

Email of Transmittal

Florida COOS Caucus

January 9, 2006

TO: Steve Wolfe, Liaison, Florida Ocean and Coastal Resources Council (FOCRC)
Florida Department of Environmental Protection (DEP)
3900 Commonwealth Boulevard M.S. 49 Tallahassee, Florida 32399

Dear Steve,

Thank you for your email which requested an estimate of the overall cost to conduct the first year's work for the Research Components of Research Focus Area 3 and 7 (**Integrated Observation and Prediction System for Science-Based Management of Florida's Coastal Marine Ecosystems**).

Consequently we are pleased to provide to you, and request you forward to the Florida Oceans and Coastal Resources Council (FOCRC) members, the enclosed white paper to create a Florida coastal ocean observing system which we reference as **Florida COOS**. This includes a budget.

A working group representing interested people from across the state (see the FL COOS Caucus web site at: <http://www.nova.edu/ocean/flcoos/>) have been meeting for several months to produce this draft.

We trust you will share our belief that we in Florida have a very exciting and unique opportunity to engage all sectors (private, public and academic) to address problems critical to our state's economy, environment, and health by applying state of the art science and technology to these very important coastal issues.

For such a science-based Florida COOS effort, we estimate that a first year budget of sixteen point two million dollars (\$16,200,000) will be required. While more work will be needed to provide budget figures for subsequent years, we expect that several hundreds of millions of dollars will be required during the initial ten year period of this project. We do believe, however, that Florida will be able to significantly leverage its resources with federal funds over the long term by authorizing this first year effort. We believe this effort is cost-effective and well worth the investment.

We are requesting that the FOCRC include this proposal as an initial research plan priority as they complete their deliberations on these matters later this month. We plan to attend your next FOCRC meeting (January 17-18, 2006 or before), and would request time be allocated for our presentation to the FOCRC.

Please let us know if you have any questions.

Sincerely yours,

Dick Dodge

On behalf of the following institutional representatives:

Dean Otis Brown, Ph.D., University of Miami Rosenstiel School of Marine & Oceanographic Science (UM RSMAS)

Dean Richard E. Dodge, Ph.D., Nova Southeastern University Oceanographic Center (NSU OC)

Dean Peter R. Betzer, Ph.D., University of South Florida College of Marine Science (USF CMS)

Jan Petri, Ph.D., Government Relations, Harbor Branch Oceanographic Institution, Inc. (HBOI)

Kumar Mahadevan, Ph.D., President and CEO of Mote Marine Laboratory (MML)

Chairman George A. Maul, Ph.D., Florida Institute of Technology Department of Marine & Environmental Systems (FIT DMES)

Chairman William K. Dewar, Ph.D., Florida State University Department of Oceanography (FSU DO)

Chairman Manhar Dhanak, Ph.D., Florida Atlantic University Department of Ocean Engineering (FAU OE)

Chairman Joseph Tedesco, Ph.D., P.E., University of Florida Civil and Coastal Engineering Department (UF CCE)

Mitchell A. Roffer, Ph.D., President, Roffer's Ocean Fishing Forecasting Service, Inc. (ROFFS)

cc: to the above

At 15:37 1/6/2006 -0500, you wrote:

Hi Dick,

Happy New Year. And it comes, naturally, with a request for help!

You already know the background, so I'll skip that part of this missive.

The request below is a standard letter we're sending to various people we think would do the best job in giving a VERY ROUGH ESTIMATE of the research project costs. You (or at least someone in the FL-COOS Caucus) seemed like a natural for estimating these pieces. If I strayed from your comfort zone, let me know and I'll cast about for another source of estimate. With this lead-in, here is our standard letter of request and the project descriptions and background are described. The projects are in the document and the foregoing language is just standard fluff from the research plan but we thought people might like to see it. You may want to pass this off to someone else but I'd appreciate the final estimates coming from you just so we can keep track of it all. Really appreciate the Thanks Dick -- Steve

Hello,

The 2006-2007 Research Plan of the Florida Oceans and Coastal Resources Council is nearing completion and needs your help in estimating the cost of proposed Research Components.

Research Component (RC) info:

- 1) Each RC represents an area of research generally aimed at answering a particular question.
- 2) It is anticipated that many RCs are sufficiently broad that it will require funding more than one research project to provide the desired information.
- 3) It may require more than one year to complete the research in an RC. However, your dollar figure represents only the first year if you determine that a particular RC would require multiple years to address.
- 4) If the RC is too broadly stated to allow an estimate, please feel free to identify work toward the RC goal that could be accomplished the first year and estimate the cost of that. If this is done, please include a brief description of what the estimate covers.
- 5) If the RC is so broad that, in your opinion, estimating is impossible, please send in that conclusion.

You've been identified as having experience that would allow you to provide the Council with an estimate of the cost to conduct one or more Research Components. We seek an estimate of the cost to conduct the **first year** of the described research, along with an estimate of the time it would take to complete the work in the RC and, if an RC will require multiple years to complete, a rough estimate of the total cost for those years.

. To that end, please:

1) Provide by close-of-business Jan 13 a rough estimate of the overall cost to conduct the first year s work for the attached Research Component(s). Please include the estimated time to complete all the work of the RC and a rough estimate for the overall cost.

2) If the Research Component ends up on the final list to be presented to the Legislature, you will be notified Jan 18. In this event, we ask for your best estimate of the first-year cost by close-of-business Jan 20.

Please send your response to: (steven.wolfe@dep.state.fl.us)

If you have any questions, don t hesitate to contact:

Thank you for your help,

Steve

Steven H. Wolfe
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Florida Oceans and Coastal Scientific Research Plan

2006-2007

III. Research to Address Management Needs

Introduction

The Council spent considerable effort examining the Management Needs received from the state agencies with coastal and oceans responsibilities. They organized those needs based upon the types of research necessary to address them, arriving at the set of Research Categories used to organize the Comprehensive Research Overview.

Because a single Management Need might require several different types of research and a single piece of research might help address several Management Needs, the Council identified Research Focus Areas within each Category. These describe fairly broad research areas around which to organize a research effort. Within the Focus Areas, more specific Research Components were created intended to provide the information necessary to address one or more of the Management Needs. Budgets were created for the Research Components, but it is envisioned that it will generally require multiple individual research projects to accomplish the goal contained in a Component.

Research Category B: Monitoring Methods and Monitoring For Research

Introduction

Monitoring can be conducted for many purposes. These can be divided broadly into two categories, the collection of data to inform one about status and trends of a system, and the collection of data in an attempt to understand the functioning of the system, typically through data analysis, modeling, and scientific interpretation. The status-and-trends monitoring data can also be used in the model development and verification. Research to develop methods for monitoring and research which depends on monitoring data for modeling or other purposes will be addressed here. Monitoring to provide raw information for management needs (for instance, to determine whether minimum water quality criteria are being met) will be addressed in the Management Recommendations chapter, though these efforts can also provide data for modeling.

Monitoring includes making sustained interdisciplinary observations using shipboard surveys, fixed-stations (for instance, moored instrument arrays that collect real-time information), high frequency radar and satellite remote sensing, and drift technologies where instrument arrays collect information as they are carried by currents. This monitoring also requires use of methods for sampling chemical constituents and the biological communities that occupy this physical-chemical environment.

Research Focus Area 3: Integrated Observation and Prediction System for Science-Based Management of Florida's Coastal Marine Ecosystems.

Science-based management of Florida's coastal and offshore marine resources requires a systematic, interdisciplinary monitoring approach that integrates physical, chemical, and

biological processes, including statewide discharges of surface and ground waters to the coasts. Monitoring includes both periodic and real-time sampling, each at scales sufficient to address management questions.

Florida is unique in that it is surrounded by oceanic boundary currents, the Loop Current in the eastern Gulf of Mexico, which continues as the Florida Current in the Straits of Florida and along the east coast. These offshore boundary currents directly force the adjacent shelf environments by: 1) driving circulation and exchange of outer and mid-shelf regions; 2) generating current induced upwelling and internal wave intrusions that can stimulate red tide blooms; 3) provide important links in recruitment pathways for local and remote spawned larvae; 4) produce high connectivity between Florida's western, southern and eastern shelves, as well as the entire southeast U. S. coastal waters and waters of the Caribbean. Therefore models of Florida's coastal circulation must be nested within larger scale circulation models of the North Atlantic and Gulf of Mexico to ensure proper interactions with the strong offshore currents and to provide the observed connectivity between adjacent State regions, and remote upstream and downstream regions.

Due to differences in shape, configuration, forcing, climate, flora and fauna the State coastal waters can be subdivided into three subregions: the West Florida Shelf (WFS) stretching from the Panhandle area to Ft. Myers; the South Florida Shelf (SFS), from Ft. Myers to Palm Beach; and the East Florida Shelf (EFS) from Palm Beach to the Florida-Georgia line. Coastal hydrodynamic models for each subregion should be linked with overlapping areas and linked to a large-scale atmospheric forcing model to provide wind stress, heat and humidity and nested within large-scale ocean circulation models to provide oceanic forcing and boundary conditions.

These subregion-scale coastal hydrodynamic models must be linked to finer-scale nearshore models which include the shallow waters near the coast and all connecting estuaries, including fresh water inputs from surface and ground waters. Water quality, biological and ecosystem models will then need to be developed that will couple to these shelf and nearshore hydrodynamic models and provide nowcasts and forecasts of environmental change and ecosystem response.

To summarize, the State of Florida's effort to observe and predict environmental change and ecosystem response of its coastal waters will require: 1) the creation of a sustained interdisciplinary observing system using a mix of remote sensing, shipboard surveys and in-situ stations with real-time elements for daily monitoring of water quality and status of marine resources and integrated with future IOOS and SECOORA observing systems; and 2) the establishment of data/modeling center(s) for data quality control and dissemination, model development and web-based posting of user friendly data and model products to accommodate science-based decisions by management agencies.

Research Components

To establish and maintain a integrated state-wide, observation-based, predictive system of coastal marine ecosystem monitoring, it will be necessary to:

RC 12: Establish real-time interdisciplinary observing systems off Jacksonville, Cape Canaveral, the Panhandle, and Ft. Lauderdale. Expand observing systems to the Dry Tortugas.

Review of ongoing observation programs in state coastal waters shows no or sparse observations from these regions which are needed to improve ecosystem forecasts for the highly-connected coastal shelf environments.

RC 13: Establish observation/modeling centers to:

- a) *Setup databases and establish QC procedures, select data transmission methods, design web based presentations for observations/modeling results. This is linked with Research Category C - Modeling and the Data Integration and Management section.*
- b) *Establish information system, including real-time data and historical data archives online. This is linked with the Data Integration and Management section.*
- c) *Configure existing circulation models for data acquisition and operational hindcast/forecast model runs and force with nested North Atlantic Ocean model, atmospheric models, tides and river inflow data. This is linked with Research Category C - Modeling.*
- d) *Develop data assimilation techniques to better link models with real-time observations and improve model predictability. This is linked with Research Category C - Modeling.*
- e) *Include remote sensing data sources in the center's efforts.*

Research Category C: Modeling Systems

Science-based management of Florida's coastal and offshore marine resources will require a systematic, interdisciplinary approach of real-time monitoring and modeling that integrates physical, chemical, biological, and geological processes. These need to include considerations of atmospheric forcing and freshwater discharges to coastal waters over the entire State as well as flow from outside the state. The management needs are for coupled physical, biological, water quality, and ecosystem predictive models having real-time data input and easily-accessed, user-friendly results.

Research Focus Area 7: Integrated Observation and Prediction System for Science Based Management of Florida's Coastal Marine Ecosystems.

Florida is unique in that it is surrounded by oceanic boundary currents, the Loop Current in the eastern Gulf of Mexico, which continues as the Florida Current in the Straits of Florida and along the east coast. Therefore models of Florida's coastal circulation must be nested within larger scale circulation models of the North Atlantic and Gulf of Mexico to ensure proper interactions with the strong offshore currents and to provide the observed connectivity between adjacent State regions, as well as remote upstream and downstream regions.

Due to differences in shape, configuration, forcing, climate, flora and fauna the State coastal waters can be subdivided into three subregions: the West Florida Shelf (WFS) stretching from the Panhandle area to Ft. Myers; the South Florida Shelf (SFS), from Ft. Myers to Palm Beach; and the East Florida Shelf (EFS) from Palm Beach to the Florida-Georgia line. Coastal hydrodynamic models for each subregion should be linked with overlapping areas and linked to a large-scale atmospheric forcing model to provide wind stress, heat and humidity and nested within large-scale ocean circulation models to provide oceanic forcing and boundary conditions.

These subregion-scale oceanic hydrodynamic models must be linked to finer-scale nearshore models, with these hydrodynamic models feeding models predicting biological effects to provide the information needed by Florida's managers. The coastal models must include inputs of fresh water discharge from surface and ground waters and the effects of the water quality of these inflows.

The State of Florida's effort to observe and predict environmental change and ecosystem response should consist of the creation of a network of long-term interdisciplinary observing systems to support predictive models with user friendly web based and ftp products created to

accommodate science-based decisions by management agencies. To establish and maintain this observation based predictive system it is necessary to:

Research Components

RC 26: Support seasonal interdisciplinary surveys in all 3 regions.

RC 27: Establish real-time interdisciplinary observing systems off Jacksonville and Cape Canaveral in the EFS, off the Panhandle in the WFS and off Ft. Lauderdale in the SFS, and expansion of observing systems to the Dry Tortugas in the SFS.

RC 28: Establish observation/modeling centers for the WFS, SFS and EFS regions to:

- a) Configure existing circulation models for data acquisition and operational hindcast/forecast model runs and force with nested North Atlantic Ocean model, atmospheric models, tides and river inflow data.***
- b) Develop data assimilation techniques to better link models with real-time observations and improve model predictability. This is linked to the Integrated Data Management section.***