



Southern Everglades Impacts from Changes in Water Level

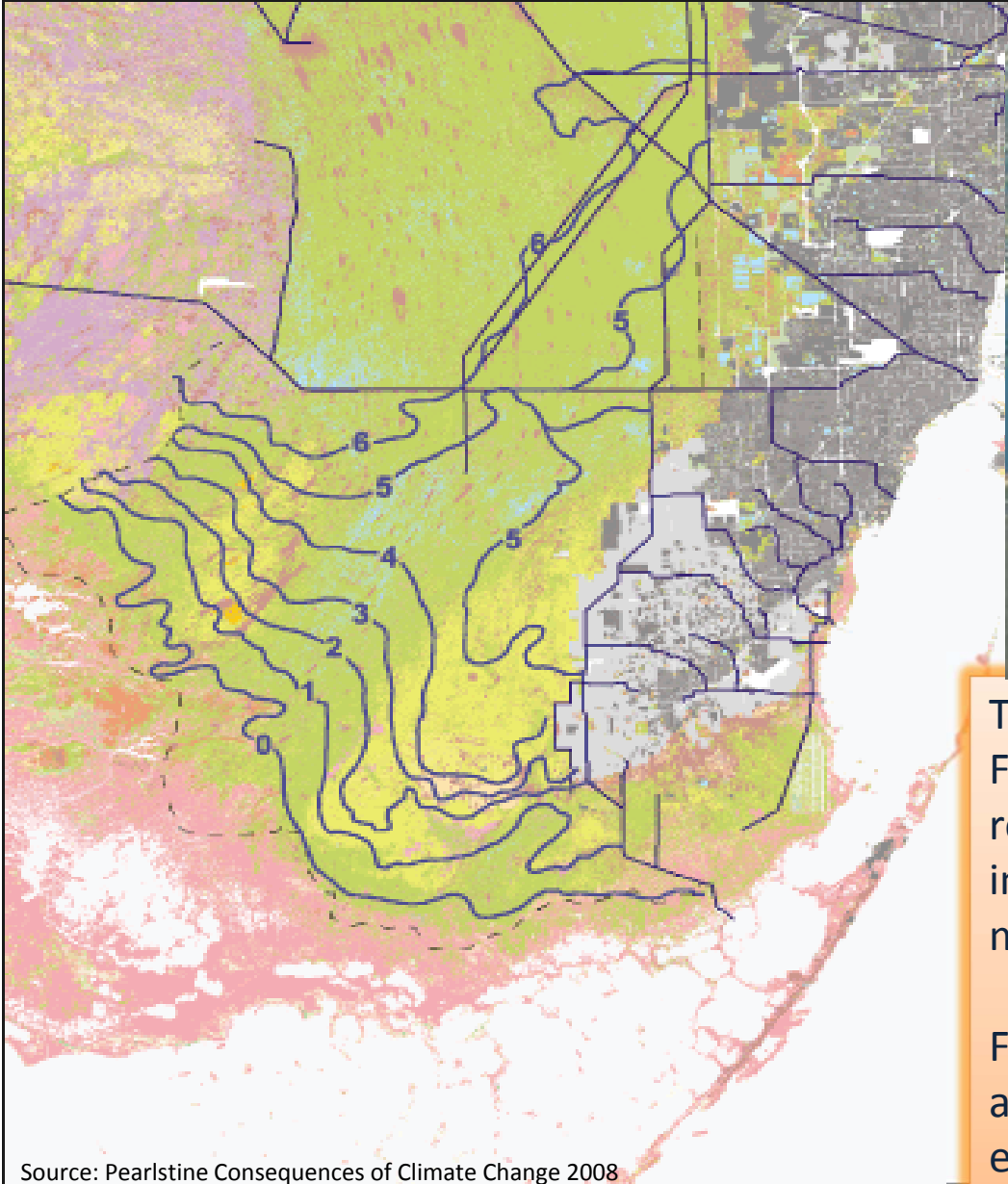
Robert Fennema

**Hydrology of the Everglades
in the Context of Climate Change**

March 30, 2012

Elevation and Vegetation

South Florida Natural
Resources Center



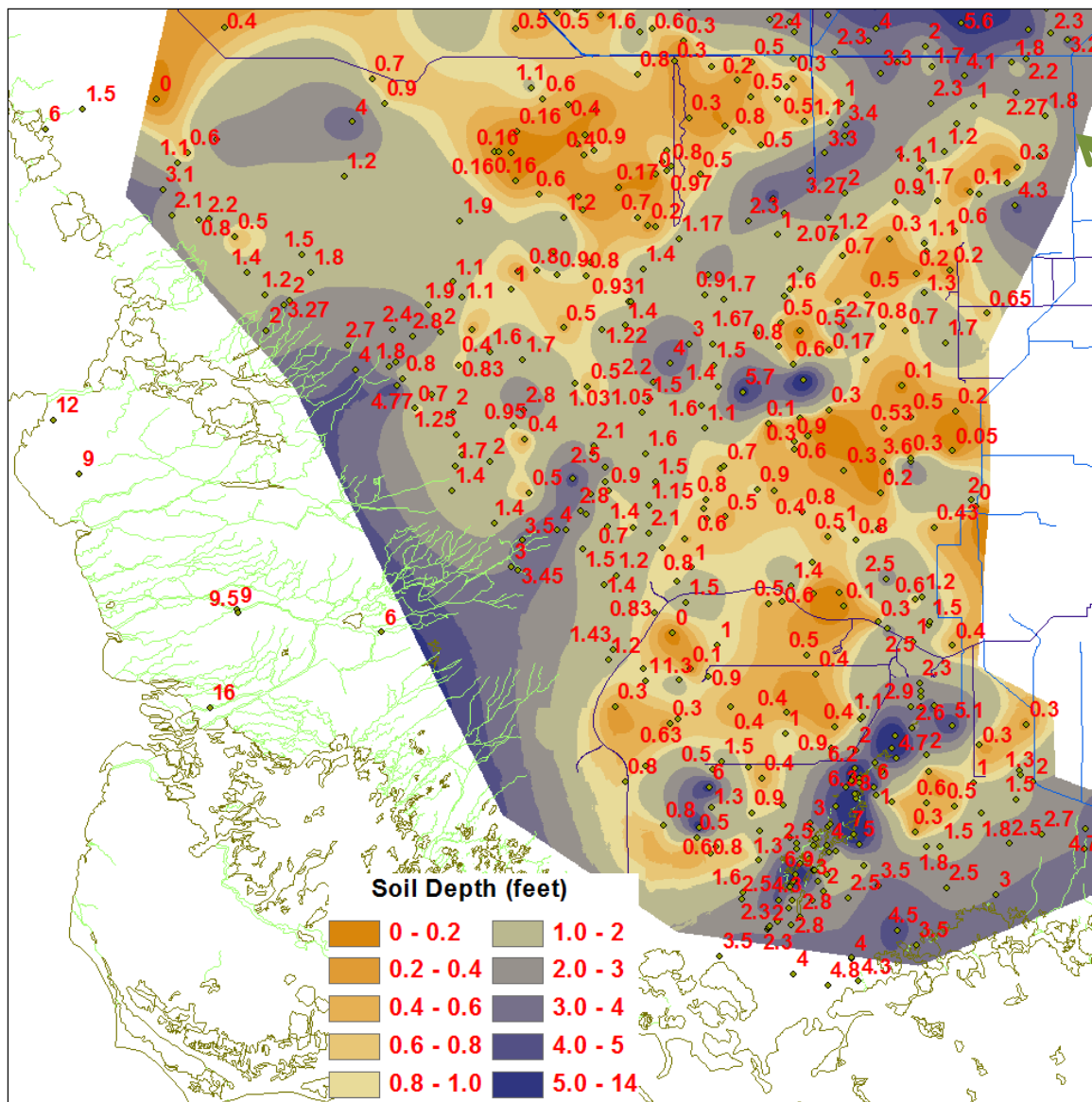
The low elevation and gradual slope of south Florida makes it's ecosystems and cultural resources particularly vulnerable to increases in water level. Prairies convert to marsh.

Further lowering of water levels due to alterations in flows, rainfall and evapotranspiration will continue to change wetlands to upland environments.

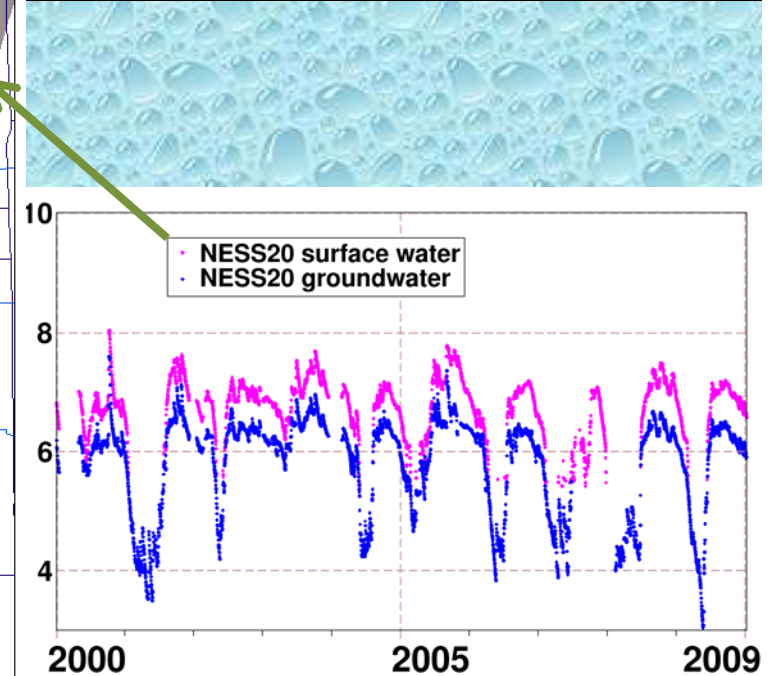
Source: Pearlstine Consequences of Climate Change 2008

Soil Thickness and Water Levels

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Data Sources: REMAP, NPS and USGS

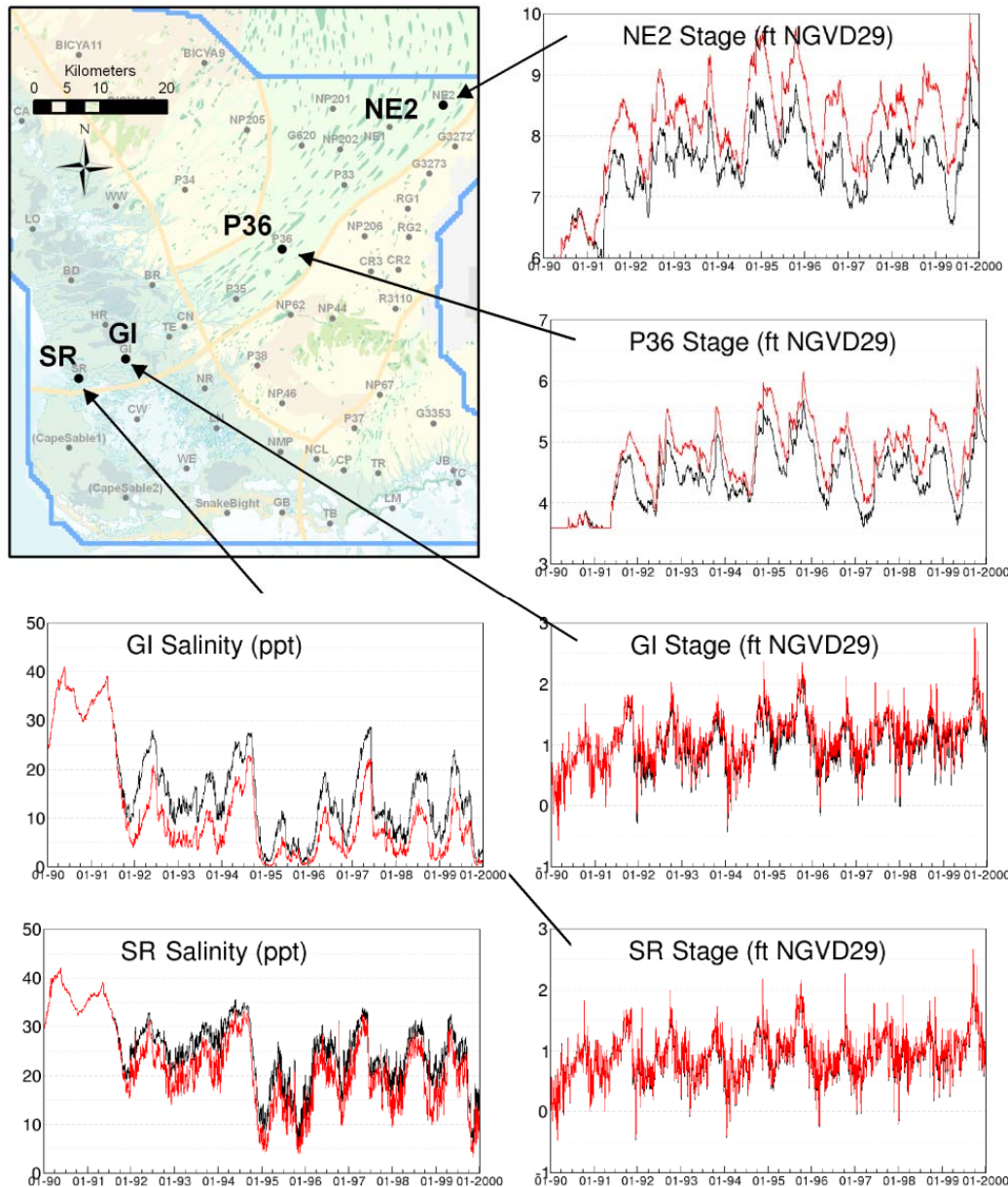


Mangrove peat underlies the coastal zone.

Sawgrass/Water Lily peat in Shark Slough and Taylor Slough. Distinct surface water and groundwater levels caused by low vertical permeability of the peat.

TIME model, stages and salinity

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TIME output with SFWMM (2x2)
flows as input along Tamiami Trail.

Current (Alt7r5e) in black
Future (Cerp0) in red

The stages are significantly
different in upper Shark Slough.

Flows are the driving force to
lower salinities.

Potential Everglades Ecological Effects

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Tolerances to changes in, for example, temperature, hydroperiods, or sea level may be exceeded for some species.

Species depend on timing of physical events such as wading bird nesting during periods of water recession.

Habitat change. Succession to new vegetation communities.



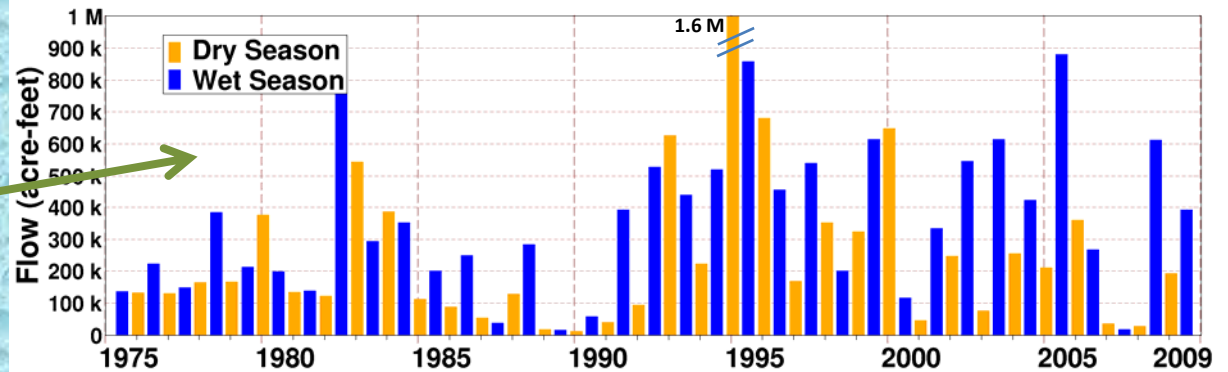
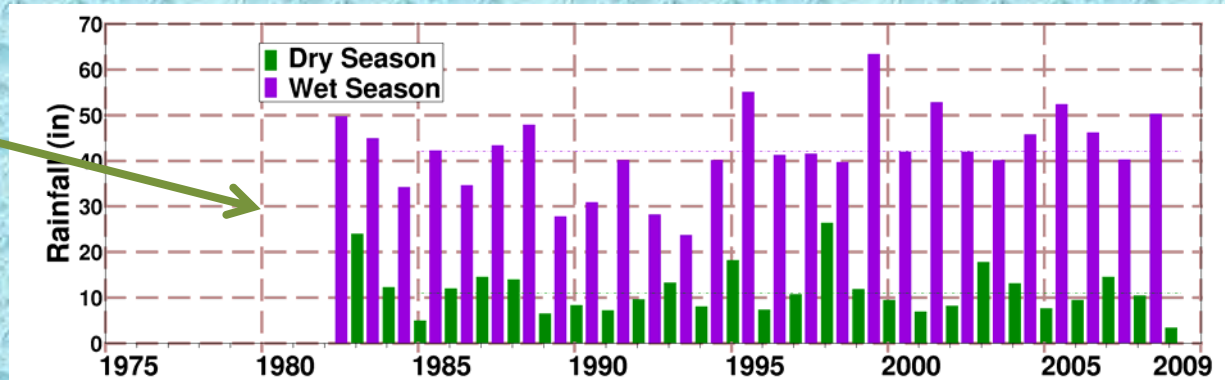
Source:

Western Shark Slough Water Levels

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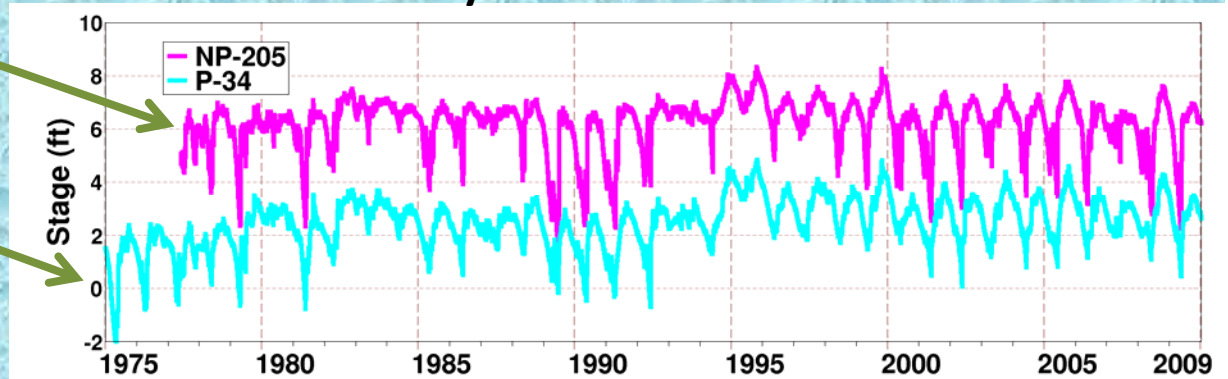
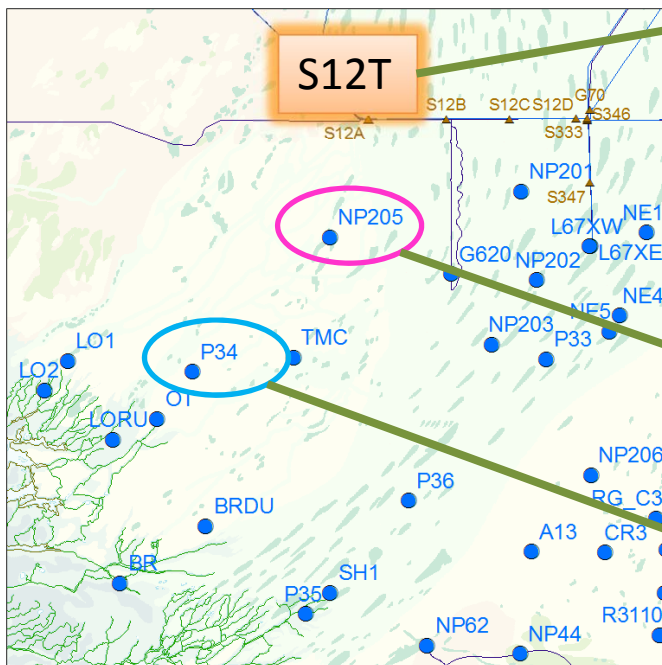


RF 1982-1993 wet 37.3in
1994-2008 wet 46.3in



Dry Period

Wet Period



Cape Sable Seaside Sparrow

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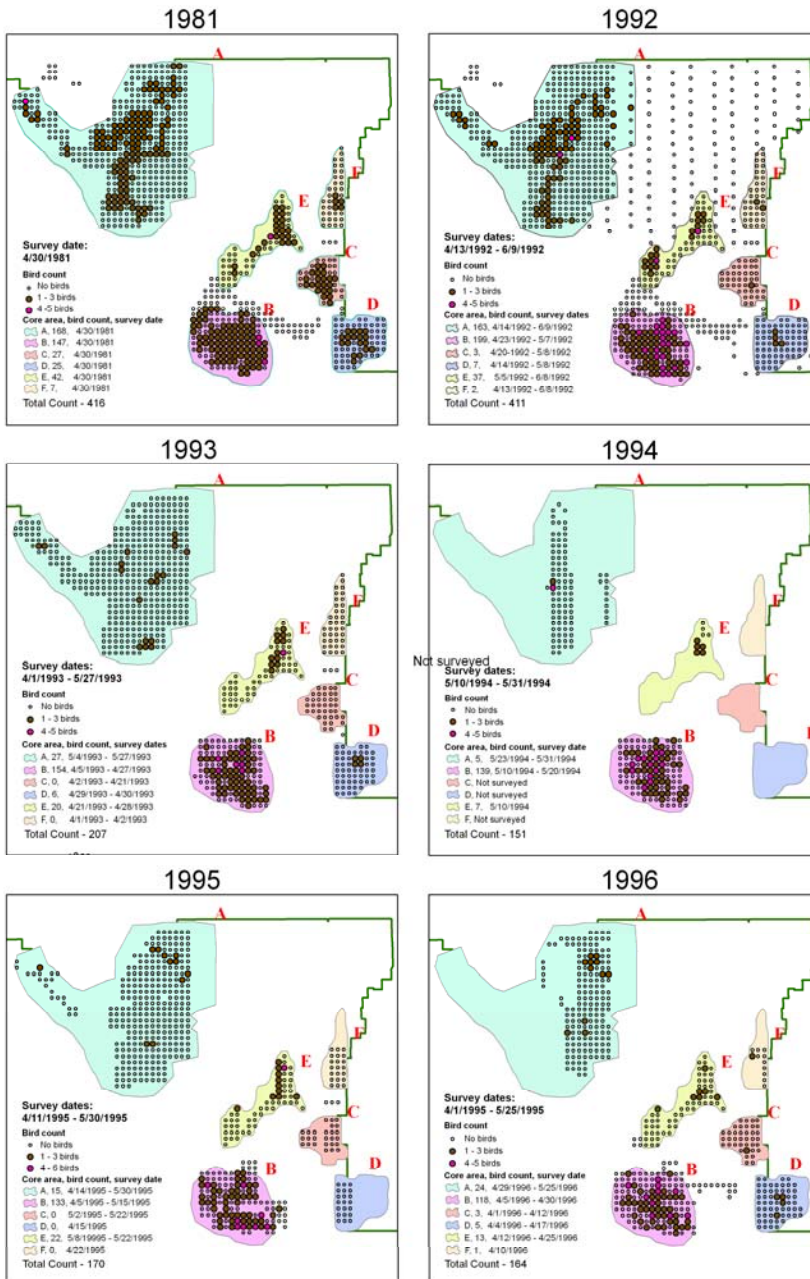


Photo by David LaPuma

Breeding season March-August

**Nests constructed of muhly
grass and sawgrass.**

**Situated 14 cm off the ground
(range 7 to 27 cm).**

Vegetation Changes

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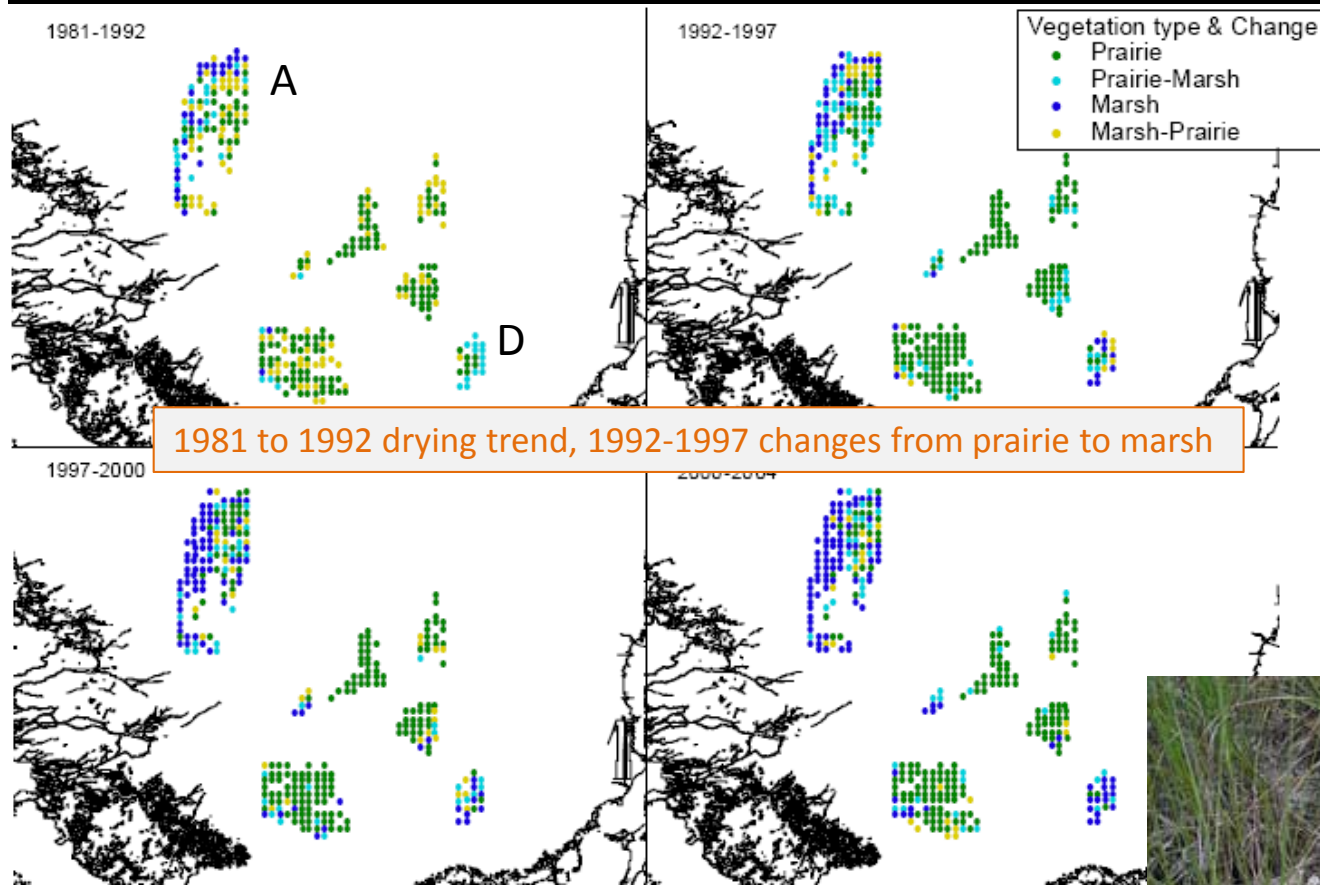


Image Source: Ross et al. 2004, annual report on habitat of CSSS

**Areas A and D changed from
prairie to marsh**

Hydroperiods:

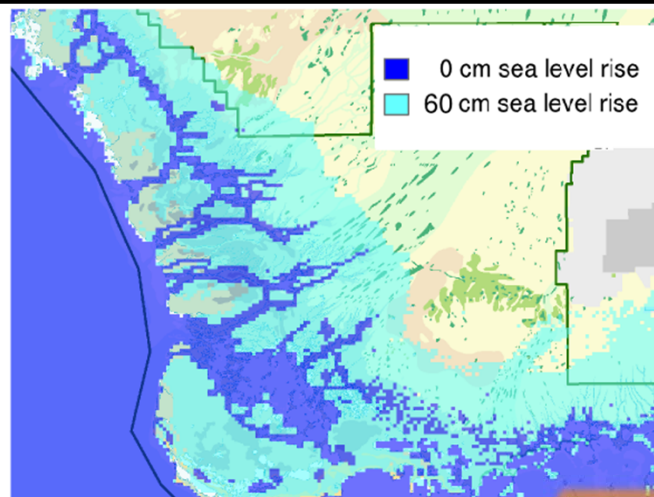
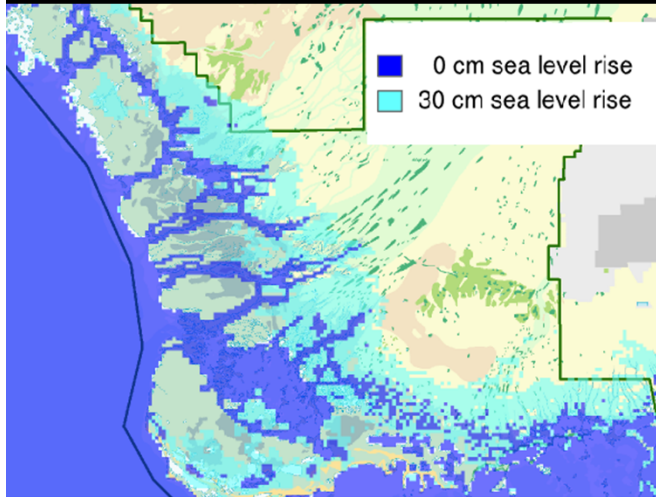
Wet prairie 199 days

Marsh 246 days



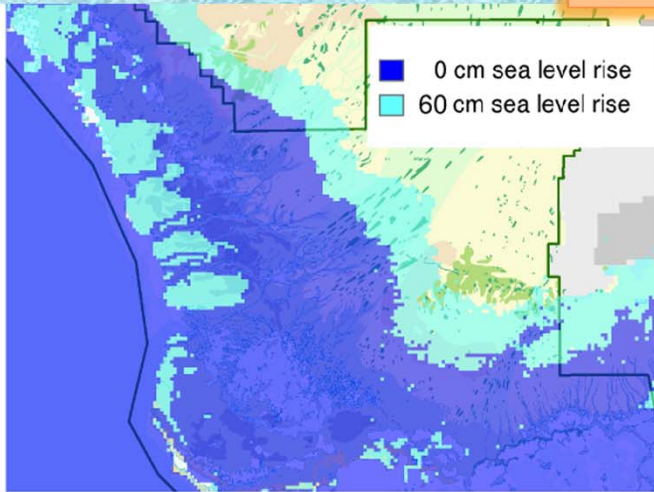
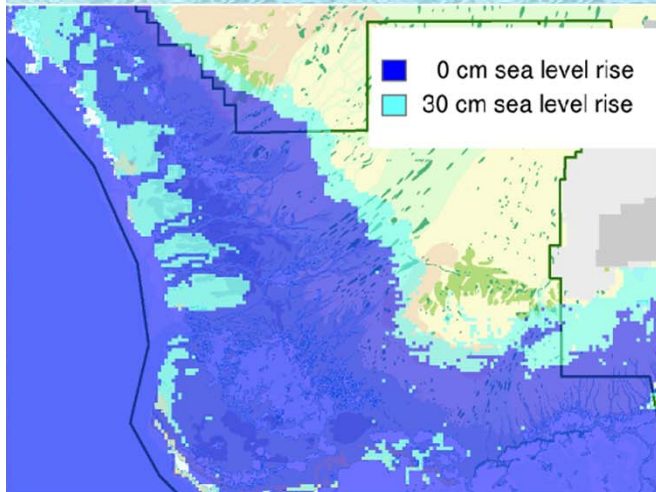
Sea Level Rise

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Minimum, -0.45 m below mean

Inundation increase as a result
of SLR, for the average 0.5 m
tidal range in the Gulf



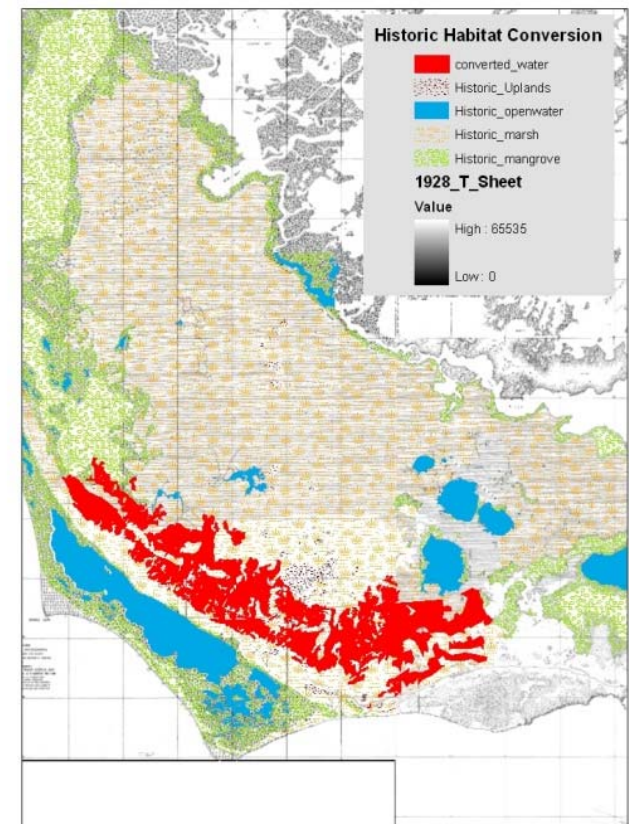
Maximum, 0.05 m above mean

Peat Decay Subsidence

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Cape Sable, Everglades National Park
Emeritus Park Researcher Sonny Bass



Source: Wanless and Vlaswinkel 2005

Ecological Impacts at EVER

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Coastal Buttonwood and Tropical Hardwood Hammock

Photos by Jesse
Hoffman & Keith
Bradley



With Sea Level Rise, Why Restore the Everglades?

1. **Species may be able to adapt* if given time. Restoration provides freshwater head to offset sea level rise saline transgressions.**
2. **The Everglades ecosystems will change, but abrupt changes are likely to be less stable and diverse than gradual change.**

- *Adapt:
1. change or phenotypic plasticity
 2. Protect or create corridors & stepping stone habitat
 3. Assisted propagation and adaptive breeding
 4. Assisted Migration
 5. Seed Banks & captive populations