

Ingredients for Success:

Building a Robust Adaptive Management Program



Stu Appelbaum
Operations Leader, Integrated Planning
ARCADIS



RETIREMENT

BECAUSE YOU'VE GIVEN SO MUCH OF YOURSELF TO THE COMPANY THAT
YOU DON'T HAVE ANYTHING LEFT WE CAN USE.

Topics

- Background
- Ingredients for Success
- Why Does Adaptive Management Fail?

**Rescuing an Endangered Ecosystem:
The Plan to Restore America's
Everglades**



*The Central and Southern Florida Project
Comprehensive Review Study
(The Restudy)*

July 1999

On December 11, 2000, the President signed the Water Resources Development Act of 2000, approving:

Comprehensive Everglades Restoration Plan (CERP)

A program providing for the restoration, preservation, and protection of the south Florida ecosystem while providing for other water-related needs of the region

Comprehensive Everglades Restoration Plan

- 68 Components
 - Storage
 - STAs
 - Seepage management
 - Removing barriers to flow
 - Revised operations
- 30+ year implementation



CERP Adaptive Management Program

“The Committee does not expect rigid adherence to the Plan as it was submitted to Congress. ***This result would be inconsistent with the adaptive assessment principles in the Plan....*** Instead the Committee expects that the agencies....will seek continuous improvements of the Plan based on new information, improved modeling, new technology and changed circumstances.”

Senate Committee on Environment
and Public Works
July 27, 2000

Why Adaptive Management?

- Conceptual nature of Comprehensive Plan
- Technology uncertainties
- Modeling uncertainties
- Ecologic response uncertainties
- Climate change effects

Ingredients for Success

- Statutory or other authority
- Agency commitment
- Strong science foundation
- Integrated processes
- Opportunities for learning
- Independent scientific review
- Communication of information

WRDA 2000 Adaptive Management Provisions

- Authorization of adaptive assessment and monitoring program - \$100 million for first 10 years
- Authorization of six pilot projects
- Programmatic Regulations - processes for implementing adaptive management
- Interim goals to measure restoration success
- Independent scientific review panel convened by National Academy of Sciences
- Periodic reports to Congress

Programmatic Regulations

Establish Processes:

- To ensure that the goals and purposes of the Plan are achieved
- To ensure that new information, *including information developed through the principles of adaptive management*, is integrated into the implementation of the Plan
- To ensure protection of the natural system, including establishment of interim goals by which restoration success of the Plan may be evaluated throughout implementation process



Federal Register

Wednesday,
November 12, 2003

Part II

Department of
Defense

Department of the Army, Corps of
Engineers

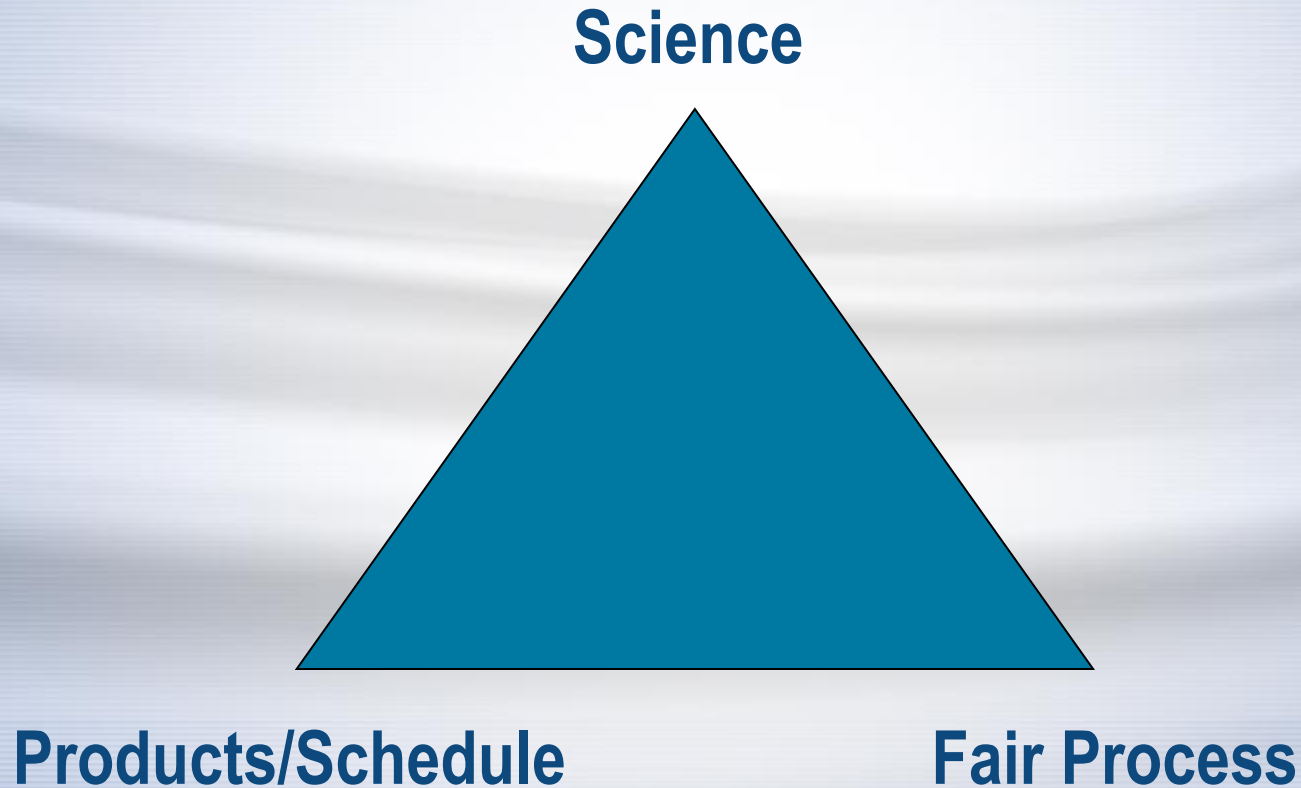
53 CFR Part 385
Programmatic Regulations for the
Comprehensive Everglades Restoration
Plan; Final Rule

Restoration Coordination and Verification (RECOVER)

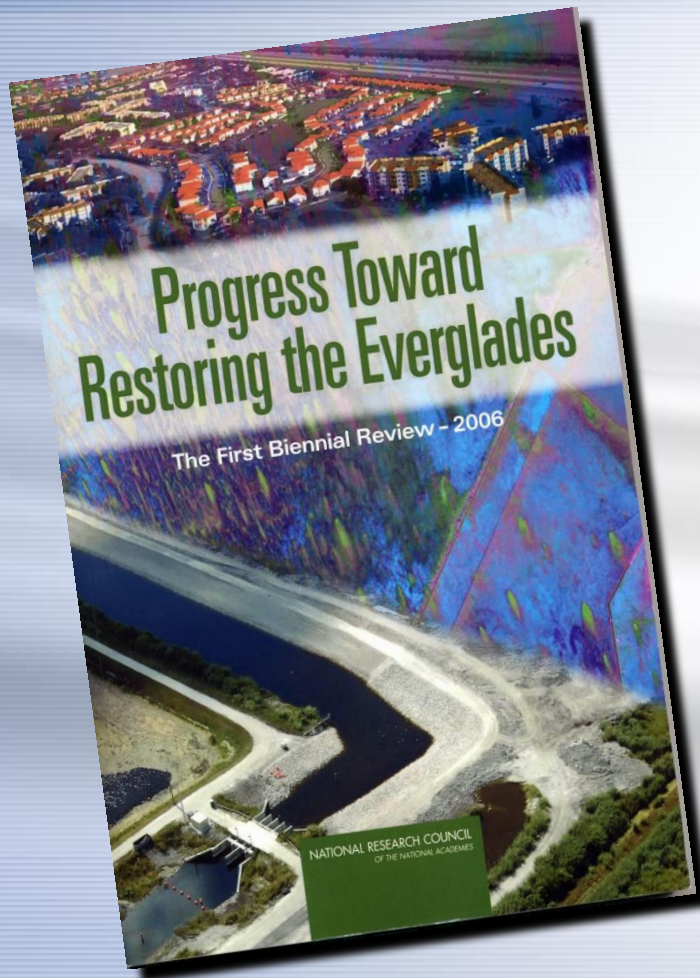


- Purpose - Organize and apply scientific and technical information to support the system-wide objectives of CERP
- Interagency, interdisciplinary team of scientists, engineers, planners, and resource specialists
- Structure:
 - Leadership Group
 - Evaluation Team
 - Assessment Team
 - Planning and Integration Team

RECOVER Values Triangle



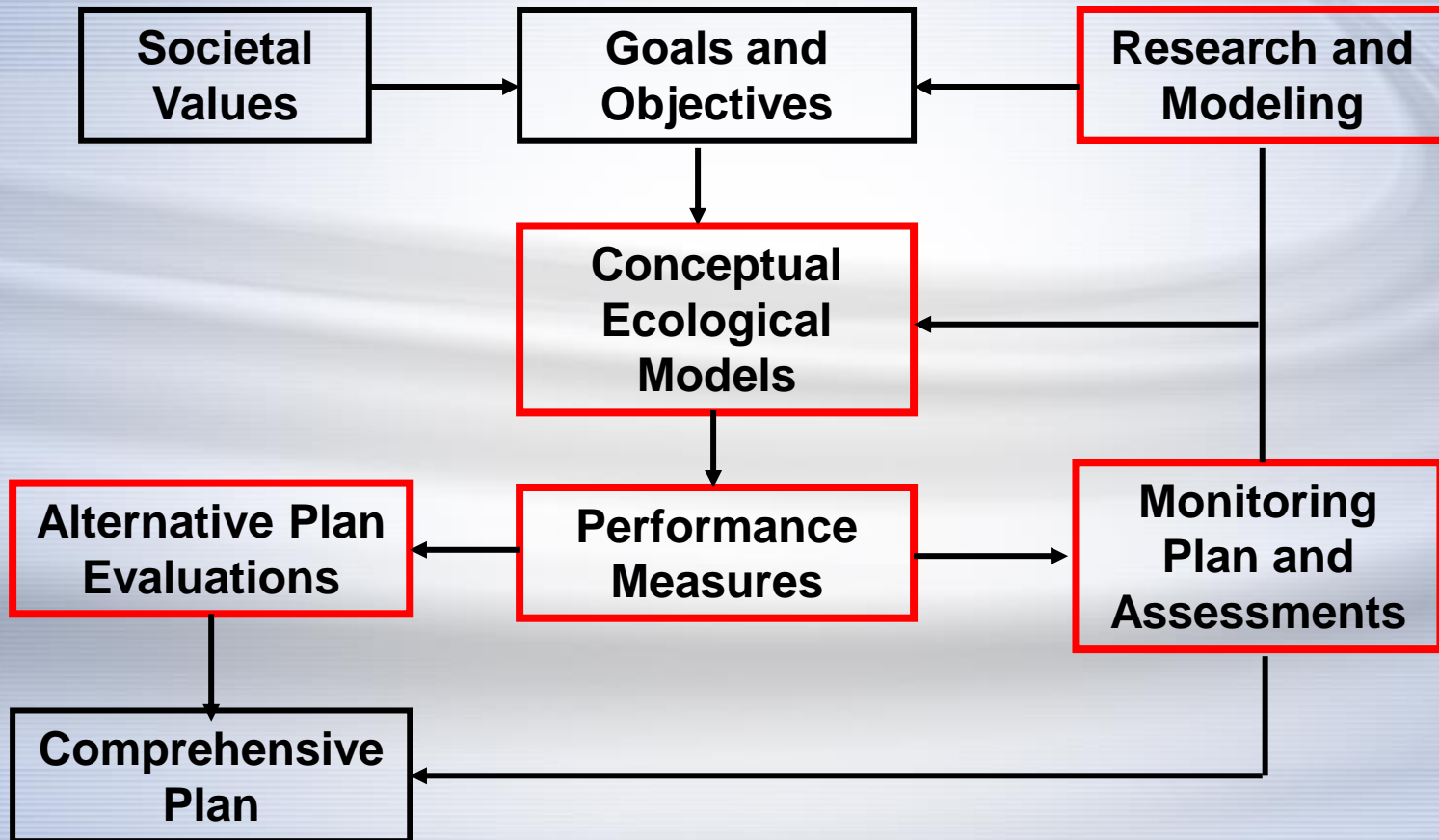
The Role of Science



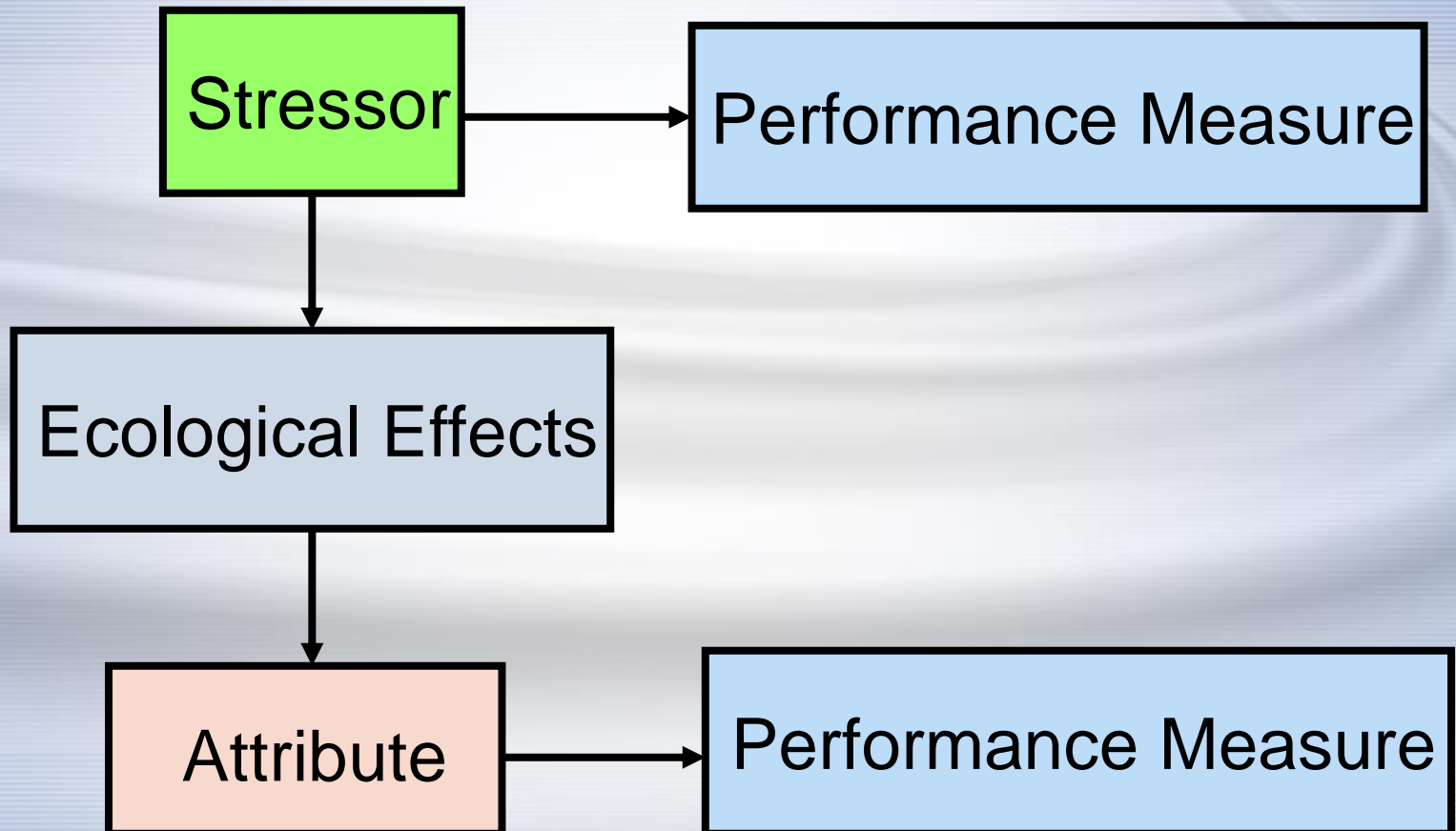
“A key tenet of the Everglades restoration effort is that reliable scientific information will guide critical ecosystem management functions.”

- National Research Council
2006

Applied Science Strategy

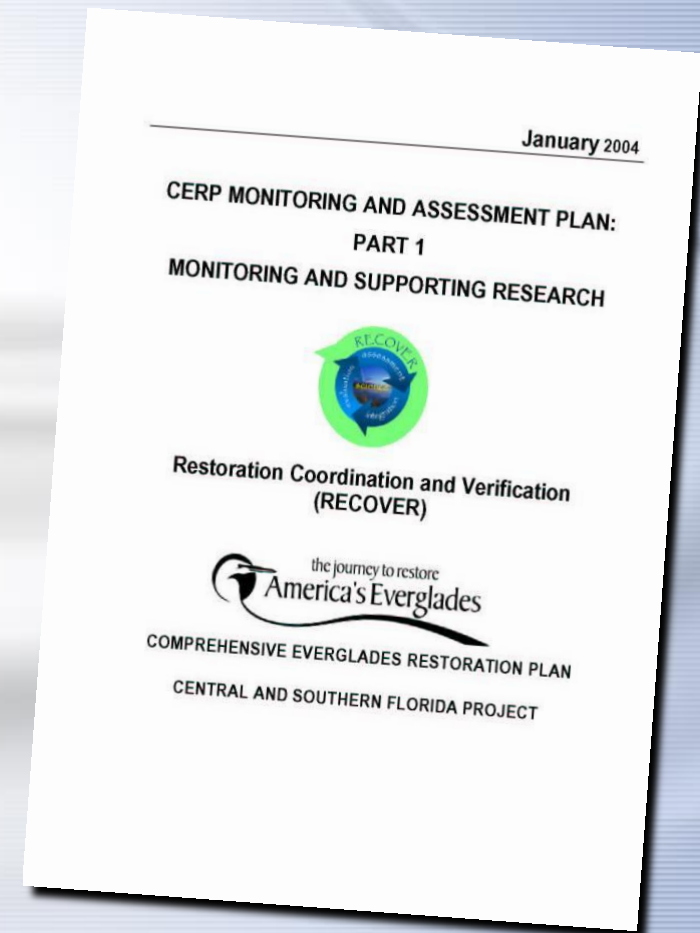


Conceptual Ecological Models

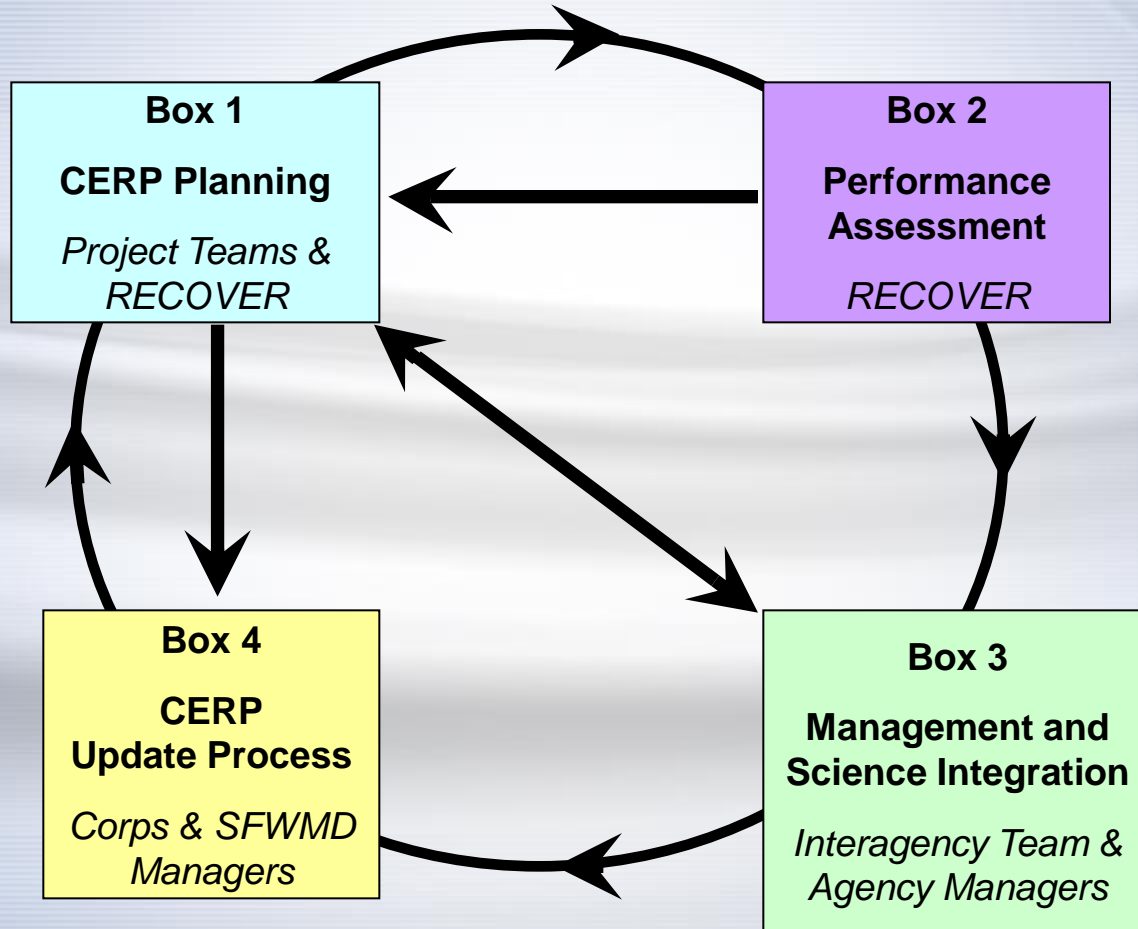


Monitoring and Assessment Plan (MAP)

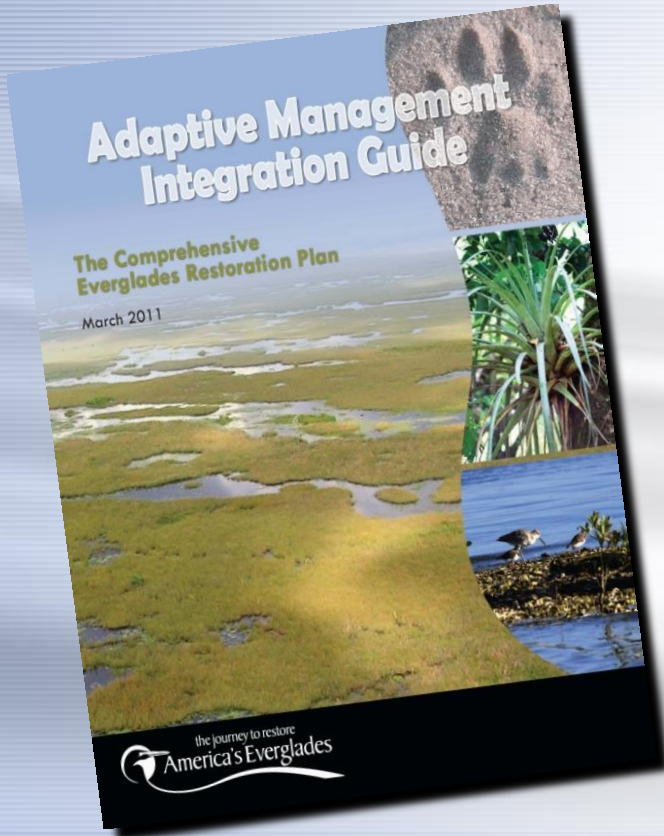
- Purposes:
 - Determine how well CERP is meeting its goals and objectives
 - Identify opportunities for improving performance of CERP
- Designed to be a single, integrated system-wide monitoring and assessment program that will be used as the primary means of measuring the performance of CERP



CERP Adaptive Management Framework



Integration and Synthesis



Principal Investigator Annual Report

- Cumulate and analyze MAP & non-Map data annually
- Evaluate design and data quality
- Provide initial level synthesis and interpretation

Module Group Annual Report

- Integrate and interpret MAP PI annual reports
- Review non-MAP information for inclusion in the assessment
- Provide module-level assessment of hypotheses and performance measures
- Review progress toward achieving Interim Goals
- Identify unexpected events

AT/IAT Annual System Status Report

- Provide an annually cumulated synthesis and interpretation across modules (system wide)
- Interpret monitoring results with respect to working hypotheses
- Review the progress toward achieving restoration goals

RECOVER 5-Year Technical Report

- Integrate and interpret the trends in findings from multiple annual AT/IAT system status reports
- Identify problems in system performance that require corrective action

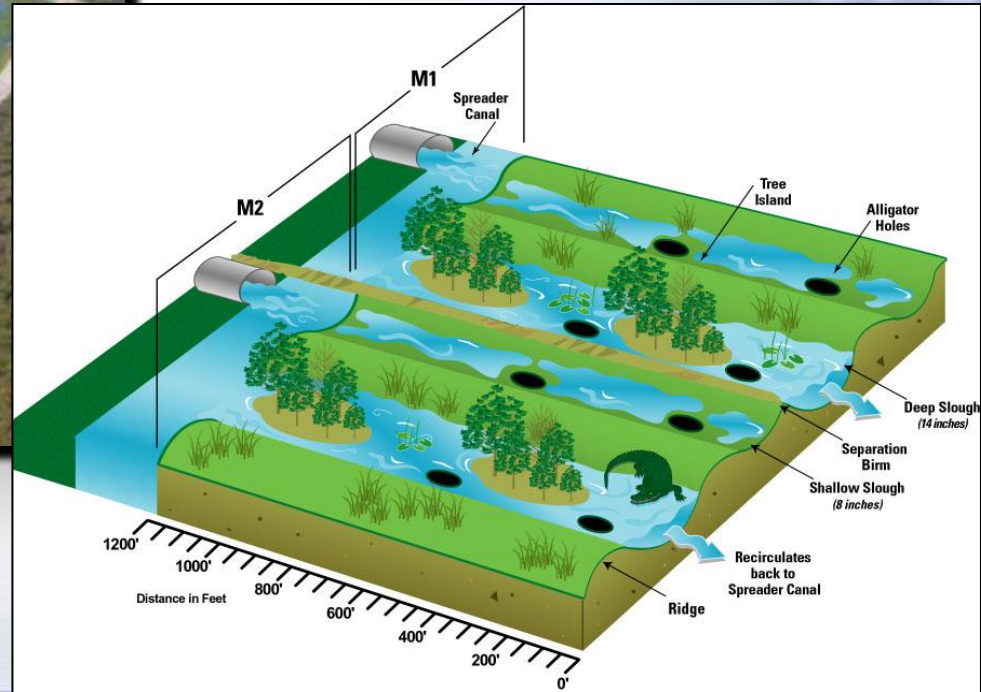
Interagency Assessment Report to Congress

Pilot Projects






Lake Okeechobee ASR	\$19,000,000
Caloosahatchee River (C-43) Basin ASR	\$ 6,000,000
Site 1 Impoundment and ASR	\$ 9,000,000
Lake Belt In-Ground Reservoir Technology	\$23,000,000
L-31N Seepage Management	\$10,000,000
Wastewater Reuse Technology	\$30,000,000
TOTAL	<u>\$97,000,000</u>

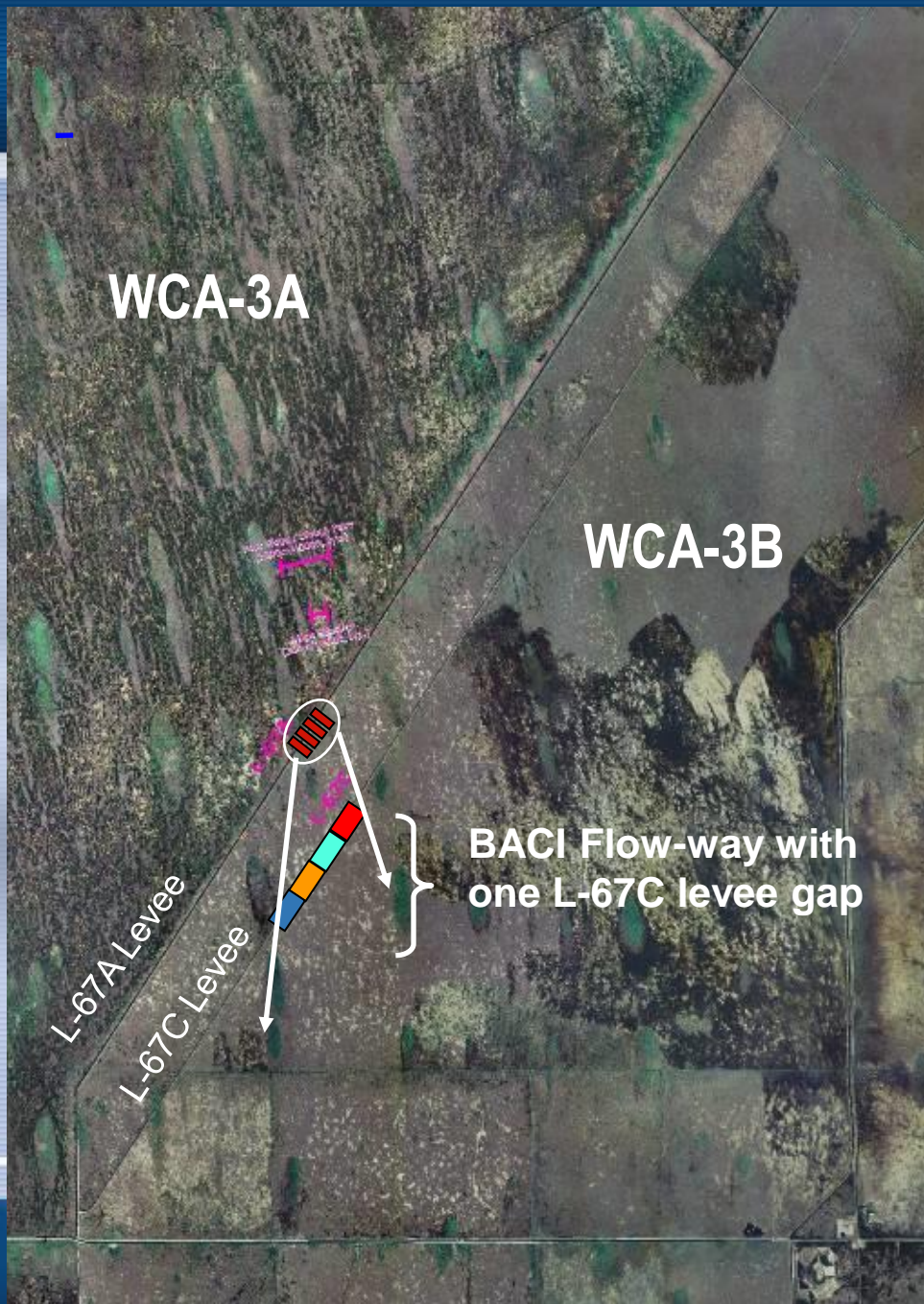


Loxahatchee Impoundment Landscape Assessment (LILA)



Decomp Physical Model

-  Levee gap & complete canal backfill
-  Levee gap & canal plug with boat channel
-  Levee gap & partial canal backfill
-  Levee gap & no canal backfill
-  Temporary gated culverts



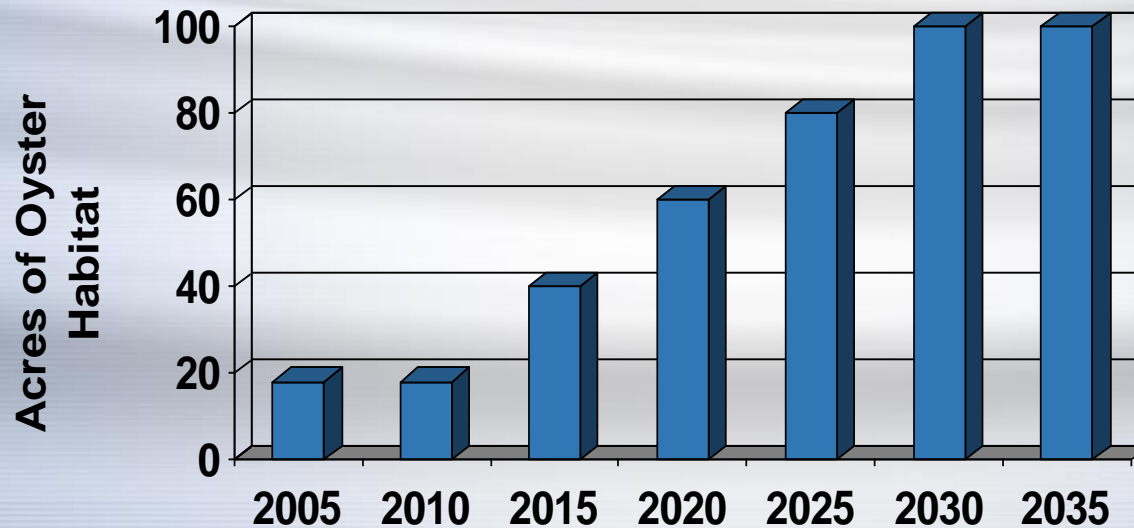
Independent Scientific Review



- NAS committee (CROGEE) reviewed science aspects of CERP from 1999-2004
- WRDA 2000 requires establishment of independent scientific review panel to review Plan's progress towards achieving natural system restoration goals and report to Congress
- Corps has contracted with NAS for committee (CISRERP) to conduct WRDA 2000 required science reviews
- CISRERP completed reports in 2006, 2008, 2010, and 2012


Interim Goals

Comparison of Oyster Habitat (acres) Change in the Caloosahatchee Estuary



System Status Report

- Hypothesis (What we expect from projects)
- Assess actual status of ecosystem
- Verify restoration success and/or performance issues
- New knowledge to adjust and improve implementation

Performance Measure	'00	'01	'02	'03	'04	'05	'06	'07	Current Status	
Total fish	G	G	R	R	R	R	R	R	Y	
Wading Bird Indicator Summary							R	R	Y	
Sea-grass Abundance							R	R	Y	Y
Sea-grass Target Species							Y	Y	G	G

Why Does Adaptive Management Fail?

- Lack of agency commitment
- Weak organizational infrastructure
- Unclear decision-making process
- Unfocused monitoring program
- High costs
- Lack of interagency cooperation
- Poor communication with management and stakeholders

Imagine the result

Questions?