Sea Level Rise: its effects on Water Management in South Florida

South Florida Ecosystem Restoration Task Force

July 9, 2013

Ernie Barnett, Interim Executive Director

South Florida Water Management District

Why is Sea Level is Important to Southeast Florida?

- Flooding
- Extreme weather events (storm surge, hurricanes)
- Sea level rise
  - Water Management
  - Saltwater intrusion and water supply
  - Beach erosion
- Impact to the Everglades

Street flooding during high tide

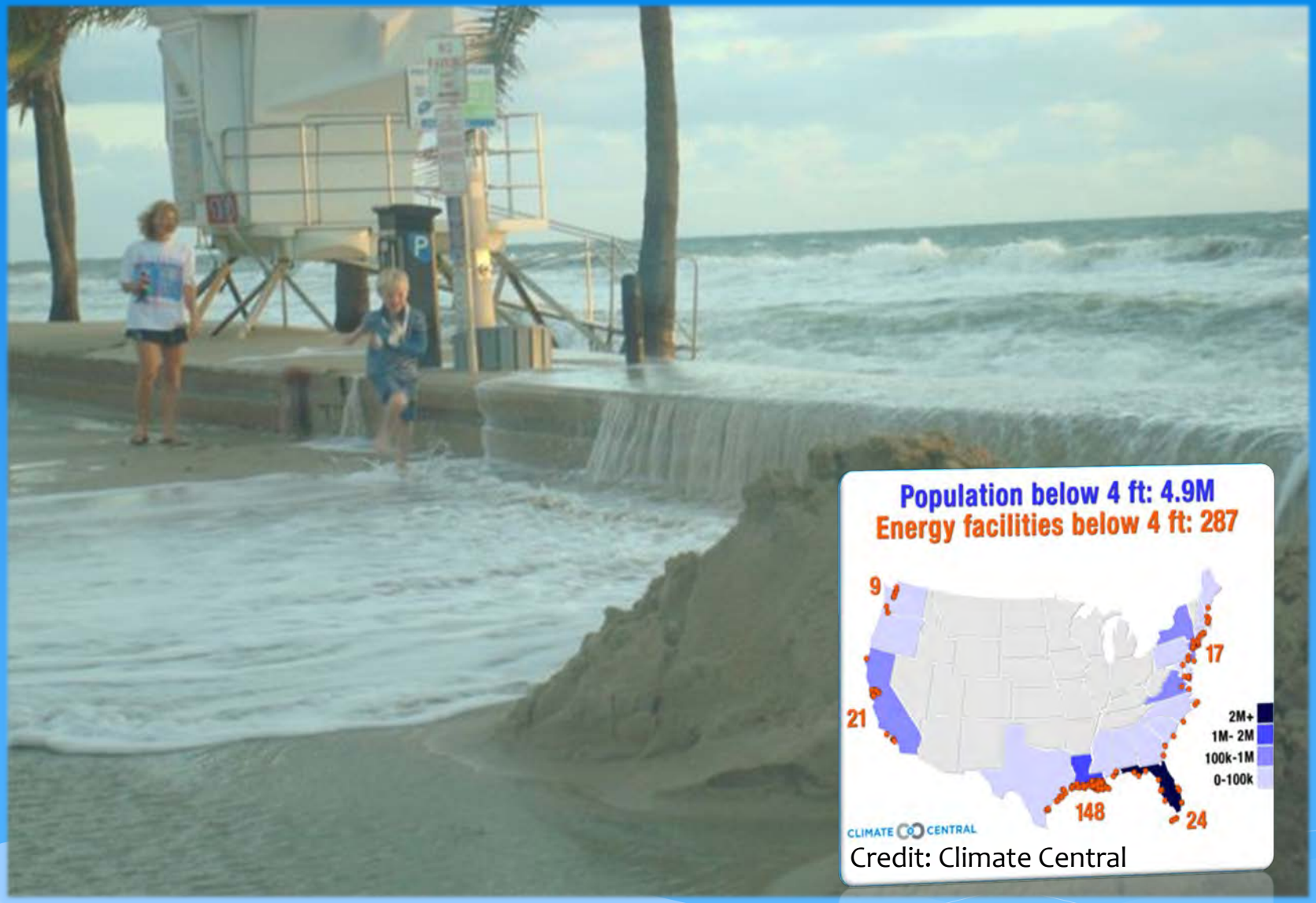
Credit: Miami-Dade, Broward and Monroe county staff

Local Impacts: Pre-High Tide Event

Credit: Dr. Jennifer Jurado

High Tide Event

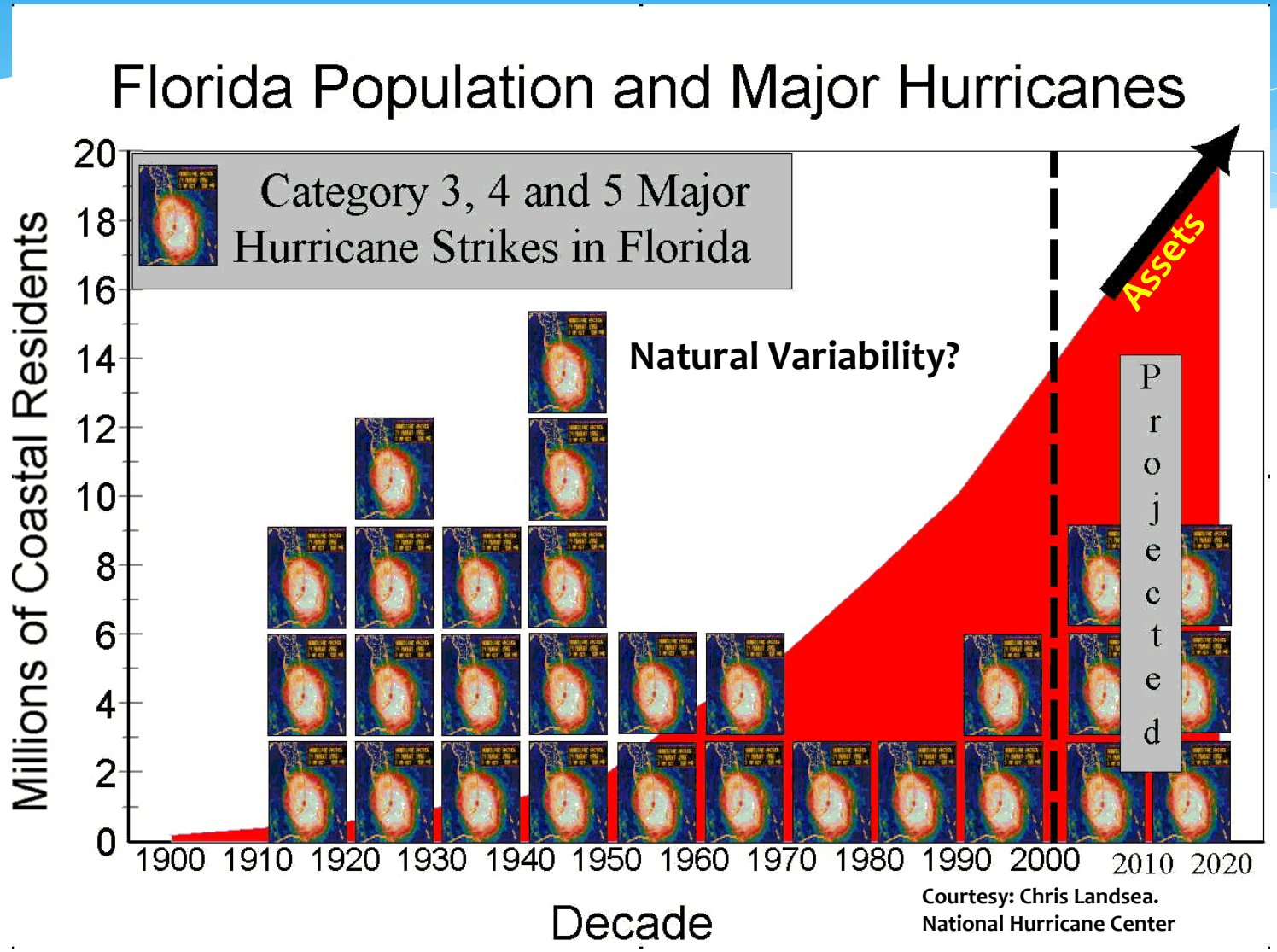
Credit: Dr. Jennifer Jurado



Credit: Climate Central

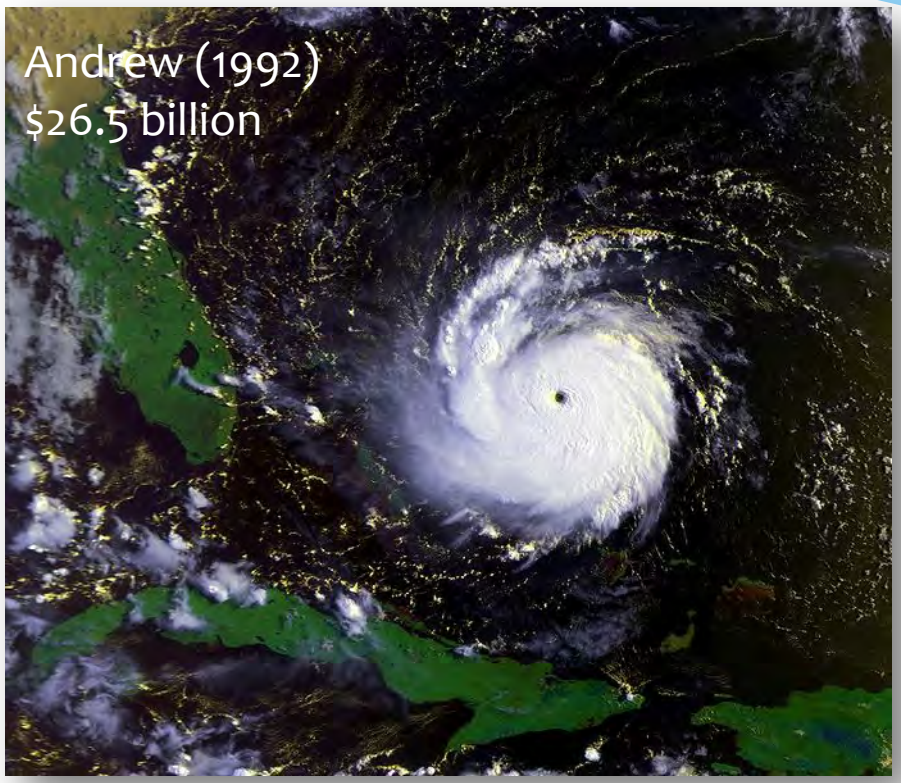
Today's Problems

Hurricanes



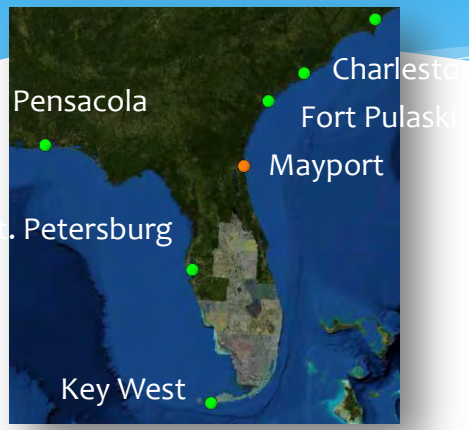
Courtesy: Chris Landsea.
National Hurricane Center

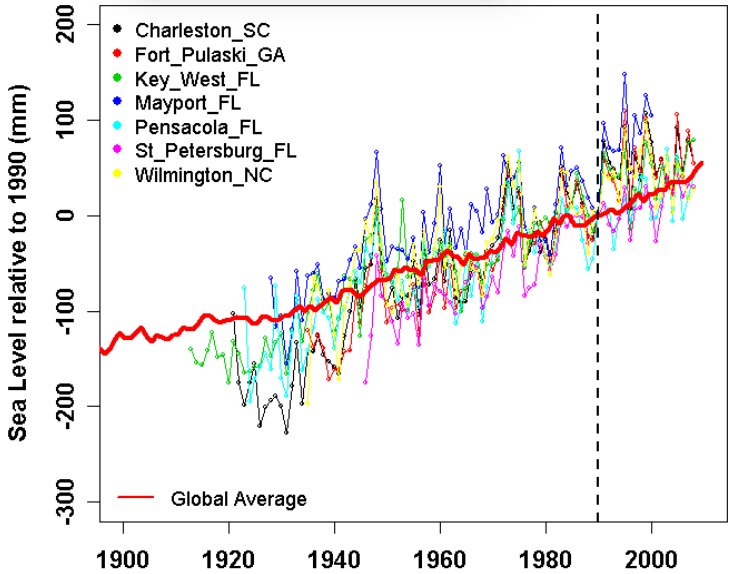
Hurricanes (Cont.)



- ✓Premature to conclude that human activities have had detectable impact on hurricane activity
- ✓Tropical cyclones to shift towards strong storms (2-11% intensity increase by 2100)
- ✓Decrease in global frequency of tropical cyclones (6-34%)
- ✓Increase in the frequency of the most intense cyclones
- ✓Increase in rainfall rate, 20% within 100 km of storm center

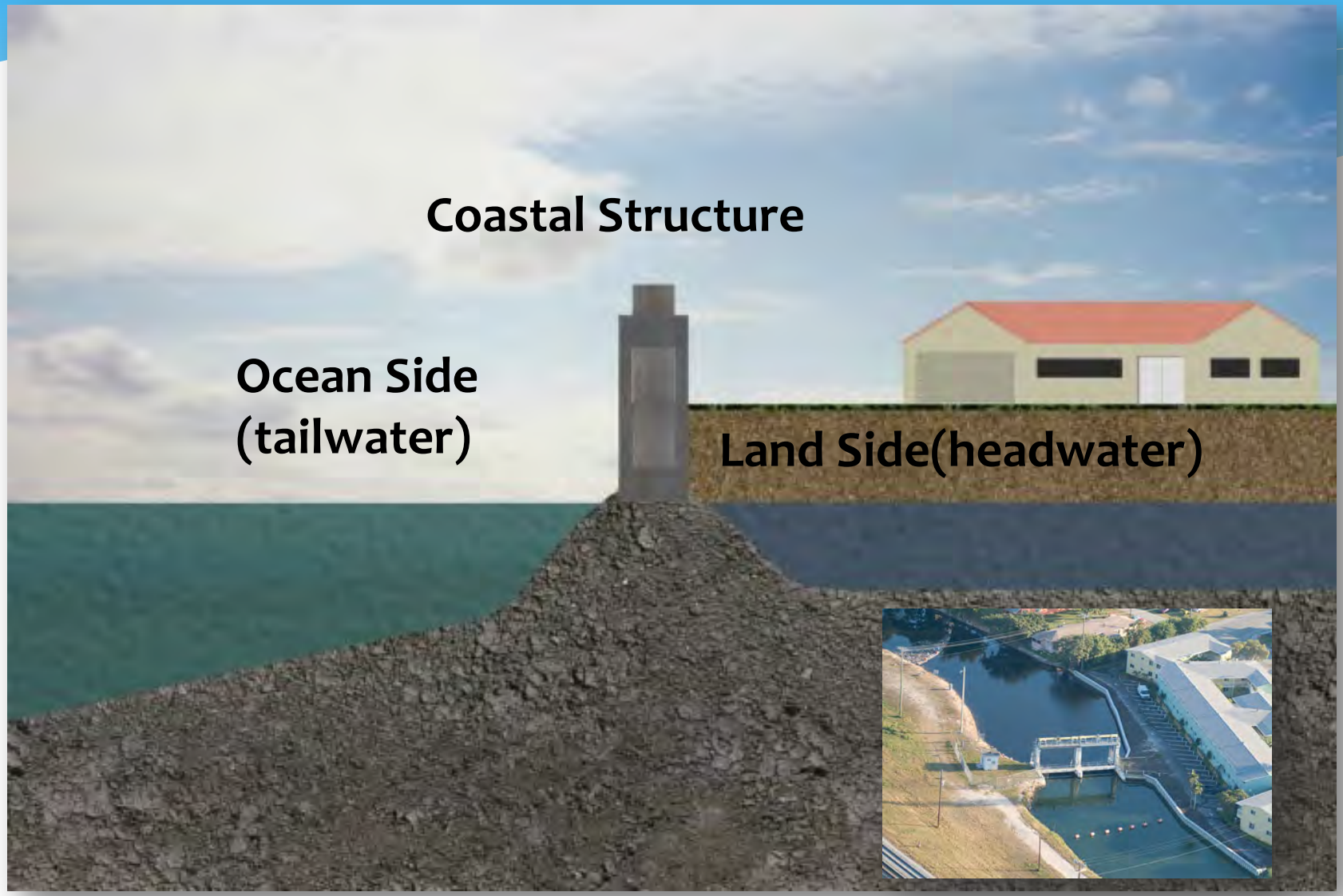
Rising Seas – Historical Data



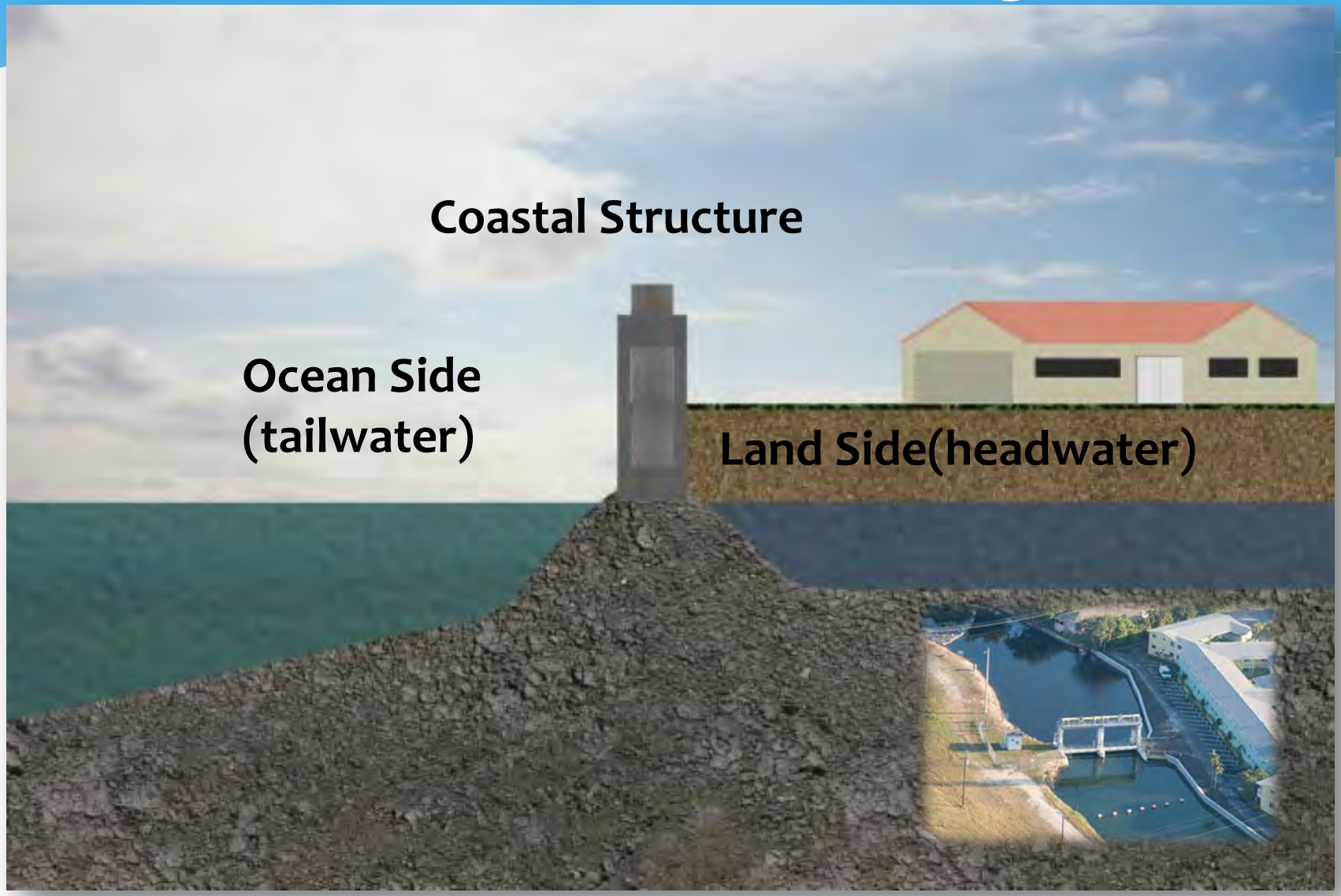


- **Relative Sea Level (height above a local datum) depends on:**
  - **Global Mean Sea Level**
  - **Regional Variability**
  - **Vertical Land Movement (uplift/subsidence)**

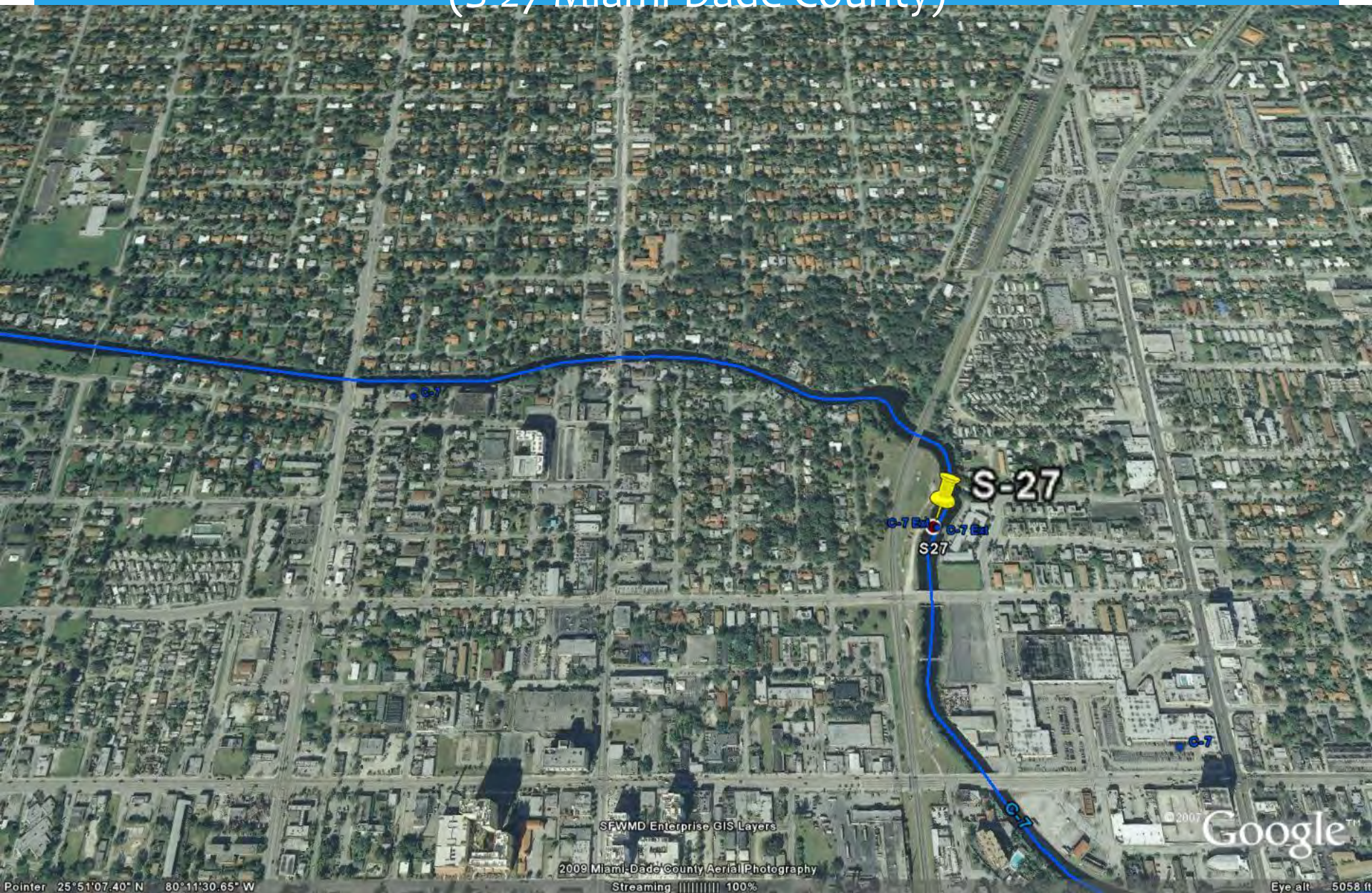
Impacts of Rising Seas: Flood Control Challenges



Impacts of Rising Seas: Flood Control Challenges

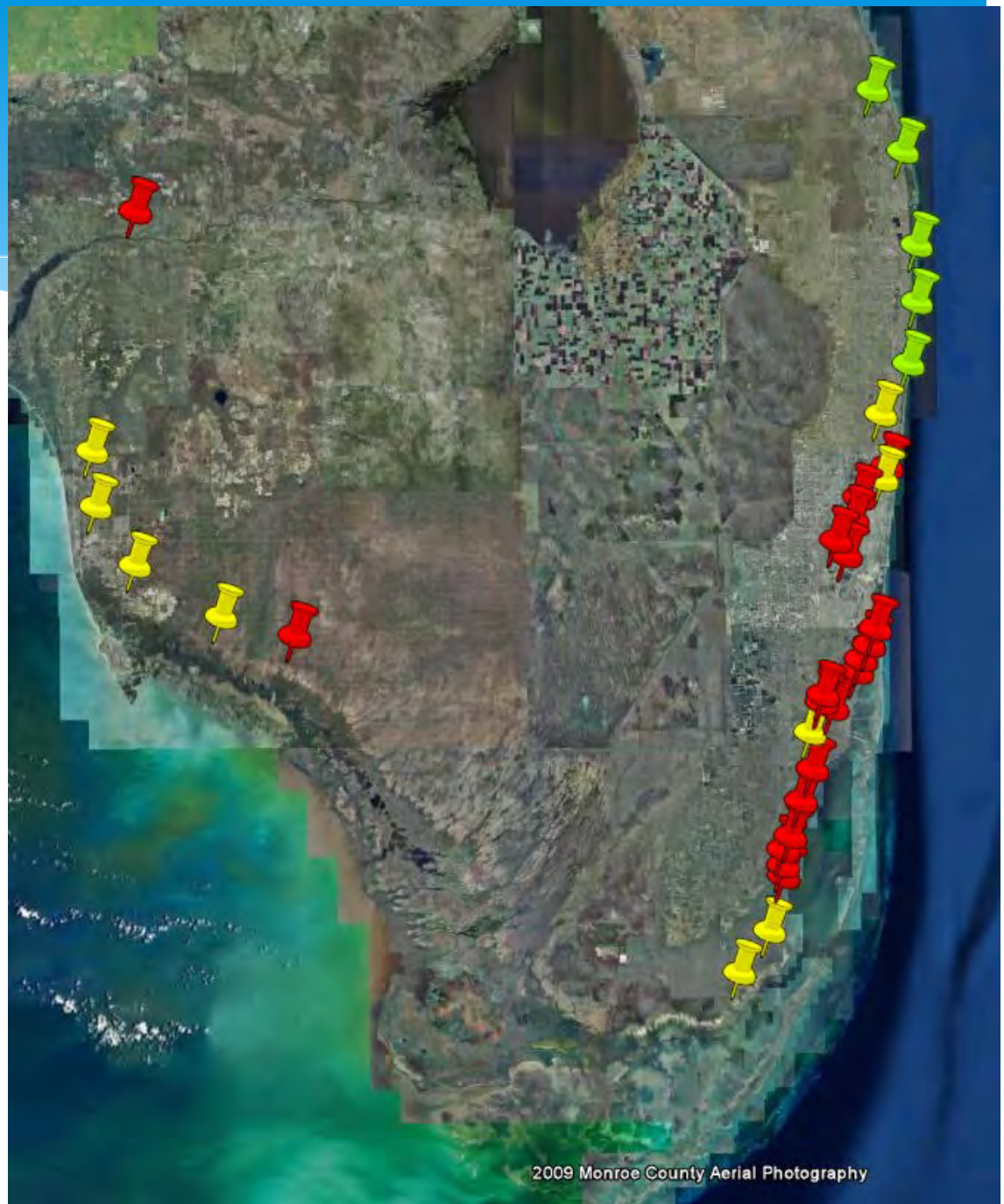


Typical Area Surrounding Coastal Structures (S-27 Miami-Dade County)

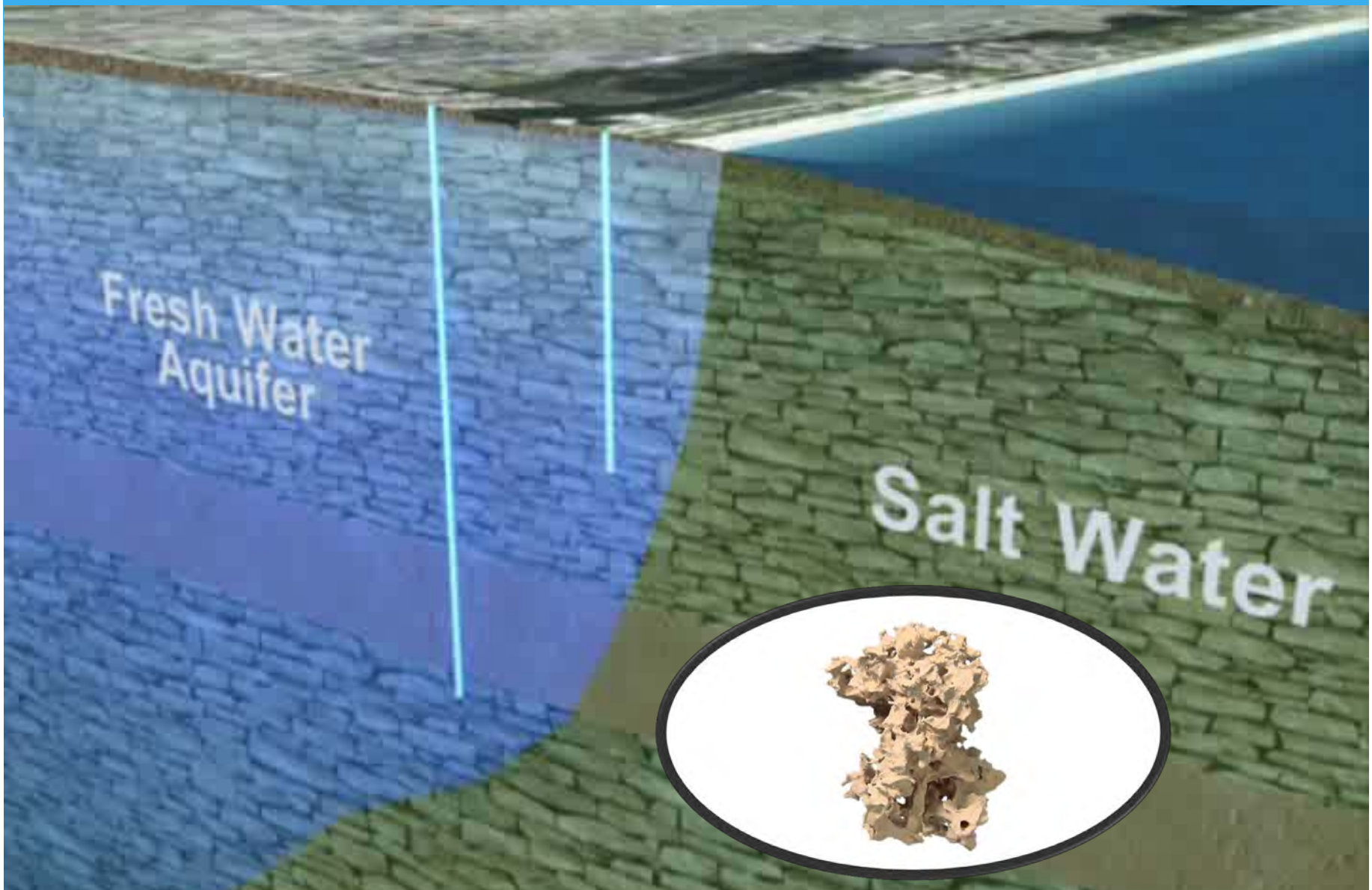


Potential Exposure

- Preliminary screening based on original designs.
- 28 gravity structures on the East Coast
- Most vulnerable structures are in Miami-Dade County



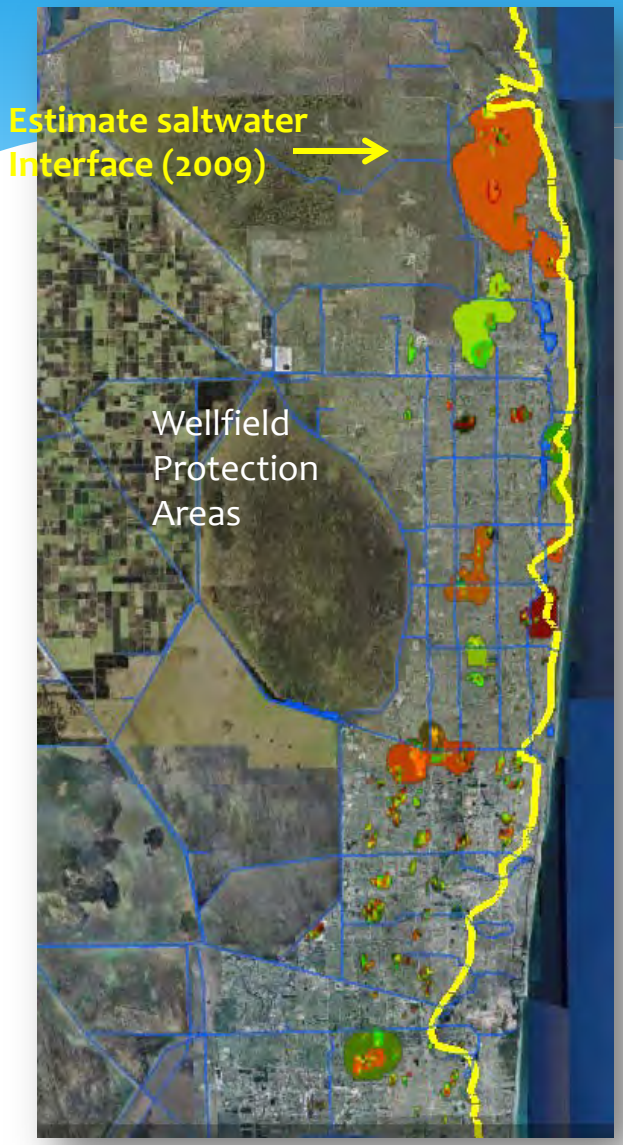
Rising Seas: Saltwater Intrusion



Adaptation to Rising Seas

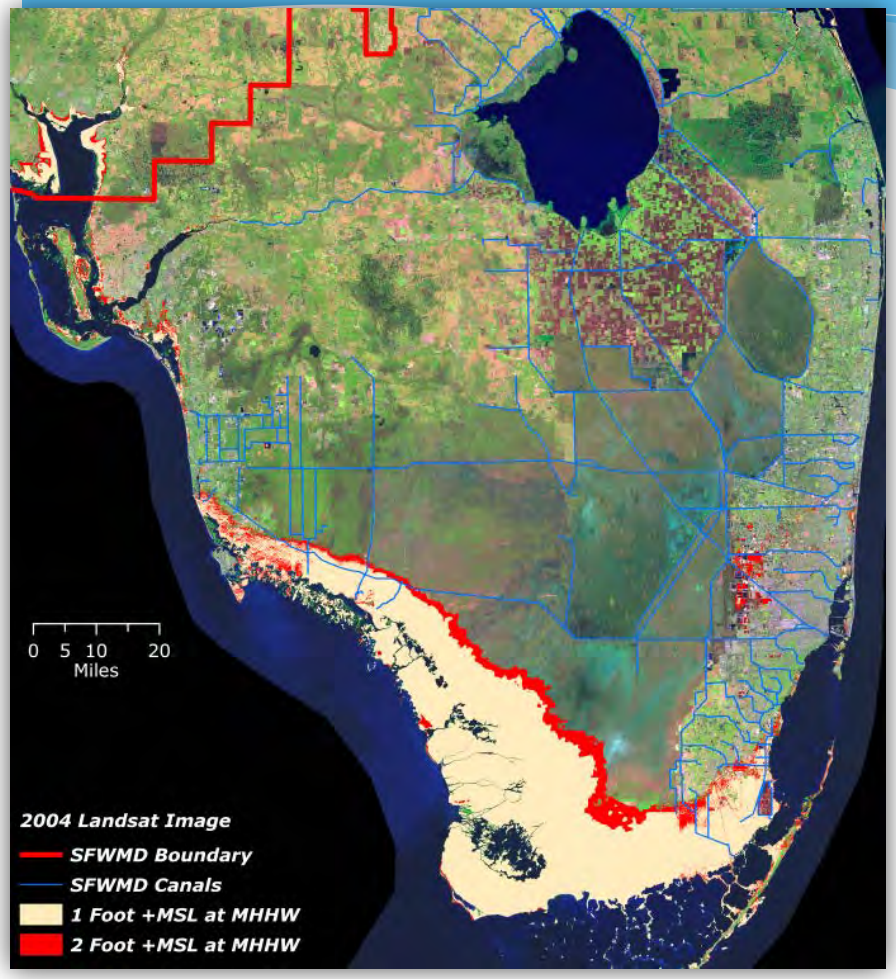
Example: Forward Pumping at S-26 Structure

Exposure: Potential acceleration of saltwater intrusion



- **Continue looking at opportunities and technologies to reduce amount of additional freshwater needed for water supply**
- **Implement water conservation measures**
- **Develop alternative water supply options**

Potential Impact of Rising Seas: Southern Everglades

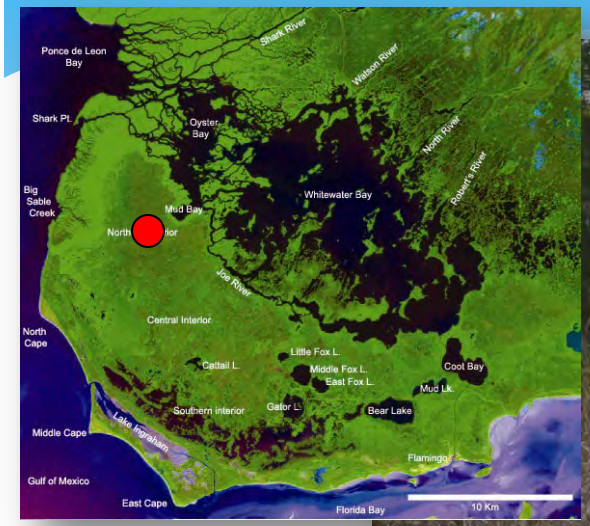


* Relocation and possible reduction of mangrove forests
* Forced migration of wading birds northward
* Potential peat collapse, coastal erosion, and redistribution of sediments
* Salinity intrusion into freshwater marshes can: discharge toxic hydrogen sulfide, cause coastal fish kills, and increase habitat loss

Permanent inundation and/or increased flooding with a sea level rise (SLR) of 1.5 to 3.5 meters

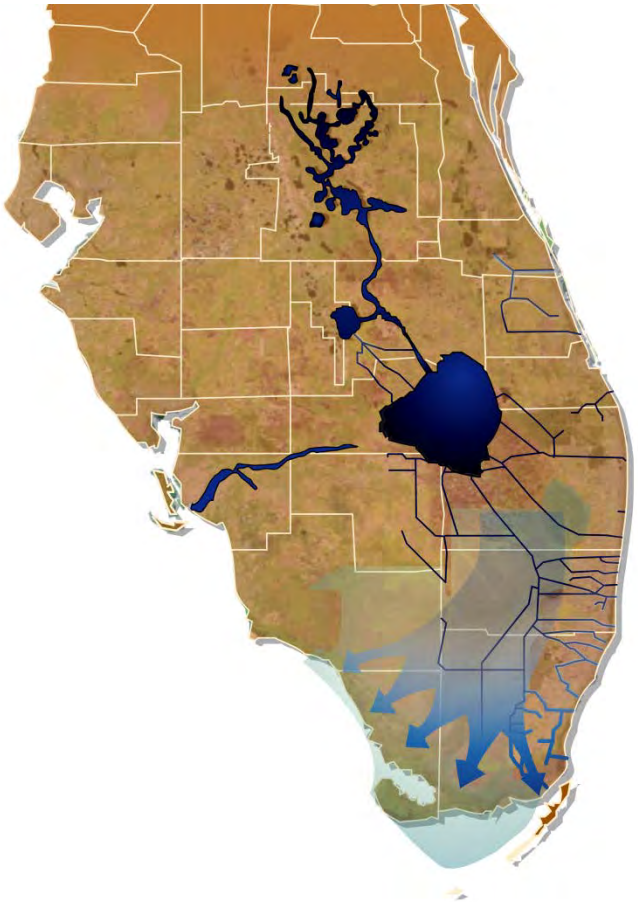
(Source: USEPA, http://www.epa.gov/climatechange/effects/coastal/slrmaps_vulnerable.html

Inundation & Collapse of Freshwater Wetlands



Credit:
Prof. Hal Wanless

Adaptation Response to Sea Level Rise



* Everglades restoration is an important adaptation response to Sea Level Rise.
* Ecosystem resilience can be enhanced through increased water flows through the Everglades and increased storage.
* Increased flows into the southern estuaries will reinstate widespread organic soil formation and maintain the freshwater head in order to mitigate the effects of sea level rise and saltwater intrusion.

Conclusions

* National Academy of Sciences 2008 report on restoration progress stated that climate change should be a reason to accelerate Everglades restoration, not a reason for delays
* Everglades Restoration will help delay impacts in natural and developed areas
* More work needed to assess impact of sea level rise and climate change on the restoration effort
* CERP PIRs to address Climate Change Adaptation Strategies for enhanced long term sustainability

Thank you!