



Florida Integrated Science Center-(FISC)

Dr. Barry H. Rosen
Director

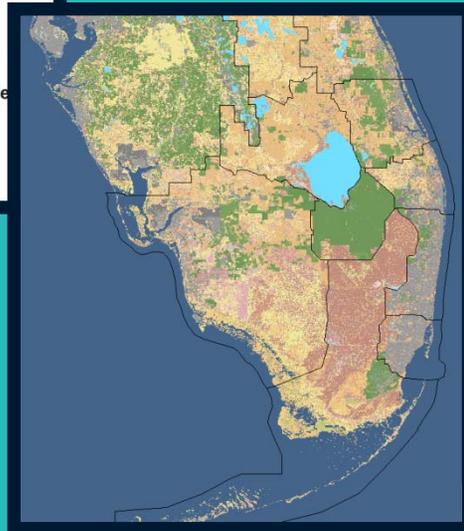
FISC Research

Around the world

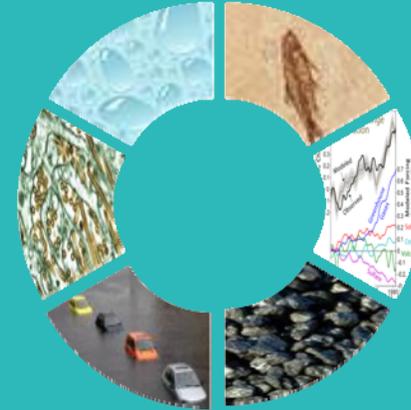


Around the state

Around the Everglades



USGS Science Strategy



- Ecosystems and Predicting Ecosystem Change
- Climate Variability and Change
- Energy and Minerals for America's Future
- Hazards, Risk, and Resilience Assessment Program
- Environment and Wildlife in Human Health:
- A Water Census of the United States



Sea-water Encroachment and Monitoring Network Improvements – Miami-Dade County, Florida

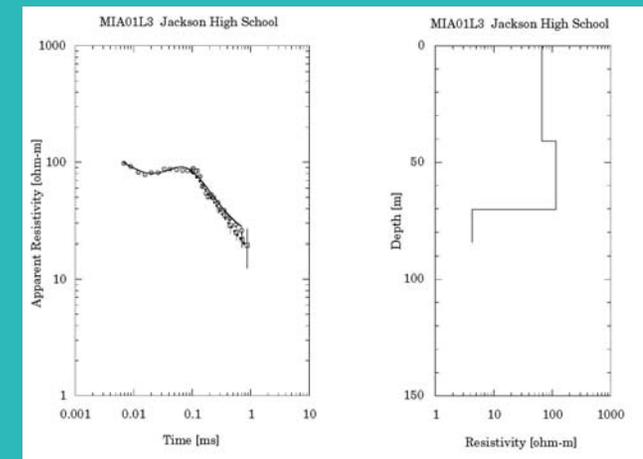
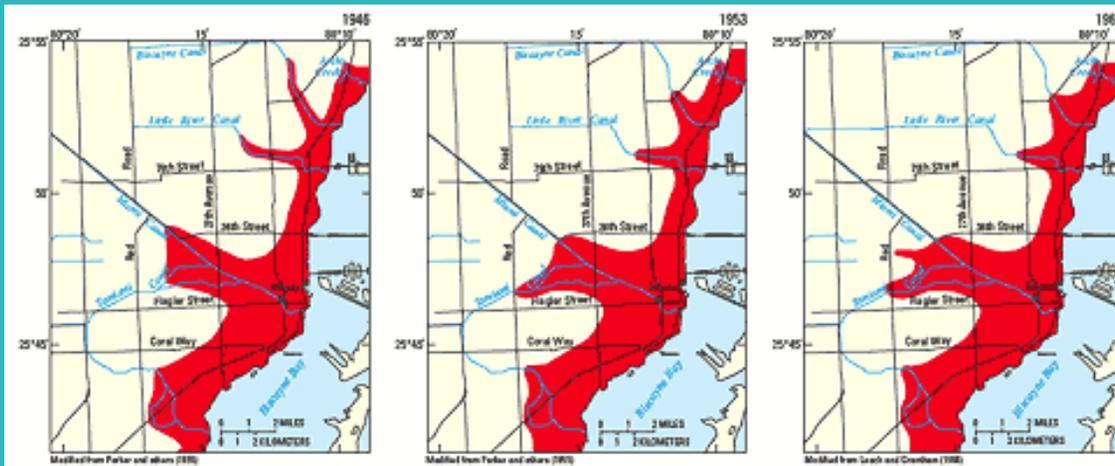


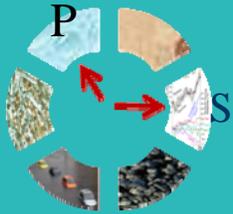
Period of Investigation: *November 2007 to October 2011*

Project Chief: *Scott Prinos, Kevin Cunningham, Bruce Irvin, David Fitterman*

Objectives:

- ❖ Determine the farthest landward extent of seawater in the Biscayne aquifer, Miami – Dade county Florida, using salinity monitoring network data and geophysical techniques.
- ❖ Improve monitoring network coverage by adding monitoring where needed and removing it where no longer needed. This includes improving hydrologic information available from new wells.
- ❖ Improve the ability of water managers to evaluate future encroachment by creating an IMS that provides data from the salinity monitoring network.





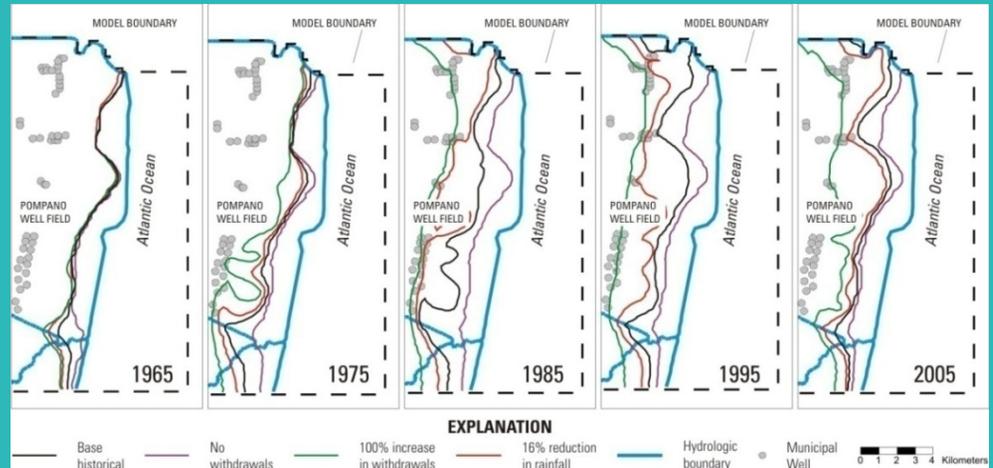
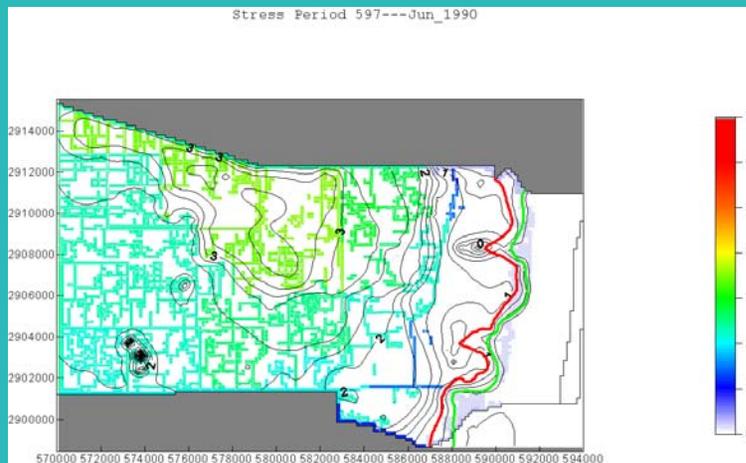
Pompano Beach Saltwater Intrusion Modeling

PIs: Chris Langevin and Michael Zygnerski

Cooperator: Broward County Water Supply Department

Objectives:

- ❖ Simulate historical patterns of saltwater intrusion in northern Broward County.
- ❖ Quantify effects of natural and anthropogenic stresses
- ❖ Provide useful tool for future well field water management strategies





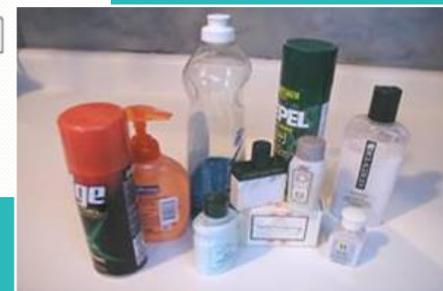
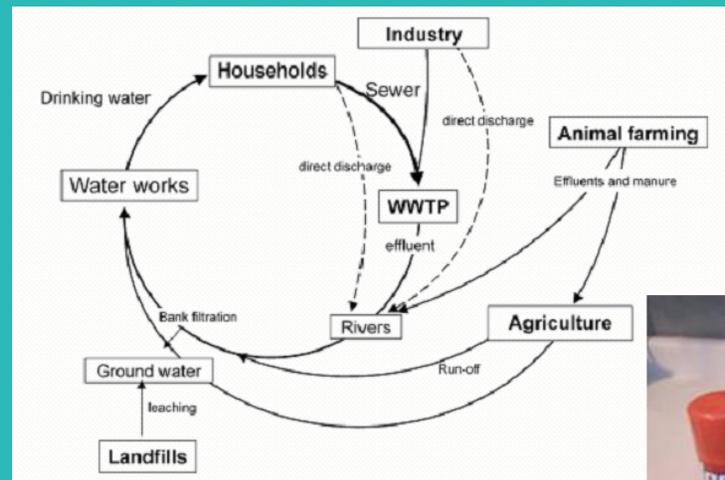
Organic Wastewater Compounds, Antibiotics, Hormones, And Pharmaceuticals In Wastewater, Canals, And Groundwater In Miami-Dade County

Adam Foster and Brian Katz

Cooperator: Miami-Dade Co. DERM & WASD

Objectives:

- ❖ Determine the occurrence of EPOCs in influent waters and treated effluent of four WWTPs to assess their removal efficiencies
- ❖ Determine occurrence of EPOCs in raw and finished waters of 7 WTFs to assess their removal efficiencies
- ❖ Compare treatment processes in terms of their removal efficiencies of different classes of compounds
- ❖ Assess the occurrence of EPOCs in ground water and surface water





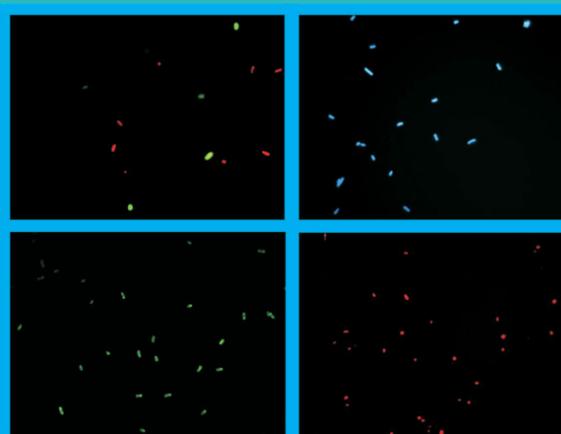
Influence of Dissolved Organic Carbon on the Microbial Ecology in Native and Blended Floridan Waters



PIs: John Lisle, Ron Harvey, George Aiken and Dave Metge
Cooperator – Miami-Dade County Water and Sewer Department
FY 2008-2009

Objectives:

- ❖ Assess influence of blended waters on respiration of native C
- ❖ Changes in microbial biomass, fate & transport of native microbes, geochemical parameters of public health interest
- ❖ Use membrane diffusion chambers into upper Floridan aquifer assess in situ inactivation rates for pathogens & indicators of human fecal pollution,
- ❖ Determine TTHM formation potential, biomass and respiration rates, and quantify C and nutrients in native and blended waters



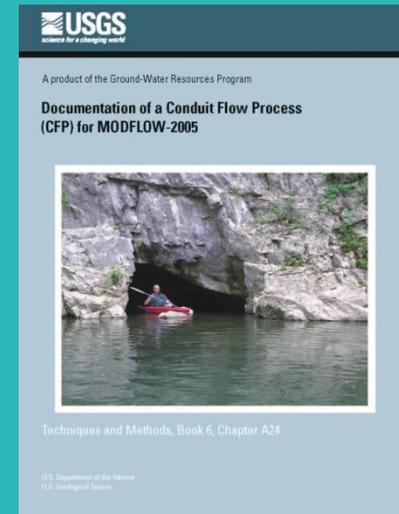
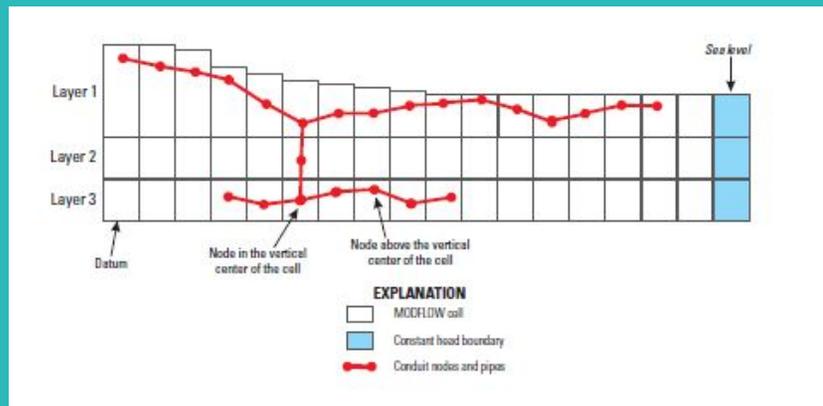


Conduit Flow Process in Karst Aquifers

PIs: Barclay Shoemaker and Eve Kuniansky
Objectives:

- ❖ Develop new Conduit Flow Process (CFP) for MODFLOW-2005 to simulate dual porosity aquifers to quantify the coupling the traditional ground-water flow equation
 - ❖ with a discrete network of cylindrical pipes (CFPM1)
 - ❖ AND/OR inserting a preferential flow layer that uses a turbulent hydraulic conductivity to simulate turbulent horizontal flow (CFPM2) conditions.

- ❖ Facilitate technology transfer of CFP developments to modelers



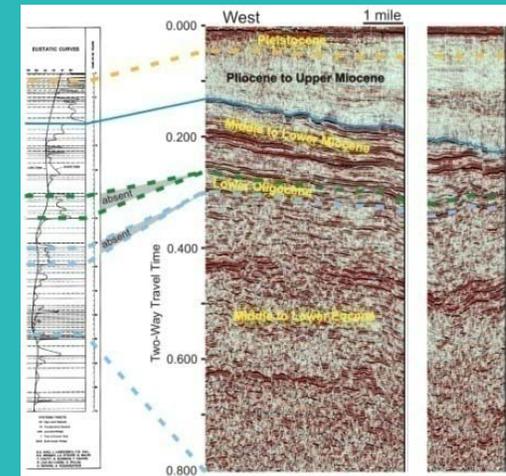
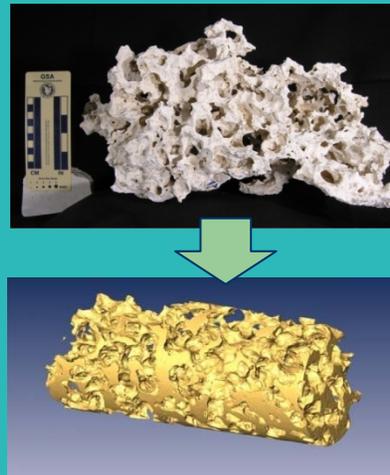
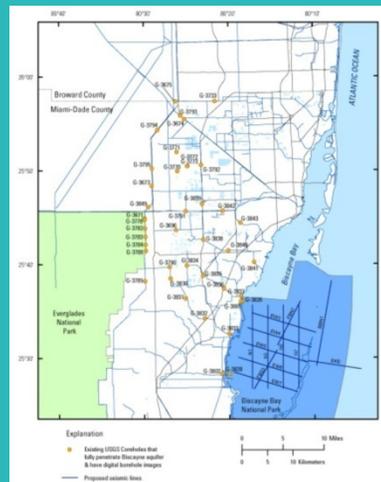


Karst Hydrogeologic Model of the Biscayne Aquifer

PI: Kevin J. Cunningham

Objectives:

- ❖ Expand Lake Belt Area hydrogeologic framework using cyclostratigraphic and borehole geophysical methods to map porosity types and develop the triple-porosity karst framework between Everglades wetlands and Biscayne Bay
- ❖ Develop simulation for ground-water flow within multi-porosity aquifer
- ❖ Develop new technologies for presenting science to decision makers for adaptive management of ecosystems.





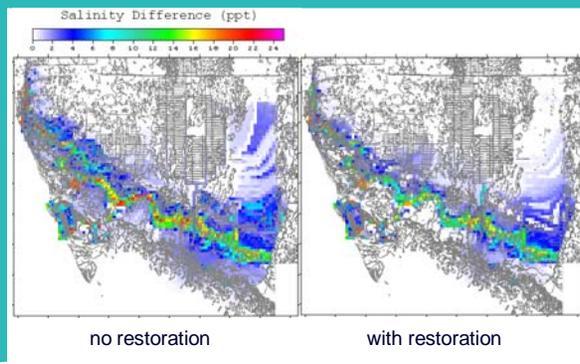
Integrated Everglades Coastal Sea-Level Rise Project

Catherine Langtimm, Dennis Krohn, Eric Swain, Donald DeAngelis, Tom J Smith III, Brad Stith, Ginger Tiling

Objectives:

- ❖ Develop predictive ecologic-hydrologic models for coastal Everglades to assess effects of scenarios, disturbance, and sea level rise
- ❖ Relate sea level rise to CERP, particularly downstream coastal impacts of the project WCA #3 Decompartmentalization.
- ❖ Map “hot spots” of historical coastal change (shoreline migrations, ecotone movements, vegetation regime shifts)
- ❖ Enhance FTLOADDS model to reliably hindcast and expand TIME application to capture important coastal ecologic areas in Cape Sable.
- ❖ Enhance mechanistic model of hydrologic-induced vegetation change at mangrove-hammock interface and apply to assess spatially-explicit habitat suitability for focal species.

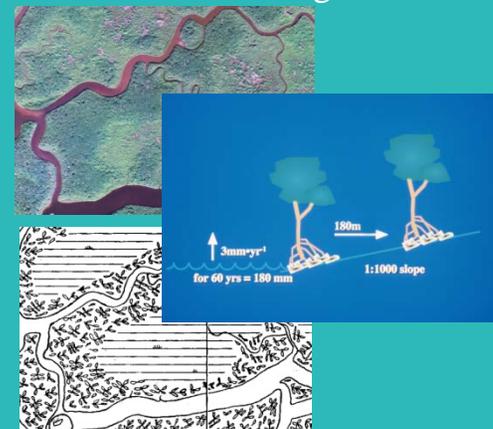
Model changing & variable conditions



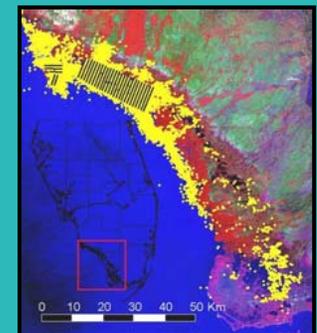
Study vegetation / habitat changes

Primarily Mangrove
2004

Primarily Marsh
1928



Test effects on species distribution

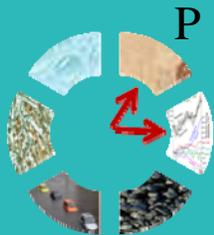




Wildlife Monitoring and Population Ecology in the Everglades



Population ecology, simulation modeling, and monitoring of crocodilians, amphibians, Burmese pythons, and small mammals.



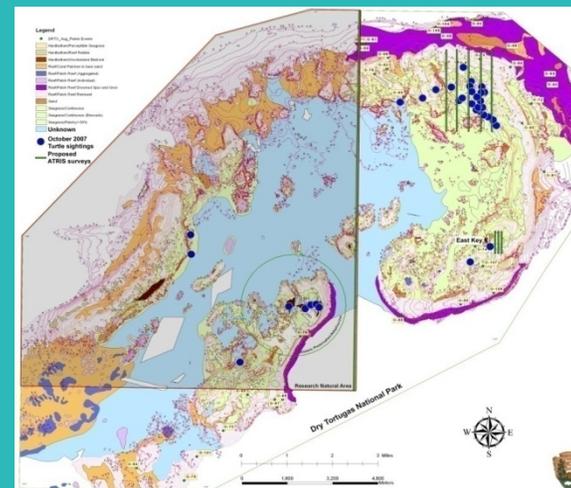
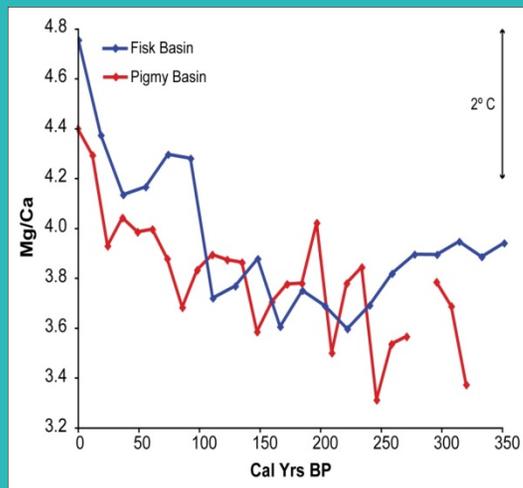
P

FISC Coral Reef Project FY 09



PIs: Dick Poore and Ilsa Kuffner

- ❖ Coral Disease
- ❖ Benthic Habitat Mapping and Monitoring
- ❖ Climate and Sea Level
- ❖ Biogenic Calcification
 - ❖ Subtask 1: Community Calcification
 - ❖ Subtask 2: Coral Calcification





Land-based Pollution Emanating from Coastal Submarine Ground-Water Discharge Sites

PI:Dale Griffin – thru FY09
Objectives:

- ❖ Link suspected between macro algae blooms on the Broward County shelf and nutrient-rich submarine ground water discharge (SGD)
- ❖ Point and non-point sources suspected
- ❖ Algae blooms may negatively impact native benthic ecological assemblages





Coastal Vulnerability Assessments

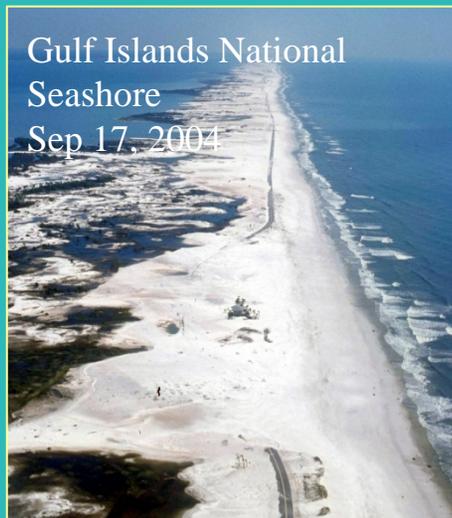
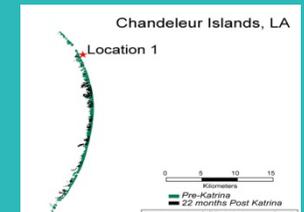
- ❖ Predict post-storm beach morphology based on pre-storm beach morphology, modeled hurricane waves, and surge.
- ❖ Quantify impact regimes and sensitivities



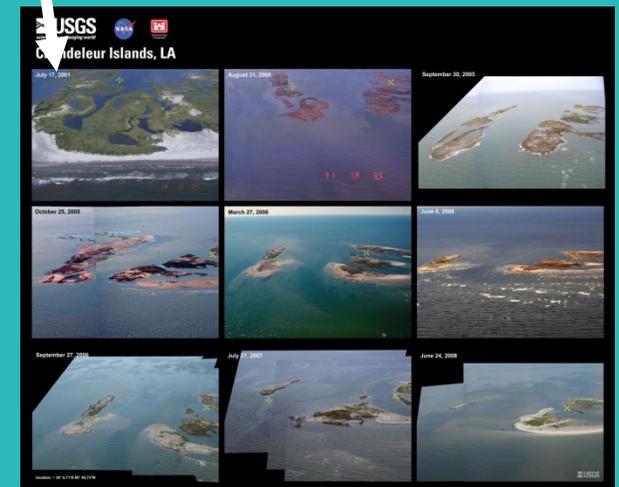
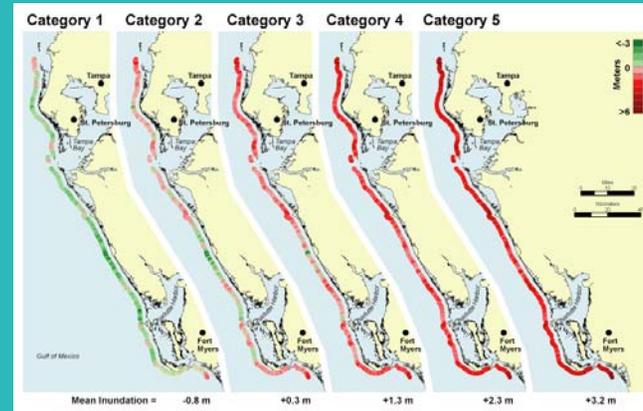
Hurricane
Ivan
(2004)

Impact regime	sensitivity = $(N_{\text{correct}}/N_{\text{observed}})*100$
Swash	0
Collision	77.2%
Overwash	72.6%
Inundation	51.0%

Hurricane Katrina (2006)



Sample output for Southwest Florida





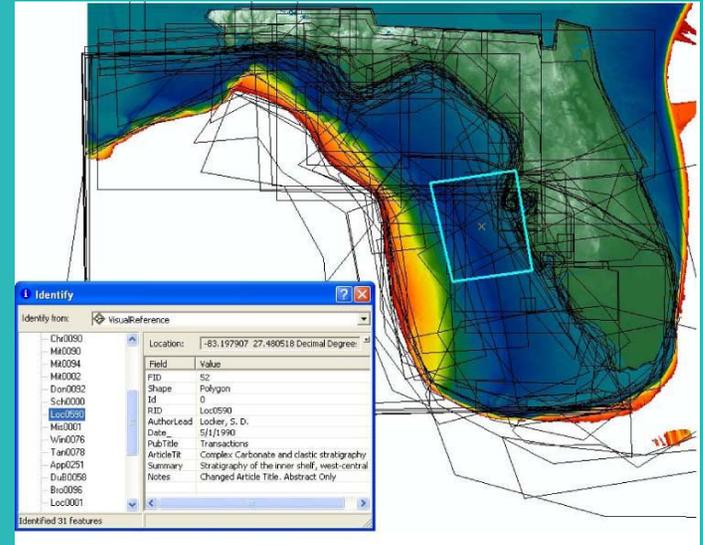
Response of Florida Shelf Ecosystems to Climate Change

PI: Lisa Robbins FY 2006-2009

Cooperator: USF

Objectives:

- ❖ Ocean acidification
 - Distribution of calcifying organisms
 - Response to elevated CO2
- ❖ Mapping and Data Integration
 - Existing Data
 - Establish Links
 - Integration: past/present carbon cycling

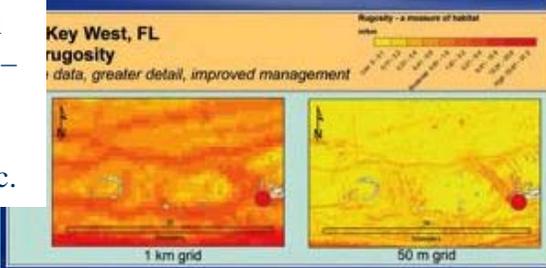


Data compilation of offshore sediment and age data and inshore geologic map



pCO2 experiments to test how *Halimeda* (calcifying green algae) responds to changing pCO2 conditions.

WFS rugosity map providing both synoptic and detailed rugosity information – to model fish migration, area of spawning, feeding etc.



Videos taken by DEP for gas pipeline

Climate Change Issues in Florida

