2003 LTER Mini-Symposium

Ecological and Hydrologic Sciences meet Socio-economics in the Restoration of the Everglades

FCE LTER
Florida Coastal Everglades
Long Term Ecological Research

PARTICIPATING INSTITUTIONS:

Florida International University
College of William & Mary
Texas A&M University
University of Louisiana-Lafayette
University of North Carolina-Wilmington
University of Virginia
University of Miami

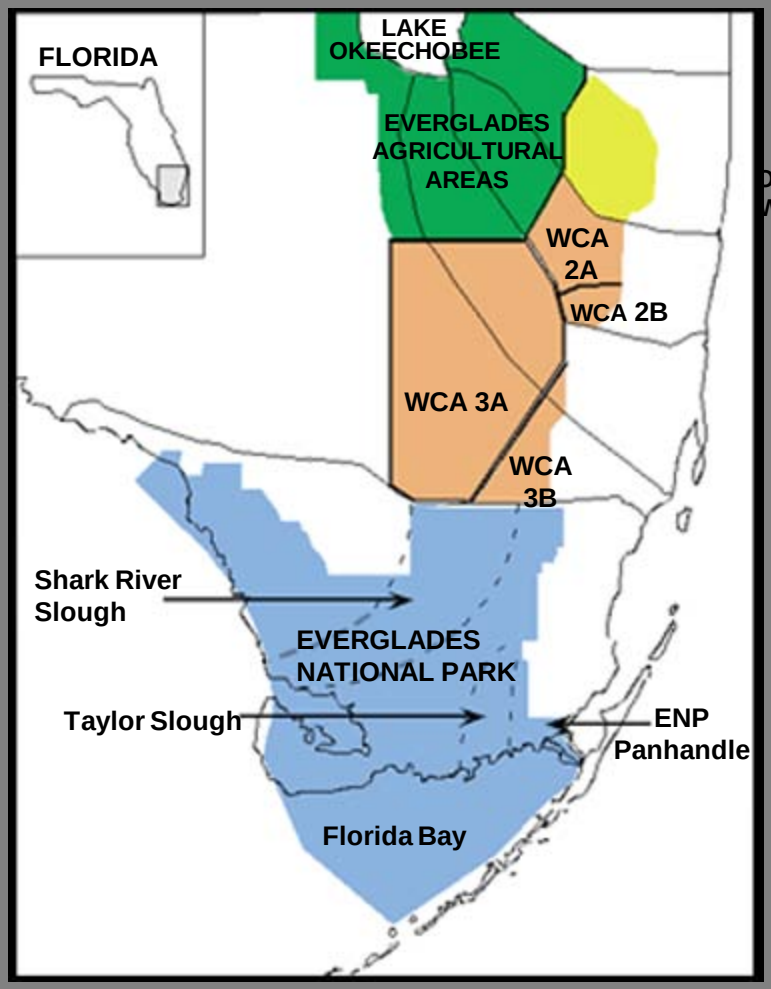
Everglades National Park
South Florida Water Management District
U.S.G.S., BRD & WRD

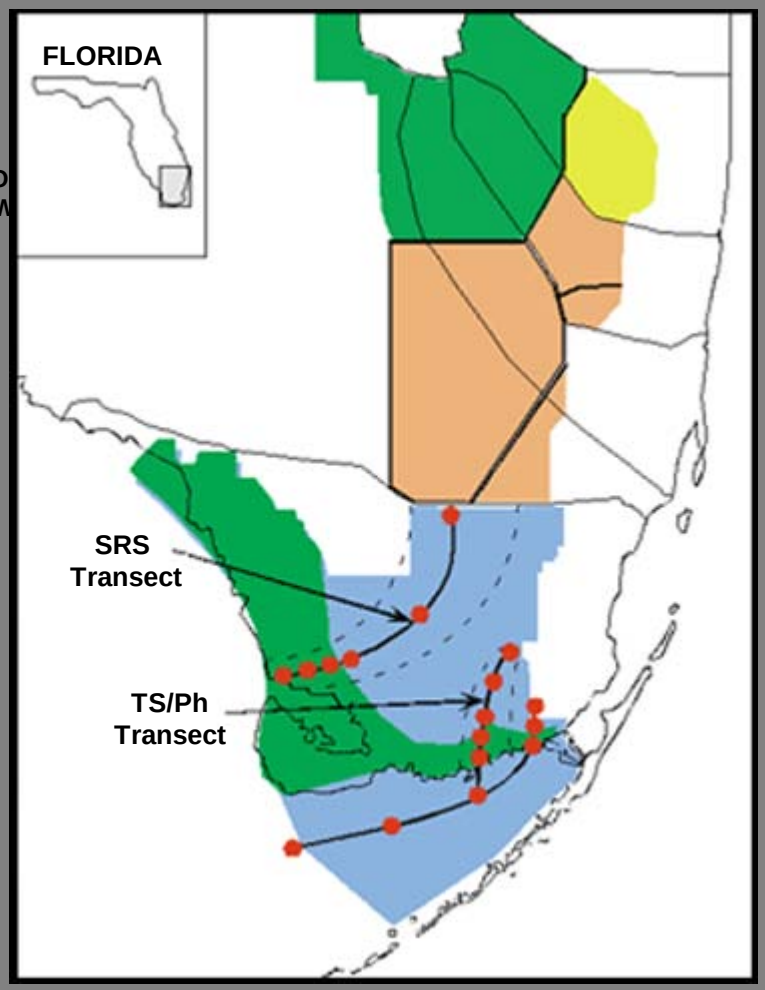
National Audubon Society
Miami Museum of Science

“Interface Science” Case Study
The Florida Everglades and FCE LTER

1. Central questions driving FCE research.
2. Ecology-Hydrology interface: Hydroperiod and surface water flow.
3. Ecology-Hydrogeology interface: Groundwater flow.
4. Past, present, and future: The context of Everglades Restoration
5. Ecology-Socioeconomics interface: Where will the water come from?
6. FCE LTER-Restoration interface: Sustainability and growth control by the limiting resource - water.

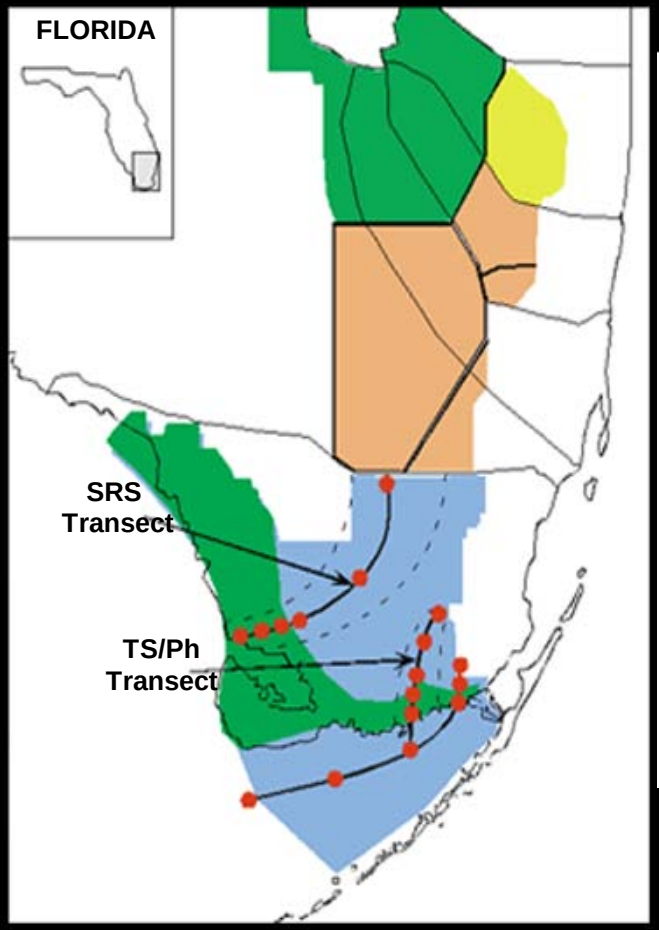
1. Central Questions Driving FCE LTER Research

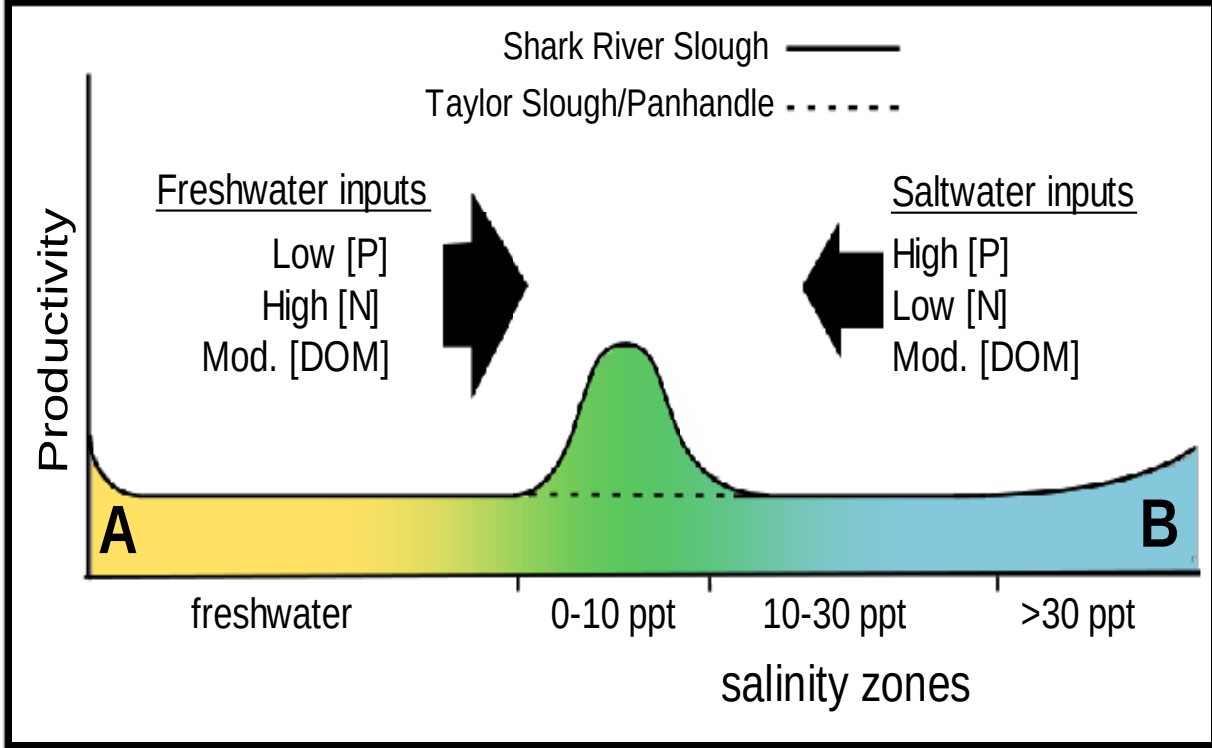




The FCE LTER Central Theme:

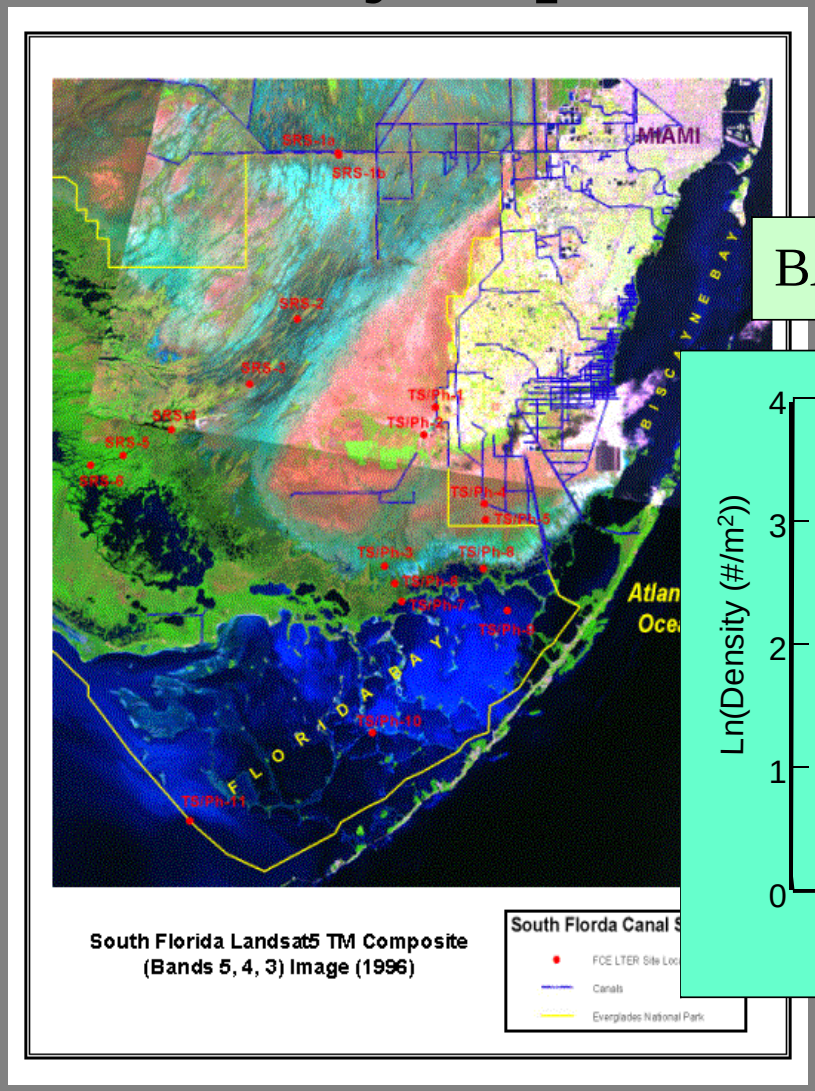
Regional processes mediated by water flow control population & ecosystem dynamics at any given location in the coastal Everglades landscape. This phenomenon is best exemplified in the oligohaline zone.



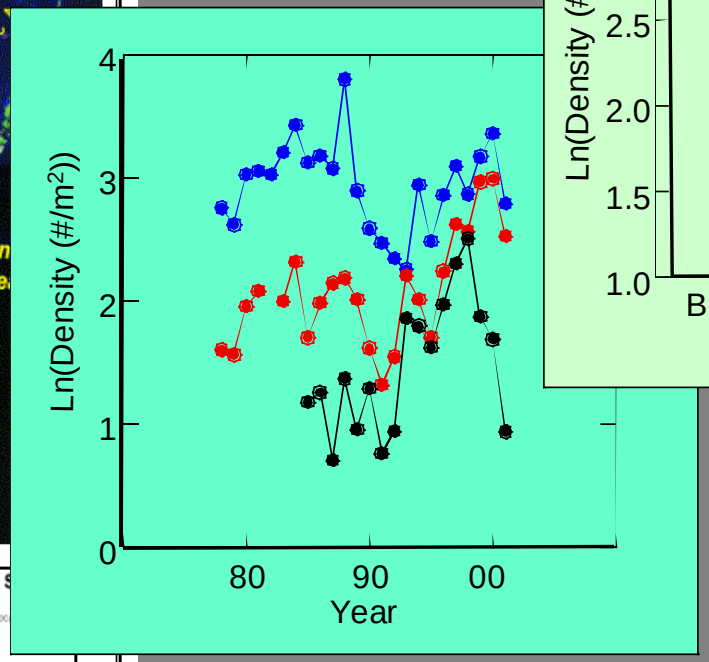


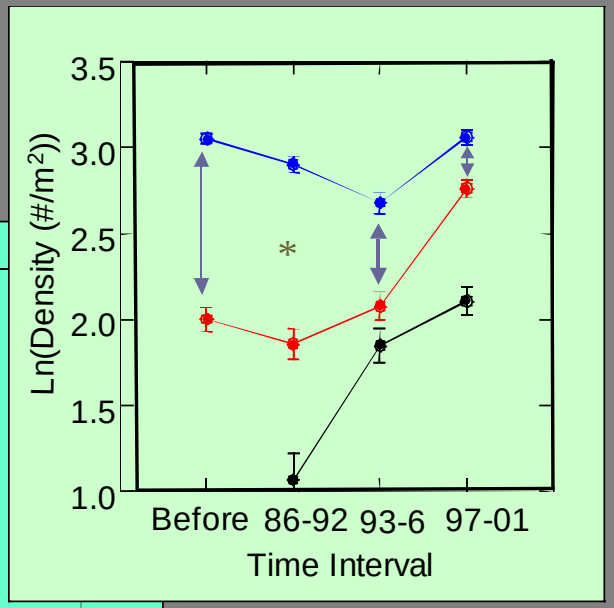
2. Ecology-Hydrology Interface

Hydroperiod and animal communities



BACI Analysis

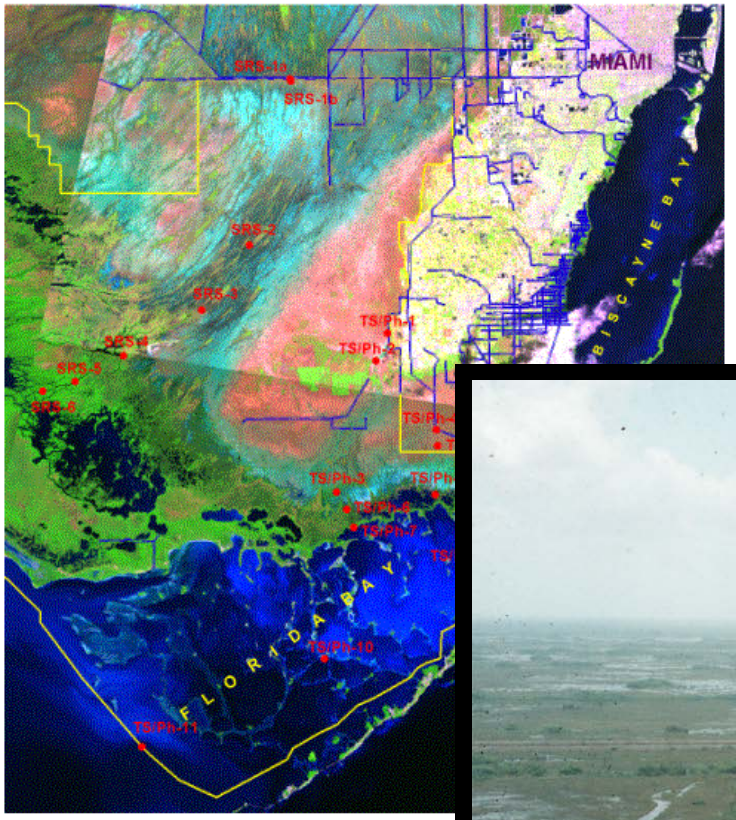




- Short hydroperiod
- short-->long
- Long hydroperiod

2. Ecology-Hydrology Interface

Hydroperiod and plant communities

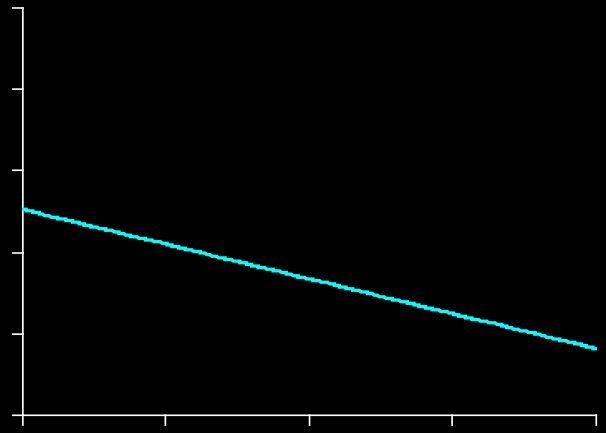


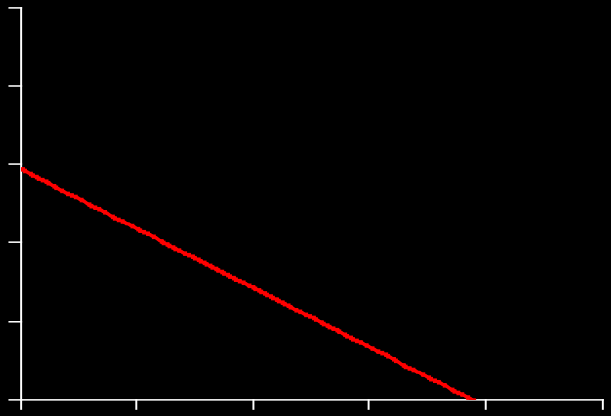
South Florida Landsat5 TM Composite
(Bands 5, 4, 3) Image (1996)

Canal levee removed in 1997

2. Ecology-Hydrology Interface

Hydroperiod and plant communities





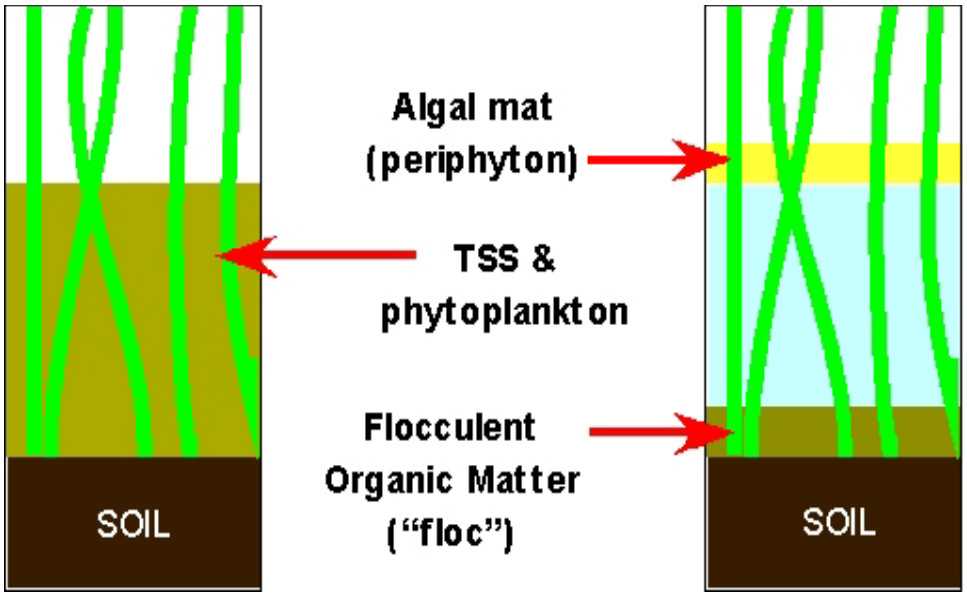
2. Ecology-Hydrology Interface

Surface water flow and landscape dynamics

Southern Everglades
Tree Island Flow
Manipulation Experiment

2. Ecology-Hydrology Interface

Surface water flow and landscape dynamics




Floc sediment trap


The "Flocculator"

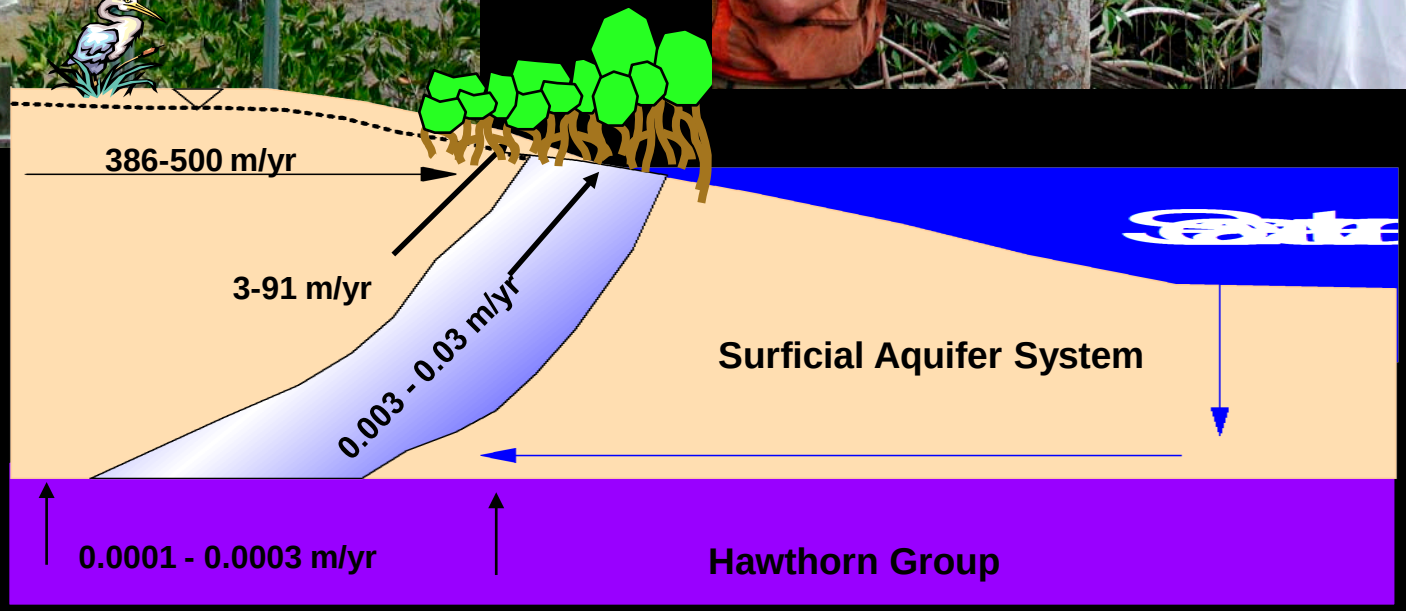
Suspended sediment and particulate organic matter (POM) in Everglades marshes compared with most other wetland systems

2. Ecology-Hydrology Interface

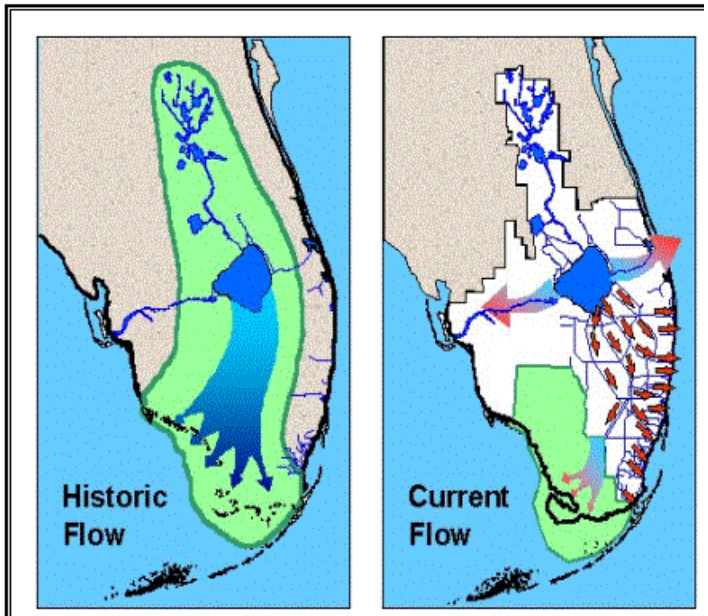
Surface water flow and landscape dynamics

3. Ecology-Hydrogeology Interface

Groundwater inflow and the estuarine ecotone



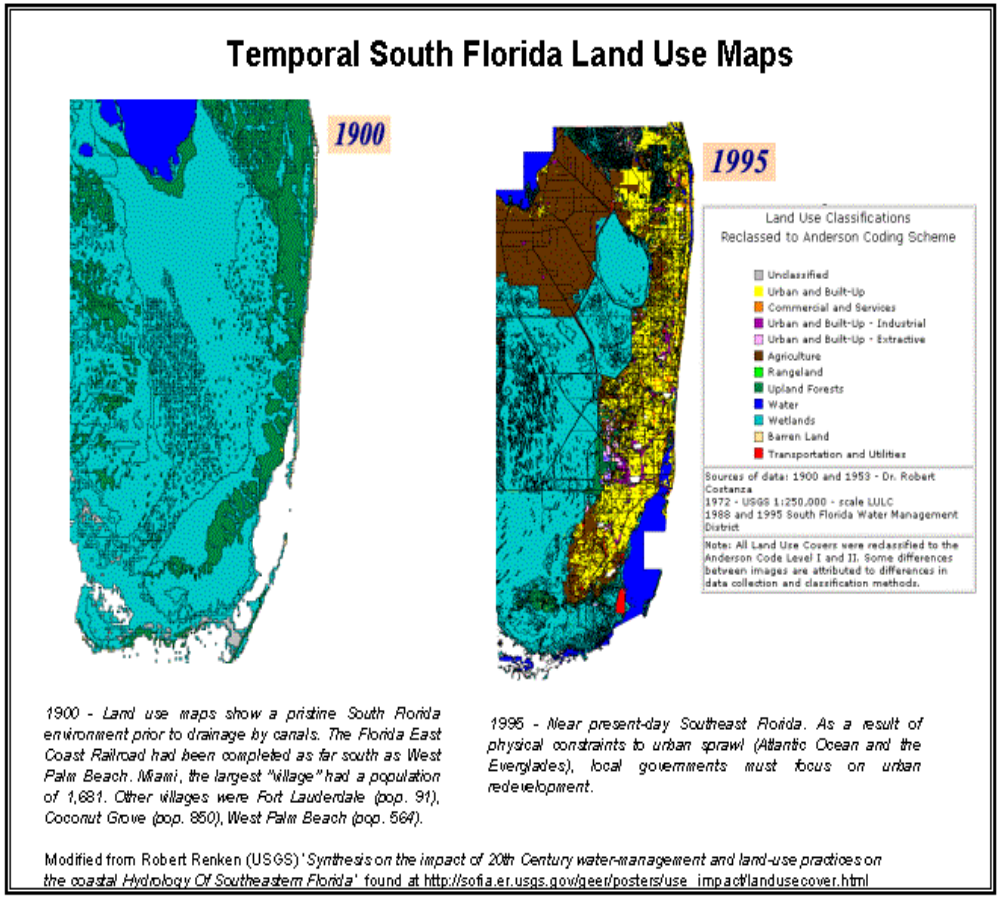
4. The Context of Everglades Restoration - Past & Present



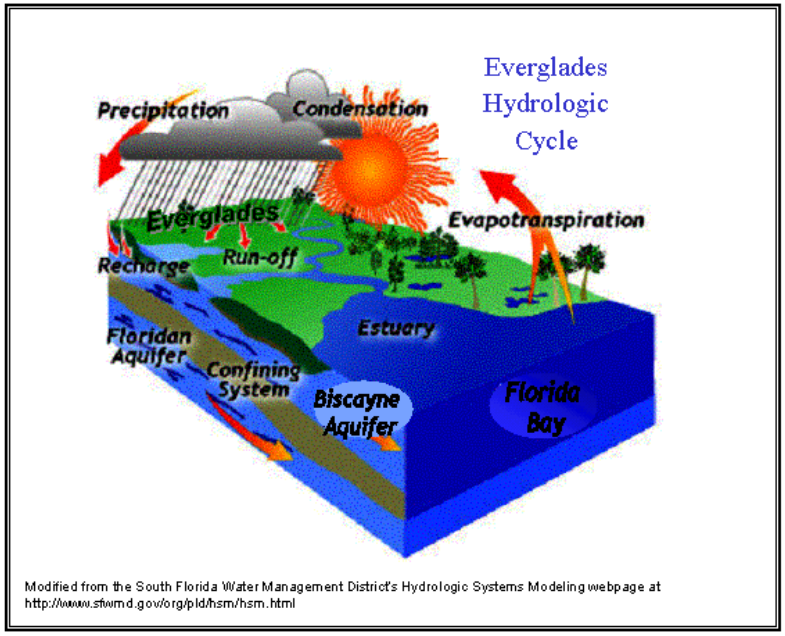
Modified from Water Flow Maps found on the Everglades Restoration Plan website at http://www.evergla

Historical flow ≈ 2.00 X 10^9 m^3 yr^{-1}

Current flow ≈ 0.986 X 10^9 m^3 yr^{-1}

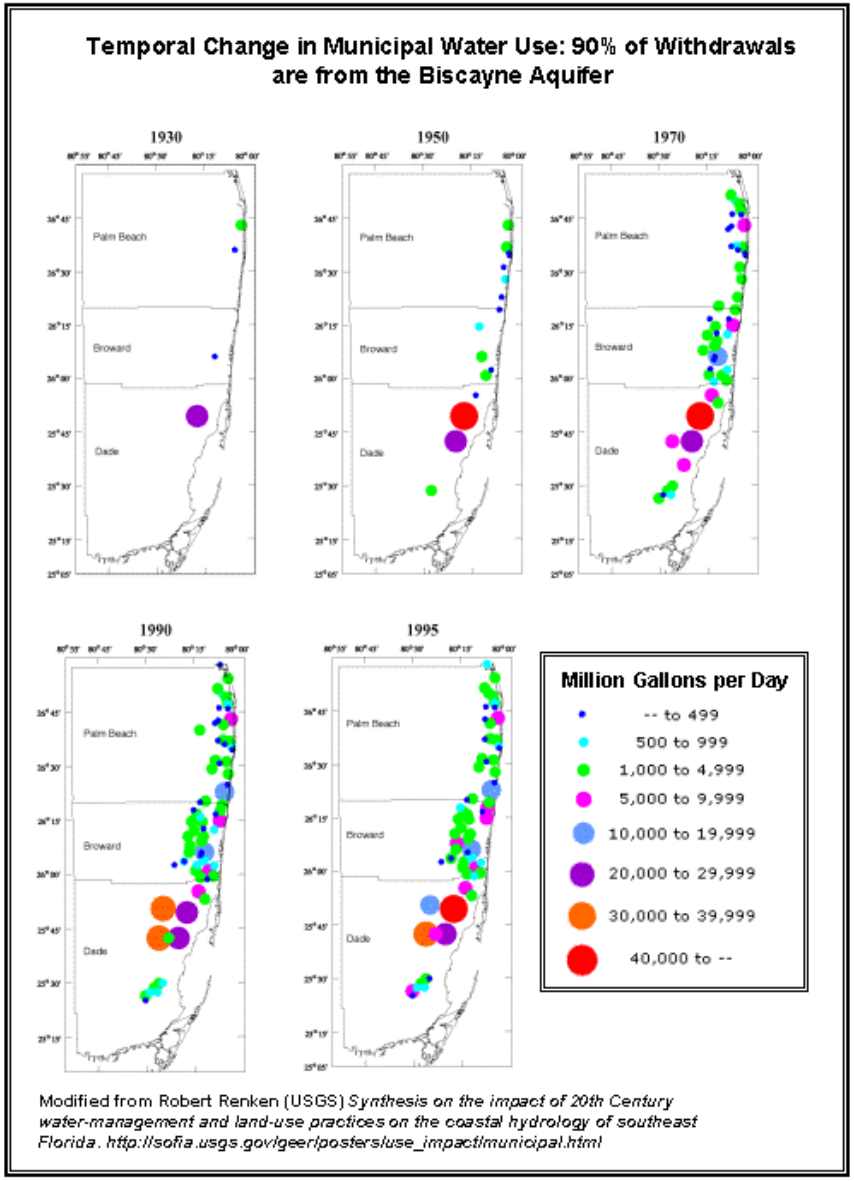


Everglades Restoration - History of human water demand



Modified from the South Florida Water Management District's Hydrologic Systems Modeling webpage at http://www.sfwmd.gov/org/pld/hsm/hsm.html

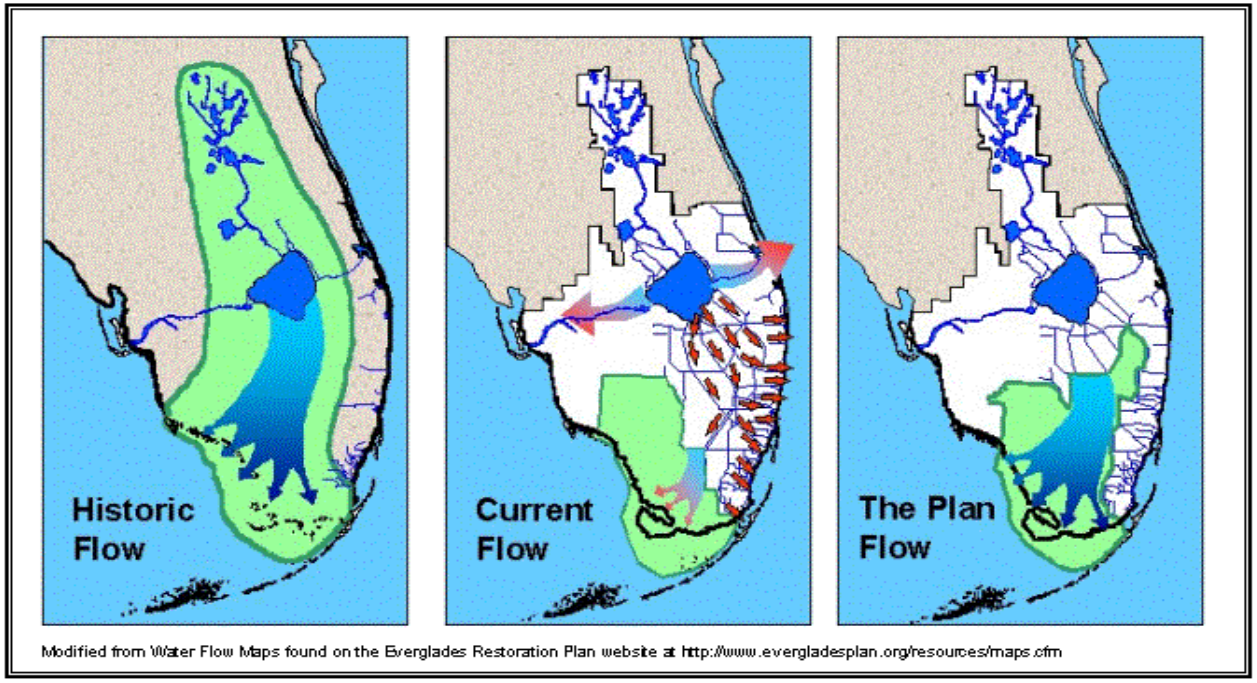
South Florida's primary water source is the shallow Biscayne Aquifer, which is recharged by the Everglades



Modified from Robert Renken (USGS) *Synthesis on the impact of 20th Century water-management and land-use practices on the coastal hydrology of southeast Florida. http://sofia.usgs.gov/geer/posters/use_impact/municipal.html*

5. Ecology - Socio-economics Interface

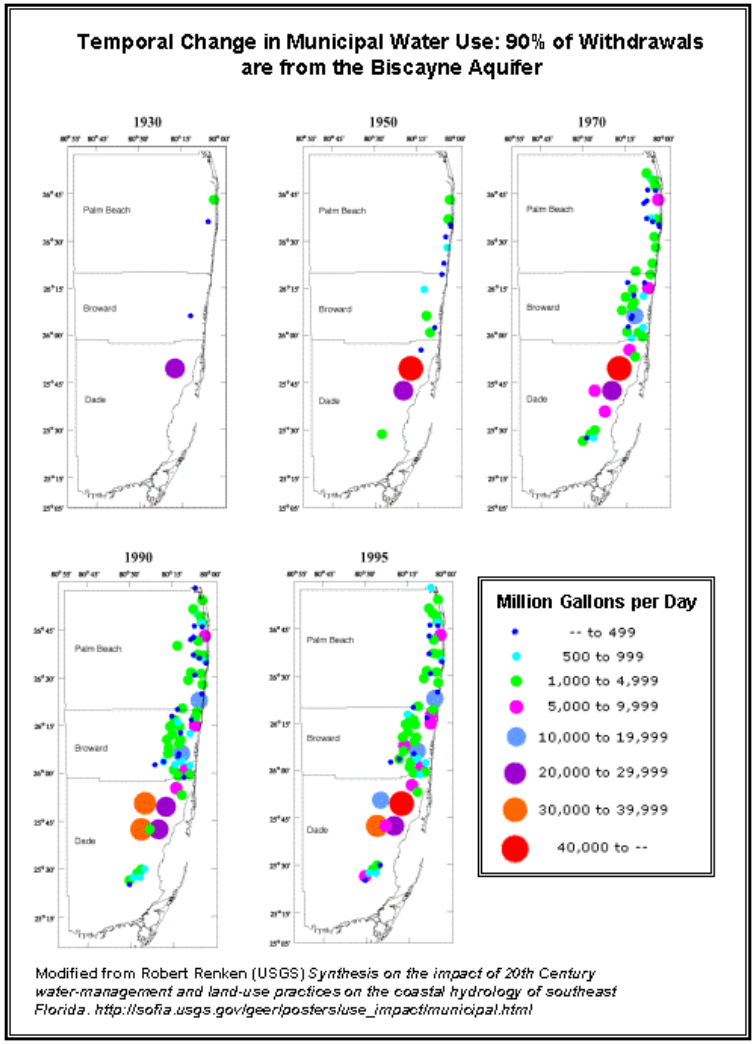
Water for both humans and the Everglades….



Modified from Water Flow Maps found on the Everglades Restoration Plan website at http://www.evergladesplan.org/resources/maps.cfm

Where will the water come from?

5. Ecology - Socio-economics Interface



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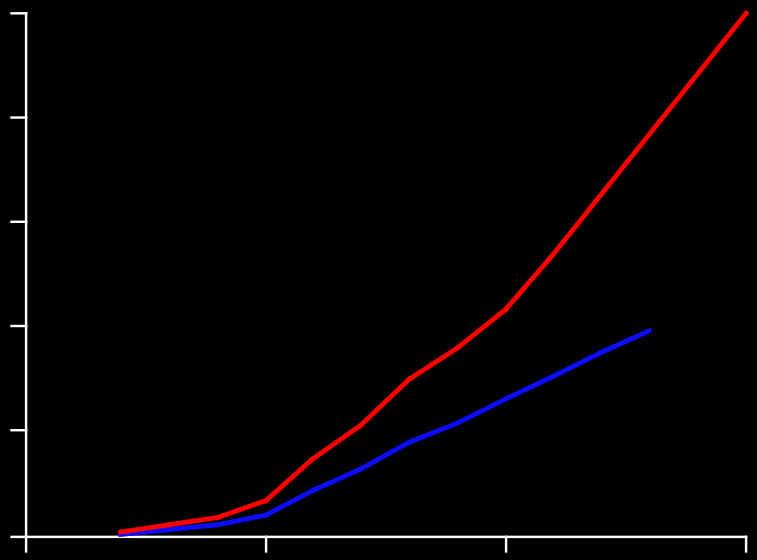


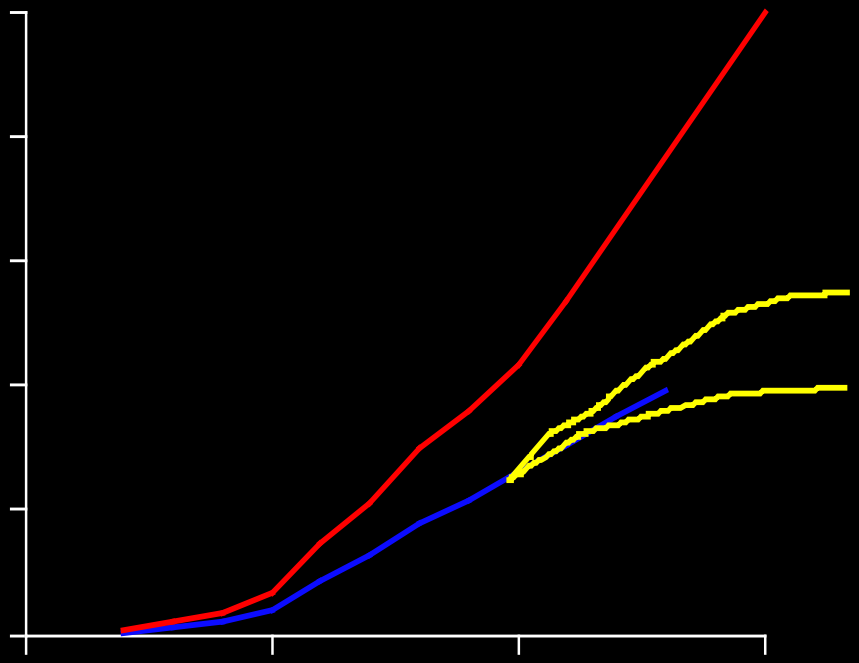
Water use today ≈ 1 billion gallons day $^{-1}$

Water use in 2050 may be 3 billion gallons day^{-1}.

Where will the water come from?

5. FCE LTER-Restoration Interface

Can we use socio-economic and population demographic models to estimate sustainable population based on water supplied by a restored Everglades?



The Florida Coastal Everglades LTER Program

http://fcelter.fiu.edu