

# COASTAL RESILIENCE AND LANDSCAPE CONSERVATION DESIGN IN SW FLORIDA



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*“We must act now, as if the future of fish and wildlife and people hangs in the balance — for indeed, all indications are that it does.”*

*— FWS Climate Change Strategic Plan “Rising to the Urgent Challenge,” 2010*



“the region faces threats on multiple fronts – from increasing urbanization and land use changes to invasive species, rising seas, and shifting weather and temperature patterns.”

# Outline of Presentation

I. Threats

II. Landscape conservation design

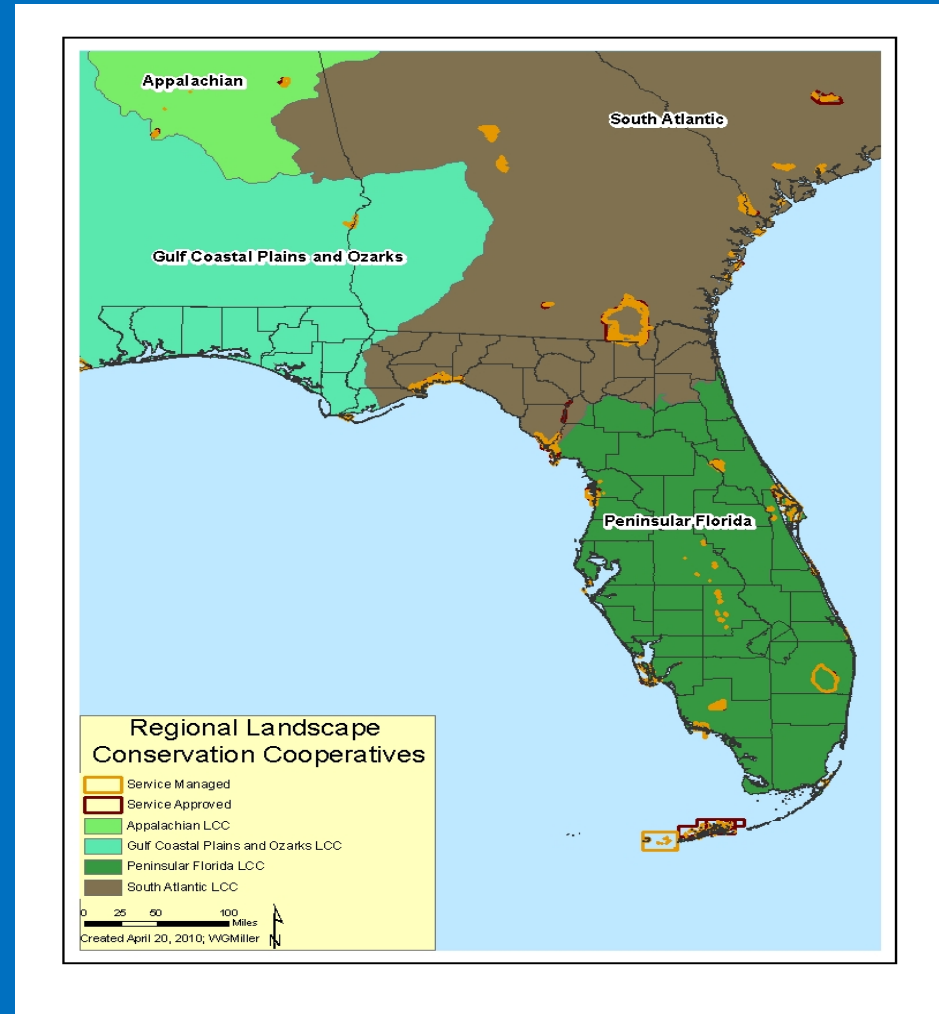
III. The White House land and water resilience project

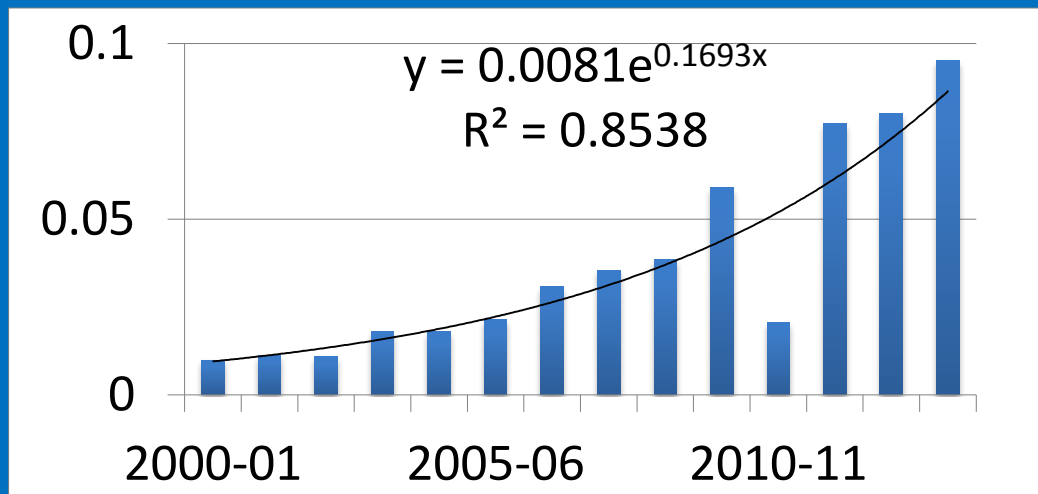
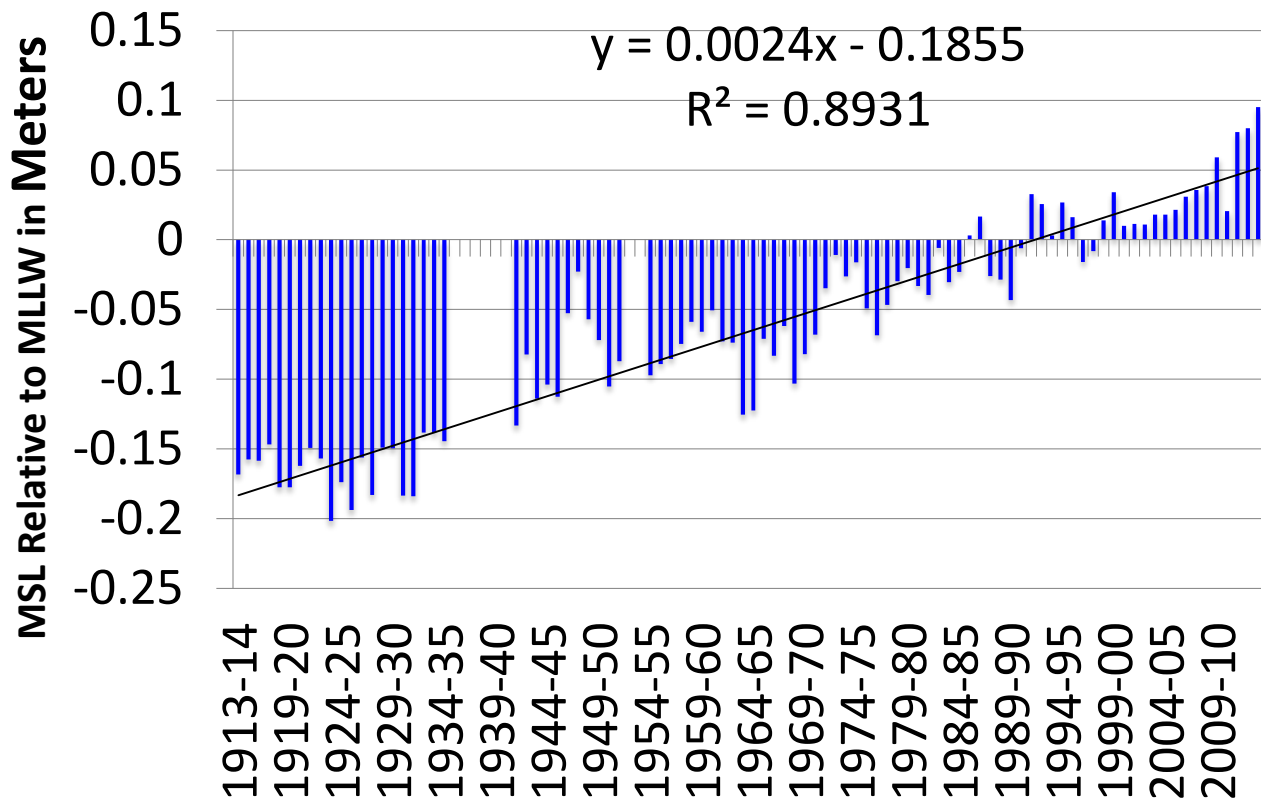
IV. Ecosystem Services

V. Conservation/adaptation strategies



# Florida and LCC Structure



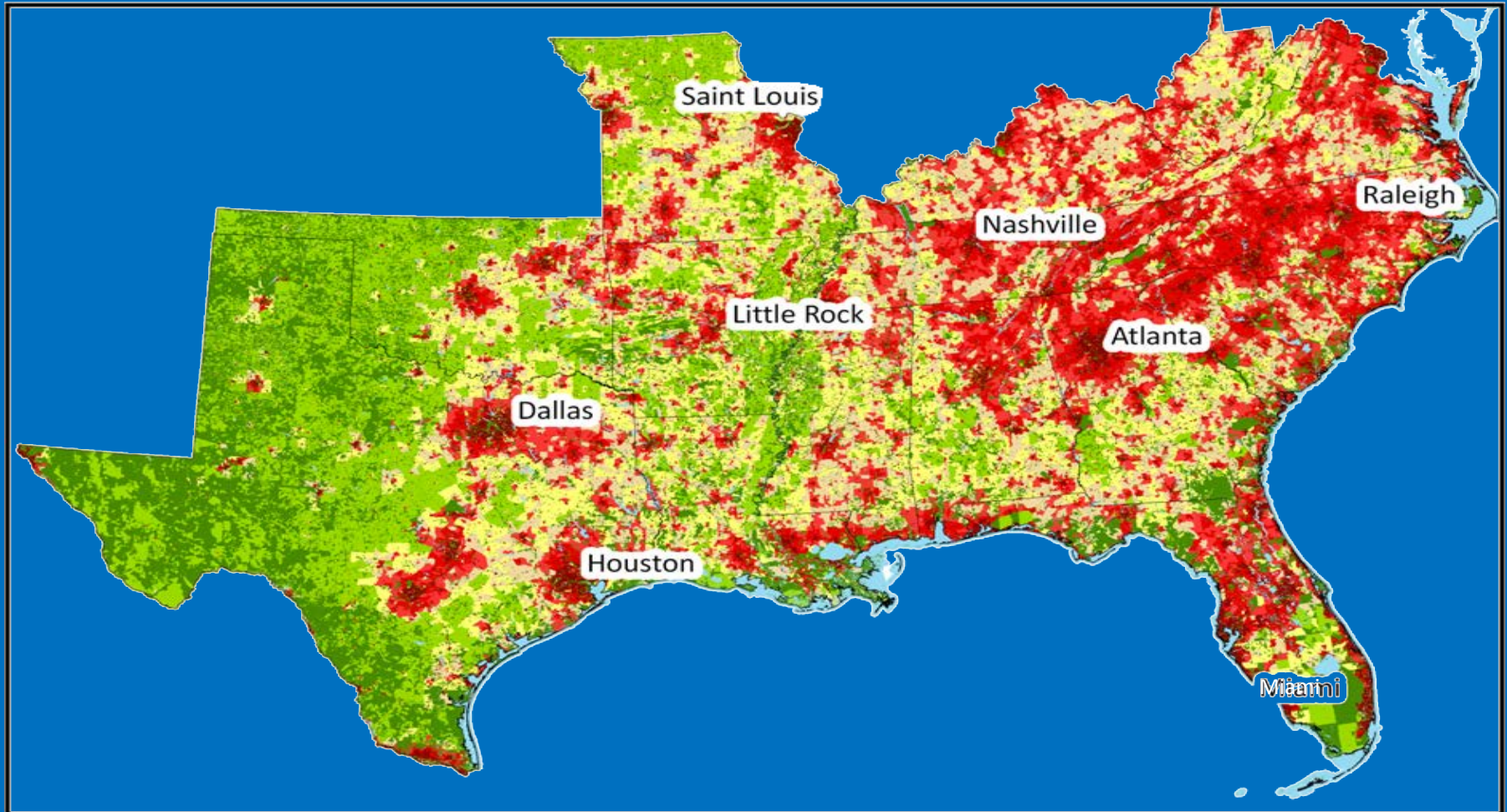
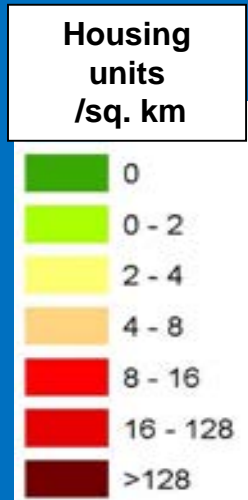


# US Population (2000): 304 M

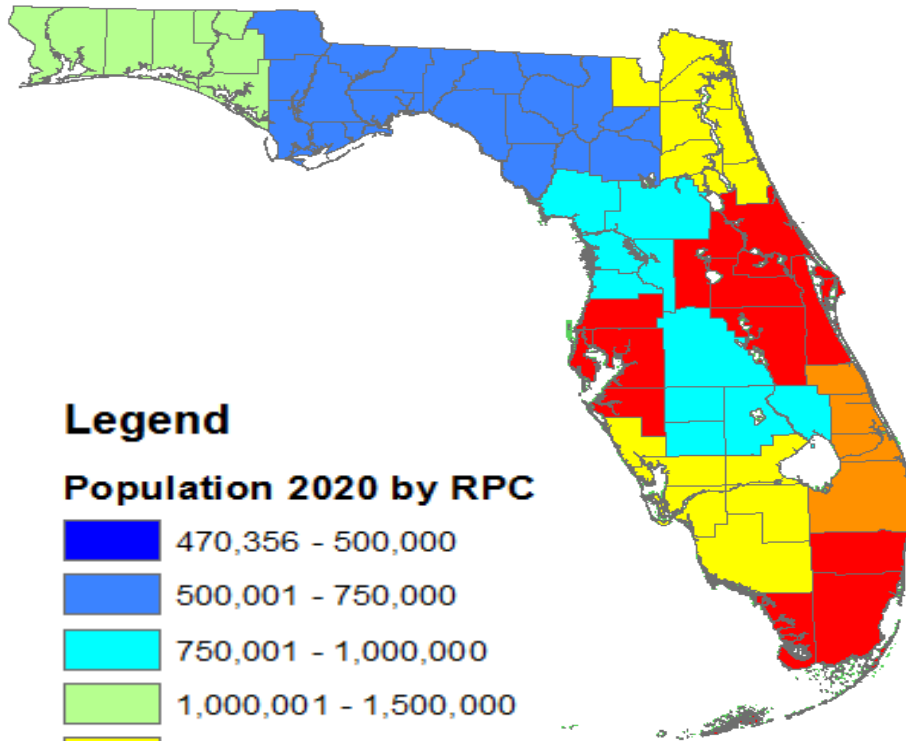
## Projected population: **1 Billion** by 2100

### Urbanization, loss/conversion of Ag-land/Open spaces

**2030**

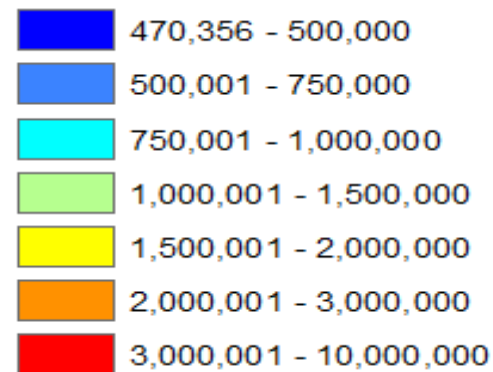
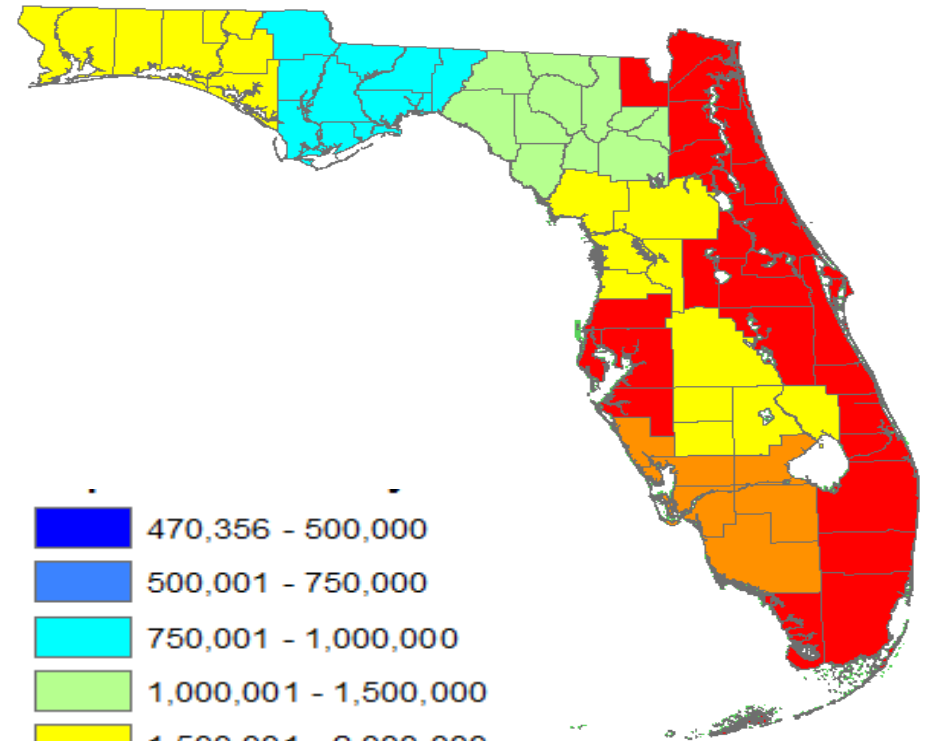
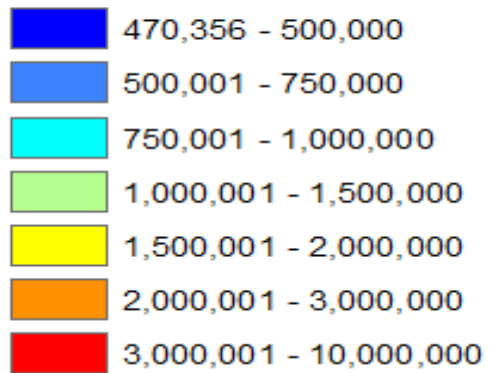


# Total Population 2020 and 2060

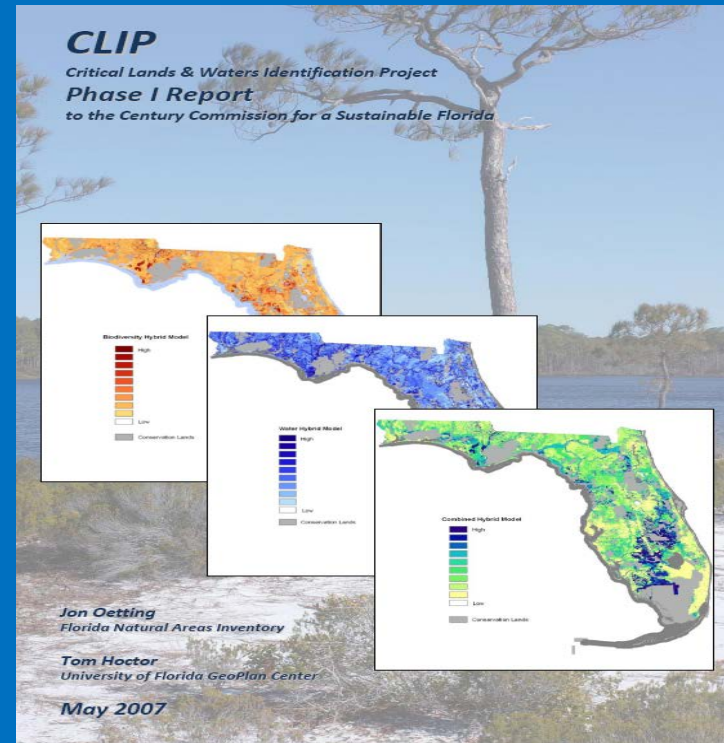
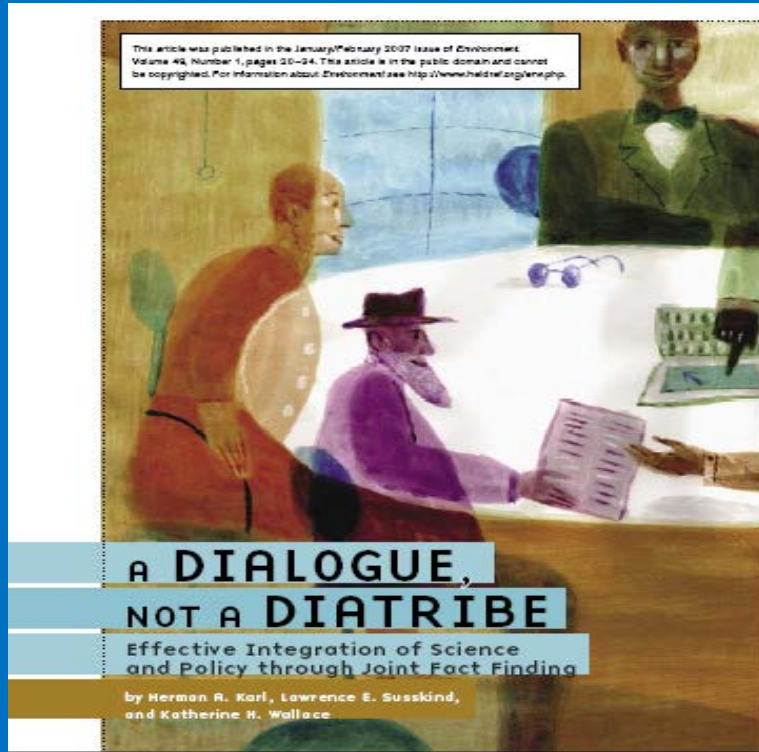


## Legend

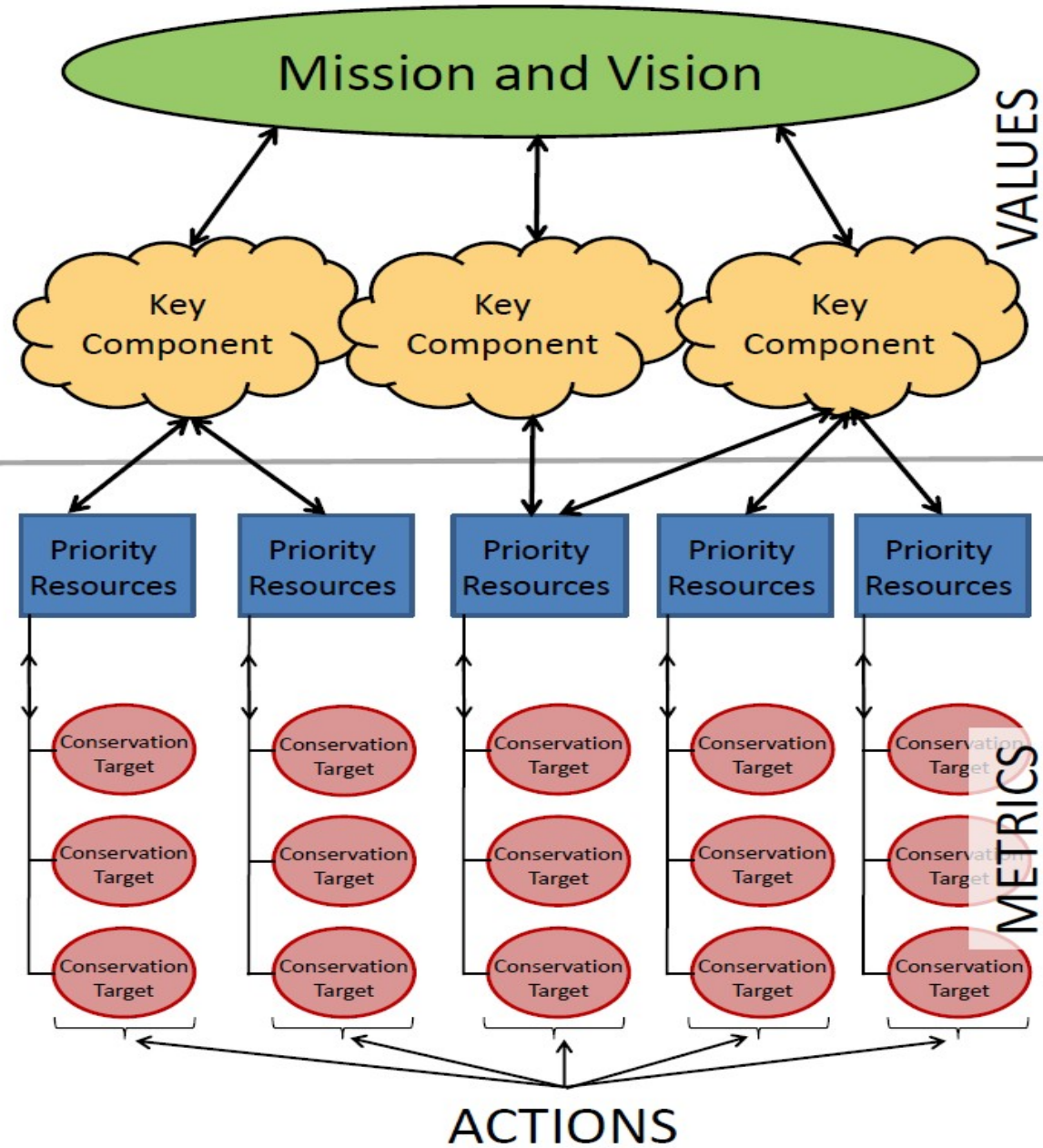
### Population 2020 by RPC



# Landscape Conservation Design







# Florida's Natural Resources

## Florida's State Wildlife Action Plan



A comprehensive wildlife conservation strategy

FLORIDA'S  
*Wildlife*  
Legacy Initiative  
MyFWC.com/WildlifeLegacy



- Biodiversity**
  - Rare Sp. Habitat Conserv. Priorities
  - Priority Natural Communities
- Landscapes**
  - FL Ecological Greenways Network
  - Landscape Integrity Index
- Surface Water**
  - Significant Surface Waters
  - Natural Floodplain
  - Wetlands

Biodiversity

Landscapes

Surface Water



## GULF COAST VULNERABILITY ASSESSMENT

**Project Goal:** Enhance conservation and restoration planning and implementation by providing a better understanding of the effects of climate change, sea level rise, and land use change on Gulf of Mexico coastal ecosystems and their species.

The Gulf of Mexico Alliance, NOAA, Gulf Landscape Conservation Cooperatives, and USGS Climate Science Centers will lead the Gulf Coast Vulnerability Assessment (GCVA) in 2012-2015 to better understand impacts to coastal ecosystems and species from climate change, sea level rise, and land use change.

The GCVA is evaluating the vulnerability of mangroves, barrier islands, oyster reefs, tidal emergent marsh and associated species with each habitat. The assessment is being conducted across the northern Gulf of Mexico which will be divided into regions to address potential differences in habitat and species vulnerability due to climatic variation across the area.

An expert panel was organized for each habitat and the panel will rely on their own knowledge as well as the best available data to answer vulnerability questions provided in climate change vulnerability indices. Climate change vulnerability indices provide a framework for assessing vulnerability by guiding users through a series of questions that relate to changes a habitat or species might experience due to climate change. The indices assess vulnerability by characterizing a species' or habitat's sensitivity to projected changes, the magnitude and rate of exposure, ecological responses, and ability of habitats and species to adapt to changes. By using a vulnerability index we can look at not only the comparative vulnerability of habitats and



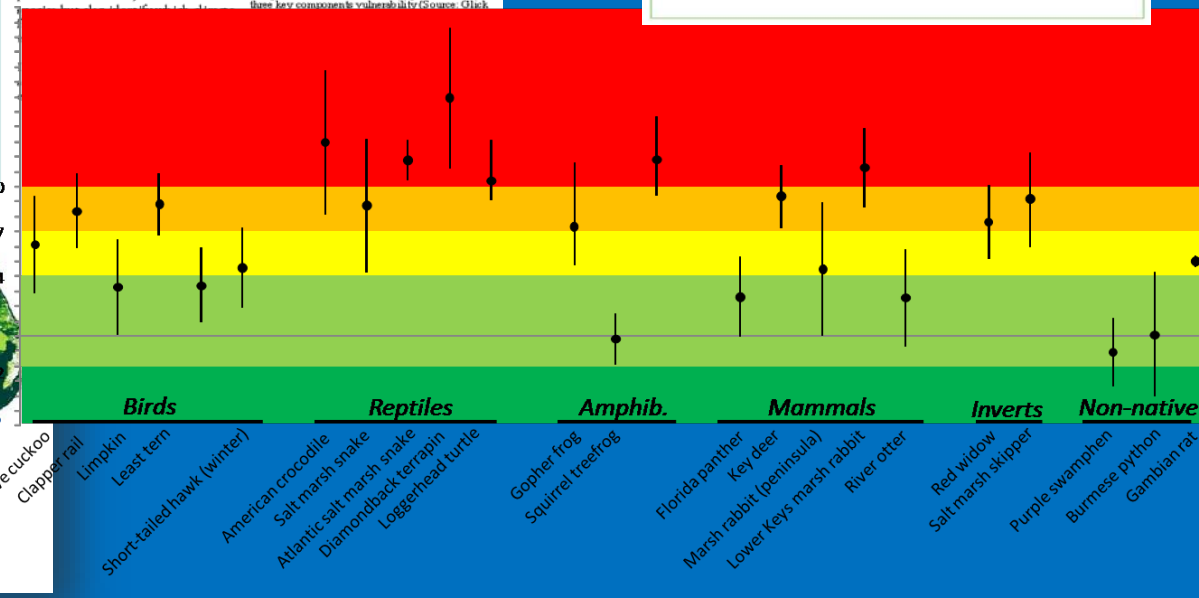
A representation of the relationship between the three key components of vulnerability. (Source: Olick)



For More Information:

Amanda Watson  
GCVA Coordinator  
Phone: 228-699-0746  
E-mail: amandaw@pri.usstate.edu

Reticulated Flatwoods Salamander  
Mangrove cuckoo  
Clapper rail  
Limpkin  
Least tern  
Short-tailed hawk (winter)



## Defining Conservation Targets on a Landscape-scale

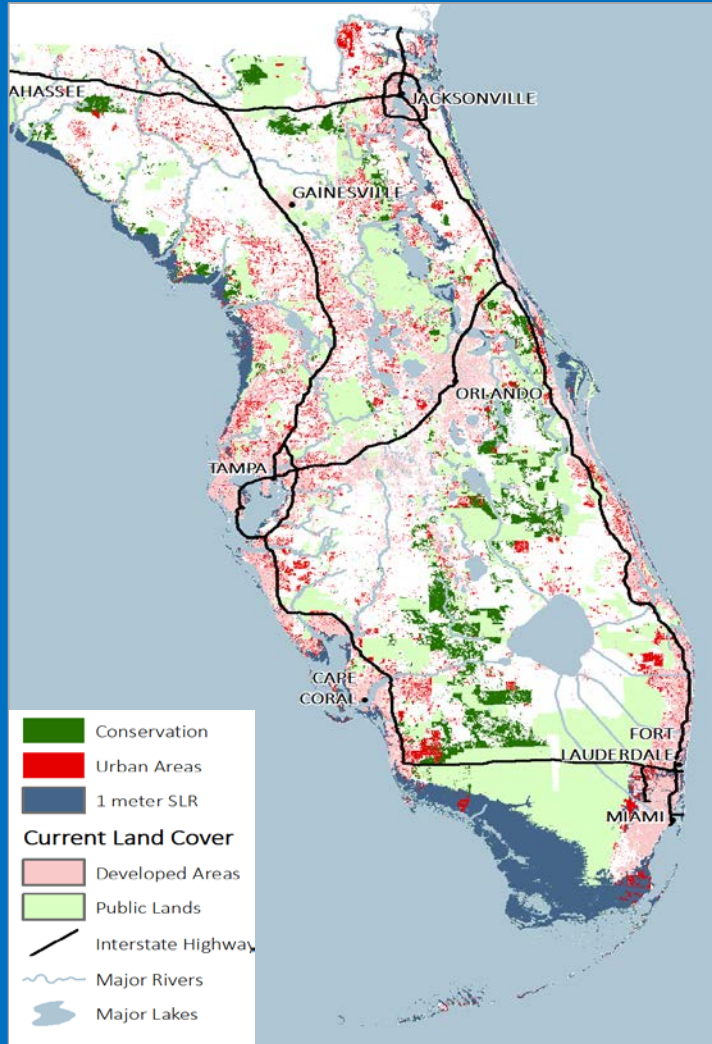
September 2015



# SCENARIO 1

50% Fee Simple 50% Easement +  
Florida Forever targets

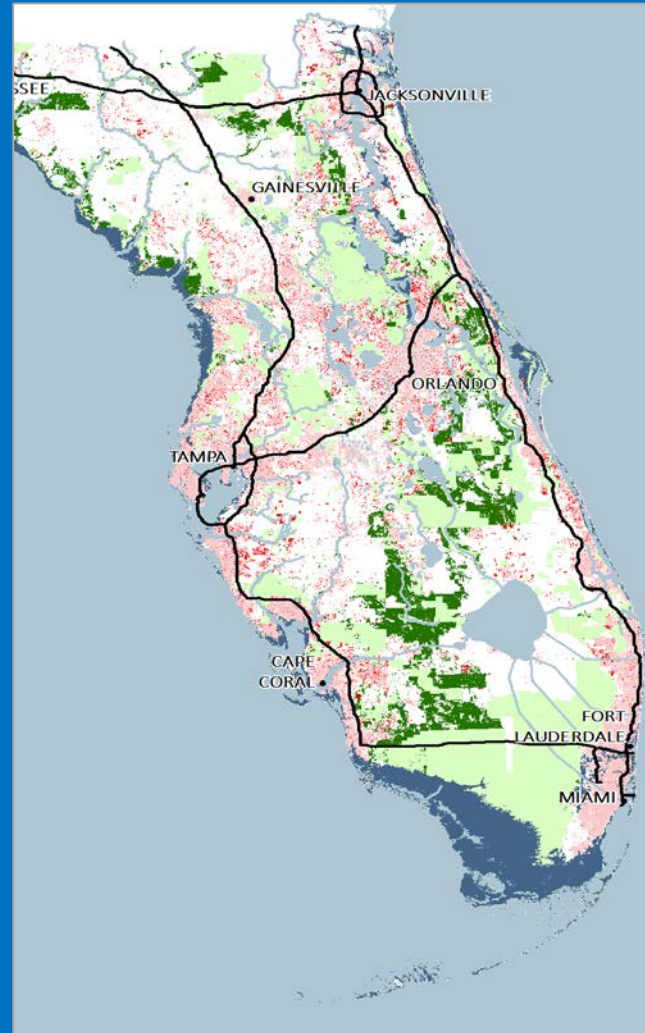
Low density greenfield development  
Existing distribution of density



# SCENARIO 2

10% Fee Simple | 90% Easement +  
Florida Forever targets

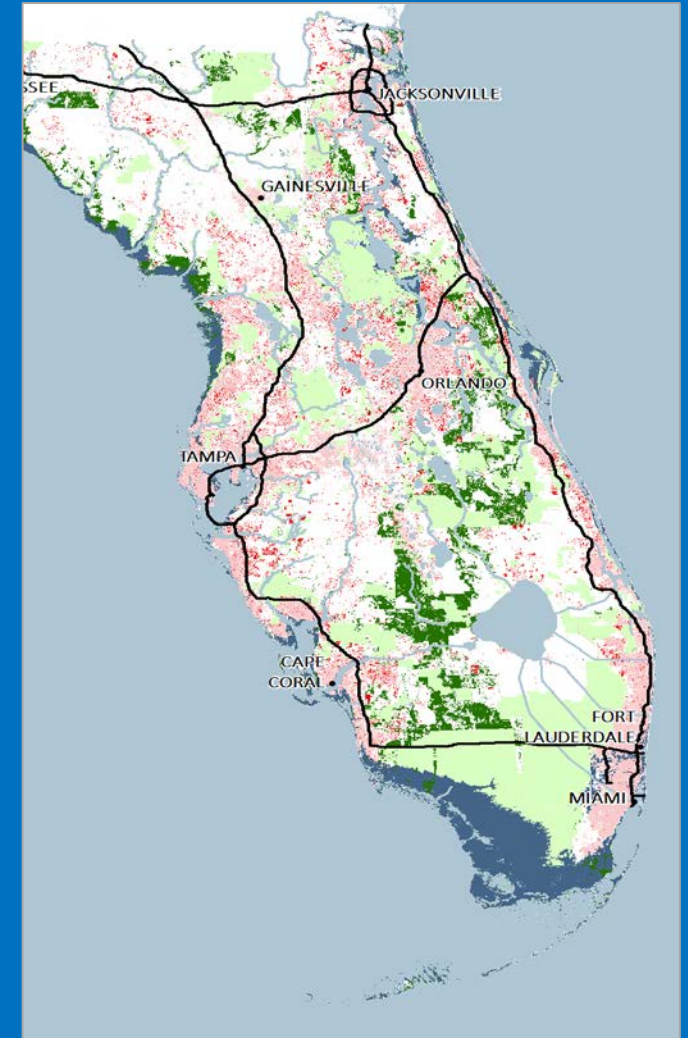
Green infrastructure+  
Redevelopment + Densification



# SCENARIO 3

10% Fee Simple | 90% Easement +  
P1-CLIP 3.0

Green infrastructure+  
Redevelopment + Densification



The CCB and PFLCC goal and guiding principles are dedicated to the creation and use of voluntary and non-regulatory conservation incentives that can be applied to a comprehensive vision of wildlife habitat and connectivity priorities across Florida. A broad array of incentives is needed for conservation in SW Florida due to a very heterogeneous landscape and large tracts of open and working lands. *The landscape conservation design and mapping of priority resources for SW Florida will be the foundation framework to determine where to focus various conservation incentives.* The strong partnerships involved will provide the needed interagency coordination and landowner and stakeholder involvement to apply incentives to meet the conservation targets for this region and provide resilience from future threats.



# Landscape Conservation Design Framework

## Direct Drivers (Future Scenarios)

- Climate Change Vulnerability- incorporated as impacts to habitat
- Human Growth Impact Areas- including impact buffers
- Direct Loss of Habitat- from sea level rise or other applicable factors

## Indirect Drivers

- Management Directives
- Conservation Partner Opportunities
- Use of Directed Funding/Programs
- Habitat Improvement- (will be incorporated as a direct driver in scenarios if possible and available, e.g. fire regimes, water management)

## Conservation Priorities

- Imperiled Species /'Expert Selection' Species
- Impacted Habitats
- Underrepresented Habitats
- Priority Linkages
- Network Criteria
- Ecosystems?

## Current Plans and Management Actions

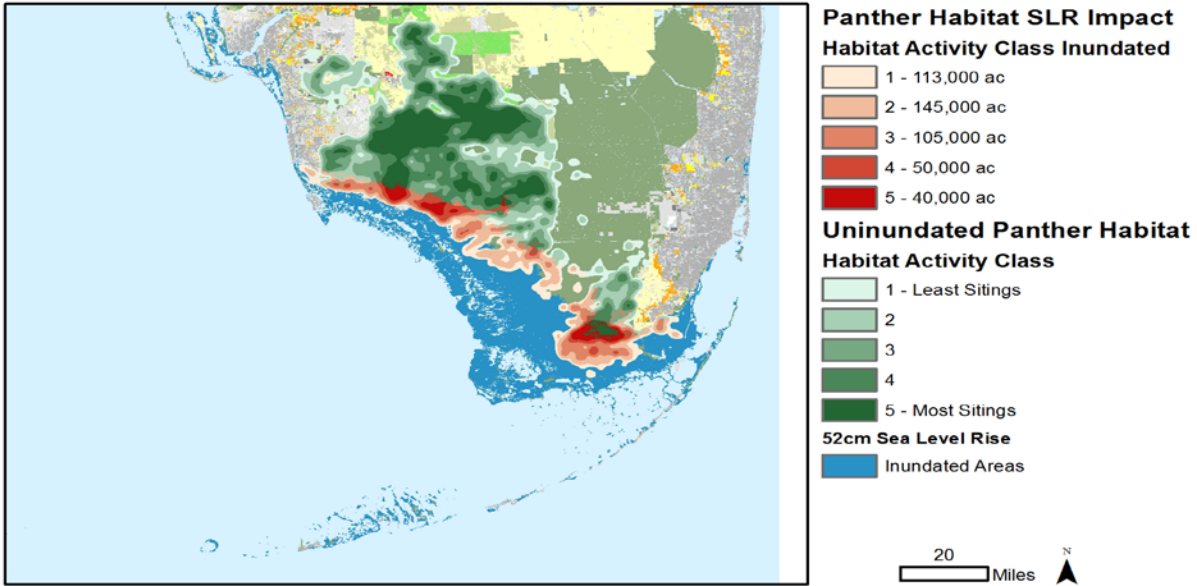
- All applicable current management and conservation plan directives and goals will be incorporated into the landscape conservation designs for the focal sites

Landscape  
Conservation  
Design and  
Planning

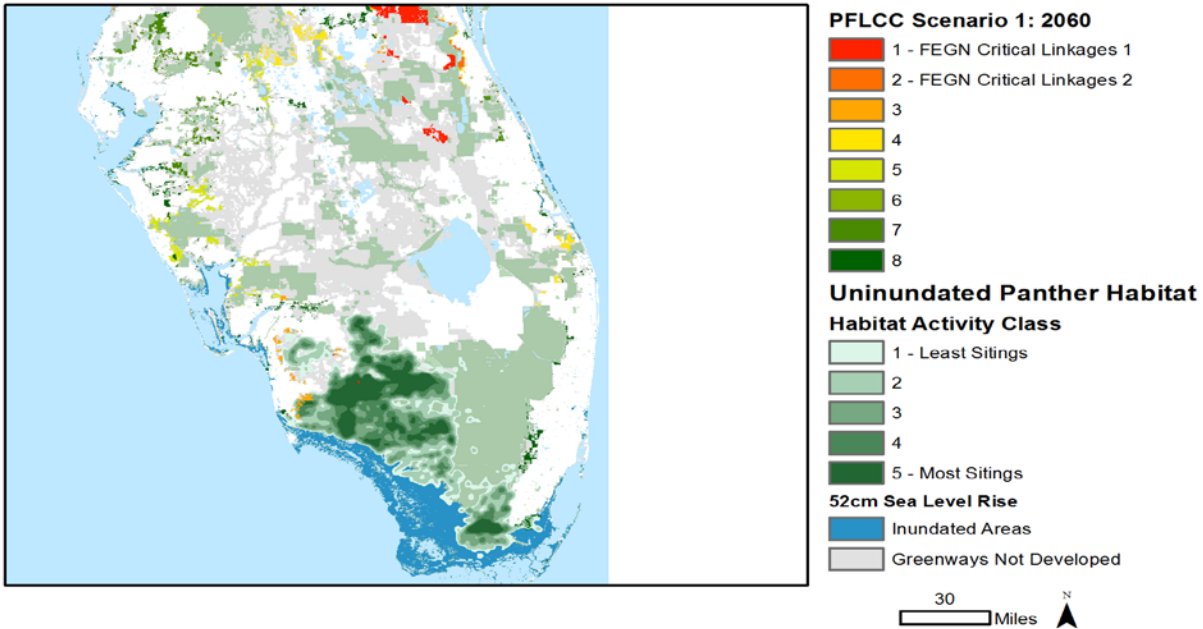
# Species Selection for Impact Assessment

- American swallow-tailed kite (*Elanoides forficatus*)
- Big Cypress fox squirrel (*Sciurus niger avicennia*)
- Eastern diamondback rattlesnake (*Crotalus adamanteus*)
- Eastern indigo snake (*Drymarchon couperi*)
- Florida black bear (*Ursus americanus floridanus*)
- Florida burrowing owl (*Athene cunicularia*)
- Florida panther (*Puma concolor coryi*)
- Gopher tortoise (*Gopherus polyphemus*)
- Mangrove cuckoo (*Coccyzus minor*)
- Red-cockaded woodpecker (*Picoides borealis*)
- Snowy plover (*Charadrius nivosus*)
- Southern chorus frog (*Pseudacris nigrita*)
- Wading birds group: consisting of roseate spoonbill (*Platalea ajaja*), little blue heron (*Egretta caerulea*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*)

## Panther Habitat Loss from SLR PFLCC Scenario 1: 2060



## Greenways Development Loss PFLCC Scenario 1: 2060



# Impact Analysis Examples for Florida Panther

- SLR: Sea Level Rise, 52cm rise in sea surface elevation
- SLR impact (red areas) corresponds directly to the level of sightings in the Habitat Activity Class groupings
- Greenways Development Loss (red through green) are the areas of FEGN-designated critical linkages and undeveloped greenways that would be lost to development in Scenario 1

# Design Process

## Site Selection

- “Trigger” impact areas identified from impact analyses
- Core study area delineation
- Identification of overlapping, spatially-defined, non-scenario driven impacts to targets that warrant inclusion in the design

## Establish Conservation Targets within Core Areas

- Individual or suites of species
- Habitats
- Ecosystems
- Other resource priorities?
- Goals/priorities from previous/current studies

## Define Explicit Focus of Design Framework

- Scale
- Extent
- Temporal- can be tied to future scenario generations
- Target-specific

## Spatial Strategy

- “Trigger” impact areas protection/intervention
- Core areas protection
- Target-specific inclusions
- Fitting of delineated high priority corridors, areas, and buffers from previous studies
- Prioritization using network criteria and metacommunity concepts if species-specific information is available



# Ecological resilience

- the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions

# Resilient Land and Waters Initiative

*President's Priority Agenda for Enhancing the Climate Resilience of America's Natural Resources,*

- Goal is to build or maintain ecologically connected networks of terrestrial, coastal, and marine areas
- Increase resilient to climate change and support a broad range of fish, wildlife, and plants under changing conditions.
- Identifying such priority areas also benefits
- Including: wildfire management, mitigation investments, restoration efforts, water and air quality, carbon storage, and the communities that depend upon natural systems for their own resilience.

The CCB and PFLCC goal and guiding principles are dedicated to the creation and use of voluntary and non-regulatory conservation incentives that can be applied to a comprehensive vision of wildlife habitat and connectivity priorities across Florida. A broad array of incentives is needed for conservation in SW Florida due to a very heterogeneous landscape and large tracts of open and working lands. *The landscape conservation design and mapping of priority resources for SW Florida will be the foundation framework to determine where to focus various conservation incentives.* The strong partnerships involved will provide the needed interagency coordination and landowner and stakeholder involvement to apply incentives to meet the conservation targets for this region and provide resilience from future threats.



Rookery Bay NERR

Conservancy of SW Florida

Everglades Coalition

SW Florida Regional Planning Council

US Fish and Wildlife Service



Audubon

# COMMUNITY PARTNERSHIP

*Working Together to Build Strong Communities*

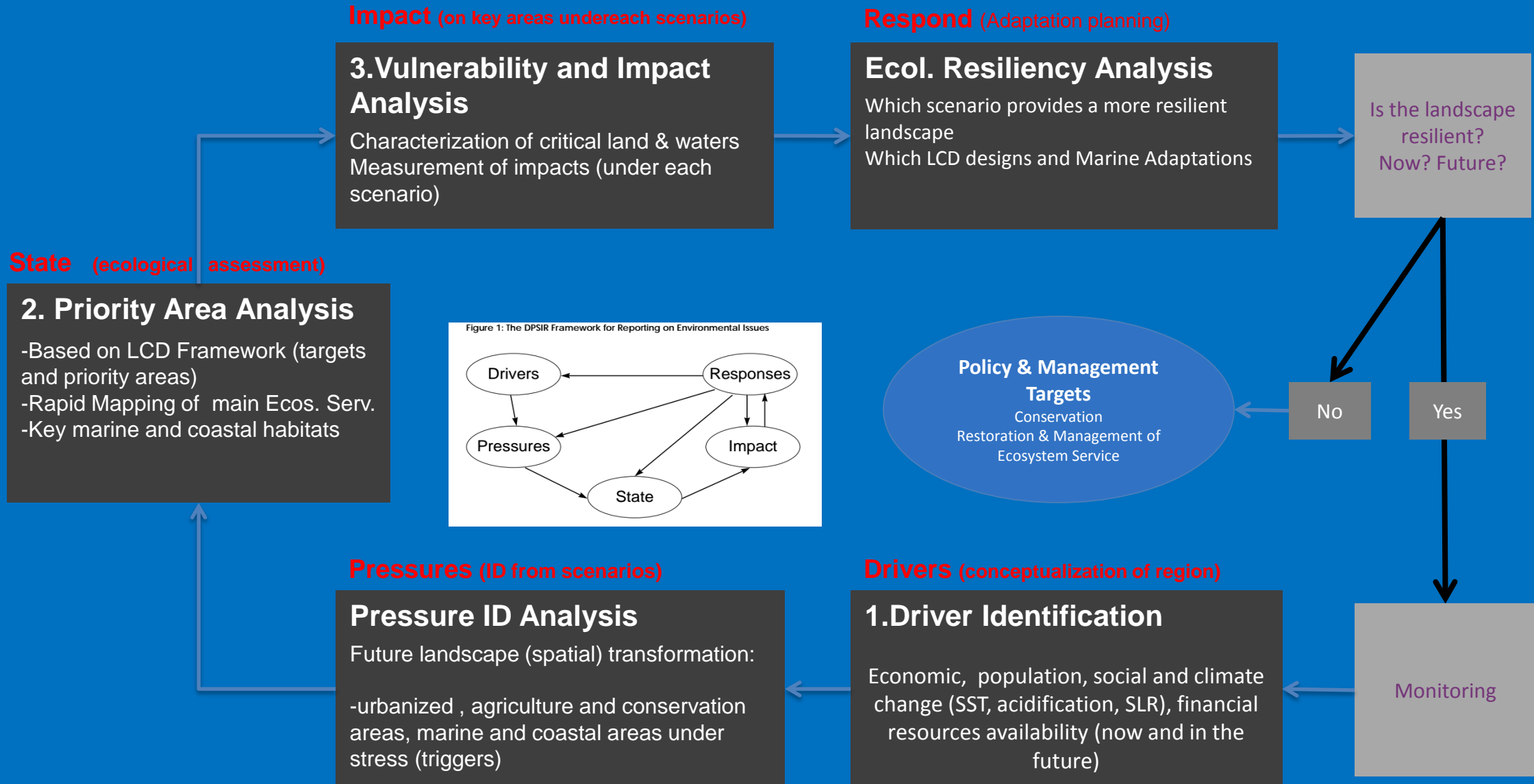
Developer groups

City and County Government

Florida Fish and wildlife Conservation Commission

# Resilience Lands and Water Rapid Analysis

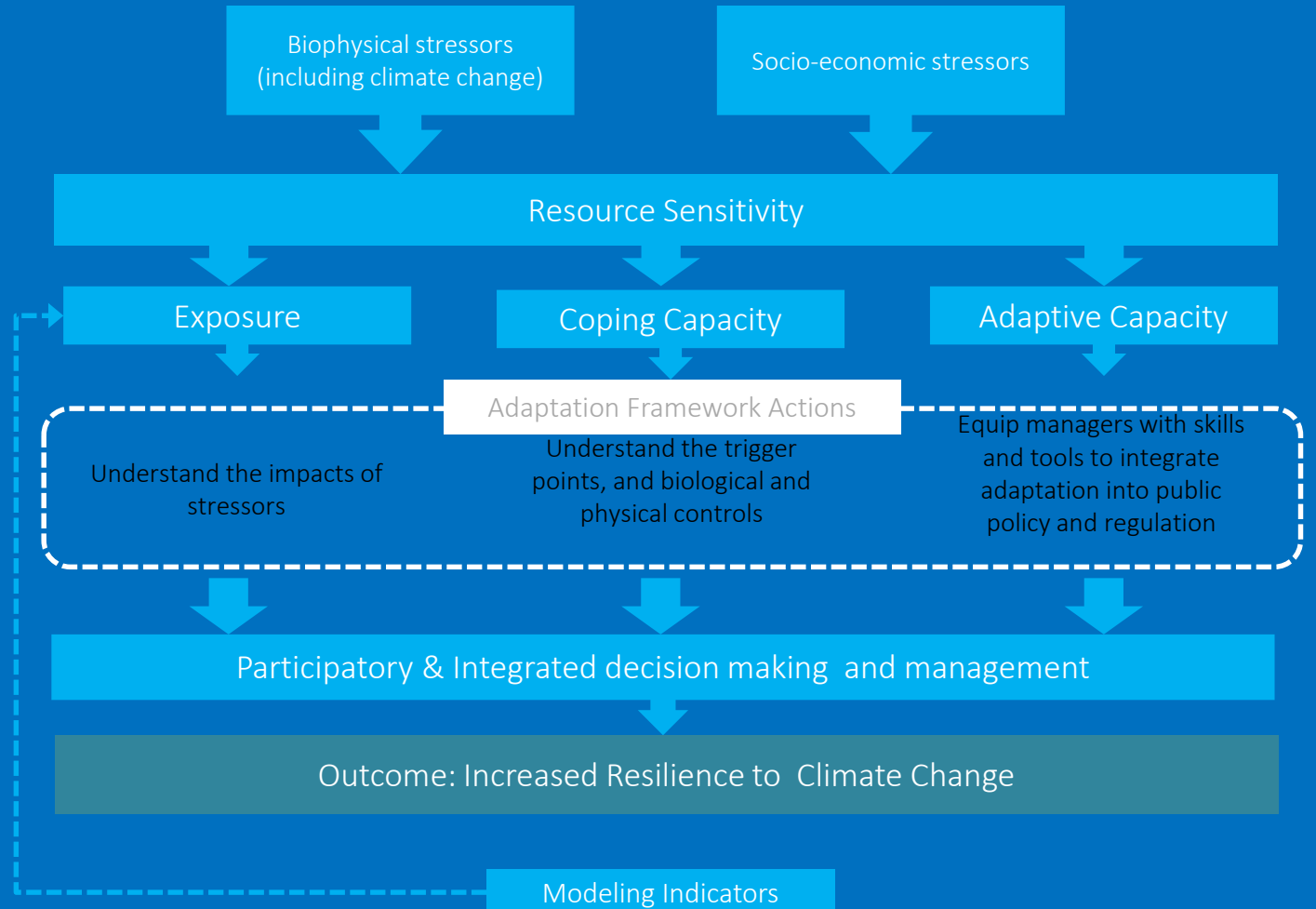
(Application to the South Florida Region ,GeoAdaptive 2015)



# GeoAdaptive Resilience Geospatial Model

SPATIO-TEMPORAL MODEL AND APPROACH

- Geographic simulation of resilience variables.
- Considering biophysical and socio-economic



# Resiliency and Resource Sensitivity

## KEY ELEMENTS OF GEOADAPTIVE RESILIENCE GEOSPATIAL MODEL

**Biophysical and Socio-economic stressors:** are represented through the PFLCC scenarios (terrestrial: urbanization, agriculture, conservation and SLR) and the KEYSMAP scenarios (Sea-surface temperature, acidification, SLAMM results: SLR)

**Exposure** is measure through an spatial impact assessment where stressors are identified in space and overlapped over current and future conditions in marine and terrestrial areas (scenarios)

**Coping Capacity:** is analyzed by describing the conditions that leads each trigger point to transform the current state of species and habitats.

**Adaptive Capacity:** is explore through plausible responses by management through the design of adaptation actions – which are prioritized based on management and ecological criteria (conservation priorities, targets and marine management adaptations)

**Coping and adaptive capacity** are measured through a spatial analysis that looks at the landscape and marine configuration.

# MARine Estuarine goal Setting (MARES) for South Florida

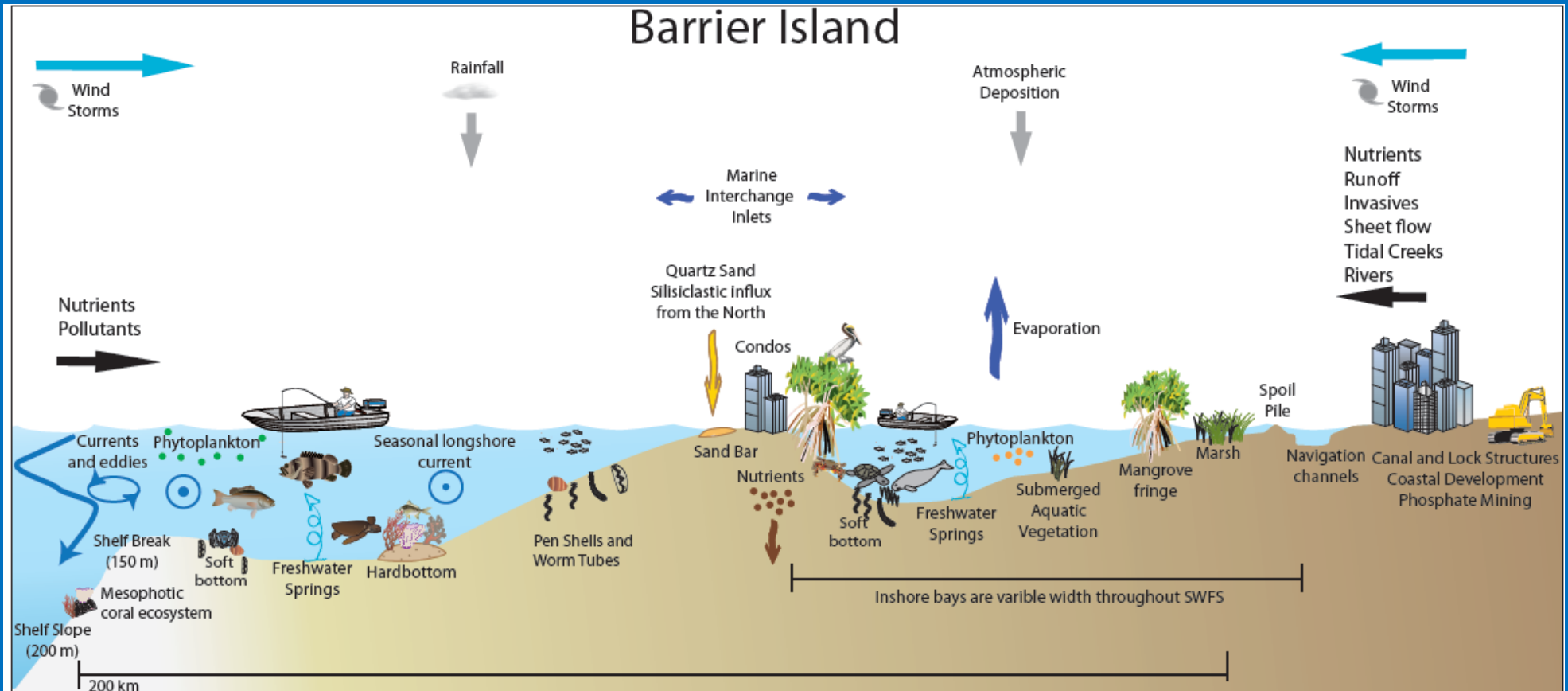
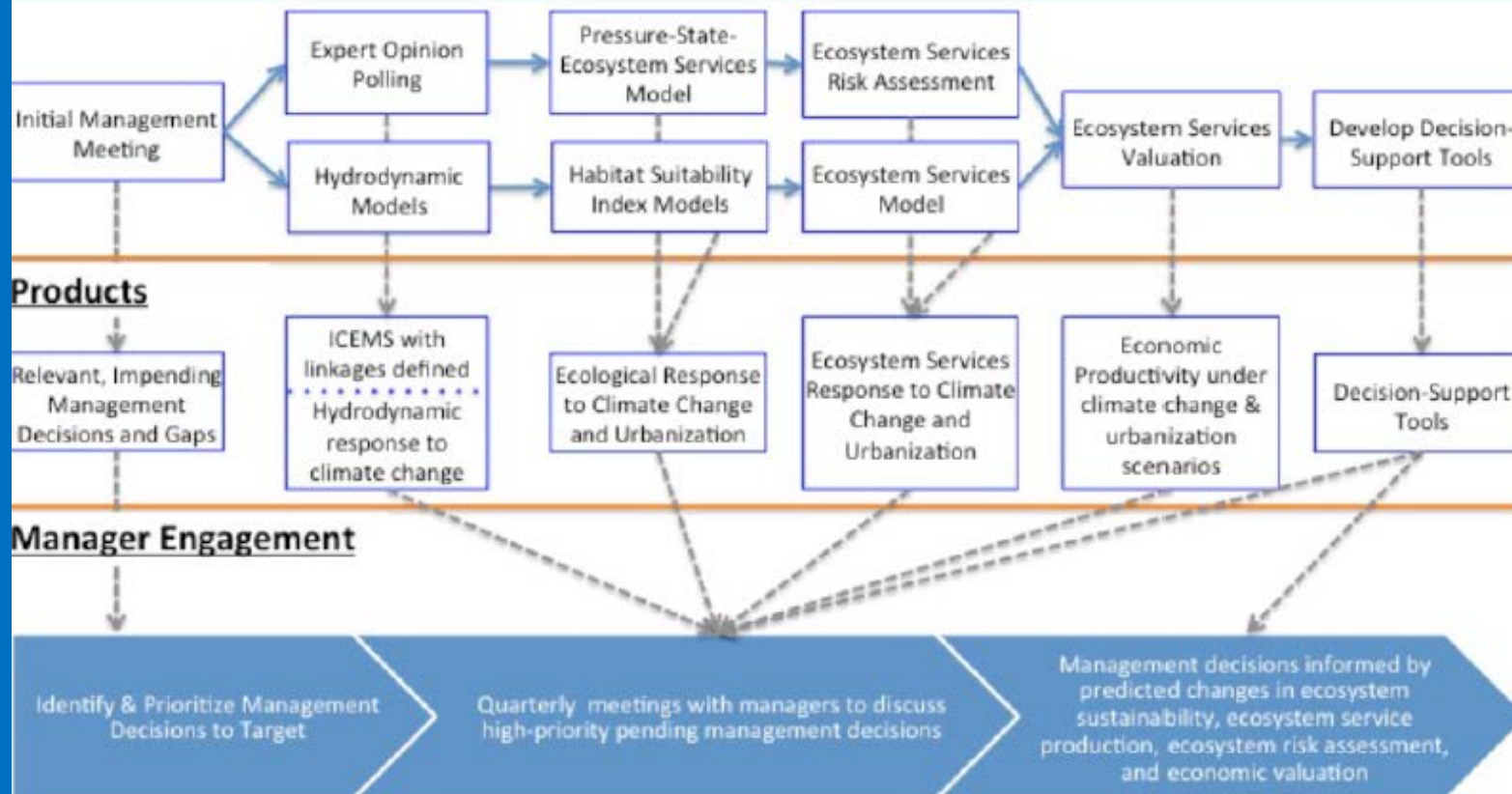


Figure 3a. Conceptual diagram of the Southwest Florida Shelf Barrier Islands Province ecosystem, processes operating upon it, and factors affecting its condition.

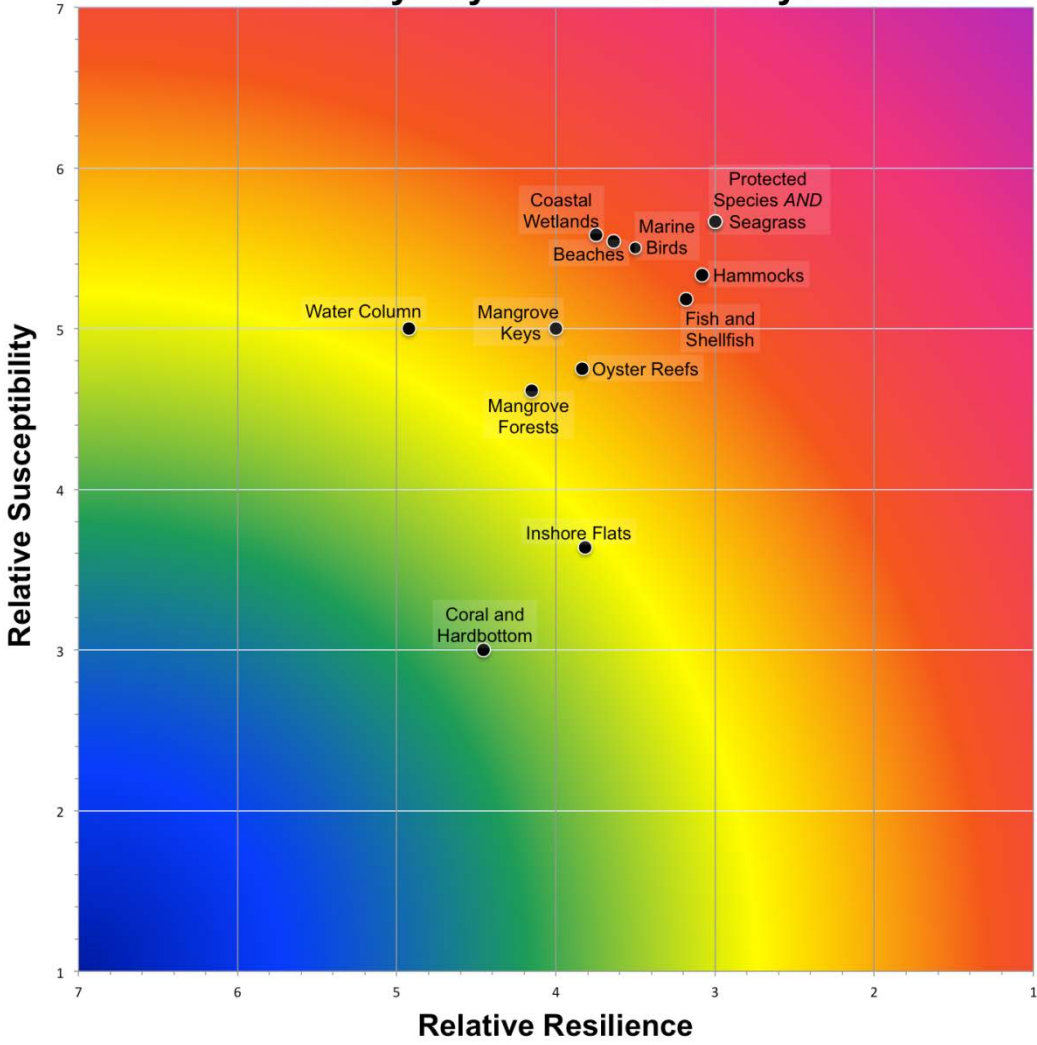
# NOAA COCa Project

## Methodology

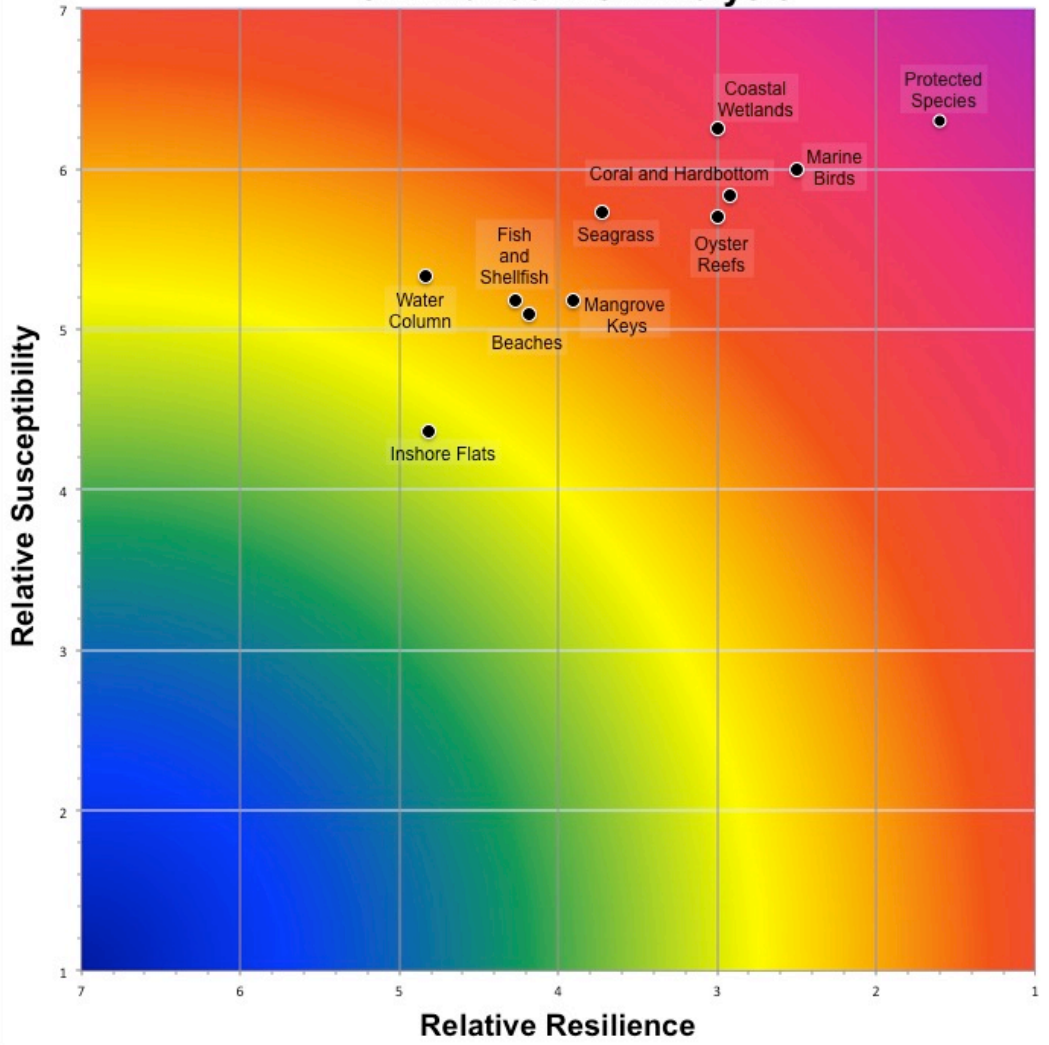




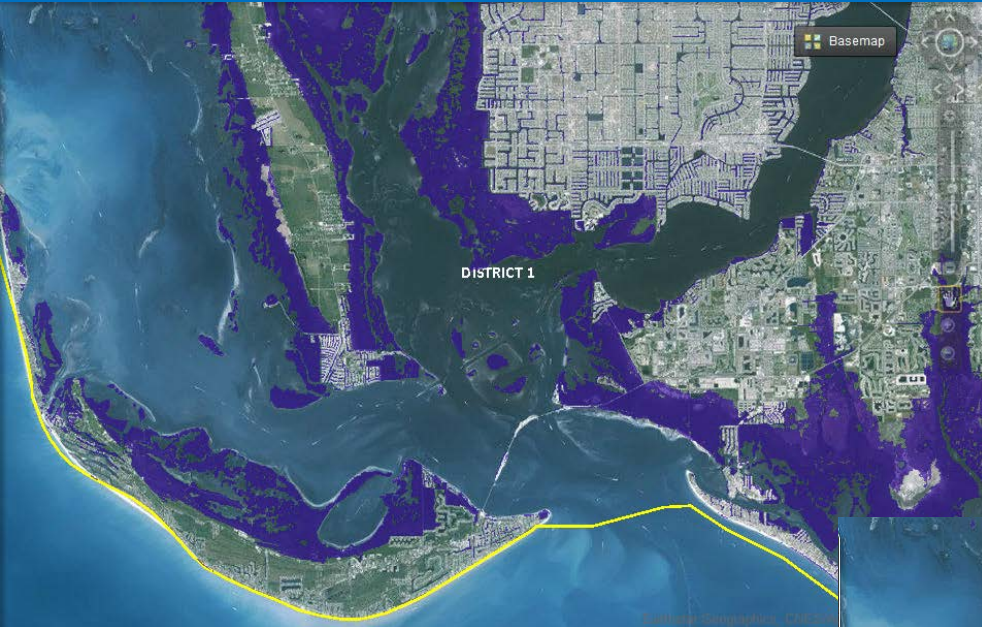
### Rookery Bay NERR Risk Analysis



### SW Florida Risk Analysis



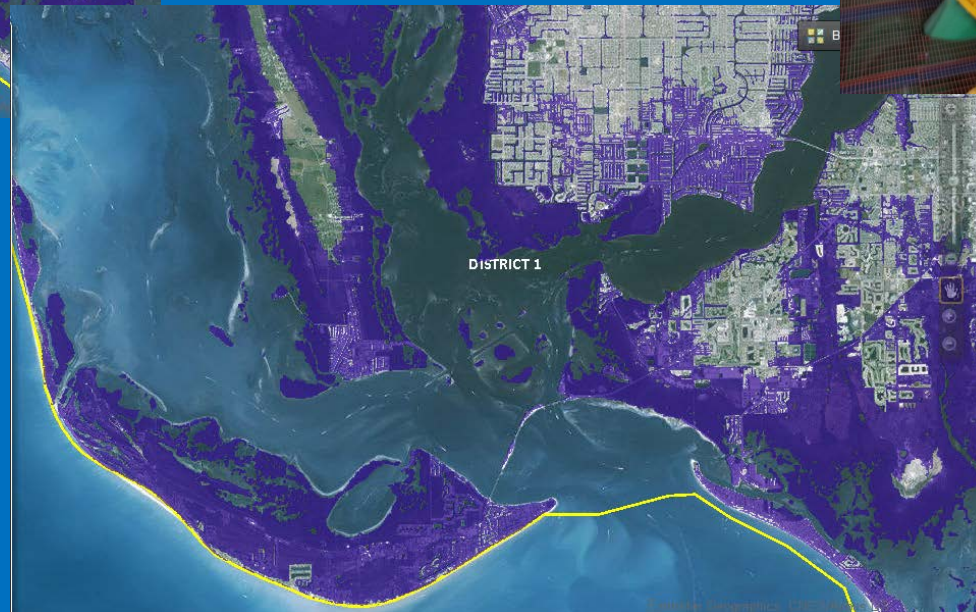
# High SLR 2060



Florida Sea Level Scenario Sketch Planning Tool  
District 1

<http://sls.geoplan.ufl.edu/>

# High SLR 2100



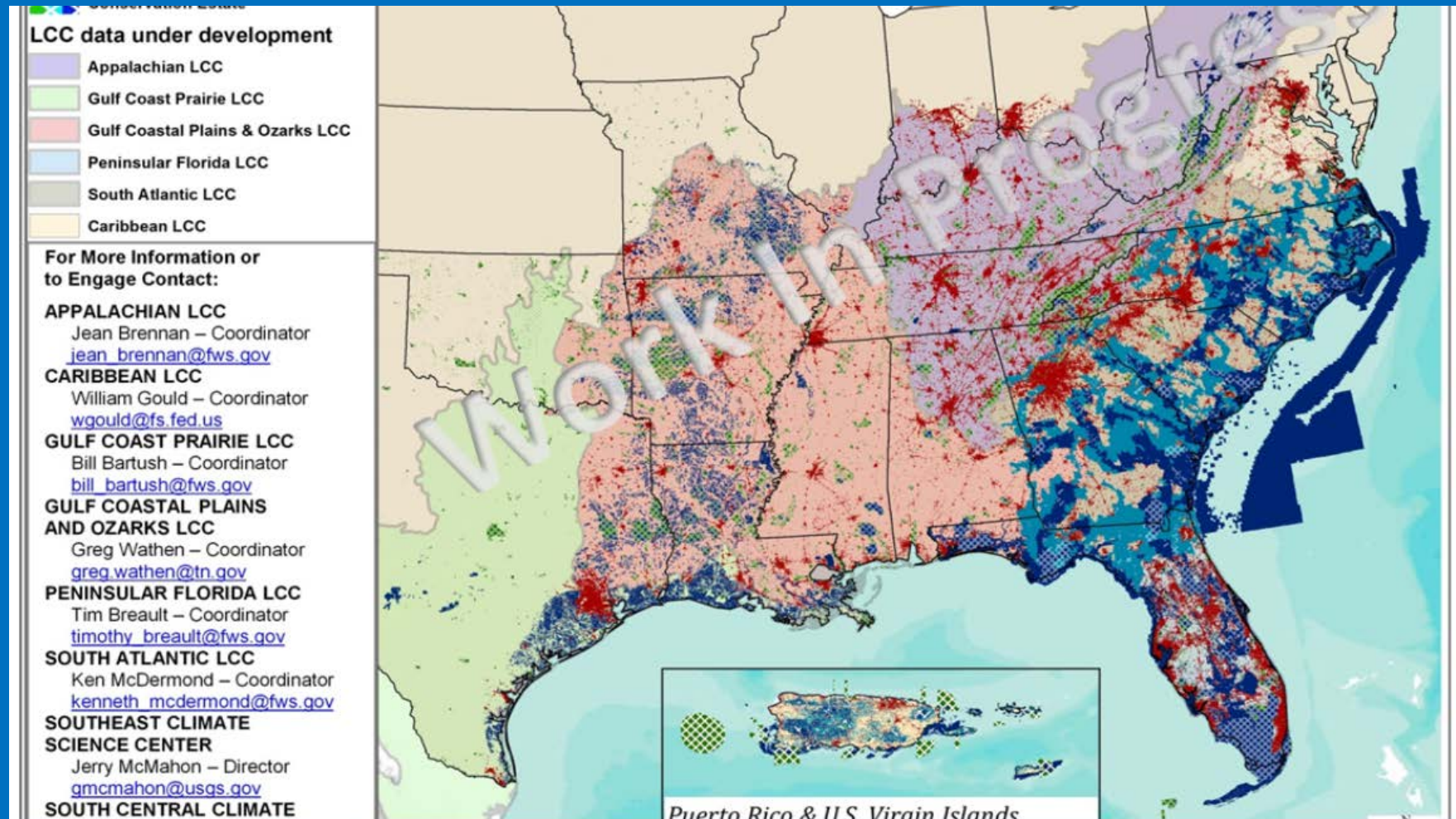
# PFLCC Conservation Planning ATLAS

- HUC 12
- Simple and complex viewers
- GIS data available
- Most PFLCC science products
- All SE LCCs have a CPA

<http://pflcc.databasin.org/>

The screenshot shows the homepage of the Peninsular Florida LCC Conservation Planning Atlas. The header includes the title "PENINSULAR FLORIDA LCC CONSERVATION PLANNING ATLAS" and a search bar. Below the header is a navigation menu with options: GET STARTED, EXPLORE, CREATE, COMMUNITY, and MY WORKSPACE. The main content area features a large banner with the text "About the PFLCC Conservation Planning Atlas" and a "Take a Tour" button. Below the banner is a "Data Galleries" section with six categories: Critical Lands & Waters Identification Project, Alternative Futures & Scenarios, Base Maps & Data, Priority Resources & Conservation Targets - Coming Soon..., Supporting Models & Data, and Landscape Changes and Threats. At the bottom, there are three sections: Simple Map Viewer (Coming Soon...), PFLCC CPA News (Dec 10 - Please welcome the PFLCC's new CPA!), and Advanced Mapper.

# SE Conservation Adaptation Strategy





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