BISCAYNE BAY COASTAL WETLANDS PROJECT
ADAPTIVE MANAGEMENT PLAN

Patrick Pitts[1], Stephen Blair[2], Eunice Ford[3], Craig Grossenbacher[2], Andrew LoSchiavo[3], Brad Tarr[3], and Steve Traxler[1]

[1] U.S. Fish and Wildlife Service, South Florida Ecological Services Office, Vero Beach, FL ; [2] Miami-Dade County Department of Environmental Resources Management, Miami, FL;
[3] U.S. Army Corps of Engineers, Jacksonville District, Everglades Division, Jacksonville, FL

Project Purpose: The Biscayne Bay Coastal Wetlands Project area encompasses south-central Biscayne Bay from Shoal Point south to Turkey Point. Human activities have degraded the function and spatial extent of the coastal wetlands throughout the western coastline of Biscayne Bay. These changes have modified the function and quality of the nearshore habitats of the bay. The project intends to restore meso-haline coastal tidal wetlands and re-establish optimal salinity conditions for fish and shellfish habitat in the nearshore of south-central Biscayne Bay through redistribution of freshwater runoff from the watershed. The redistribution will result in a more natural and historic freshwater delivery to the bay by decreasing canal discharges, while increasing flow through existing coastal wetlands.

Adaptive Management Plan

Purpose:
- Describe how the CERP adaptive management principles are applied to address uncertainty associated with the Biscayne Bay Coastal Wetlands Project.
- Provide framework for how ecological response can be utilized to guide future decisions needed to maximize ecological performance.
- Generate new information to address uncertainties about how this project, and subsequent phases, will achieve desired restoration goals and objectives.

Plan Components:
- Desired Ecological Responses
- Uncertainties
- Project-level hypotheses to test and address uncertainties*
- Decision Frameworks that link monitoring to projects goals/ objectives, performance measures (targets and timeframes) to verify success or performance issues, and options and costs to adjust project implementation based on feedback.
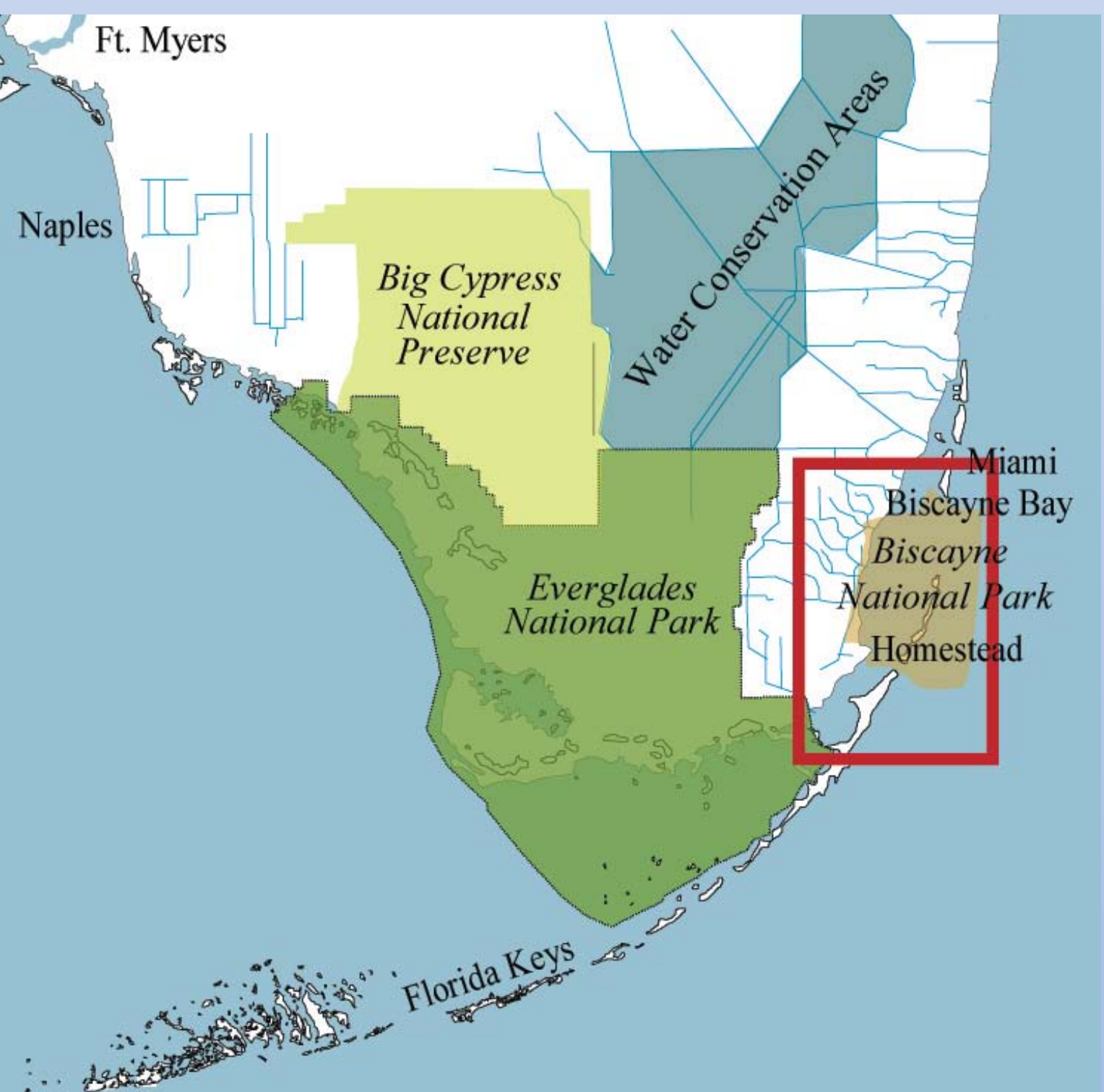
*Note: project-level hypotheses not listed in this poster, see:
http://www.evergladesplan.org/pm/projects/project_docs/pdp_28_biscayne/031910_dpir/031910_bbcw_dpir_vol_3_annex_e.pdf

Desired Ecological Responses

Project restoration and redistribution of flow to Biscayne Bay costal wetlands and adjacent bay waters hinge on achieving five positive ecological responses:

1. Re-establish productive nursery habitat along the shoreline.
2. Redistribute freshwater flow to minimize point source discharges to improve estuarine habitat.
3. Restore and improve quantity, quality, timing, and distribution of freshwater to the bay.
4. Preserve and restore spatial extent of natural coastal glades habitat.
5. Re-establish connectivity between Biscayne Bay Coastal Wetlands, C-111 Basin, Model Lands, and adjacent basins.

Uncertainties

A number of uncertainties were identified that could affect the success of this restoration effort and related to water quantity, sea-level rise, salinity, oysters, seagrass, macroinvertabrates and fish, crocodiles, periphyton, water quality, and achieving wetland structure and function. This poster will focus on a few -
- Whether enough water is available , especially during the dry season, to achieve established salinity targets?
- What is the current and historical pre-canal distribution of oyster buildups in the Southern Estuaries?
- Will redistributed water patterns achieve desired structure and spatial extent of adjacent coastal wetlands?

Decision matrices were developed to summarize potential management options to address the identified uncertainties in project related restoration metrics.
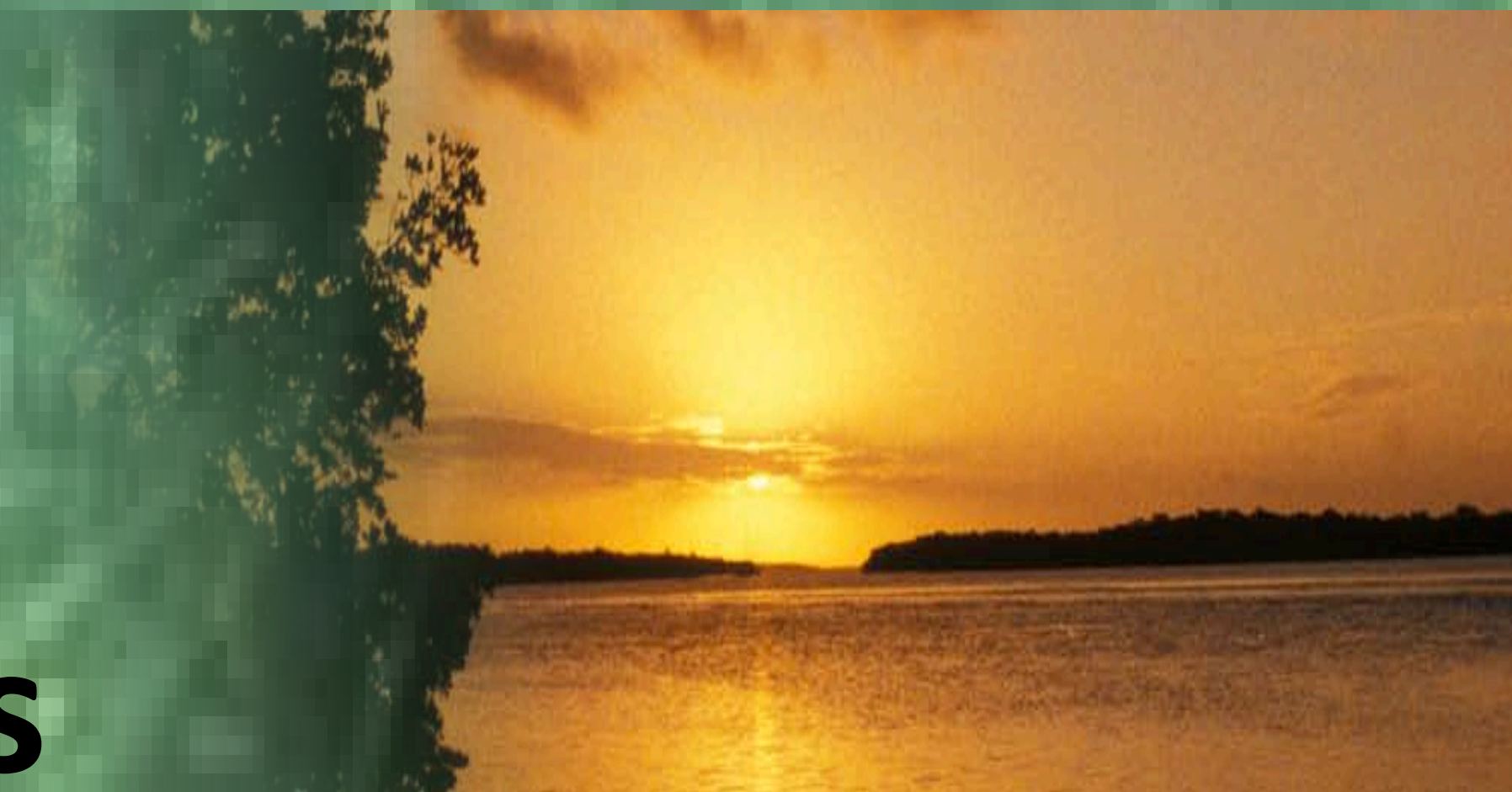
Examples of Decision Matrices

Wetland Vegetation

Stressor Metric	Target	OPTION 1 Management Action	OPTION 2 Management Action	OPTION 3 Management Action
Water level	-0.5 to +2.0 feet	If target not met, change operations to meet target (i.e., redirect more water into wetlands)	Change operations to meet a different point of the target range	System-wide/ Regional Performance Issue Analysis (More water)
Hydroperiod	28 to 32 weeks	If target not met, change operations to meet target (i.e., redirect more water into wetlands)	Change operations to meet a different point of the target range	System-wide/ Regional Performance Issue Analysis (More water)
Salinity	0 psu west of L-31E; 0-20 psu east of L-31E (with gradient)	Increase or decrease diversions to attain target	Fill or plug drainage and mosquito ditches	System-wide/ Regional Performance Issue Analysis (More water)
Fire or other disturbance	Natural fire frequency	Modify fire frequency to meet target	Increase or decrease fire frequency	

Eastern (American) Oyster

Stressor metric	Target	Management Action OPTION 1	Management Action OPTION 2	Management Action OPTION 3
Salinity	Stable salinity range of 10-25 psu at creeks	Change operations to meet flows	Review and revise (if appropriate) the salinity target	System-wide/ Regional Performance Issue Analysis (More water)
Recruitment	Presence/absence adults and larvae	Stock larvae	Stock adults	Change operations to avoid too much or too little flow in key months
Substrate	Acres of suitable habitat	Add oyster shell cultch	Try different substrate (e.g., concrete)	Dredge muck
Oyster reef development	Presence/absence of reefs at least 1 m2 in size	Add additional cultch		
Juvenile growth and mortality	Attain natural levels of growth and mortality	If flow/salinity events are affecting growth or mortality, adjust operations to eliminate or minimize events	Adjust flows to attain salinity similar to creeks where oyster growth is optimal	Excessive predation may require salinity adjustments through operations
Disease	Elimination	Operate flows to maintain salinity below maximum threshold	Lower salinity threshold and adjust operations accordingly	

Adaptive Management Plan Costs

Management Option	Cost
Oyster shell (cultch)[1]	$160,000
Oyster larvae stocking[2]	$21,200
Oyster spat-on-shell stocking[2]	$16,000
Operational Adjustments	$0
Plug or fill mosquito and drainage ditches[3]	$100,000
Fire[4]	$19,000 (Aerial Ignition) / $180,000 (WUI Burning)
Berm vegetation removal[5]	$160,000 (heavy equipment grubbing) / $240,000 (hand grubbing)
Total Cost AM Actions	**$486,200 / $727,200**