SEACOOS Program Management

The SEACOOS Executive Committee: H. Seim (chair), M. Fletcher, C.K.N. Mooers, J. Nelson, R. Weisberg, F. Werner.

Introduction

The management of the SEACOOS program is reviewed below. The topics included pertain to the mechanisms used to create the consortium, define its mission, develop and manage its annual budget and tasking cycle, and the history of its focus of a five year time period. The management of SEACOOS was complex and required quite a bit of development effort. Over the five year period, changes in management were made in response to less successful management options to provide for better management of the program and allow for a more unified approach to the research, operations, data management and outreach efforts.

The other significant regional IOOS effort underway when SEACOOS began was the Gulf of Maine Ocean Observing System (GoMOOS, www.gomoos.org). There was good communication between the SEACOOS and GoMOOS programs, and strong collaboration on data management, but program management was quite different. GoMOOS had incorporated as a not-for-profit, was focused on establishing and marketing a buoy-based observing program and viewed itself as a utility. The SEACOOS region did not have the history of regional collaboration present in the Gulf of Maine to draw upon, is considerably larger in area, and SEACOOS was focused on fostering collaboration between a number of existing observing efforts rather than managing a particular one.

There are several aspects to the program that made its management challenging. Most significant was the evolving vision for the Integrated Ocean Observing System (IOOS) as a whole. As SEACOOS began there was a notion of regional efforts but the more specific description of regional associations (RA) and the regional coastal ocean observing system (RCOOS) the RA was to manage would not be described until two years into the program. SEACOOS began with the perception that it would (and must) tackle all aspects of regional development responsibilities – and this perception led to a broad range of funded activities. As IOOS matured, SEACOOS became more focused on addressing the technical aspects of RCOOS development. As the program draws to a close, the perception is that SEACOOS was a RCOOS research and development effort that should document what it accomplished and synthesize its lessons learned as completely as possible to inform future activities to the maximum extent possible.

The other significant challenge SEACOOS faced, and which appears to be true of many aspects of the IOOS endeavor, is promoting regular and sustained communications among the partners. The distributed nature of a RCOOS forces communications to be electronic, and despite exploration and testing of a number of tools to facilitate communications, it remains a task that requires constant attention. The personnel requirement this task implies is easily under-estimated; the price of neglect can be high in terms of confused objectives, disenfranchised participants, and mission creep.

Inception of the consortium

SEACOOS as a congressionally-directed program was conceived of in early 2001. The approach of the Congress was the result of an interest in pursuing a regional effort consistent with the IOOS vision and a recognition that no existing agency programs were capable of funding the kind of effort envisioned. An initial regional workshop held in Miami, FL in June, 2001 made clear that there was sufficient interest and expertise in the southeast US to warrant pursuit of significant funding. As the initial group of subregional programs began to discuss how to proceed, Dr. Russ Lea at UNC-General Administration urged the partners to enter into a contracting model (the **Master Agreement**) prior to receiving any funding to ensure that funding, once procured, could be quickly and efficiently distributed to the partner organizations. The Master Agreement proved to be a robust financial agreement that allowed the program flexibility in funding and autonomy of the partners while ensuring fiscal accountability. The defining attributes of the Master Agreement are that it provided:

- Uniform treatment of all partners
- Equal credit for principal investigators
- Flow through terms, appropriate to the receiving institution
- Negotiate standard terms in advance of prime award
- Reduce turn-around time for funding actions (task orders)
- The legal framework for managing the relationship(s) among partner institutions and the basis for termination of individual or institutional participants.

The Master Agreement proved of value throughout the lifetime of the program.

The Task Order component of the Master Agreement was especially useful. These are issued as the funding action under the general terms and conditions of the Master Agreement. A Task Order contains the essential information needed to establish an award with a recipient institution including annual and cumulative funding levels, funding period(s), information on the prime grant agreement including CFDA #, the identified recipient PI, Administrator and Fiscal Officer, established payment terms (invoicing schedule) and reporting requirements and can accommodate special terms and conditions as needed. The recipient's plan of work and the prime grant agreement are included as attachments and the Master Agreement is incorporated by reference. Task Orders are issued to the recipient institutions and include funding for all projects at that institution. The exception is the University of South Florida, which had three different Task Orders, two of which were added in the second year. While negotiating a common agreement among 11 different entities is time consuming, having the advance approval allowed the actual Task Orders to be issued within weeks of receiving the formal grant agreement from ONR. Typically it takes 1-3 months to establish sub agreements under a prime award among university partners

Task Orders can be summarized as follows:

- Provide funding authority
- Incorporate approved budgets/scopes of work
- Invoicing and reporting requirements

- Issued within days of receiving prime award

Governance
Beyond the fiscal arrangements, the SEACOOS program quickly recognized a need to implement a form of self-governance. The program at inception had identified 1-3 PIs from each partner, and the management of the program was undertaken by the collection of the PIs. However, within the first year additional PIs were engaged as gaps on the program's expertise were identified, and the number of PIs grew from 10 to more than 20. The number of issues being addressed and the complexity of the issues made teleconferencing difficult, and for the first 1-2 years of the program videoconferencing was used as a way to manage travel costs but make the regular (monthly?) PI-meetings productive. However, by the second year the number of PIs and co-PIs made it obvious that another model was needed.

There was also concern about conflict of interest. The PIs who originally conceived of the program were also the individuals promoting the program with the Congress and making funding decisions for the program as a whole. It was difficult to argue that the one group alone could objectively develop and approve budgets for the entire program. There was a need to clarify the roles and responsibilities of the partners in the program. Hence a governance document was developed that articulated how the partners would work together to operate the system being built.

The **Articles of Collaboration** were drafted to address the concerns raised above. It instituted an agreed-upon organizational structure, some of which had been the *de facto* breakdown of responsibilities and some of which were new efforts. To address the (then pressing) issue of conflict of interest, the Articles called for the formation of a SEACOOS Board of Directors, composed largely of chief officers from the partner institutions, but with some external representation as well. The articles were considered a constitution of the community participating in SEACOOS and clarified the roles and responsibilities of the participants. It also formalized policies of SEACOOS on information sharing (free and open access to the data collected but a requirement for recognition of source), on publicity/publication (a generic attribution of funding), on organizational conflict of interest and on dispute resolution.

The Articles defined the following roles with their attendant responsibilities (Figure 1):

- Board of Directors – disinterested representatives who approve the budgeting process and are the forum for dispute resolution;
- Working Groups – the functional organizational units of the program that include the observing, modeling, information management, and extension and education working groups;
- Principal Investigators – the funded, institutionally-authorized participants in the program who bear responsibility for developing and executing the work tasks;
- The Executive Committee – comprised of the chairs of the individual working groups, the named PI on the program with the funding agent (also known as the chief operating officer) and the project coordinator (the chief fiscal agent), responsible for the day-to-day management of the program

and the development of the program direction, development and implementation;
- Federal affiliates – representatives of agencies from the region that have significant assets and/or interest in the development and execution of the RCOOS.

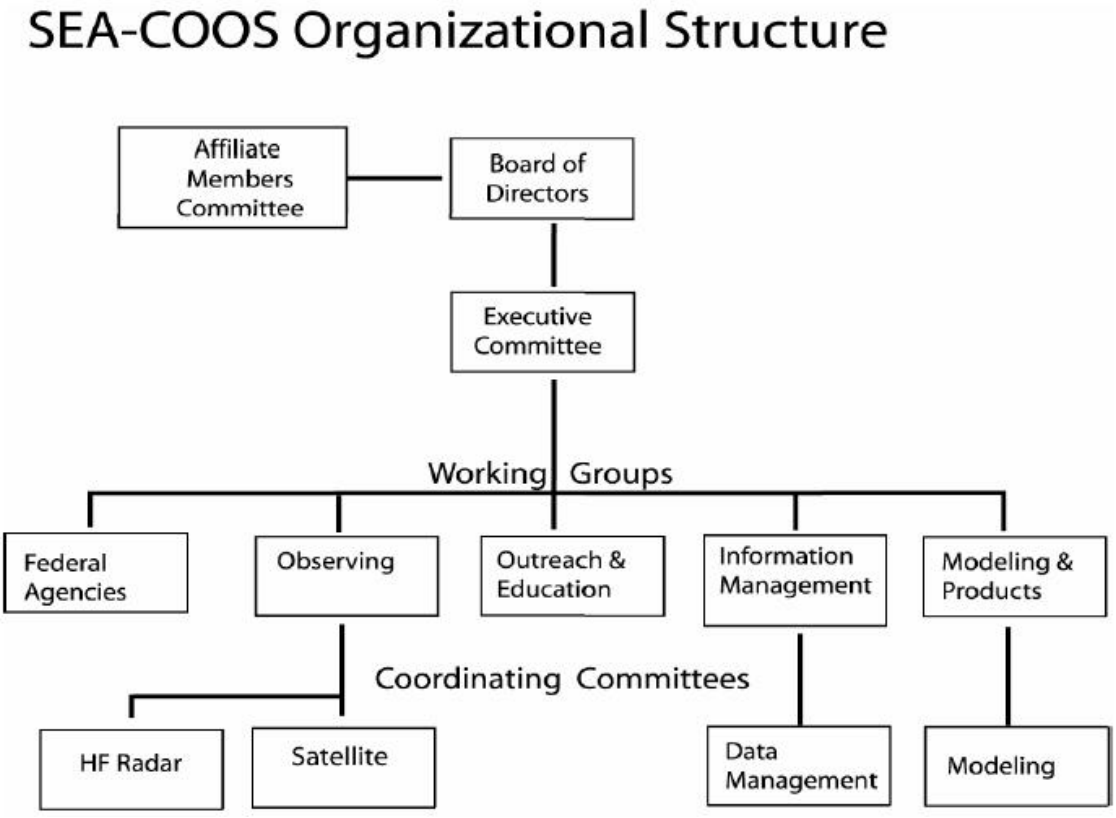

Figure 1 - an organizational chart of SEACOOS

Overall the Articles of Collaboration worked well and allowed SEACOOS to successfully operate as a program for the remainder of its funding. However, a number of issues persisted and are worthy of some exploration.

A primary issue for the organizational structure was the struggle of maintaining institutional balance in representation versus representation based on programmatic structure. Obviously the latter was preferable from an operational standpoint but the political realities of functioning as an earmark activity meant that the key institutions required active participation of their organization as a condition for continued support. This tension will not be unique to earmark efforts; for the RAs the challenge will be maintaining balanced geographic representation throughout the organization. The model used by SEACOOS of trading off expertise against geographic distribution is likely to be reproduced and is a reasonable compromise. The principal cost is the potential loss of leadership in a functional area if skill is concentrated within a limited number of entities.

A second major issue of the organizational structure used by SEACOOS was the isolating nature of the working groups. Once the decision was made to organize participation in SEACOOS along working group lines, the annual proposal development, with its associated work tasks and reporting requirements, generated a significant amount of communications. It was a challenge to promote adequate dialog within the working groups on these items alone; there often were concerns over sufficient engagement of all the funded entities. The most obvious reason that it was difficult to engage funded participants was the part-time nature of most of the funding. Most staff were multi-tasking and overwhelmed by the combined communications demands. Given this setting, it is not surprising that we found it hard to promote dialogue on topics that cut across working groups. Similar to notions of matrix management, we initiated theme activities (e.g. search and rescue, fisheries) that sought to encourage participation and dialog among all the working groups. Though these themes proved useful and popular in workshop settings we were not able to sustain activity in them outside of the workshops. It may be that it is simply not possible to sustain this level of fine-grained management with part-time participation. The implication is that dedicated staff will likely be required to sustain a healthy level of interaction among the functional elements of the RCOOS.

Defining the Mission: Long-term program direction

As stated above, there was not a clear vision of how IOOS was to be created or operated as the program began. As such, there was very little guidance on the scope of the program, the roles and responsibilities of its participants, or a notion of how it should develop over time. After the realization that so little guidance was available, the program began, at Dr. Mooers persistent urging, to author a set of plans to guide it. Participation of a broad cross-section of the participants was deemed critical in the writing of the plans to ensure their input and buy-in to the directions chosen.

The first plan written was a **Strategic Plan**. It took nearly a year to complete but greatly clarified the long-term purpose and vision for the program. The main attributes of the program are to:

- Deploy, operate and evaluate *in situ* measurement and remote sensing systems;
- Evaluate emerging observational technologies in field operations;
- Develop, implement, and evaluate numerical modeling systems for research and operational forecasting applications;
- Generate and distribute information products in near real-time that combine observational data and model output and are based on up-to-date oceanographic knowledge;
- Develop a regional information management system to access, distribute and archive data, metadata, and visualization products, and to ensure data formats and delivery systems are coordinated, interoperable, and compliant with national systems and standards;

- Coordinate with governmental agencies and the private and public sectors to enhance the development and efficiency of the observing system and to expand the economic opportunities that it provides;

- Promote the use of coastal information by decision-makers, educators and the general public through outreach and education activities.

The Strategic Plan also defines the four working groups in more detail than was done in the Articles of Collaboration and presents views on products, product development, and governance.

Some of the drawbacks of the strategic plan as written are that it defines what should be done but not how it will be accomplished nor by whom. This uncertainty about roles and responsibilities included no explicit recognition of the role of research and development in the RCOOS, which should remain an integral part of IOOS. The plan did not describe how the system could be grown and led to the development of an **Implementation Plan**.

Defining how best to grow a RCOOS led to a dedicated 2-day meeting of the funded investigators near the beginning of year 2 to discuss a path forward. There were two significant outcomes, one related to identification of the audiences we could realistically engage in the near term, the other related to recognition of the central role modeling should take in the technical development. For the latter, our identification of 3 broad process components of IOOS – its **physical state**, **biogeochemical and ecosystem state**, and **socio-economic state** – was to link the organizational units envisioned in the planning documents for IOOS (e.g. Airlie House, OceanUs) with the societal themes the program is intended to address (Figure 2). The three scientific processes above comprise logical units of activity that include numerous inter-related elements and which should be developed in a coordinated fashion. Perhaps most importantly, each component can be tested for adequacy, both in terms of its ability to resolve and predict key ocean features and to address specific application areas. Establishing the best overlay of components, coastal themes, and scientific processes to study is challenging but vital, and is one of the main purposes of the Implementation Plan.

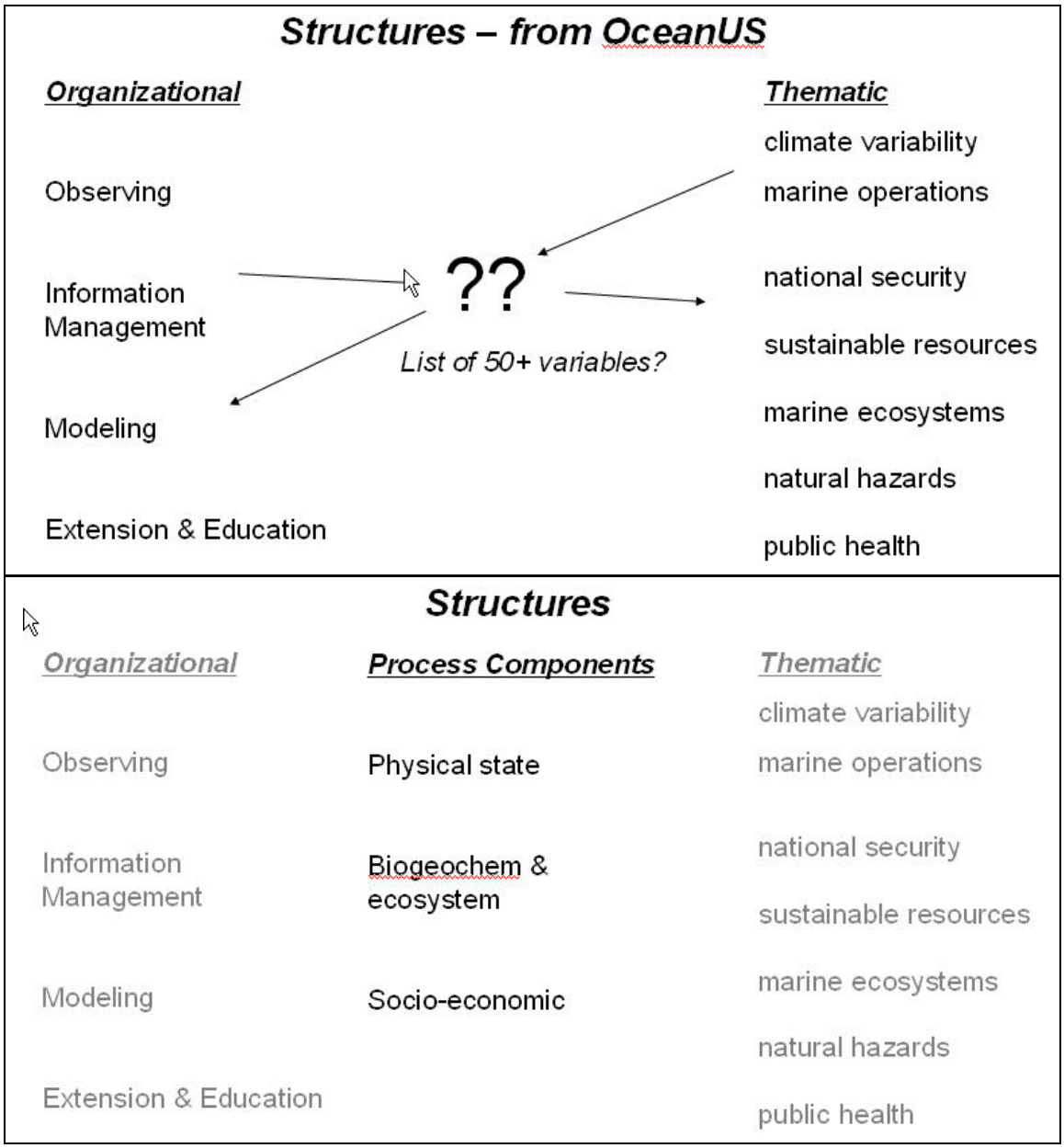

Figure 2 - role of process components in Implementation Plan in bridging the existing notional structures from OceanUS

The Implementation Plan identified two short-term (1-5 year) phases of development, both of which focus on creation of the physical state estimation component ~~[include table?].~~

Phase 1 – a) Produce circulation fields and 3D particle trajectories for use in Search & Rescue, spill response, nowcasts and forecasts of pollutant dispersal, and HABs. The identified users are Coast Guard, State and Federal emergency managers, NOAA HAZMAT, and the NWS Weather forecast offices. b) Support Fisheries oceanography with an emphasis on particle trajectories to assess regional "connectivity" and fisheries recruitment. The identified users in part b) are the Southeast Fisheries Science Center, South Atlantic Fisheries Management Council, Gray's Reef National Marine Sanctuary,

Florida Keys National Marine Sanctuary, Florida Marine Resources Institute, South Carolina Department of Natural Resources, and Beaufort Marine Laboratory.

The two application areas were chosen for a few reasons. Those in a) are considered quite mature user groups and ideal candidates to quickly and efficiently take advantage of increased dataflow to support their applications. Their preference is for demonstrable predictive capability in the short-term and aligned closely with an interest in SEACOOS in quantifying the uncertainty of the initial nowcast/forecast system. The fisheries application was chosen to demonstrate the importance and utility of (just) physical state estimation to ecosystem-based management, and to engage users whose data needs are more archival and retrospective in nature.

Phase II seeks to enhance nearshore and inshore capabilities by adding two more targeted applications. These applications are also chosen because of feasibility, but are delayed until Phase II because of the significant development efforts required. a) Storm surge/inundation – assist in providing high-resolution estimates of surge heights and inundation areas. The identified users are the- NWS/Weather Forecasting Offices (WFOs) and Emergency Management groups (Federal, State, and County). The major development required is high resolution topography onshore and- high resolution bottom topography in the nearshore/inshore regions. B) Surface Waves – to better represent rip currents, bed stress and sediment transport, and to provide validation for wave forecast models. The identified users are NWS/WFOs and state resource managers, and the major development required is a regional directional wave measurement program.

The staging of these two phases was largely dictated by a desire to first integrate existing assets available on the open shelf and then grow the system landward.

The implementation plan provided a venue to put forward ideas on a number of other topics. These included a rationale for system design (which later led to a separate plan on this topic) driven by geography, oceanography, history, capability and needs; an expression of appropriates roles of the various provider sectors as the system progresses through its development stages; an appropriate development process that attempts to define a generic approach (inventory, aggregation, evaluation, augmentation, testing, etc); an explanation of our chosen prioritization, based on the rationale/philosophy behind selection of initial efforts; and an attempt at a timeline for implementation, expressed as a chart of development targets.

In retrospect, the Implementation Plan is a reasonably thorough document but it lacks a listing of clear science learning objectives that define the spatial and temporal scales of critical processes relevant to the applications.

In January 2005, roughly 2.5 years after funding began, the program subjected itself to a mid-term self-imposed **External evaluation**. Two volumes of material were produced for the evaluators, one which described the program and actions to date and which was augmented with presentations to the evaluators, and a second volume of the proposals and annual and semi-annual reports. The preparation of these volumes was a significant undertaking but did greatly clarify our explanations of SEACOOS. The evaluation has been made public and includes responses from the program.

An outgrowth of the external evaluation, the **RCOOS design** exercise (Seim et al., 2007) sets out a reasonably detailed depiction of an initial RCOOS (Figure 3) and makes an estimate of the cost to maintain it. An important new aspect to the RCOOS design plan that differs from the SEACOOS implementation is recognition of the need for explicit funding of application teams/forecast centers/analysis centers to utilize the information flow to its greatest extent. A secondary but fulfilling motivation to develop the RCOOS design document was the need to estimate observing system costs as part of the SECOORA business plan.

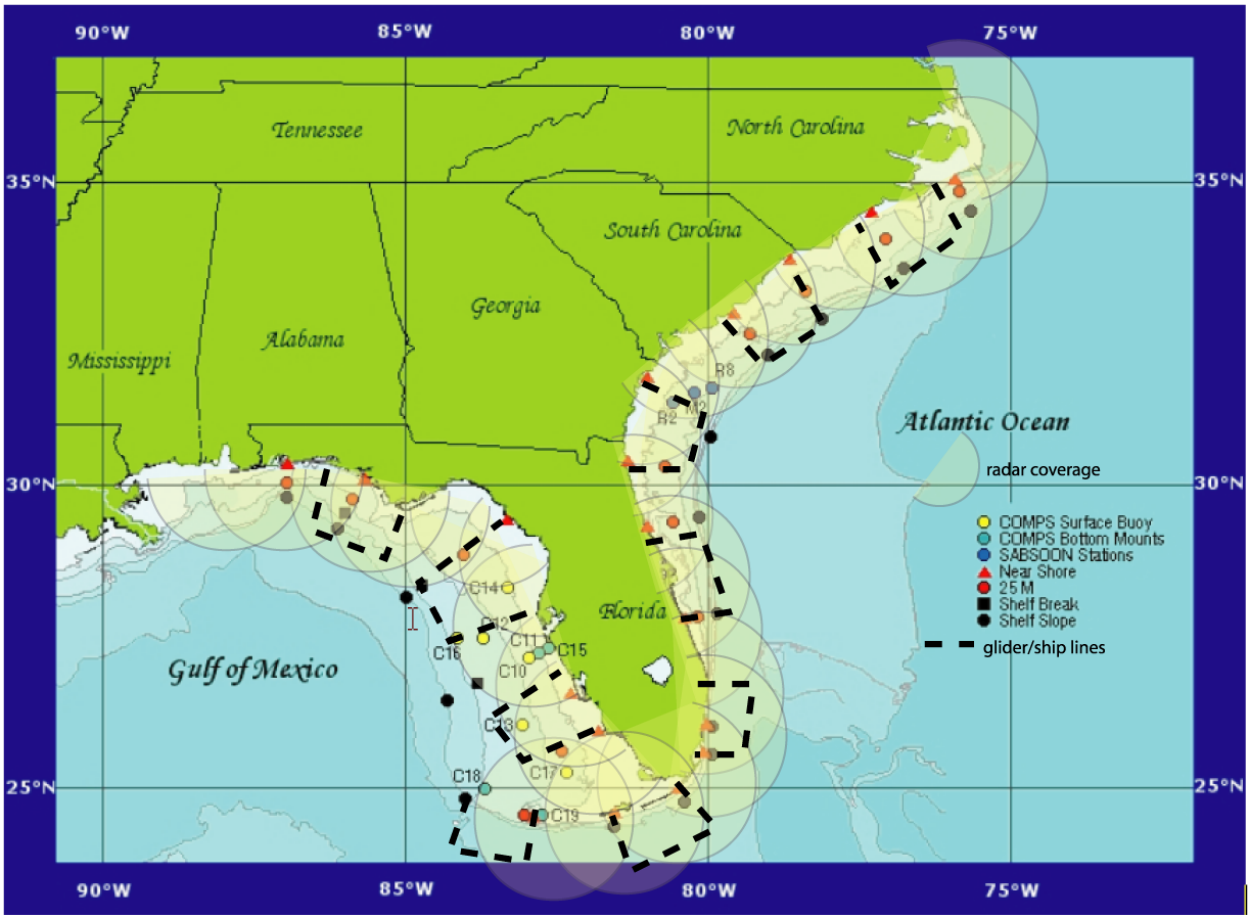

Figure 3 - conceptual design of the observing assets of the SE RCOOS

The last document authored as a cross-cutting effort within SEACOOS was the **State of the Coastal Ocean Report**. It consists of characterizations of the atmosphere and coastal ocean, status of the SE RCOOS, and several recent events to begin establishing a regularly produced report that can serve as a record of changing conditions in the SE. It may serve well as an organizing principle to encourage review and evaluation among the participants. It can also be used as a straightforward way to measure progress in an easily stated fashion

A next logical publication would be a science plan to augment the implementation plan by providing science foci during each phase of development.

Annual funding: Developing and managing the budget

In addition to providing overall direction for the program, a major undertaking in the management of SEACOOS was development and implementation of an annual funding process. Over the first two years of its existence the program evolved to use the sequence of annual milestones in Table 1.

Table 1 - annual funding process

Date	Milestone
Month 2	Annual objectives – present before Fall Workshop
Month 3	draft working tasks – discuss at Fall Workshop
Month 5	excomm review
Month 6	draft budget, balance against funding
Month 7	board approval, submission to funding agent
Month 6	Semi-annual report
Month 12	Annual report

The process is long and rather involved but did allow sufficient time for everyone to participate at some level. It had to be flexible because of the uncertainty in funding levels that the program received each year. As could be expected the process was never simple nor without difficulty but it did prove to be reasonably effective.

The drafting of work tasks for each component of the program provided a relatively simple and straightforward way to set performance objectives at the investigator level and to track progress over the funding cycle. For essentially all those involved, projecting what they would accomplish in a year's time was a significant departure from the grant proposal process of envisioning what could happen over the lifetime of the grant. It is worth noting that investigators almost always overstated what could be accomplished in a year, and that even by the end of the program, it was still difficult to project what could be accomplished in a year. Because of this difficulty in realistically scoping annual work tasks the program never implemented a formal review and evaluation process at the investigator level as part of the annual process. Carrying out such an implementation would be straightforward and is an attractive aspect of the annual process. One drawback to the procedure was the lack of a place to capture and report activities undertaken during the year that were not part of the proposed work tasks, e.g. leveraging SEACOOS funding to participate in a experiment funded by another entity. Providing a mechanism to list opportunistic activities would address this drawback.

Below are the annual objectives developed in each year of the program that guided the annual proposal process.

Annual Tasking Cycle: Developing and managing project goals

Year 1 Goals (from Oct. '02 workshop)

More sites reporting real-time observations
Critically evaluate key technologies in field deployments
Use and refine data assimilative modeling techniques
Produce nowcasts and forecasts from circulation models
Implement a regional data management system

Develop mechanisms of information exchange between SEA-COOS and non-research users
Engage the SE research and management community to plan for further development of the system
Develop a working partnership with federal operational and research entities to link to national infrastructure.
Establish a flexible Governance system

Year 2 (from Nov '03 workshop)

Continue activities and include:

A pilot effort to observe surface waves (enhance relevance to nearshore)
Work with the Centers for Ocean Science Education Excellence (COSEEs)
Support development of the Southeast Regional Association (SERA)
➔ clarifies our role as a pilot study in developing a coastal ocean observing system.
Explicit inclusion of satellite remote sensed observations

Primary Year 3 Target: ocean response to weather effort (from Nov. '04 wkshp)

HF radar, highest priority instrument pilot project effort
fixed, moving, and remote sensed observables to be merged
Modeling will work towards N/F including the full density field
Outreach and education centered around derived products

Secondary Year 3 efforts

surface waves
Fisheries
Biogeochemical indicators
GIS coastal databases

Year 3 Possible Road-blocks and solutions

Communications – need to promote more dialog between WGs.
Steps: develop Implementation Plan; establish cross-cut teams; revisit project management software
Budget process – uncertain lines of authority
Steps: develop internal governance document; establish more formal budget process
Central office personnel – too light, can't service all requests
Steps: suggest consideration of PhD-level project manager

Year 4 targeted activities

- Refinement of ocean circulation, emphasizing baroclinic processes and apps: S&R, spill response, and fisheries management
- Design and begin implementing a direction wave observations sys and storm surge observations and prediction sys, in support of EM, resource management and safe navigation.
- Design CODAE to test ocean circulation observations and modeling based on lessons learned

Year 5 – document, skeleton crew

Workshops

SEACOOS hosted nine regional workshops over the five year timeframe of the program. After some initial adjustments, the program settled into holding a spring workshop that was open to the public and intended to foster interactions among all interested parties in the region, and a fall workshop that was used for program planning and review (see annual process above). The spring meetings initially sought to provide a venue for information exchange between SEACOOS, other COOS activities, and federal activities in the region. As SEACOOS developed a clearer notion of how the RCOOS effort should be implemented, the spring workshops evolved into discussion forums for specific aspects of RCOOS development. The workshops were quite popular with attendance exceeding 100 participants in 2004 and 2005. The fall workshops were dedicated to internal communications and program development and were venues for discussion of long-range planning documents and the annual budgeting process. Time was always set aside in breakout for the working groups to interact, review progress to date and consider necessary re-orientation of objectives.

Several aspects of the workshops are worth noting. First and foremost they proved to be a wonderful venue for planning and frank dialogue among all the interested parties in the region. It was the one and only time that we witnessed participation by state, federal, academic and private sectors in planning regional efforts; in particular, the development of a waves program for the SE and an ecosystem-based fisheries observation program. There is great potential for follow-on activities that should include further planning and joint execution of regional implementation of RCOOS components. This positive aspect of the workshops was partially offset by the difficulty in maintaining coordination on projects after workshops. A second point is that the scope of the workshops failed to include a focus on science issues. Though some of the earlier spring workshops did foster dialogue on regional scientific issues this topic deserves more attention now that there is a vision for how a science plan can be linked to the implementation plan. As those with experience in organizing workshops will know, planning and executing these relatively large workshops is a major undertaking and requires a significant time commitment by a program committee and a workshop reporting team. The number of simultaneous document creation efforts undertaken by SEACOOS was large; the workshop reports proved difficult to complete as a result. It can be hard to balance the need for numerous workshops against the time commitment required to make them worthwhile.

Budgets – The annual budget and allocations by working group are shown in Table xx. The funding levels varied widely from year to year, a result of the earmark process in Congress. personnel numbers, categories and leveraging.

Table xx. Annual budget, broken down by working group.

	Year 2	Year 3	Year 4	Year 5	Total
Observing	3125903	3049794	2372761	616693	9165151
Modeling	619049	730356	652986	164727	2167118
Information Management	993014	1261836	1236455	613770	4105075
E&E	478000	496875	427546	117084	1519505
Management	48034	226139	132252	49437	455862
Total	5264000	5765000	4822000	1561711	17412711

Summary and Lessons Learned

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Strategic Plan. http://seacoos.org/documents/strategy

Implementation Plan. http://seacoos.org/documents/implementation

External Evaluation documents. http://seacoos.org/General%20Information/Folder.Organization/ExternalEvalDocs/document_view

External evaluator review and SEACOOS response. http://seacoos.org/documents/evaluation

Seim,. H.E., C.N.K. Mooers, J.R. Nelson, R.H. Weisberg and M. Flectcher, 2007. Towards a regional coastal ocean observing system design for the southeast coastal ocean observing regional association, submitted to *Journal of Marine Systems*.

Southeast Coastal Ocean Report. http://seacoos.org/documents/report

Annual proposals (on website currently: Year 1, Year 2, Year 3)

Annual reports (on website currently: Year 1 to ONR, Year 2 to ONR, Year 2, Year 4)

Semi-annual reports (on website currently: Year 2, year 3)

Workshop reports – (on website currently: June 2001 (not labeled correctly), Fall 2002 (minutes, not a report), [2003 – mixed bag, no obvious single report], May 2004, Fall 2004, [2005 – mixed bag, no obvious single report], fall 2006)

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Appendices

Partner and Affiliate Organizations

Board of Directors

Principal/co-Principal Investigators