“The Institute of Marine and Coastal Sciences is working to conserve the oceans through a spectacular combination of innovative research and technology, public outreach, and local engagement. I am excited about the resources IMCS provides for New Jersey.”

Francine Cousteau
President, The Cousteau Society
**A Global Resource:** The Institute of Marine and Coastal Sciences

The stability of our beaches. The quality of our water. The viability of our fisheries. The livability of our coastal communities. With 127 miles of shoreline, New Jersey is a state whose fate is inextricably bound to the health of its coastal, estuarine, and ocean environments. Beyond the state’s shores, the world’s oceans drive economies, harbor diverse biological ecosystems, and generate the powerful forces that determine weather patterns, global change, and atmospheric phenomena. Informed management of these local and global resources depends on science-based decisions; science-based decisions hinge on fact-based research and education. The Institute of Marine and Coastal Sciences (IMCS) at Rutgers, The State University of New Jersey, is the research powerhouse that delivers solutions when the economic development and sustainable management of New Jersey’s — and the world’s — marine assets are at stake.

**IMCS ranks among the nation’s top 10 institutions in funding from the National Science Foundation for ocean science.**

**Who Benefits from IMCS?**

beachgoers, sea-food lovers, harbor pilots, natural resources managers, energy traders, commercial and recreational fishermen, pharmaceutical executives, K-12 science teachers and schoolchildren, public policy makers, land-use planners, shore home owners, aspiring marine scientists, fish and shellfish farmers, environmentalists and preservationists, visiting scientists, tourists and tourism workers, and more!

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**Nondiscrimination Policy**

It is the policy of Rutgers, The State University of New Jersey, to make the benefits and services of its educational programs available to students and to provide equal employment opportunity to all employees and applicants for employment regardless of race, religion, color, national origin, ancestry, age, sex, sexual orientation, disability, marital status, or veteran status.

**Photo Credit**

Photographs from the IMAX film, *Volcanos of the Deep Sea*, a production of Rutgers and the Stephen Low Company, are courtesy the Stephen Low Company.

Page 4: Growing mountains illuminated by the lights of the submersible *ALVIN*.

Page 8: Pilot Bruce Strickrott peers out of one of *ALVIN*’s ports.

This page, pocket: The TAG hydrothermal site on the Mid-Atlantic Ridge.
Since 1989, IMCS has built its reputation on the tangible benefits of its research and scholarship. A track record of solid outcomes and strong partnerships earned IMCS a place as the 11th member of the Joint Oceanographic Institutions, a consortium of the nation’s leading academic oceanographic research institutions. IMCS is home to the Jacques Cousteau National Estuarine Research Reserve, the Mid-Atlantic National Undersea Research Program, and a Cooperative Marine Educational Research Program with the National Marine Fisheries Service.

**Solid Outcomes**

- When research moves out of the lab and into the community, it has a direct impact on people’s lives and New Jersey’s economic growth.
- Beaches, fisheries, and water quality have improved through science-based information gathered from IMCS’ ocean observing system.
- IMCS insights revitalized New Jersey’s multimillion-dollar oyster and surf-clam industries.
- New Jersey’s K-12 science education has been enriched through programs based on IMCS research and expertise.
- IMCS scientists revealed the effects of ocean dumping on life in the deep sea, contributing to the end of ocean dumping off New Jersey.

**Strong Partners**

- Innovators in government, industry, and academia collaborate with IMCS to advance many ambitious projects.
- The Aquaculture Technology Transfer Center helps shellfish farmers in southern New Jersey increase their profits through better aquaculture techniques, in partnership with the National Oceanic and Atmospheric Administration (NOAA) and an academic consortium.
- The Fisheries Information and Development Center, with support from government, academic, and industry partners, provides the science needed to improve fisheries management.
- IMCS leads the development of the Mid-Atlantic Regional Association for integrated ocean observation systems with NOAA and other universities.

**IMCS’ Record: Real Achievements, Innovative Partners**

- IMCS research has inspired key innovations in industries as diverse as ocean forecasting, fishing, aquaculture, shipping, tourism, and biotechnology.
The IMCS network of field stations, ocean observing systems, and research vessels brings scientists and students to the ocean for hands-on research and learning. Inland, the IMCS building is a center of scholarship, where students and professors collaborate to create new knowledge.

Ocean to Campus
IMCS’ headquarters on the Cook campus at Rutgers-New Brunswick brings the ocean to campus. In addition to class-
rooms, offices, and laboratories, the building houses specialized equipment for observing and analyzing coastal and oceanic processes.
- 32,000 gallons of seawater stored in the flume and seawater facility allow students and scientists to study the effects of water flow on marine processes, from the life histories of organisms to the transport of sediment.
- State-of-the-art rooftop receivers and fast Internet links collect information from a global constellation of satellites and a network of ocean observation sensors measuring ocean currents, water temperatures, and chlorophyll levels of ocean-growing plants.
- Scientists and students at high-performance computers have real-time access to changing underwater conditions through the continual transmission of high-resolution data from LEO-15, a cabled coastal research observatory tethered to the ocean floor northeast of Atlantic City.

“Without IMCS, I never would have found my passion for marine science or developed the skills for a graduate school education.”
Sara Bender, undergraduate student

Campus to Ocean
From research vessels at sea or laboratory benches on shore, Rutgers scientists and students conduct innovative research. Strategically placed IMCS field stations across New Jersey facilitate targeted research and service programs for state citizens and policymakers.
- Set in a major estuary with direct access to the Atlantic Ocean, the Rutgers University Marine Field Station hosts visiting scientists and Rutgers students and professors engaged in oceanographic and ecosystems research. The facility includes fully equipped laboratories, classrooms, dormitories, and docking for research vessels and small boats.
- The IMCS-run Jacques Cousteau National Estuarine Research Reserve in the Mullica River-Great Bay estuary promotes science-based management of the nation’s estuaries — the critical environments where rivers meet the ocean.
- A national treasure, the 1.1 million acre Pinelands National Reserve is the largest expanse of undisturbed land on the mid-Atlantic coast. Rutgers’ Pinelands Field Station provides a base for scientists who are studying the reserve’s diverse uplands and wetlands that comprise the watershed.
- For more than 100 years, the Haskin Shellfish Research Laboratory on the Delaware Bay has conducted research and shared knowledge with the fisheries and aquaculture community. At this IMCS field station, scientists investigate shellfish diseases, genetics, and habitats that spur improved oyster-production technology.

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IMCS’ Reach: A Resource for Research, Education, and Service

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More than half of New Jersey's top 50 employers rely on New Jersey's coastal resources — whether directly, such as fisheries or shipping; or indirectly, such as tourism and biotechnology. The continued health of New Jersey's coastal economy depends on scientific solutions to environmental challenges. IMCS researchers are providing the answers — and serving as world leaders in a variety of emerging fields.

**Contributions to the State**
New Jersey’s citizens and policymakers are dedicated to protecting our marine and coastal resources. IMCS provides the science that guides their efforts.

**Fish and Shellfish Management.** IMCS’ contributions to the $300-million fish and seafood market in the tri-state New Jersey area are critical.

- IMCS researchers developed disease-resistant strains of oysters and new approaches to surf-clam stock assessment, leading to multimillion dollar gains for both industries.
- By tagging and tracking striped bass, IMCS experts are gaining insight into the fish’s habits — critical information for successful fisheries management.
- The discovery by IMCS scientists of deep-sea vent organisms with bioactive compounds has spurred the creation of a spin-off biotechnology firm.

**Beach and Coastal Processes.** The $14-billion-a-year coastal tourism industry depends on healthy beaches and coastlines, as do coastal industries, communities, and ecosystems. IMCS scientists explore the environmental processes that change — or sustain — our beaches and coastlines.

- IMCS scientists developed the nation’s premier modeling system for understanding how prevailing coastal currents and storms shape beaches and shores.
- The management plans for four New Jersey estuaries relied on IMCS’ scientific expertise.
- IMCS researchers are examining the value of extensive restored wetlands for maintaining fish populations in the Delaware Bay.

**Leadership in the World**
An external committee of oceanographers has ranked several of IMCS’ research programs among the world’s best. IMCS provides leadership for the international Census of Marine Life and its Ocean Biogeographic Information System.

**Ocean Observing Technology.** A pioneer in this field, IMCS operates a test bed for new remote-sensing and underwater technology and information systems.

- Data is delivered to scientists and government agencies, as well as boaters, fishermen, and beachgoers, in real-time via the COOLroom internet site, which receives over 150,000 hits a day during the summer.
- The international constellation of satellites provides maps of water temperature and composition.
- High frequency radar systems measuring ocean currents provide critical data for navigation, search and rescue missions, and spill control.
- IMCS develops and deploys ocean robots throughout the world, in Europe, the Far East, and the Mediterranean. IMCS is the world leader in this technology.
- Ocean Modeling and Prediction. At the leading edge of a revolution in coastal oceanography, IMCS scientists integrate observing networks and information technologies with numerical models and data assimilation to understand and anticipate ocean behavior and change.
- IMCS scientists developed the nation’s most advanced modeling system for basic research and prediction of changes in the coastal ocean.
- Modeling systems developed by IMCS are in worldwide use by more than 300 researchers.
- IMCS scientists were chosen to lead a national program to model the impact of global climate change on marine ecosystems.
- Environmental Biophysics and Molecular Ecology. Biophysical instrumentation, satellite technology, and sophisticated data explore the interplay among the ocean’s biological, geological, and chemical cycles.
- IMCS scientists developed the first satellite-based maps of global photosynthesis as well as the most-sensitive instruments to measure photosynthesis.
- Insights into the roles of phytoplankton in oxygen production and microbes in human disease are direct results of IMCS research.
- IMCS scientists discovered the mechanisms for coral bleaching and methods of monitoring coral health.

“The value of IMCS’ work is confirmed by a 12-fold increase in federal research dollars to its marine science faculty and memberships in the National Academy of Sciences and the American Academy of Arts and Sciences.”

Stan La Bruna, Vice President, Public Service Enterprise Group

IMCS’ Research: Solutions that Matter

IMCS brings millions of dollars of research funding into New Jersey. This is good business that benefits everyone in the state.”
More than half of New Jersey’s top 50 employers rely on New Jersey’s coastal resources — whether directly, such as fisheries or shipping; or indirectly, such as tourism and biotechnology. The continued health of New Jersey’s coastal economy depends on scientific solutions to environmental challenges. IMCS researchers are providing the answers — and serving as world leaders in a variety of emerging fields.

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At IMCS, professors and students have forged an intimate, interdisciplinary learning community focused on a common goal — the understanding and protection of our marine ecosystems. To reach that goal, IMCS scholars must engage all the state’s citizens, from schoolchildren to government officials, through educational and service outreach.

“Teaching Our Students

With access to top scientists and advanced oceanographic field stations and technology, students receive a competitive and challenging marine science education.

- IMCS offers the state’s first multi-disciplinary undergraduate major in marine science at a four-year university.
- The curriculum includes hands-on research and laboratory experience as well as research internships in Bermuda and Australia’s Great Barrier Reef, among others.
- Each year, about 30 graduate students work toward advanced degrees and careers as the next generation of marine-science innovators and explorers in the state’s first graduate program in oceanography.
- Rutgers students majoring in other disciplines can augment their education with courses in marine sciences. Minor and certificate programs are available.
- Working with faculty members at field stations and on research vessels, selected juniors and seniors pursue a defining 10-week oceanographic field experience, funded in part by the National Science Foundation and the National Oceanic and Atmospheric Administration.

“Serving Our State

IMCS fulfills its mandate for service and outreach to the state through its management of the Jacques Cousteau National Estuarine Research Reserve and the Mid-Atlantic Center for Ocean Sciences Education Excellence.

- The MAPE curriculum for K-8 education is currently used in 47 New Jersey schools. This professional development program trains science teachers to turn New Jersey’s coastal environment into a living laboratory through a fun, hands-on curriculum.
- IMCS offers workshops, seminars, and training programs for officials, planners, and managers making important environmental decisions. Policymakers benefit from IMCS expertise on topics as diverse as building livable communities to maintaining beaches and dunes.
- The online COOL Classroom allows middle-school and high school teachers to incorporate real-world oceanographic research into classroom lessons, linking students with oceanographers studying the waters off the coast of New Jersey.
- Public educational and recreational programs for adults and children include kayak trips, festival exhibits, clean-up projects, and elementary school demonstrations.

“The next decade presents exciting opportunities to make new discoveries in oceanography, train the next generation of marine scientists, and protect ocean resources.”

J. Frederick Grassle (below), director, IMCS

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In less than a decade, IMCS has emerged as one of the top 15 oceanographic institutions in the nation and has set its sights on the top 5.

**New Initiatives**

Meeting this ambitious goal means steady improvements in research, outreach, and academics.

- A $7 million Multispecies Aquaculture Demonstration Facility in Cape May County will highlight cost-effective, high-tech, environmentally sensitive aquaculture techniques for New Jersey’s fish and shellfish farmers, enhancing competitiveness and productivity.

- Two new graduate programs — operational oceanography and atmosphere, ocean, and biological modeling — will target the growing demand for professionally trained scientists in these emerging fields.

**New Home**


Serving these constituents requires space. On the drawing board is a 70,000-square-foot addition to the current IMCS building. This expansion will not only increase the space for research and teaching laboratories, classrooms, and offices, but also bring IMCS and its interdisciplinary partner, Rutgers’ Department of Geological Sciences, together under one roof.

“On research cruises from the Norwegian seas to the Gulf Stream, I am not only learning oceanography but living it.”

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