Executive Summary
Adaptive Management for the Comprehensive Everglades Restoration Plan

What is Adaptive Management?

Adaptive management (AM) provides an alternative approach to traditional planning procedures for the design and implementation of programs and projects that seek to manage and/or restore natural systems. AM is not "what we've been doing for years" and is neither "trial and error" nor "managing adaptively". The more traditional, "cookbook" protocols and guidance for project planning depends upon high levels of predictability with respect to the performance of alternative plans, and high levels of agreement regarding project goals. Predictions of plan performance are usually generated using numerical models to characterize the results of management actions at large spatial scales and to define program/project goals. For ecosystem projects, however, comparatively few numerical models exist that can accurately predict ecosystem responses, resulting in uncertainty about what management decision should be made and disagreement about the most effective routes for achieving project objectives.

To help address these uncertainties, and to improve the performance of a restoration project, AM has evolved to deal with the challenges inherent in predicting and restoring large-scale complex ecosystems. AM replaces the current dependencies on numerical models and traditional planning guidelines by applying a focused "learning-by-doing" approach to decision-making. The "learning-by-doing" approach is proactive – it is an iterative and deliberate process of applying principles of scientific investigation to the design and implementation of restoration projects to better understand the ecosystem and to reduce the key uncertainties, as a basis for continuously refining the program/project design and operation. New information that can guide a project plan can include results from scientific research and monitoring, new or updated modeling information gleaned from iterative project implementation and as input from managers and the public. Potential applications of this "learning by doing" AM approach include: (1) transfer of lessons learned from one program/project to another to avoid pitfalls; (2) use of physical models/modeling to test possible outcomes of management decisions; and (3) incorporation of flexibility and versatility into project design and implementation.

Why and When should AM be applied?

There are many reasons why an AM approach is well suited for the management and restoration of large-scale ecosystems. First and foremost, the use of an AM approach improves the chance of success in meeting program/project goals. The use of an AM approach improves our capacity to meet program/project goals, particularly in light of the large uncertainties associated with ecosystem performance and the wide range of opinions and options concerning desired outcomes. AM fosters the success of project planning, implementation, and assessment by applying the following principles:

1. Use of a scientific inquiry based approach to address the most important structural, operational, and scientific questions;
2. Incorporation of robustness (i.e., maintaining design and operational options) into project design;
3. Use of feedback loops that iteratively feed new information into the decision-making process for planning, implementation and assessment of project components;
4. Emphasis on an open, inclusive, and integrative process for design and implementation of ecosystem management and restoration programs/projects; and
5. Emphasis on collaboration and conflict resolution in order to reconcile competing objectives (scientific and socioeconomic).

These principles maximize learning to address key uncertainties and disagreements and help build an expanding body of knowledge that will support both current and future decision-making. This continuously updated body of knowledge and the open collaborative process facilitate consensus on the ultimate plan design and the desired endpoints. Because decision-making in an atmosphere of uncertainty can foster an uninformed and distrustful public, AM incorporates an active collaborative process for the purpose of

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creating an informed and contributing public, and for bridging gaps in communication and understanding among the public, the scientific community, and the managers who are responsible for implementing the ecosystem program.

In summary, the use of AM is essential for achieving program/project objectives in any situation where there are comparatively high levels of uncertainty and/or disagreement about: (1) how complex ecosystems function; (2) the most effective design and operation to achieve program/project goals; and (3) the desired endpoints (i.e., what constitutes program/project success). In these situations, the key to moving forward is to apply the principles and guidelines of AM as a means of reducing the hurdles to planning and program/project implementation caused by uncertainty and a lack of consensus.

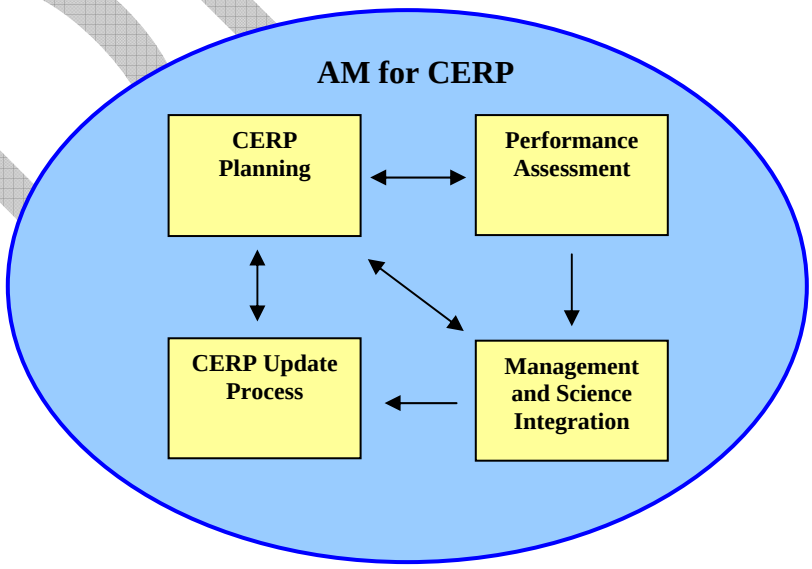
How will AM be applied to CERP?

The Water Resources and Development Act of 2000 (WRDA 2000) and the Programmatic Regulations (Pro Regs) require that an AM program be followed in the design and implementation of CERP. Congress "did not expect rigid adherence to the Plan" and instead expected "that the agencies responsible for project implementation…will seek continuous improvement of the Plan based upon new information, improved modeling, new technology, and changed circumstances."

The AM program for CERP includes four interrelated components:

1. ***CERP Planning*** - AM applied to aid planning activities at the project and system-wide levels;
2. ***Performance Assessment by RECOVER*** - monitoring and assessment to understand responses of the Everglades ecosystem to the Plan implementation;
3. ***Management and Science Integration*** - a process of synthesizing monitoring results and other new information as a basis for identifying options for improving the design and operation of CERP, in the context of CERP goals;
4. ***CERP Update Process*** - adjustments to the Plan as needed.

These four interrelated components of the AM program for CERP (yellow boxes) operate within an open, inclusive, and collaborative atmosphere (light blue circle) and can be graphically depicted (see below). This diagram is further explained in the CERP Adaptive Management Strategy document (2006).



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