

CENTRAL EVERGLADES PLANNING PROJECT



December 16, 2011

WORKING
GROUP
SPONSORED
WORKSHOP

PRESENTED BY

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District

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Management District

CENTRAL EVERGLADES PLANNING PROJECT



December 16, 2011

PROJECT DELIVERY TEAM MEETING

PRESENTED BY

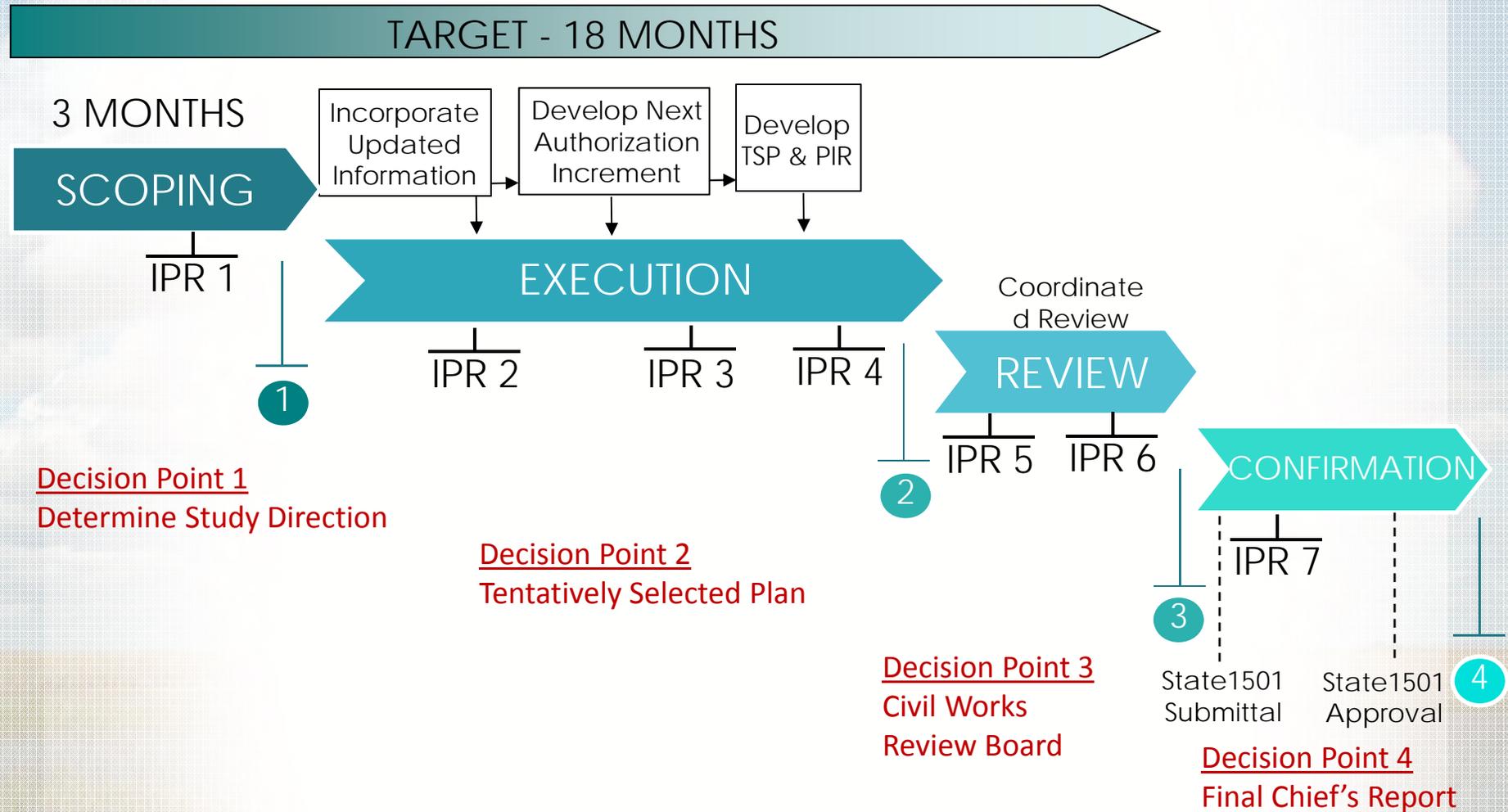
Bradley Foster,
U.S. Army Corps of
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Matt Morrison,
South Florida Water
Management District

Topics

- USACE Planning Process
- Problems and Opportunities
- Goals and Objectives
- Planning Constraints
- Other Considerations
- Planning Assumptions
- Ecological Evaluation Tools
- Next Steps

CEPP and NEPA Process



IPR: In-Progress Review

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USACE
PLANNING
PROCESS

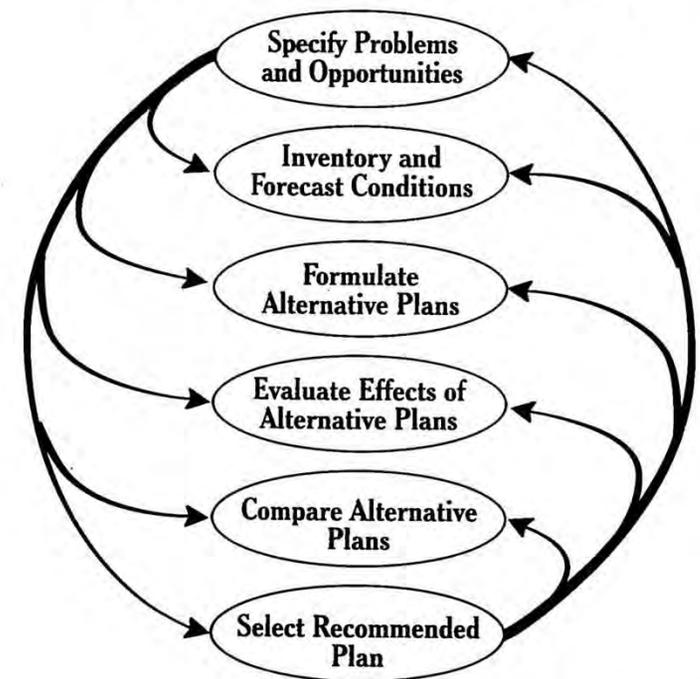


USACE Planning Process

The six steps of the planning process

1. Specify Problems & Opportunities
2. Inventory & Forecast Conditions
3. Formulate Alternative Plans
4. Evaluate Effects of Alternative Plans
5. Compare Alternative Plans
6. Selection Recommended Plan

PLANNING PROCESS



USACE Planning Process

Step 1: Specify Problems and Opportunities

- Problems: negative
- Opportunities: positive

- Problems and opportunities are the basis for the planning objectives

USACE Planning Process

Step 2: Inventory and Forecast

- Inventory the Existing Condition
- Helps establish and document problems and opportunities
- Much data can be assembled
- Not all data provide important information to decision-making
- Focus on the critical features most relevant for evaluating and comparing the effects of alternatives

USACE Planning Process

Step 2: Inventory and Forecast

- Forecast the Future Without Project Condition
- General Rule: Describe the future condition that is likely to occur in the absence of any public attempt to respond to the planning objectives
- Usually more than a snapshot of a single time; it describes changes through the period of analysis
- Helps establish and document problems and opportunities
- Essential for evaluation and comparison of alternative plans
- Same as “No Action” for NEPA purposes

USACE Planning Process

(Step 1 or 2): Planning Objectives/Constraints

- Planning Objective – A statement of what an alternative plan should achieve. It is more specific than an overall goal.
- Objectives are what you are working towards
- Planning Constraint – A statement describing what an alternative plan cannot produce or do. Constraints limit the extent of the planning process.

USACE Planning Process

(Step 1 or 2): Planning Objectives/Constraints

- Objectives are developed from the problems & opportunities (Step 1) and the inventory & forecast (Step 2).
- Both objectives and constraints are unique to each planning study and should be specific to the planning area.
- Objectives and constraints that are unique to the study area will result in better plan formulation
- Objectives and constraints indicate what is important to people

USACE Planning Process

Step 3: Formulate Alternative Plans

- Doing nothing is always the default action
- Management Measures – a feature or activity at a site
- Alternative Plan - one or more management measures
- Management measures and alternative plans must address one or more of the planning objectives or constraints

USACE Planning Process

- Step 4: Evaluate Alternative Plans
 - Performance Measures and Modeling (evaluation tools) **will be discussed today**
 - Compare Future Without Project condition to Future With Alternative Plans conditions – more on this in future meetings
- Step 5: Compare Alternatives Plans – deferred to future meetings
- Step 6: Select Recommended Plan – deferred to future meetings

CENTRAL EVERGLADES PLANNING PROJECT

PROBLEMS AND
OPPORTUNITIES



Problems and Opportunities Northern Estuaries

- Problems
 - High volume flood control releases from Lake Okeechobee and local basin run-off
 - Extreme Salinity Fluctuations
 - Degraded Water Quality (nutrients, sediments, contaminants, algal blooms)
 - Stressed Submerged Aquatic Vegetation
 - Reduced Oyster Survival and Recruitment

Problems and Opportunities Northern Estuaries

- Opportunities

- Reduce high volume regulatory releases from Lake Okeechobee
- Reduce magnitude or duration of adverse salinity fluctuations
- Improve water quality conditions and reduce sediment loads
- Reduce impacts to oyster and submerged aquatic vegetation habitats within the St. Lucie and Caloosahatchee estuaries

Problems and Opportunities

Water Conservation Area 3

- Problems
 - Hydropattern and hydroperiod disruption
 - Lack of sheetflow
 - Too deep for too long in portions of south end (ponding)
 - Extreme low water events, especially in the north end
 - Unnatural accession and recession rates(reversals)
 - Low flow velocities
 - Seepage losses to the east

Problems and Opportunities

Water Conservation Area 3

- Problems (cont.)
 - Degraded water and soil quality
 - Loss of ridge and slough topography
 - Shifts in vegetative communities
 - Soil subsidence caused by over-drying and muck fires
 - Tree Island habitat loss due to flooding and over-drying
 - Reduced wading bird and snail kite foraging
 - Exotic species

Problems and Opportunities

Water Conservation Area 3

- Opportunities

- Improve hydroperiod and hydroperiod
- Improve water and soil quality
- Revitalize ridge, slough and tree island topography and habitat
- Restore native vegetative communities
- Reduce soil subsidence
- Increase wading bird and snail kite foraging, nesting and natural distribution
- Manage seepage losses to the east
- Decrease exotic species refugia

Problems and Opportunities Everglades National Park

- Problems

- Poor hydroperiods and lack of deepwater sloughs
- Excessive dry outs
- Seepage losses
- Peat subsidence
- Muck fires
- Altered vegetative communities
- Reduced foraging opportunities
- Reduced nesting success and breeding populations of wading birds

Problems and Opportunities Everglades National Park

- Opportunities

- Re-establish tree islands and other landscape characteristics that are important for the unique species of the Everglades system
- Increase the availability of fish and amphibians that serve as essential prey sources for many predators in the ecosystem
- Raise productivity in the ecosystem and restore a healthier, natural pattern of vegetation
- Repair the inconsistently flooded landscape that produces severe fires and encourages soil subsidence
- Increase habitat function and maintain the unique plant and animal diversity that defines the Everglades

Problems and Opportunities Southern Estuaries

- Problems

- Water quantity and high estuarine salinity
- Saltwater intrusion in surface wetlands, soils (inland mangrove expansion) and groundwater
- Degraded water quality (algal blooms)
- Habitat degradation
- SAV loss of cover and diversity
- Reduction in fish and invertebrate populations
- Reduced Spoonbill foraging and nesting

Problems and Opportunities Southern Estuaries

- Opportunities

- Improve delivery of freshwater flow and resultant estuarine salinity
- Reduce rate of saltwater intrusion in surface wetlands, soils and groundwater
- Maintain or improve water quality
- Improve habitat (coastal wetlands, SAV)
- Improve fish and invertebrate populations
- Increase Spoonbill foraging and nesting

CENTRAL EVERGLADES PLANNING PROJECT

GOALS AND
OBJECTIVES



Planning Goals

The goal of the CEPP is to improve the quantity, quality, timing and distribution of water in the Northern Estuaries, Water Conservation Area 3, and Everglades National Park in order to restore the hydrology, habitat and functions of the natural system.

Planning Objectives

- Restore seasonal hydroperiods and freshwater distribution that support a natural mosaic of wetland and upland habitat in the Central Everglades system
- Improve sheet flow patterns and surface water depths and durations in order to reduce soil subsidence, frequency of damaging fires, decline of tree islands and decrease saltwater intrusion
- Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization

Planning Objectives (cont.)

- Restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function
- Reduce high volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the northern estuaries

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PLANNING
CONSTRAINTS



Planning Constraints

- Section 601(h)(5) of WRDA 2000 and Chapter 373.1501(4)(d), F.S.
 - Avoid any reduction in levels of service for flood protection existing as of December 2000 caused by Plan implementation
 - Provide replacement sources of water of comparable quantity and quality for existing legal users required for Plan implementation
- Lake Okeechobee Regulation Schedule – LORS 2008
- Meet applicable Water Quality Standards

CENTRAL EVERGLADES PLANNING PROJECT

OTHER
CONSIDERATIONS



Other Considerations

- Focus on lands purchased for CERP
- Maximize available CERP cost-share
- Minimize adverse effects to federally listed species under the Endangered Species Act
- Minimize adverse effects to state listed endangered or threatened species or species of special concern consistent with Florida Statutes and regulations
- Migratory Bird Treaty Act Compliance
- Agricultural Chemical Impacted Soils
- Cultural Resources
- Recreation
- Prime and Unique Farmlands
- Environmental Justice

CENTRAL EVERGLADES PLANNING PROJECT

PLANNING
ASSUMPTIONS



Planning Assumptions

- Existing Conditions Base (ECB) – 2010/2011
 - Land use & water supply demands based on recent data sources (2008 to 2010)
 - Lake Okeechobee Regulation Schedule – LORS 2008
 - Currently constructed Stormwater Treatment Areas (STAs)
 - Existing Water Conservation Area (WCA) regulation schedules and Interim Operating Plan (IOP)
- Future Without Project Condition (FWO) – 2050
 - Land use & water supply demands based on future projections
 - Lake Okeechobee Regulation Schedule – LORS 2008
 - Additional water quality remedies
 - Modified Water Deliveries Components, 1-mile Tamiami Trail Bridge & operational changes.
 - First and Second Generation CERP Projects
- Future With Project Condition (FWPC) – 2050
 - Future Without Project Conditions plus project features and operations (multiple alternatives)
- Plan Formulation and Benefit Calculations
 - Compare and Contrast – Future Without Project Condition (FWO) against Future With Project Condition (FWPC) alternatives

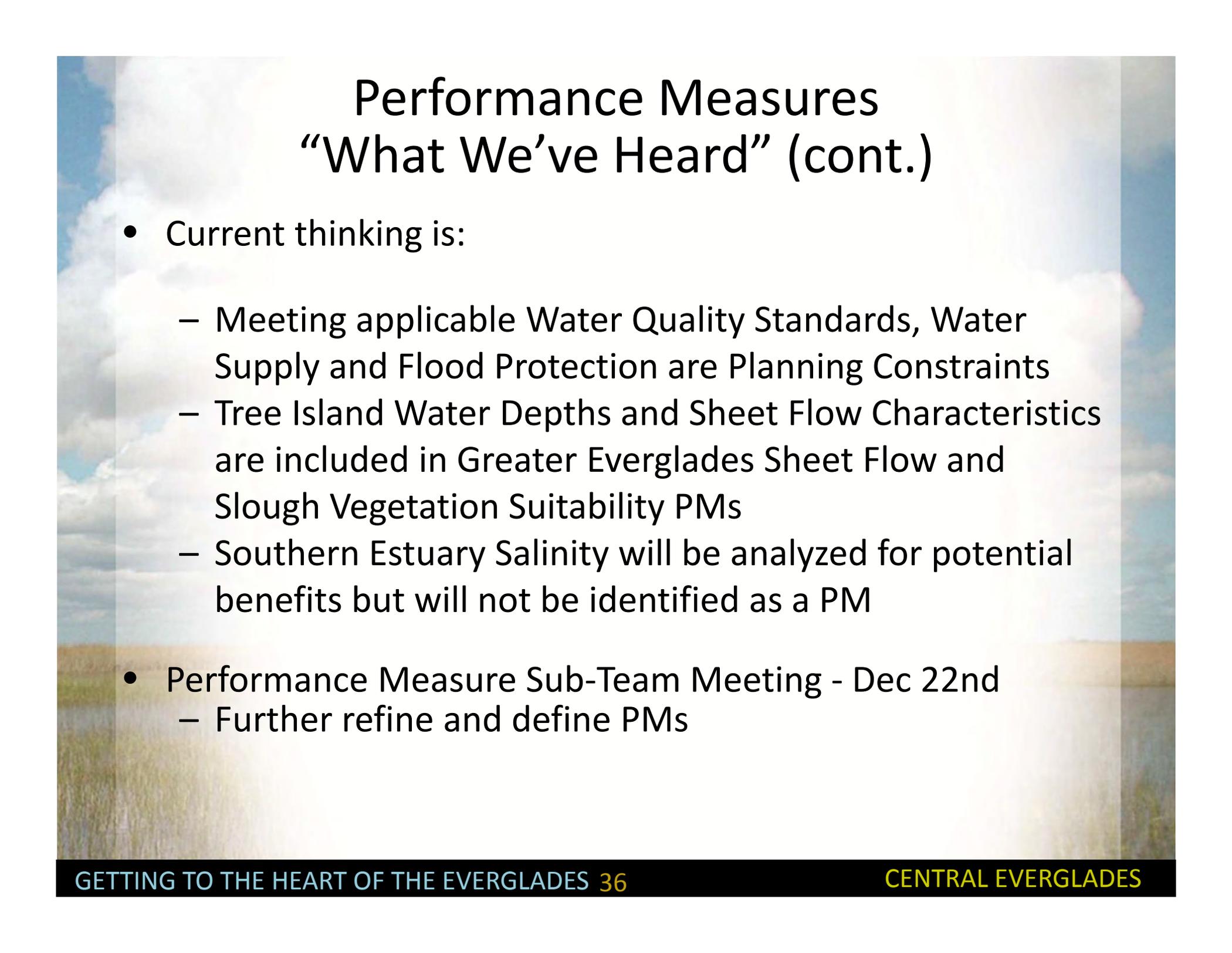
Performance Measures

- Performance measures are indicators of conditions in the natural system that have been determined to be characteristic of a healthy restored ecosystem
- Used to predict performance of alternative plans
- Identified preliminary list of project performance measures to be used in planning effort
 - Previously used in CERP
 - Include system system-wide performance measures reviewed by RECOVER
- Intent is to comprehensively evaluate aspects of system in a concise manner
- Use of RECOVER approved PMs will significantly reduce peer review time and facilitate concurrence of project performance measures from ECO- Planning Center of Expertise

Performance Measures

“What We’ve Heard”

- Preliminary Performance Measures presented at November 30th PDT and Working Group Meetings
- Recommendations to include Performance Measures for:
 - Water Quality
 - Water Supply
 - Flood Protection
 - Tree Island Water Depths
 - Sheet Flow Characteristics (Direction and Velocity)
 - Southern Estuary Salinity



Performance Measures

“What We’ve Heard” (cont.)

- Current thinking is:
 - Meeting applicable Water Quality Standards, Water Supply and Flood Protection are Planning Constraints
 - Tree Island Water Depths and Sheet Flow Characteristics are included in Greater Everglades Sheet Flow and Slough Vegetation Suitability PMs
 - Southern Estuary Salinity will be analyzed for potential benefits but will not be identified as a PM
- Performance Measure Sub-Team Meeting - Dec 22nd
 - Further refine and define PMs

Performance Measures

Planning Region	Performance Measure	Description
Lake Okeechobee	Lake Stage	Measure of optimum stages for Lake Okeechobee littoral zone health.
Northern Estuaries	Salinity Envelopes	Measure of suitability for oyster and sea grass habitat based on frequency of flows from S-79 and S-80.
Greater Everglades	Hydrologic Surrogate for Soil Oxidation	Measure of cumulative drought intensity to reduce exposure of peat to oxidation.
	Inundation Pattern in Greater Everglades Wetlands	Measure of the number and duration of inundation events used to calculate the percent period of record of inundation.
	Number and Duration of Dry Events in Shark River Slough	Measure of the number of times and mean duration in weeks that water drops below ground.
	Sheet flow in the Everglades Ridge and Slough Landscape	Measure of the timing and distribution of sheet flow across the landscape.
	Slough Vegetation Suitability	Measure to evaluate the hydrologic suitability for slough vegetation.

Performance Measures

Performance Measure	OBJ 1: Restore seasonal hydroperiods and freshwater distribution that support a natural mosaic of wetland and upland habitat in the Everglades System.	OBJ 2: Improve sheet flow patterns and surface water depths and durations in order to reduce soil subsidence, frequency of damaging fires, and decline of tree islands.	OBJ 3: Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization.	OBJ 4: Restore more natural water level responses to rainfall predicted by project modeling that will promote plant and animal diversity and habitat function.	OBJ 5: Increase oyster habitat and sea grass populations in the Northern Estuaries by reducing salinity fluctuations from freshwater regulatory pulse discharges.
Lake Stage					X
Salinity Envelopes					X
Soil Oxidation	X	X	X		
Inundation Pattern	X	X	X	X	
Number and Duration of Dry Events	X	X	X	X	
Sheet flow	X	X		X	
Slough Vegetation Suitability	X	X			

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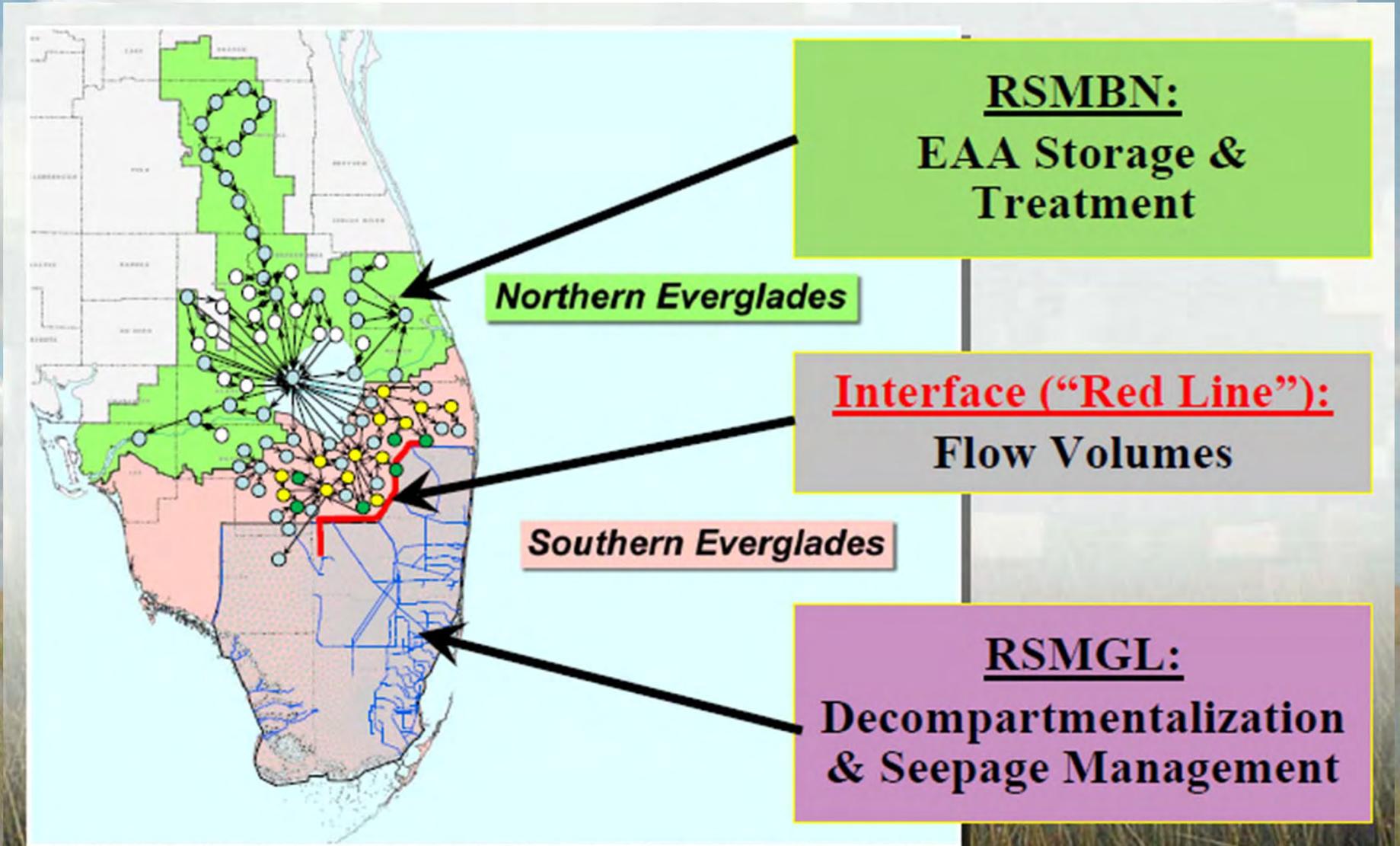
ECOLOGICAL
EVALUATION
TOOLS



Ecological Evaluation Tools and Techniques Under Consideration

1. Utilize planning tools recently developed by the SFWMD Expedited Planning Process (*i.e.* Everglades Viewing Windows, Thermometer Graphics) for preliminary screening of project alternatives.
 - Quickly test performance of alternative configurations and scenarios to identify feasible ideas for further in-depth analysis.
2. Utilize methodology recently developed in Decomp PIR 1 for quantification of habitat units (HU) for final array of project alternatives.

Decoupled Modeling Approach

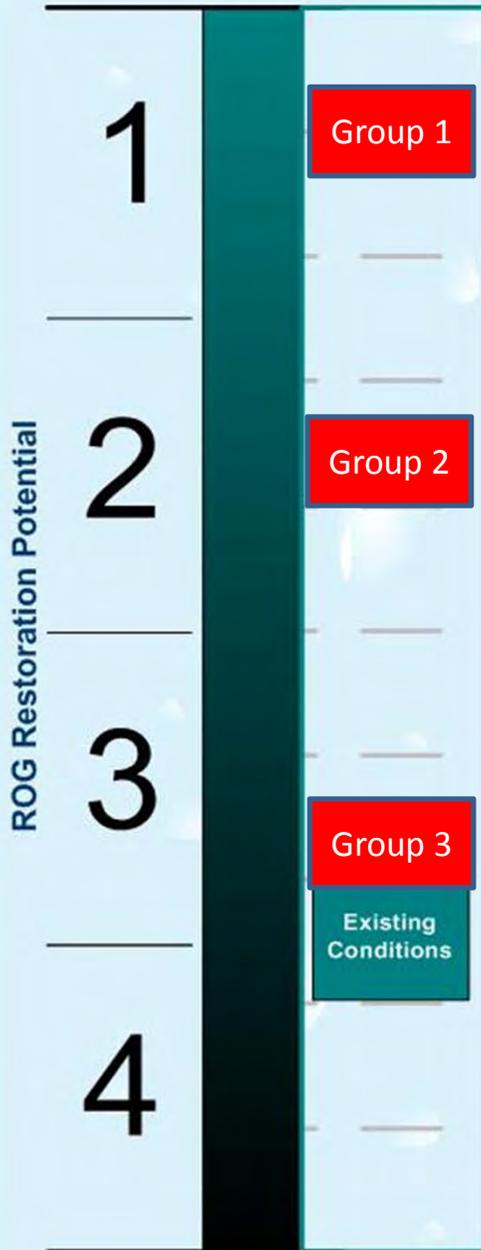


Ecological Evaluation Tools and Techniques Under Consideration

- Ecological performance measured as a function of “Restoration Potential”
 - Northern Estuaries
 - Lake Okeechobee
 - Everglades
 - Southern Estuaries

		Northern Estuaries	Lake Okeechobee	Everglades	Southern Estuaries
ROG Restoration Potential	1 Trajectory for recovery and sustainability				
	2 Improvement, conditions sub-optimal but sustainable		Existing Conditions		
	3 “Tipping Point” extended declining trajectory	Existing Conditions			
	4 Declining trajectory, irreversible damage			Existing Conditions	Existing Conditions

Everglades



Predrainage Conditions

- Water moves as unobstructed sheet flow over full width of remaining landscape.
- Long term average water depths match pre-drainage depths and depths and flows vary according to pre-drainage linkage to weather variation.
- Depths and flows sustain peat processes and in turn sustain shapes, elevations, and vegetation of ridge and tree islands.
- Populations of large multi-year fish persist; wading bird prey base present.
- Flows into Florida Bay continue through most of the year, preventing hyper-salinity and sustaining diverse submerged aquatic vegetation, fish and shrimp.

Ecologically Sub-Optimal Conditions

- Hydrology cannot restore landscape to optimal condition, but can sustain in Condition 2.
- Very strong sensitivity of Everglades ecology to hydrology means that Condition 2 can be maintained only by hydrology that is very similar to Condition 1 hydrology.

“Tipping Point:” Landscape on Degrading Ecological Trajectory

- Ecologically, very different from Condition 2 because of downward trajectory.
- Very strong sensitivity of Everglades ecology to hydrology means that Condition 3 hydrology differs only slightly from Condition 1 and 2 hydrology.

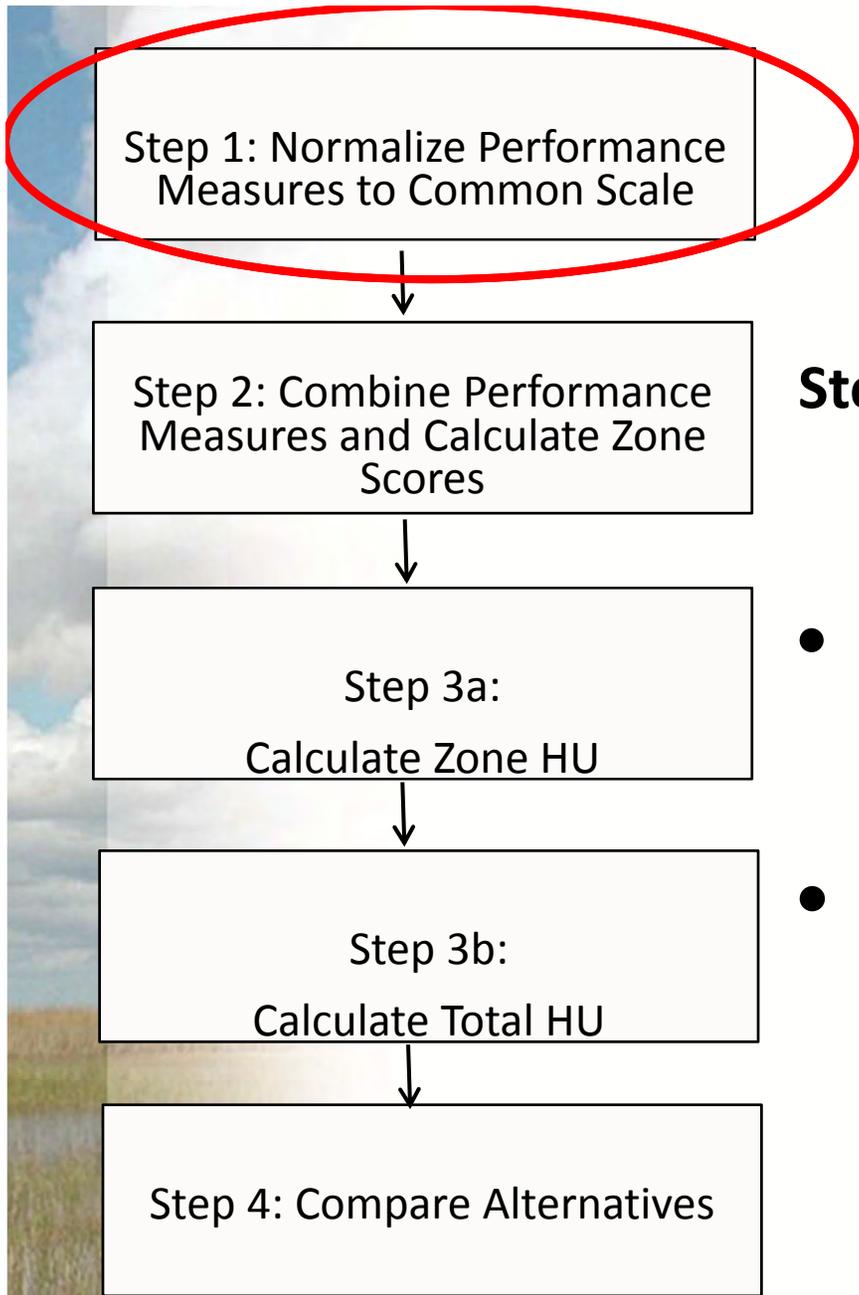
“Loss of Characteristic Ecology”

- Sloughs are dry (water depths zero) for more than four months of the year.
- Flows zero for more than six months of the year; annual flows to Florida Bay near zero.
- Multi-year large fish populations eliminated; small fish populations greatly reduced.
- Wading bird prey base essentially eliminated.
- Widespread oxidation and/or burning of peat.
- Elevations of ridges and tree islands reduced to level of sloughs (landscape flattened).
- Water lilies gone; sloughs invaded by sawgrass/dryland species; tree islands gone.

Methodology for Quantifying Ecological Benefits – Decomp PIR 1

Step 1: Normalize Performance Measures to Common Scale

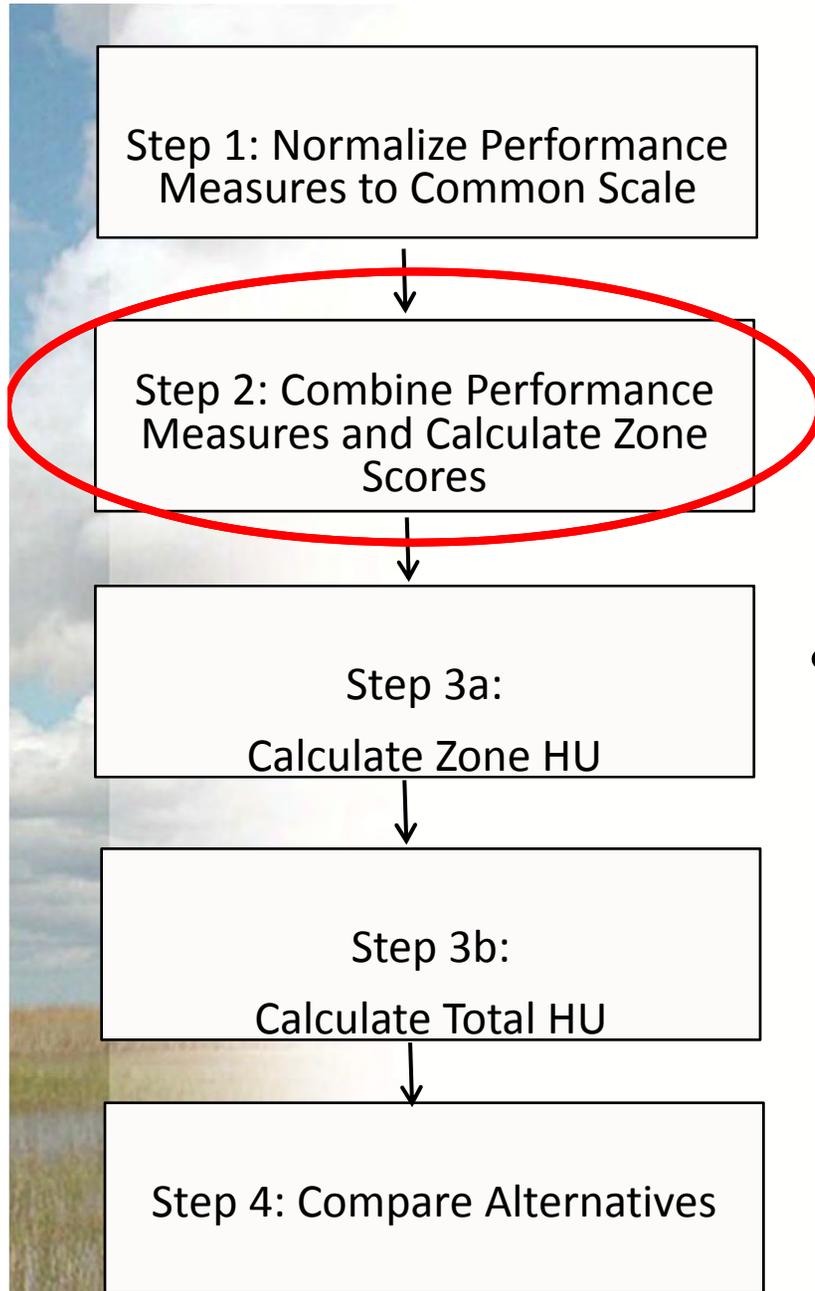
- Ecological performance measured as a percent achievement of the target.
- Raw performance measures linearly rescaled between 0 and 100.



Methodology for Quantifying Ecological Benefits – Decomp PIR 1

Step 2: Combine Project Performance Measure and Calculate Zone Scores.

- Performance measure scores are averaged for each project zone for each alternative (0-100).



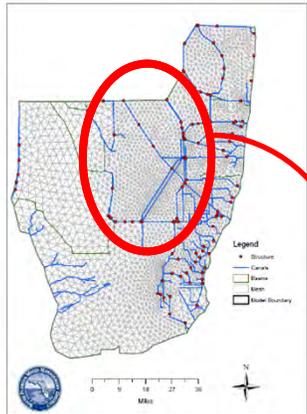
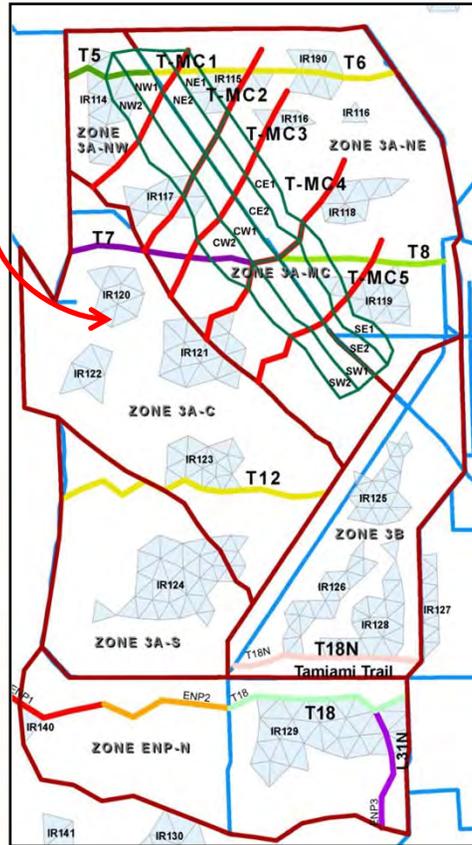


Figure 2-2: Glades LECSA Model Domain with Canal, Mesh and Structure Locations

RSM Model Mesh



RSM Zones:

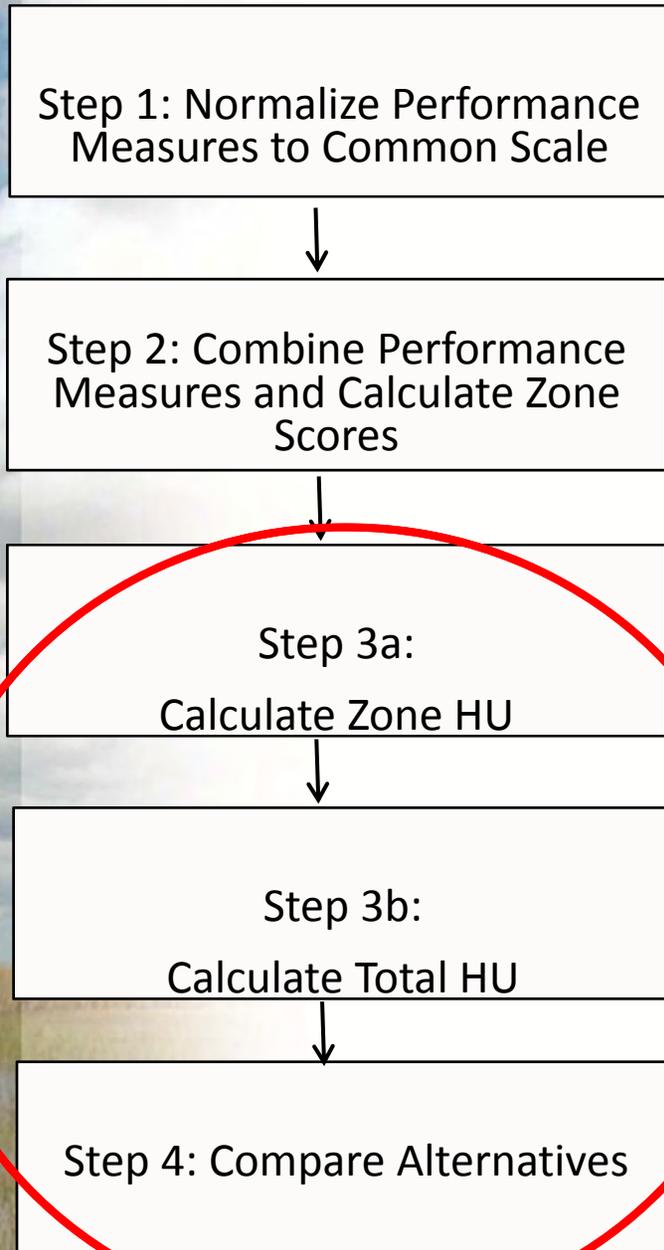
- 3A-NE
- 3A-NW
- 3A-MC
- 3A-C
- 3A-S
- 3B
- ENP-N

Methodology for Quantifying Ecological Benefits – Decomp PIR 1

Example:

- Indicator regions used for performance measures which measure depth, distribution and duration of surface flooding.
- Transects used for performance measures which measure timing and distribution of flows.
- Because indicator regions and transects cover only a portion of the project area, the region is divided into seven zones to extrapolate from the indicator regions and/or transects to the larger areas they represent.
- Zones delineated to capture the spatial extent of the structural components and were based on differences in existing conditions within the study area.

Methodology for Quantify Ecological Benefits – Decomp PIR 1



Step 3a: Calculate Zone Habitat Units

- Index = Single score for each project alternative is rescaled (0 to 1)

- $HU_{(zone)} = (Index) \times (Acreage_{(zone)})$

Step 3b: Calculate Total Habitat Units

- HU summed for each project zone for each alternative.

Step 4: Compare Alternative Plans

- $HU\ Lift = Alternative - FWO\ Project\ Condition$

Other Potential Ecological Planning Tools

- Ecological planning tools are helpful to facilitate the evaluation and assessment of alternative approaches to restore Greater Everglades ecosystems
- These tools provide additional information by linking ecological effects of alternative plans to hydrology
- CISRERP (2010) concluded that “Improved species models... are urgently needed to provide more rigorous scientific support for water management decisions” (p 11)

Other Potential Ecological Tools for CEPP

- Prey-based Freshwater Fish Density
- Everglades Landscape Vegetation Succession Model (ELVeS)
- Wood Stork Foraging Probability
- Cape Sable Seaside Sparrow
- Apple Snail Population
- Oyster habitat suitability index for Caloosahatchee Estuary (and possibly St. Lucie)

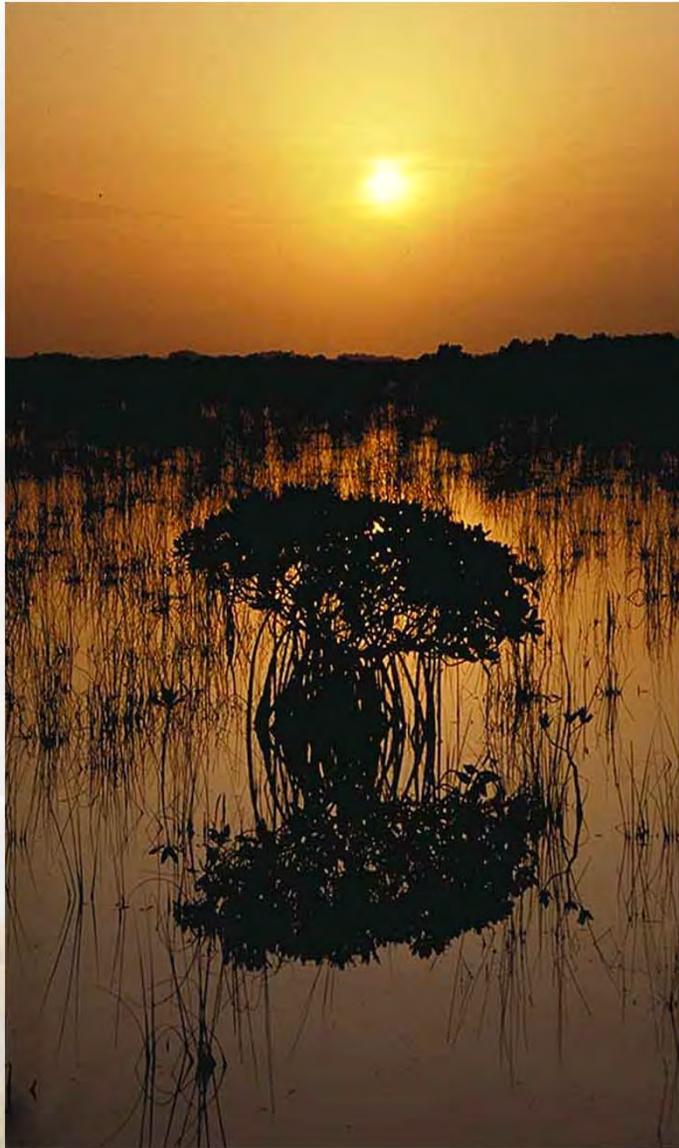
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NEXT STEPS



Next Steps

- Develop Methodology for Quantifying Ecosystem Benefits.
- Develop Management Measures to address the “Problems” and “Objectives”
- Formulate and evaluate alternative plans during CEPP Execution Phase – Feb 2012



DISCUSSION