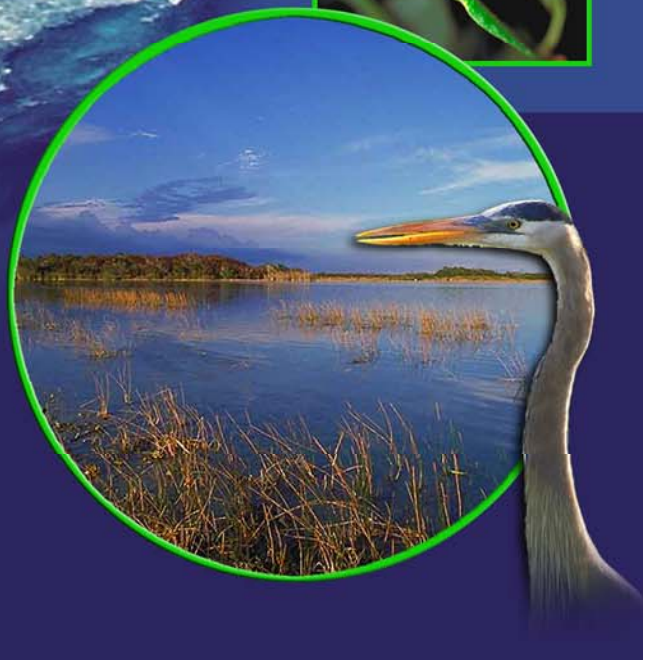
the journey to restore America's Everglades

Adaptive Management for CERP

What, Why, When, How and Where



John Ogden, SFWMD

What is Adaptive Management (AM)?

- 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."
- Deals with the challenges inherent in predicting and restoring large-scale complex ecosystems in the face of large uncertainties and major trade-off issues.
- AM replaces the current dependencies on numerical models and traditional planning guidelines by applying a focused "learning-by-doing" approach to decision-making.

What is AM?

- AM is an iterative and deliberate process of applying principles of scientific investigation to the design and implementation to better understand the ecosystem and reduce the key uncertainties, as a basis for continuously refining the program/project design and operation.

What is AM?

"AM is driven by growing recognition of the need for an alternative management paradigm to deal with high levels of complexity and uncertainty, by needing a better means to accelerate the rate at which managerially relevant knowledge can be acquired, and for a growing appreciation of the limits of predictive models…coupled with the challenges of dealing with a world full of surprises…and social and political volatility." (Allan et al. 2006)

AM Definition
CERP Programmatic Regulations

"…ensure that new information resulting from changed or unforeseen circumstances, new scientific or technical information or information that is developed through the principles of adaptive management contained in the Plan, or future authorized changes to the Plan are integrated in the implementation of the Plan."

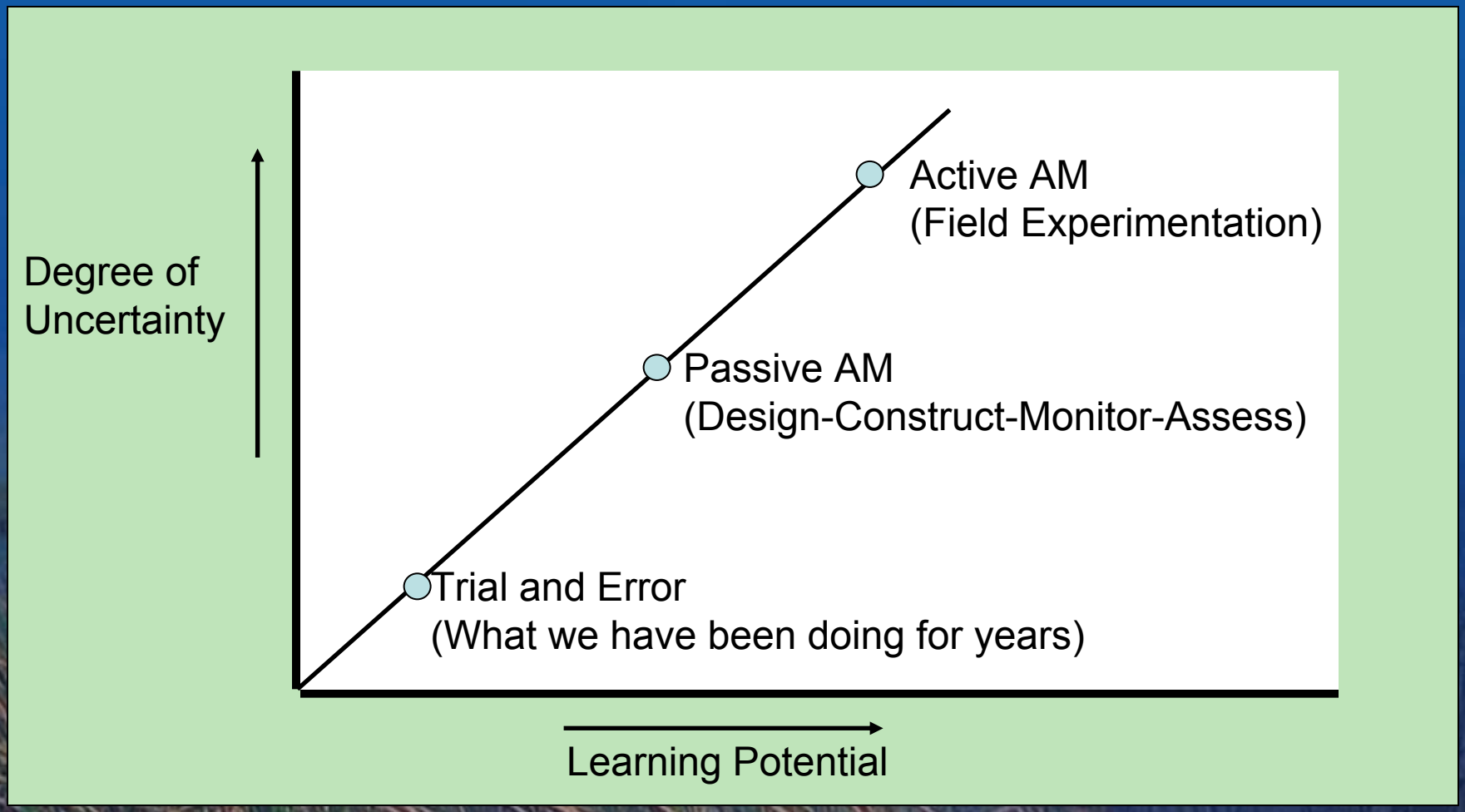
AM Definition
National Research Council

- Promotes flexible decision making that can be adjusted
- Advances scientific understanding and helps adjust policies or operations as part of an iterative learning process
- Recognizes the importance of natural variability in contributing to ecological resilience and productivity
- It is NOT a 'trial and error' process, but rather emphasizes learning while doing

Active vs. Passive AM

- Passive AM – "…a preferred course of action is selected based on existing information and understanding. Outcomes are monitored and assessed, and subsequent decisions regarding design and operation are adjusted based on improved understanding."
- Active AM "…begins with analysis of the most serious gaps in understanding about the system, and designs and conducts field tests to remove the maximum amount of uncertainty…Active AM is based upon the assumption that early investment in knowledge generation will reduce the likelihood of making inappropriate management decisions."

Active vs. Passive AM



Active AM involves actual field testing and experimentation addressing high levels of uncertainty.

When Should AM be Applied?

- AM is critical in situations where there are high levels of uncertainty and/or disagreement about:
  - how complex ecosystems function
  - design and operation
  - the desired endpoints (i.e., what constitutes program/project success)

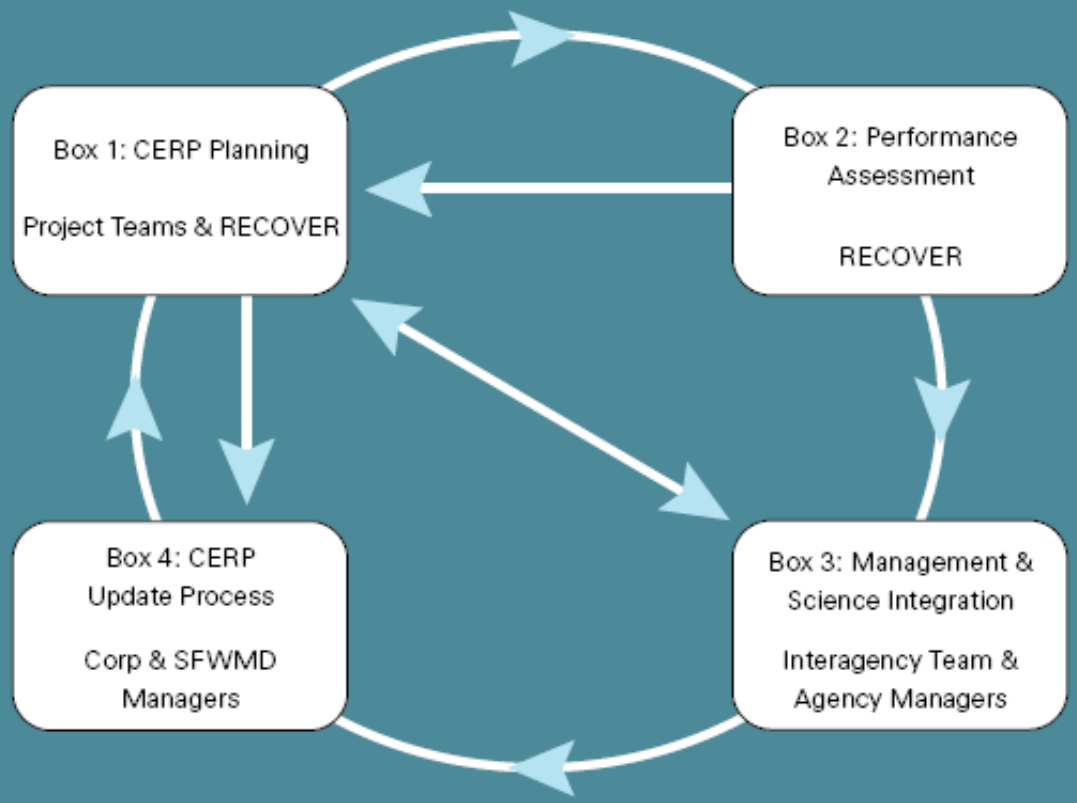
Should AM be Used?

- Do we understand the ecosystem to be restored well enough to predict how it will respond to our actions?
- Is there broad agreement on the desired goals, i.e., definition of success?
  - YES → no need to apply AM principles because potential risk of project failure is minimal due to a low levels of uncertainty
  - NO → AM principles are appropriate to deal with the potential risk and high levels of uncertainty in the success of project implementation

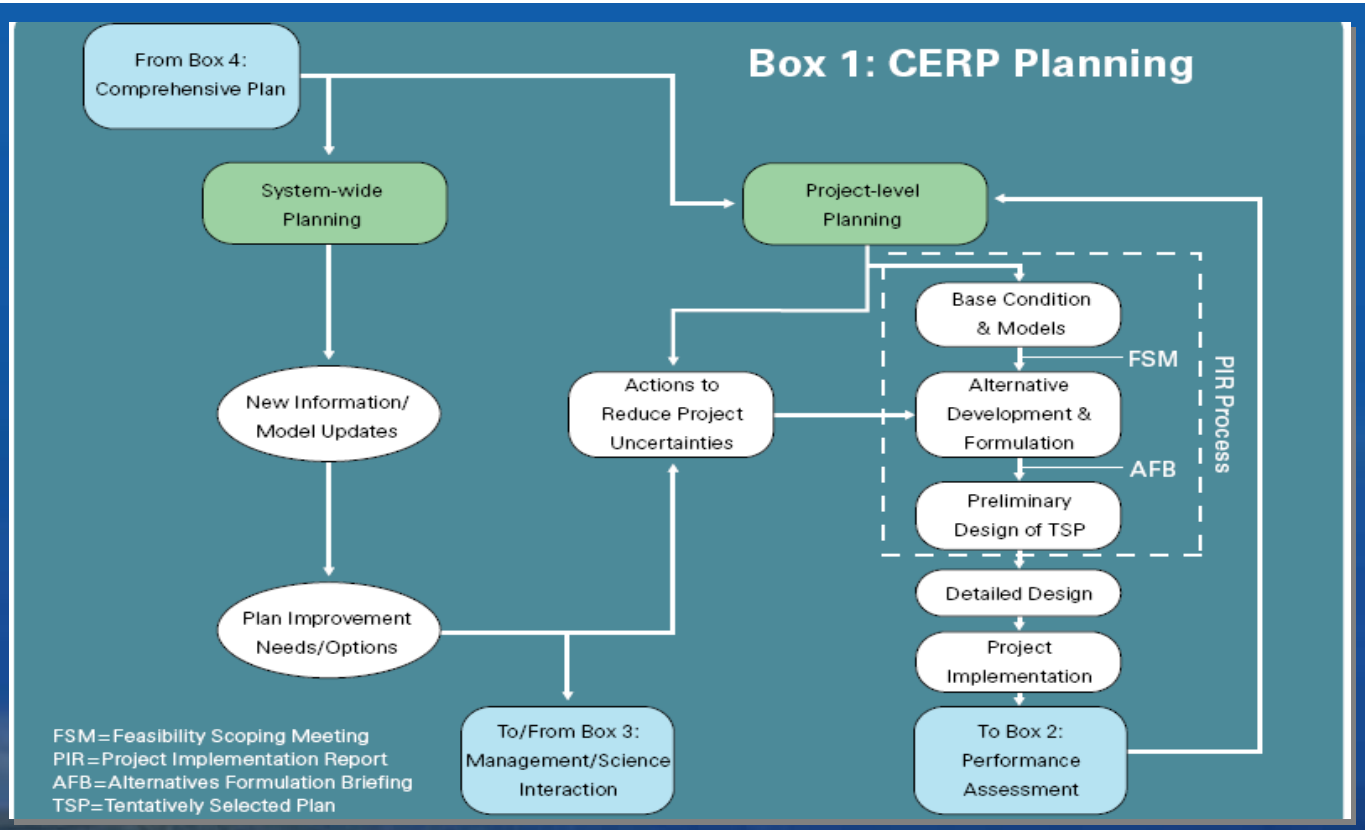
CERP AM Framework

- Four elements outline the process for, and the interactions among, the various components of AM strategy:
  - CERP Planning
  - Performance Assessment by RECOVER
  - Management and Science Integration
  - CERP Update Process

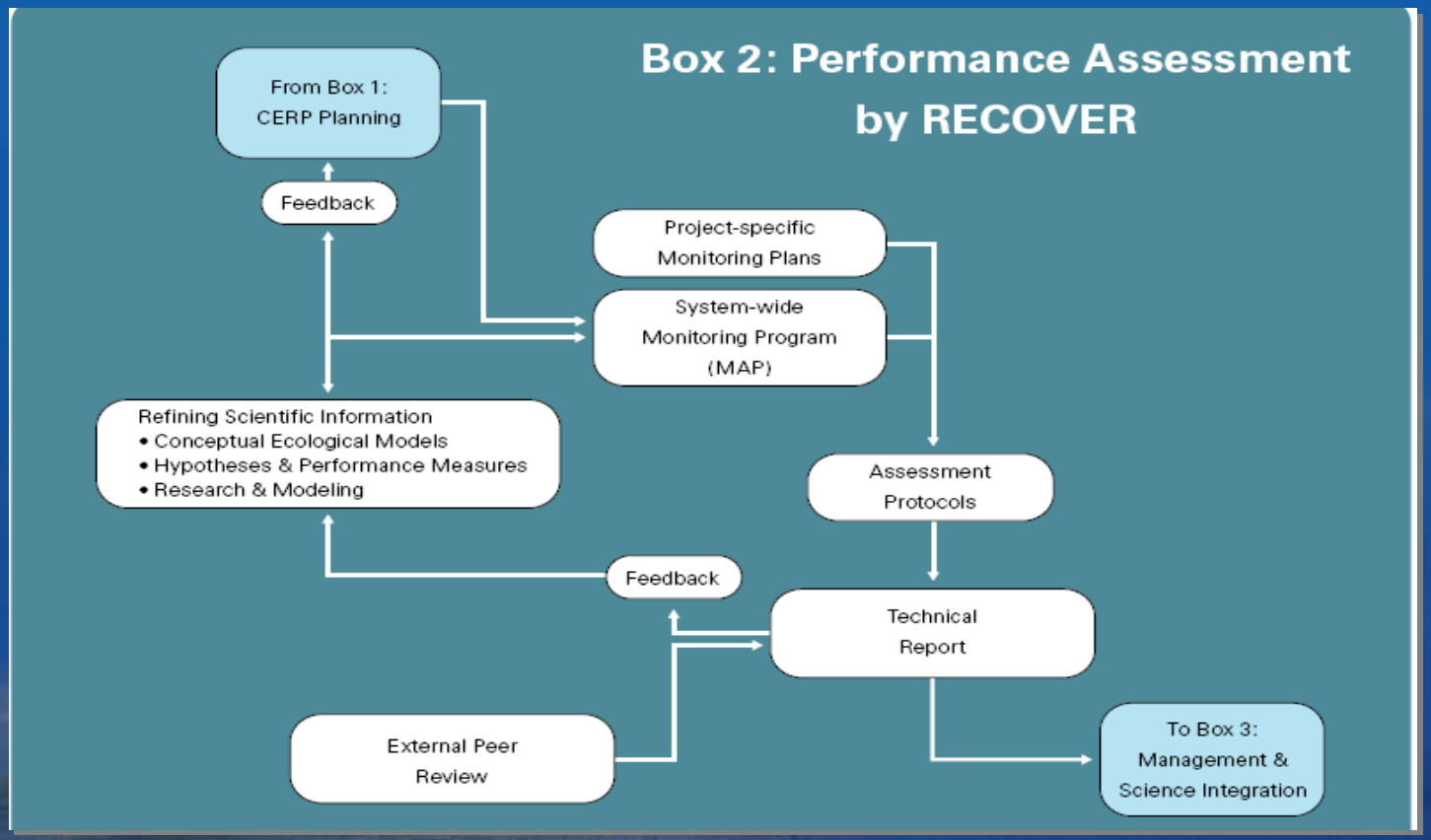
The CERP Adaptive Management Framework: Overview



If completed projects are meeting expectations continue with project planning and implementation (plan unchanged). If completed projects are not meeting expectations, follow four phases of Adaptive Management to address performance shortcomings.



- Responsibility – CERP Project Team
- Activities
  - Identify key uncertainties
  - Decide active and passive options in design and implementation



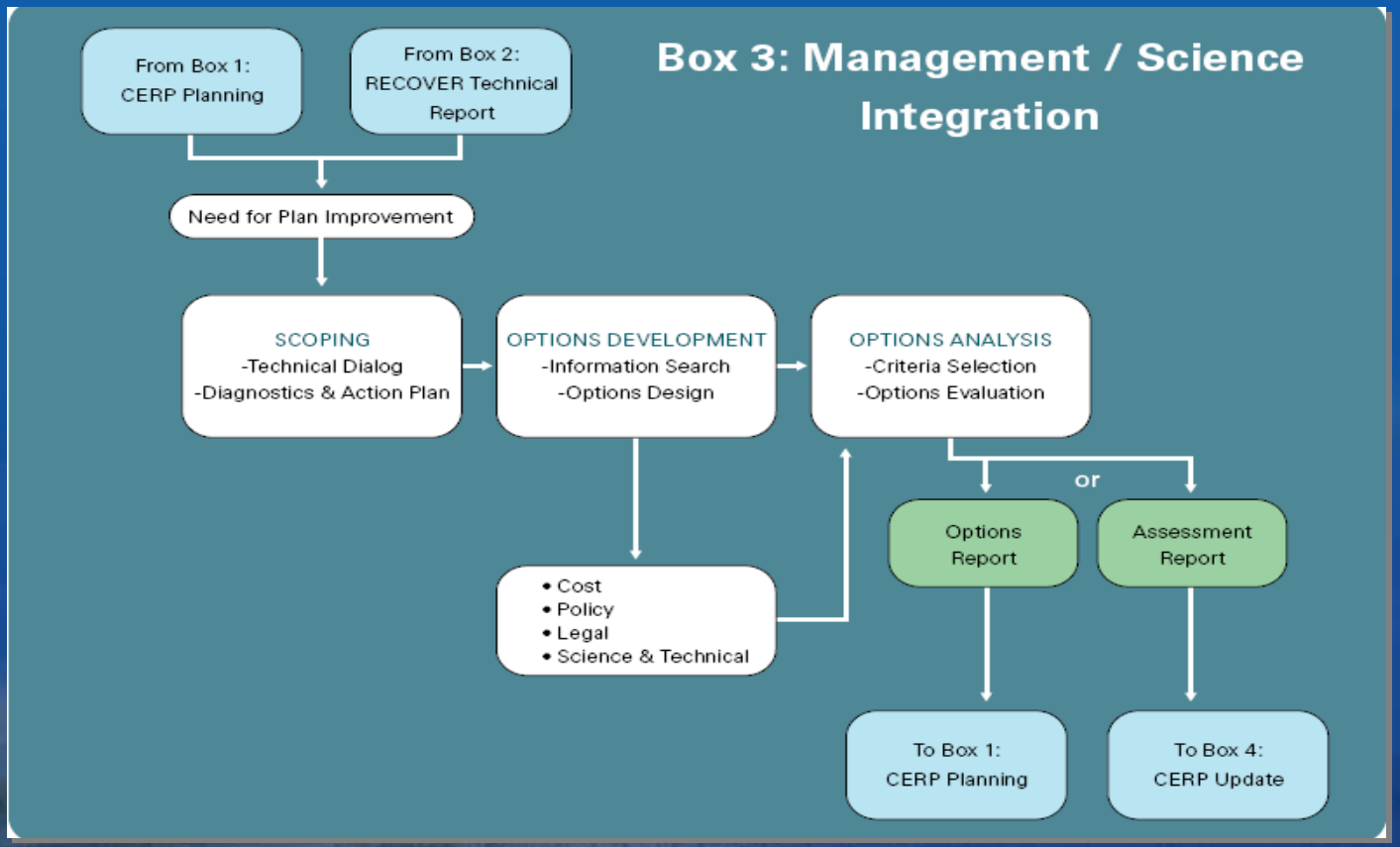
- Responsibility - RECOVER
- Activities
  - System-wide monitoring and assessment
  - Technical report assessing performance of the plan or project

2006 System Status Report (SSR)

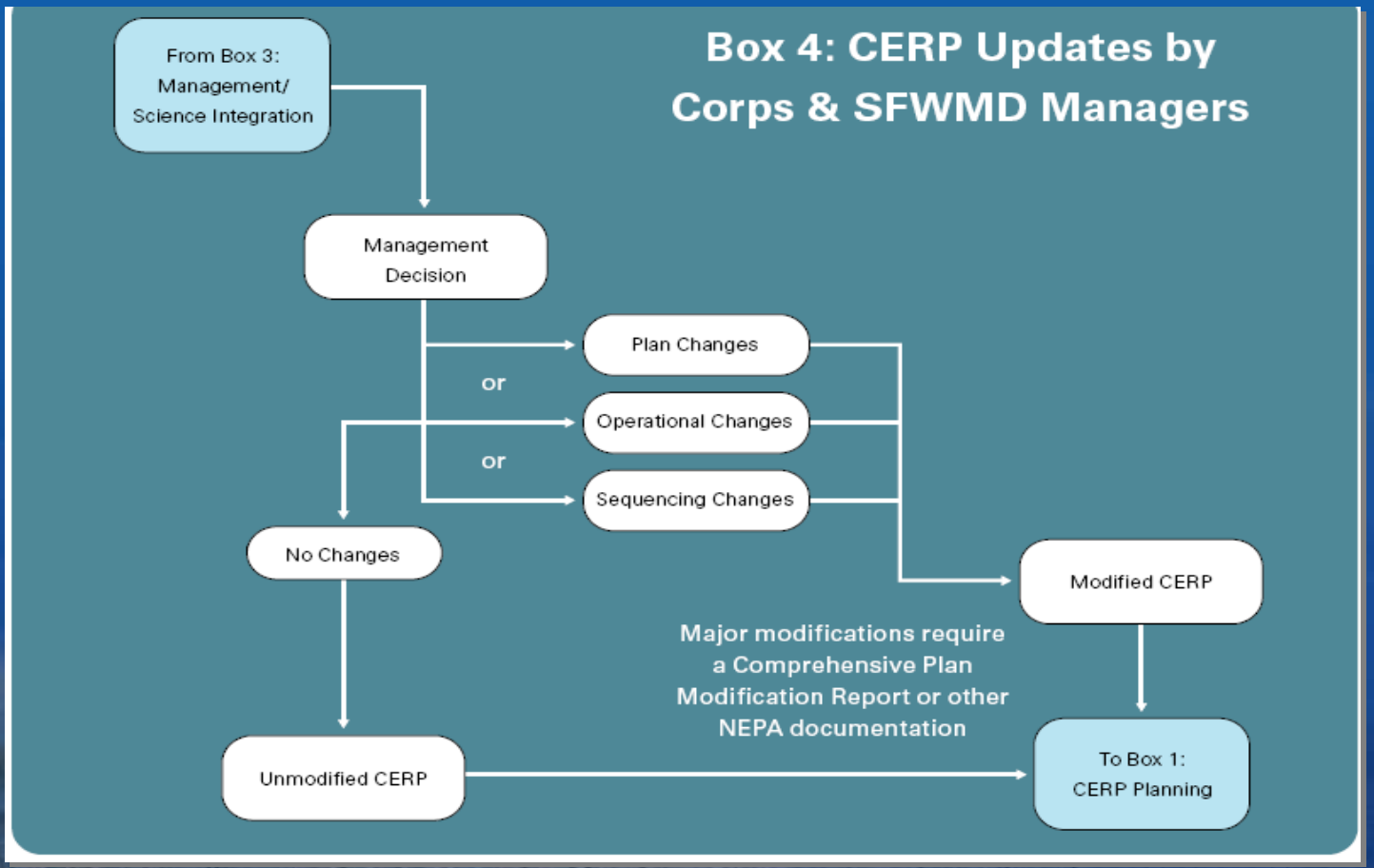
- "Proof of concept" using assessment strategy outlined in the MAP, Part 2
- Two part document
  - System-wide Report
  - Module Group Report
  - Includes sections addressing relationship to Interim Goals and Lessons Learned
- Undergone RECOVER review; will be reviewed by the RLG in November 2006

Timeline for Future SSRs

- 2006 SSR will be updated and submitted to the NRC in August 2007
- Future SSRs will be developed biannually
  - SSR developed in the year prior to the NRC Report
    - NRC Report in 2008, 2010, and 2012
    - SSR developed in 2009 and 2011
- Biannual SSR development allows for NRC review and feedback.



- <u>Responsibility</u> – Interagency System Planning and Operations Team (SPOT) and Sponsoring Agencies
- <u>Activities</u>
  - Scoping, options development, and analysis
  - Development of Options or Assessment Report



- Responsibility – Sponsoring Agencies
- Activities
  - Decision to alter CERP through adjustments in project plans or operations, or alterations in project sequencing

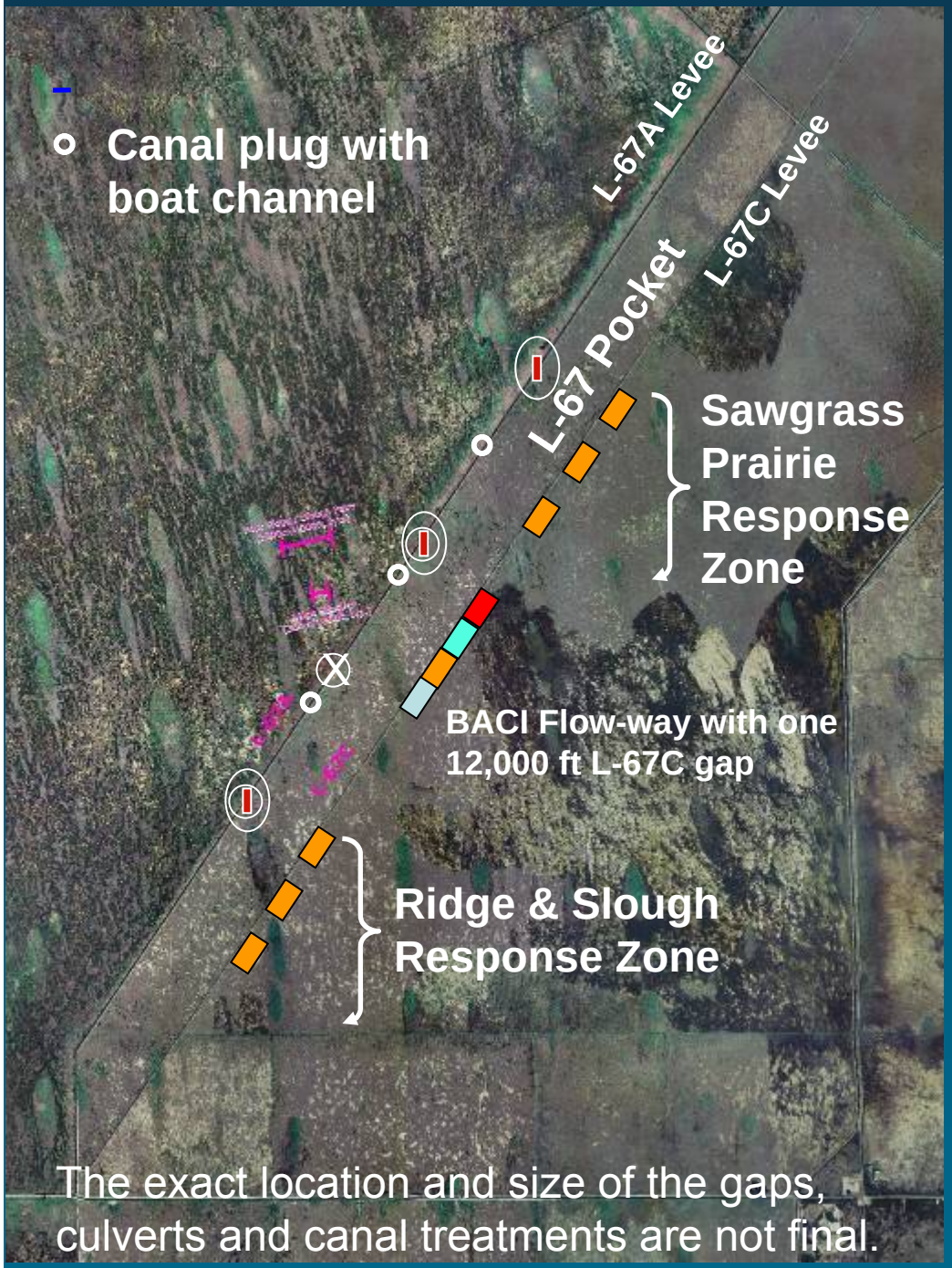
AM Case Study – DECOMP

What is AM for DECOMP? What will be gained by using AM?

- First major project proceeding under the AM Strategy
- Seeks best restoration design for DECOMP without compromising water supply or flood control
- Combines data mining, historical analysis, physical models, and evaluation tools
- Addresses scientific uncertainties and incorporate new information
- Uses multi-agency collaborative approach (with stakeholder input)
- Increases understanding of system responses to various activities
- Selects optimal project alternative(s)

Scientific Uncertainties of DECOMP

1. Ecological effects of levee modifications
2. Effects of partial versus extensive backfilling of canals
3. Water depth and hydroperiod tolerance of tree islands
4. Support quantification of benefits of sheetflow
5. Assessment of seepage
6. Calibration of hydrologic models



The exact location and size of the gaps, culverts and canal treatments are not final.

Prius Model v2

This is a hybrid of the basic 3-gap CSOP design to include replicated Response Zones, and a Before and After Control Impact (BACI) flow-way physical model

- 3000 ft gap (complete backfill)
- 3000 ft gap (canal plug with boat channel)
- 3000 ft gap (partial backfill)
- 3000 ft gap (no fill)
- CSOP L-67A weir-culvert cluster location

DECOMP Physical Model Expected Results

- Evaluate PMs for planning and designing DECOMP
- Reduce major uncertainties and develop a clearer understanding of potential “tradeoffs”
- Indicate the “ecological lift” associated with levee removal and canal backfilling
- Assess the hydrologic flow fields associated with different gap sizes
- Mechanistic understanding of the ecological processes associated with flow
- Ability to scale up to the landscape level

AM Case Study – 10-Mile Creek

Ten Mile Creek Water Preserve Area

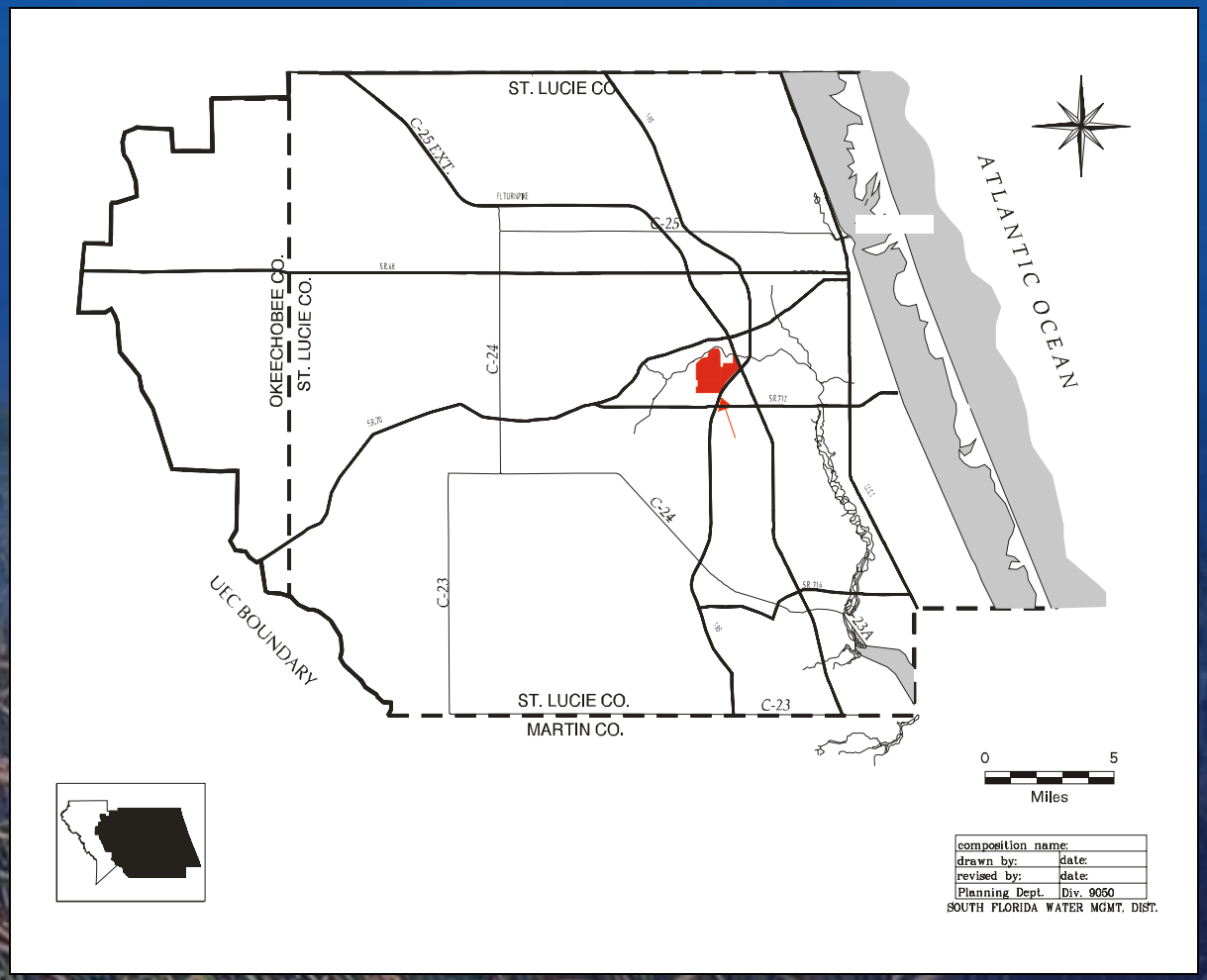
Reservoir-
- 550 acres (6000 acre-ft)

STA-
- 110 acre polishing cell

PROJECT SCHEDULE

Construction Completed
December 2005

Interim Operations:
- Testing and Monitoring 2006 (6-9 months)
- Final Water Control Plan in 2007

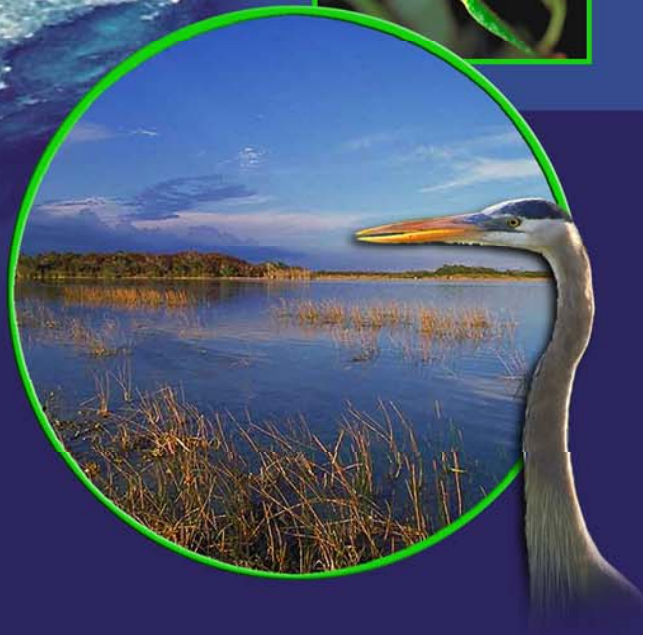


Ten Mile Creek WPA
North Fork St. Lucie River
A Partnership in Adaptive Management

- Formalize Partnerships and Develop Plan
- Collaborate in the Development of Initial Environmental Protocols for the Reservoir/STA
- Collect and Compile Baseline Data in the North Fork of the St. Lucie River
- Assess Ecological Response over time
- Field test Adaptive Management Strategies and Tools to provide input to management for optimization of future Reservoir/STA projects

the journey to restore

America's Everglades



Thank You