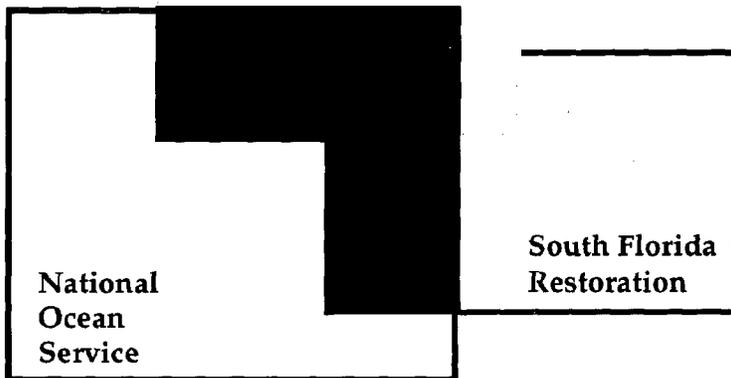

Florida Keys Ecosystem Integration Project: Establishing NOS Priorities

Management Information Needs

Florida Keys National
Marine Sanctuary



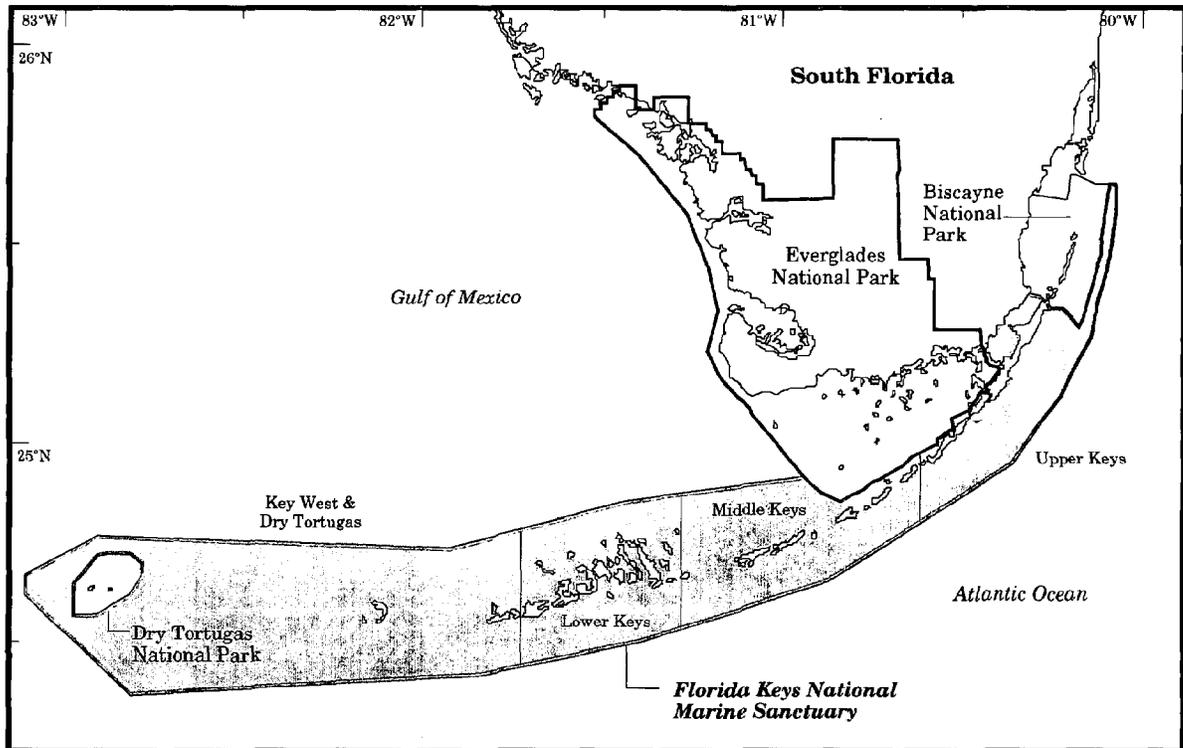
November 1995

NOS Florida Keys Ecosystem Integration Team
National Ocean Service



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1995

Florida Keys National Marine Sanctuary



The Florida Keys National Marine Sanctuary (FKNMS) was designated by the U.S. Congress in 1990. It includes approximately 2,800 sq. nautical miles of coastal and oceanic waters and the submerged lands thereunder at the southern tip of Florida. These waters are home to spectacular and unique marine environments, including seagrass meadows, mangrove islands, and extensive living coral reefs. These habitats support rich biological communities possessing myriad recreational, commercial, ecological, historical, scientific, educational, and aesthetic values of great importance to our Nation.

The economy of the Keys is inextricably linked to its marine environment. Three million tourists visit the area each year, primarily to participate in water-related activities as fishing, diving, and boating. In 1990, half of the Keys' population held jobs that supported the outdoor recreation industry. Additionally, commercial fishing accounted for \$17 million of the Keys' economy, more than 20 percent of Florida's total gross earnings from commercial fishing. These activities depend on a healthy marine environment and good water quality.

During the past four years NOAA and its Federal, regional, State and local partners have worked together to design the Sanctuary's comprehensive management plan. This task was greatly complicated by the Sanctuary's size, the resources it contains, and the diversity of its users' activities.

*The three-volume Strategy for Stewardship: **FKNMS Draft Management Plan/Environmental Impact Statement** was released for public comment in April 1995; comments can be submitted until December 31, 1995. For a copy of the plan or to submit comments, contact the Florida Keys National Marine Sanctuary, P.O. Box 500368, Marathon, FL 33050; phone 305/743-2437.*

Florida Keys Ecosystem Integration Project: Establishing NOS Priorities

This report presents the results of a cross-National Ocean Service (NOS) planning project to improve integration among NOS activities that affect the South Florida coastal ecosystem. It includes a description of project goals and objectives, a review of the methods used for identifying, characterizing, and prioritizing NOS South Florida projects, and a detailed summary of how integration needs were identified. Operational details, including specific tasks and products required to achieve integration, are identified. Recommendations for FY96 activities, proposals on who would conduct this work, and options for FY96 funding are presented. Finally, a process is proposed for reaching consensus within NOS and implementing high priorities.

Summary Recommendations*

These items are the priority tasks recommended by the project team. They were established through a systematic assessment of NOS activities, regional needs, and integration potential.

- **Conduct a regional workshop process to establish a consensus-based ecosystem monitoring program for the FKNMS and marine waters in South Florida.**
- **Design and implement an Internet-based metadata access and distribution system that links to actual records of regional environmental data relevant to the FKNMS.**
- **Conduct workshops to identify priorities for ecosystem characterization relevant to FKNMS management needs.**
- **Complete benthic habitat maps for priority regions of Florida Bay and the Florida Keys.**
- **Conduct work sessions to reach consensus on priority approaches and data requirements for modeling physical processes in Florida Bay and Florida Keys relevant to Sanctuary management.**
- **Improve bathymetry data for Florida Bay and the Florida Keys and document methodology.**
- **Establish an NOS team to define operationally "sustainable development" with respect to NOS priorities in South Florida.**
- **Establish an "integration" fund to provide incentives for NOS project managers to undertake the remaining integration tasks identified in Table 4 (page 14).**

* See Table 5 (page 18) for a summary of integration needs.

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Introduction

In April 1995, NOS (see inside back cover) initiated a planning project to better focus and integrate its ongoing and planned activities being conducted in the Florida Keys and Florida Bay. NOS had identified this as a high priority based upon its continuing responsibility for managing the Florida Keys National Marine Sanctuary (FKNMS). During the past four years, NOS and its partners have completed a comprehensive management plan for the FKNMS, a task greatly complicated by the Sanctuary's size, the resources it contains, and the diversity of its users' activities. In April 1995 the draft plan was officially released for public comment. It is expected to be finalized in early 1997.

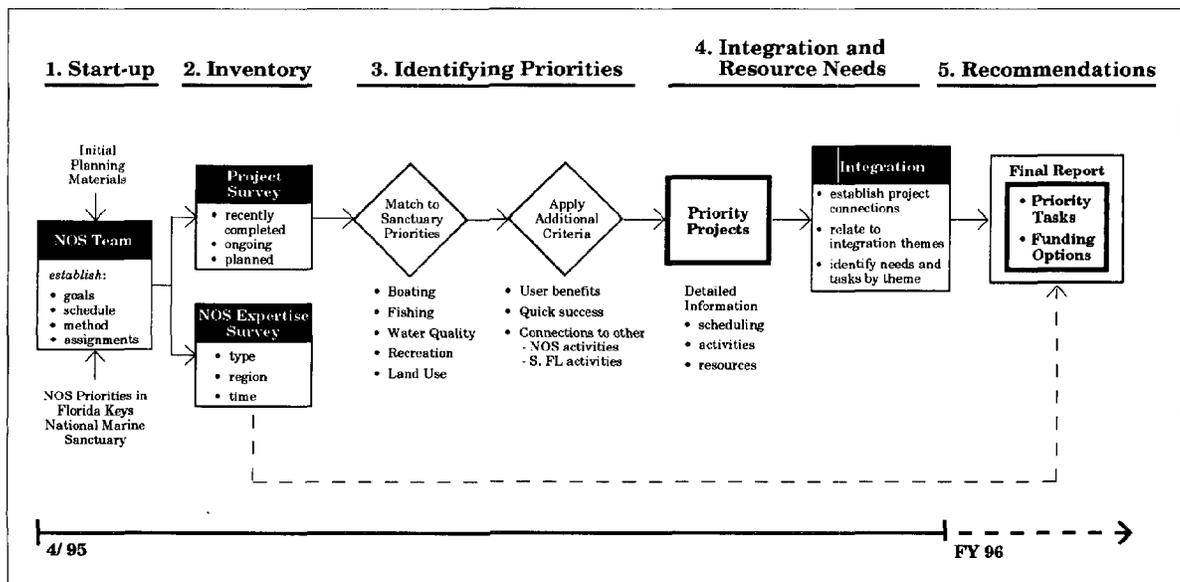


Figure 1. Process to establish NOS integration priorities in the Florida Keys.

This report is intended to help NOS fulfill the broad environmental mandates described in the Sanctuary management plan. The initial objectives have been to:

1. Inventory ongoing, planned, and recently completed NOS projects in and around the Florida Keys;
2. Inventory and assess relevant NOS expertise in this area (this data was set aside for later use);
3. Identify priority projects based primarily on NOS priorities in the FKNMS (from the Draft FKNMS Management Plan);
4. Evaluate the potential for integration among priority projects, and between these projects and other South Florida coastal environmental activities; and
5. Develop specific, operational recommendations for cross-NOS project integration.

Figure 1 illustrates the process used to conduct the project. This document represents the final report. The next steps may include realignment of certain NOS projects, additional integration with other NOAA, Federal, and State/local activities, and a closer examination of NOS's responsibilities associated with implementing the FKNMS management plan.

Methods: Collecting the Information

The most significant challenge for the project team was to create a credible set of "planning data" where none existed, and to then conduct a rational assessment of these data to establish priority integration targets for NOS. A cross-NOS team (inside back cover) first identified the required data elements and formulated a strategy to collect them.

The Data

Data were collected in two stages. First, survey forms were distributed throughout NOS to collect an initial set of comparable data on the projects and expertise associated with the protection and conservation of South Florida's coastal ecosystem. Project data requested included project title and description, regional focus, priority, status, objectives, schedule, products, resources, partners and users, and personnel. Expertise data requested included regional expertise, topical expertise, recent South Florida experience, and current assignments. These data were used to prioritize the projects based upon specific criteria (e.g., relationship to FKNMS priorities, level of user benefits, etc.).

Second, a more detailed survey form was used to collect additional information for high-priority projects. These data, which included detailed tasks, personnel assignments, and costs for items such as travel, contracts, and equipment, provided the basis to establish connections between projects and to identify opportunities for integration. The data collection survey forms are presented in Appendices B, C, and D.

How Good Are The Project Data?

Although much of the planning information obtained was somewhat (or to a degree) speculative, the overall picture presented a reasonably accurate and comprehensive view of NOS's ongoing and planned South Florida ecosystem projects. All major and most minor

Defining Integration

integrate. To make into a whole by bringing all parts together. 2. To join with something else; unite.

American Heritage Dictionary

Integration is a process of bringing parts together into a whole. It can be applied in many different situations: manufacturing, politics, philosophy, and even biology. **In organizational management, integration is a process of bringing people and projects together to achieve specific institutional objectives.** In this context, integration means much more than meetings or memorandums to ensure coordination. It includes a systematic assessment of how, and how well, institutional resources are being applied to a particular task. If the information base required for this assessment does not exist, it must be created. Integration also means identifying where improvements can be made and how these changes can be implemented. This does not typically include a review of mission or broad goals and objectives. Rather, the process is confined to evaluating how best to achieve specific results with available resources. Integration in this context is, therefore, more about tactics than it is about strategy.

NOS projects were identified. Information such as project description, objectives, schedule, and partners was generally available for all of the reported projects. Key factors in the survey's success were the project team's familiarity with most of the projects and their ability to work directly with their NOS colleagues throughout the survey process.

However, detailed information was still difficult to obtain, even for major efforts. For example, budget figures were particularly elusive as most NOS offices do not itemize funds by individual project and very few projects had compiled accurate figures. Products were sometimes poorly defined (e.g., "database" or "report") and specific tasks associated with project implementation were often either missing or vague. In some cases, several iterations of the project information sheets were necessary to ensure that all of the available details about a project had been included. ***All of this suggests a need to improve project management and planning skills within NOS.***

Filling the Information Gaps

One of the project team's principal responsibilities was to improve the "value" of the sometimes spotty project descriptions by filling in the missing pieces and adding new information. For example, after summarizing the initial survey results, the project team "added" information on how each project connected to FKNMS priorities. Although valuable for interpreting survey results, this is difficult or impossible to establish through a survey process. The project team also "added" value by developing priorities based upon clearly defined criteria, identifying connections among projects, and recommending new tasks and products to ensure integration among priorities. Each value-added step improves the utility of the survey data and expands NOS's ability to apply the results. Emerging from this process is a clearer strategy for accomplishing NOS's priorities in the FKNMS.

Conducting the NOS Project Inventory

Initial Results

Given the imperfect nature of this process, the results were much better than expected. Eighty-four projects and 76 subject experts were identified and characterized. ***The data on NOS personnel with South Florida expertise was summarized and set aside for later use.*** The number of projects was quickly reduced to the 54 projects listed by theme in Table 1 by dropping projects that were not spatially associated with the Florida Keys ecosystem, combining similar projects being conducted by the same office (e.g., multiple damage assessment projects), and eliminating obvious duplications (e.g., two persons reporting on the same project).

A Mix of Projects

The results reflected a broad mix of activities conducted, planned, or recently completed with NOS resources. The projects range from large scale (e.g., Digital Orthophotography of South Florida) to small scale (e.g., Monitoring of M/V Wellwood Site); from *in situ* research (e.g., Nutrient Microalgal Dynamics) to regional resource management (e.g., Multi-Use

Table 1. Project list with office by theme.

Regional Ecosystem Monitoring (8)		Spatial Data Characterization: Mapping (cont.)	
• Benthic Community Monitoring	OCRM	• Remote Sensing Experiment	OCRM
• Bottom Temperature Monitoring	OCRM	• Southeast Florida Outfall Experiment	OES
• Keys-Wide Coral Health Monitoring	OCRM	• Topographic Survey Using Global Positioning System (GPS)	OES
• Monitoring of M/V Wellwood Site	OCRM	Regional Ecosystem Characterization (8)	
• Monitoring Pesticides and Other Chemicals: Surface, Sediments, Biota	COP	• Assessment of Biological Effects of Contaminants	ORCA
• Monitoring Plan for Florida Bay and Florida Keys	ORCA	• Assessment of Mercury in Florida Bay Biota	COP
• National Status and Trends Mussel Watch Project	ORCA	• Florida Bay Benthic Macroinvertebrate Study	ORCA
• Sediment Records as Monitor of Changes	COP	• Florida Bay Salinity Characterization Project	ORCA
Physical Processes/Modeling (9)		• Nutrient Microalgal Dynamics	COP
• Florida Bay Circulation and Exchange	COP	• Pink Shrimp as an Indicator of Habitat Health	COP
• Florida Bay Regional Circulation Assessment	ORCA	• Trophic Structure and Response of Fish and Shellfish to Habitat Change	COP
• Flux Assessment Between Florida Bay and Adjacent FKNMS	ORCA	• Trophodynamic Roles of Zooplankton	COP
• Modeling Regional Boundary Conditions for Florida Bay	COP/OES	Socio-economic/Impact Assessments (10)	
• NOS Tide and Tidal Current Table Update	OES	• Archaeological and Cultural Resource Projects	OCRM
• Oceanographic Feature Analysis	OES	• Coastal Waste Site Assessment	ORCA
• Remote Sensing of Coastal Ocean Surface, Salinity, and Temperature	OES	• Coral Reef Restoration	OCRM
• Remote Sensing System for Estuarine-Coastal Ocean Color Map	OES	• Damage Assessment Activities	OCRM
• South Florida Episodic Meteorology	COP	• Linking the Economy and Environment of Florida Keys/Florida Bay	ORCA
Spatial Data Characterization: Inventory (3)		• Multi-Use Zonation Strategy in Florida Keys	OCRM
• National Water Level Observation Network	OES	• Natural and Anthropogenic Events Impacting Florida Bay	ORCA
• South Florida Spatial Data Inventory	ORCA	• Oil Spill/Disposal Contingency Planning	ORCA
• Tidal Benchmarking	OES	• Seagrass Restoration Projects	OCRM
Spatial Data Characterization: Mapping (12)		• Socio-Economic Assessment of FKNMS Replenishment Reserves	OCRM
• Benthic Habitat Mapping	NGS	Data Distribution (4)	
• Coastal Change Analysis Program (C-CAP)	CCEH	• COMPAS Florida	ORCA
• Digital Orthophotography of South Florida	CCEH	• Development of CCEH Clearinghouse and Library	CCEH
• Florida Bay LIDAR Survey	OCS	• FGDC Clearinghouse Metadata Generator/SDTS	ORCA
• Florida Bay Mud Bank Mapping	ORCA	• FKNMS Data Server/Home Page	OCRM
• Multispectral Scanner Testing	NGS		
• Recent Geodetic Surveys	NGS		
• Recent Hydrographic Surveys	OCS		
• Regional Bathymetry for Florida Bay	ORCA		

Abbreviations:

LIDAR, Light Detection and Ranging; FKNMS, Florida Keys National Marine Sanctuary; FGDC, Federal Geographic Data Committee; SDTS, Spatial Data Transfer Standards; COMPAS, Coastal Ocean Management, Planning and Assessment System.

Office (number of projects):

CCEH - Center for Coastal Ecosystem Health (3)

COP - Coastal Ocean Program (9)

OCS - Office of Coast Survey (2)

OCRM - Office of Ocean and Coastal Resource Management (12)

NGS - Office of National Geodetic Survey (3)

OES - Office of Ocean and Earth Sciences (9)

ORCA - Office of Ocean Resources Conservation and Assessment (16)

Zonation Strategy in Florida Keys); and from conventional (e.g., NOS Tide and Tidal Current Table Update) to experimental (e.g., Coral Reef Restoration). Some projects focused on new problems (e.g., Seagrass Restoration Projects), while others were age-old (e.g., Recent Geodetic and Hydrographic Surveys). Some projects were ongoing (e.g., Damage Assessment Activities) and others were planned (e.g., Flux Assessment Between Florida Bay and Adjacent FKNMS).

The National Ocean Service Investment

The total NOS investment for the 54 projects identified by the survey is approximately \$11 million to date. Another \$3.3 million has been contributed to these projects by partners outside of NOS. The NOS investment in FY93-94 was approximately \$6 million; \$5.0 million was invested during FY95. This includes funding for nine Coastal Ocean Program projects whose FY95 funding amounted to approximately \$1 million, with \$1 million anticipated in FY96. It is estimated that another \$5.2 million is needed to complete these projects over the next several years.

Viewed as a whole, these projects reflected the broad mission of NOS and an apparently high level of activity in South Florida. This long list also suggested significant opportunities for improved integration among these projects.

How does the Coastal Ocean Program Connect to NOS Integration?

During 1993 and early 1994 at the request of the Science Subgroup of the Interagency South Florida Ecosystem Restoration Task Force, a NOAA Work Group was convened to develop a science plan to characterize the oceanographic, atmospheric, and natural resources of Florida Bay. This plan was part of the larger, interagency effort to develop a science plan to guide restoration efforts across South Florida and Florida Bay. *The plan was not aimed at addressing the management needs of the FKNMS.*

Following the April 1994 publication of the National Park Service's Science Plan for restoration of the Florida Bay ecosystem (much of which lies inside the boundaries of Everglades National Park), the Coastal Ocean Program (COP) committed \$545K in FY94 funds toward a Florida Bay Program consisting of a subset of the Florida Bay projects recommended by the NOAA Work Group. This commitment was made in anticipation of additional funding from other NOAA line offices to support other priority projects identified by the Work Group. In FY95, COP support for its Florida Bay Program increased to \$1 million.

The nine COP projects included in Table 1 are part of its FY95 Florida Bay Program. A tenth COP project, entitled "Human-Environment Linkages in the South Florida Coastal Ecosystem: Effects of Natural and Anthropogenic Stressors," also focused on South Florida, principally Biscayne Bay National Park and the Florida Keys National Marine Sanctuary. This project was not identified in time to be included in this report. However, the project is a significant effort (\$450K in FY95 as first-year funding from a six-year, \$6.25 million budget) and focuses on FKNMS issues. Therefore, it will be important to eventually understand how it connects to NOS's integration priorities.

Identifying Priorities

The next step toward “integration” was to arrange the 54 projects in order of importance or priority based upon specific criteria. This valuable exercise provided the integration team with a basis for distinguishing among projects and for focusing its limited resources. High priorities were carried forward for additional assessment. Low priorities received no further consideration.

Defining and Applying Criteria

The process of scoring, ranking, and prioritizing activities was conducted using an agreed-upon set of criteria that were clearly defined and equally applied to all activities. After an initial screening process reduced the list of surveyed activities from 84 to 54, a set of seven criteria were identified as the most important for setting priorities:

- √ 1. Quick success;
- √ 2. Relationship to FKNMS priorities (as defined in the Draft Management Plan);
3. Relationship to other NOS projects;
4. Partnership features (inside and outside of NOS);
5. Funding (availability/likelihood);
- √ 6. User benefits; and
7. Relationship to other non-NOS programs (e.g., South Florida Ecosystem Interagency Restoration Task Force).

Three (√) of the seven criteria were identified as particularly relevant at this phase of the project: quick success, relationship to FKNMS priorities, and user benefits. Therefore, as a first step, the 54 projects were organized into a series of “bins” based upon combined scores for these three criteria (e.g., high-high-high; high-medium-medium, etc.). In some cases, additional information was required before a score was assigned.

Each criterion and the methods for its application were carefully defined. For example, Quick Success was scored “high” for those projects that:

- identified completion of at least an interim product or the implementation of a major activity in the next 6-12 months (not applicable to recently completed projects);
- were high profile with a clear connection to a major issue or problem that is also understandable by a broad technical and non-technical audience; and/or
- described products that would be widely distributed to maximize value and use by the greatest number of persons.

For "Relationship to FKNMS Priorities," projects were evaluated based on their direct connection to management strategies identified in the FKNMS Draft Management Plan/EIS or to an important aspect of priority issues for which a management strategy had not yet been identified. For "User Benefits," the term "users" refers to the direct and indirect beneficiaries of the products, primarily persons using the resources of the Florida Keys. The term "benefits" refers to the range and number of direct users. For example, high benefits result from broad-based products that benefit many or all users, such as projects linked to improvements in water quality. Projects with products that benefit/target fewer users or user groups were scored lower.

Initial Results

Table 2 shows the ranking of individual criteria and 22 priority projects. Footnotes indicate projects that were combined. These projects were determined to be the subset most closely associated with NOS's FKNMS priorities, and that had broadly defined user benefits and a good likelihood of establishing a relatively quick success. Although this process necessarily included subjective choices based upon sometimes incomplete information, it captured the relative importance of each project based upon the criteria selected.

The priority projects were carried forward to the next phase of assessment where additional information was gathered to evaluate and target integration needs. The 32 remaining projects received no further consideration.

Targeting Integration Needs

The project information acquired to this point provided a general description of objectives, products, and tasks. However, to operationally define integration and effectively target integration needs, the following additional steps were required:

1. Collect additional details on each priority project;
2. Identify direct and indirect relationships among the projects;
- √ 3. Develop operational tasks, including proposed "integration" tasks, and expected products /outcomes for each project;
4. Establish relationships between projects and subject "themes";
5. Identify integration "needs" associated with each theme;
6. Develop specific operational integration tasks and expected products/outcomes required to accommodate the "needs"; and
7. Link the integration tasks to one or more priority projects based upon the project relationships.

The third (√) step is highlighted because defining these tasks and products is the critical information content of integration. It is also the part of the "value-added" work that requires the closest scrutiny and review.

Collecting Additional Project Details

To facilitate the identification of relationships among projects and subsequent opportunities for project integration, the 22 priority projects were further characterized using a second, more detailed survey sheet (see Appendix D). Additional information requested included a list and schedule of major activities, personnel assignments, and proposed expenditures (travel, contracts, etc.). The results from this exercise were much better than the original survey, although some details were still difficult to acquire or simply not available.

Table 2. Priority projects and ranking bins.

	Keys Priorities	Quick Success	User Benefits
1. South Florida Spatial Data Inventory	●	●	●
2. Benthic Community Monitoring			
3. Florida Bay Salinity Characterization			
4. Keys-Wide Coral Health Monitoring	●	⊙	●
5. Monitoring Plan for Florida Bay and Florida Keys			
6. Oil Spill/Disposal Contingency Planning			
7. Linking the Economy and Environment of Florida Keys/ Florida Bay	●	●	○
8. National Status and Trends Mussel Watch Project			
9. Regional Bathymetry for Florida Bay	●	⊙	⊙
10. Florida Bay Benthic Macroinvertebrate Study			
11. Flux Assessment Between Florida Bay and Adjacent FKNMS			
12. Modeling Regional Boundary Conditions and Circulation for Florida Bay (a)	●	○	⊙
13. Monitoring Pesticides and Other Chemicals: Surface, Sediments, Biota			
14. Archaeological and Cultural Resource Projects			
15. Benthic Habitat Mapping			
16. Nutrient Microalgal Dynamics	●	○	○
17. Oceanographic Feature Analysis(b)			
18. Coral Reef Restoration			
19. Damage Assessment Activities	⊙	○	●
20. Florida Bay Regional Circulation and Exchange			
21. FKNMS Data Server/Home Page			
22. Seagrass Restoration Projects	⊙	⊙	⊙

● - High ⊙ - Moderate ○ - Low

(a) Combines projects 10 and 12 from Table 1.

(b) Combines Projects 14, 15, and 16 from Table 1.

Establishing Project Relationships

The second project survey form included sections for identifying partners and for listing integration tasks that could be conducted with other NOS units. These data, though not available for all projects, provided a starting point for identifying relationships among the priority projects. The relationships are based upon project type, information needs, and objectives. For example, projects 11 and 12 (Table 2) are both investigating Florida Bay physical processes and are therefore related by project type. Projects 2 and 15 are related by information needs because the benthic habitat maps from project 15 will help support benthic community monitoring in project 2. Projects 1 and 21 are related because they have similar objectives: the distribution of, and access to, information about the South Florida ecosystem.

Developing Operational Tasks and Proposed Products/Outcomes

To better illustrate how the priority projects could be integrated, the integration team developed a detailed set of operational tasks for each (e.g., “Develop and distribute a summary report on...”, etc.) based, in part, on the results of the second survey. A subset of these tasks were characterized as “integration” tasks; activities that would ensure the project

Project	Products/Outcomes	Tasks	How Projects Connect
2. Benthic Community Monitoring	<ul style="list-style-type: none"> Information on the spatial distribution and abundance of benthic habitats in proposed Replenishment Reserves Information on reef fish populations An overview of the health of benthic habitats Standardized, long-term monitoring stations for trend analysis 	<ul style="list-style-type: none"> Review the SDI metadata inventory to identify gaps in the current benthic monitoring record. Conduct monitoring and observations of benthic communities and reef fish in proposed Replenishment. Process and analyze samples and information. Collect and synthesize expert anecdotal information. Develop and distribute a summary report on the health of benthic communities and reef fish populations, including supporting anecdotal information and a list of potential indicators of benthic habitat health. Coordinate with other projects to design a database that can be easily accessed and queried. Coordinate with other monitoring programs to select monitoring sites and variables. Develop instructions on how to access and query the data base, and how to obtain other useful information, i.e., video and photo data. Generate and distribute a map depicting the location of sampling locations. Prepare information for assisting with benthic classifications. 	<ul style="list-style-type: none"> The data base and report can <ul style="list-style-type: none"> help corroborate data and information developed by Projects 4 & 10; help with the development of a comprehensive monitoring plan, Project 5; help identify areas for implementing management strategies, including restoration, Projects 18 & 22; and help evaluate & corroborate the information contained on benthic habitat maps, Project 15. The data can be input into the assessment and valuation of habitat resources as recreational opportunities conducted for Project 7. The data will be used for damage assessment, Project 19. Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects.

Figure 2. Example of Appendix A. Project Connections.

connections described above would be realized. An equally important part of this process was to identify specific interim and final products associated with each task or set of tasks. These products (databases, reports, maps, etc.) typically represented the purpose for conducting each project, and as such were essential to describe accurately.

Appendix A presents a summary of project connections, tasks, and expected products/outcomes for each priority project. An excerpt from Appendix A is presented in Figure 2. The tasks in red represent “integration” tasks. This material was the foundation for the additional assessment steps described below.

Project Relationships Among “Themes”

So far, we have evaluated integration from the perspective of individual projects. The next step was to widen the focus to “themes” or topics. The goal was to establish for themes the same operational details illustrated in Figure 2 for projects (i.e., connections, tasks, and products/outcomes). This process retained the “currency” of integration - operational tasks - but allowed for a broader evaluation of purposes and objectives. The first step was to look at connections between projects and themes.

The 22 priority projects were categorized into seven themes. These were first introduced in Table 1. Table 3 illustrates direct and indirect relationships between priority projects and themes. “Direct” refers to projects that are conducting this type of activity (e.g., monitoring, mapping, etc.). “Indirect” refers to projects that will produce data, maps, or other material that will contribute significantly to this type of activity (e.g., regional bathymetry contributing to hydrodynamic modeling). Understanding and documenting these relationships represented an important step toward targeting integration opportunities across priority projects.

Table 3. *Project relationships to integration themes.*

Integration Theme	Project Identification Number																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Regional Ecosystem Monitoring	○	●	○	●	●			●	○	○			●		○	○						○
Physical Processes/ Modeling			○						○		●	●					●				●	○
Spatial Data Characterization: Inventory	●		○		○							○		○							○	●
Spatial Data Characterization: Mapping		○		○		○			●	○					●		○					○
Regional Ecosystem Characterization			●		○				○	●					○	●						○
Socio-economic/Impact Assessments					○	●	●		○					●	○			●	●		○	●
Data Distribution	●		○		○		○						○		○						○	●

Relationship to Integration Themes: ● - Direct ○ - Supporting

Bringing the Pieces Together: Identifying Integration Needs and Associated Tasks

Integration “needs” were established for each theme. These were based upon the objectives of high priority NOS projects (Table 2) and the relationships between projects and themes (Table 3). Each “need” is a general statement of what is required for integration. For example, given the variety of environmental monitoring being conducted or planned by NOS in South Florida, improving understanding of existing and planned monitoring activities is a critical “need” under the theme of Regional Ecosystem Monitoring.

Detailed and specific integration tasks and associated products/outcomes were then developed. The tasks describe, in operational terms, how the needs can be achieved. For example, to improve understanding of ... monitoring, one must

- *develop a metadata inventory of current monitoring projects;*
- *determine the status of current monitoring efforts and identify project-related goals and objectives; and*
- *develop maps depicting monitoring sites, parameters measured, and frequency of monitoring for current monitoring projects.*

Tasks and associated products/outcomes were derived primarily from the integration tasks presented in Appendix A. In some instances new tasks were developed to ensure that all the needs were addressed.

Linking Integration Tasks to Priority Projects

Finally, tasks were linked to one or more priority projects in either a lead or support role. A lead role indicated that a project was linked directly to an integration task based upon the project description and objectives. A support role indicated that a project was indirectly linked to an integration task based upon products (maps, data, etc.) that could contribute to implementing that task.

Table 4 presents the results. It is organized into two parts. The left side presents the seven themes and the related integration needs, tasks, and products/outcomes. Tasks are shown in red to highlight the table’s operational component. In most cases, more than one task is presented for each need. The right side of the table illustrates links between integration tasks and priority projects. The numbered columns represent the seven themes. Links between projects and tasks are illustrated by project numbers in corresponding rows. Within a row, project numbers are presented in the column that corresponds to the theme that project is directly associated with (based on Tables 1 and 3). This format was adopted to illustrate links between projects and tasks AND links between tasks and themes. For example, the first task under theme seven, data distribution, is linked to two projects representing two themes. The second task under the same theme is linked to 16 projects across all seven themes.

Boxed numbers beside integration tasks indicate proposed FY96 priorities, which are discussed in the next section.

Figure 3 diagrams how the priorities for FY96 were arrived at from the 67 detailed tasks presented for 22 projects in Appendix A, to the 38 integration tasks presented by theme in Table 4, to the eight recommended priorities for FY96 presented in the next section in Table 5.

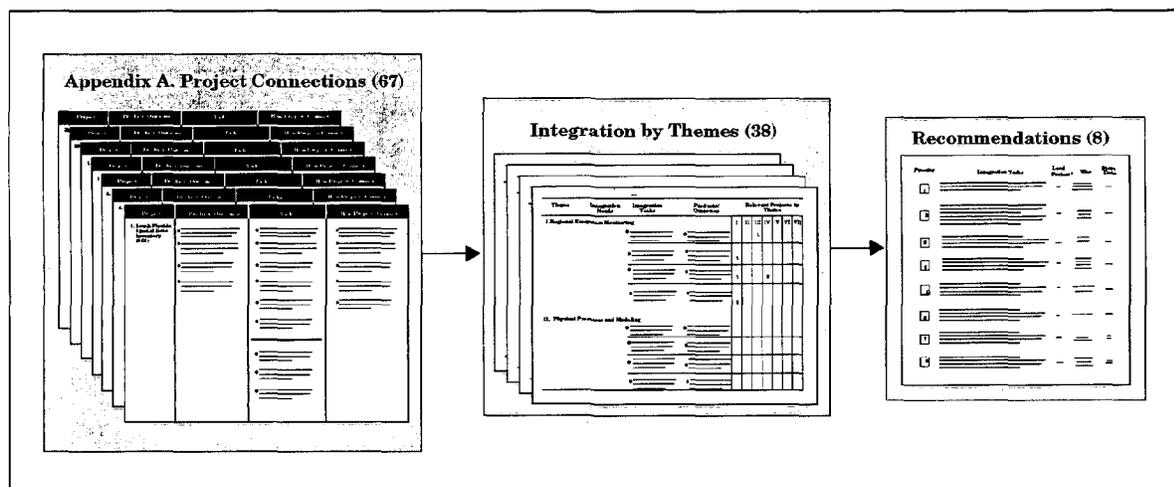


Figure 3. From detailed tasks to FY96 recommended priorities.

Significant progress has now been made toward integration of NOS's South Florida activities. We have

- established a list of priority projects;
- identified relationships among these projects and their associated themes;
- specified integration needs, tasks, and products for each theme; and
- linked tasks to priority projects for lead and supporting roles.

However, some tasks and products will be more valuable than others for accomplishing NOS's integration priorities. Therefore, the next step is to evaluate the proposed integration tasks based on selected criteria and nominate priorities for implementation in Fiscal Year 1996.

Table 4. Summary table of project connectivity.

Theme	Integration Needs	Integration Tasks	Relevant Projects* by Theme							
			I	II	III	IV	V	VI	VII	
I. Regional Ecosystem Monitoring	<i>Improve understanding of existing and planned monitoring activities</i>	<ul style="list-style-type: none"> Develop a metadata inventory of current monitoring projects An accessible metadata inventory 			1					
		<ul style="list-style-type: none"> Determine the status of current monitoring efforts, and identify project-related goals and objectives A list of critical participants 	5							
	<i>Establish clear and compatible goals and objectives</i>	<ul style="list-style-type: none"> Develop maps depicting monitoring sites, parameters measured, and frequency of monitoring for current monitoring projects Maps of project characteristics 	5			9,15				
		<ul style="list-style-type: none"> Conduct a regional workshop process to establish a consensus-based ecosystem monitoring program for the Keys Sanctuary and adjacent marine waters A set of common goals and objectives and information on the extent to which they are currently met 	5, 2 4,8 13				3,10			
II. Physical Processes and Modeling	<i>Data and information on salinity, water mass movements, flux between Florida Bay and the Florida Reef Tract, and other physical processes to initialize circulation models and support management activities</i>	<ul style="list-style-type: none"> Conduct work sessions (5-6 persons) using maps and other materials to determine additional monitoring needs (locations, variables, timing, etc.) in relation to agreed-upon goals and objectives A monitoring framework 	5, 2 4,8 13				3,10			
		<ul style="list-style-type: none"> Conduct work sessions to schedule future monitoring activities related to the goals and to assign institutional responsibilities A monitoring schedule 	5, 2 4,8 13				10			
	<i>Physical processes to initialize circulation models and support management activities</i>	<ul style="list-style-type: none"> Define components of an ecosystem monitoring "plan" Outline and mock-up of a regional plan 	5, 2 4,8 13		1			10		21
		<ul style="list-style-type: none"> Write, produce, and distribute final "blueprint" plan for regional ecosystem monitoring Final monitoring plan 	5, 2 4,8 13		1			10		21

Note: Shaded boxes identify top seven recommended integration tasks that appear in Table 5 in the FY96 Recommendations section.
 * Refer to Table 2 on page 9 for project titles listed by number in bold type directly support the associated integration task.

Table 4. Summary table of project connectivity. (cont.)

Theme	Integration Needs	Integration Tasks	Products/Outcomes	Relevant Projects* by Theme						
				I	II	III	IV	V	VI	VII
		<ul style="list-style-type: none"> Conduct work sessions to reach consensus on priority approaches and data requirements for modeling physical processes in Florida Bay and Florida Keys relevant to Sanctuary management 	<ul style="list-style-type: none"> Report on NOS priorities for modeling in Florida Bay and Florida Keys 		II, 12, 17, 20		9	3	6	
		<ul style="list-style-type: none"> Define and implement strategy for collecting existing data and, if required, developing additional data sets 	<ul style="list-style-type: none"> Plan for collecting and/or developing required data including sequence of steps, lead office, etc. 		II, 12, 17, 20		9	3	6	
		<p>III. Spatial Data Characterization - Inventory</p> <p><i>Inventory of major existing spatial data associated with coastal ecosystem health</i></p> <ul style="list-style-type: none"> Conduct a survey of Federal, State, and local institutions to identify existing spatial data sets Characterize and prioritize sources of spatial data Collect detailed metadata on priority spatial data associated with ongoing research and assessment activities 	<ul style="list-style-type: none"> Report summarizing survey results List describing priority sources Summary report including metadata descriptions of additional projects 			1				
		<p>IV. Spatial Data Characterization - Mapping</p> <p><i>Support characterization of South Florida benthic habitat with associated monitoring data and</i></p>	<ul style="list-style-type: none"> Complete benthic habitat maps for priority regions of Florida Bay and Florida Keys Develop guidelines for reviewing/editing benthic habitat maps data and making edits Distribute maps and guidelines to key persons working on relevant monitoring/research projects Review edits and make appropriate changes Work with users to develop innovative methods for accessing the information 	<ul style="list-style-type: none"> Draft maps for priority regions Tools and templates for encoding new data and making edits Edited maps Revised maps and database Access to benthic habitat data 			15	D		
		<p>6.</p> <p><i>Baseline bathymetric data for mapping, selecting monitoring sites, constructing models, and other uses.</i></p>	<ul style="list-style-type: none"> Improve bathymetry data for Florida Bay and Florida Keys and document the methodology 	<ul style="list-style-type: none"> Report on bathymetry data development 			9, 15	D	6	

Note: Shaded boxes identify top seven recommended integration tasks that appear in Table 5 in the FY96 Recommendations section.
 * Refer to Table 2 on page 9 for project titles listed by number in these columns. Numbers in bold type directly support the associated integration task.

Table 4. Summary table of project connectivity. (cont.)

Theme	Integration Needs	Integration Tasks	Products/Outcomes	Relevant Projects* by Theme						
				I	II	III	IV	V	VI	VII
V. Regional Ecosystem Characterization	<p>4. An accurate assessment (including maps and supporting data) of South Florida's coastal and marine ecosystem, with emphasis on ecotones and their function.</p>	<ul style="list-style-type: none"> Conduct workshops to identify priorities for ecosystem characterization relevant to FKNMS management needs Report on workshop results identifying priorities 	<ul style="list-style-type: none"> Initial list of sources for priority data 	5	1	1	1	3, 10, 15	18, 22	
		<ul style="list-style-type: none"> Review existing information (e.g., Project 1, South Florida Spatial Data Inventory) and others for availability of priority data Identify/target on-going and planned NOS activities for remaining assessment/characterization priorities (may include recommendations for new projects) Establish a process for integrating characterization and assessment results into management decisions Establish an NOS team to define operationally "sustainable development" with respect to NOS priorities in South Florida Design, with users, a natural and cultural resources valuation database that meets management needs Develop and distribute a report on the value of natural and cultural resources, natural and cultural resources of South Florida emphasizing how the information can be used for making management decisions 	<ul style="list-style-type: none"> A set of maps depicting location and status of seagrass and coral reef restoration and damage assessment activities 	5						
VI. Socio-economic/Impact Assessments	<p>7. A method for applying information on the value of natural (e.g., wetlands, coral reefs) and cultural (e.g., shipwrecks and submerged cultural resources) resources to management activities (including ecosystem restoration and damage assessment)</p>	<ul style="list-style-type: none"> Establish a process for integrating characterization and assessment results into management decisions Establish an NOS team to define operationally "sustainable development" with respect to NOS priorities in South Florida Design, with users, a natural and cultural resources valuation database that meets management needs Develop and distribute a report on the value of natural and cultural resources, natural and cultural resources of South Florida emphasizing how the information can be used for making management decisions 	<ul style="list-style-type: none"> A set of maps depicting location and status of seagrass and coral reef restoration and damage assessment activities 	5	1	1	1	3, 10, 15	7, 14, 19	
		<ul style="list-style-type: none"> In association with habitat mapping projects, develop maps showing the location and value of natural and cultural resources In association with habitat mapping projects, develop maps showing the location and status of seagrass and coral reef restoration and damage assessment activities 	<ul style="list-style-type: none"> A set of maps depicting the value and location of natural and cultural resource 	5			9, 15		6, 7, 14	18, 19, 22

Note: Shaded boxes identify top seven recommended integration tasks that appear in Table 5 in the FY96 Recommendations section.
 * Refer to Table 2 on page 9 for project titles listed by number in these columns. Numbers in bold type directly support the associated integration task.

Table 4. Summary table of project connectivity. (cont.)

Theme	Integration Needs	Integration Tasks	Products / Outcomes	Relevant Projects* by Theme							
				I	II	III	IV	V	VI	VII	
VII. Data Distribution	<p><i>A capability for researchers and planners to quickly access, query, and extract data, maps, and information related to projects affecting the Sanctuary and South Florida</i></p>	<ul style="list-style-type: none"> Develop a schedule for reevaluating natural and cultural resources and adding to and updating the database and maps 	<ul style="list-style-type: none"> Plan for periodic updates 			15			7, 14, 18, 19, 22		
		<ul style="list-style-type: none"> Conduct a survey or workshop to identify and prioritize information to be linked through the Internet 	<ul style="list-style-type: none"> A prioritized list of projects 		1						21
		<ul style="list-style-type: none"> Design and implement an Internet-based metadata access and distribution system that links to the actual regional environmental data records (including interface screens and maps) according to the agreed-upon schedule 	<ul style="list-style-type: none"> The Internet access for data query and retrieval 	245, 8, 13	11, 12, 17, 20	1	9	3, 10	7, 14		21
		<ul style="list-style-type: none"> Develop and distribute a "data-users" guide describing the access, appropriate usage, its links, and its utility 	<ul style="list-style-type: none"> A "data-users" guide 	245, 8, 13	11, 12, 17, 20	1	9	3, 10	7, 14		21
		<ul style="list-style-type: none"> Establish a schedule for bringing the information on-line 	<ul style="list-style-type: none"> A schedule for developing the access 	245, 8, 13	11, 12, 17, 20	1	9	3, 10	7, 14		21
		<ul style="list-style-type: none"> Conduct workshop to ensure that the metadata data, maps, and information are properly formatted and accessible 	<ul style="list-style-type: none"> Data sets, information, maps, etc. that can be accessed through the Internet 			1					21
		<ul style="list-style-type: none"> Develop a schedule for updating and adding to the access 	<ul style="list-style-type: none"> A framework for adding to and improving the access 								21
	<ul style="list-style-type: none"> Explore other data distribution methods, such as CD-ROM 	<ul style="list-style-type: none"> Alternative ways to provide access to information 	5		1					21	

Note: Shaded boxes identify top seven recommended integration tasks that appear in Table 5 in the FY96 Recommendations section.
 * Refer to Table 2 on page 9 for project titles listed by number in these columns. Numbers in bold type directly support the associated integration task.

FY 96 Recommendations

This section presents specific recommendations on priorities for NOS integration in South Florida for Fiscal Year 1996. These priorities consist of a subset of the integration tasks presented in Table 5 based, in part, on the application of the following criteria:

- Does the task represent a significant step toward meeting integration needs?
- Is the task linked to other projects or to several themes (that is, does the task have a strong integration component)?
- Could the task be substantially completed in FY96?

The results are organized into two sections: Priority FY96 Tasks, which includes a list of priorities and some specifics on how they might be implemented; and Funding Options,

Table 5. Summary of priority integration needs.

Priority	Integration Tasks	Lead Project*	Who	Start Date
1	Conduct a regional workshop process to establish a consensus-based ecosystem monitoring program for the Keys Sanctuary and adjacent marine waters.	5	ORCA/SEA ORCA/CMBAD OCRM/SRD	1/96
2	Design and implement an Internet-based metadata access and distribution system that links to the actual regional environmental data records (including interface screens and maps) according to the agreed-upon schedule.	21	ORCA/SEA OCRM/SRD	2/96
3	Complete benthic habitat maps for priority regions of Florida Bay and Florida Keys.	15	OCS/ PD ORCA/SEA OCRM/SRD	12/95
4	Conduct workshops to identify priorities for ecosystem characterization relevant to FKNMS management needs.	--	OCRM/ ORCA	2/96
5	Conduct work sessions to reach consensus on priority approaches and data requirements for modeling physical processes in Florida Bay and Florida Keys relevant to Sanctuary management.	12	OES/MAID ORCA/SEA	1/96
6	Improve bathymetry data for Florida Bay and the Florida Keys and document methodology.	9	ORCA/SEA ORCA/CMBAD OCRM/SRD	12/95
7	Establish an NOS team to define operationally "sustainable development" with respect to NOS priorities in South Florida.	--	ORCA/SEA ORCA/DAC OCRM/SRD	7/96
8	Establish an "integration" fund to provide incentives for NOS project managers to undertake the remaining integration tasks identified in Table 4.	--	Integration Management Team	2/96

* Number refers to the project identification number in Table 2.

Abbreviations:

SEA, Strategic Environmental Assessments Division; SRD, Sanctuaries and Reserves Division; PD, Photogrammetry Division; MAID, Marine Analysis and Interpretation Division; CMBAD, Coastal Monitoring and Bioeffects Assessment Division; DAC, Damage Assessment Center.

which presents alternatives for the distribution of additional funds among priorities if they become available.

Priority FY96 Tasks

Seven priority tasks were identified. They are presented in Table 5 in priority order (i.e., if only two tasks are conducted, it is recommended that they should be tasks 1 and 2 in Table 5). These priorities are shown in Table 4 by the boxed numbers appearing next to the integration tasks. Table 5 also includes an eighth priority that reflects the need for a mechanism to complete the remaining integration tasks.

A "lead project" was identified for tasks that were directly linked to ongoing priority projects (see Table 4). The "who" column identifies the NOS offices best suited to implement these tasks. Start dates were estimated by evaluating when tasks could be initiated given available resources and preliminary requirements.

Priority 1 - Conduct a regional workshop process to establish a consensus-based ecosystem monitoring program for the Keys sanctuary and marine waters in South Florida.

Why? This task is recommended as the number one NOS priority for FY96. A regional monitoring plan is critical for building consensus both within NOS and among the many other Federal and state institutions conducting monitoring in Florida Bay and the Florida Keys. This plan would not only provide consensus on the details of a monitoring program, i.e., location and number of monitoring sites, the parameters to be measured, frequency of measurement, etc., but also would provide alternatives and priorities for various resource levels and short-term versus long-term information needs, and indicate clearly the role and activities of each partner.

How? Developing an integrated plan of the type envisioned will require the application of a systematic and carefully designed process. Therefore, prior to conducting workshops, several tasks must be undertaken to characterize current monitoring activities. This includes developing a metadata inventory of existing activities, identifying essential participants, preparing maps and other materials for one or more workshops, and developing a workshop "process" that ensures consensus on key items. Workshop participants will use these materials to agree on priority goals and gauge how well current monitoring efforts are meeting these goals.

Who? Project 5, the Monitoring Plan for Florida Bay and Florida Keys, is the suggested lead for completing these tasks. This will require participation by ORCA's Strategic Environmental Assessments (SEA) and Coastal Monitoring and Bioeffects Assessment (CMBAD) Divisions, and OCRM's Sanctuaries and Reserves Division. This work is recommended to begin in January 1996 based upon the preliminary work required, some of which is underway.

Priority 2 - Design and implement an Internet-based metadata access and distribution system that links to actual records of regional environmental data relevant to the Keys sanctuary.

Why? Improved distribution and access to ecosystem data is recommended as an essential component of an overall NOS South Florida management strategy. Internet-based access will provide quick and efficient transfer of information critical for research and modeling efforts, restoration efforts, damage assessment activities, mapping, and management decisions. Establishing "links" to data and information also will permit the system to evolve as data and information are updated.

How? Establishing the initial Internet access will require several intermediate steps including identifying priority topics and targeting specific data, maps, and other information to be incorporated. Designing the system will entail developing interface screens, establishing appropriate links, and setting a schedule for bringing the system on-line. Some of these steps are already under way.

Who? Project 21, FKNMS Data Server/Home Page, is the suggested lead for completing these tasks. It is recommended that OCRM's Sanctuaries and Reserves Division, particularly the FKNMS staff in the Florida Keys, and ORCA's Strategic Environmental Assessments Division jointly develop this capability. The FKNMS staff is currently installing advanced hardware and software to improve communications with regional institutions. SEA has considerable experience in designing Internet systems. Participation by other NOS units as well as selected South Florida institutions may also be required. This work is recommended to begin in February 1996.

Priority 3 - Conduct workshops to identify priorities for ecosystem characterization relevant to FKNMS management needs.

Why? The draft FKNMS management plan includes numerous strategies for achieving the goals of the congressional act designating this region for special protection and management. A prerequisite for implementing many of these strategies is detailed information on the region's complex coastal ecosystems. However, some parts of the Florida Keys and adjacent Florida Bay have not yet been adequately mapped, measured, or otherwise characterized in a way that assists managers in effectively planning regional projects. Examples include benthic habitats (especially coral), bathymetry, and circulation. A high priority for FY96, therefore, will be for NOS to facilitate a series of workshops to identify characterization needs (by subject and location) based on strategies in the management plan, establish priorities among these needs, and schedule the implementation of data collection, mapping, or other activities. This work would be conducted in cooperation with regional experts.

How? The workshops will require several intermediate steps such as targeting key strategies, identifying participants, developing appropriate summary materials on existing characterization, and designing the workshop process. Participants will be asked not only to define characterization priorities, but also to evaluate alternative methods of data collection and to specify the measurements required (e.g., acreage estimates, temporal distributions, trends, etc.).

Who? Table 4 shows that eight of the 22 priority projects are indirectly linked to this task. However, a lead project is not identified in Table 5 because, as yet, no existing or planned NOS projects are scheduled to conduct this type of activity. Nevertheless, it is recommended that this task be organized by the OCRM's Sanctuaries and Reserves Division with assistance from ORCA's SEA Division. This work is recommended to begin in February 1996.

Priority 4 - Complete benthic habitat maps for priority regions of Florida Bay and the Florida Keys.

Why? Accurate benthic habitat maps will be extremely useful for evaluating environmental impacts, and for targeting regional research and monitoring projects. They will also contribute to a better understanding of the areal extent and distribution of sensitive benthic regions. Developing this product for key coastal areas of South Florida is therefore recommended as a high priority for NOS in FY96.

How? The Office of National Geodetic Survey has aerial photography for the entire Florida Keys and Florida Bay region that was taken in December 1990/January 1991 as part of its ongoing shoreline delineation project. Most of this photography is suitable for benthic habitat mapping. Additional photography from April 1995 was recently acquired for those scenes in which the water was too turbid to accurately classify bottom areas. A test area was mapped in 1993. NGS's Photogrammetry Division, ORCA's Strategic Environmental Assessments Division, and the State of Florida developed the initial benthic habitat classification scheme and the prototype maps. The classification scheme was updated and improved in 1994 to better reflect existing habitat types. The principal remaining steps are to establish priority regions, photo-interpret the corresponding photography, compile the interpreted photos, digitize the habitat polygons, and print and distribute the hard-copy and electronic products.

Who? This work was recently reinitiated at a relatively low level by NGS personnel in Norfolk, Virginia. To ensure the timely completion of maps, it is recommended that NGS's Photogrammetry Division, OCRM's FKNMS staff, and ORCA's SEA Division work together on this task. This work will require substantial resources and time to complete, particularly due to the labor-intensive nature of photointerpretation of habitat polygons and compilation.

Based upon the work under way, this task is recommended for initiation in December 1995. Project 15, Benthic Habitat Mapping, is identified as the lead for this task for obvious reasons.

Priority 5 - Conduct work sessions to reach consensus on priority approaches and data requirements for modeling physical processes in Florida Bay and Florida Keys relevant to FKNMS management.

Why? Determining how modeling, particularly circulation modeling in Florida Bay and around the Florida Keys, will be conducted to support FKNMS needs is recommended as a high priority for NOS in FY96. A better understanding of Florida Bay's hydrophysical characteristics and its potential influence on the Florida Reef Tract is critical. Various South Florida modeling teams (including a major new effort funded by the U.S. Army Corps of Engineers), workshops, and projects have so far been unable to reach consensus on model types, scales, data requirements, and outputs appropriate for this type of assessment. This task is intended to resolve these issues and establish an agreed-upon process for targeting priorities and implementing an FY96 NOS modeling project in cooperation with regional experts.

How? This work will include several associated tasks such as reviewing completed, ongoing, and planned data collection projects related to modeling requirements, and summarizing the goals and methods of ongoing circulation and other coastal ocean modeling efforts. This information will be used in a series of work sessions to establish modeling priorities and additional data collection requirements.

Who? While some components of this task are under way, they are not necessarily being conducted in an integrated fashion. Project 12, Modeling Regional Boundary Conditions and Circulation for Florida Bay, is the suggested lead for initiating this task. Project 11, Flux Assessment Between Florida Bay and Adjacent FKNMS, will also be an important contributor since the flux analysis will determine some of the modeling requirements. It is recommended that OES's Marine Analysis and Interpretation Division conduct this work in association with ORCA's Strategic Environmental Assessments Division and the Coastal Ocean Program. COP has recently funded several related research projects in South Florida and should be instrumental in helping to ensure the participation of regional experts. This activity is suggested to begin in January 1996.

Priority 6 - Improve bathymetry data for Florida Bay and the Florida Keys and document methodology.

Why? The last complete hydrographic survey of this region was taken in the 1880s. However, since a new survey is impractical (estimated costs of over \$10 million), the recommended task is for NOS to make the best possible use

of existing data to develop updated bathymetry and document carefully the procedures used. Hard-copy and digital bathymetric maps that accurately reflect the subtle, shallow water topography of Florida Bay and the Florida Keys will be extremely useful for coastal monitoring, research, modeling, restoration, damage assessment, and many other management activities. A report documenting the technical methods will provide potential users with a better understanding of work in progress and help reduce duplicate mapping efforts. It may also provide an opportunity for users to incorporate their mapping needs into ongoing NOS work.

How? Because available bathymetric data for Florida Bay and the surrounding areas are incomplete and of inconsistent quality, NOS has recently been assembling and digitizing archival sounding data to establish a regional baseline. The next steps will include generating associated digital elevation fields and draft maps. These data may be further augmented by using remotely sensed data to refine the locations and depths of shallow channels and shoals.

Who? Project 9, Regional Bathymetry for Florida Bay, is the suggested lead for this task as this project has been responsible for completing some of the preliminary steps. It is recommended that this work be conducted jointly between ORCA's Strategic Environmental Assessments Division and the Coast Survey's Hydrographic Survey Division. Work on this task is recommended to begin in December 1995 as several of the preliminary steps have already been completed.

Priority 7 - Establish an NOS team to define "sustainable development" with respect to NOS priorities in South Florida.

Why? Sustainable development is typically described as ensuring an adequate supply of renewable resources to accommodate continued economic growth. An alternative definition is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. However, even after considerable national and international debate, there remain mixed perceptions about the meaning and implications of this term, especially with respect to operationally redesigning economic, environmental, and social programs.

How? Although NOAA and NOS have indicated that "sustainable development" in the nation's coastal zone is a priority issue, there is little information available defining this term with respect to NOS programs. Reaching consensus on a definition of "sustainable development" and how it applies to NOS's priorities in the FKNMS is therefore recommended as a priority task for FY96. This should help NOS and its partners establish an appropriate balance of resource use and conservation across the sanctuary.

Who? Table 4 indicates that three of the 22 priority projects are indirectly linked to this task. A lead project is not identified in Table 5 because there are currently no plans within NOS to conduct this type of activity. It is recommended that this task be explored by OCRM's Sanctuaries and Reserves Division in cooperation with ORCA's Damage Assessment Center and Strategic Environmental Assessments Division. Based upon the availability of key personnel resources, this work is not proposed to begin until July 1996.

Priority 8 - Establish an "integration" fund to provide incentives for NOS project managers to undertake the remaining integration tasks identified in Table 4.

Why? Seven of the 38 integration tasks presented in Table 4 have now been recommended for priority implementation in FY96. Many others have been linked to the FY96 priorities as important prerequisite or follow-up activities. The remaining tasks should not be overlooked, as they are also part of successful NOS integration in South Florida. Given the significant effort and careful thought required to develop this material, it is incumbent upon NOS project managers to consider carefully how they can incorporate the remaining integration tasks into both ongoing and future work plans.

How? A small "integration incentive fund" of \$50K to \$100K could help support the additional integration tasks and related products identified in Table 4 by providing important incentives to project managers. Few actual incentives now exist, and very few of these integration activities have been budgeted for. With the funds in place, a first step toward implementing the remaining tasks will be to review the links between projects and tasks presented in Table 4 and Appendix A. Figure 3 on page 28 illustrates a process by which this might occur. Initial discussions would occur in the first workshop and details on implementation and funding levels would be primary goals of the second workshop.

Who? An integration team similar to the group that produced this report would manage the funding levels and recommend NOS beneficiaries based on criteria such as FKNMS priorities and integration potential.

Funding Options

This section expands Table 5 by presenting FY96 funding options to support NOS South Florida program integration. The purpose is to identify the funding status and priorities among the priority tasks, and to describe briefly how progress toward completing these tasks would proceed under different funding scenarios. Funding sources are not discussed, although they could include NOS base funds, reprogrammed base funds, additions to base funds from NOS or NOAA, and/or additions from outside of NOAA. All figures are estimates. Whole project costs are not included.

Table 6 reprises the priority integration tasks. Three funding options are shown in the columns to the right: existing funds only, \$250,000 of new funds, and \$500,000 of new funds. This table illustrates three important points:

- it shows the distribution of existing funds among priority tasks (for existing NOS priorities) - Option 1;
- it suggests funding priorities among the priority tasks - Options 2 and 3 (e.g., task 4 has a greater funding need than task 6); and
- it illustrates the funds required to complete, or make substantial progress toward completing, the priority tasks in FY96 - Option 3.

Table 6. Summary of FY96 funding options for integration tasks (\$1,000).

Priority	Integration Tasks	Options		
		1	2	3
		Existing FY96*	+\$250	+\$500
1	Conduct a regional workshop process to establish a consensus-based ecosystem monitoring program for the Keys Sanctuary and adjacent marine waters.	200	25	50
2	Design and implement an Internet-based metadata access and distribution system that links to the actual regional environmental data records (including interface screens and maps) according to the agreed-upon schedule.	0	25	50
3	Complete benthic habitat maps for priority regions of Florida Bay and Florida Keys.	150	75	100
4	Conduct workshops to identify priorities for ecosystem characterization relevant to FKNMS management needs.	0	25	100
5	Conduct work sessions to reach consensus on priority approaches and data requirements for modeling physical processes in Florida Bay and Florida Keys relevant to Sanctuary management.	120	25	50
6	Improve bathymetry data for Florida Bay and the Florida Keys and document methodology.	140	25	50
7	Establish an NOS team to define operationally "sustainable development" with respect to NOS priorities in South Florida.	0	0	0
8	Establish an "integration" fund to provide incentives for NOS project managers to undertake the remaining integration tasks identified in Table 4.	0	50	100
Totals		610	250	500

* Estimates based on project worksheets (Appendix D).

The options are discussed in detail below. Assessments of how work might progress under different funding scenarios are based upon the detailed project survey sheets as well as the integration team's understanding of project requirements.

Option 1 - Existing Funds

The dollar amounts presented in Table 6 represent funds that NOS project managers estimated as "existing/available" on the detailed project survey sheets for those projects designated as "lead projects" in Table 5. However, in most instances the integration tasks represent new activities not directly accounted for on the project survey sheets. Therefore, for some of the priority tasks, existing/available funds may not be adequate to conduct what often amounts to new or expanded work.

Table 6 shows that over \$600K is available in existing funds for the priority tasks. With these funds, work can proceed on integration tasks 1, 4, 5, and 6. Task 7, a new task with no existing funds, can likely be completed since this task is not expected to require any new funds. Substantial progress will probably occur for tasks 1, 5 and 6, and moderate progress should be made on task 4. Tasks 2 and 3, with no existing funds, would probably see only limited progress. No progress would be made on Task 8.

Option 2 - \$250,000 in additional funds

With \$250K of additional funds (either from reprogrammed base funds, additions to base from NOS or NOAA, and/or additions from outside of NOAA), tasks 1 and 5 could proceed toward completion, tasks 2, 3, and 8 would be initiated, and substantial additional progress could be made on task 4.

Tasks 1 and 5 have existing funds of \$200K and \$120K, respectively. An additional \$25K for each would help support travel, workshop materials and printing, and meeting facilitation. These funds would also permit some of the important follow-up tasks associated with tasks 1 and 5 (see Table 4).

For task 2, \$25K will help support data processing, system design, and hardware and software costs. A similar amount for task 3 will help cover initial workshop costs, including travel and summary materials for workshop participants.

Task 4 is targeted for substantially more funds (\$75K) because of the labor-intensive work associated with map production. And, although this work was recently reinitiated, these funds would help insure the more timely completion of this important work.

Task 6 has existing funds of \$140K. An additional \$25K would support the evaluation of supplementary data such as remotely sensed imagery to refine the location and depths of shallow water channels and shoals.

Task 8 has no existing funds as this is a new concept proposed in this report. Although \$50K is a relatively small amount, used properly it will provide an important incentive for additional integration beyond the priority tasks identified in Table 5.

And, as described in Option 1, task 7 can be completed without additional funds.

Option 3 - \$500,000 in additional funds

This option essentially adds \$250K to Option 2. All priority tasks could be completed or substantially completed in FY96 with these funds. In addition, significant progress could also be made on many of the follow-up tasks associated with these priorities. For example, an additional \$50K for task 1 would ensure that the initial workshop is completed, resulting in substantial progress on a regional ecosystem monitoring plan. The same is true for tasks 2, 3, 4, and 5, each of which have related follow-up tasks identified in Table 4.

Additional funds for task 6 would likely insure the products associated with this work are completed faster. There are no related follow-up integration tasks.

No funds are suggested for task 7 because, as mentioned above, it does not require funds to complete. Related follow-up tasks are currently lower priority than those related to tasks 1 and 5.

An additional \$100K for task 8 will undoubtedly support additional integration tasks and products beyond those identified in Table 5. However, specific targets for these funds would be determined through a consensus process such as the one illustrated in Figure 3.

These recommendations represent a means for NOS to improve its effectiveness in fulfilling its responsibilities in the FKNMS. They include suggestions on what the priority tasks should be, who should conduct these tasks and when, and a brief look at the resources required for implementation. However, full NOS integration in South Florida will require a significant and continuous commitment. The first step will be to reach consensus within NOS on the recommended integration tasks.

Next Steps

Before NOS can implement a South Florida integration plan, agreement is needed among the line offices and other senior staff on tasks and responsibilities. It will also be important to establish a framework for periodic reviews in response to evolving needs. Finally, once FY96 priorities are agreed to and under way, it may be appropriate to review integration opportunities with other Federal, state, and local partners. A permanent NOS integration team, similar to the team that developed this report, is recommended for conducting the additional planning required and for tracking progress toward objectives.

This closing section presents a proposal for meeting these objectives. It is organized into four parts: Reaching NOS Consensus, Implementation, Establishing an Integration Process, and Expanding South Florida Integration Beyond NOS.

Reaching NOS Consensus

Figure 4 illustrates a suggested process for reaching consensus and developing detailed plans of action. Following the distribution of this report, the first step would be to conduct a one-half-day NOS workshop to review integration priorities and agree on the integration tasks. Participants would include senior staff from NOS line offices and divisions conducting relevant work in South Florida. The workshop results would produce a well-defined set of tasks. This workshop could be convened as early as November 1995 and could be organized and conducted by the same integration team that developed this report.

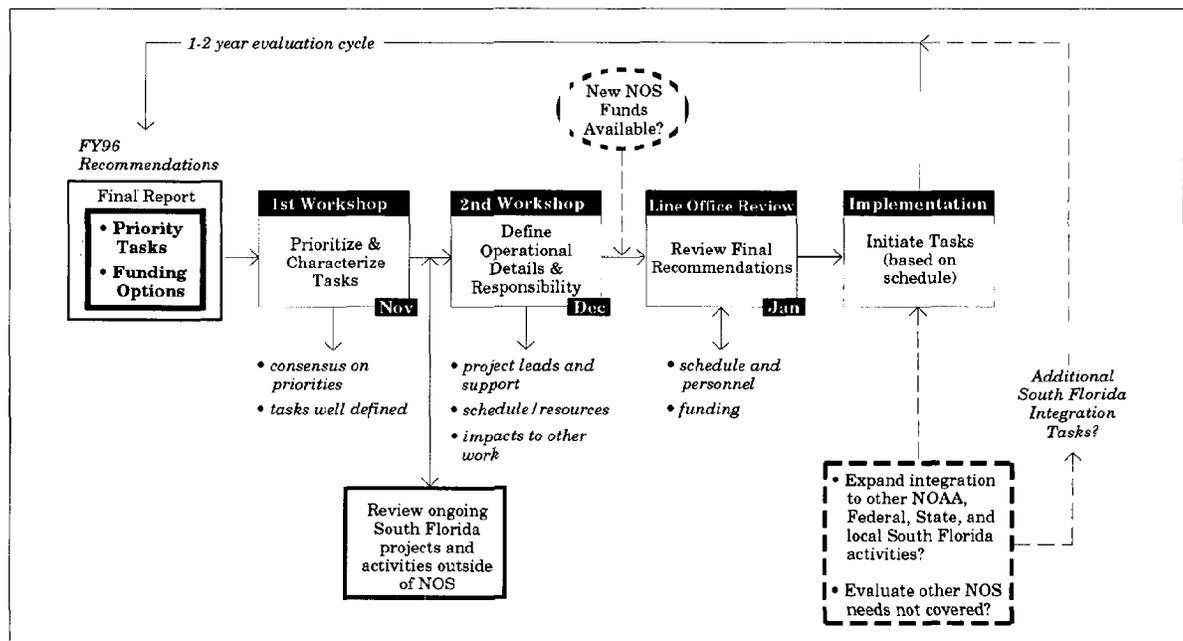


Figure 4. Process for implementation.

A follow-up one-half-day workshop may be necessary to define the operational requirements for each priority, consider potential impacts to other NOS work, and reach agreement on schedules and responsibilities. As shown in Figure 4, an important interim step will be to review carefully relationships between proposed FY96 priorities and other ongoing and/or proposed activities being conducted by other organizations (including projects such as the COP's "Human Environment Linkages in the South Florida Ecosystem" described on page 6). A detailed plan would be produced for each task, similar to the project planning sheet shown in Appendix D. This workshop could be held as early as December 1995, three weeks after the first workshop. It could also be organized and conducted by the current integration team.

Figure 4 shows that Line Office Review will follow the second workshop. This step involves careful evaluation of the operational requirements and commitments, particularly with respect to personnel and schedules. To facilitate this process, the integration team would prepare and distribute summary materials from the workshops similar to those presented in this report (e.g., Table 4). Figure 4 also shows that questions about additional NOS funds to support integration priorities should be resolved after the second workshop. This information will help line offices evaluate trade-offs and make better planning decisions. The line office review would likely be conducted over a period of two to three weeks. It could be initiated as early as January 1996.

Implementation

Once a plan is completed, implementation of specific tasks can move forward. This step will include distribution of additional NOS funds, if available, to the NOS offices and divisions responsible for the priority tasks. An integration team will track the progress toward scheduled products and the use of funds. This team may also begin exploring how NOS will implement its responsibilities associated with the FKNMS Draft Management Plan/EIS (for example, of the seven priority topics outlined in the Plan - boating, fishing, recreation, water quality, zoning, education, and land use - only water quality was adequately addressed by the NOS projects inventoried in this report).

Establishing A Process

Because NOS is a complex organization with many programmatic objectives, it will be difficult to ensure integration over time without putting in place an explicit framework. As illustrated in Figure 4, it is recommended that this process, as it evolves, be based on a regular one- to two-year cycle. It should include monitoring the progress toward integration objectives and a periodic review of more general integration needs. This process would eventually become part of an overall planning strategy for NOS. As part of the next steps, it is recommended that a detailed proposal for this framework (including diagrams illustrating timing, events, and responsible parties) be developed starting in February or March of 1996.

Expanding Integration Beyond NOS

The focus of this report has been on NOAA's National Ocean Service with the specific objective of protecting and preserving the ecological health of the coastal and marine habitats of the FKNMS and surrounding areas. Therefore, the recommendations contained herein are based solely on NOS projects and activities. However, it is recognized that there are connections between NOS projects and other NOAA, Federal, State, and local South Florida initiatives.

For example, the Interagency South Florida Ecosystem Task Force (established as part of the U.S. Department of Interior's 1993 interagency agreement to restore South Florida's ecosystem) is currently designing strategies and considering recommendations that focus on many of the same priority issues identified in this report. A logical next step in the integration process would be to examine and assess these connections more closely and determine if additional integration between NOS priorities and those developed by other institutions such as the Task Force will help NOS more effectively achieve its goals.

An example of how integration efforts might move beyond NOS is the ongoing work associated with Priority 1 (page 19) where NOS is currently developing a detailed spatial data inventory of historic, ongoing, and planned monitoring activities in the coastal and marine waters of South Florida. The goal is to develop a regional marine ecosystem monitoring plan that includes areas beyond the boundaries of the FKNMS and effectively integrates the various needs and capabilities of many different programs. A critical component of this work has been the careful evaluation of other efforts to establish similar regional monitoring proposals. This project could serve as a demonstration or "blueprint" for how NOS integration efforts can serve both NOS management priorities and, fundamentally, the greater interests of South Florida.

Appendices

Appendix A. Project Connections

Appendix B. Sample Project Inventory

**Appendix C. Sample Inventory of Experienced
Personnel**

**Appendix D. Sample Project Planning
Worksheet**

Appendix A. Project Connections

Twenty-two priority projects are described (see Table 2 on page 8). This material was derived primarily from data collected on detailed project survey sheets (see blank sample in Appendix D). Project numbers in the column "How Projects Connect" correspond to the project numbers in this Appendix and in Table 2. The tasks shown in red represent "integration" tasks. Some of these tasks were not necessarily included on the original survey sheets but were added to better illustrate how a project could be conducted in a more integrated manner. These integration tasks provided the foundation for the theme-based tasks presented in Table 4.

Project	Products/Outcomes	Tasks	How Projects Connect
1. South Florida Spatial Data Inventory (SDI)	<ul style="list-style-type: none"> An organized inventory of monitoring activities, including the spatial and temporal distribution of monitoring sites 	<ul style="list-style-type: none"> <i>Develop a data base containing metadata information derived from project surveys.</i> <i>Develop and distribute a summary report on existing monitoring activities, and the utility of the information.</i> <i>Coordinate with other projects to design an Internet access.</i> <i>Develop instructions on how to access and query the data base.</i> 	<ul style="list-style-type: none"> Users can identify monitoring projects that provide data relevant to their research, assessment, or modeling needs, Projects 2, 3, 4, 5, 8, 10, 13, 16, & 20. The information can be used to help coordinate monitoring activities and to select monitoring sites and variables, Project 5. The Internet access should be developed in conjunction with the FKNMS Server, Project 21.
2. Benthic - Community Monitoring	<ul style="list-style-type: none"> Information on the spatial distribution and abundance of benthic habitats in proposed Replenishment Reserves Information on reef fish populations An overview of the health of benthic habitats Standardized, long-term monitoring stations for trend analysis 	<ul style="list-style-type: none"> Review the SDI metadata inventory to identify gaps in the current benthic monitoring record. Conduct monitoring and observations of benthic communities and reef fish in proposed Replenishment Reserves. Process and analyze samples and information. Collect and synthesize expert anecdotal information. Develop and distribute a summary report on the health of benthic communities and reef fish populations, including supporting anecdotal information and a list of potential indicators of benthic habitat health. <ul style="list-style-type: none"> <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> <i>Develop instructions on how to access and query the data base, and how to obtain other useful information, i.e., video and photo data.</i> <i>Generate and distribute a map depicting the location of sampling locations.</i> <i>Prepare information for assisting with benthic classifications.</i> 	<ul style="list-style-type: none"> The data base and report can: <ul style="list-style-type: none"> help corroborate data and information developed by Projects 4 & 10; help with the development of a comprehensive monitoring plan, Project 5; help evaluate & corroborate the information contained on benthic habitat maps, Project 15, and help identify areas for implementing management strategies, including restoration, Projects 18 & 22. The data can be input into the assessment and valuation of habitat resources as recreational opportunities conducted for Project 7. The data will be used for damage assessment, Project 19. Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects.

Project	Products/Outcomes	Tasks	How Projects Connect
3. Florida Bay Salinity Characterization	<ul style="list-style-type: none"> • Salinity profile data • An accurate description of salinity characteristics and trends • A description of how this information can be used for research and planning 	<ul style="list-style-type: none"> • Review the SDI metadata inventory to identify relevant monitoring programs. • Collect existing salinity data for Florida Bay. • Process and interpret the data. • Develop and distribute an assessment report characterizing salinity profiles, trends, and natural and anthropogenic influences. <hr/> <ul style="list-style-type: none"> ◦ <i>Coordinate with other projects to design a salinity data base that can be easily accessed and queried.</i> ◦ <i>Develop instructions on how the data base can be accessed, and information on its utility for modeling and other assessment activities.</i> ◦ <i>Coordinate activities with other assessment projects.</i> 	<ul style="list-style-type: none"> • The data base and report can: <ul style="list-style-type: none"> - help with the development of a comprehensive monitoring plan, Project 5; - help assess the flux between Florida Bay and the Florida Reef Tract, Project 11, and - initialize computer models on circulation patterns, Project 12.
4. Keys-Wide Coral Health Monitoring	<ul style="list-style-type: none"> • Information on the health of coral reefs in the FKNMS • A list of potential indicators of coral reef health 	<ul style="list-style-type: none"> • Review the SDI metadata inventory to identify relevant monitoring programs. • Collect benthic and sediment samples at 33 sites. • Process and analyze samples. • Collect and synthesize expert anecdotal information. • Develop and distribute a report on the overall health of coral reefs, including supporting anecdotal information and a list of potential indicators of coral reef health. • Develop an annual report on coral reef conditions. <hr/> <ul style="list-style-type: none"> ◦ <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> ◦ <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> ◦ <i>Develop instructions on how to access and query the data base, and how to obtain other useful information, i.e., video and photo data.</i> ◦ <i>Generate and distribute a map depicting the location of sampling locations.</i> ◦ <i>Prepare information for assisting with benthic classifications.</i> 	<ul style="list-style-type: none"> • The data base and report can: <ul style="list-style-type: none"> - help corroborate data and information developed by Projects 2 & 10; - help with the development of a comprehensive monitoring plan, Project 5; - help evaluate & corroborate the information contained on benthic habitat maps, Project 15; and - help identify areas for implementing management strategies, including restoration, Project 18. • The data will be used for damage assessment, Project 19. • Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects.

Project	Products/Outcomes	Tasks	How Projects Connect
<p>5. Monitoring Plan for Florida Bay and Florida Keys</p>	<ul style="list-style-type: none"> • A network of standardized, long-term monitoring stations throughout the Florida Bay & Keys area • Coordination of monitoring activities to meet common, agreed-upon goals • A method for sharing data, technology, and equipment • A coordinated approach for developing and refining monitoring programs based on gaps and redundancies in the existing monitoring record • An integrated method for planning, producing, and distributing reports based on monitored data • A method for periodically updating the SDI 	<ul style="list-style-type: none"> • <i>Review and evaluate current monitoring activities using the SDI metadata inventory and data base.</i> ◦ <i>Design a process for identifying common goals across monitoring programs and develop a comprehensive monitoring scheme to meet those goals.</i> ◦ <i>Conduct workshops with participating priority project staff to agree upon the goals, identify and select monitoring stations, and identify variables to be monitored. This includes developing monitoring standards.</i> ◦ <i>Produce and distribute summary reports and other products throughout the planning process.</i> ◦ <i>Design a standardized data base structure for participating projects.</i> ◦ <i>Produce and distribute a final monitoring plan. Include maps of monitoring station locations (existing and proposed), substances monitored, and temporal elements. Also include a comprehensive set of goals and the blueprint for conducting future monitoring activities.</i> 	<ul style="list-style-type: none"> • An integrated, comprehensive approach to monitoring that lays the groundwork for identifying areas that require monitoring. • A method for conducting cost-effective monitoring. • A method for using monitored data to determine the effectiveness of implemented management strategies, including restoration, Projects 18 & 22. • A method for using monitored data to support damage assessment, Project 19. • A method for efficiently collecting, processing, and disseminating monitored data to different users, Project 21. • Coordinating activities across monitoring projects will help minimize duplication and help meet the management goals of the Sanctuary, Projects 2, 4, 7, 8, 10, 13, & 16.
<p>7. Linking the Economy & Environment of Florida Keys/Bay</p>	<ul style="list-style-type: none"> • Estimates of market and non-market economic values 	<ul style="list-style-type: none"> • Conduct the survey, and process and analyze the data. • Build the data base. • Develop and distribute a metadata summary, including a description of priority data. <hr/> <ul style="list-style-type: none"> ◦ <i>Coordinate with other projects to design a valuation data base that can be easily accessed and queried.</i> ◦ <i>Develop instructions on how to access and query the data base.</i> ◦ <i>Develop and distribute a report on the results of the data analysis, specifying how it can be used to support priority projects. Include maps showing the spatial coverage of priority data elements.</i> 	<ul style="list-style-type: none"> • Information that can be used to: <ul style="list-style-type: none"> - help with oil spill/disposal planning, Project 6; - help with the development of management priorities for archaeological and cultural resources, Project 14; - assist with restoration efforts, Project 18; and - assist with damage assessment activities, Project 19.

Project	Products/Outcomes	Tasks	How Projects Connect
8. National Status and Trends Mussel Watch Project	<ul style="list-style-type: none"> Information on the status and trends of environmental quality conditions. 	<ul style="list-style-type: none"> Add 1995 data to the existing data base. Review the SDI metadata inventory for gaps and redundancies related to NS&T activities. Prepare summary materials on planned and ongoing activities. <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> <i>Develop instructions on how to access and query the data base.</i> <i>Identify monitoring activities that can be coordinated with the NS&T project.</i> <i>Coordinate activities with other monitoring projects.</i> 	<ul style="list-style-type: none"> A clear description of the NS&T Mussel Watch project that will help with the effort to integrate monitoring activities for Project 5. Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects, Projects 2, 4, 10, 13, & 16.
9. Regional Bathymetry for Florida Bay	<ul style="list-style-type: none"> Baseline bathymetric data for Florida Bay & Keys 	<ul style="list-style-type: none"> Assemble and digitize relevant regional archival soundings. Conduct bathymetric surveys. Construct a digital data base. Develop digital base maps at different resolutions. Produce summary materials clearly describing the resolution of the data and digital base maps. <i>Develop a method for users to access digital data and base maps.</i> <i>Develop instructions on how the information and maps can be accessed and used.</i> 	<ul style="list-style-type: none"> Digital bathymetric data and base maps that can be used to support numerous activities, including: <ul style="list-style-type: none"> - mapping (habitats, resources, etc.); - visualizing data; - selecting monitoring sites; - developing site characterizations; and - constructing models, Projects 2-8, 10-20, 22.
10. Florida Bay Benthic Macro-invertebrate Study	<ul style="list-style-type: none"> Base-line benthic macroinvertebrate information An overview of the health of benthic macroinvertebrate communities 	<ul style="list-style-type: none"> Complete 1995 sampling. Process and analyze samples and include in the existing data base. Develop and distribute a report that clarifies what data is being collected, a detailed list of indicator species (including spatial distribution), and a summary of the health of benthic macroinvertebrate communities. <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> <i>Develop instructions on how the information can be accessed.</i> <i>Generate and distribute a map depicting the location of sampling locations.</i> <i>Prepare information for assisting with the classification of benthic communities.</i> 	<ul style="list-style-type: none"> The data base and report can: <ul style="list-style-type: none"> - help corroborate data and information developed by Project 2; - help with the development of a comprehensive monitoring plan, Project 5; - help identify areas for implementing management strategies, including restoration, Projects 18 & 22; and - help evaluate & corroborate the information contained on benthic habitat maps, Project 15. The data will be used for damage assessment, Project 19. Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects.

Project	Products/Outcomes	Tasks	How Projects Connect
<p>11. Flux Assessment Between Florida Bay and Adjacent FKNMS</p>	<ul style="list-style-type: none"> • Base line information on the volumes, rates, and timing (daily, monthly, annually) of flux in and out of Florida Bay 	<ul style="list-style-type: none"> • Collect existing transport and salinity information. • Process data and interpret results. • Develop and distribute an interim report identifying data sources and gaps. • Develop and distribute a final report illustrating transport characteristics. <hr/> <ul style="list-style-type: none"> ◦ <i>Develop recommendations for future data collection activities.</i> ◦ <i>Provide data for input to circulation models.</i> ◦ <i>Coordinate with other projects to identify overlaps in sampling and to compare data and information.</i> 	<ul style="list-style-type: none"> • The assessment can be used to help select monitoring sites and parameters while planning for a comprehensive monitoring program, Project 5. • The information can be used: <ul style="list-style-type: none"> - as base-line data and calibration for modeling circulation and exchange, Project 12; and - to understand the role of advection and mixing in nutrient and plankton dynamics, Project 16. • Coordinating activities with other assessment projects will help minimize duplication and ensure that critical needs are met, Projects 3 & 20.
<p>12. Modeling Regional Boundary Conditions & Circulation for Florida Bay</p>	<ul style="list-style-type: none"> • Regional circulation simulations • Transport simulations for water moving from Florida Bay to the Florida Reef Tract 	<ul style="list-style-type: none"> • Define the study area. • Collect data, including information from other relevant projects. • Process and analyze data. • Calibrate model using comparative information, i.e., remotely sensed SST and SSS data. • Run model simulations, and update as other data becomes available. • Develop and distribute an assessment report describing boundary conditions, circulation, and exchange characteristics. <hr/> <ul style="list-style-type: none"> ◦ <i>Construct a data base so the information can be used for running other models.</i> ◦ <i>Develop a method for users to access the model.</i> ◦ <i>Develop instructions on how the model can be accessed and used.</i> ◦ <i>Coordinate with other projects to identify overlaps in sampling and to compare data and information.</i> 	<ul style="list-style-type: none"> • A reliable circulation model can help with oil spill/disposal planning, Project 6. • Coordinating activities with other assessment projects will help minimize duplication and ensure that critical needs are met, Projects 3, 11, & 20. • The information can be used to calibrate SLFMR and SSS maps, Project 17.
<p>13. Monitoring Pesticides and Other Chemicals: Surface, Sediments, and Biota</p>	<ul style="list-style-type: none"> • Information on agricultural pesticides and other contaminants 	<ul style="list-style-type: none"> • Identify other similar monitoring projects and obtain lists of station locations, and substances and media monitored. • Use the SDI survey format to develop a metadata summary of the information being collected. <hr/> <ul style="list-style-type: none"> ◦ <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> ◦ <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> ◦ <i>Generate and distribute a map depicting the location of sampling locations.</i> 	<ul style="list-style-type: none"> • The data and information can be used to help determine future monitoring activities across monitoring projects, Project 5. • The information will also be useful for site and variable selection. • Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects, Projects 2, 4, 8, 10, & 16.

Project	Products/Outcomes	Tasks	How Projects Connect
14. Archaeological and Cultural Resource Projects	<ul style="list-style-type: none"> • An accurate inventory and data base of the location and value of archaeological and cultural resources 	<ul style="list-style-type: none"> • Locate resource targets using side-scan surveys. • Conduct site-specific archaeological surveys. • Establish criteria for assigning site values. • Classify sites as either high, medium, or low value. • Construct the inventory/data base. • Develop maps of the locations of archaeological and cultural resources and their values. <hr/> <ul style="list-style-type: none"> ◦ <i>Establish user access to the data and maps.</i> 	<ul style="list-style-type: none"> • A data base of archaeological and cultural resources, and their value, can be used for assisting with damage assessment, Project 19.
15. Benthic Habitat Mapping	<ul style="list-style-type: none"> • A spatial data base of benthic habitats • Base maps of benthic communities generated in a GIS system 	<ul style="list-style-type: none"> • Obtain existing habitat information and photographs. • Classify benthic habitats. • Compile highly accurate shoreline manuscripts to include classified benthic habitats. • Conduct GIS processing. • Produce and distribute maps. <hr/> <ul style="list-style-type: none"> ◦ <i>Corroborate existing habitat information using data from monitoring projects.</i> ◦ <i>Develop digital files and instructions on how they can be accessed.</i> 	<ul style="list-style-type: none"> • The base maps and spatial data base can be used for: <ul style="list-style-type: none"> - oil spill/disposal contingency planning, Project 6; - helping determine the health of aquatic ecosystems, Projects 2, 4, & 10; - supporting the development of a comprehensive monitoring plan, Project 5; - helping identify areas for implementing management strategies, including restoration, Projects 18 & 22; and - helping with damage assessment activities, Project 19.
16. Nutrient Microalgal Dynamics	<ul style="list-style-type: none"> • Information on nutrient and microalgal dynamics 	<ul style="list-style-type: none"> • Identify other similar projects and obtain lists of sampling locations. • Use the SDI survey format to develop a metadata summary of the information being collected. <hr/> <ul style="list-style-type: none"> ◦ <i>Coordinate with other projects to design a data base that can be easily accessed and queried.</i> ◦ <i>Coordinate with other monitoring programs to select monitoring sites and variables.</i> ◦ <i>Generate and distribute a map depicting the location of sampling locations.</i> 	<ul style="list-style-type: none"> • The information will also be useful for site and variable selection, Project 5. • Coordinating activities with other monitoring projects will help minimize duplication, and help determine future monitoring activities across monitoring projects, Projects 2, 4, 8, & 10.

Project	Products/Outcomes	Tasks	How Projects Connect
<p>17. Oceanographic Feature Analysis</p>	<ul style="list-style-type: none"> • Historical analyses of water mass movements in the eastern Gulf of Mexico through the Straits of Florida, and Florida Bay • An assessment of seasonal (wet vs. dry) trends in water mass movement • Ongoing (3 to 4 times/week) analyses of water mass movements 	<ul style="list-style-type: none"> • Review and reformat archived AMMS and SLFMR data to suit current needs. • Establish a schedule for conducting initial flights. • Collect and process data, and incorporate into the data base. • Produce and distribute a report on initial findings, including maps of SST, SSS, turbidity, and chlorophyll a. • Develop a plan for ongoing data collection, organization, and dissemination. • Schedule and conduct data collection flights to produce maps 3 to 4 times/week, or as appropriate. <hr/> <ul style="list-style-type: none"> ◦ <i>Establish user access to the data and digital maps.</i> ◦ <i>Devise a method for real-time use of the data base.</i> 	<ul style="list-style-type: none"> • A method for conducting high resolution trend analysis. • Data base files and maps to support a wide variety of priority projects, particularly those associated with circulation and transport, Projects 11, 12, 20. • Information on water mass movements will help determine the ecological impacts of HAZMAT spills and would aid in clean-up operations, Project 6. • Information for producing frequency response curves (e.g., per salinity and temperature) for various petroleum and chemical products, Project 6.
<p>18. Coral Reef Restoration</p>	<ul style="list-style-type: none"> • Data and information on ongoing coral reef restoration activities 	<ul style="list-style-type: none"> • Complete restoration activities at Elpis and Maitland sites. • Develop and distribute a post-restoration assessment report, including information on the techniques used and anticipated results. • Identify the location of current restoration sites (point or boundary), and develop and distribute a map depicting their characteristics. <hr/> <ul style="list-style-type: none"> ◦ <i>Identify monitoring needs to evaluate the effectiveness of restoration efforts and coordinate with other monitoring projects to ensure they can be met.</i> 	<ul style="list-style-type: none"> • Information to help determine future monitoring activities, Project 5. • Information supporting ongoing ecosystem monitoring activities, Projects 2, 4, 8, & 10. • Information supporting damage assessment activities, Project 19.
<p>19. Damage Assessment Activities</p>	<ul style="list-style-type: none"> • Data and information on ongoing damage assessment activities 	<ul style="list-style-type: none"> • Develop and distribute a report detailing current damage assessment activities and their status. Include a description of how the information can be used to help plan monitoring activities. • Utilize existing benthic habitat maps and monitored information to develop and distribute a map depicting the location and status of damage assessment activities. <hr/> <ul style="list-style-type: none"> ◦ <i>Identify monitoring needs to evaluate the effectiveness of restoration efforts and coordinate with other monitoring projects to ensure they can be met.</i> 	<ul style="list-style-type: none"> • Information on damage assessment activities can be used to help determine future monitoring activities, Project 5. • Information supporting ongoing ecosystem monitoring activities, Projects 2, 4, 8, & 10. • Information for planning restoration efforts, Projects 18 & 22.

Project	Products/Outcomes	Tasks	How Projects Connect
20. Florida Bay Circulation and Exchange	<ul style="list-style-type: none"> • Direct measurements of circulation and exchange 	<ul style="list-style-type: none"> • Define the study area. • Collect data, including information from other relevant projects. • Process and analyze data. • Construct a data base. • Develop and distribute an assessment report describing the data and its utility. <hr/> <ul style="list-style-type: none"> ◦ <i>Develop a method for users to access the data.</i> ◦ <i>Develop instructions on how the data can be accessed and used.</i> ◦ <i>Coordinate with other projects to identify overlaps in sampling and to compare data and information.</i> 	<ul style="list-style-type: none"> • Information that can be used to understand and evaluate transport between Florida Bay and the Florida Reef Tract, Project 11. • Base line information that can be used to supplement other data sources used in circulation and transport models, Project 12. • Information that can be used to understand the role of advection and mixing in nutrient and plankton dynamics, Project 16. • Coordinating activities with other assessment projects will help minimize duplication and ensure that critical needs are met, Projects 3 & 12.
21. FKNMS Data Server and Home Page	<ul style="list-style-type: none"> • A FKNMS server and Home Page providing access to Sanctuary-related data, maps, and information • A list server • A file server for NOS/NOAA use • E-mail access for information queries • Coordination with projects supplying materials 	<ul style="list-style-type: none"> ◦ <i>Install required hardware and software.</i> ◦ <i>Conduct work sessions with priority projects to ensure that the data and information is properly formatted.</i> ◦ <i>Prioritize the data and information sets to be linked and set a schedule for bringing them on-line.</i> ◦ <i>Design and construct the server and home page, and establish links according to the agreed upon schedule.</i> ◦ <i>Develop and distribute a document describing the system, its contents/links, and its utility.</i> 	<ul style="list-style-type: none"> • A capability for researchers and planners to quickly access and extract information integral to priority projects, All Projects.
22. Seagrass Restoration Projects	<ul style="list-style-type: none"> • Data and information on ongoing seagrass restoration activities • A seagrass compensation model and optimal transplantation methods to guide restoration efforts 	<ul style="list-style-type: none"> • Conduct experimental tests to determine recovery rates. • Develop and distribute a post-experimentation assessment, including information on the techniques used and anticipated results. • Utilize data and maps developed by other monitoring projects to identify candidate locations for restoration efforts. • Develop information on the status of candidate sites, including existing conditions, feasible restoration techniques, and priority. • Identify the location of candidate restoration sites (point or boundary), and develop and distribute a map depicting their characteristics. <hr/> <ul style="list-style-type: none"> ◦ <i>Identify monitoring needs to evaluate the effectiveness of restoration efforts and coordinate with other monitoring projects to ensure they can be met.</i> 	<ul style="list-style-type: none"> • A method for identifying and prioritizing areas for restoration. • Information to help determine future monitoring activities, Project 5 • Information supporting ongoing ecosystem monitoring activities, Projects 2, 4, 8, & 10. • Information supporting damage assessment activities, Project 19.

Appendix B. Sample Project Inventory

Florida Keys Ecosystem Integration Project National Ocean Service

This sheet is to inventory and characterize recently completed, on-going, and planned NOS projects in South Florida for the purposes of integration, where appropriate, to more effectively accomplish NOS management objectives in the Florida Keys National Marine Sanctuary. A project is any activity or set of activities associated with specific programmatic objectives. Please use one sheet per project and fill out ALL relevant sections.

1. Project Title

_____	recently completed	on-going	planned	proposed
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Contact

name: _____	NOS office: _____
phone: _____	fax: _____ email: _____

3. Description

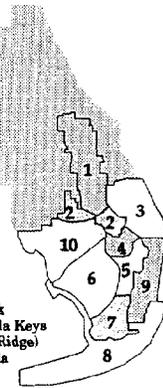
4. Regional Focus

list by number the South Florida regions this project is associated with

directly _____

indirectly _____

1. Kissimmee River Basin
2. Lake Okeechobee/Fisheating Creek
3. Upper East Coast/St. Lucie River
4. Everglades Agricultural Area
5. Water Conservation Areas
6. Big Cypress Watershed
7. Mainland portion of Everglades National Park
8. C-111 Basin/Card Sound/Biscayne Bay/ Florida Keys
9. Lower East Coast Urban Area (Metropolitan Ridge)
10. Caloosahatchee River Basin/Southwest Florida



5. Current Priority (at your level)

high: <input type="checkbox"/>	medium: <input type="checkbox"/>	low: <input type="checkbox"/>	other: <input type="checkbox"/>	_____
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6. Objectives

1.	_____
2.	_____
3.	_____

7. Schedule

start (mm/dd/yr): _____	finish (mm/dd/yr): _____
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8. Products

	date	target user
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____

9. Resources

	NOS Base	Other NOS <i>source</i>	Other NOAA <i>source</i>	Other non-NOAA <i>source</i>
FTEs	_____	_____	_____	_____
Funds (000s)	_____	_____	_____	_____

10. Partners/Users

	partner	user		partner	user
1. _____	<input type="checkbox"/>	<input type="checkbox"/>	6. _____	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	<input type="checkbox"/>	<input type="checkbox"/>	7. _____	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	<input type="checkbox"/>	<input type="checkbox"/>	8. _____	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	<input type="checkbox"/>	<input type="checkbox"/>	9. _____	<input type="checkbox"/>	<input type="checkbox"/>
5. _____	<input type="checkbox"/>	<input type="checkbox"/>	10. _____	<input type="checkbox"/>	<input type="checkbox"/>

11. NOS Personnel

<i>name</i>	<i>office</i>	<i>project responsibility</i>	<i>name</i>	<i>office</i>	<i>project responsibility</i>
1. _____	_____	_____	5. _____	_____	_____
2. _____	_____	_____	6. _____	_____	_____
3. _____	_____	_____	7. _____	_____	_____
4. _____	_____	_____	8. _____	_____	_____

Appendix C. Sample Inventory of Experienced Personnel

Florida Keys Ecosystem Integration Project National Ocean Service

This sheet is intended to provide NOS with a measure of its collective knowledge and expertise to conduct new program activities to support its management of the Florida Keys National Marine Sanctuary and Federal efforts in the greater South Florida region. This form should be filled out ONLY by those persons with first-hand experience with South Florida issues and topics.

1. Name/Organization

name: _____ title: _____

NOS office (e.g. office/div/branch): _____

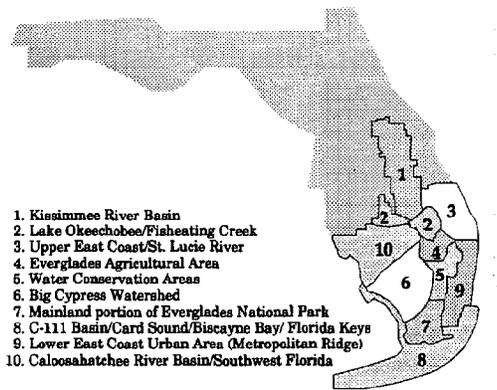
phone: _____ fax: _____ email: _____

2. Regional expertise?

list by number the South Florida regions you have first-hand knowledge or experience with:

directly _____

indirectly _____



3. Topical expertise?

	no. of years		no. of years		no. of years
Modeling	<input type="checkbox"/> _____	Marine Chemistry	<input type="checkbox"/> _____	Marine Biology	<input type="checkbox"/> _____
Env. Monitoring	<input type="checkbox"/> _____	Geography	<input type="checkbox"/> _____	Fisheries Biology	<input type="checkbox"/> _____
Remote Sensing	<input type="checkbox"/> _____	Cartography	<input type="checkbox"/> _____	Env. Engineer	<input type="checkbox"/> _____
Phys. Oceanography	<input type="checkbox"/> _____	Est./Marine Ecology	<input type="checkbox"/> _____	GIS Systems	<input type="checkbox"/> _____
Navigation	<input type="checkbox"/> _____	Cartography	<input type="checkbox"/> _____	Toxicology	<input type="checkbox"/> _____
Nautical Charting	<input type="checkbox"/> _____	Coastal Zone Mgmt.	<input type="checkbox"/> _____	Computer Science	<input type="checkbox"/> _____
Data Management	<input type="checkbox"/> _____	Env. Assessment	<input type="checkbox"/> _____	Other _____	<input type="checkbox"/> _____
Satellites	<input type="checkbox"/> _____	Coastal Geology	<input type="checkbox"/> _____	Other _____	<input type="checkbox"/> _____
Geodesy	<input type="checkbox"/> _____	Hydrology	<input type="checkbox"/> _____	Other _____	<input type="checkbox"/> _____
Coastal Processes	<input type="checkbox"/> _____	Information Systems	<input type="checkbox"/> _____	Other _____	<input type="checkbox"/> _____

4. Specific South Florida projects worked on in the past 4 years?

	project name	start/completion dates	your primary responsibilities
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

5. Current assignments/responsibilities?

1.	_____
2.	_____
3.	_____
4.	_____

5. Direct supervisor?

name: _____	title: _____	
phone: _____	fax: _____	email: _____

6. Comments on South Florida experience?

Appendix D. Sample Project Planning Worksheet

NOS Florida Keys Ecosystem Integration Project

Contact: _____

Phone: _____

NOS Office/Div/Branch: _____

Project Title _____ on-going planned proposed

Description _____

Major Products _____ *date* _____ *target users* _____

Start Date _____ Estimate of Total Resources Required *FTE* _____ *Funds* _____

Finish Date _____ existing/available _____

additional required _____

TOTAL

Partners _____ *Lead* *Support*

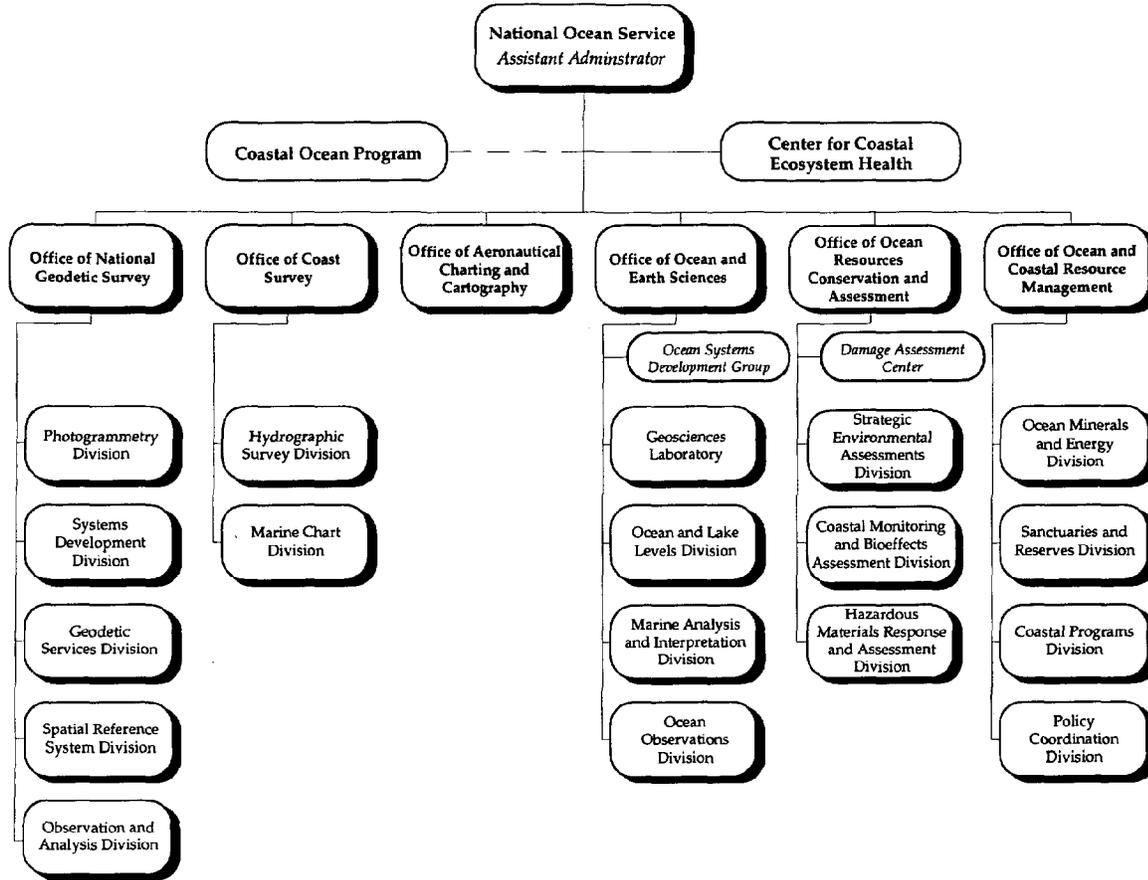
Major Activities

	FY95			FY96												FY97		
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

Integration: Other NOS Units

<i>unit</i>	<i>major activity</i>	FY95			FY96												FY97		
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

The National Ocean Service



Project Team

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Walton Campbell	SEA Division/ORCA (formerly of OES)
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