



***RISING TIDE: ADAPTING EVERGLADES ECOSYSTEM
RESTORATION TO CLIMATE CHANGE***

National Conference on Ecosystem Restoration
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Everglades National Park



- A World Heritage Site in Danger
- Home to 68 Threatened & Endangered Species
- An International Biosphere Resource
- A Wetland of International Importance
- An economic engine for Miami-Dade County, Florida



Comprehensive Everglades Restoration Plan “CERP”



Climate Change Concerns for Florida

Sea Level Rise

- Salinity changes in coastal bays, plus tidally influenced creeks and rivers
- Shoreline retreat with natural habitat changes/losses
- Increasing flood frequency and depth in coastal areas
- Saltwater intrusion in water supply wells, OR higher canal stages and flood risks
- Uncertainties and risks in rate and depth of sea level rise

Warmer Temperatures

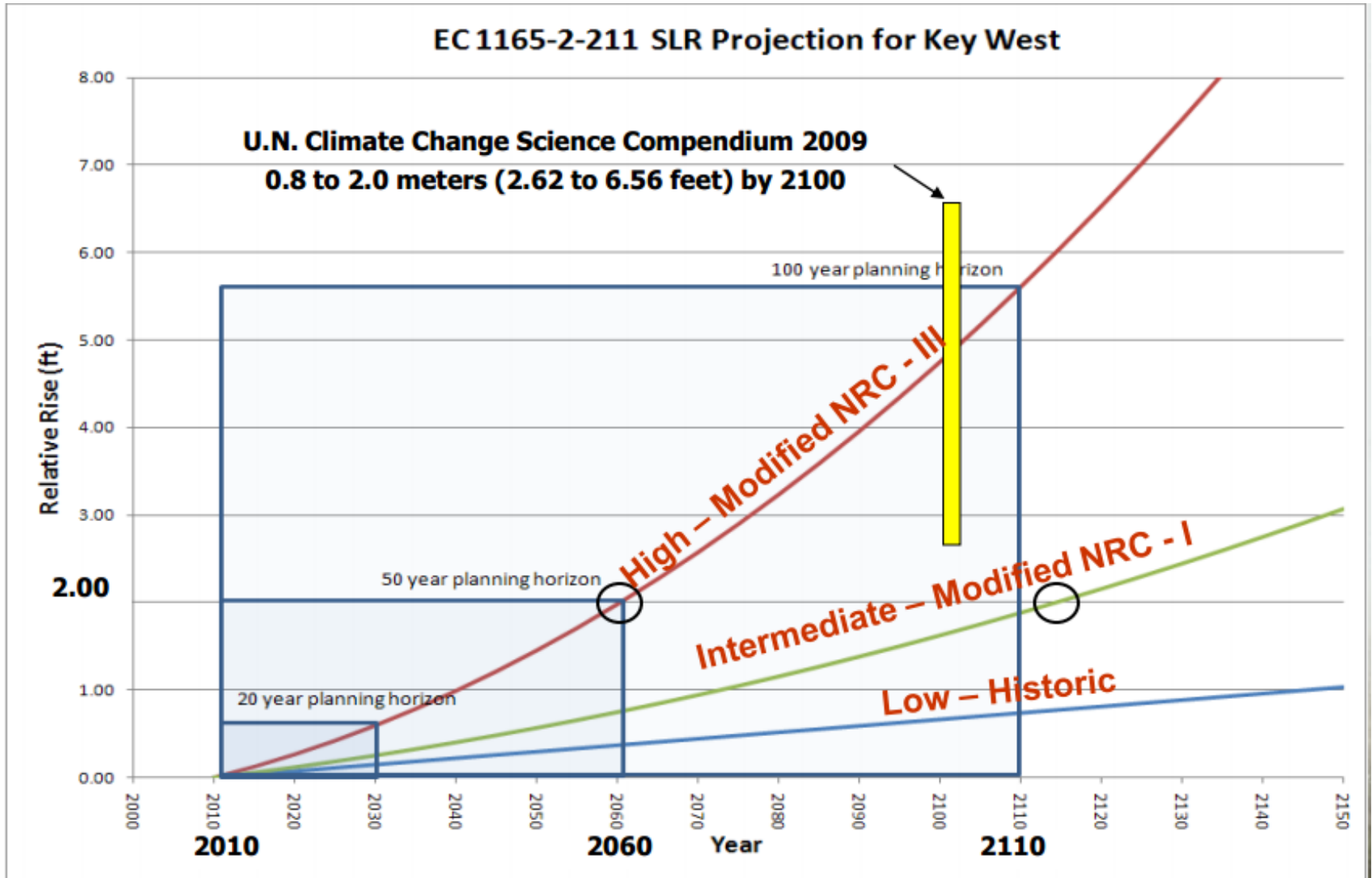
- Evaporation losses up; water supply down
- Stresses on plant, animal, and marine ecosystems
- Changes in growing season and migratory patterns

Hydrologic Pattern Changes

- Potential for less frequent and more intense rain events
- Potential increased tropical storm intensity or frequency



Sea Level Rise Scenarios



[http://architecture2030.org/slr/miami_beach_](http://architecture2030.org/slr/miami_beach_fl)
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Sea Level Rise In Everglades National Park

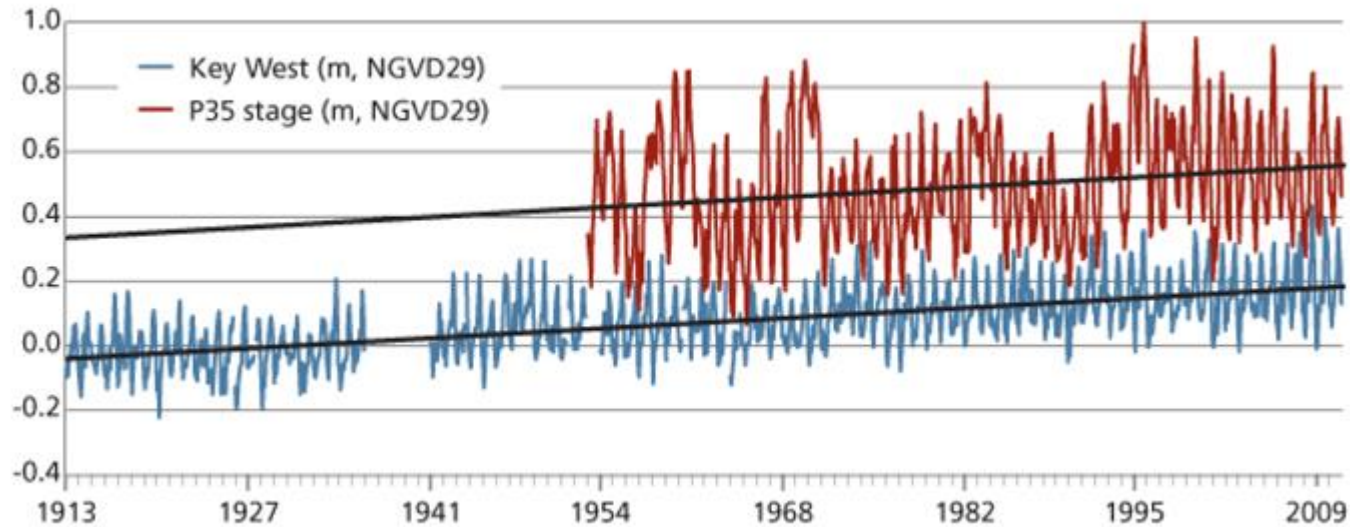
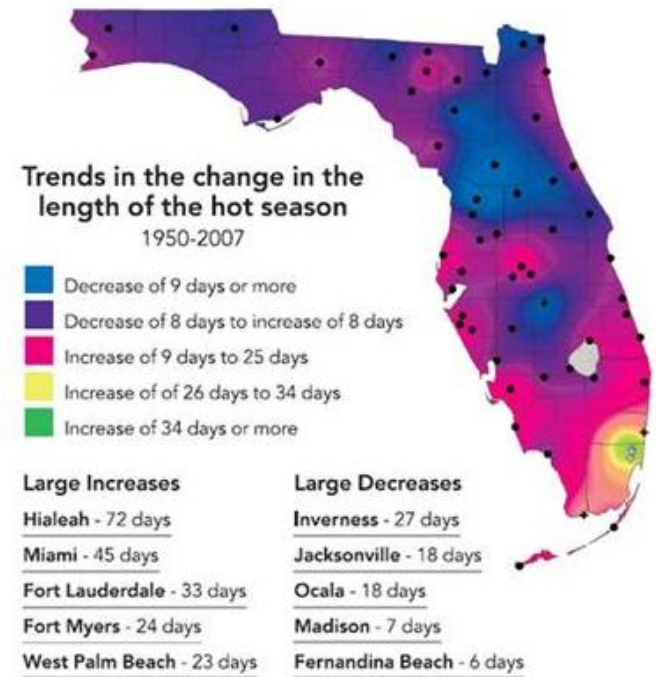
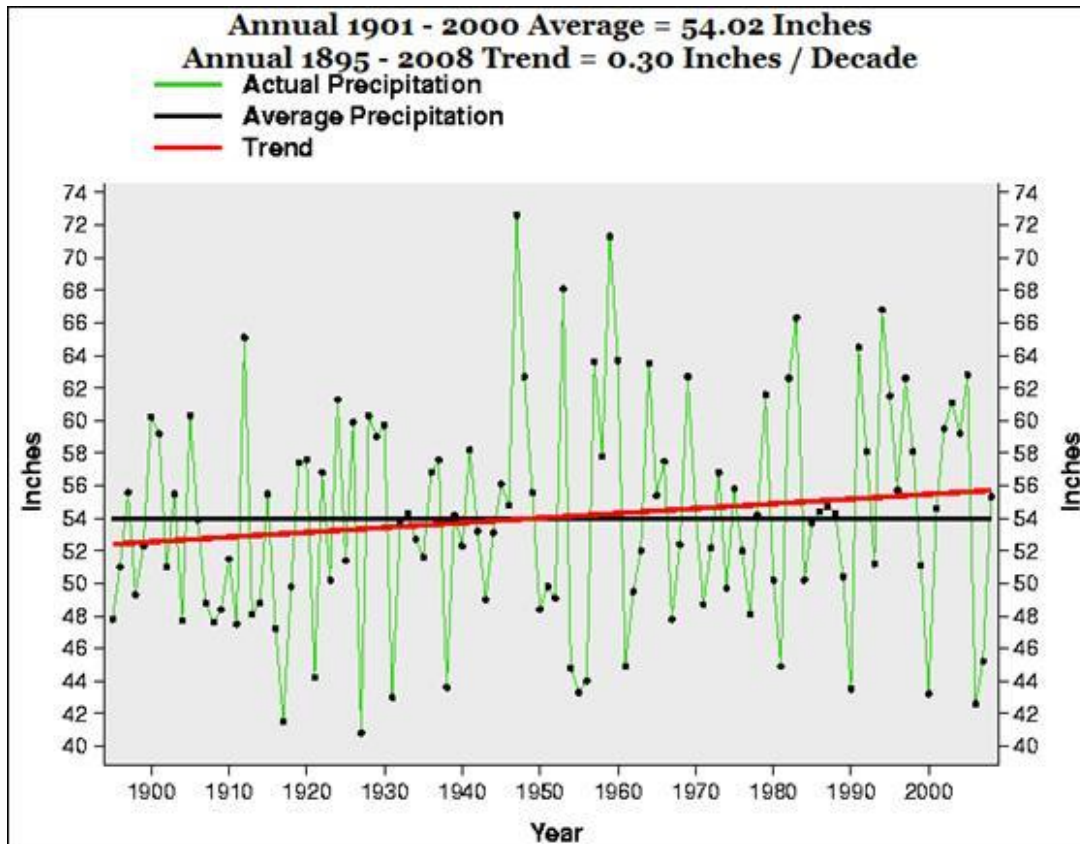


Figure from Stabenau, Erik, Vic Engel, Jimi Sadle, and Leonard Pearlstine 2011. "Sea-level rise: Observations, impacts, and proactive measures in Everglades National Park." *Park Science* 28:26-30.



Rainfall Projections



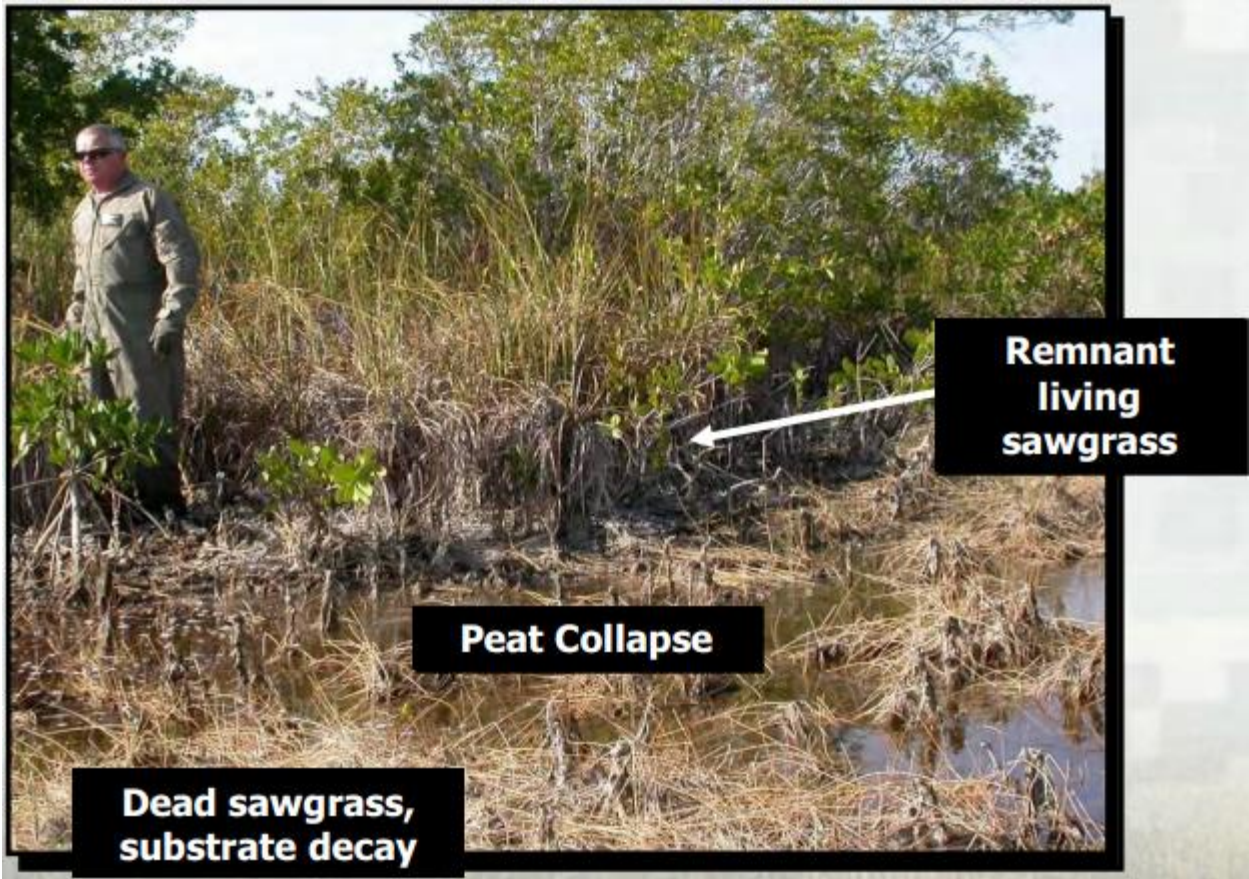


Photo Credit: Dr. Harold R. Wanless; University of Miami, Department of Geological Sciences; co-chair of Miami-Dade Climate Change Task Force



Southeast Florida Regional Climate Change Compact

- Collaborate on joint policy positions urging Congress to recognize vulnerabilities of South Florida to Climate Change & enhance federal participation in regional adaptation strategies
- Develop joint position statements on proposed State legislation and energy/climate policies
- Develop baseline greenhouse gas emissions for South Florida and coordinate emissions reductions strategies
- Unify sea level rise projections



NPS Efforts

- Reduce Fuel Use and GHG Emissions from Transportation Sources
- Reduce GHGs Through Buildings and Facilities Management
- Increase Climate Change Outreach and Education
- NPS 2nd Century Call to Action – 21 & 23

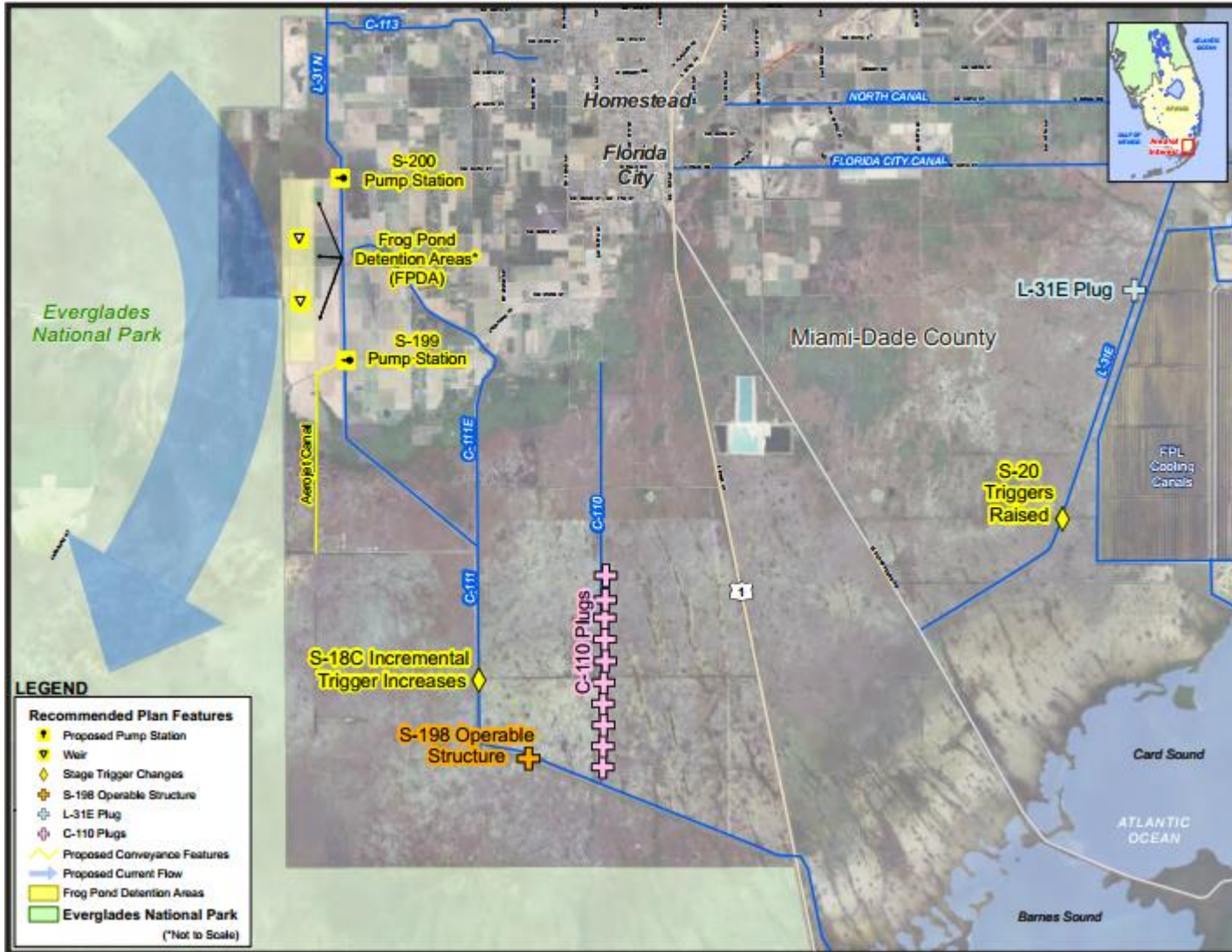


USACE Efforts

- June 2011 Climate Change Adaptation Policy Statement released
- Feb 2013 Adaptation Plan & Report
- <http://corpsclimate.us/>



C-111: A Case Study



Barriers and Opportunities

- Time consumptive to model for a large range of impacts.
- Climate deniers remain amongst decision makers needed for authorization & funding.
- Inflexibility of federal process.
- Long term benefits exceed term limits.
- Broaden & diversify funding sources.



Policy Challenges

- USACE 2011 guidance does not apply to regulatory activities.
- Limitations of adaptive management to address climate adaptation.
- Calculating long term benefits for climate mitigation and adaptation.
- Skyrocketing project costs.



Lessons Learned

- Everglades Restoration will help delay climate change impacts in natural and developed areas... **IF** it happens fast enough.
- Additional water storage is the critical element to deal with uncertainties.
- More work needed to assess impact of sea level rise and climate change on the restoration effort
- CERP PIRs must address adaptation strategies for enhanced long term sustainability.



Questions?

