SHORT TERM ANALYSIS SERVICES (STAS)

Independent Scientific Review of the Document Titled: "South Florida Ecosystem Restoration Task Force Plan for Coordinating Science for Everglades Restoration - Phase 1" Prepared by the Science Coordination Group

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1.0 Introduction

Restoring the south Florida ecosystem involves a complex combination of activities intended to return the degraded ecosystem to a more natural state. The historic ecosystem was an 18,000-square-mile region of subtropical uplands, wetlands, and coastal waters that extended from the Kissimmee Chain of Lakes south of Orlando through Florida Bay and the reefs southwest of the Florida Keys. The restoration effort is a long-term process requiring the resolution of complex environmental, engineering, and management issues. Continual improvements in plans and designs must be made by incorporating new information and lessons learned (referred to as adaptive management). Restoration involves the cooperation and coordination of multiple federal, state, and tribal organizations to address these issues and make the decisions necessary to achieve restoration.

The Comprehensive Everglades Restoration Plan (CERP) provides a framework and guide to restore, protect, and preserve the water resources of central and southern Florida, including the Everglades. It covers 16 counties over an 18,000-square-mile area, and centers on an update of the Central & Southern Florida (C&SF) Project. The current C&SF Project includes 1,000 miles of canals, 720 miles of levees, and several hundred water control structures. The C&SF Project provides water supply, flood protection, water management and other benefits to south Florida. For close to 50 years, the C&SF Project has performed its authorized functions well. However, the project has had unintended adverse effects on the unique and diverse environment that constitutes south Florida ecosystems, including the Everglades and Florida Bay. There are more than 60 projects associated with CERP designed to restore south Florida ecosystems.

There are additional projects that fall outside of the purview of CERP, such as the Modified Water Deliveries, Land Acquisition programs, Kissimmee River Restoration, Southwest Florida Feasibility Study, Florida Keys Water Quality Improvement Program, and the Miami-Dade Regional Canal Study. All of these projects require high quality science to occur at multiple organizational and ecological levels to enable sound policy decisions.

CERP includes a program known as Restoration Coordination and Verification (RECOVER) which is designed to organize and provide high quality scientific and technical support and to ensure that a system-wide focus is maintained. RECOVER links science and the tools of science to a set of system-wide planning, evaluation, and assessment tasks, specifically for CERP projects.

The U.S. Congress established the South Florida Ecosystem Restoration Task Force (Task Force) to, among other things, coordinate policies and programs and exchange information among the member organizations responsible for the restoration, preservation, and protection of the entire south Florida ecosystem, both CERP and non-CERP. The Task Force reviewed, through its Science Coordination Group (SCG), the information generated within RECOVER and is using it to develop a system-wide suite

of ecological indicators and determine if there are any gaps in strategic science issues and questions for the other non-CERP projects.

As part of their role, the Task Force, through the SCG, has prepared a Plan for Coordinating Science (Plan). The Office of the Executive Director commissioned Battelle to conduct an Independent Scientific Review of the South Florida Ecosystem Restoration Task Force's Phase I Plan. The Plan was completed to detail a methodology for science program coordination and the identification of system-wide science needs and gaps, in response to both Congressional and GAO concerns regarding improvements in the coordination of the science being conducted as part of the Everglades restoration program. The intent of the independent scientific review was to address key questions posed by the SCG and gather other pertinent observations / insights from experts about the science coordination process including whether the existing approach is reasonable, functional, and useful to agencies involved in the Everglades restoration science. The Task Force coordinates the development of consistent policies, strategies, plans, programs, projects, activities, and priorities addressing the restoration, preservation, and protection of the South Florida ecosystem. We have made suggestions that attempt to assist the Task Force in working within its authorities to enhance coordination or highlight the consequences of not doing so.

2.0 Independent Scientific Review Process Background

The independent scientific review process created a means for providing specific advice on the high-level coordination issues related to the science of Everglades restoration. The ecological and political complexity of Everglades restoration necessitates numerous levels and degrees of coordination within and between agencies, and a number of special interest stakeholders. The reviewers' foci was on the **approach** to coordination, making specific recommendations that, if implemented, could assist the Task Force in continuing their mission as "agents of coordination," through providing efficient and more explicit connections between science needs and gaps, and the actions that will result in Everglades restoration progress.

The primary elements of any independent scientific review, all of which were incorporated in this approach, include:

- Identifying technically qualified and experienced reviewers familiar with the subject matter, in this case, regional ecosystem restoration processes, from both scientific and programmatic perspectives;
- Creating diversity in the panel of reviewers, from the perspective of technical knowledge, years of experience, geography, and scientific discipline expertise;
- Assuring that the reviewers have no vested interest in the outcome of the review through verification of current activities;
- Orienting the reviewers by clearly communicating the technical boundaries of the review by describing the scope of responsibility, in this case, of the Task Force, and providing specific questions that are addressed in the context of the Plan contents;

- Maintaining the integrity of the review process through each reviewer completing their assessments individually, with no interaction with one another, and focused on providing input from their specific expertise; and
- Maintaining consistency in the review results by providing an identical response framework for each reviewer to provide their input.

To ensure that the independent science review was thorough, Battelle included on the review team experts in regional ecosystem restoration, ecological risk assessment, ecosystem stressor / response analysis, ecosystem modeling, science program management, south Florida biology / ecology, and hydrologic / water quality / nutrient issues (Table 1). Each scientist was asked to read the entire document and answer, from their perspective, the following questions:

- **Question 1: Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

- **Question 2: Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Table 1. Independent Review Panel Experience

Name	Experience in/Scientific understanding of the specified ecosystems							
	Ecosystem Restoration Projects and Principles	Complex, Multi-organizational Scientific Coordination	South Florida, Everglades Ecosystem	Hydrologic, Water Quality, and Biological Conditions	Freshwater Wetlands Ecology	Surface Water Hydrology and Modeling	Ecosystem Ecology	Water Quality and Nutrient Analyses
John Brawley (Ph.D.)	X	X		X	X	X	X	X
Jennifer Field (M.S)	X		X	X			X	
Carlton Hunt (Ph.D.)	X	X	X	X		X	X	X
Norman Richardson (M.S.)	X			X	X		X	X
Ron Thom (Ph.D.)	X	X		X	X		X	X

- **Question 3: Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

- **Question 4: Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

- **Question 5: Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of "filling the gaps" in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task Force for doing this.

- **Question 6: Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).**
    - *Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan*

    - *Establish a process to identify key resource management issues that need to be addressed by science planning*

    - *Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis*

A summary of the reviewers' answers to each of these questions has been included in Section 4.0 Summarized Specific Review Findings. Each subsection, in order, relates directly to the numbered questions above.

This document was developed to provide a summary of the overall findings of the independent review panel on Phase I of the Plan. When possible, specific examples are supplied to assist the Task Force through their next steps, specifically in the development of Phase II, which will include the results of implementing the needs and gaps identification for a subset of science coordination topics. Phase II will also include the full identification of needs and gaps, additional essential coordination actions, and processes for ensuring quality science. Our comments and recommendations were designed to be considered in the context of developing Phase II.

3.0 Overview of Review Findings

The general consensus of the reviewers on the Plan for Coordinating Science was that it created a solid framework to fulfill the Task Force's goal of coordination among member organizations of the Task Force. They did, however, find many areas that could benefit

from additional specificity and from a defined process that would more comprehensively assess gaps and research needs, for example, within and among eco-regional modules.

An "eco-regional module" is a geographic representation within which Conceptual Ecological Models (CEMs) have been developed to define ecological relationships (drivers/stressors > processes > output) within a specific region. Eco-regional modules consist of a set of modules that have been established by RECOVER as defined in the CERP Monitoring and Assessment Plan: Part 1 Monitoring and Support Research (January 2004), and are Greater Everglades Wetlands, Southern Estuaries, Northern Estuaries, and Lake Okeechobee. An additional set of eco-regional modules were defined by the Science Coordination Group which include: the Kissimmee River Basin, Florida Keys, and Western Big Cypress Basin. CEMs have not yet been developed for Kissimmee River Basin, Florida Keys, and Western Big Cypress Basin.

The overall comments can be categorized into three major themes:

1. General formatting and content issues
2. Use and application of CEMs for each eco-regional module
3. Assessing Needs, Gaps, and Actions among eco-regional modules, and measuring "risk of ecosystem restoration failure," relative to the critical and potentially overlapping ecological links identified in the CEMs.

The specific written comments from each reviewer can be found in Attachment 1. Although we have summarized the comments as part of this document, it is encouraged that the individual reviewer findings be consulted for additional details and examples. The overview of review findings was based largely on the input from the reviewers, however, additional interpretation and synthesis has been included based on local understanding and status of various programs affecting overall coordination.

3.1 General Formatting and Content Issues

There was a general consensus that the Plan sufficiently addressed coordination issues, but could be improved overall by the inclusion of additional specificity on problem definition, and utilizing summary matrices or simple tables to visually communicate the complexity inherent in linking needs, gaps, and actions within ecosystems, or in the overall coordination framework. For some of the reviewers, the Plan fell short of fully addressing the coordination of restoration science programs and the issues raised by the GAO because of the lack of specificity and identification of "who will do what, when, and how." They did recognize the Plan as a document that clearly recognized the need for science coordination that ensures production of quality and comparable science results and sharing of results across the many programs being implemented in south Florida.

Some specific recommendations are listed below:

- Include an overall summary of historical activities, both anthropogenic and natural, that have necessitated the current level of restoration planning and implementation. Without specifically defining the problem, the reader may not

fully understand the problems being addressed through the restoration activities that are repeatedly discussed in the Plan. If a more detailed summary of historical activities is not desired in the actual Plan, minimally reference the Task Force Strategic Plan which includes this information.

- A diagram of the coordination process / framework through which the Task Force will receive information, evaluate it, and provide recommendations in support of coordination would be very useful at the beginning of the Plan. The diagram should include an explicit link to where RECOVER inputs, or other scientific information inputs, occur.
- A series of diagrams and matrix-type tables would assist in the visualization of where specific strengths and weaknesses exist in terms of the scientific needs associated with each CEM, and would assist in organizing the flow of understanding (1) existing knowledge (cause/effect; CEMs), (2) scientific needs to support required management decisions, and (3) fully assessed gaps relative to one another.
- The identified "needs" seemed to be appropriately detailed, but the "gaps" need to be more specifically described to avoid any ambiguity, and to assist in taking the next needed step in identifying potential agency leads and other contributors who are equipped to address the "gaps" through identified "actions." The general consensus of the review panel was that any opportunity to get more specific in defining "gaps," "actions," and taking the next step to identify "who," would result in a higher level of accountability and a unified approach that would assist the Task Force in their overall coordination role.

3.2 Use and Application of Conceptual Ecological Models

There was broad consensus among the reviewers that the use of CEMs was both appropriate and preferred in regional restoration efforts. We identified a number of recommended improvements in describing the process of determining gaps through CEMs, establishing more explicit links between the needs-gaps-actions to the CEM (the "drivers"), and prioritizing the gaps. Suggestions include:

- Reorganize the needs-gaps-actions by eco-regional module and then group / utilize the CEMs by module.
- Clearly show in the overall coordination diagram where scientific input to the Task Force occurs, such as from RECOVER or other organizations or projects. Define specifically whether the input creates a new science "need," if it is an existing "need," or whether it fulfills or creates an "action." The Task Force is in a position to bring a needed level of awareness on these issues as new information is provided and needs, gaps, and actions are reassessed.
- Utilize CEMs and indicator development as a way to assess research and management needs assessments.
- In order to fully represent system-wide restoration, CEMs should be developed for Kissimmee River Basin, Florida Keys, and Western Big Cypress Basin modules.

3.3 Assessing Needs, Gaps, and Actions and Measuring "Risk of Ecosystem Restoration Failure"

Although the presentation of "needs, gaps, and actions" was straightforward and understandable, the Plan could benefit from more explicit linkages among them. Additionally, a stronger association with the RECOVER organizational framework to define CEMs for each eco-regional module would fully utilize an existing technical relationship and introduce greater efficiency in coordination. Specific recommendations include:

- Presenting "needs, gaps, and actions" in one table or matrix for each eco-regional module, with an added explanation of how efforts to address identifying information "gaps" will be coordinated across logically involved agencies.
- Within all CEMs there is a certain amount of scientific uncertainty that occurs due to gaps in the data or understanding. Gaps may include any or all of the stressors, ecological responses at the species community, population levels, or at the process or linkage level. Until these gaps are filled the uncertainty will remain. Sometimes as the data become available and understanding grows, scientists find that the assumptions made when creating the CEM were incorrect. This may lead to actual or perceived failure in restoration. Thus, the Task Force should specify the risk for each need and gap identified in their program, using the CEMs, so that they can focus their coordination efforts on those needs, gaps, and actions that without answer, could lead to a "high risk of restoration failure." Completing a relative ranking of uncertainties of individual stressors (or interactions between combinations of ecological links as identified in the CEMs) can be useful in identifying risk and may help prioritizing research needs. The analyses should be repeated at appropriate intervals as the scientific information base develops and research needs are reprioritized accordingly.
- Clearly stating the consensus-derived program level research, monitoring, and modeling priorities, and establishing a link with specific actions.
- Addressing the issue of overall synthesis, to minimally get information organized as to "who is doing what, and where" would greatly enhance coordination efforts. By instituting a process for meta-analysis and synthesis, the Task Force can assist in discerning between critical science issues and assessing them relative to one another. One example of effective meta-analysis where "big picture" science issues were discussed in which scientists did not have agreement was the Avian Ecology Workshop sponsored by the Task Force. These types of workshops could continue to provide value to resolving scientific differences and promoting restoration progress.

4.0 Summarized Specific Review Findings

This section comprises a summary of the reviewers' comments to each Task Force question. The subsections provided here relate to each question, in order, as listed under section 2.0.

4.1 Reasonableness and Usefulness of Approach

The reviewers were divided on whether they saw this document as a "*Plan for Coordinating Science*." Although divided, the reviewers felt that more information was necessary to have a comprehensive plan to coordinate the science conducted in support of this program. The Task Force needs to address the processes for coordination, management, communication, planning, consensus building, priority setting, and integration of activities.

Assuming the goal of the science coordination is to make a unified whole that works together, the document is weak on the necessary actions to bring individual agency contributions to a common place for assignment and discussion of ways to address science needs and gaps. The document would be improved greatly if the key themes and points were better identified up front and the document organized to address these themes head on. Several reviewers felt that, as written, this technical report only addresses the GAO recommendations in part and does not provide the type and level of information necessary for agency managers and administrators to use in their planning and negotiations for resources. The title of the document leads one to believe that the document will present a plan describing how the various agencies will interact to address the science issues, not just identify them. The plan would essentially provide a blueprint for identifying which agencies would be accountable for addressing which science issues and how those agencies would communicate/inform other agencies. There is no description in this plan of how the agencies will work together to actually make management decisions. This document is a good first step, a base to build upon. The approach needs to include more accountability and mechanisms of interaction.

An overall summary of historical activities, whether anthropogenic or natural, is necessary to set the stage for providing justification of restoration planning and implementation. Continued review of these goals is necessary to ensure that developing science activities and management questions are continually aligned and if not, that corrective actions are taken to affect realignment. The document may also be improved by providing a few summary matrices, conceptual models, and/or simple tables that illustrate (a) primary topic areas (e.g., hydrology, salinity, nutrients, and so forth); (b) existing and planned programs that are providing scientific support in primary topic areas; and (c) the relative strengths, weaknesses, and omissions in coverage of these areas. In essence, a series of diagrams and matrix-type tables would assist in the visualization of where specific strengths and weaknesses exist in terms of the scientific needs associated with each example CEM. These visualizations would provide tremendous help to the accompanying text. Of course, it is acknowledged that this is Phase I, and therefore, the level of information needed to develop these summaries may not yet be synthesized.

To better assure that recommended actions are completed, the Task Force should identify lead agencies, and coordinate or broker agreements between them, with specific assigned tasks. The Task Force should consider contingencies should an agency have to back out of commitments. A diagram of how and when the Task Force will receive data, evaluate the data, and make decisions would be useful to put in the report.

4.2 Using the Conceptual Ecological Models

The reviewers agreed that the use of conceptual models to address goals and identify data gaps, science needs, and coordination actions are an essential step in the overall planning and coordination process for any scientific endeavor, especially large regional programs. Conceptualization based on the most up-to-date understanding of a system's functions and processes and sound scientific principles is a key element of the scientific method and fits well with developing data quality objectives and monitoring program design as is documented in numerous papers and federal guidance documents.

Given the incomplete understanding of the complexity of interactions at the ecosystem level, concerns will remain that failure to recognize or fully appreciate one or more environmental stressors (acting solely or in concert) could result in a failure to properly design restoration efforts. Continued consideration of this by the Task Force (including expert teams) and, where possible, validation of the dominant role of identified stressors (e.g., phosphate mesocosm research studies), evaluation of initial monitoring results, and development of more refined modeling techniques will improve chances for achieving program goals. One reviewer suggested that it would also be worthwhile to consider a further formalization of the process of identifying prospective science needs based on CEMs (i.e., a process of determining gaps). Decision analytic techniques (e.g., Multiple Attribute Analysis, Multiple Criteria Decision Analysis) represent an improvement over qualitative ranking procedures by explicitly quantifying the uncertainty attributable to individual factors as related to goal attainment.

One improvement suggested by the reviewers was better articulation of the problem(s) being addressed at the system level, and to the extent possible, define critical questions that must be addressed to ensure restoration is having the desired outcome(s). The reviewers also suggested prioritization of what restoration strategies are most, more, or least important to the recovery of the area. A clear "big picture" discussion of how the various CEMs address the Goal of "getting the water right" (goal 1), "restoring, preserving and protecting natural habitats and species" (goal 2) and "fostering the compatibility of the built and natural systems" (goal 3) should be included early in the document. Although this information is somewhat implicit in the document, it needs to be explicitly stated early to provide context before leading into a more detailed approach and methodology of the plan for coordinating science. The reviewers also thought there were many unaddressed issues around the scale of the problem and placing boundaries (time, space, parameters, and variability) on the program to ensure data gathered is the most relevant and informative.

Introducing two of the twelve potential CEMs in this document as "test runs" of the process was found to be interesting and useful. However, the plan becomes a partial summary of critical science needs, gaps, and actions that is biased towards the two CEMs (Florida Bay and Total System). This is not problematic if additional CEMs are to be completed and integrated into the ultimate draft in Phase II.

4.3 Appropriateness of Critical Science Needs, Gaps, and Actions

The identified needs for research, monitoring, modeling and science applications were for the most part found by the reviewers to be comprehensive and pertinent. However, only the identified gaps and actions for the Florida Bay and Total System are currently presented so it was difficult to systematically catalogue, comprehensively evaluate, and prioritize the individual research needs within and among study areas and to state unequivocally the relevance of the identified gaps. As indicated in answers to the previous questions, the document tends to address science issues and conducts problem solving rather than developing and articulating a plan to coordinate the science that ensures the most appropriate and complete data is generated. Recognizing that this is likely to be a focus of Phase II, additional discussion on how this process will be implemented would be beneficial. Discussion on how the Task Force will help promote better inter-agency coordination at the operational level would be of value as well. It is also recommended that citations to key reports or literature be added as an appendix or as a Bibliography.

The reviewers felt the Task Force should focus on developing a small, robust suite of key system-wide indicators for the natural system. Hydrology is the key factor that should form the central focus for restoration. The GAO study also identified the incomplete understanding of the impacts of fertilizers and pesticides on exposed plants and animals as a significant science knowledge gap. This concern should be directly referenced as a critical need where applicable (e.g., Florida Bay).

This plan also needs to address how uncertainties at many different scales will be dealt with (i.e., how will uncertainty be accounted for and by whom etc.; see the second bullet under 3.3 [page 7]). Some principles need to be developed to address how these results will be reviewed by the various agencies and how they will be used to make management decisions. This will be perhaps the biggest hurdle for the Task Force but is of utmost importance. This plan must discuss approaches for evaluating uncertainty and making management decisions based on those uncertainties. It will be important that the scientists explain the concepts of uncertainty to managers and policy makers who are often uncomfortable with the topic. Perhaps providing examples of uncertainty used in similar policy decisions including how it was addressed (be they restoration activities or other non-science activities) could be incorporated into the document.

4.4 Clarity of Identified Needs, Gaps, and Actions

Many of the comments in the previous section also pertain to this question, but to the extent that the discussion in the document is complete and accurate, the presentation of needs and gaps were noted as clear and understandable by the reviewers. When implemented, actions described in Section 3.3.2 (including development of system-wide quality protocols, process to ensure timely communication of information and evaluating progress against performance metrics and incorporating “lessons learned”) should effectively improve the process of ensuring quality science. Less clear are the linkages between the identified needs/gaps/actions. The reviewers suggested that when a need/gap analyses defines a set of actions, a clear statement of the response requirements be prepared with assignment of responsibility and expectations (what, when, deliverables)

for follow-up to ensure the appropriate response and remedies are developed including what uncertainties exist.

It is acknowledged that both CEMs (Florida Bay and Total System) are supporting relatively large, diverse research and management activities. Pulling them out of the text and relating them visually would help the reader understand more clearly the direct links between the primary issues and remedies. One reviewer who is familiar with the South Florida subregions noted some confusion on the need to develop conceptual ecological models for all South Florida subregions. They wondered how they would differ from the Conceptual Ecological Models presented earlier.

A broader issue noted by one reviewer was that the RECOVER Programs adaptive management process and other system wide scientific inputs should be clear in how they inform the restoration process overseen by the Task Force. One of the reviewers thought in particular that the actions needed to be stated more clearly. For example, in the Florida Bay CEM, there was an action to "review the hydrodynamic model," with no specificity as to how the review would be conducted or the information that resulted used.

4.5 Will the Document Persuade Agencies to Fill Data Gaps in the Critical Science Needs?

Reviewers generally felt that the actions in the plan would help move overall coordination and commitments forward, which will in turn help the process of addressing gaps. However, follow-up and setting expectations for agency follow-up and commitment will greatly influence the response from agencies. Part of the coordination plan should be clear communication of the issues (i.e., why it is important to address, why an agency should participate [by whatever means it can]). Additionally, agencies being willing to commit is as essential as the list of actions. The coordination plan should address communications head on and completely. How will the Task Force ensure the agencies are aware of the needs and work toward consensus on whom and how to address the needs? By clarifying and defining their authority and other opportunities to facilitate, the Task Force can work toward commitment and consensus. The reviewers felt that it will be important to get commitments from the various agencies and to describe in the plan what they will be contributing, how they will be communicating and interacting with the other agencies, etc. A goal of the plan should be to make the coordination process as transparent and explicit as possible so that scientific efforts are conducted as efficiently as possible with minimal duplication of effort.

Although the identified action items are important and reasonable, the generality of some, the lack of explicit linkage to specific needs, and the failure to prioritize individual actions would appear to make more difficult the process of inter-agency coordination. Recognizing that the Phase II document will provide substantially more details on the process, every effort to make explicit the consensus-derived research, modeling, and monitoring priorities and establish the linkages with specific actions steps will be valuable.

4.6 Does this Plan Address GAO Concerns?

4.6.1 Science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan

The "Plan for Coordinating Science, Phase I" does not address this GAO concern directly (no plans and documents specified or schedule included). The document focuses primarily on identifying science gaps, not what must be done for coordination. Reviewers noted that the overall coordination plan will likely emerge more strongly in Phase II if the remaining studies (and their CEMs) are adequately integrated. The test case of Florida Bay and Total System needs, gaps, and actions is a good start at this. However, improvements to the plan reside in more organizational efforts that assist the linkage between (1) CEM attributes, (2) system-wide indicators, (3) existing knowledge (and modeling), and (4) necessary information (gaps). The plan focuses on providing support to existing programs, and this may be the level of detail necessary to fulfill the GAO concerns; however, the reviewers suspected that more process-specific information might be necessary. Suggestions for improvement include adding information on how to implement these approaches and protocols (e.g., how the agencies need to interact) and the steps that will be necessary to make it happen (e.g., a work plan or business plan). This plan presents the approach to identifying key science information needs and gaps, but it does not go into sufficient detail to explain how those needs and gaps will be addressed. While the Plan lists the actions needed to fill gaps, it falls short of explaining how the actions will be accomplished.

Phase I presents a general approach that addresses a majority of the concerns raised by the GAO with Phase II intended to provide a full exposition of information needs and gaps along with further specification of essential coordination and quality assurance components. Emphasis of the need for the development of system-wide indicators and restoration endpoints (including performance endpoints) is good.

To fulfill the GAO recommendations, the reviewers noted that a comprehensive monitoring plan would need to be developed either in Phase II, or by some other means. For example, the RECOVER Monitoring and Assessment Plan (MAP) is a comprehensive plan that may form the basis for a larger system-wide monitoring effort. The idea is to utilize existing modeling / monitoring, but go further in implementing quality assurance / quality control practices in all of the monitoring activities, current or planned.

4.6.2 Process to identify key resource management issues that need to be addressed by science planning

The reviewers found that a process to identify key resource management issues was provided, although not in detail. While the document acknowledges the seminal role of management decision making, success in achieving strategic objectives would be improved by establishing an explicit process (perhaps even a separate process) where management issues and objectives are regularly reviewed. Additional opportunities for interaction and understanding between resource managers and scientific experts would be beneficial where a consensual understanding between the questions of interest to resource

managers and the kinds of answers the current state of the science can provide is developed.

The document could also be improved by defining a resource management issue identification process. Such a process could be developed separately from Phase II, or perhaps as a refinement to this Plan using the needs, gaps, and actions process. The Task Force has effectively already developed a process for identifying needs, gaps, and actions. The idea is to transfer that methodology, and develop a common understanding from a scientific and management perspective through a process that will identify needs, gaps, and actions specifically for key resource management issues. This important step would allow for enhanced communication between scientists and managers by articulating strategic resource management concerns or questions (for example, exotic plants or contaminants) in terms that science can address. Although mention of a process is in the Plan, it is sometimes hard to find and needs to be brought out succinctly in future documents for better implementation.

Aside from the scientific issues, a "business plan" model could be utilized to address the logistics of addressing key resource management issues. The development of a "business plan" may be beyond the scope of developing a Plan to Coordinate Science, in which case it could be completed as a stand-alone activity. This approach would allow for a methodology to be implemented that is resource focused and details strategic relationships between entities to complete the work of restoration. Although separate from efforts to coordinate science per se, the "business plan" approach is an essential component to fulfilling the need, gaps, and actions identified through that effort. This could include describing needed roles and the various organizations that could assist, defining staff levels of effort, drafting flow charts at different scales to present organizational structure, reporting/communication structure, and work breakdown structure for each key resource management area.

4.6.3 Identify and implement methods or processes to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis

The reviewers noted that identification and implementation of methods or processes to ensure that the SCG, Working Group and Task Force develop sound justifiable priorities for science issues is to some extent presented in the document (i.e., the approach to identifying needs and gaps). Although this is supplied, the reviewers felt that a more in-depth discussion of how the SCG, Working Group and Task Force will actually address the needs and gaps is critical to answering the GAO's concerns. They recommend that the actual specifics of the process be detailed including timelines within which these gaps should be addressed and specifics on staff commitments. There is also no mention of meta-analysis. Further plan development is recommended to address how strategic objectives will be met given the operational constraints and mission differences among

the various agencies involved, and taking into account the authority constraints the Task Force as a consensus building organization.

Although specifically requested by the GAO, the reviewers noted that the document does not address development and implementation of an independent science review committee. Thus, it was not possible to judge based on the materials received for this review if this recommendation has been addressed fully. It is unclear how independent reviews will be conducted to ensure the work of the Task Force and its subcommittees remain focused and on target. To assist in clarifying this area, the reviewers suggest that the discussion on Quality Protocols and Independent reviews needs to be more specific (when it will appoint peer review panels, how it will select peer reviewers etc.) and incorporated into the "actions" to address needs and data gaps. Additional details that clarify the role, composition, and authority of this panel would be helpful.

Another issue, timely exchange of peer-reviewed data, remains problematic in the plan. Regional-specific journals, conferences (mentioned in the plan), and central data warehouses (electronic) are all appropriate methods for ensuring timely data exchange. In reality, there is significant uncertainty associated with data exchange including quality, therefore, reviewers felt that relying on such an adaptive, innovative series of approaches (as noted above) would be necessary. There is also the concept of diminishing return on data/information gathering efforts. At some point, decision-makers must rely on best professional judgment with respect to scientific uncertainty and the effort it requires to elucidate.

5.0 Summary/Suggested Next Steps

The south Florida ecosystem restoration is an opportunity to evaluate the utility and effectiveness of ecological indicators to not only achieve restoration, but to inform other programs. A global example could be set by the coordination approach established by the Task Force, but will only be viewed as an example if it is successful. The Task Force's Plan for Coordinating Science takes a great stride in assuring that there is a wide awareness of the science needs across topics and regions. The development of Phase II of the document is an opportunity to take the Task Force's coordination mission to the next level and fully address the GAO concerns by:

- Assessing the identified "gaps" relative to one another within each eco-regional module, and assessing the level of risk of restoration failure if that "gap" is not addressed.
- Defining an "Actions Process" through which agency or agencies are identified that are the best situated (in terms of scope of agency responsibility, budget, etc.) to handle a specific action. Successful coordination will depend on taking a bold, next step to identify specifics on how actions will be taken (i.e. lead agency / co-lead agency / supporting agencies).
- Adopting Quality Protocols and Information Sharing (web-based mechanism to input and access data) policies applicable to all member agencies.

- Specifying an Independent Review Process that addresses when and how a peer review panel will be selected, including its role, composition, and authority, and incorporate into the "actions" to address "needs" and data "gaps."
- Incorporating accountability for the "actions" through a "Progress Tracking Process," that will show each agency's report of their activities that addressed or resolved a "gap.
- Focusing on a small, robust set of system-wide ecosystem health indicators when developing the Total System Science gaps to clearly measure restoration relative to stated goals.
- Discussing approaches for evaluating uncertainty and making management decisions based on those uncertainties, determining how the issue of "uncertainty" will be accounted for and by whom, and developing some principles of how modeled results will be reviewed by various agencies. The issue of uncertainty is often an uncomfortable topic, which may be alleviated by using examples of uncertainty in similar policy decisions and incorporate how they were addressed into the document.

The reviewers shared an appreciation for the complexity of the coordination task associated with Everglades restoration science, and sincerely hope that the findings and recommendations from their assessment will assist in furthering the mission of the South Florida Ecosystem Restoration Task Force.

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Attachment 1

Reviewer Comments

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Plan for Coordinating Science Phase I
Review

Reviewer: John W. Brawley, Ph.D.	Date Reviewed: September 20 – 21, 2005
Area of Expertise: Marine/estuarine systems ecology; submerged aquatic vegetation; ecosystems modeling.	

1. **Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

Answer to Question 1:
In general, I feel that the plan ultimately proposes a reasonable and useful approach. However, I feel that it could be improved by the following:

(1) Problem definition: the reader may not fully understand the problem(s) being addressed through the restoration and conservation activities that are repeatedly discussed in the document. The only place that the problem definition (i.e., that altered hydrology throughout South Florida has resulted in a series of undesirable ecological conditions) is illustrated is briefly on page 3 (Scope); page 10 (Florida Bay Science Needs, Gaps, and Actions – 3rd paragraph under Background); and on page 13 (Total System Science Needs, Gaps, and Actions – paragraph on Water Management). I feel that an overall summary of historical activities, whether anthropogenic or natural, is necessary to set the stage for providing justification of restoration planning and implementation.

(2) Conceptual Plan: the document may be improved by providing a few summary matrices, conceptual models, and/or simple tables that illustrate (a) primary topic areas (e.g., hydrology, salinity, nutrients, and so forth); (b) existing and planned programs that are providing scientific support in primary topic areas; and (c) the relative strengths, weaknesses, and omissions in coverage of these areas. In essence, a series of diagrams and matrix-type tables would assist in the visualization of where specific strengths and weaknesses exist in terms of the scientific needs associated with each example CEM. These visualizations can often provide tremendous help to accompanying text. Of course, it is acknowledged that this is Phase I, and therefore, the level of information needed to develop these summaries may not yet be synthesized.

2. **Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Answer to Question 2:

I believe that the employment of CEMs is absolutely necessary to this approach, particularly with respect to the derivation of system-wide indicators and measurable attributes. This approach is certainly one particular strength of the document. I think that introducing two of the twelve potential CEMs in this document for "test runs" of the process is interesting and useful. However, the plan becomes a partial summary of critical science needs, gaps, and actions that is biased towards the two CEMs (Florida Bay and Total System). This is not problematic if the others are to be integrated into the ultimate draft in Phase II.

I suggest the following as potential improvements:

(1) Identify the necessary set of expertise required for each CEM and, if possible, identify team leaders (if things have progressed that far).
(2) Develop a preliminary Gant Chart or illustrated schedule of expert team progress (could be inserted into sections dealing with tracking progress, etc.).

3. **Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

Answer to Question 3:

This is a difficult question to answer. It seems apparent to me that the critical science needs, gaps, and actions identified were limited to the two CEMs (Florida Bay and Total System). I've broken down my response into comments about each of the case/test studies:

(1) Florida Bay Science Needs, Gaps, and Actions

The background section could perhaps be improved by inserting a description of the current conditions; what is known about the current conditions that warrant restoration efforts?

The third paragraph does get into the running hypothesis that altered hydrological regimes across the land margin to Florida Bay **has** resulted in the following:

- Seagrass population less resistant to stress
- Loss of seagrass habitat
- Altered species composition and diversity of upper trophic levels of Florida Bay.

The following results are inferred as hypothesized:

- Progressive nutrient loading **may have** exacerbated the seagrass problems
- Changes in nutrient availability **may** also be related to the occurrence of blue-green algal blooms in the central basins and diatom blooms along the western margin
- These blooms (above) **may** affect the habitat quality and diversity of upper trophic levels of Florida Bay.

Thus, this infers that the "knowns" include causality between salinity and seagrass health, and subsequent responses at higher trophic levels; and the areas of uncertainty are the rates and effects of nutrient loading, including algal species composition changes and subsequent deleterious effects on higher trophic levels.

This section is divided into three subsections: salinity, water quality, and ecological effects. The callout box that identifies needs (p. 12) indicates three primary areas: salinity, water quality, and seagrass communities.

<u>Salinity</u>
In the salinity section, it seems that hydrological and hydrodynamic (H&H) models are currently being developed and are expected to be operational within the next year (as part of FB/FKFS). However, the discussion on science needs is somewhat unclear, other than bathymetric data on the mudflats is necessary to collect. I recommend highlighting, if possible, the status of the H&H

modeling efforts and pointing out, directly, the immediate needs and gaps associated with assessing historical, current, and future system physics and salinities as they pertain to ecological responses of interest.

Water Quality
This section could be slightly improved by providing an overview, or summary, of known changes in water quality in Florida Bay that goes beyond the general causal relationships that are currently written (e.g., the typical effects of nutrient loads to shallow marine environments). Another area that could use more description is that concerning how potential restoration activities may increase or decrease historical or existing nutrient delivery rates to various regions of Florida Bay. The text infers that restoration activities in the Everglades would increase nutrient loads to Florida Bay – if this is generally the case then it should probably be stated and why that would be important. This section points out that water quality modeling is currently a significant need. More specifics would bolster this section (what WQ constituents; why; what specific questions would modeling answer?)

Ecological Effects
I feel that this section may be focused too heavily on the comparison between mechanistic and statistical modeling in general. Although it is important to express this difference, it may be best to shorten this description/definition and increase description of the ecological effects that are associated with the restoration process. This section may be improved by providing more specific information on ecosystem responses to altered hydrology, the status of our knowledge on the associated relationships, and what is needed to provide sound scientific knowledge that will lead to sound management decisions. It seems that the callout box on p. 12 is focused on seagrass communities as a specific scientific need. Perhaps this section can elaborate more on specific seagrass ecosystem responses to both changes in hydrology (salinity and exchanges) and water quality (nutrient availability and light penetration).

General comments: The overview of existing programmatic activities on page 12 is very informative to the reader. However, the link between these programs and the actual scientific needs is not readily apparent. I recommend providing a matrix, table, or organizational chart that helps the reader connect each identified scientific need to existing and future program support. This may also aid in the identification and illustration of specific gap areas. The gap section is somewhat specific and concise (which is beneficial to the reader) and could be slightly improved by going a little further into linking the gaps to the three categories of needs shown on the top of page 12. The introduction of additional summary graphics (tables, matrices, and/or figures) might help organize the flow of (1) existing knowledge (cause/effect; CEMs), (2) scientific needs to support required management decisions, and (3) prioritized gaps.

(2) Total System Science Needs, Gaps, and Actions

- The background section is a great summary of the big picture and I recommend something like this to be developed for the document's Introduction section.

- Not sure that the callout boxes are necessary or consistently contextual (minor comment).

- Overall, the background descriptions of water management, land use, nutrients, and fragmentation are well written and concise. The only confusion is the term "spatial extent" which I think is very generic. I recommend considering

"ecosystem fragmentation" or simply "fragmentation". But perhaps the term has more significant historical/programmatic meaning than I realize.

- Total System Needs: The table/box is quite comprehensive. There are many interrelated system processes and associated science needs (as one would expect). Perhaps tabularizing and relating to the primary areas that are described in the Background section would help link needs to processes. Again, the link between the description of needs and the existing/planned program support could be improved with visual tools and more specific text.

4. **Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

Answer to Question 4:

Many of the comments in Answer #3 can pertain to this question.

General comment: I feel that there can be significant improvement in laying out the linkages between the identified needs/gaps/actions. It is acknowledged that both CEMs (Florida Bay and Total System) are supporting relatively large, diverse research and management activities. Pulling them out of the text and relating them visually (again, in figures and matrices) would really help the reader understand more clearly the direct links between the primary issues and remedies.

5. **Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of "filling the gaps" in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task Force for doing this.

Answer to Question 5:

Overall, as far as I can see, yes. The key, of course, is to provide any additional gaps in the actions such as Task Force review, and provide clear guidance on implementation. The identification and prioritization of ecosystem indicators is well defined in this document and I feel that indicator development should lead much of the research and management needs assessment. Therefore, this specific series of actions (related to system-wide indicators) should be an efficient way to filling the gaps.

NOTE – FOR Question 6 See page 46 of the specified GAO report

6. **Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).**

a. Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan

Answer to 6a:

This plan only focuses on two of the twelve potential regional study areas where CEMs have been reportedly developed. The overall coordination plan will likely emerge more strongly in Phase II if the remaining studies (and their CEMs) are adequately integrated. The test case of Florida Bay and Total System needs, gaps, and actions is a good start at this. However, improvements to the plan reside in more organizational efforts that assist the linkage between (1) CEM attributes, (2)

system-wide indicators, (3) existing knowledge (and modeling), and (4) necessary information (gaps). The plan focuses on providing support to existing programs, and this may be the level of detail necessary to fulfill the GAO concerns; however, I suspect that more process-specific information may be necessary. Much of this can be achieved by moderate improvements in the organization of information in the plan as I have indicated in Answers #3 and #4.

b. Establish a process to identify key resource management issues that need to be addressed by science planning

Answer to 6b:

The process described in the plan proposes a two-phased approach, of which this document is Phase I. I feel that more information is necessary to fulfill this GAO concern. The Phase I plan is focused on two regional CEMs only, and acknowledges that there are ten remaining. But complexity limits an overview of all twelve.

I think that the intent is to integrate all resource management issues and relevant science planning in Phase II. This requires a holistic approach (all regions, all programs, all necessary research/modeling) to make sure that additional, significant resource issues are adequately included.

c. Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis

Answer to 6c:

I feel that the plan does establish such a process and adequately describes the requirements associated with information sharing, quality protocols, and independent review. The sections of the plan that describe these processes is relatively strong. One issue, timely exchange of peer-reviewed data, remains problematic in the plan and this is where some additional creativity would improve the plan. Regional-specific journals, conferences (mentioned in the plan), and central data warehouses (electronic) are all appropriate methods for ensuring timely data exchange. In reality, there is significant uncertainty associated with data exchange (and quality!) and therefore, I feel that relying on an adaptive, innovative series of approaches is necessary. There is also the concept of diminishing return on data/information gathering efforts. At some point, decision-makers must rely on best professional judgment with respect to scientific uncertainty and the effort it requires to elucidate.

Additional Information that you feel will be helpful to the Task Force in completing their task:

Site-specific figures and ecosystem process diagrams associated with the two case studies would improve understanding and potentially aid in the authors' consistency.

Plan for Coordinating Science Phase I
Review

Reviewer: Jennifer Field, M.S.	Date Reviewed: Sept. 20-21, 2005
Area of Expertise: Biology	

1. **Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

Answer to Question 1:
In some ways, the plan appears to summarize what has already been identified in many RECOVER documents, meetings and scientific conferences as far as the science needs and data gaps are concerned. The approach taken to identifying these science needs and gaps appears to be reasonable, but the coordination piece still seems to be missing. The title of the document leads one to believe that this document will present a plan describing how the various agencies will interact to address the science issues, not just identify them. The plan would essentially provide a blueprint for defining which agencies would be accountable for addressing which science issues and how those agencies would communicate/inform other agencies. There is no description in this plan of how the agencies will work together actually make management decisions. The roles of the various agencies need to be spelled out explicitly as to how they will interact and communicate and be held accountable for the science component so that all agencies involved in the restoration effort operate as a unified group. This document is a good first step, a base to build upon. The approach needs to include more accountability and mechanisms of interaction. The document should describe the approach, the results and the specifics of HOW the agencies intend to address the data needs and gaps.

2. **Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Answer to Question 2:
I do think that the method of using the RECOVER CEMs is a good approach to understanding and defining the science needs and gaps, but there does not appear to be an adequate discussion of how these CEMs are used to coordinate actions among agencies. It might be beneficial to not only describe the needs and gaps identified in each of the CEMs, but discuss how these needs and gaps fit into the goals and subgoals of the Task Force. A clear "big picture" discussion of how the various CEMs address the Goal of "getting the water right" (goal 1), "restoring, preserving and protecting natural habitats and species" (goal 2) and "fostering the compatibility of the built and natural systems" (goal 3) should be included early in the document. Although this information is somewhat implicit in the document, it needs to be <u>explicitly</u> stated early to provide context before leading into a more detailed approach and methodology of the plan for coordinating science.

3. **Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

Answer to Question 3:
I'm not sure I understand what this question is trying to ask, but looking at the Florida Bay and Total Systems CEMs only, it does appear that the needs and gaps listed are real and that scientists

need to better understand them to evaluate restoration activities. I do, however, think the actions need to be more fully described, particularly in terms of how they will impact the restoration progress. In addition to evaluating needs and gaps on a CEM by CEM basis, this plan should also consider one critical overarching issue in all restoration activities and that is the concept of uncertainty. This plan needs to address how uncertainties at many different scales will be dealt with, (i.e., how will uncertainty be accounted for and by whom etc.). Intricately tied to the issue of uncertainty is the use of models and how decisions will be made based on use of models and the inherent uncertainties in these activities. Many of the goals and targets specific to CERP are based on modeled results. Some "rules" need to be developed to address how these results will be reviewed by the various agencies and how they will be used to make management decisions. This will, perhaps, be the biggest hurdle for the Task Force but is of utmost importance. This plan must discuss approaches for evaluating uncertainty and making management decisions based on those uncertainties. It will be key that the scientists explain the concepts of uncertainty to managers and policy makers who are often uncomfortable with the topic. Perhaps using examples of uncertainty in similar policy decisions and how it was addressed (be they restoration activities or other non-science activities) could be incorporated into the document.

In the Science Applications sections of this plan, there is a discussion of developing indicators of restoration success. This section needs careful consideration and will need to include "rules" or actions for when performance measures or goals for various indicators are not met. It is often incorrect to assume that if various indicators are not met that the restoration effort is not working. This concept needs to be carefully explained and some process/protocols for addressing these issues when they arise must be presented.

4. **Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

Answer to Question 4:
Based on the two CEMs presented and the discussion of the CEMs, the needs were generally straight forward. The gaps were stated, but I think there is a need for more discussion of these gaps, including detailed discussion of uncertainties associated with each gap. The actions were not always clear. For example, for the Florida Bay CEM, three gaps are identified and the action is to "review" model progress and several science plans. There needs to be some description of How the review of these plans addresses the gaps. The actions need to be clearly stated as to who (which agency) should do what. Some are going to be easier to explain and address than others. It will be important for the authors to pay attention to consistency and provide same level of detail for all discussions of needs, gaps, actions. Develop a format to use for addressing each and stick with it.

I found the Science Applications section, 3.3.1.2, more difficult to follow. I was confused by the need to develop conceptual ecological models for all South Florida subregions. How is this different from the Conceptual Ecological Models presented earlier? The Science Applications Actions do seem more clear than some of the earlier actions. For the actions involving the design and implementation of indicators and restoration endpoints, the Task Force should consider reviewing the input received on the CERP Interim Goals and Interim Targets documents by several outside peer reviewers. These reviewers provided input on many issues they should address.

5. **Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of "filling the gaps" in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task

Force for doing this.

Answer to Question 5:
No. I think it needs to be explicitly stated that Agency X and Agency Y will address actions a, b and c. This is how Agency X and Y will do so, and this is how they will report the information, use the information to make decisions etc. To persuade the various agencies to step up to the plate, so to speak, it might be beneficial to remind them of their agencies respective strategic goals, objectives and sub-objectives and point out how addressing these gaps actually ties to their goals and objectives. It will be important to get a commitment from the various agencies and describe this in the plan as to what they will be contributing, how they will be communicating and interacting with the other agencies, etc.

NOTE – FOR Question 6 See page 46 of the specified GAO report

6. **Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).**

a. Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan

Answer to 6a:
This is a good first step, but the Task Force needs to build upon it, detail it and really take into consideration how to implement these approaches and protocols – e.g., how the agencies need to interact – the steps that will be necessary to make it happen – a work plan or business plan. This plan presents the approach to identifying key science information needs and gaps, but it doesn't go into sufficient detail to explain how those needs and gaps will be addressed.

This plan does not present a comprehensive monitoring plan but will do so in Phase 2. This monitoring plan should describe the process of how the information from existing monitoring plans will be used as well as lay out a framework for additional monitoring if warranted. The Phase 2 document will need to detail how the various agencies conducting monitoring will need to interact.

The progress reports will also need to be addressed in Phase 2 and should detail what will be presented in these reports, how the information will be gathered to create them, how often, who will create them etc.

b. Establish a process to identify key resource management issues that need to be addressed by science planning

Answer to 6b:
The process identifying key resource management issues is not presented in detail in this phase of the plan, but will need to be included in Phase 2. The Task Force may need to define the roles for the various organizations, define staff level of effort, draft flow charts at different scales to present organizational structure, reporting/communication structure, work breakdown structure, etc. The task force needs to be thinking in terms of developing a "business plan" for how they will coordinate the science of this restoration effort.

c. Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis

Answer to 6c:

Identification and implementation of methods or processes to ensure that the SCG, Working Group and Task Force develop sound justifiable priorities for science issues is to some extent presented in this document (approach to identifying needs and gaps), but more in-depth discussion of how the SCG, Working Group and Task Force will actually address the needs and gaps is critical. The discussion on Quality Protocols and Independent reviews needs to be more specific (when it will appoint peer review panels, how it will select peer reviewers etc.) and incorporated into the "actions" to address needs and data gaps.
Additional Information that you feel will be helpful to the Task Force in completing their task:

Plan for Coordinating Science Phase I
Review

Reviewer: Carlton D. Hunt, Ph.D.	Date Reviewed: September 15 - 21, 2005
Area of Expertise: Science management, Program management, Ecosystems	

1. **Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

Answer to Question 1:
I began this review by reading the March 2003 GAO summary findings and recommendations for executive action, then read the review questions, then read and reread the "Plan for Coordinating Science, and finally revisited the GAO summary and recommendations. Based on the document title and the GAO findings and recommendations, I expected to review a plan that laid out the wherefores (i.e., who, what, when, and how) for coordinating the restoration science in this complex region. Unfortunately, the present Phase I document only goes a short way towards conveying a coordination plan and only partially addresses the issues raised by the GAO. The authors recognize this in part through the plan to complete Phase II. However, the concepts listed for attention in the Phase II document (page iv and p2) do not go to the crux of the GAO findings. Thus, I find this document lacking as a plan. Rather it is a technical report on an evaluation of a process for needs and gap analysis.

That said, what does this document do? It clearly recognizes the need for science coordination that ensures production of quality and comparable science results and sharing of results across the many programs being implemented in south Florida. It also recognizes the need for both data and program adequacy to support sound decision making within and across restoration programs in south Florida and recognizes key issues that must be dealt with for successful use of the science. Recognized issues include developing sound science, providing sound frameworks for the science programs, needs and gap analysis, ensuring data quality and comparability, and tracking and reporting progress.

As written, the document is underpinned by the assumption that understanding science gaps and being able to fill them is the critical need for restoration coordination in the region. These needs are clearly identified as an important issue that must be addressed in paragraph 2 of the GAO summary findings. This is the focus of the information conveyed in the document and appears to be the major element of coordination. As such the document goes a long way towards addressing and filling this need. However, the document does not address what I consider the critical concerns in the GAO report.

Specifically, the GAO findings summary state "*The Task Force is responsible for coordinating scientific activities for restoration, but has yet to establish an effective means of doing so, thereby limiting extent to which restoration decision can be based on sound scientific information*" and "*The Task force established the SCT to coordinate the scientific activities of many agencies involved in restoration, but it did not give the SCT clear direction on which of the responsibilities were a priority for supporting the Task force, …*". Moreover, the GAO indicates "*Without first clarifying the responsibilities of the SCT and then providing it with sufficient resources to accomplish thee responsibilities, the Task Force cannot ensure that scientific activities are being adequately coordinated, or that the key scientific information is available for restoration decisions*".

Nowhere in the document are these identified critical needs acknowledged, nor are they addressed directly or indirectly by citation of Task Force directives or other management actions taken to ensure restoration coordination and communication. The closest the document comes to directly addressing the first GAO concern is to convey that the Task Force replaced the Science Coordination Team (SCT) with the Science Coordination Group (SCG) in 2003. However, the document does not convey the charge given to the SCG nor explain the charge, processes, expectations, deliverables, nor schedule for the committee. Had such information been included in the document it would have been easier to judge whether the document meets Task force goals and objectives and whether the Task Force is being responsive to the GAO findings.

As presented, the information in the document only goes part of the way towards addressing the critical coordination needs and certainly does not constitute a coordination plan. Rather, the document only addresses the needs and gap analysis process, and only acknowledges the need for additional work to implement the results through 1) completion of the needs and gap identification process, 2) determine additional essential coordination actions, and 3) identify process for ensuring quality science. As such, the document only delays addressing the critical issues identified in the GAO report, especially those actions need under 2).

While it is not necessarily wrong to approach the problem from needs and gaps perspective, this approach does not get at the heart of the GAO concerns which are most embodied in the recommendations for executive action on p46 of the GAO document which are to:

- Specify the plans and documents that the SCT (now SCG) needs to complete and the time frames for completing them
- Establish a process that ensures the Task Force identifies key management issues that need to be addressed by science planning
- Establish a process, to ensure that the SCT (now SCG), Working Group, and task Force prioritize issues that require synthesis and are critical to restoration decisions
- Evaluate SCT's (now SCG) current staffing needs and allocate sufficient staff, including full time management staff, to the SCT so that it can carry out its responsibilities.

The document is strongest in its development and testing of a two pronged approach (process) for system wide science needs and gap identification. Based on the outcomes from this test approach, addressing the coordination from both a cause-effect understanding and from a science and management expertise perspective to identify science applications holes, the approach appears to have merit. The approach was able to apply a previously developed and demonstrated approach (i.e., conceptual models) from RECOVER to the entire system to identify research, monitoring and modeling issues related to cause effect and science applications gaps (defined in the document as the need to synthesize and communicate findings). As such the document conveys, but in an imprecise manner, a reasonable and useful process that can assist coordination of the larger science picture among the agencies represented on the Task Force. However, as indicated previously it fails to deal directly with the coordination process.

From format and editorial perspectives, the document would gain credibility if it presented the larger coordination approach the Task Force will follow (if it has been defined), document why the gaps analysis was the highest priority coordination action, and describe the process and outcomes of the pilot testing. The details of the process and findings of the approach tested (nearly 15 of the 26 pages) could have been provided as an appendix, enabling the authors to focus on the coordination aspects such as what went right and what went wrong in the implementation of the

process to ensure the future efforts to be conducted under Phase II are implemented more effectively.

From a content perspective, the document could be improved and be more responsive to the GAO findings and recommendations by addressing specific elements of coordination (what, how, who, schedule, documentation, decision making processes, accountabilities, authorities, roles and responsibilities, communication processes and requirements, etc.) including:

- A better definition of the problem faced by the agencies (what are the issues and barriers to coordination; what can be gained from better coordination, what might be lost from an agency perspective)
- An analysis of resource constraints and needs and why; ways to address the constraints and the implications of not removing constraints to coordination
- A statement of coordination expectations at the Task Force level and expectations of those charged with coordinating the science (e.g., job performance Goals)
- Organization and communication strategies
- More specific action items, next steps, deliverables, and a schedule for implementing these.

Returning to the expectation that is set up by the title of the document "*Plan for Coordinating Science*" and my assessment that this document does not constitute a plan, the Task Force needs to address the processes for coordination, management, communication, planning, consensus building, priority setting, and integration of activities so the whole is greater than the sum of its parts. Technically, the science outcomes provided in the document are more naturally the result of the coordination, not the process of coordination.

Assuming the goal of the science coordination is to make a unified whole that works together, the document is weak on the necessary actions to bring individual agency contributions to a common place for assignment and discussion of ways to address science needs and gaps. In some ways, the needs and gap analysis is getting the cart before the horse; on-the-other hand one must start somewhere and this as good as any as long as the other coordination activities and demands are addressed in a formal manner.

There are also some nomenclature inconsistencies in the document that suggest the authors were not well focused on what was needed by the Task Force. For example, the title conveys that the document is a plan for science coordination, yet on page 2 it is called a science plan. These are two distinct concepts: one goes to management, the other to what needs to be done scientifically. Since the document tries to address both, it becomes confusing in its intent and layout. Is it to define a coordination process or to define the science that needs to be coordinated? It does neither effectively.

It is clear from the GAO report and this response document than much work remains for a clear conveyance of the processes for coordination (by definition coordination is a transitive verb to organize a complex enterprise in which numerous people are involved and bring their contributions together to form a unified whole) and assignment of actions that ensures the contributing agencies will pick-up, implement, and complete assigned activities. It is one thing to contribute data from ongoing programs to the whole; it is quite another to modify programmatic direction or add a new program to meet the system wide data needs. I think the latter is what the GAO was looking for improvement. The necessary activities and agreements to make this happen are missing from this document.

A start is made in the call out box on p9 that identifies six coordination action items. However, the document does not follow-up on these actions nor indicate where and how these important actions will be addressed, and only includes vague statements concerning the content of the Phase II document. Importantly the summary in Section 3.3.3 cuts to the heart of many these coordination issues, yet these actions find their way to the executive summary only in part. This makes the detailed reader question the authors overall understanding of the intent of the document and what is important to convey to decision makers.

The document would be improved greatly if the key themes and points were better identified up front and the document organized to address these themes head on. As written, this is technical report that only addresses GAO recommendations in part and does not provide the type and level of information necessary for agency managers and administrators to use in their planning and negotiations for resources.

2. **Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Answer to Question 2:
First, I am not so sure this is a non-traditional approach to coordinating science as much as having a more formal mechanism to ensure agencies to work together and identify the processes necessary to ensure value added, complementary science and over come barriers to working together to ensure success of the restoration and to communicate to the public, regulators, and legislators. I am aware of many large programs that rely on a CEMs approach and expert teams to identify science needs. The key is to ensure the interest and commitments are sustained over the life of the program and that sufficient flexibility is built into the coordination to enable response to the unforeseen events or responses or uneducated critic who does not see value in the restoration.

Second, I think the use of conceptual models to address goals and identify data gaps, science needs, and coordination actions are an essential step in the overall planning and coordination process for any scientific endeavor, especially large regional programs. Conceptualization based on the most up-to-date understanding of a system's functions and processes and sound scientific principles is a key element of the scientific method and fits well with developing data quality objectives and monitoring program design as is documented in numerous papers and federal guidance documents.

The major improvement I would impose on the science coordination process being developed is to better articulate the problem(s) being addressed at the system level, and to the extent possible, define critical questions that must be addressed to ensure restoration is having the desired outcome(s). As such, I think development of reliable indicators and performance measures that address trends and the strength of stressors and also ecological/physical/biological response(s) is critical to the process. I also think there are many unaddressed issues around the scale of the problem and placing boundaries (time, space, parameters, and variability) on the program to ensure data gathered is the most relevant and informative.

3. **Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

Answer to Question 3:
The identified gaps appear to be relevant and important. However, given that only two cases were

tested in the approach, much work remains. Moreover, without a clear articulation of the system wide restoration goals, it is difficult to state unequivocally the relevance of the identified gaps. As indicted in the answers to the previous questions, the document tends to address science issues and conducts problem solving rather than developing and articulating a plan to coordinate the science that ensures the most appropriate and complete data is generated.

4. **Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

Answer to Question 4:
To the extent that the discussion in the document is complete and accurate, the present of needs and gaps are clear. Less clear are the remedies, assuming the actions are meant to be the remedies. If not, then the document needs to address what is meant by remedies, as the term is not used in or the focus of the document. For example, on p13, an action for Florida Bay is identified. The action is to review progress on a model, implementation of the CERP MAP for the southern estuaries, and FBAMS strategic science plan. The key action word is "review", but that is where the coordination appears to stop. Who does the review? How often? What happens if the review finds the MAP defined southern estuaries monitoring is not being implemented as described in MAP? Who has the responsibility to ensure commitments are honored, to ensure funding short falls are addressed, that program reductions may be ok?

The actions (remedies?) on p17 are somewhat better defined as one action points to working with implementing organizations (it is assumed to be the Task Force) but what authority does the Task Force have to ensure commitments are honored? Also, what is the nature of the problem requiring action? What types of issues need attention: funding, coordination, inconsistent science results, expected responses are not occurring, etc.?

I suggest that when a need/gap analyses defines a set of actions, make a clear statement of the response requirements with assignment of responsibility and expectations (what, when, deliverables) for follow-up to ensure the appropriate response and remedies are developed.

5. **Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of "filling the gaps" in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task Force for doing this.

Answer to Question 5:
I see no reason that the actions in the plan would not help move overall coordination and commitments forward. Thus, many of the actions may help the process of addressing gaps. However, follow-up and setting expectations for agency follow-up and commitment will greatly influence the response from agencies. Part of the coordination plan will be clear communication of the issues (why it is important to address, why an agency should participate [by whatever means it can]), and getting commitments from the agencies will be as important as an action list. The coordination plan must address communications head on and completely. How will the Task Force ensure the agencies are aware of the needs? What authority does it have to facilitate and work towards commitment and consensus on whom and how to address the needs?

I do not believe that an attitude that says show the agencies the problem and they will respond is realistic. Rather hard, consistent work under a set of agreements and operating principles, policies, and responsibilities will be required for the Task Force to achieve its charge of meeting critical

system wide science needs and coordination. This will require agency commitment and flexibility to work together, dedicate staff, and defined processes. If this has not been accomplished yet (the document is not clear in this area), it needs to be made a high priority.

NOTE – FOR Question 6 See page 46 of the specified GAO report

6. **Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).**
   a. *Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan*

Answer to 6a:
First, the above statement appears to be a rewording of the GAO recommendation. The GAO report I received recommends that "*plans and documents ..-…- that the SCT needs to complete and time frames for completing them"* be specified (to include a science plan that focuses on information gaps, a comprehensive monitoring plan, and progress reports). The "Plan for Coordinating Science" reviewed does not address this directly (no plans and documents specified or schedule included). The document focuses primarily on identifying science gaps, not what must be done for coordination. See also the answer to question 1.

   b. *Establish a process to identify key resource management issues that need to be addressed by science planning*

Answer to 6b:
The document does establish a process and tests it through application to two CEMs in southern Florida. However, the process is hard to find in the document and needs to be brought out succinctly in future documents for better implementation. Specifics of the process are minimally described in the document, which focuses on the outcomes of the process piloted.

   c. *Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis*

Answer to 6c:
The above recommendation appears to be a rewording of the GAO recommendation, which says "*establish a process to ensure … prioritize issues that require synthesis and are critical to restoration decisions*". I believe the Task Force has tried to address prioritization by naming the SCG and developing the needs and gap analysis process included in the document.

The document does not, however, address the independent science review committee suggested by the GAO, so it is not possible to judge on the basis of the materials received for this review if this recommendation has been addressed fully. It is unclear how independent reviews will be conducted to ensure the work of the Task Force and its subcommittees remain focused and on target.

Additional Information that you feel will be helpful to the Task Force in completing their task:
The document also does not address the fourth GAO recommendation to evaluate and staffing needs and allocate resources to support the effort. This is a critical issue that one hopes is being addressed within the Task Force. If I were the GAO and did not see this recommendation addressed directly, I would give pause as to the seriousness that the Task Force takes GAO recommendations, which could have down stream resource implications.

My main input here is for the Task Force and SCG to focus on the coordination issues in one document and science in other documents. Also to develop a plan that deals with who, what, when, how, communications and decision-making; hard to do but critical to long-term success. Mixing two or three themes into a report without clear articulation of the content of the report results in fuzzy documents that are not focused and satisfying.

Plan for Coordinating Science Phase I
Review

Reviewer: Norman Richardson, M.S.	Date Reviewed: 21 September 2005
Area of Expertise: Ecological Risk Assessment, Ecosystem Stressor/Response Analysis	

1. **Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

Answer to Question 1: Yes, the general approach identified in Section 3 is a comprehensive and reasonable approach. Although a broad understanding of management goals has been a critical element of the strategic planning process, continued review of these goals is necessary to ensure that developing science activities and management questions are continually aligned and if not, that corrective actions are taken to affect realignment. This feedback process should be made as explicit as possible.

2. **Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Answer to Question 2: The use of CEMs provides a comprehensive approach to representing the current understanding of the linkages between key resources and anthropogenic activities and other factors that may adversely impact them. The stressor-response model has proven to be an effective conceptual tool for other large ecosystems including the national estuaries program. Given the incomplete understanding of the complexity of interactions at the ecosystem level, concerns will remain that failure to recognize or fully appreciate one or more environmental stressors (acting solely or in concert) could result in a failure to properly design restoration efforts. Continued consideration of this by the Task Force (including expert teams) and, where possible, validation of the dominant role of identified stressors (e.g., phosphate mesocosm research studies), evaluation of initial monitoring results, and development of more refined modeling techniques will improve chances for achieving program goals.

It would also be worthwhile to consider a further formalization of the process of identifying prospective science needs based on CEMs. Decision analytic techniques (e.g., Multiple Attribute Analysis, Multiple Criteria Decision Analysis) represent an improvement over qualitative ranking procedures by explicitly quantifying the uncertainty attributable to individual factors as related to goal attainment. Relative ranking of uncertainties of individual stressors (or interaction between combinations of factors) is a useful approach to prioritizing research needs; the analyses can be repeated at appropriate intervals as the scientific information base develops and research needs reprioritized accordingly.

3. **Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

Answer to Question 3: The identified needs for research, monitoring, modeling and science applications are for the most part comprehensive and pertinent. However, the identified gaps and actions for the Florida Bay and Total System are currently presented so generally that it would be difficult to systematically catalogue, comprehensively evaluate, and prioritize the individual

research needs within and among study areas. Recognizing that this is likely to be a focus of Phase II, additional discussion on how this process will be implemented would be beneficial, particularly by making more explicit how the specific steps and responsible agencies will be identified (and conflicts resolved) so that identified information gaps are addressed. Discussion on how the Task Force will help promote better inter-agency coordination at the operational level would be of value as well.

The GAO study also identified the incomplete understanding of the impacts of fertilizers and pesticides on exposed plants and animals as a significant science knowledge gap. This concern should be directly referenced as a critical need where applicable (e.g., Florida Bay).

4. **Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

Answer to Question 4: See comments on Question 3 above. As a key process element, further explication of how efforts to address identified information gaps will be coordinated across involved agencies would be helpful (the Phase II will contain "additional essential coordination actions"). Phase I identified 5 research, modeling, and monitoring gaps and 2 scientific application gaps that require a coordinated response at the Task Force level. Specific discussion on how consensus on prioritized information gaps and proposed actions to fill those gaps will be achieved is warranted.

When implemented, actions described in Section 3.3.2 (including development of system-wide quality protocols, process to ensure timely communication of information and evaluating progress against performance metrics and incorporating "lessons learned") should effectively improve the process of ensuring quality science.

5. **Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of "filling the gaps" in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task Force for doing this.

Answer to Question 5: Although the identified action items are important and reasonable, the generality of some, the lack of explicit linkage to specific needs, and the failure to prioritize individual actions would appear to make more difficult the process of inter-agency coordination. Recognizing that the Phase II document will provide substantially more details on the process, every effort to make explicit the consensus-derived research, modeling, and monitoring priorities and establish the linkages with specific actions steps will be valuable.

In addition, a goal of these documents should be to make the coordination process as transparent and explicit as possible so that scientific efforts are conducted as efficiently as possible with minimal duplication of effort.

NOTE – FOR Question 6 See page 46 of the specified GAO report

6. **Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).**
   a. *Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan*

Answer to 6a: Phase I presents a general approach that addresses a majority of the concerns raised by the GAO with Phase II intended to provide a full exposition of information needs and gaps along with further specification of essential coordination and quality assurance components. Emphasis of the need for the development of system-wide indicators and restoration endpoints

(including performance endpoints) is good.

The document should more fully specify how a comprehensive monitoring plan (including projects not covered in the RECOVER MAP) would be structured; this is acknowledged as a "Total System Gap" but is left vague in the initial actions. Further development of the process of adaptive management (including periodic appraisal, responsibilities, and corrective action processes) and how it will be specifically implemented, in addition to the elements, will be beneficial. A more quantitative approach for identifying key science information gaps is also recommended to minimize the likelihood of not recognizing important state variables or interactions.

b. Establish a process to identify key resource management issues that need to be addressed by science planning

Answer to 6b: Further plan development is recommended to address this GAO concern (see response to Question 1 above). While the document acknowledges the seminal role of management decision making, success in achieving strategic objectives would be improved by establishing an explicit process where management objectives are regularly reviewed in the context of the developing scientific understanding of processes and corrective actions taken as necessary. Additional opportunities for interaction and understanding between resource managers and scientific experts would be beneficial where a consensual understanding between the questions of interest to resource managers and the kinds of answers the current state of the science can provide is developed.

c. Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis

Answer to 6c: Further plan development is recommended to address this GAO concern - particularly with respect to how strategic objectives will be met given the operational constraints and mission differences among the various agencies involved. The establishment of an independent scientific review panel charged with review and execution of necessary corrective actions where necessary (as identified as a specific "Quality Protocols& Independent Reviews Needs) will be an important component of the overall approach. Additional details that clarify the role, composition, authority of this panel would be helpful. Provisions for tracking progress and plan update are good.

Additional Information that you feel will be helpful to the Task Force in completing their task:

Plan for Coordinating Science Phase I
Review

Reviewer: Ron M. Thom, Ph.D.	Date Reviewed: 19-23 September 2005
Area of Expertise: Coastal and estuarine ecosystem restoration; seagrasses; wetlands	

1. **Do you feel that the plan employs a reasonable and useful approach for helping to coordinate the larger science picture among the agencies represented on the Task Force?** If not could you please explain why and provide suggestions for ways we might be able to better coordinate these big picture science issues?

Answer to Question 1: The plan makes sense, but implementation may be encumbered by the fact that so many entities are involved. Each entity has their own priorities, agendas, and demands on time, and expertise. I have found that agencies will commit initially to a task, but must back out because of funding or time constraints, or a change in the mission of their organization. The Task Force will have to develop formal agreements, with specific assigned tasks, with each agency to better assure that the tasks are completed. The Task Force should consider contingencies that if an agency does have to back out of their commitments. It was a little vague as to how the coordination will be implemented in order to facilitate coordination toward management of the program. How and when will the Task Force receive data, evaluate the data and make decisions? A simple framework would be useful. A diagram of this framework would be useful to put in the report.

2. **Given the non-traditional nature of this approach to coordinating science do you feel that the method of using the RECOVER Conceptual Ecological Models with expert teams to identify "critical science needs, gaps and actions" is a good one and appropriate to our goals?** If so do you have any suggestions for improving the process? If not how would you do this?

Answer to Question 2: The CEMs are the right approach. They organize the collective understanding in one simple, explicit set of diagrams. They can be updated when new results arrive, and they form a basis for the gap analysis. They also can be used to select monitoring metrics. I wondered about how the gap analysis was actually done, especially with so many agencies involved. How was the inevitable bias dealt with? Seems like one could organize the restoration goals relative to the factors affecting the ecosystem and come up with a set of data needs. I recommend a statement regarding the process of determining gaps. Other programs could benefit from this approach.

A major issue with any large restoration program is where to invest in the various restoration strategies. For example, how will sites be prioritized for restoration, preservation, and conservation? Where is this prioritization process explained? This is important because there will be competing interests for actions among agencies and other entities. The prioritization should be as objective as possible and ideally provide the best results for the least costs. I recommend a section on the prioritization process, and how the Task Force will feed research into this process.

3. **Are the critical science needs, gaps and actions we identified pertinent to the issues of restoration based on what information is currently available?** If not what needs and gaps do you believe are missing, or what restoration issues are not being considered?

Answer to Question 3: In general, I think that the needs, gaps and actions are pertinent. For this system, hydrology is the key factor that should form the central focus for restoration. Getting the

hydrology correct is critical. For Florida Bay, I understand that there is controversy regarding whether the problem is salinity or nutrient delivery. There is uncertainty associated with each point of view. I suspect both hypotheses are partially correct. I wondered what role natural climatic events, disease, and the top down influence of fishing pressure played in the seagrass dynamics. I did not see these types of issues explicitly addressed, so I wondered if they were seriously discussed. The document was a little light in some technical details. I recommend that citations to key reports or literature be added as an appendix or as a Bibliography.

The Total System needs analysis appears comprehensive and relevant.

The indicators are a critical part of this program. The Task Force should focus on developing a small, robust set of key ecosystem health indicators. The indicators should provide a clear measure of how well the restoration is doing relative to the stated goals of the program. As a first cut, the Task Force should consider following national guidance (National Research Council. 2000. Ecological indicators for the Nation. National Academy Press, Washington, D.C.). The ecosystem restoration in south Florida is unprecedented, and is a prime opportunity to evaluate the utility and effectiveness of indicators. This will inform other programs.

4. **Are the identified needs, gaps and actions unambiguous and the remedies clear?** If not, how do you think we could make them so?

Answer to Question 4: These are somewhat vague. The Task Force and the SGC have a lot to do. Statements like “”…the SCG will establish systematic processes for tracking progress.” leaves one wondering what they will come up with. I would like more specifics.

Information sharing is, in particular, a key issue. Web-based mechanisms to input and access data can be effective if user friendly and up to date.

A broader issue, the RECOVER Program will be conducted in an adaptive management framework. I did not see this framework specifically laid out in this plan. This should be explicit. It should be clear how research and monitoring inform restoration. The AM plan could indicate a “Science Coordination” component. This plan would detail that component. The AM framework forms a roadmap for the program, and identifies where science coordination fits in the overall program.

5. **Would the actions recommended in this plan help the Task Force coordinate and persuade agencies of the importance of “filling the gaps” in the critical science needs?** If not, would you tell us why you think it would not and offer your suggestions to the Task Force for doing this.

Answer to Question 5: In general, the actions may not be compelling enough to persuade agencies. A section should be added that identifies the key benefits for participating in the program. As mentioned under question 1, agencies have varying agendas and missions, that themselves may change. The agencies need a compelling “hook”. There should be a clear indication regarding how cooperative and active participation help each agency fulfill its mission. This can come from the Governor directly in the form of a directive or in the form of a reorganization of the participating agencies. Because state, federal and local agencies are involved, some coalition of state federal and local directors may be required.

NOTE – FOR Question 6 See page 46 of the specified GAO report
6. **Does this plan address the concerns expressed by the GAO in their March 2003 report? (GAO-03-345 –** please refer to the GAO document for additional details**).** *a. Development of a science plan focused on key science information gaps, a comprehensive monitoring plan, and progress reports for each plan*
Answer to 6a: The plan generally addresses all of the recommendations from the GAO, but lacks specifics. Some of the specifics are addressed in responses to previous questions.
b. Establish a process to identify key resource management issues that need to be addressed by science planning
Answer to 6b: Yes, the plan does do this.
c. Identify and implement methods or processes (e.g. Establish Independent Scientific Review Committee) to ensure that the SCG, Working Group, and Task Force develop sound and justifiable priorities for science issues that are critical to restoration decisions including those that require synthesis or meta-analysis
Answer to 6c: I recommend that the actual specifics of the process be detailed. There are few timelines, and there are no specifics on staff commitments. No mention of meta-analysis.
Additional Information that you feel will be helpful to the Task Force in completing their task: