



REStoration, COordination, VERification (RECOVER)

RECOVER and Adaptive Assessment and Monitoring

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RECOVER Executive Committee

RECOVER TOPIC WORKSHOP
July 19 & 20, 2023





SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE

LEADERSHIP • PARTNERSHIP • RESULTS

<u>Goal 1:</u> Get the Water Right	<u>Goal 2:</u> Restore, Preserve & Protect Natural Habitats & Species	<u>Goal 3:</u> Foster Compatibility of the Built & Natural Systems
Comprehensive Everglades Restoration Plan (CERP)	Habitat Protection and Restoration	Water Management
Non-CERP and Foundation Projects	Invasive Exotic Species	<ul style="list-style-type: none">• Water supply planning• Water conservation• Flood protection
Water Quality		
RESTORATION SCIENCE		



CERP is.....

INTEGRATED DELIVERY SCHEDULE 2022 UPDATE

SOUTH FLORIDA ECOSYSTEM RESTORATION | CENTRAL AND SOUTHERN FLORIDA COMPREHENSIVE EVERGLADES RESTORATION PLAN

The Comprehensive Everglades Restoration Plan (CERP) is the largest aquatic ecosystem restoration effort in the nation, spanning over 18,000 square miles, and is designed to improve the health of more than 2.4 million acres. The Integrated Delivery Schedule (IDS) is a forward-looking snapshot of upcoming planning, design, and construction schedules and programmatic costs at a "top" line level for the South Florida Ecosystem Restoration (SFER) Program - including CERF, Modified Water Deliveries to Everglades National Park, the Critical Projects Program, Kissimmee River Restoration, and non-CERF Central and Southern Florida (CASF) projects.

The IDS reflects the sequencing and construction and land acquisition. The IDS does not require an agency act. It is a tool that is updated as project priorities with the state, consistent with funding constraints and the interdependencies between the state of Florida and achieves the CERP restoration objectives needed to reflect progress and/or program changes. The state of Florida and achieves the CERP restoration objectives needed to reflect progress and/or program changes. The state of Florida and achieves the CERP restoration objectives needed to reflect progress and/or program changes.

Although non-CERP and Foundation projects upon which the CERP is dependent are reflected in the IDS schedule, they are not included in the funding scenario. These projects are funded through other program authorities or by other entities. Restoration projects by others are also not included but are considered during planning.

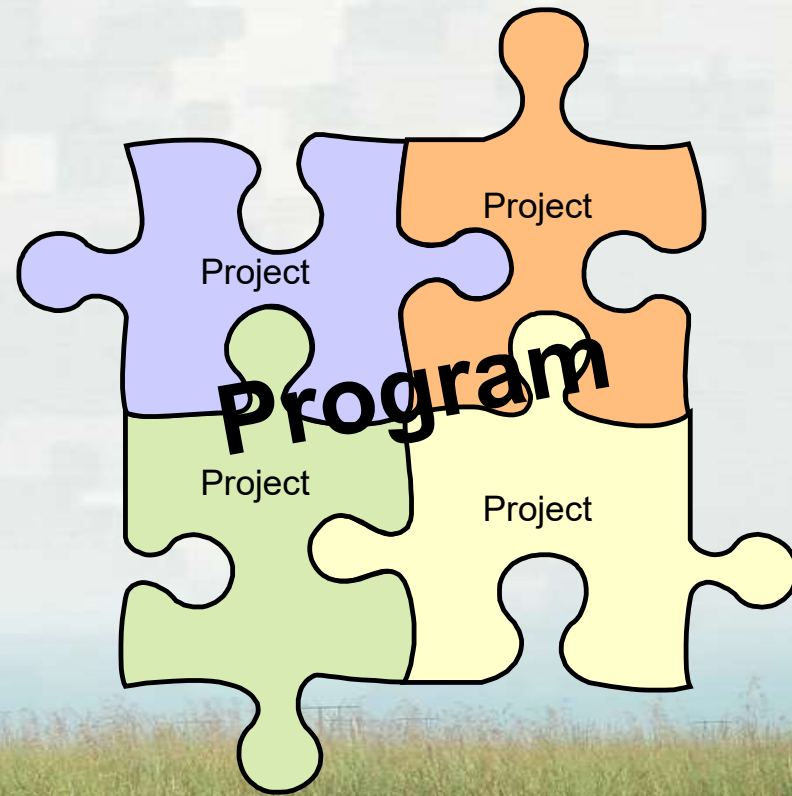
Note: The IDS serves the purpose of the Master Sequencing and Implementation Plan (MSIP) described in the original CERP plan (Yellow Book). Funding shown for Fiscal Year 24 (Fiscal Year, October 1 - September 30) and beyond is only national, representing approximate funding levels that would be needed to sustain the work displayed in the IDS for any particular fiscal year. The funding does not represent a commitment by the Administration to budget the amounts shown.

Projects completed in prior years have been removed from the 2022 IDS.

SOUTH FLORIDA ECOSYSTEM RESTORATION (SFER) INVESTMENT THROUGH FY2021 (Millions)				
	FEDERAL		NON-FEDERAL	GRAND TOTAL
	USACE	DOI	MULTIPLE AGENCIES	
Modified Water Deliveries to the Critical Projects	\$ 78	\$ 317	\$ 395	\$ 395
Kissimmee River Restoration	\$ 89	-	\$ 89	\$ 177
CASF Non-CERP	\$ 405	-	\$ 405	\$ 804
CASF CERF	\$ 774	\$ 52	\$ 826	\$ 1,053
CASF CERF to be cancelled	\$ 1,818	\$ 112	\$ 1,930	\$ 3,867
TOTAL SFER	\$ 3,163	\$ 482	\$ 3,645	\$ 7,463
Herbert Hoover Dike Restoration Strategies and ECP	\$ 1,504	-	\$ 1,504	\$ 1,504
Restoration Strategies and ECP	-	-	\$ 2,229	\$ 2,229

SCAN THIS CODE FOR QUICK ACCESS TO A DIGITAL COPY OF THE IDS

PROJECT LOCATION	PROJECT	YELLOW BOOK COMPONENT	FISCAL YEAR (DOLLARS IN MILLIONS)														
			2021	2022 W	2023	2024 W	2025	2026 W	2027	2028 W	2029	2030 W	2031	2032 W	2033		
	Planning Estimates Federal Construction Cost (SFER)**		\$ 250	\$ 352	\$ 1,128												
	Planning Estimates Non-Federal Construction Cost (SFER)**		\$ 238	\$ 332	\$ 1,343	\$ 1,386	\$ 1,157	\$ 840	\$ 894	\$ 849	\$ 484	\$ 278	\$ 138	\$ 25	\$ 25		
	Planning Estimates Total Construction Cost (SFER)**		\$ 508	\$ 679	\$ 2,471												
		NON-CERP AND FOUNDATION															
P2	Herbert Hoover Dike*																
P3	Lake Okeechobee System Operating Manual*																
P4	Restoration Strategies*																
P5	Tombigbee Trail Next Steps (TINS) Phase 2*																
P6	Kissimmee River Restoration (KRR) Construction																
P6	KRR Development of Operational Transition Plan/Evaluation Monitoring	N/A - Non-CERP															



An integrated program

OUTLINE

- RECOVER
- Adaptive Assessment and Monitoring
- Conceptual Ecological Models
- Hypothesis Clusters
- Monitoring and Assessment Plan

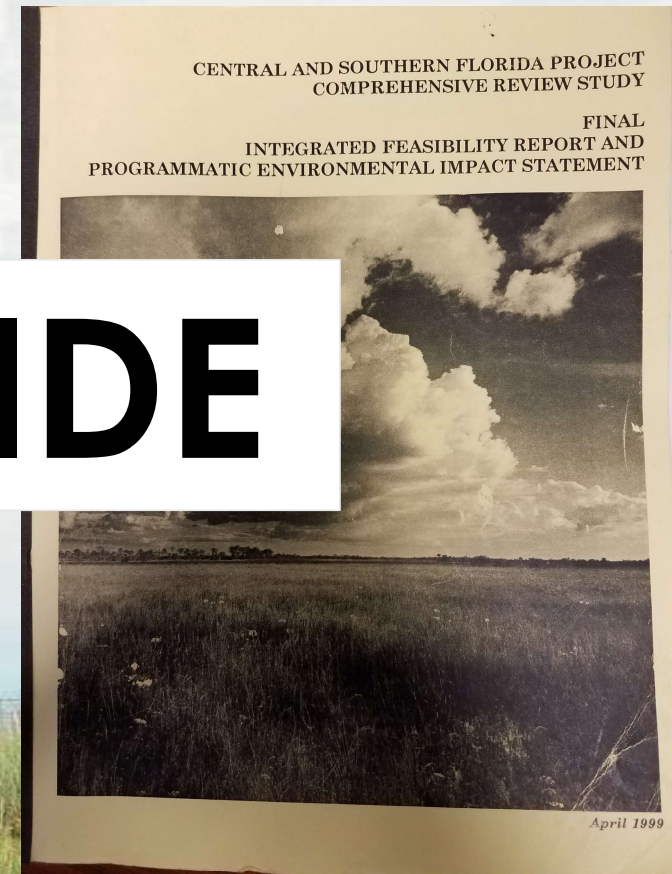


RECOVER



RECOVER

- Interagency, interdisciplinary team of scientists, modelers, planners, and resource specialists
- Organize and apply scientific and technical information to make the Comprehensive Everglades Restoration Plan (CERP) **SYSTEM-WIDE**
- Foundation in Restudy
- Described in Yellow Book
- First meeting in 1999
- Codified in WRDA 2000 and 2003 Programmatic Regulations



RECOVER COMMUNITY

- USACE and SFWMD Program Manager



- Partner entities



- Additional scientific and technical expertise



Adaptive Assessment and Monitoring



ADAPTIVE ASSESSMENT AND MONITORING

- Design a monitoring program to measure status and trends towards achieving the goals and purposes of the Plan
- Conduct monitoring activities
- Develop an adaptive assessment program to assess responses of the system to implementation of the Plan
- Determine if measured responses are reaching Interim Goals/Interim Targets
- Evaluate if corrective actions to improve performance or cost should be considered



ADAPTIVE ASSESSMENT AND MONITORING

Applied Science Strategy

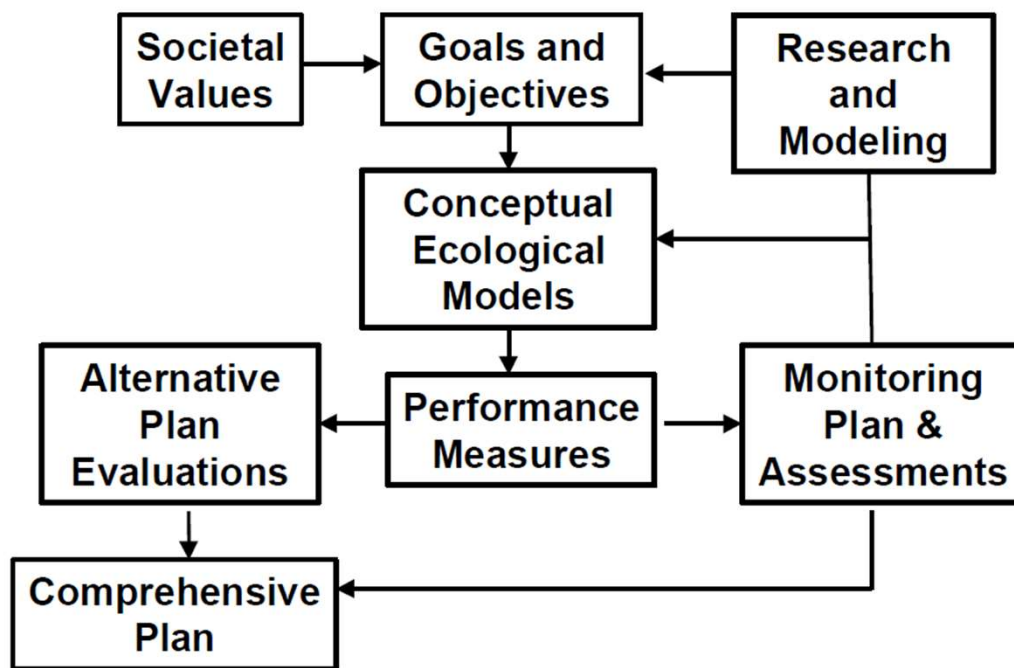


Figure 1-2: Applied Science Strategy



Conceptual Ecological Models



CONCEPTUAL ECOLOGICAL MODELS

- Non-quantitative planning tools
- Identify
 - Major anthropogenic drivers and stressors
 - Ecological effects
 - Biological attributes or indicators
- Primary communication, planning, and assessment link among scientists and policy makers
- Show how the natural system has been altered by human stressors
- Provide information to focus CERP efforts



CONCEPTUAL ECOLOGICAL MODELS

- First work in 1995
- Refined 2001
- Published 2005

Draft updates 2023

WETLANDS, Vol. 25, No. 4, December 2005, pp. 795–809
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THE USE OF CONCEPTUAL ECOLOGICAL MODELS TO GUIDE ECOSYSTEM RESTORATION IN SOUTH FLORIDA

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CONCEPTUAL ECOLOGICAL MODELS

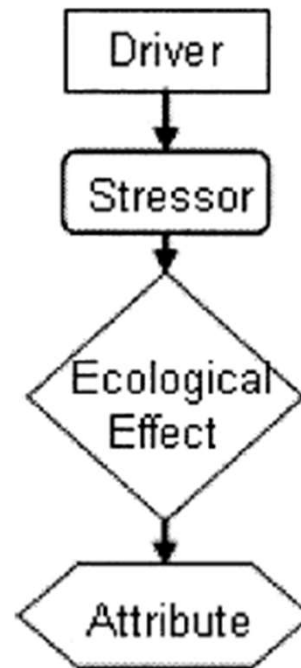


Figure 3. Simplified diagram of a conceptual ecological model.



CONCEPTUAL ECOLOGICAL MODELS

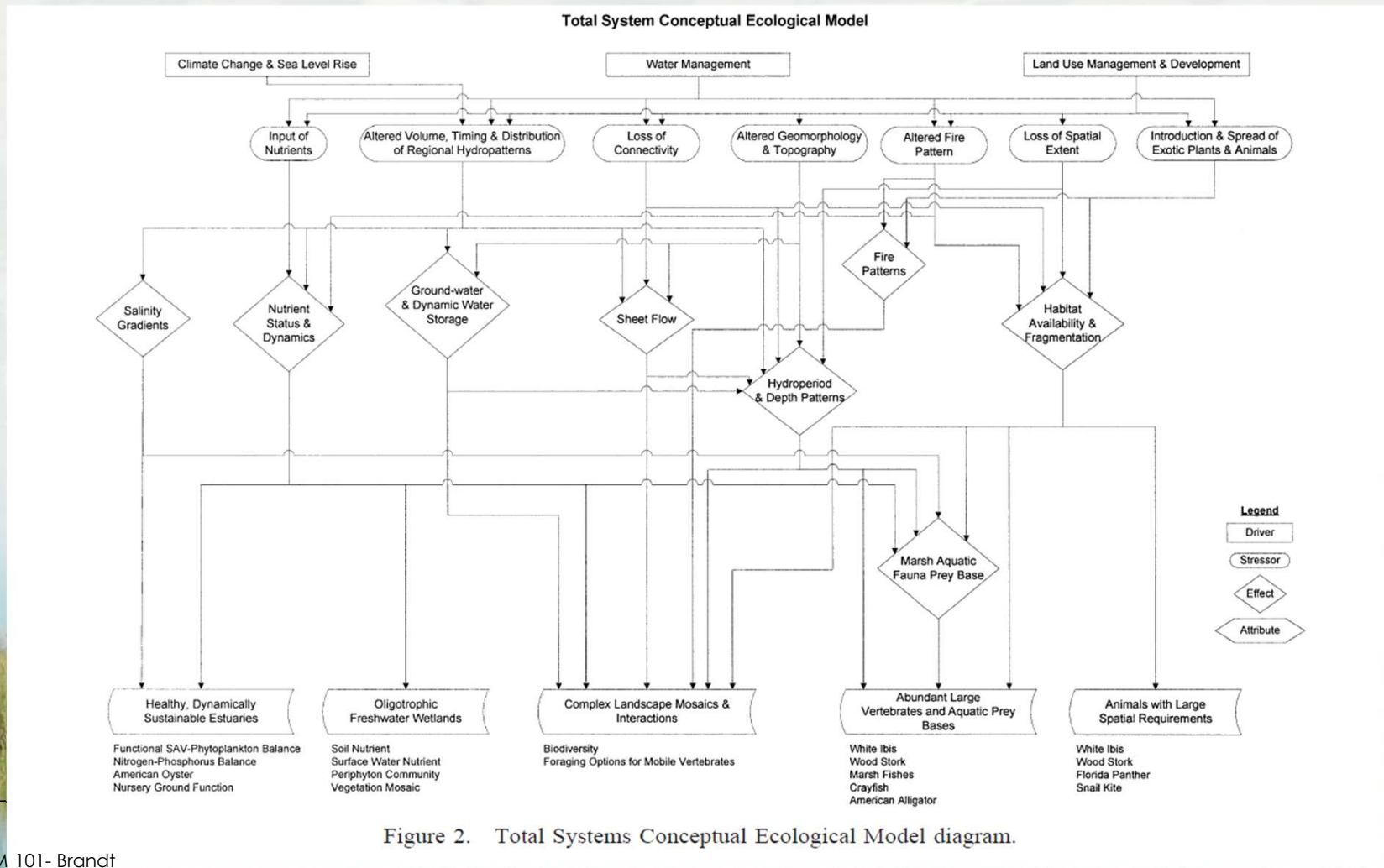


Figure 2. Total Systems Conceptual Ecological Model diagram.



Hypothesis Clusters



HYPOTHESIS CLUSTERS

- Causal relationships among ecosystem components and describe how these relationships are expected to change with restoration
- Set up as CERP expectations
- If we do X, then we expect Y to happen

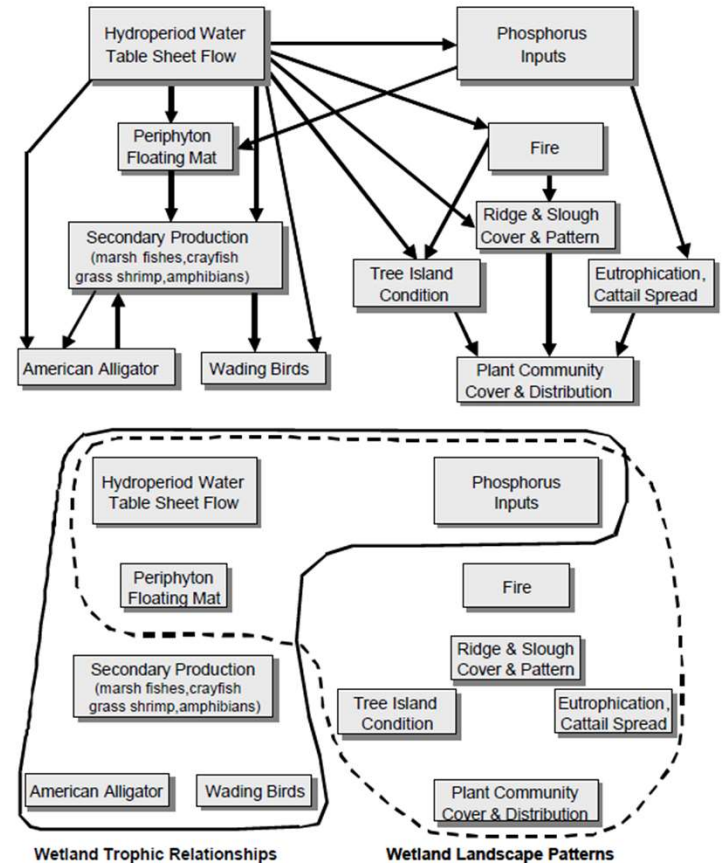


Figure 3-2: Simplified Conceptual Ecological Model to Reflect Expected CERP Influences in Everglades Ridge and Slough



3.1.2.5 American Alligator (Figure 3-12)

Ecological Premise: The distribution and reproduction of American alligator populations have been reduced as a result of altered hydrologic conditions and the reduced abundance and accessibility of prey organisms that accompany the hydrologic alterations.

CERP Hypotheses: The restoration of hydrology toward NSM conditions will result in the following:

- Expand the distribution of reproducing alligators and alligator holes to the southern marl prairies and restore the keystone role of alligator holes as drought refugia for aquatic fauna in that region
- Provide salinity regimes that are favorable for expansion of populations of reproducing alligators into the mangrove estuary
- Sustain current populations of reproducing alligators in the ridge and slough landscape

Adaptive Management Question: Will the restoration of NSM conditions achieve these objectives? If not, how and to what extent do we modify the physical structure and hydrology of the system to restore populations of the alligator in regions where they were formerly abundant by reestablishing both their wetland habitat requirements and the abundance and accessibility of their prey?

**Conceptual
Ecological Model**



Ecological Premise



Hypotheses Cluster



**Performance
Measure**

Monitoring



Plan Projects

**Implement
Projects**



Inform and Adapt



Monitoring and Assessment Plan



MONITORING AND ASSESSMENT PLAN

MARCH 29, 2001

MONITORING AND ASSESSMENT PLAN

COMPREHENSIVE EVERGLADES RESTORATION PLAN



U.S. Army Corps of Engineers
Jacksonville District



South Florida
Water Management District

January 2004

CERP MONITORING AND ASSESSMENT PLAN: PART 1 MONITORING AND SUPPORTING RESEARCH

December 2006

Monitoring and Assessment Plan (MAP), Part 2 2006 Assessment Strategy for the MAP

Final Draft



Prepared By:

RESTORATION COORDINATION & VERIFICATION
(RECOVER)

INTEGRATIVE ASSESSMENT SUB-TEAM

CERP MONITORING AND ASSESSMENT PLAN



Restoration Coordination and VERIFICATION (RECOVER)



Comprehensive Everglades Restoration Plan

Central and Southern Florida Project

Revised
December 2009



MAP 2001

- Single integrated system-wide monitoring and assessment plan
- Four broad objectives
 - Establish base-line variability
 - Determine the status and trends
 - Detect unexpected responses
 - Cause-and-effect scientific investigations
- Described the process for determining what should be monitored
- Presented Conceptual Ecological Models
- Presented performance measure documentation sheets
- Described research and modeling support for Adaptive Management



MAP 2001 – MAP 2004

- Development of “packages” which became Hypothesis Clusters
- Focus on system-wide attributes
- Recognized need for project level monitoring to address some attributes
- Further discussion of how to balance different spatial and temporal scale needs
- Considered top down and bottom up to link regional, index, and transect sites
- Identified need for package teams of experts to coordinate sampling design, implementation, and assessment



MAP 2004

- Result of second public and agency review of March 2003 draft
- Reiterated
 - Focus on monitoring for CERP
 - System-wide focus
 - Need for project level monitoring
 - Need for other restoration monitoring



MAP 2004

- During the development of the MAP, the Adaptive Assessment Team relied upon two key assumptions that are critical to the success of the performance assessment process:
 - Existing monitoring will continue with existing funding sources (i.e., the MAP should not replace ongoing agency efforts that are essential to the plan implementation). These monitoring efforts are presented in Table 1-1
 - Partnering agencies will contribute funding and/or will participate in implementation of the MAP



MAP Assumption: Existing monitoring will continue with existing funding sources (i.e., the MAP should not replace ongoing agency efforts that are essential to the plan implementation). These monitoring efforts are presented in Table 1-1

Table includes 43 Components

Table 1-1: Summary of Existing Monitoring and Responsible Agencies

Map Component	Activity	Funding Source
Greater Everglades Wetlands		
Interior Gradients of Water Quality (3.1.3.1)	Water Conservation Area (WCA) Water Quality Monitoring Network	South Florida Water Management District (SFWMD)
	404 Permit Monitoring	SFWMD
	Everglades National Park Water Quality Monitoring Network	Everglades National Park
Coastal Gradients of Flow, Salinity, and Nutrients (3.1.3.3)	Tidal Creek Monitoring Stations Established. Prior to 2003	United States Geological Survey (USGS)

Table 1-1: Summary of Existing Monitoring and Responsible Agencies (Continued)

Map Component	Activity	Funding Source
Mangrove Forest Soil Accretion (3.1.3.9)	Sediment Elevation Sites In Mangrove Estuary Established. Prior to 2005	USGS
Aquatic Fauna Regional Populations (3.1.3.10)	Throw-trap sampling and Electrofishing at Long-term Sites in Shark River and Taylor Sloughs and WCA3A&B	Everglades National Park
	Drop-trap Sampling at Long-term Sites in Florida Bay Mangrove Zone	United States Army Corps of Engineers (USACE)/ Everglades National Park
	Drop-trap Sampling at Long-term Sites in Biscayne Bay Mangrove Zone	SFWMD/ National Marine Fisheries Service (NMFS)
Wading Bird Foraging Distribution and Abundance (3.1.3.12)	ENP Systematic Reconnaissance Flight	Everglades National Park
	WCA and Big Cypress Systematic Reconnaissance Flights	USACE
Wading Bird Nesting Colony Location, Size, and Timing (3.1.3.13)	Aerial Surveys in ENP	Everglades National Park
Productivity in Coastal Ecotone: Sea Level and CERP Influences (3.1.4.3)	Florida Coastal Long-term Ecological Research Program (LTER)	National Science Foundation /SFWMD
Ridge and Slough Landscape Sustainability (3.1.4.4)	Tree Island Research in ENP	Everglades National Park
	Tree Island Research in WCA3A and 3B	SFWMD
	Everglades Landscape Model (ELM)	SFWMD
	Loxahatchee Impoundment Landscape Assessment (LILA)	SFWMD
Southern Estuaries		
Water Quality and Phytoplankton Monitoring Network (3.2.3.1)	Water Quality Monitoring Network	SFWMD
Water Quality and Phytoplankton Monitoring Network (3.2.3.1) and Salinity Monitoring Network (3.2.3.2)	Interdisciplinary Sustained Coastal Observations (CTD casts/synoptic surveys/in situ instruments)	NOAA
	Florida Bay Salinity Platform Network	Everglades National Park
South Florida Fish Habitat Assessment Program (3.2.3.3)	South Florida Habitat Assessment Program	Critical Ecosystems Studies Initiatives
Seagrass Fish, Pink Shrimp, and Invertebrate Assessment Network (3.2.3.5)	Pink Shrimp Fisheries Assessment (CPUE/Model)	National Oceanic and Atmospheric Administration (NOAA)



MAP 2009

- MAP 2004 was refined in response to:
 - Recommendations from the National Research Council
 - Completion of the 2006 and 2007 System Status Reports
 - Incorporation of CERP project-level monitoring into the MAP
 - Uncertainties regarding funding for the MAP
 - Slowdown in other complementary monitoring programs
 - Delays in the Integrated Delivery Schedule



MAP 2009

- Refinements included expansion to include linkages with
 - Adaptive Management
 - Interim Goals
 - Project-level assessments
 - MAP sustainability



FUNDING

- Initial WRDA 2000 authorization included “10 million for 10 years”
- Funding became available in 2001
- Most MAP funded monitoring in place by 2004

- 2007-2011: average \$10.5M, ranging between \$9-11M



FUNDING

2011 Budget Cuts

- 2012-2017: average \$5.4M, ranging between \$4-7M
- 2018-2022: average \$5.5M, ranging between \$5-7M



SUMMARY

- A lot of deliberate thought went into selection of things to be included in the MAP
- Adjustments were made in 2009 based on information learned
- Reductions in MAP monitoring were made in 2012 because of a reduction in AA&M funding
- Assumption has always been that partner entities would contribute to monitoring as fit with their mission(s) and responsibilities



THIS WORKSHOP

- Forum to identify current science and monitoring efforts and future science and monitoring needs across South Florida to address outstanding uncertainties and assess Comprehensive Everglades Restoration Plan (CERP) success.
- The information gained at this workshop will inform the future REstoration, COordination and VERification (RECOVER) Monitoring and Assessment Plan (MAP) Update

