CERP Sea Level Change Guidance Update and Path Forward

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US Army Corps of Engineers
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Sea Level Change
Planning Guidance for the CERP

- The CERP Apr 99 report addressed 0.5 ft of sea level rise (SLR) by 2050. Coastal communities were found to be most impacted due to reduced flood protection and saltwater intrusion. Coastal estuaries/ecosystems required additional freshwater deliveries to maintain desirable salinity patterns.
- CGM #16 May 04, based largely on 1995 EPA guidance, states "PDTs should conduct sea level rise sensitivity analyses that are appropriate for the *most-probable* rate…" and goes on to identify the most-probable rate by 2050 as "…in essence, a 0.8 ft rise for the region."
- The CISRERP Sep 2008 report recommended a new analysis of impacts based on higher SLR assumptions, and states that "…sea level rise of much more than 3 feet this century is not very likely (Meier et al., 2007)."
- The UN Climate Change Science Compendium Sep 2009 provides science updates since the 4th IPCC report in 2007. It notes unexpectedly rapid rates of change in Arctic sea ice loss and melting of land ice on Greenland and Antarctica. One meter of sea level rise is now termed "likely" this century.

Path Forward for CERP Sea Level Change Planning

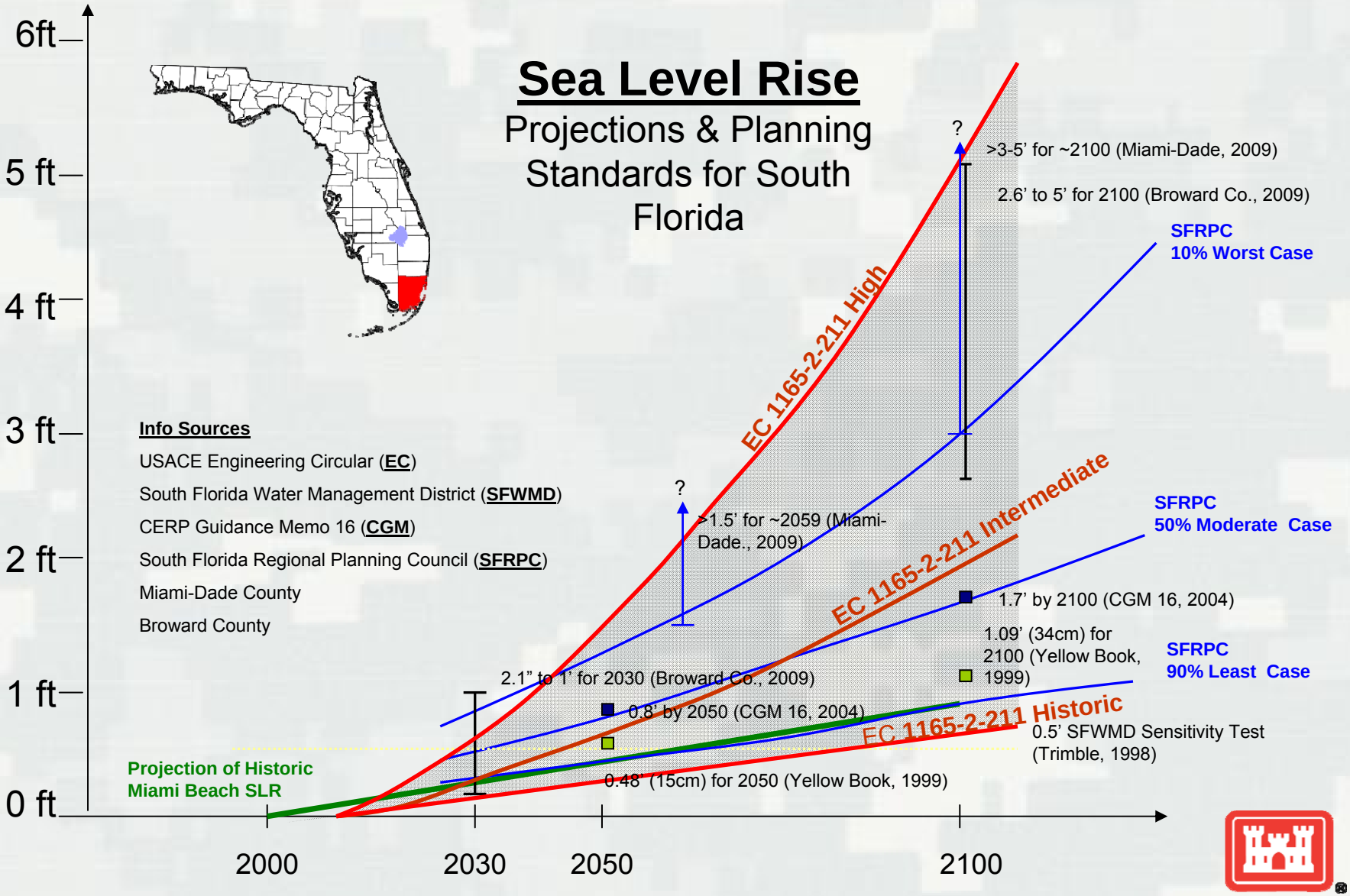
- **USACE EC1165-2-211** (Jul 2009) is current USACE national guidance for low, intermediate and high rates of sea level change for future scenarios.
- **CGM #16** is being updated to be consistent with USACE national guidance.
- **CERP Technical Report 1** will provide a preliminary sea level change impacts assessment, identify regional and local scale modeling needs, and help coordinate related interagency Climate Change studies and climate change sensitivity data collection efforts.
- **CERP Technical Report 2** will summarize FY2010-2011 efforts on collection of climate change sensitivity data, plus development of regional and local scale models to address climate change variables such as sea level rise, saltwater intrusion, shifts in hydrologic patterns, etc., as needed to evaluate adaptation strategies.
- **CERP Climate Change Regional Adaptation Planning** studies are anticipated to then develop and recommend appropriate adaptation strategies, policies and plans. Climate Change is a long term trend, so planning horizons of 20, 50 and 100 years must be addressed.

USACE EC 1165-2-211 Interim Guidance on Sea Level Change

- Follows existing planning guidance
- Based on guidance from the National Research Council of the National Academy of Sciences
- Recognize uncertainties and risks in rate and depth of sea level rise
- Interim Guidance pending new info Effective July 2009 – July 2011
- Applies to <u>all</u> Planning, Design & Construction in Coastal Areas
- Does NOT apply to Regulatory

Sea Level Rise

Projections & Planning Standards for South Florida



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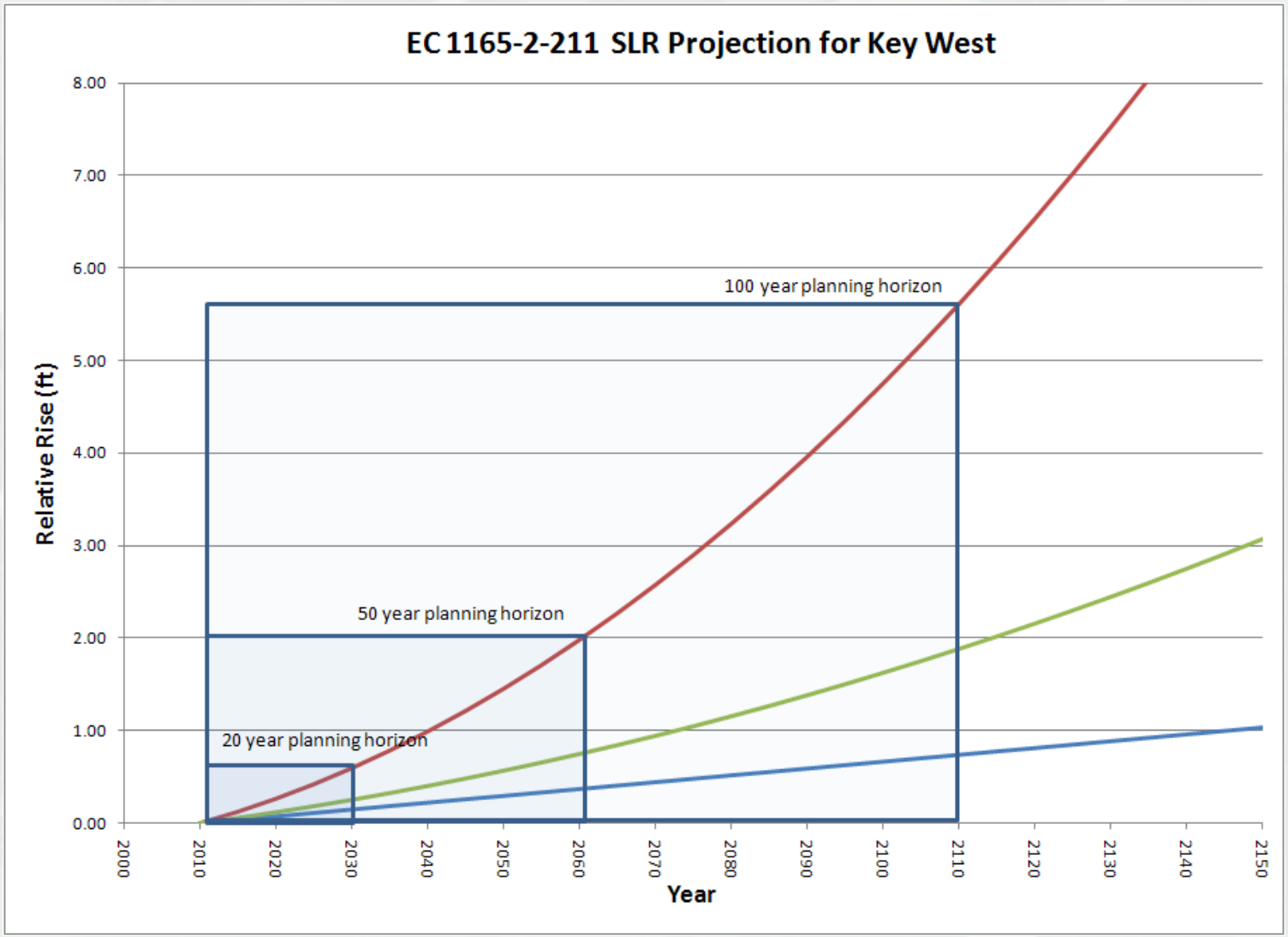
Consideration of Sea Level Change Impacts in USACE Project Planning and Engineering

- Acknowledge uncertainties. Follow the multiple scenario approach recommended by the National Research Council (NRC, 1987)
- Scenarios to include Low, Intermediate and High rates of sea level rise where Low = continuation of historic trend, and High = modified NRC Curve 3 (about 5 ft or 1.5 m by 2100)
- Address Planning Horizons of 20, 50 and 100 years starting from the end of project construction
- Be prepared to implement flexible planning and engineering adaptations accounting for a range of possible changes and to recognize meaningful changes that may require additional response

Source: USACE communications on Engineering Circular 1165-2-211, INTERIM GUIDANCE FOR INCORPORATING SEA LEVEL CHANGE

Planning Horizons for Sea Level Change Impacts Assessment and Adaptation Studies



Consideration of Sea Level Change Impacts in USACE Project Planning and Engineering

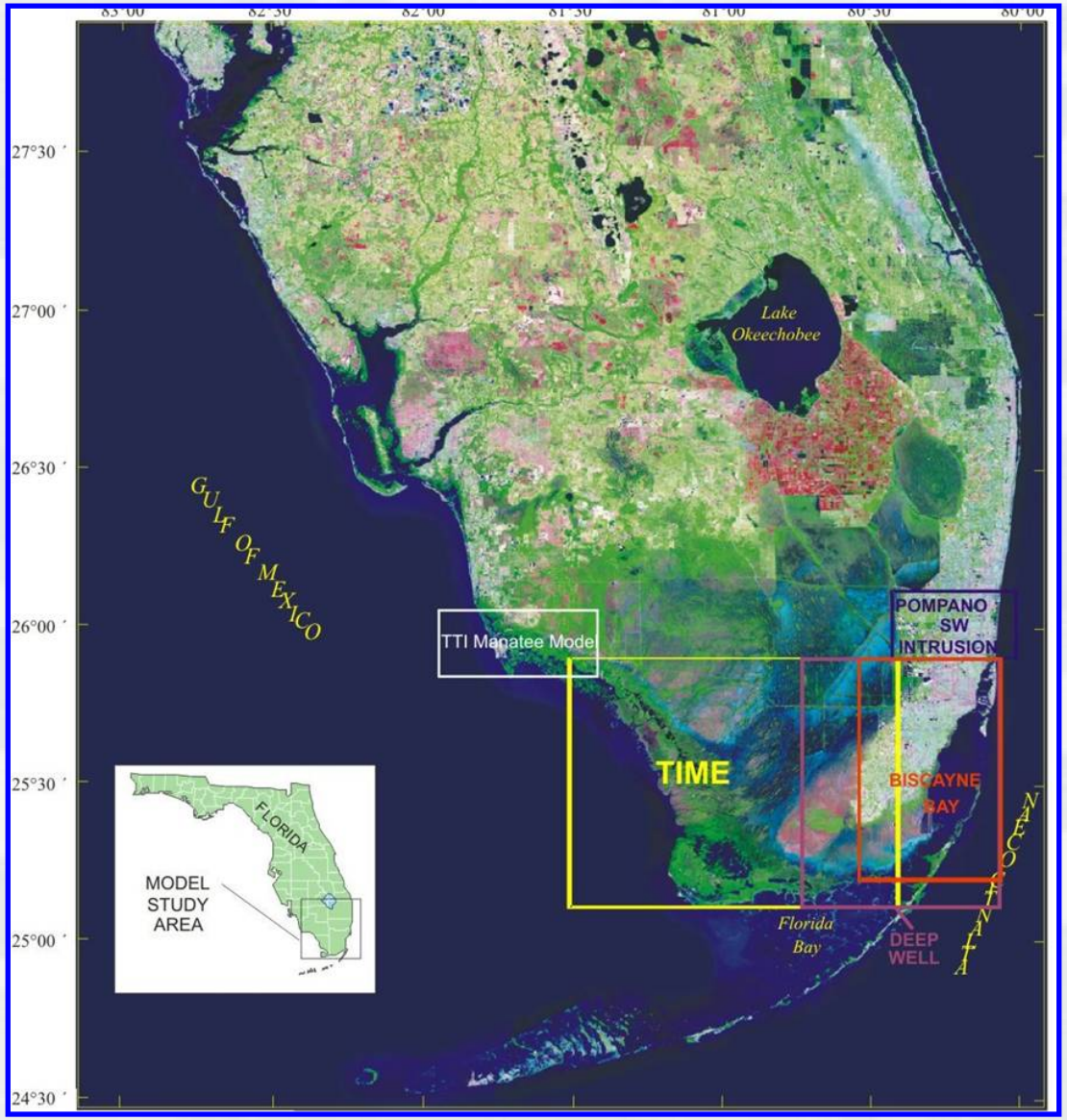
- Address Risk Assessment:
  - What can go wrong?
  - What is the likelihood that it will go wrong?
  - What are the consequences?

- Address Risk Management:
  - What can be done and what options are available?
  - What are the associated tradeoffs in terms of costs, benefits, and risks?
  - What are the impacts of current management decisions on future options?

Source: USACE communications on Engineering Circular 1165-2-211, INTERIM GUIDANCE FOR INCORPORATING SEA LEVEL CHANGE

Everglades Restoration Plan

- Restore natural hydrologic conditions in the remaining 50% of historic Everglades
  - Water quantity, quality, timing and distribution
- Maintain existing services in developed areas
  - Flood Protection, Water Supply, and other (currently for 6.5 M people)
- Use Adaptive Management to adjust over time



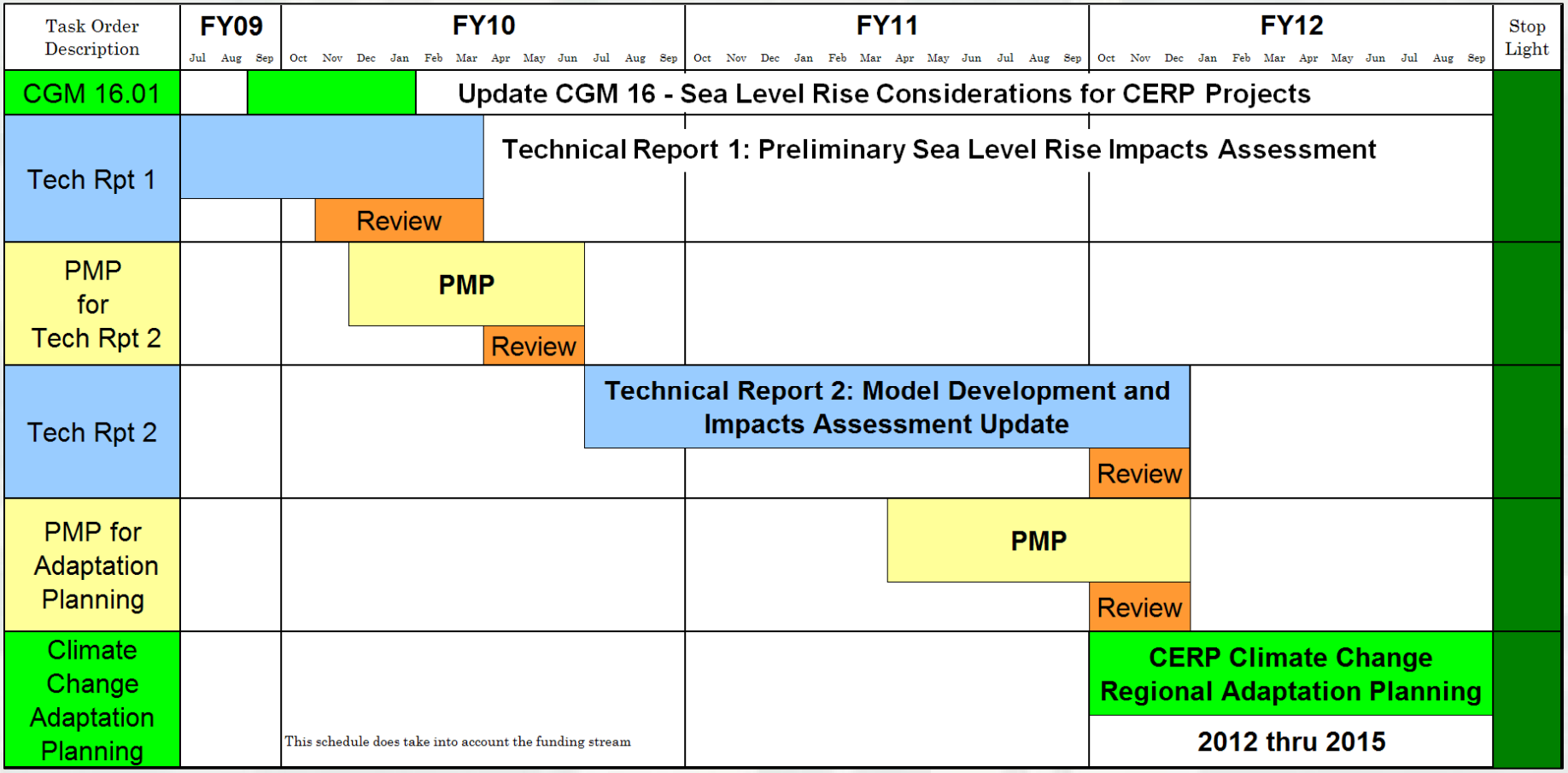
Model Development

For South Florida Climate Change Adaptation Studies

Regional models must be modified or developed to evaluate potential climate change related variations in rainfall, evapotranspiration and tropical storms.

Local models with one foot topographic contours must be developed or enhanced to evaluate potential sea level rise and salt water intrusion impacts in natural and developed coastal areas.

Proposed Schedule



CERP Climate Change Team Vision Statement (Draft) – A wide range of potential global climate change impacts are forecast in coming years for the Everglades and South Florida. To minimize future negative impacts and adaptation costs, the CERP partner agencies will collaborate to quickly identify climate change sensitivities in natural and developed areas, and then to work proactively with stakeholders and decision makers to develop and implement climate change adaptation policies and plans by 2015(?) that will be models for the rest of Florida and our Nation.

Proposed Schedule

Task Order Description	FY09	FY10	FY11	FY12	Stop Light
	Jul Aug Sep	Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep	
Tech Rpt 1		Tech Rpt 1: Prelim Sea Level Rise Impacts Assessment			
Tech Rpt 2			Tech Rpt 2: Model Dev and Impacts Update		
Adapt Plng				CERP CC Adaptation Plng	

◆ USACE EC 1165-2-211: Sea Level Change Considerations for Civil Works Programs (Jul. 2009)

◆ UN Climate Change Science Compendium, Sep. 2009

IPCC Report #5 Preparation (2007 - 2013) IPCC #5, Pre-Release News, Jun. 2012? ◆

CISRERP Committee for Independent Scientific Review of Everglades Restoration Progress

CISRERP Report, Sep. 2010 ◆ CISRERP Report, Jun. 2012 ◆

DOI__National Park Service - Everglades Climate Change Studies

DOI__USFWS/ USGS/ MIT Climate Change Impacts Assessment on FWS Trust Resources

DOI__USGS - Everglades and National Climate Change Studies (Multiple Efforts)

EPA/ Charlotte Harbor National Estuary - Climate Change Ready Estuaries Program

NOAA Climate Change Studies

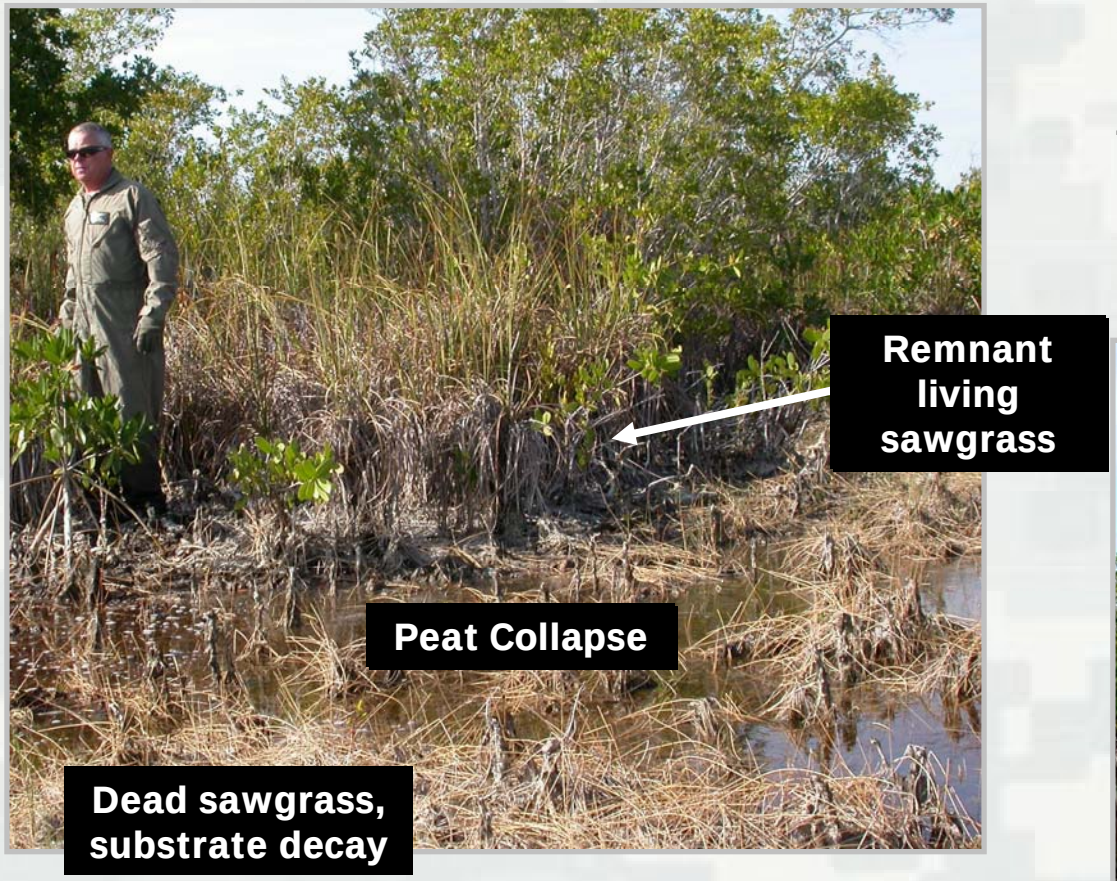
FEMA - National Flood Insurance Program Updates; Climate Change Risk Studies

State of Florida - River of Grass Acquisition and Planning

State of Florida Universities System - Climate Change Studies

State of Florida / Local Counties - Climate Change Impacts Assessment

Natural Areas



Saltwater inundation leads to peat collapse and decline of freshwater wetlands habitat

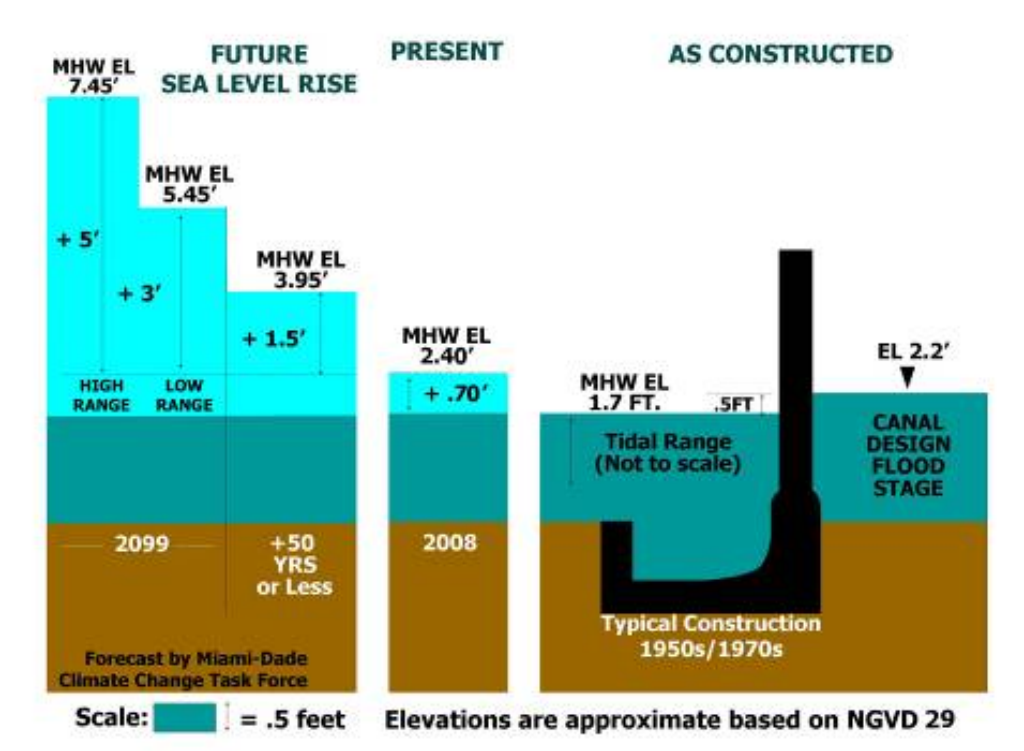
Photo Credit: Dr. Harold R. Wanless; University of Miami, Department of Geological Sciences; co-chair of Miami-Dade Climate Change Task Force

60% of Everglades National Park lands are below 3 feet MSL. Everglades restoration will increase freshwater flows to natural areas and may delay some future habitat changes

Developed Areas

The population of south Florida is 6.5 million and growing. Climate change and subsequent sea level rise will impact local flood protection and water supplies.

Flood Damage Concerns



Sea level rise will reduce the effectiveness of gravity drainage canals

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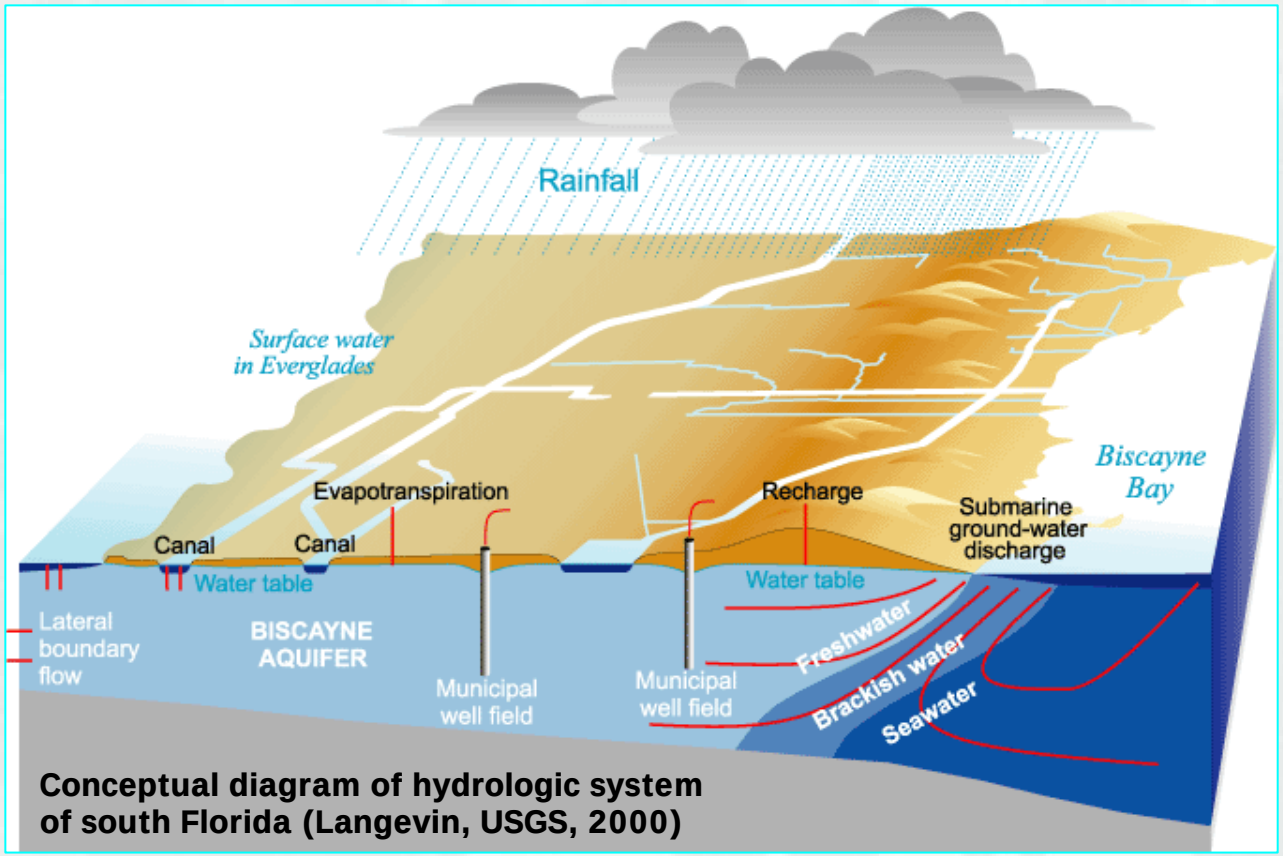
Water Supply Concerns

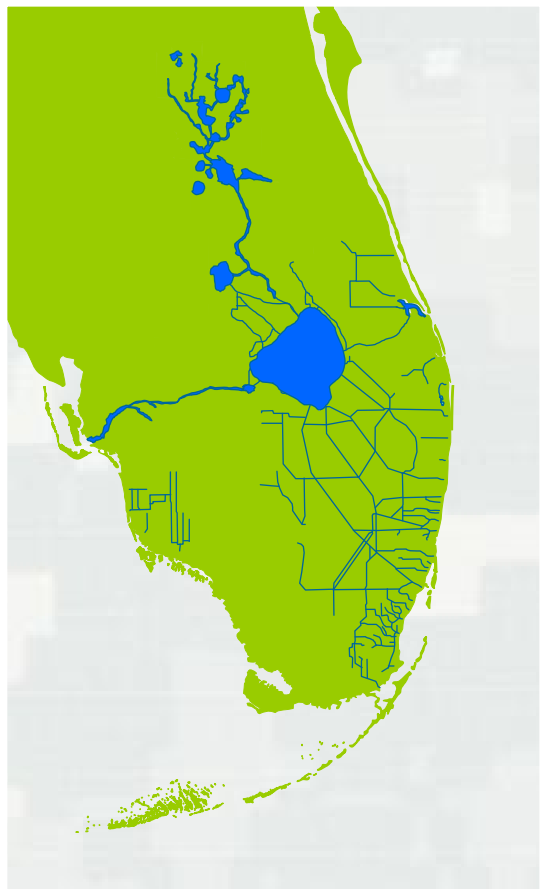


Conceptual diagram of hydrologic system of south Florida (Langevin, USGS, 2000)

- **Shallow wells are the primary source of drinking water for south Florida communities.**
- **Continued sea level rise and related saltwater intrusion will create a need for alternative freshwater sources.**

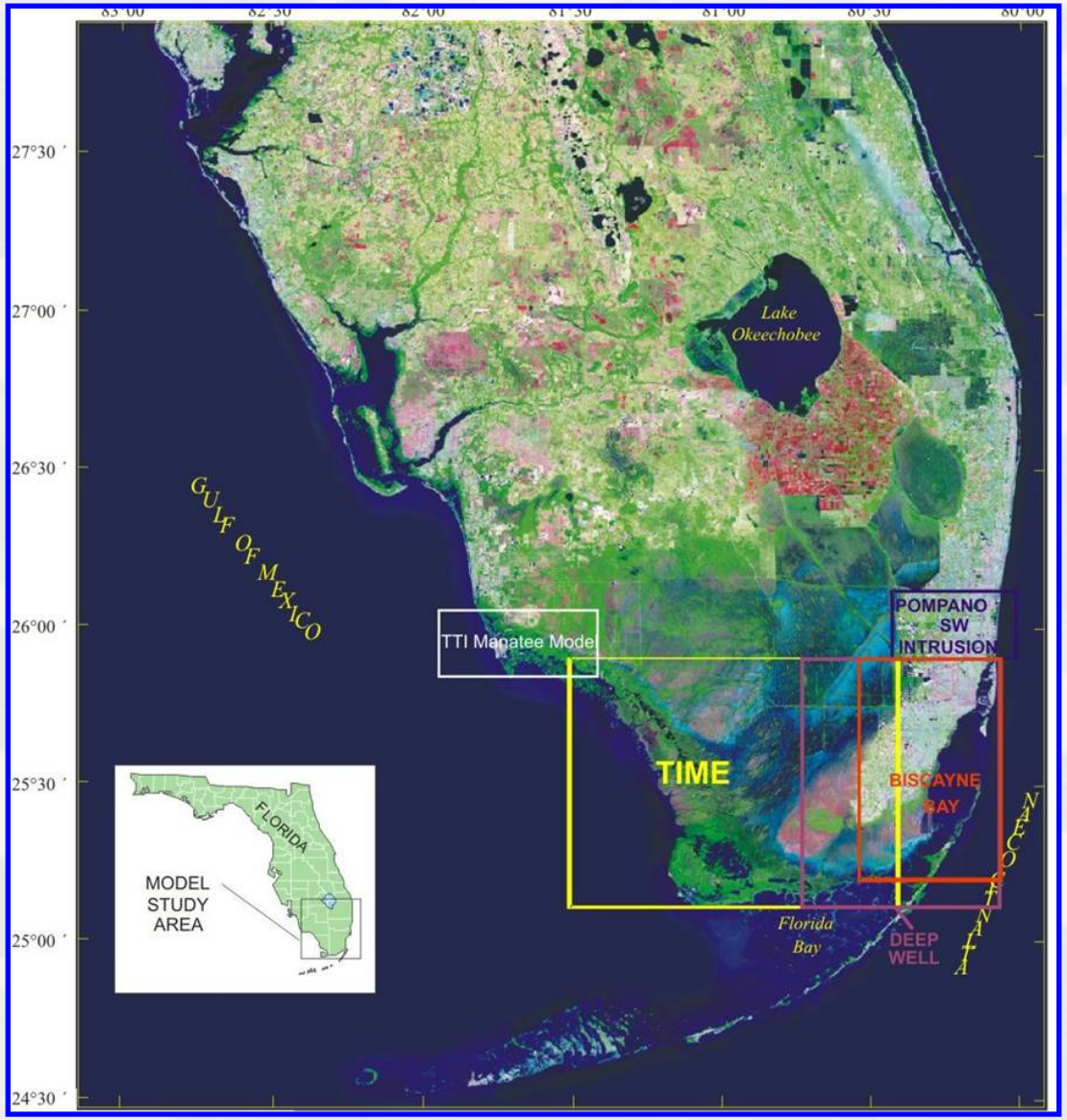
Water Supply Concerns

Kissimmee River Basin and Lake Okeechobee



Lake Okeechobee Drought

- **Climate change impacts on rainfall patterns and evaporation rates will increase water storage needs**



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Thank you!

For additional information, contact:

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