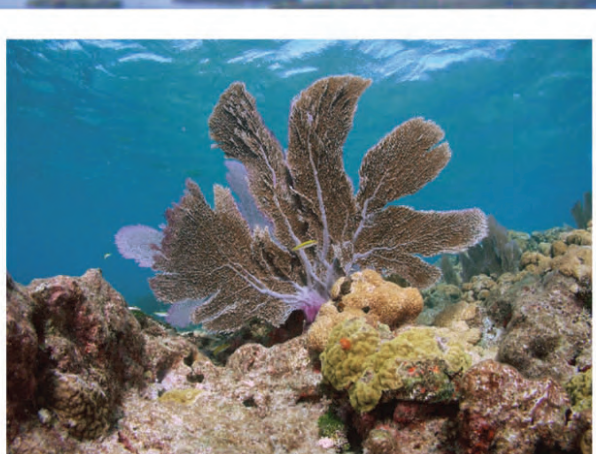
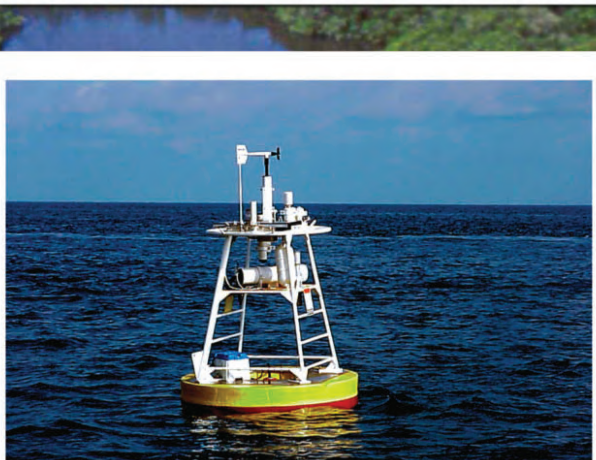
FLORIDA OCEANS AND COASTAL COUNCIL





2008-2009

Annual Science Research Plan

Florida Oceans and Coastal Council

Ex officio (non–voting) members:

- Mike Sole (co–chair) – Secretary, Department of Environmental Protection (DEP).
  Designee – Bob Ballard, Deputy Secretary, Land and Recreation.
- Ken Haddad (co–chair) – Executive Director, Fish and Wildlife Conservation Commission (FWC).
  Designee – Gil McRae, Director, Fish and Wildlife Research Institute.
- Sherman Wilhelm – Director of Aquaculture, Department of Agriculture and Consumer Services (DACS).

Voting members:

Appointed by Department of Environmental Protection:

- Karl Havens, Ph.D. – Chair of the Department of Fisheries and Aquatic Sciences, University of Florida.
- John C. Ogden, Ph.D. – Director of the Florida Institute of Oceanography and Professor of Biology, University of South Florida.
- Lisa Robbins, Ph.D. – Senior Scientist, United States Geological Survey, Center for Coastal and Watershed Studies.
- Thomas D. Waite, Ph.D. – Dean of the College of Engineering, Florida Institute of Technology.

Appointed by Fish and Wildlife Conservation Commission:

- James Cato, Ph.D. – Director, School of Natural Resources and Environment, University of Florida.
- Billy Causey, Ph.D. – Regional Director, Southeast Atlantic, Gulf of Mexico and Caribbean Region, National Marine Sanctuary Program.
- Holly Greening, Executive Director, Tampa Bay Estuary Program.
- Jerome Lorenz, Ph.D. – Research Director, National Audubon Society's Tavernier Science Center.
- Shirley Pomponi, Ph.D. – President and Chief Executive Officer, Harbor Branch Oceanographic Institution.

Appointed by Department of Agriculture and Consumer Services:

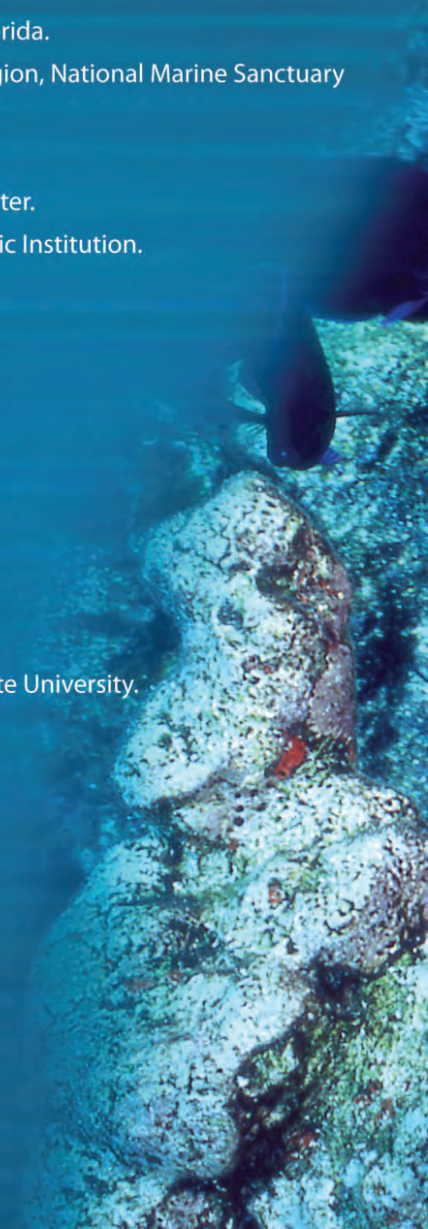
- Jane Davis – Aquarium Curator, The Living Seas at Walt Disney World's Epcot®.
- Ernest Estevez, Ph.D. – Director, Mote Marine Laboratory's Center for Coastal Ecology.
- Rob Hendricks - Chief Executive Officer, Coastal Conservation of Florida.
- Jerry Sansom – Executive Director, Organized Fishermen of Florida.
- Jody Thomas – Director, The Nature Conservancy's South Florida Region.

Outgoing members:

- Wilton (Tony) Sturges, Ph.D. – Professor Emeritus, Department of Oceanography, Florida State University.
- R. Grant Gilmore, Ph.D. – Senior Scientist, Estuarine, Coastal, and Ocean Science, Inc. (ECOS).
- Rob Kramer – President, International Game Fish Association.

Council staff:

- Steven H. Wolfe – (outgoing) Council Liaison, DEP, Office of Coastal and Aquatic Managed Areas (CAMA).
- Nicole Robinson – Council Liaison, DEP, Office of Coastal and Aquatic Managed Areas (CAMA).
- Janice Fleischer – Meeting Facilitator, Flash Resolutions, Inc.



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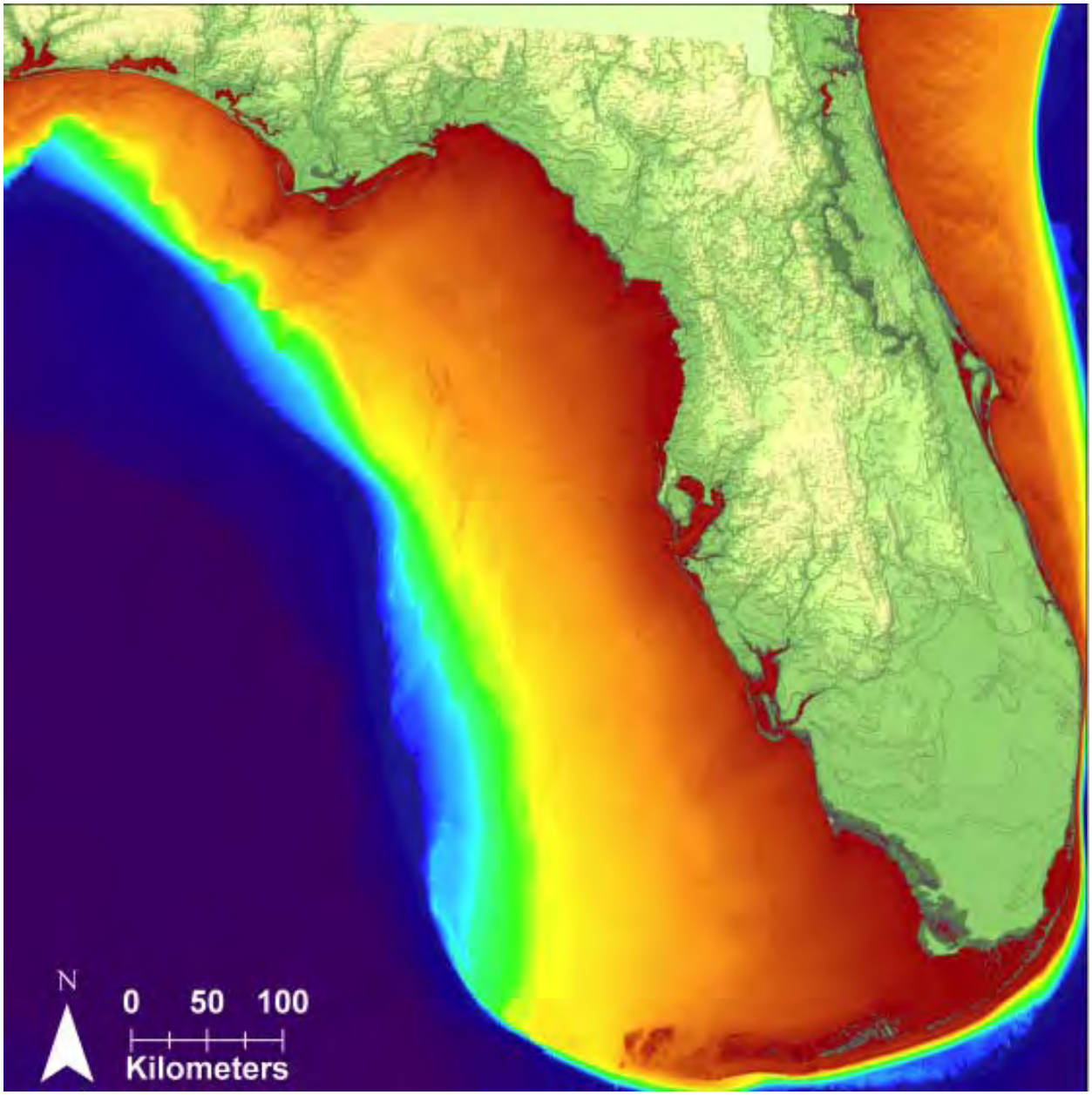

Florida Shelf Bathymetry (courtesy USGS).

Investing in Florida's Coastal and Ocean Future FY 2008-2009

Introduction

There is no greater influence in our lives than the sea. Our waters define Florida and we are recognizing, as never before, the inextricable links between our communities, our coasts, our ocean, and our quality of life. Our oceans control our weather and dictate the climates. Our oceans cover 70 percent of the planet, hold 97 percent of Earth's water, generate a significant portion of the oxygen we breathe, absorb carbon dioxide, supply our fresh water through rain, provide food, and are a deep source of inspiration to all.

Florida is the only continental state largely surrounded by coastal seas and ocean. In Florida you are never more than 75 miles from saltwater. Now, more than ever before, we as Floridians recognize how our decisions individually and regionally can impact the oceans as a whole. Today, through cutting-edge technologies, we have access to advanced data and new, timely information. By sharing our collective resources—the best science available, the expertise of hundreds of scientists and resource managers and our collective commitment—we can better protect the health of our complex ocean and coastal ecosystems and secure an ocean legacy for future generations.

Florida's economy and population are projected to grow rapidly over the long term with development booming along our coasts. This is where multiple interests intersect and informed management is critical. To abate critical threats to Florida's marine resources requires accurate assessments, continuous monitoring, and real-time ability to predict and interpret changes to the physical, chemical, biological, geological, and socioeconomic components of our marine ecosystems. It also requires a fully-integrated system to allow resource managers and other interested parties to share data and information in making their decisions.

Florida's economy is heavily dependent on its oceans and coastal ecosystems and it is important to know how to use them sustainably to strengthen our economy. In 2003[1]:

- **Florida's coastal Gross State Product (GSP) was over $402 billion, two-and-a-half times the nearly $160 billion of its' inland economy.**
- **Florida produced $23.2 billion from transactions of marine resources and marine-related industries.**
- **Ocean tourism and recreation for 2005-2015 in Florida is projected to grow by 73 percent, creating more than 268,000 new jobs.**
- **Florida's GSPs for marine transportation and for coastal recreation are each among the top five in the nation, a significant influence on the ocean economy.**

Together, working across local, state, regional and international borders, we can further demonstrate the uncommon commitment that Florida has in protecting a most remarkable treasure—its oceans.

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[1] Kildow, J. 2006. Phase 1, Florida's Ocean and Coastal Economies Report. Report to Florida Department of Environmental Protection. Office of Coastal and Aquatic Managed Areas. 111 pp.

The Florida Oceans and Coastal Council

The Oceans and Coastal Resources Act, §161.70, et seq., Florida Statutes, created the Florida Oceans and Coastal Council (Council). The Secretary of the Florida Department of Environmental Protection, the Executive Director of the Florida Fish and Wildlife Conservation Commission, and the Commissioner of the Department of Agriculture and Consumer Services, each appoints five marine scientists and experts who serve as voting members of the Council. Designees of the three agency heads serve as ex-officio members with the Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission co-chairing the Council. This resulting Council of 18 is charged with coordinating coastal and marine research in Florida, identifying research gaps and creating an annual Research Plan, and recommending new strategies that enhance management and conservation efforts for our coastal and marine resources.

Accomplishments

The Council has already made significant achievements and been able to influence a broad range of activities. Among these:

- The Council solicited and incorporated input from 17 Florida resource-management agencies and entities. This information was used to perform a broad-based assessment of resource-management needs and to prioritize the research needed to address those needs.
- The Council's Annual Science Research Plan has been used by State agencies to guide their actions in the areas of research and resource assessment.
- Priorities identified by the Council are being used to shape the newly formed regional collaborations of the Gulf of Mexico Alliance and South Atlantic Alliance.
- Creation and initial steps are underway to implement a Resource Assessment to provide internet-based information for all about the location and status of Florida's natural and human resources.
- Creation and initial steps are underway to implement a Research Review for Florida to provide internet-based information for all on existing ocean and coastal research. This will help identify research gaps and prevent duplication of effort.
- The Council sponsored creation of a white paper on aquaculture in Florida that explores opportunities and hindrances for expanding aquaculture's role in Florida.
- The Council partnered with the Florida Water Resources Monitoring Council to support establishing metadata standards to improve use of existing Florida data.
- Council actions stimulated the creation of an organized ocean observing effort for Florida that includes public/private partnerships.
- The GAME project (Geospatial Assessment of Marine Ecosystems) is gathering existing biological and physical information in a web-based GIS format. The goals are to identify critical information gaps and to define and map Florida's marine ecosystems.
- The Council's emphasis on mapping prompted a joint state-federal interagency workshop to assess existing information and identify and prioritize mapping needs for Florida. Results from the workshop have already influenced projects funded through other sources. For example: a website was established with information to help with coordination of mapping within the state (www.dep.state.fl.us/MarineMapping); the information was integrated into the USGS's Florida Shelf Habitat Mapping Project, the Response of Florida Shelf Ecosystems to Climate Change, and a pending project to establish habitat and resource baselines within the boundaries of an impact zone on a test and training range in Northwest Florida (for U.S. Department of Defense).
- Priorities identified by the Council influenced the National Ocean Research Priorities Plan.

The Annual Science Research Plan

This third Annual Science Research Plan is based on prioritized resource-management needs. These were collected from a comprehensive array of state and local government agencies with coastal and oceans resource management responsibilities and augmented by input from non-governmental organizations regarding their view of the State's resource-management needs. This information was used to identify research gaps and guide research priorities. The Council compared the management needs to available research to identify where research funding was

needed. Two common themes throughout the lists were the need to understand and predict environmental change on an ecosystem level and develop science-based solutions to environmental problems.

More details and the foundation on which this Research Plan is constructed are located at www.FloridaOceansCouncil.org. The Full Science Research Overview contains the areas of research needs identified by the Council and an explanation of their importance. The research needs are based on a survey of resource-management agencies, which can also be found on this website.

The Future of Florida's Oceans

Florida's Constitution states that it "shall be the policy of the state to conserve and protect its natural resources[2]…" Success mandates that we use creative public and private partnerships, pursue opportunities to leverage funds, use our universities and research laboratories and coordinate our efforts with local, state and federal agencies. A discussion of the Council's overall research priorities is contained in the Full Science Research Overview (v 1/4/08), which can be downloaded from their website.

The Council recommends the following areas of research emphasis in FY2008-2009:

Water Quality

Water quality is of critical importance to Florida—it determines what biological communities can live in a water body, whether the water is harmful to humans and whether the water is suitable for other designated uses. With an economy driven by our environment, maintaining water quality to support coral reefs, grass beds, fishing and beach activities must be a high priority.

Research Priorities—Water Quality:

1. Research and monitoring that examines effects of excess nutrients on living coastal resources and relates them to causes and sources and to human activities. The intent is to support cost-effective resource management programs to improve oceans and human health.
2. Statewide coastal observing that guides water quality management, marine resource management, and navigation and hazard response.
3. Harmful algal bloom (HAB) research to protect tourism, commercial and recreational fisheries, and inform watershed management for ocean health. The emphasis is on non-red tide HABs as red tide HABs are already being addressed.
4. Modeling of hydrodynamics, water quality, and coastal/ocean ecosystems to support better understanding of cause and effect between uplands activities, coastal freshwater discharges, and resulting effects on estuarine and marine biological communities.

[2] Florida Constitution, Article II, Section 7

Climate Change

The world's changing climate has the potential to dramatically impact Florida's marine resources, disrupt marine-based economies and cause significant damage to coastal development, thereby creating the need for mitigation and adaptive-management strategies.

Research Priorities—Climate Change:

Providing guidance to minimize effects on Florida's population and natural resources must begin with investigation into three key areas.

1. Modeling of sea-level rise based on Intergovernmental Panel on Climate Change (IPCC) scenarios and development of cost estimates for resulting effects in terms of natural resource impacts and adaptation of existing coastal development. Emphasis is on collaborative, statewide efforts with peer review. These can include steps that may be necessary to improve model accuracy such as improved topography for coastal uplands.
2. Assessing the impact on fisheries productivity from changes in Florida's estuarine habitats due to sea level rise.
3. Monitoring, modeling, and mapping of natural system responses with an emphasis on predicting effects of climate change on coral reef communities. To establish baseline data, it will be necessary to map and characterize Florida's coral reef communities.

Ocean and Coastal Ecosystems

Florida's beaches and near shore coastal waters draw more than 33 million tourists each year, while contributing more than $56 billion and more than 900,000 jobs to the economy.

Those same resources are shaped by geology, water movement, and the plants and animals themselves interacting on a variety of scales from hundreds of kilometers to millimeters. Having a comprehensive understanding of these ecosystems through reliable baseline information is critical to supporting wise management decisions.

Research Priorities—Ocean and Coastal Ecosystems:

1. Map and characterize the seafloor and coast including the distribution and abundance patterns of coastal marine organisms. Emphasis is on the gaps in mapping identified by the state resource management agencies at the Florida Mapping Workshop in February 2007 [3].
2. Improve understanding of coastal and ocean hydrology, including the linkages between freshwater input and coastal waters. Emphasis should be on water budgets, hydrologic modeling, and factors affecting and controlling freshwater input to coastal and nearshore waters.

[3] February 2007 joint DEP/USGS/SERPPAS workshop on Florida mapping priorities. Available at http://www.dep.state.fl.us/MarineMapping/priorities.htm

3. Research and modeling to understand and describe linkages between ocean and coastal habitats and the living marine resources they support. One area of emphasis is the effects of marine protected areas (MPAs) on surrounding populations. Fisheries and their linkages to habitats are an important area of these studies.
4. Increase understanding of ocean and coastal economics, including the values of non-market resources and the costs and benefits of beach renourishment and beach restoration.

Tools and Technology

Fulfilling Florida's need to observe and predict environmental change and the ecosystem responses of its coastal waters provides abundant opportunity for the development and implementation of cost-effective tools and technologies to understand, monitor, and improve the health of Florida's resources.

Research Priorities—Tools and Technology:

1. Integrated Coastal and Ocean Observing Systems—A mix of in-water platforms and buoys, shipboard surveys and remote sensing is required for continuous monitoring of water quality and status of marine resources. The goal is to create a sustained interdisciplinary observing system that spans all of Florida's waters from the outer shelf to coastal estuaries and rivers. Emphasis is on extending, integrating and filling gaps in existing coastal observations.
2. Development of sensors to provide improved abilities to determine the status and trends of our coastal waters and their inhabitants. Emphasis is on sensor development for biological and chemical sensing, as well as tagging and tracking of wildlife.
3. Integrated Data Management and Prediction—Coordinated collection, handling, quality control, sharing, and interpretation of research and monitoring data are critical to improving the State's resource management capabilities. Centralized coordination of model development to provide prediction and user-friendly web-based posting of information and model predictions are needed to accommodate science-based decisions by management agencies and the general public.
4. Development of innovative tools to cost-effectively map and monitor the State's coasts and oceans.
5. Development of assessment tools, particularly for assessments of biological community status and trends, for rapid assessments of natural resources, and for evaluation of management efforts.

Ongoing Research Efforts

The Oceans and Coastal Resources Act seeks better coordination of coastal and ocean research. The Council stresses that this Research Plan is not generally intended to replace ongoing state-funded research efforts and partnerships. These research recommendations are based on

identified research gaps to supplement research already underway and eliminate duplication of efforts.

Integrated Data Management and Dissemination

Based on input from managers; improved collection, handling, sharing, and interpretation of research and monitoring data is a necessary element to improve the State's resource management. Initial steps of this effort were launched in FY 2007-2008, but the full design and implementation necessary to produce a robust, cost-effective, and useful system must take place over several years.

To ensure continued support, the Council encourages that an appropriate percentage of research funding be targeted to support the costs of providing a strong integrated data management and dissemination program. The proposed next steps are below:

1) Complete the development of metadata standards for the remaining major types of research and monitoring data, complete vetting of proposed standards with the public, and establish the final metadata standards.
2) Work with State of Florida technology oversight entities to initiate system design, including system specifications and requirements.
3) Undertake a pilot project to identify key historical data for rescue and restoration and develop methods to achieve restoration in a cost-effective manner. Have state and local agencies identify existing databases that are candidates for conversion and compile information describing data contained therein.
4) Establish a working panel to recommend the best means for providing strong statistical support to researchers during both the design and analysis phases of their research and to ensure that support is incorporated into the state's research programs.
5) Establish working panel to recommend the best means for providing strong data-interpretation support to researchers and resource managers.

Communication and Interagency Coordination

The Council encourages the agency or agencies charged with implementing funding of the priority research areas to use existing mechanisms, or to develop new mechanisms as appropriate, to fund innovative collaborative work between the private sector and Florida universities and research institutions in order to maximize the expertise of each and effectively link research with education of the next generation of scientists.

Building on the success of the 2007 Mapping Workshop, the Council will continue to engage scientists, managers, and members of the public on priority issues through workshops, Oceans Day, and other forums.

Recommended Priority of Funding

The Council offers the following four items in order of importance. This list is also expected to provide guidance on state research priorities for state, regional, and federal research, ocean observation, and natural resource data management programs.

1. Council administration and operation:

Operating costs for Oceans Council – costs for Council meetings and support staff to create annual Research Plan and oversee research proposals and contracts.

Recommended funding = $300K

2. Legislatively-defined duties

a) **Research Review –** maintain publicly-available Research Review detailing past and present coastal and ocean research in Florida;
b) **Resource Assessment –** complete publicly-available Resource Assessment providing information on the location and status of the natural and human resources in Florida's coastal and ocean realm.

Recommended funding = $225K

3. Integrated Data Management and Dissemination

Continue efforts to establish standards, procedures and a metadata framework to safely and efficiently store and share research data, and to develop and maximize the usefulness of the information generated from that data.

Recommended funding = $775K

4. Priority research in Water Quality, Climate Change, Ocean and Coastal Ecosystems, and Tools and Technology, including coastal ocean observing that supports these priorities.

Recommended funding = $9.7M

A list of research projects will be developed by the Council agencies from peer-reviewed proposals addressing the research priorities identified in this Research Plan. This list will present projects in order of their priority for funding consideration and will be submitted to the Legislature.

Note: the 'Areas of Research Priority' below are elaborated in the "Future of Florida's Oceans" section above. The descriptions below after 'Priority Task' are those aspects of the Research Priority that the Council feels are most urgent.

Water Quality

Areas of Research Priority: Nutrient loading, observing systems, harmful algal blooms (HABs), modeling.

Priority Task: **Effects of non-point or point sources of nutrients on coastal flora or coastal ecosystems; including relative impacts of point versus non-point sources, ties to land use, and ability to distinguish sources of nitrogen and/or corresponding response conditions.**

Climate Change

Areas of Research Priority: **Modeling, monitoring, mapping, and natural system responses including fisheries.**

Priority Task: **Modeling sea-level rise in Florida and its effects on human and natural resources. Requires collaborative, state-wide sharing of ideas, peer-review, and defined timeline. Additional topographic data may be required.**

Priority Task: **Predict impacts of climate change on coral communities.**

Ocean & Coastal Ecosystems

Areas of Research Priority: **Mapping, hydrology, modeling, harmful algal blooms (HABs), marine protected areas, fisheries, economics, beach renourishment/restoration, aquaculture.**

Priority Task: **Fill in mapping gaps from state agencies' priority list[4] to improve decision support tools for resource managers.**

Priority Task: **Fisheries and effectiveness of marine protected areas (MPAs) to include habitats, spawning sites, and development of rapid-assessment tools. There is a need for statewide area(s) of study and creation of decision-support tools for managers.**

Tools and Technology

Areas of Research Priority: **Integrated coastal ocean observing systems, sensor development, tagging and tracking technologies, innovative new mapping tools, tools for biological and other types of assessment.**

Priority Task: **Development of sensors for measuring biological activity, add sensors to existing observing systems and address gaps in existing systems. Leverage capabilities from existing state investments.**

Priority Task: **Development of biological community health & rapid-assessment tools.**

[4] Results of February 2007 joint DEP/USGS/SERPPAS workshop on Florida mapping priorities. Available at http://www.dep.state.fl.us/MarineMapping/priorities.htm

Florida Oceans and Coastal Council

Vision Statement

The Florida Oceans and Coastal Council envisions the bountiful ocean and coastal resources of Florida as a perpetual life-support system and the foundation of our economy and society.

The Council will promote innovative research and the use of scientific results to guide management and stewardship of Florida's ocean and coastal resources for future generations.

The Council will support the enhancement of Florida's academic and marine research institutions into an integrated network, cooperating and partnering with public agencies, industries, environmental organizations and citizens.

Florida will be an internationally-recognized leader in marine science and ecosystem-based management.

Florida Oceans and Coastal Council
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