The National Academies of
SCIENCES • ENGINEERING • MEDICINE

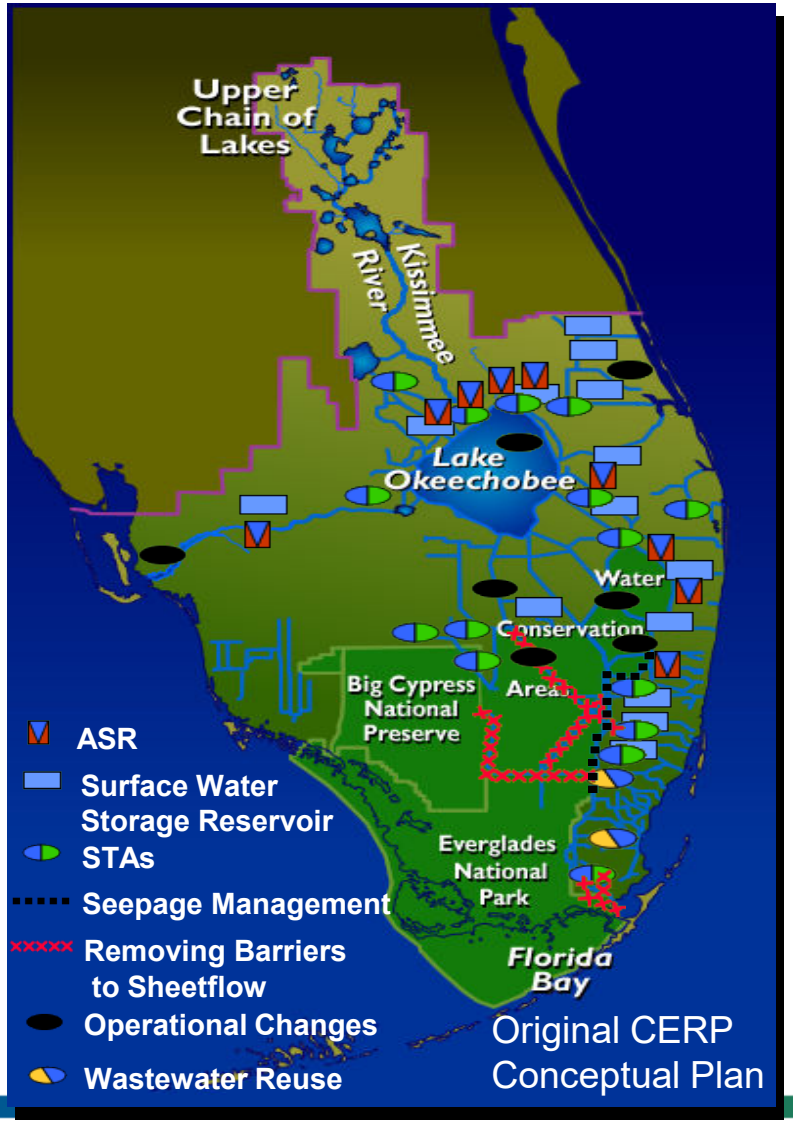
Progress Toward Restoring the Everglades: The Seventh Biennial Review, 2018

A CERP Mid-Course Assessment

Wendy Graham, Ph. D
Director University of Florida Water Institute
CISRERP Committee Member, 2016-2018

Comprehensive Everglades Restoration Plan (CERP)

- The largest of several South Florida restoration initiatives
- Designed to "get the water right"
- >40 major projects and 68 project components
- Joint federal-state program, launched in 2000, estimated then at $8 billion and 30 years, recent (2015) estimates ~$16 billion



Original CERP Conceptual Plan

Since CERP launched in 2000

- New understanding of "pre-drainage hydrology"
- New understanding of the importance of interannual, multidecadal climate cycles for S. Florida hydrology
- Consensus regarding expected increases in sea level rise and temperature for the region
- Uncertainty regarding long-term precipitation trends
- Florida's population has grown by ~5 million, 5 million more expected by 2040

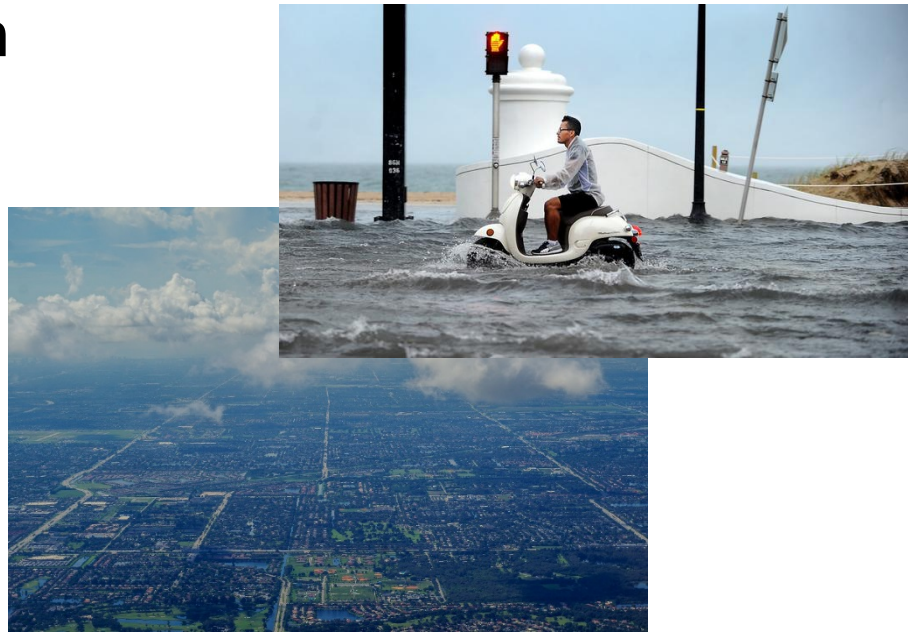
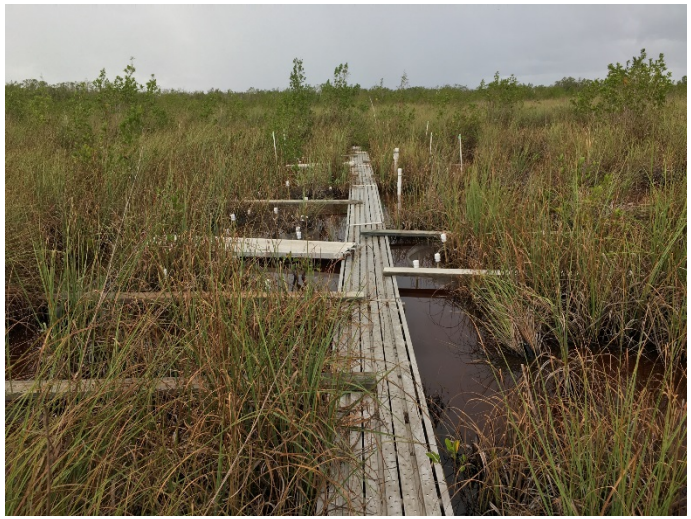


Image sources: Leon Hernandez, Flickr Commons
Robert Duyos/Sun Sentinel SoFlaShare

Questions

- Is restoration of “pre-drainage flows” feasible in the contemporary climate? Future climate?
- To what extent can restoration of flow mitigate salinity incursion related to sea-level rise and associated peat collapse?



- To what extent can restoration of flow facilitate a landward migration of coastal mangroves to counteract the effects of sea-level rise?
- Are current estuary salinity envelope performance measures valid for 2050 sea levels?
- How can CERP improve the resilience of the Greater Everglades System to future conditions?
- Are new or additional performance measures needed?

Source: (top) Brendan McGovern
(bottom) Chauncey Davis, Flickr Commons

Since CERP launched in 2000

- Reduced estimate of the feasible number of ASR wells for interannual storage
- Planning is largely complete for above ground storage N, S, E and W of lake, with significant reductions over original plan
- Feasibility of in-ground reservoirs in lake belt region is unproven
- System-wide aggregated impact of these anticipated changes has not been assessed.

STORAGE COMPONENT	Yellow Book Storage Capacity Acre-Feet	Updated Storage Capacity Acre-Feet
Existing System Storage		
Lake Okeechobee	3,817,000[a]	3,253,000[a]
Water Conservation Areas	1,882,000	1,882,000
Total lake/WCA storage	5,699,000	5,135,000
Above-ground Reservoirs		
North Storage Reservoir (Kissimmee)	200,000	43,000[b]
Taylor Creek/Nubbin Slough	50,000	0[b]
Caloosahatchee (C-43) Basin	160,000	170,000
C-44 Reservoir	40,000	50,600
Other Upper East Coast Storage[c]	349,000	109,400[c]
EAA Reservoirs	360,000	300,000[d,e]
Central Palm Beach Reservoir	19,920	TBD
Site 1 Reservoir	14,760	0[f]
Bird Drive Reservoir	11,600	0[g]
Acme Basin	4,950	0[h]
Seminole Tribe Big Cypress	7,440	TBD
Total above-ground reservoir storage	1,217,670	
Projects planned to date	1,190,310	673,000
Potential storage in projects not yet planned, or planning not finalized:	27,360	
In-ground Reservoirs		
North Lake Belt	90,000	Feasibility unproven
Central Lake Belt	187,200	Feasibility unproven
L-8 Basin	48,000	45,000[e]
Total in-ground reservoir storage	325,200	
Projects planned to date	48,000	45,000[e]
Potential storage in projects not yet planned, or planning not finalized:	277,200	
ASR Wells		
All CERP wells	1,637,000[i]	TBD

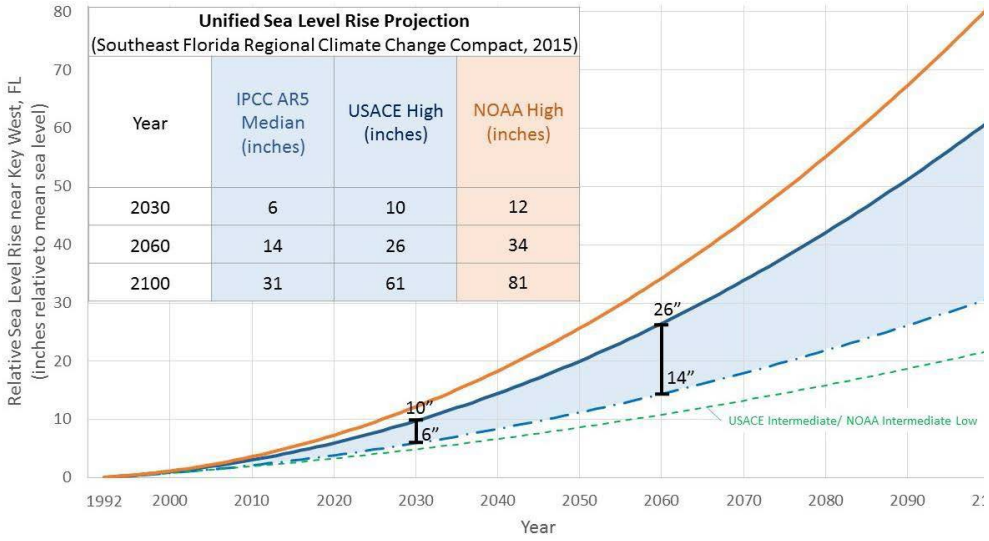
Context for Mid-course Assessment

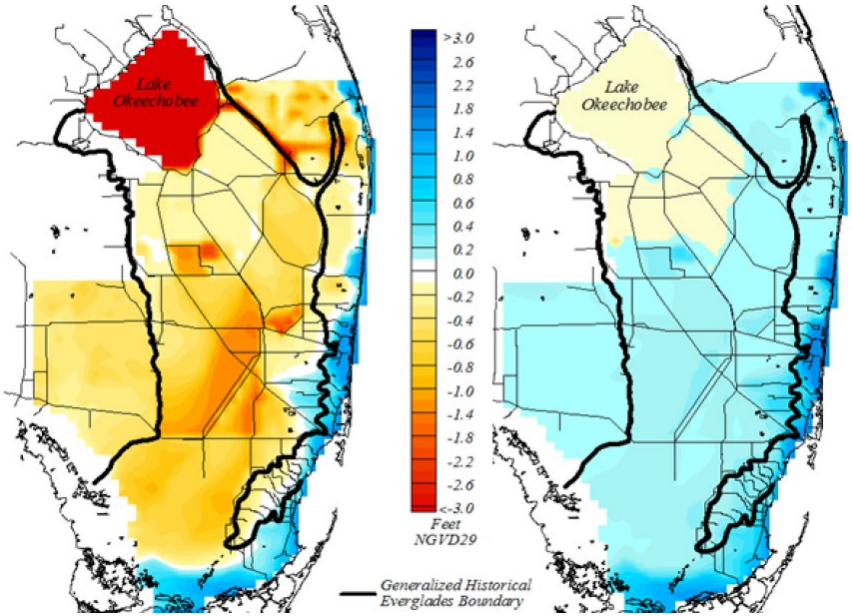
- Everglades of 2050 and beyond will differ from what was originally envisioned when CERP was developed

- A forward-looking program-level analysis that incorporates the latest socioeconomic, scientific, and engineering information, while considering uncertainties about future conditions is recommended

Unified Sea Level Rise Projection
(Southeast Florida Regional Climate Change Compact, 2015)

Year	IPCC AR5 Median (inches)	USACE High (inches)	NOAA High (inches)
2030	6	10	12
2060	14	26	34
2100	31	61	81





The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Image sources: Obeysekera et al, 2015
Obeysekera et al, 2017

Mid-Course Assessment Should

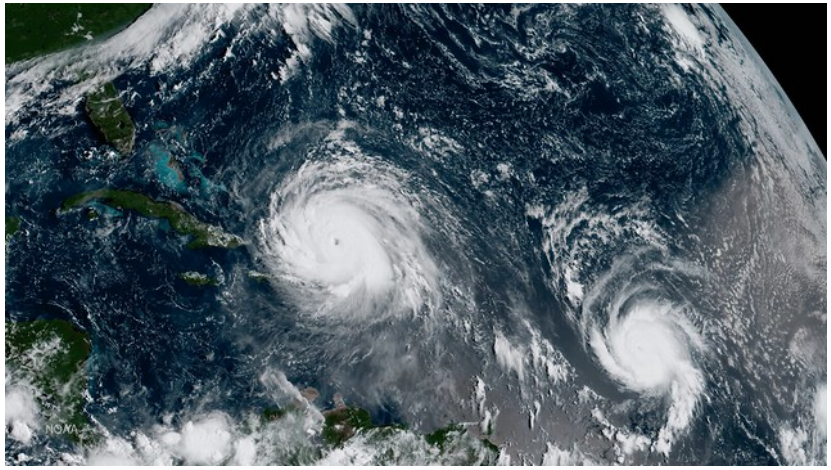
- Be forward- rather than backward-looking. What does a healthy S. Florida ecosystem that is resilient to 2050 stresses look like?
- Include integrated analysis of all major CERP and non-CERP projects that are currently planned, under construction, completed.
- Leverage advances in hydrologic, water quality and ecologic models
- Incorporate a suite of future climate, sea-level and socioeconomic projections in addition to contemporary conditions

Mid-Course Assessment Could Evaluate

- Future without any CERP projects
- Future with CERP projects as completed today
- Future with all authorized CERP projects
- Future with authorized CERP projects and CERP projects in planning
- Future with authorized and planned CERP projects plus potential alternative Lake Okeechobee regulation schedules
- Expected performance of the above over a suite of future scenarios to identify whether they are robust and resilient over a wide range of possible future conditions

Mid Course Assessment Would

- Demonstrate the combined performance under contemporary climate of all projects that are currently planned, under construction, completed
- Investigate the resilience and robustness of Everglades restoration efforts to climate change and sea level rise
- Inform robust decisions about planning, sequencing, adaptive management



Source: Brendan McGovern, ENP
Cayobo, Flickr Commons, Hurricane Irma

Carpe Diem!

- The time is right! Current authorized and planned projects will require decades to construct at current funding levels. This should not slow down restoration efforts.
- The expertise exists! SFWMD has begun to conduct these types of analyses for planning and management projects outside of CERP
- The cost is small! Even a $10 million investment would likely represent less than 5% of the total cost of CERP

Questions?

Supporting Sound Decision Making for a Future Everglades

- Requires a science program that can bring the latest information and tools into CERP planning and implementation
  - Research needed to understand systemwide issues affected by future change, including peat collapse, saltwater intrusion, invasive species
  - May be best championed by an independent Everglades Lead Scientist empowered to coordinate and promote needed scientific advances