

## **7.0 SYSTEM-WIDE PERFORMANCE ASSESSMENT**

The purpose of this section is to describe the synthesis of findings across modules and across years to provide a holistic description of the status of the system and interpret the results relative to supporting system-level hypotheses and meeting IG/IT. It is at this point that a summary is prepared of those changes that are consistent with goals and hypotheses and those that are not. If necessary, a scientific explanation should be provided as to why the goals and hypotheses are not being achieved (see Section 7.2).

### **7.1 Across-Module Integration of Performance Measures**

The integration of information across modules to provide a system-wide synthesis of the information and an evaluation of CERP progress presents conceptual and analytical challenges to completing the system-wide assessments. Consequently, this initial guidance will focus on framing the appropriate questions and process for approaching system-level synthesis. This process begins with a clear definition of the system-level goals and expectations for the restoration as defined by CERP. The Technical Assessment and Reporting Timelines section of this guidance (Section 8.0) outlines a reporting structure that is hierarchal in scale and integration culminates in a system-wide synthesis of information. The minimum reporting requirements provide general guidance on what is to be expected at each level of reporting but do not provide clear strategy and process for identifying the goals and expectations for the assessment process at each level or scale (e.g., PI, Module, and System). This is particularly difficult at the system-level which is where we will focus the following discussion.

The primary question is “How do we want to characterize “system-wide” success?” To do this requires identifying those physical, chemical, and ecological attributes that are critical to measuring restoration success at the system level and which will be reported to the Public and Congress as the keys to assessing the success of the restoration. However, this level of aggregation and synthesis must be coupled to the actual scientific assessments in a meaningful and transparent manner.

For example, one of the defining characteristics of the pre-drainage Everglades was the wide and expansive populations of wading birds. For purposes of illustration let us assume that the restoration of the wading bird populations is one of the system level goals of the restoration and that both the public and Congress are expecting to know how the program is progressing towards that goal. This goal has then been translated, scientifically, to one of the dominant hypothesis-clusters for the Greater Everglades Module where most of the actual research will be conducted. Consequently, a system-wide assessment of this “defining characteristic” will rely heavily on the results from the Greater Everglades Module with additional relevant information from other modules.

The System Level assessment of the status and condition of wading birds will then be a compilation of the quantitative results reported by the Greater Everglades Module along with other relevant information from the modules and the literature to provide an overall assessment that illumines our current understanding of how well we are moving toward

System-wide goals associated with this attribute in a general, semi-quantitative manner. The following are some recommendations that might prove useful in assessing the interface among multiple modules. First, identify the points of interface and interconnections and overlap between modules, or the effects of changes in one module on another (e.g. Greater Everglades effects on Southern Estuaries). These inter-module connections should be identified in advance of the synthesis to facilitate the synthesis. Second, highlight successes and when possible link them to an IG and the defining attributes not as statements of fact but as inferences that remain to be verified as the program continues. Third, identify emerging issues: those relevant to the validity of our hypotheses; and, those issues that are totally unanticipated and require attention.

Interconnections among modules should be placed in the context of the overall restoration effort and articulated by the module level hypotheses, IGs, or the system-wide “defining characteristics” of the pre-drainage Everglades. This implies a “hierarchy” for the reporting presented in the Reporting and Timelines Section. As the process moves through the hierarchy, it decreases in analytical robustness, i.e. the models may progress as far as the Module Group individual hypothesis clusters (e.g., intermediate scale) but not much beyond.

However, one approach for addressing our current analytical limitations is to use the “defining characteristics” as the highest level and then identify those critical system-level structures and processes that are necessary to move the system trajectory closer to the pre-drainage condition for each of the defining characteristics identified in the Total System CEM (Ogden et al. 2005). Using this as a point of departure, identify all the lines of evidence needed to evaluate the defining characteristic or the IG. Then identify which modules are contributing this information. This will determine the points of interface and connection between the modules that will be used in a synthesis statement for that defining characteristic. We can also “weigh” the relative importance of the lines of evidence as part of the synthesis to make it more robust. This approach obviates the need for a traditional analysis framework or models but does present a “transparent” process for reaching conclusions at the system level.

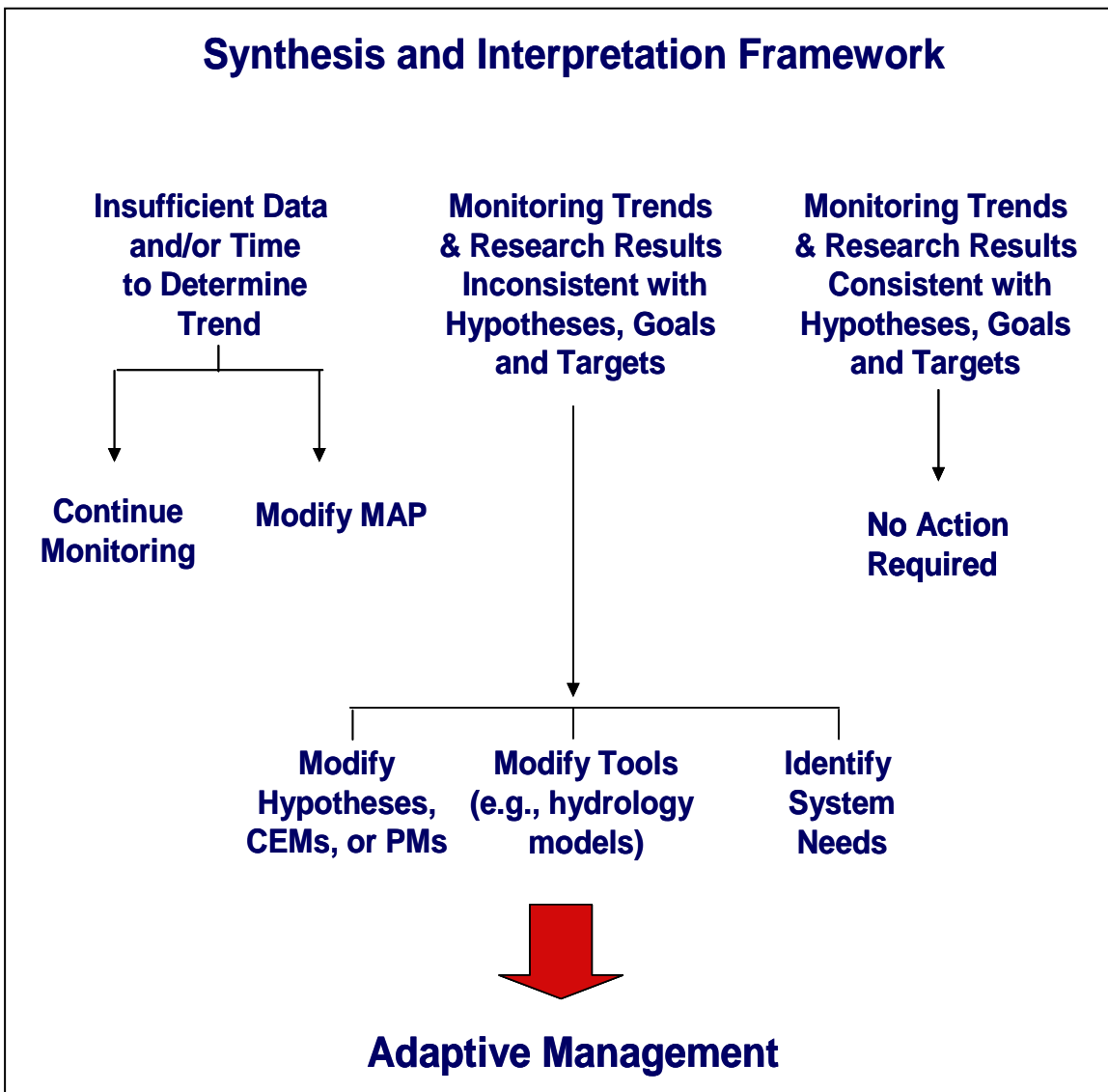
## **7.2 System-wide Synthesis and Interpretation of Assessment Results**

Three plausible alternatives for interpreting system-wide assessments are illustrated in Figure 7-1. For this discussion, it is important to note that system-wide assessments do not account for the effects of stochastic events.

The first alternative recognizes that there was insufficient data or time to determine a pattern or trend. Two possible explanations can be postulated: (1) insufficient time for either the performance measure or the system to respond in a measurable manner allowing for the MAP hypothesis to be critically examined; or (2) incorrect metrics are being measured and reported. In the former case, the monitoring should continue until the performance measure being assessed is adequately characterized. In the latter case, the option is to modify the MAP.

The second alternative is that the monitoring trends and research results are inconsistent with and/or do not support the hypotheses or the IG/IT. This could result in the following options: (1) modify the hypotheses, conceptual ecological models and/or the associated performance measures; (2) modify the tools (e.g., hydrologic models); and/or (3) identify system-wide hydrological and/or ecological needs to improve performance of the Plan.

The last option would provide the basis for initiating the next phase of the adaptive management process, which addresses alternatives for modifying water management operations and/or the Plan. No action is needed because the trend detected that is consistent with the hypotheses and the IG/IT.



**Figure 7-1:** Framework for Interpreting System-Wide Assessments

\*\*Please note the decision framework does not consider the influence of stochastic events.

The AT System Status Annual Report and the RECOVER Technical Report will encompass this interpretation of the system-wide assessment and develop conclusions based on the science that may. These conclusions may include whether corrective actions for MAP modifications or CERP performance should be considered.

### **7.3 Linkages to Adaptive Management**

#### **7.3.1 Introduction**

Development of an AM program is a critical element of CERP. AM for the Plan is defined in the Pro Regs as “the continuous process of seeking a better understanding of the natural system and human environment in the South Florida ecosystem, and seeking continuous refinements in and improvements to the Plan to respond to new information resulting from changed or unforeseen circumstances, new scientific and technical information, new or updated modeling; information developed through the assessment principles contained in the Plan; and future authorized changes to the Plan in order to ensure that the goals and purposes of the Plan are fulfilled.” The AM program is intended to guide the implementation of CERP and will be used to assess the responses of the South Florida ecosystem to CERP implementation and to determine whether these responses match expectations, including expected performance levels.

To address the requirement of the Pro Regs to establish an AM program, a multi-agency team has been formed to begin the task of developing an AM implementation strategy for the Plan. The team has organized a series of interagency, management, and science collaborative workshops, which have created an AM Framework (see Figure 7-2). The AM Framework is designed to identify the major components of a comprehensive AM strategy and the connections among the components. The framework currently contains four elements or “boxes” that outline the process for the various components of a comprehensive adaptive management strategy.

##### **7.3.1.1 Project Development (Box 1)**

The goal of this first element is to apply AM principles during CERP planning activities whether at the system-wide or project levels by anticipating and planning for performance uncertainties, incorporating opportunities for learning and flexibility into the project design, and incorporating these considerations into project management plans and the final Project Implementation Report (PIR) during the planning and implementation of Plan projects. The lead responsibility for Box 1 activities is with the PDT in coordination with RECOVER.

##### **7.3.1.2 Assessment (Box 2)**

This element includes the system-wide assessment process for measuring and reporting actual system responses to the effects of the Plan, including progress towards meeting the IG/IT. The results of these assessments are provided by RECOVER in technical reports

to the Corps and SFWMD in accordance with the Pro Regs. The assessment process is discussed in detail in this guidance memorandum.

### **7.3.1.3 Management and Science Integration (Box 3)**

This element is the link of “decision-makers” with scientists in a collaborative review process to produce the assessment report required by the Pro Regs. This box creates a management and integration team led by the Corps and the SFWMD for the purpose of reviewing the technical reports on assessment prepared by RECOVER, and for identifying and evaluating options for resolving any significant performance problems in the Plan. The management/science team will help produce the assessment report, required by the Pro Regs that will describe these options and the potential benefits from each. The AM framework has also created a shortcut from project planning (Box 1) to Box 3 to assist in solutions to system-wide problems that may arise in the project planning phase. The management and integration team will include members of RECOVER and management from participating agencies and tribal governments.

### **7.3.1.4 CERP Update Process (Box 4)**

The final element of the AM Framework involves using the assessment report as the basis for selection of the preferred option to either make changes or adjustments in project plans, operations, and/or sequencing of projects, including modification of the Plan or to continue on the present course. The actions in this box occur under the guidance of senior management in the Corps and the SFWMD in consultation with other agencies and tribal governments. The newly formed System Planning and Operations Team (SPOT) is expected to play a major role in Box 3.

## **7.3.2 Initiating Adaptive Management Activities**

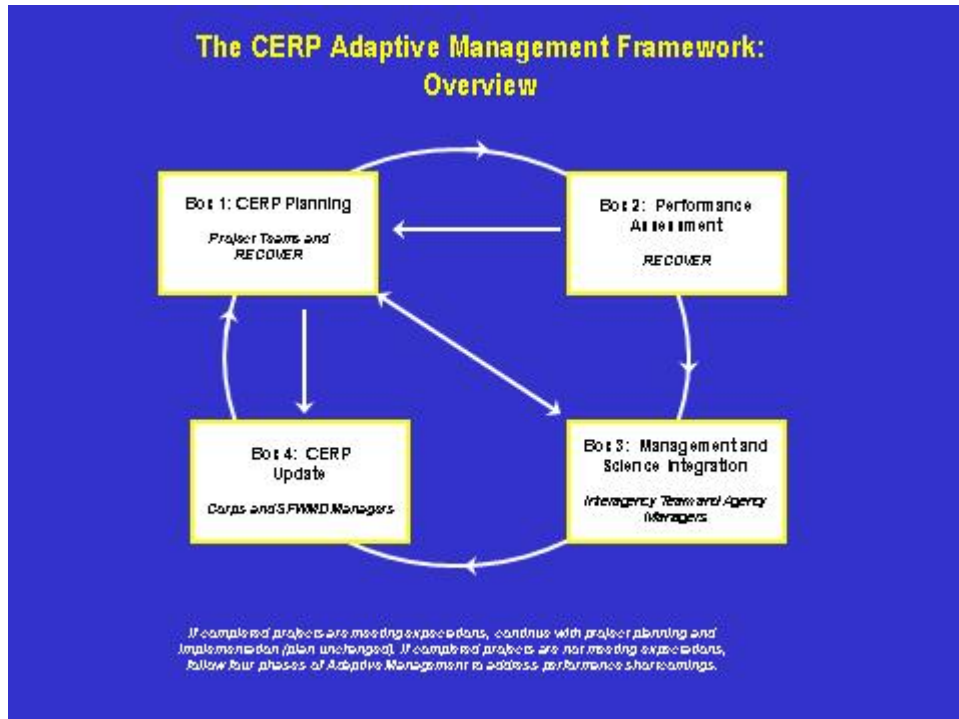
There are a number of factors or events that will occur during the implementation of CERP that may trigger the initiation of the adaptive management process to be initiated. This section describes these factors and events.

### **7.3.2.1 Periodic CERP Updates**

The programmatic regulations require that the Plan be evaluated periodically using new or updated modeling that includes the latest scientific, technical, and planning information. As appropriate, the results of this evaluation may be used to initiate adaptive management activities.

### **7.3.2.2 Shortfalls in Water Made Available by CERP Projects**

In the event that a Plan project does not perform as planned and designed (i.e., there is a “shortfall” in the quantity or quality of water that the project produces), the Corps and the SFWMD will initiate AM activities, including preparation of an assessment by RECOVER (Box 2) as described in this guidance memorandum.



**Figure 7-2:** CERP Adaptive Management Framework Overview

To assist RECOVER in conducting assessment activities, the PDT should provide documentation in the PIR (see Guidance Memorandum #1) that describes the identification of water for the natural system and other water-related needs contained in the PIR. The PDT may prioritize these benefits and reiterate the goals and purposes of the project in order to provide information to decision-makers in their resolution of a shortfall.

### 7.3.3 Achievement of Interim Goals and Interim Targets

The interim goals provide a means by which the restoration success of the Plan may be evaluated at specific points throughout the overall planning and implementation process of CERP and are established to facilitate inter-agency planning, monitoring, and assessment. Similarly, the interim targets provide a means by which the Plan's progress towards providing for other water-related needs of the region may be evaluated. If the Corps and SFWMD find that the interim goals or interim targets are not met or are unlikely to be met, then the AM process may be initiated in accordance with the programmatic regulations.

For the purposes of assessing Interim Goals, RECOVER proposed a total of 23 indicators, which included hydrologic, water quality and biological indicators in the four sub-regions of the South Florida ecosystem that the CERP is designed to influence. Eight indicators were chosen for Interim Targets. The primary criterion for the selection of

indicators was whether that indicator is expected to be highly responsive to the changes in water regime that will be brought about by the CERP. In addition, indicators that represent short-term, intermediate, and long-term responses are represented. Interim Goal indicators from all levels of the trophic web are also represented.

For the purposes of Interim Goal assessment processes carried out by RECOVER, the entire suite of indicators will be examined. Where quantitative estimates are available, these will be compared with numerical analysis. Where qualitative descriptions are available, these will be analyzed in narrative fashion. For specific quantitative and qualitative predictions for IG/IT indicators on a five year time step applicable to a particular module, reference should be made to the IG/IT Recommendations Document prepared by RECOVER (RECOVER 2005)." This document can be found at: [http://www.evergladesplan.org/pm/recover/igit\\_subteam.cfm](http://www.evergladesplan.org/pm/recover/igit_subteam.cfm)

The Pro Regs indicate that the potential exists to create a higher level of performance than that described in the originally authorized Plan, and that this potential should be realized during CERP implementation. This higher level of performance can be defined as a "desired restoration goal." The desired restoration goal or condition is not necessarily equal to the historic condition. It reflects optimal characteristics of the indicator given that some irrevocable changes have occurred in the South Florida ecosystem (such as loss of spatial extent, and the existence of the eastern levee system). It must be possible to measure the desired restoration goal using data collected from the field. It is also possible to estimate Interim Goal values for the desired restoration goals; these values would reflect the estimated trajectory of the condition of the indicator throughout CERP implementation.

#### **7.3.4 Required Periodic Assessments**

In accordance with the Pro Regs, RECOVER is required to prepare a technical report, not any less often than every five years, that presents an assessment of whether the goals and purposes of the Plan are being achieved, including whether the interim goals and interim targets are being achieved or are likely to be achieved. At the project level, in accordance with Guidance Memorandum #1, each project PIR will include a description of project contributions toward achieving IG/IT.