nontidal wetland functional assessment techniques and application to Virginia's coastal plain
- Breeding bird use of nontidal forested wetlands in the coastal plain and relationship to vegetation structure
- Establishment of long-term hydrology and vegetation monitoring sites in nontidal forested wetlands

SELECTED PUBLICATIONS

Varnell, L., K. Havens, J. G. Bradshaw. 1994. An assessment of ecological conditions in a constructed marsh and two natural tidal marshes. *J. of Ecological Engineering*.

Bradshaw, J. G. 1991. A technique for the functional assessment of nontidal wetlands in the coastal plain of Virginia. Special Report No. 315 in *Applied Marine Science and Ocean Engineering*. VIMS. Gloucester Point, VA.

Bradshaw, J. G. 1991. Coastal resources and the permit process: definitions and jurisdictions. Technical Report No. 91-2. Wetlands Program. VIMS. Gloucester Point, VA.

Bradshaw, J. G. 1990. Monitoring of compliance with permits granted by local wetlands boards. Technical Report No. 90-A. Wetlands Program. VIMS. Gloucester Point, VA.



Robert F. Breeding, Jr.

Monitoring Program Coordinator

Chesapeake Bay National Estuarine Research Reserve in Virginia

B.S., College of William & Mary; Graduate Study, Duke University School of the Environment

RESEARCH INTERESTS

My research focuses on the collection of long-term data on the natural resources of the Reserve sites. I am interested in updating and improving the collection methods and monitoring programs. I hope to integrate the monitoring and inventory work with Geographic Information System development, remote sensing habitat assessment. I have organized and tested a volunteer data collection methodology for documenting the stopover ecology of migratory birds using the York River Reserve components.

CURRENT PROJECTS

- Monitoring of groundwater, surface water, migratory birds, Natural Heritage "rate" and "endangered species" and marine debris on Reserve components

- Herptile and mammal inventory and monitoring programs

SELECTED PUBLICATIONS

Birds of the York River, a four-brochure series describing avian community and species occurrence of the York River components of the Reserve. 1994. Virginia Institute of Marine Science.

RESEARCH INTERESTS

My research interests are wetlands ecology, both tidal and nontidal, environmental law, public policy and land use issues.

CURRENT PROJECTS

- Investigation of temporal partitioning of salt marshes by aquatic fauna
- Investigation of oxidized rhizosphere formation in Red Maple seedlings
- Investigation of invasive plant species in created wetlands
- The relationship of soil temperature to ground water in wetlands
- Animal use of wetlands using night vision image intensifier equipment

SELECTED PUBLICATIONS

Hershner, C. and K. J. Havens. 1994. Landfill environmental impacts in the coastal zone. A

report prepared for the Virginia House of Delegates.

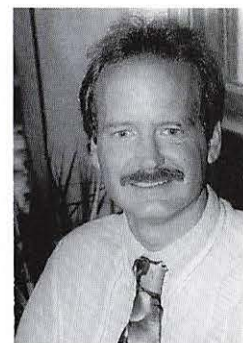
Havens, K. J., L. M. Varnell, J. G. Bradshaw. An assessment of ecological conditions in a constructed marsh and two natural tidal marshes. *Ecological Engineering* (in press).

Varnell, L. M., K. J. Havens, and C. Hershner. Daily variability in the population levels and characteristics of aquatic wildlife using tidal marshes. *Estuaries* (in press).

Varnell, L. M., and K. J. Havens. Methods for assessing intertidal pocket marsh use by mobile aquatic fauna using time and space data normalization. *Estuaries* (in press).

Perry, J. E., K. J. Havens, J. G. Bradshaw, G. M. Silberhorn, and C. Hershner. 1991. Technical review of the proposed changes to the Federal Wetlands Delineation Manual. Prepared for the U.S. EPA. Virginia Institute of Marine Science.

Havens, K. J. and J. M. McConaughy. 1990. Terminal molt in the female blue crab *Callinectes sapidus* Rathbun. *Bulletin of Marine Science*.



Kirk Havens

Wetlands Program

B.S., M.S., Old Dominion University; Ph.D. Program, George Mason University

RESEARCH INTERESTS

My interest is in the development and implementation process for environmental public policy.

CURRENT PROJECT

- Role of universities in environmental public policy

SELECTED PUBLICATIONS

Lennarz, M. M. 1994. University contribution to the development and implementation of environmental policy. White paper for Environmental Public Policy Symposium, College of William and Mary.



Mollie M. Lennarz

**Adjunct Faculty
Resource Management & Policy**

B.A., The Johns Hopkins University; J.D. Washington & Lee University School of Law



Department personnel provide advice on management of wetland resources including the design and use of man-made wetlands such as Goose Creek.



Pamela Mason

Wetlands Program

B.A., University of Delaware;
M.A., College of William and Mary

RESEARCH INTERESTS

My research interests include watershed planning, resource management, environmental policy, environmental assessment and restoration.

CURRENT PROJECTS

- Functional Assessment Workshop final report preparation
- York River Watershed Workshop planning and preparation
- Symposium on the role of the University in Environmental Policy
- Chesapeake Bay Program Wetlands Workgroup

SELECTED PUBLICATIONS

Mason, P. A. 1993. Natural resources management in coastal Virginia. VIMS Wetlands Program Technical Report. 8 pp.

Barnard, T. A. and P. A. Mason. 1990. A survey of compensatory mitigation within the tidal wetlands of Virginia. Final CZM Report to Virginia Council on the Environment. 40 pp.

Silberhorn, G. M., P. A. Mason and J. Kerwin. 1990. The extent and effects of zinc contamination in the Wood Creek area of Virginia. Task B: wetland evaluation. Final report to BASF Corporation, Williamsburg, VA. 18 pp.



Bill Roberts

Wetlands Program

B.S., College of William & Mary
M.S., Eastern Michigan University

RESEARCH INTERESTS

My research interests include wetland plant adaptations, coastal plain flora, wetland plant assemblages and wetland ecology.

CURRENT PROJECTS

- Non-tidal Wetland Delineation Instruction Program
- Tidal Wetland Educational Curriculum Program
- Educational Programs for the General Public



Wetland vegetation community assessment.

RESEARCH INTERESTS

I have broad interests in parasitology, invertebrate zoology and ecology. I am currently investigating several aspects of the taxonomy, population biology and community ecology of parasites in marine invertebrates, primarily crustaceans.

CURRENT PROJECTS

- Epizootiology of a parasitic dinoflagellate in blue crabs
- Etiological investigation of wasting syndrome in black abalone
- Community structure of the invertebrates of intertidal saltmarshes in the Chesapeake Bay National Estuarine Research Reserves
- Community structure of the parasites and symbionts of Australian blue crabs

- Development of site profiles for the Estuarine Research Reserves

SELECTED PUBLICATIONS

Shields, J. D., and C. H. Earley. 1993. *Cancrion australiensis* new species (Isopoda: Entoniscidae) found in *Thalamita sima* (Brachyura: Portunidae) from Australia. *Int. J. Parasitol.* **23**:601-608.

Shields, J. D., and F. E. I. Wood. 1993. The impact of parasites on the reproduction and fecundity of the blue sand crab *Portunus pelagicus* from Moreton Bay, Australia. *Mar. Ecol. Prog. Ser.* **92**:159-170.

Shields, J. D. 1992. The parasites and symbionts of the crab *Portunus pelagicus* from Moreton Bay, eastern Australia. *J. Crustacean Biol.* **12**:94-100.



Jeffrey D. Shields

Chesapeake Bay National Estuarine Research Reserve in Virginia

B.A., University California, Santa Barbara; M.S., University California, Berkeley; Ph.D., University California Santa Barbara

RESEARCH INTERESTS

My interest is in developing techniques for interpreting remotely sensed data and watershed modelling using geographic information systems.

CURRENT PROJECTS

- Development of geographic information systems for monitoring water resources
- Development of remote sensing and image processing techniques for identifying natural and cultural resources
- Development of interface for linking extraneous databases into current geographic information systems

SELECTED PUBLICATIONS

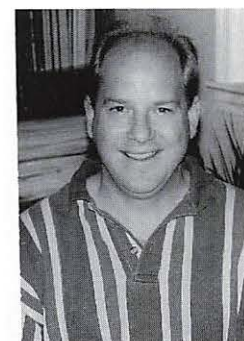
Berman, M.R., J.B. Smithson and J.E. Perry III. 1993. The Application of Remotely Sensed Data for Measuring Temporal and Spatial Variability of Vegetation Patterns in Tidal Marshes of the Chesapeake Bay. Abstract submitted to the Estuarine Research Foundation.

Berman, M. R., J. B. Smithson and A. K. Kenne. 1993. Guidelines for Quality Assurance and Quality Control. Center for Coastal Management and Policy, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA.

Hershner, C., J. H. Posenau and J. B. Smithson. 1992. Application of Remotely Sensed Information to the Development of a Shoreline Management Policy in Virginia. In: Proceedings of First Thematic Conference on Remote Sensing for Marine and Coastal Environments.

Kimball, S. M., C. H. Hershner, J. H. Posenau and J. B. Smithson. High Resolution Shoreline Mapping in Estuarine Environments. In: Proceedings of First Thematic Conference on Remote Sensing for Marine and Coastal Environments.

Berman, M.R., J.B. Smithson. 1991. Comprehensive Coastal Inventory Program Final Report. Virginia Institute of Marine Science, Gloucester Point, Virginia. Submitted to the Virginia Council on the Environment, Richmond, Virginia.



John B. Smithson

Comprehensive Coastal Inventory Program

B.S., Old Dominion University



Lyle Varnell

Wetlands Program

B.S., M.A., Old Dominion University

RESEARCH INTERESTS

My research involves environmental policy, wetlands compensation/mitigation/restoration; wetland assessment methodology and wetland plant morphological adaptation.

CURRENT PROJECTS

- Needs identification for nontidal wetlands technical advisory activities to support the Virginia Water Protection Program
- Development of a nontidal wetland mitigation bank/site evaluation and monitoring protocol
- The relationship between wetland hydrology and stem hypertrophy in *Taxodium distichum*, *Nyssa sylvatica*, and *Fraxinus pennsylvanica*

- Temporal use partitioning of saltmarsh systems by fish and blue crabs with application to assessment methodology

SELECTED PUBLICATIONS

Havens, K. J., L. M. Varnell and J. G. Bradshaw. An assessment of ecological conditions in a constructed marsh and two natural tidal marshes. *Ecological Engineering* (in press).

Varnell, L. M. and J. R. McConaugha. Dispersal dynamics of larvae of the blue crab (*Callinectes sapidus*) on the Mid-Atlantic Bight (in press).

Varnell, L. M. and K. J. Havens. Methods for assessing intertidal pocket marsh use by mobile aquatic fauna using time and space data normalization. *Estuaries* (in press).

Varnell, L. M., K. J. Havens and C. Hershner. Daily variability in the population levels and characteristics of aquatic wildlife using tidal marshes. *Estuaries* (in press).



Maryann Wohlgemuth

Wetlands Program

**B.S., St. Mary's College;
M.A., College of William & Mary**

RESEARCH INTERESTS

My research is focused on tidal and nontidal wetland plant life history and its relation to measurements of primary production, and the role of wetlands in stormwater management practices and nonpoint source pollution controls.

CURRENT PROJECTS

- Continuing development and updating of the Tidal Education Curriculum and self-taught courses
- Development of regular education workshops offerings
- Development of Wetland Identification and Delineation Curriculum

Wohlgemuth, M. 1993. Editor, Wetlands Education Curriculum, Part II.

Wohlgemuth, M. 1991. Nontidal wetland functions and values. VIMS Technical Report No. 91-A, Virginia Institute of Marine Science, Gloucester Point, VA.

Wohlgemuth, M. 1991. Primary producers and decomposers of intertidal flats, VIMS Technical Report No. 91-4. Virginia Institute of Marine Science, Gloucester Point, VA.

Wohlgemuth, M. 1990. Tidal wetland values. VIMS Technical Report No. 90-5, Virginia Institute of Marine Science, Gloucester Point, VA.

SELECTED PUBLICATIONS

Wohlgemuth, M. 1994. Editor, Wetland Education Curriculum, Self-taught education program.

Wohlgemuth, M. 1994. Wetland Functions and Values, Self-taught education unit.

DEPARTMENT EQUIPMENT

The Wetlands Program maintains a supply of field sampling equipment including soil probes, meteorological instruments, vegetation surveying equipment, digital data loggers and portable computers.

The Comprehensive Coastal Inventory Program (CCI) uses Trimble global positioning system equipment and Topcon total station survey gear.

CCI has developed a state-of-the-art distributed computer facility consisting of high performance workstations operating in conjunction with personal computers (PCs), digitizing stations, image scanner, and output devices to facilitate a combination of geographic information systems (GIS) and image processing techniques.

Capabilities exist for the analysis of photographic information from the capture of images from video tape, scanned photographs, or digital satellite data. Tools are available for wave climate, shoreline response, and three dimensional physical process modelling. To assist in the analysis of the model data, CCI cooperates with the Department of Physical Sciences in a computer visualization laboratory equipped to provide support in areas like flow visualization, 3-D volume rendering, and the development of presentation graphics and animated sequences.

CCI currently uses the vector based GIS system ARC/INFO working in concert with the raster image processing system ERDAS as the basis for its programs.

The Nutrient Analysis Lab (NAL) provides analytical services to the scientists and students of VIMS and to other Virginia governmental bodies or corporations. In general, only conventional pollutants are measured. Measurements can be made using water, sediments, or animal tissue samples, but water quality samples constitute the majority of the lab's work.

The NAL has well-documented procedures and an extensive QA/QC program.





ADMISSION POLICY

Applicants are encouraged to visit the campus and contact faculty members about specific research interests, funding opportunities, and program information. Admission to the School of Marine Science is highly competitive, and admissions procedures are designed to provide adequate information for objective evaluation by the faculty.

Applicants are required to submit:

- 1) One copy of the completed application form.
- 2) A non-refundable processing fee of \$20. This fee is not credited to the student's account.
- 3) Three letters of recommendation.
- 4) Official transcripts of all college work. Final degree transcripts are required of admitted students before they matriculate.
- 5) Official scores of the Verbal and Quantitative sections of the Graduate Record Examination (GRE).
- 6) International students whose primary language is not English are required to submit GRE-TOFEL scores.

Requests for application forms as well as additional information should be directed to:

**Dean of Graduate Studies
School of Marine Science
Virginia Institute of Marine Science
College of William & Mary
P.O. Box 1346
Gloucester Point, VA 23062
(804) 642-7105
Fax (804) 642-7097**

GENERAL INFORMATION

Located in historic Tidewater Virginia, Gloucester Point is within 20 minutes of Williamsburg and Hampton/Newport News, Virginia. Major metropolitan areas of Norfolk, Virginia Beach, and Richmond are within easy driving distance. The semi-rural location offers diverse opportunities for outdoor activities from sailing, windsurfing, canoeing and kayaking to biking, hiking, fresh and salt water fishing. SMS students may participate in a broad range of cultural and athletic activities on the nearby William & Mary campus.

A limited number of apartments for SMS graduate students are available on the William & Mary campus in Williamsburg. There are no housing facilities on the VIMS campus; however, most students live in Gloucester Point and surrounding communities. Rental housing is plentiful and rates are reasonable. It is advisable for students to have access to transportation as most living quarters are not within convenient walking distance of the campus.





The College of William & Mary
School of Marine Science
Virginia Institute of Marine Science