Participatory Scenario Planning for Climate Change and Development: A Landscape Conservation Case Study in South Florida's Greater Everglades Ecosystem

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Fish and Wildlife Service Webinar

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Massachusetts Institute of Technology
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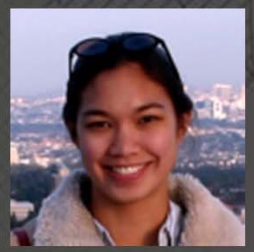

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MIT Everglades Project Overview

•Research initiative developed by MIT and sponsored by FWS and USGS.

• In response to climate change challenges, simulates a range of possible futures, including variations in climate change, population growth and planning assumptions

• Identifies potential impacts of these scenarios on “trust resources” (species, habitats, refuges and landscapes).

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Overview

What's the general challenge of climate change planning?

What is the specific situation in Florida?

What has the MIT Alternative Futures Project done?

What are broader implications of such methods?

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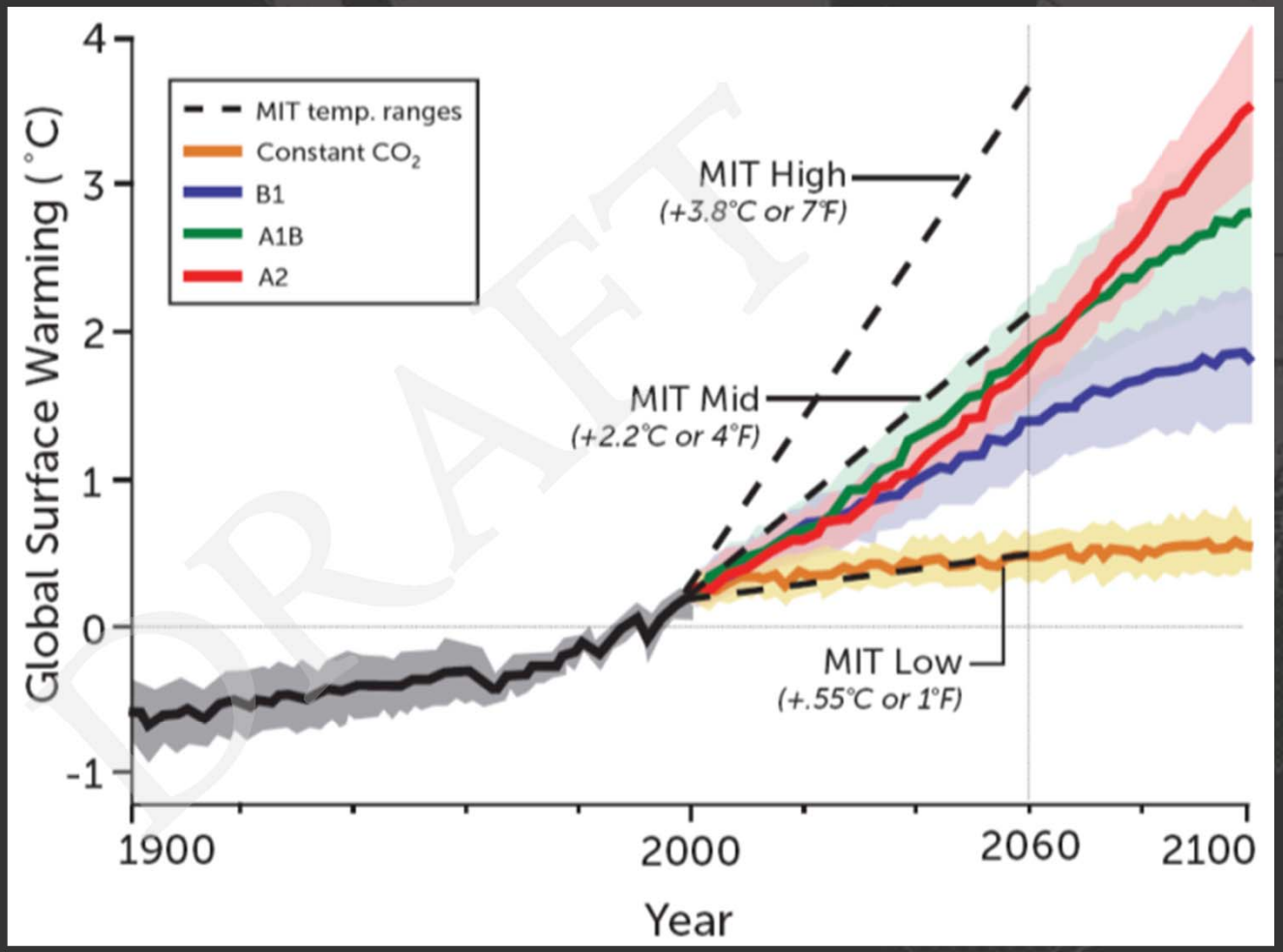
The Downscaling Challenge

Need to Downscale IPCC Scenarios and Global Circulation Model to Regional Climate Models

This process in itself introduces significant uncertainty

But…we must proceed with best available estimates



Adapted from: http://www.epa.gov/climatechange/science/images/ipcc_scenario_prediction.gif

Climate Change is a "Wicked" Problem

- Missing broad social consensus
  - but science, professional due diligence and legislation require addressing the issue
- Levels of uncertainty make conventional planning or risk assessment techniques problematic
  - For example, IPCC scenarios have no probabilities assigned
- Involves a deeply coupled human-natural system.
  - Assumptions about human behavior are significant in systems operation, and affected by natural events
  - Physical designs and policies can effect outcomes
- Potentially effects many systems in parallel
  - Humans – not just species - will move in response to climate change
  - Water demand, recreation, transportation, energy, all will adapt simultaneously

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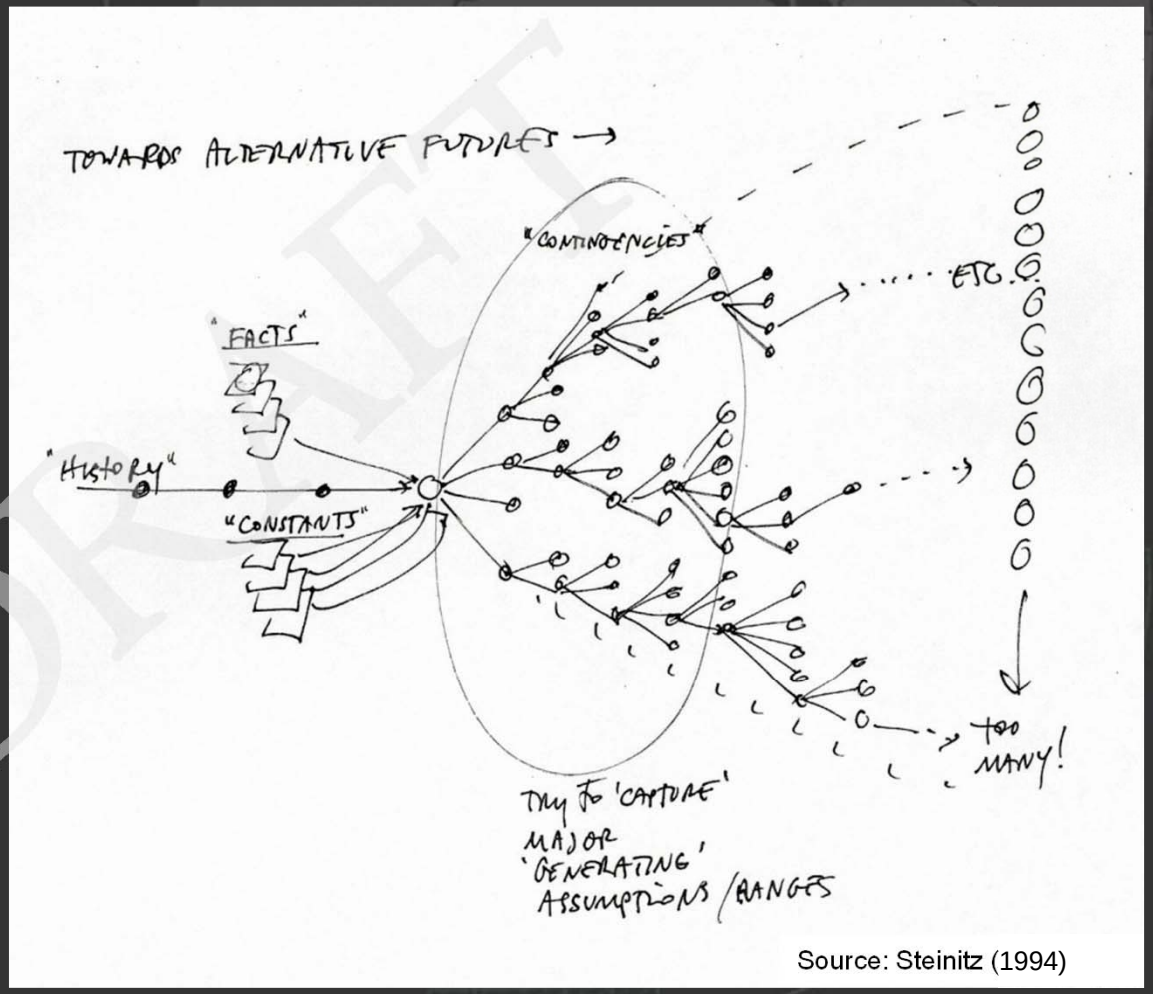
Characteristics of Desirable Solutions

- **Technical/Scientific**
  - **Generating solid information at relevant scales**
  - **Integrating across science project/disciplines**
  - **Managing propagation of uncertainty**
- **Planning Process/Institutional Aspects**
  - **Accounting for dynamic spatial processes with significant uncertainties**
  - **Integrating fast-changing science**



Source: Steinitz (1994)

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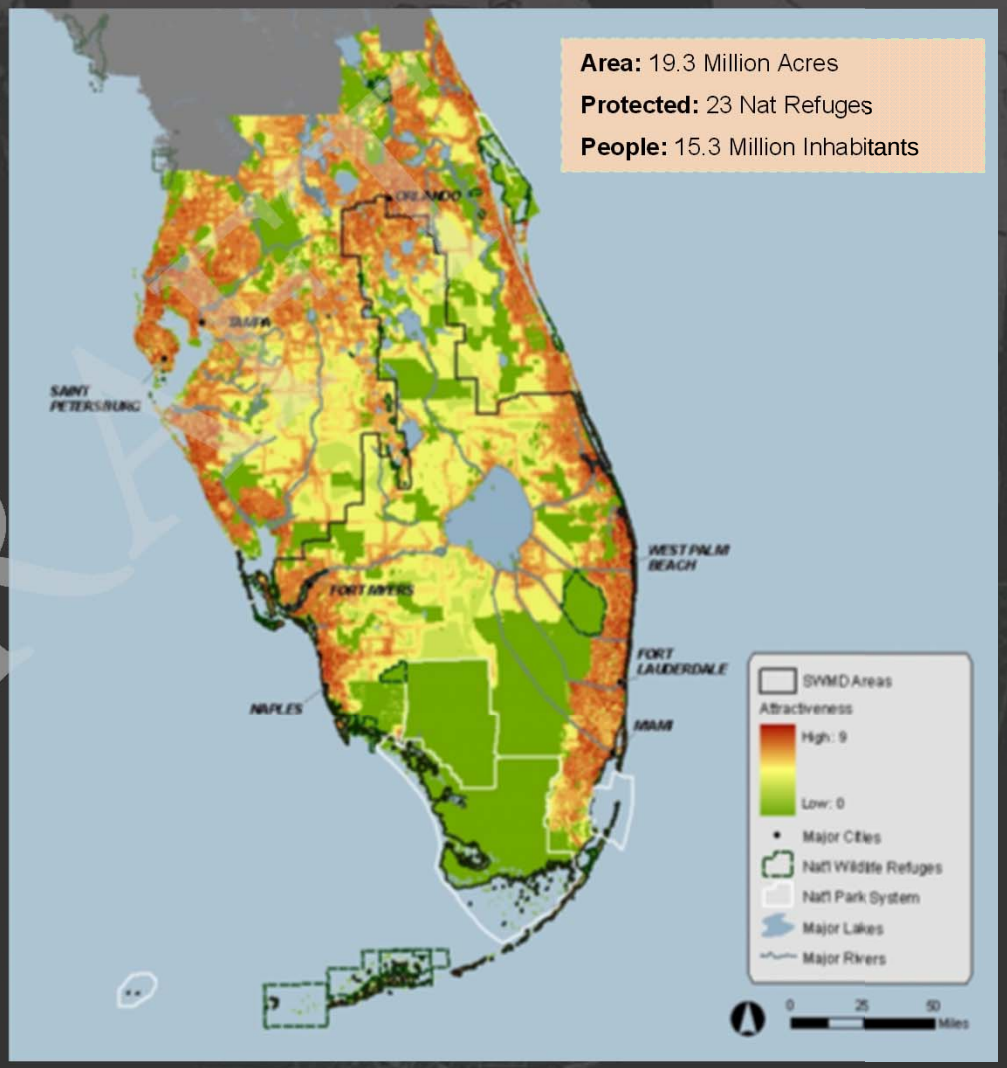
Drivers of Change
Transcend Management Geographies

1. Current institutions were not designed to deal with rapid population or ecological change

2. Land / water / transportation / conservation currently managed by **hundreds** of organizations across So. Florida

3. Multiple Agencies, jurisdictions are **not** going away

4. We must develop effective ways of planning **despite** these barriers



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Drivers of Change

1. Population Change
    1. Effects of population change on urbanization
2. Planning Assumptions and Regulations (Land Use and Water)
    1. Urbanization as a cause of landscape fragmentation
    2. Unintended consequences of resource consumption
3. Climate Change
    1. Sea Level Rise
    2. Temperature Changes
    3. Precipitation Changes
4. Conservation Strategies
    1. Expert stakeholder driven
    2. Landscape scale approach (establishment of patterns and processes)

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Climate Change Factors:

Temperature

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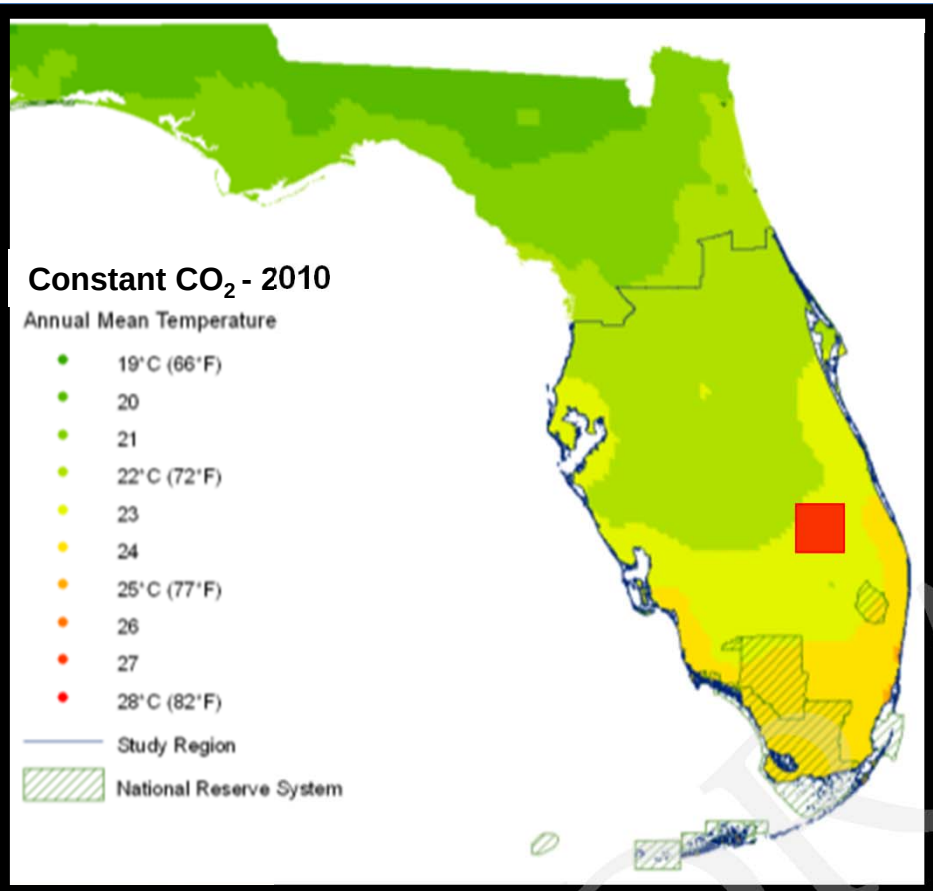

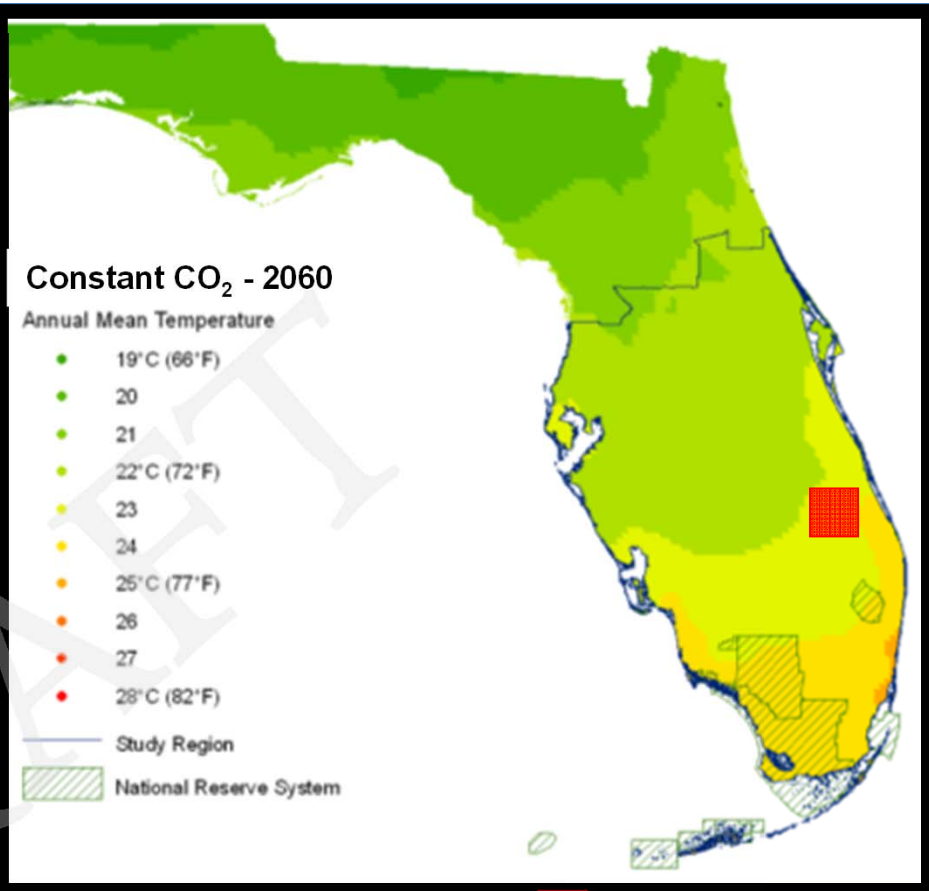

Little shift in isotherms; minimal effects on temperature-dependent species

Federal Reserve	Annual Mean Temperature 2010 Average	Annual Mean Temperature 2060 Const. CO_2
Dry Tortugas National Park	25.1*C (77.3*F)	25.0*C (77.1*F)
Canaveral National Seashore	22.2*C (72.0*F)	22.0*C (71.6*F)
Florida Panther National Wildlife Refuge	23.5*C (74.2*F)	23.3*C (74.0*F)
Great White Heron National Wildlife Refuge	25.6*C (78.0*F)	25.4*C (77.8*F)

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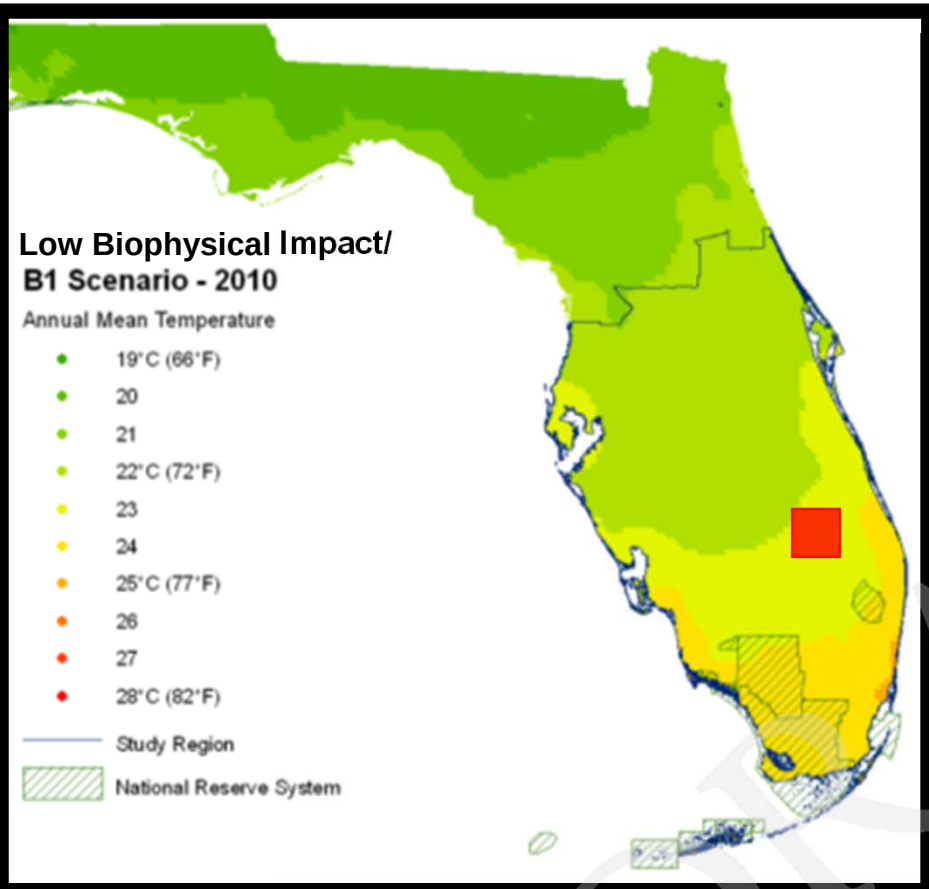

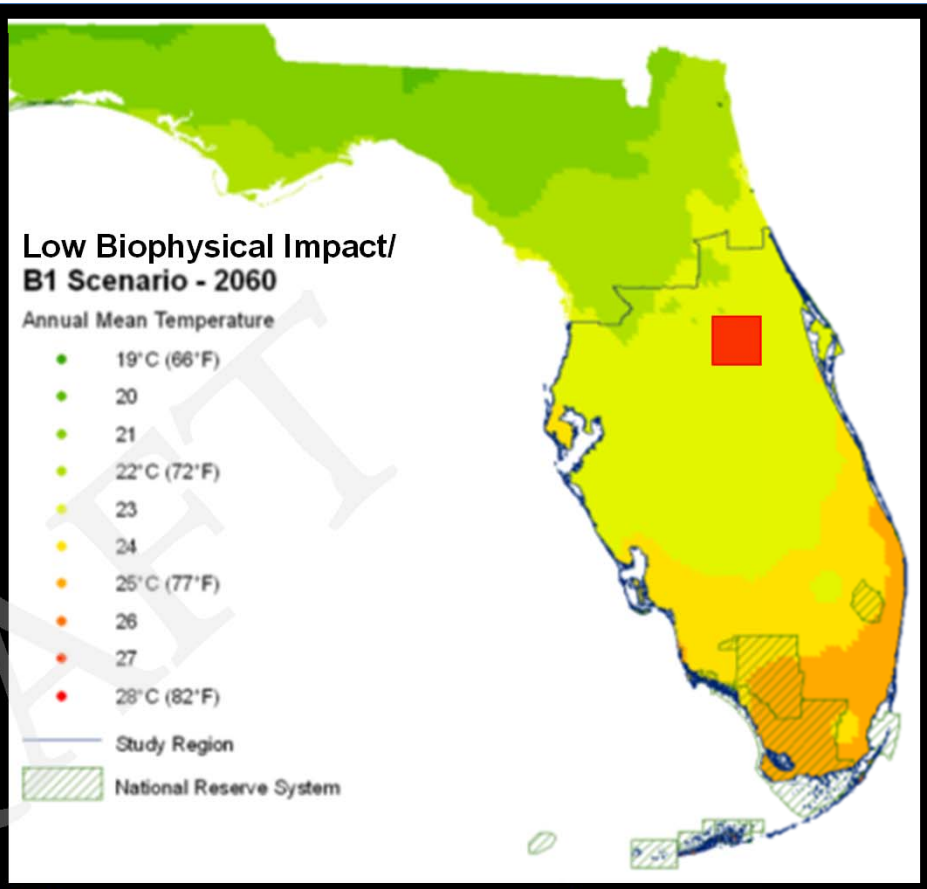

Temperature-regulated species may shift out of existing reserves

Federal Reserve	Annual Mean Temperature 2010 Average	Annual Mean Temperature 2060 – B1
Dry Tortugas National Park	25.1*C (77.3*F)	25.7*C (78.3*F)
Canaveral National Seashore	22.2*C (72.0*F)	22.9*C (73.3*F)
Florida Panther National Wildlife Refuge	23.5*C (74.2*F)	24.0*C (75.2*F)
Great White Heron National Wildlife Refuge	25.6*C (78.0*F)	26.1*C (78.9*F)

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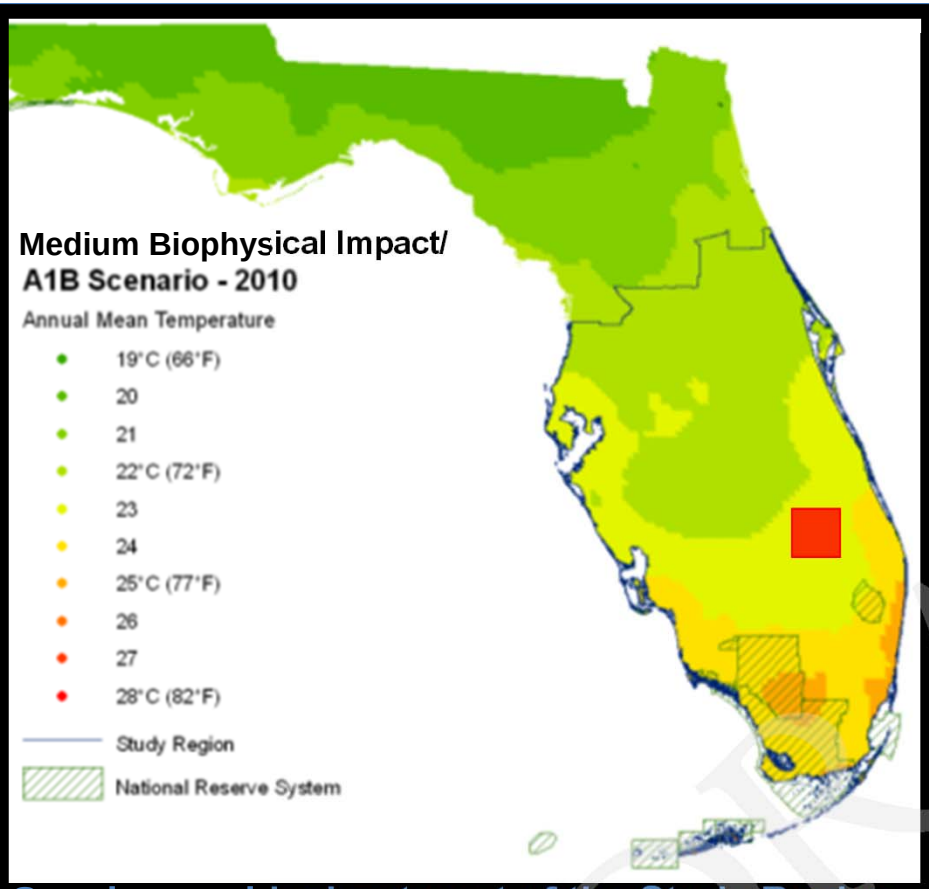

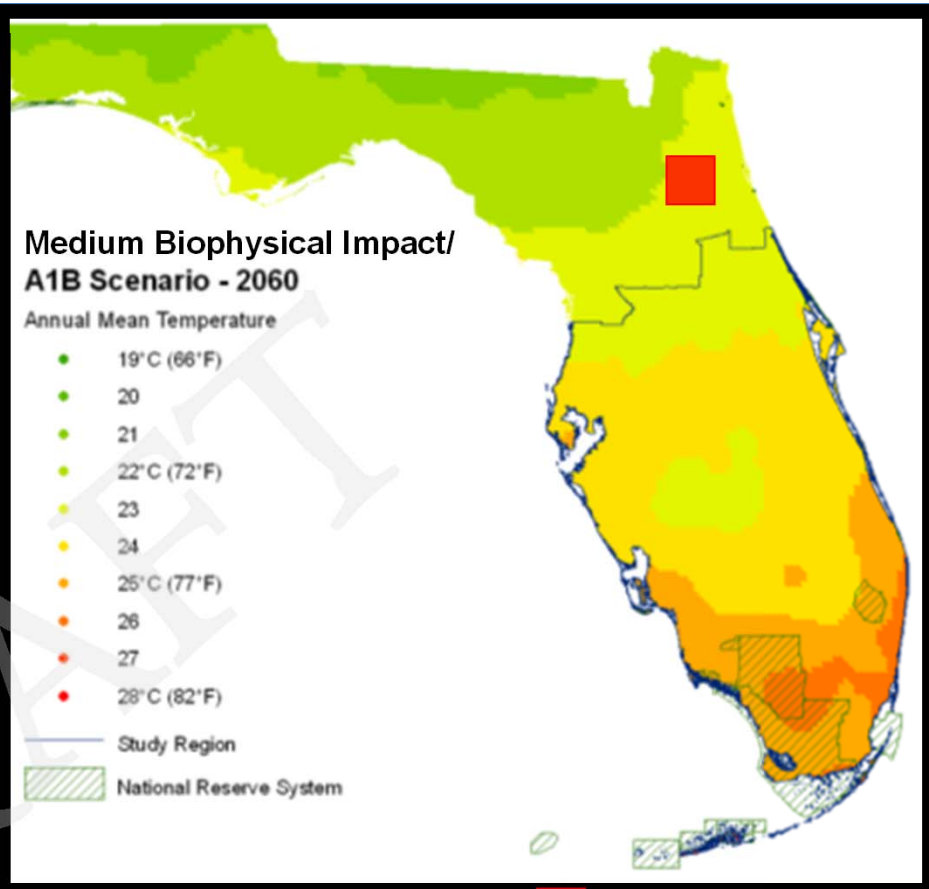

Species could migrate out of the Study Region

Federal Reserve	Annual Mean Temperature 2010 Average	2060 – A1B
Dry Tortugas National Park	25.1*C (77.3*F)	26.4*C (79.4*F)
Canaveral National Seashore	22.2*C (72.0*F)	23.6*C (74.5*F)
Florida Panther National Wildlife Refuge	23.5*C (74.2*F)	24.7*C (76.5*F)
Great White Heron National Wildlife Refuge	25.6*C (78.0*F)	26.7*C (80.1*F)

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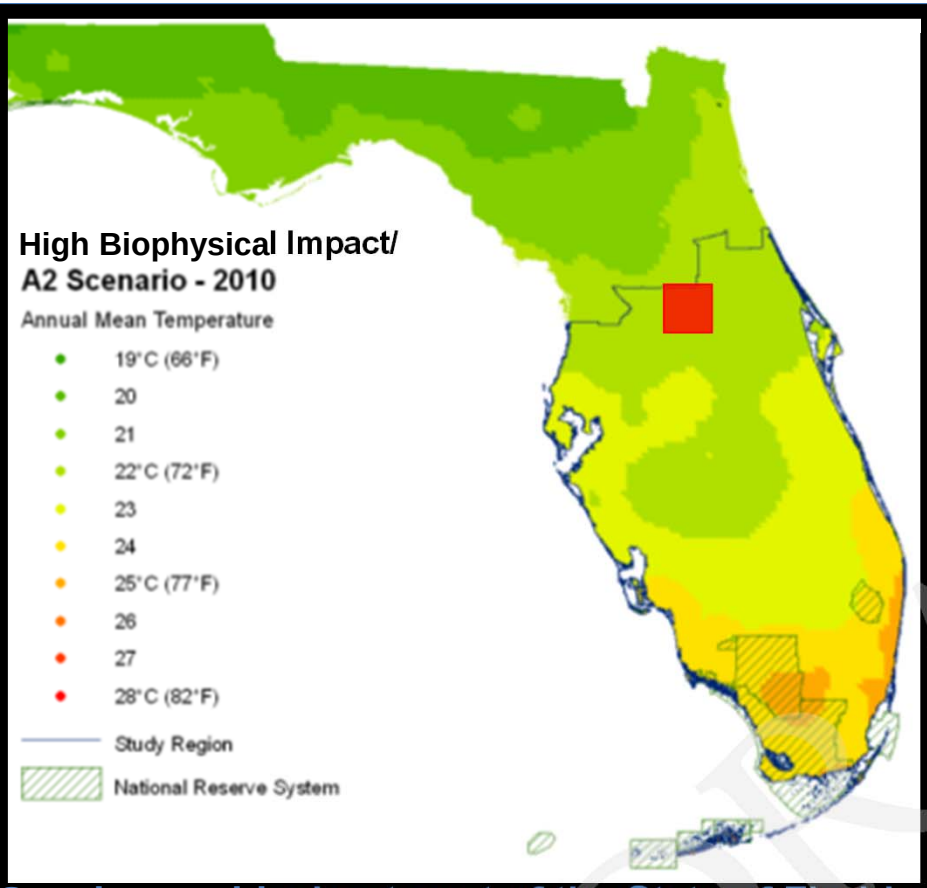

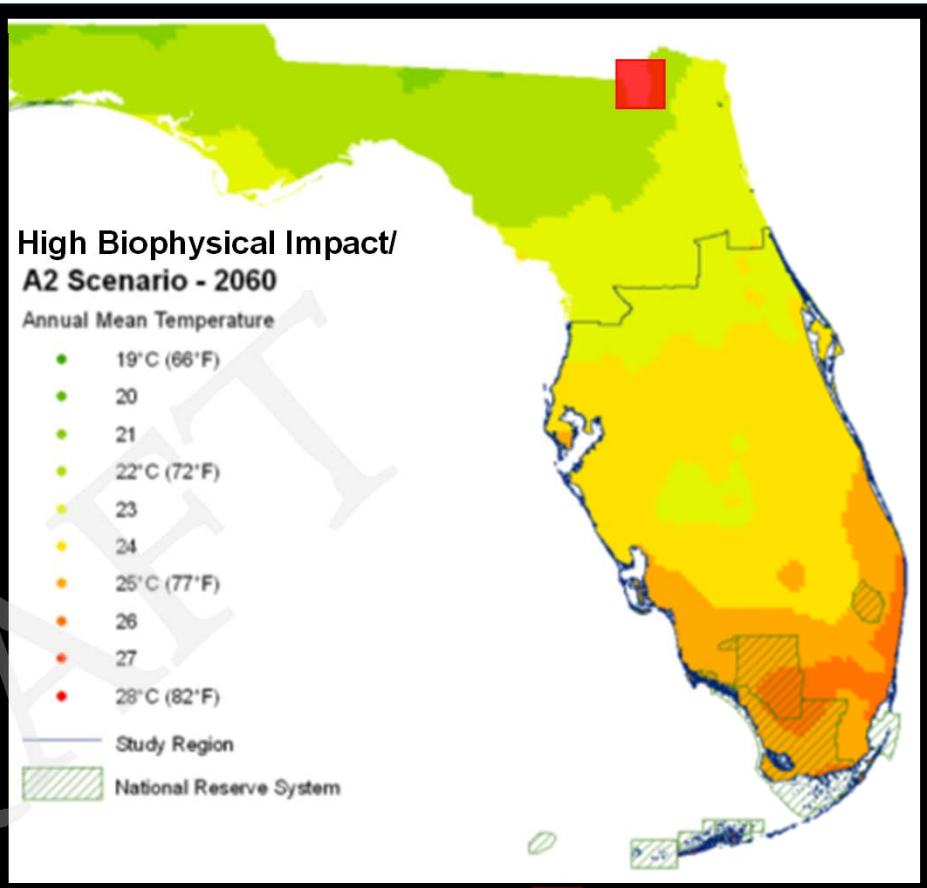

Species could migrate out of the State of Florida

Federal Reserve	Annual Mean Temperature 2010 Average	2060 – A2
Dry Tortugas National Park	25.1*C (77.3*F)	26.4*C (79.6*F)
Canaveral National Seashore	22.2*C (72.0*F)	23.7*C (74.6*F)
Florida Panther National Wildlife Refuge	23.5*C (74.2*F)	24.8*C (76.6*F)
Great White Heron National Wildlife Refuge	25.6*C (78.0*F)	26.7*C (80.2*F)

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Climate Change Factors:

Precipitation

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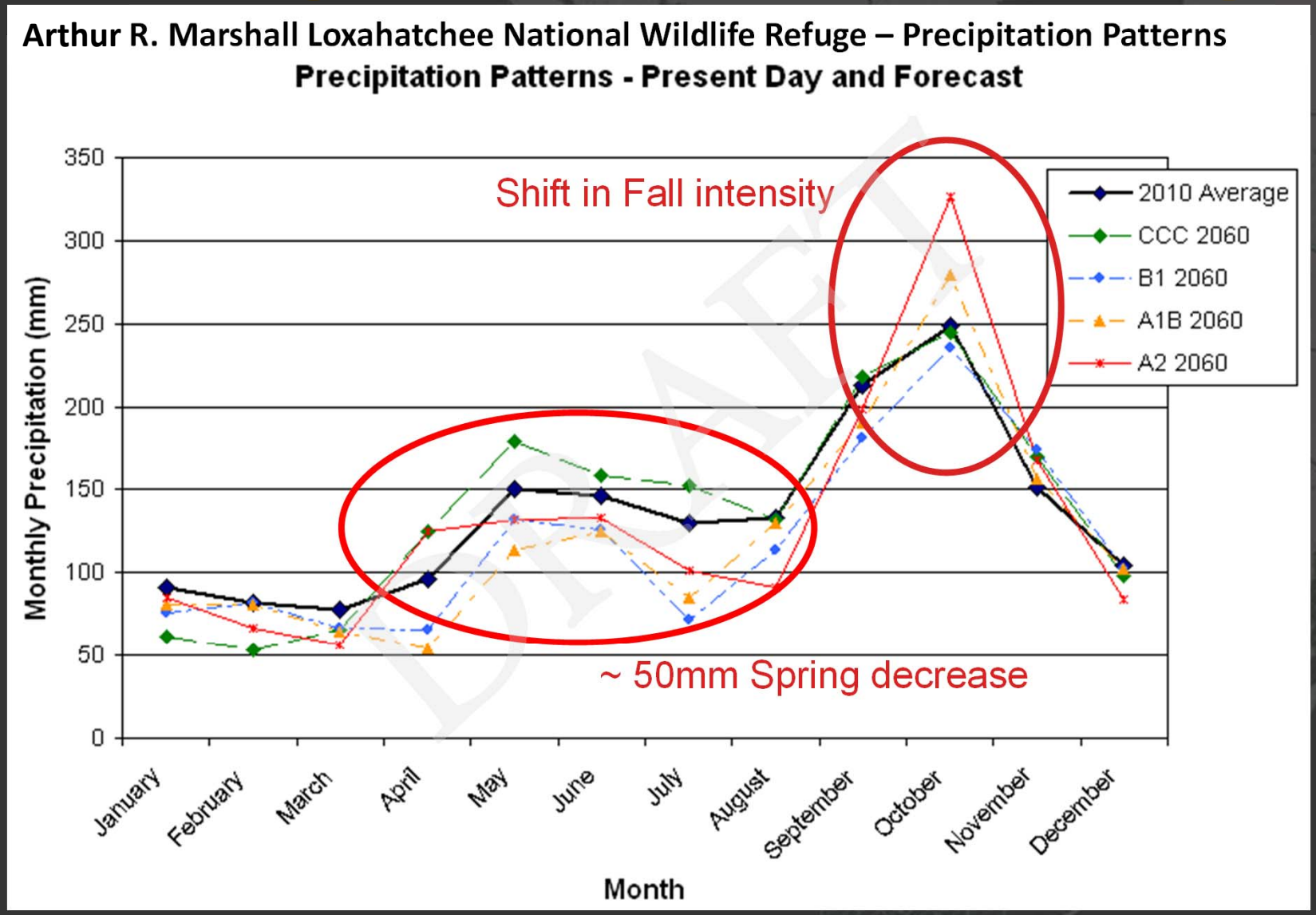
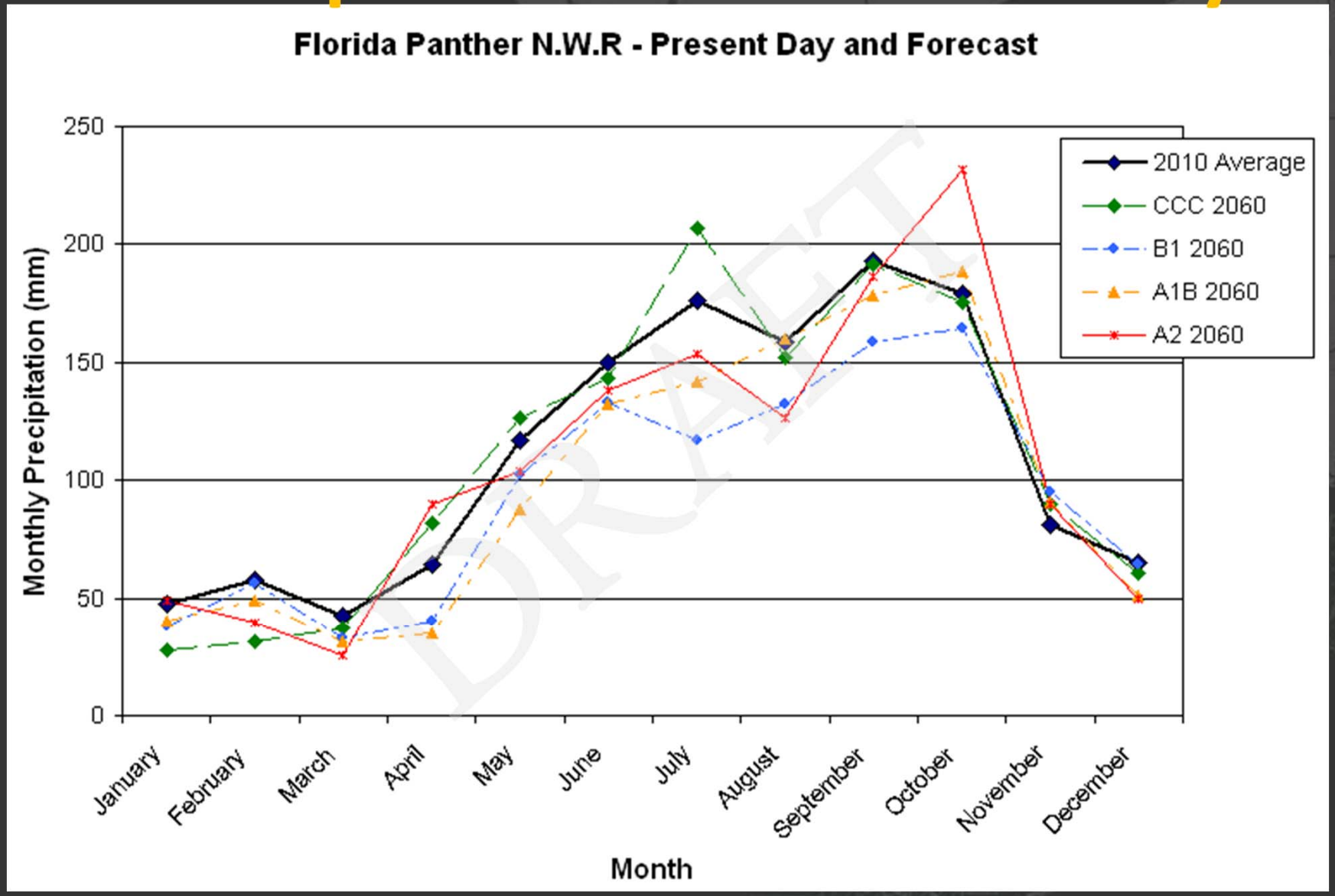
Anticipated Rainfall Variability



Anticipated Rainfall Variability



Climate Change Factors:

Sea-level rise

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Crocodile Lake | Everglades N.P. | Ding Darling | Key Deer Refuge

(Not a crocodile)

Sea level rise threatens critical South Florida coastal refuges.

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How will 1 meter SLR affect key refuges?

How much land will be lost with varying degrees of SLR?

What other damage can we expect?

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	Sea Level Rise			
Federal Reserve	**3.6”**	**18.4”**	**39.1”**	**113”**
Caloosahatchee National Wildlife Refuge	40%	73%	**100%**	100%
Island Bay National Wildlife Refuge	2.5%	**88%**	93%	100%
Pine Island National Wildlife Refuge	5.5%	**77%**	82%	87%
Ten Thousand Islands NWR	8.1%	**77%**	96%	100%
Hobe Sound National Wildlife Refuge	6.5%	46%	**70%**	83%

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Approach

1. Stakeholder-based participatory planning
   1. Get people responsible for making decisions involved up front and throughout

2. Scenario-based simulation modeling
   1. Make uncertainties explicit and tangible
   2. Package multiple variables to avoid combinatorial explosion

3. Evaluate Conservation Consequences
   1. Model and evaluate different conservation strategies in scale and with realistic budgets
   2. Look for “resilient” strategies (plans which work across a range of conditions)

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What Are the Essential Components of "Alternative Futures" Planning?

1. Stakeholder Process
2. Scenarios
3. Change Models
4. Impact Models

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Stakeholder-Based Processes

1. Want a broad-based, representative group of **those tasked with implementation + those with substantive knowledge to contribute**

2. Provide expert review and help ensure management relevance

3. This requires significant "contact hours" and long term commitment

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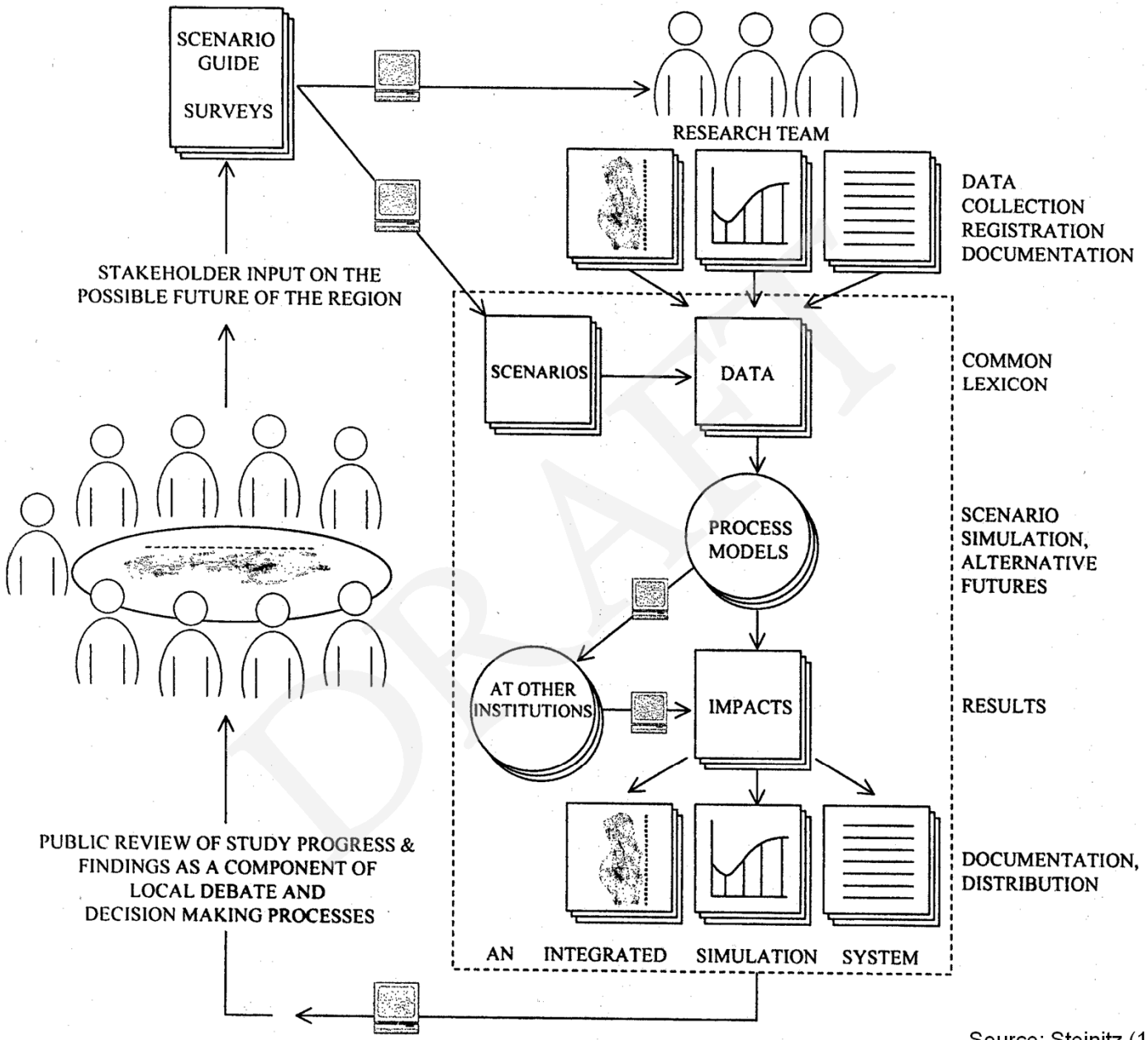

Source: Steinitz (1990, 1993)

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What Do We Mean By "Scenarios"?

1. Bundles of consistent assumptions, facts, projections and possible policies

2. Vary along multiple dimensions, not just one (i.e. climate + population)

3. Require expertise and **judgment** to construct usefully

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MIT Scenario Dimensions

Biophysical				Socio-economic		
SEA LEVEL RISE	TEMPERATURE INCREASE	PRECIPITATION VOLUME	PRECIPITATION INTENSITY	POPULATION	LAND USE & WATER PLNG. ASSUMPTIONS	FINANCIAL RESOURCES
(inches)	*(degrees F.)*	*(Annual Mean Precipitation)*	*(Avg. vol. increase per storm)*	*(all FL. in millions)*	*(BAU - Proactive)*	*(low vs. high)*
No Change	No Change	No Change	No Change	No change (19)	No Change	No Change
3.6	1	-5%	25%	Marginal decrease (12)	Business as Usual (B.A.U.)	$
		(+) 5%				
18.4	4	-10%	50%	Trend (25)		
		(+) 10%			Proactive	$$$
39.1	7	-15%	70%	Double (29)		
		(+) 25%				

SCENARIOS:
Internally-consistent bundles of biophysical variables and socioeconomic and regulatory planning assumptions.

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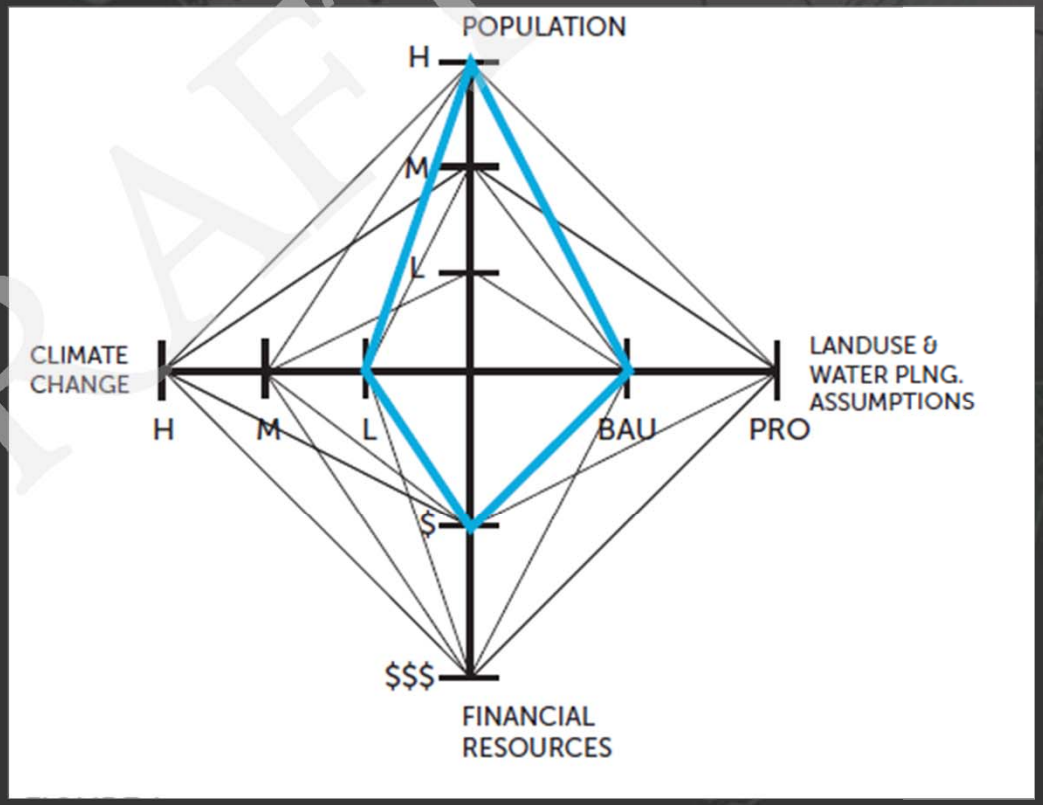
Scenario Representation

Which aspects of change are considered in each scenario?

- Climate Change
- Population Projections
- Financial Resources
- Planning Assumptions



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Scenario Prioritization

SCENARIO	BIOPHYSICAL	POPULATION	WATER & LAND USE PLNG. ASSUMPTIONS	FINANCIAL RESOURCES
A	LOW	DOUBLE	B.A.U.	$
B	LOW	TREND	PROACTIVE	$$$
C	HIGH	TREND	B.A.U.	$
D	HIGH	TREND	PROACTIVE	$$$
E	MID	DOUBLE	B.A.U.	$$$
F	MID	TREND	B.A.U.	$
G	HIGH (113" SLR)	LESS	PROACTIVE	$$$
I	HIGH	DOUBLE	PROACTIVE	$
J	LOW	DOUBLE	PROACTIVE	$

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Requirements for Spatial Change Simulation Models

1. Must cover uniform extent, spatial and temporal resolution

2. Consistent with historic change (and sometimes calibrated using it)

3. But must be sensitive to scenario parameters, often including ahistoric policies or events

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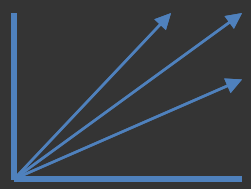
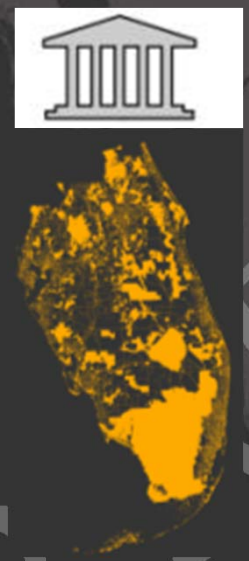
"AttCon" Simulation Process

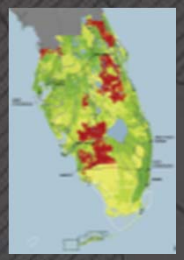
DEMAND



•Residential
•Conservation
•Agriculture

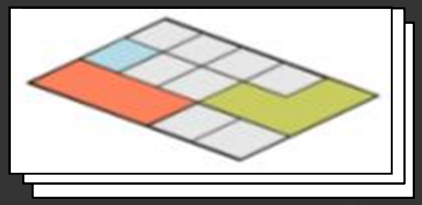


ATTRACTIVENESS



•Residential
•Conservation
•Agriculture

ALTERNATIVE FUTURES (2020 -2040 -2060)



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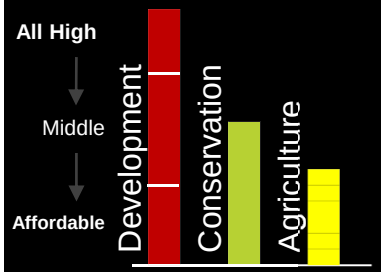
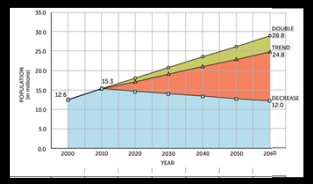
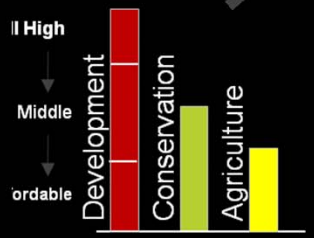
ANIMATION - PROCESS OF GEOSPATIAL SEQUENCED-ALLOCATION

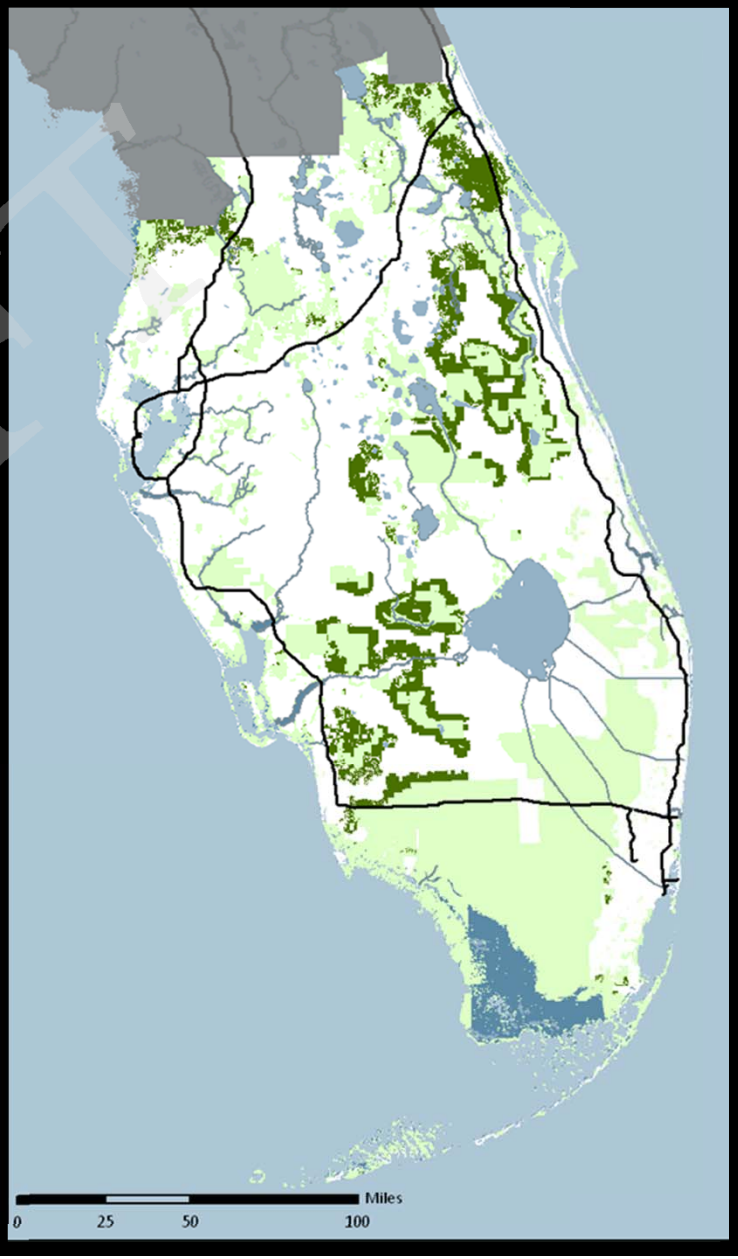
Development, conservation and agriculture

YEAR 2020









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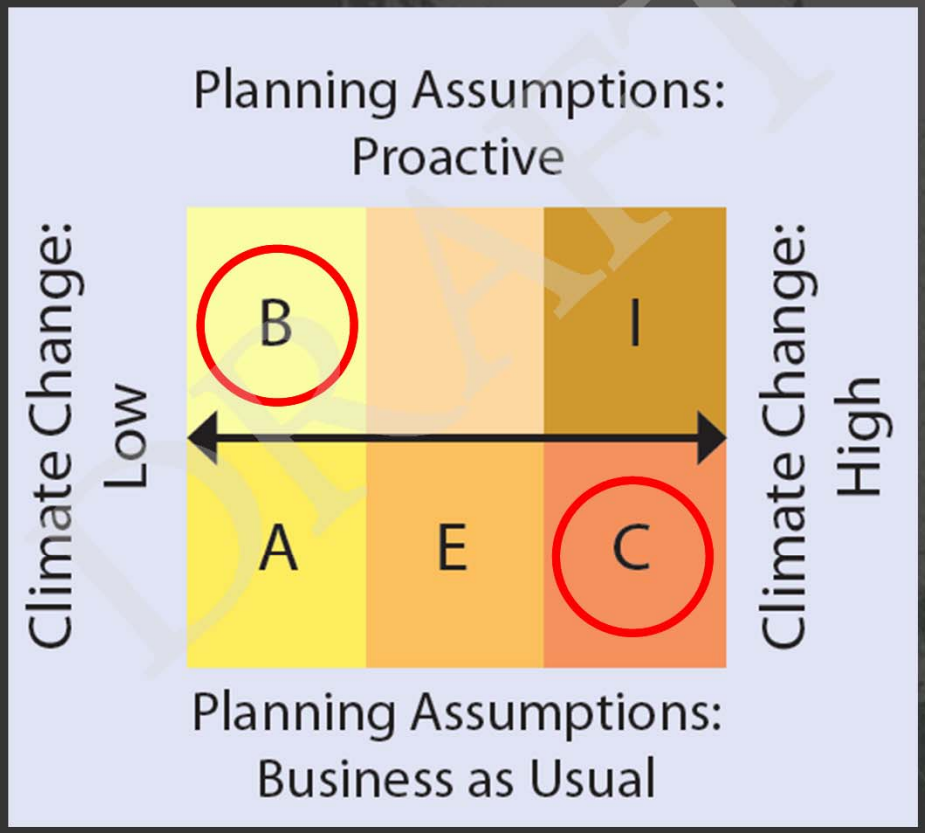
"Top 5" Scenario Organization



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Scenario C

Scenario B

Only Area Allocated

Year: 2060

Allocated Land Uses
- Residential
- Conservation
- Agriculture
- Transit Oriented Dev.
- Sea Level Rise

Current Land Uses
- Urban
- Conservation
- Agriculture
- Other
- Interstate Highways
- Major Rivers
- Major Lakes

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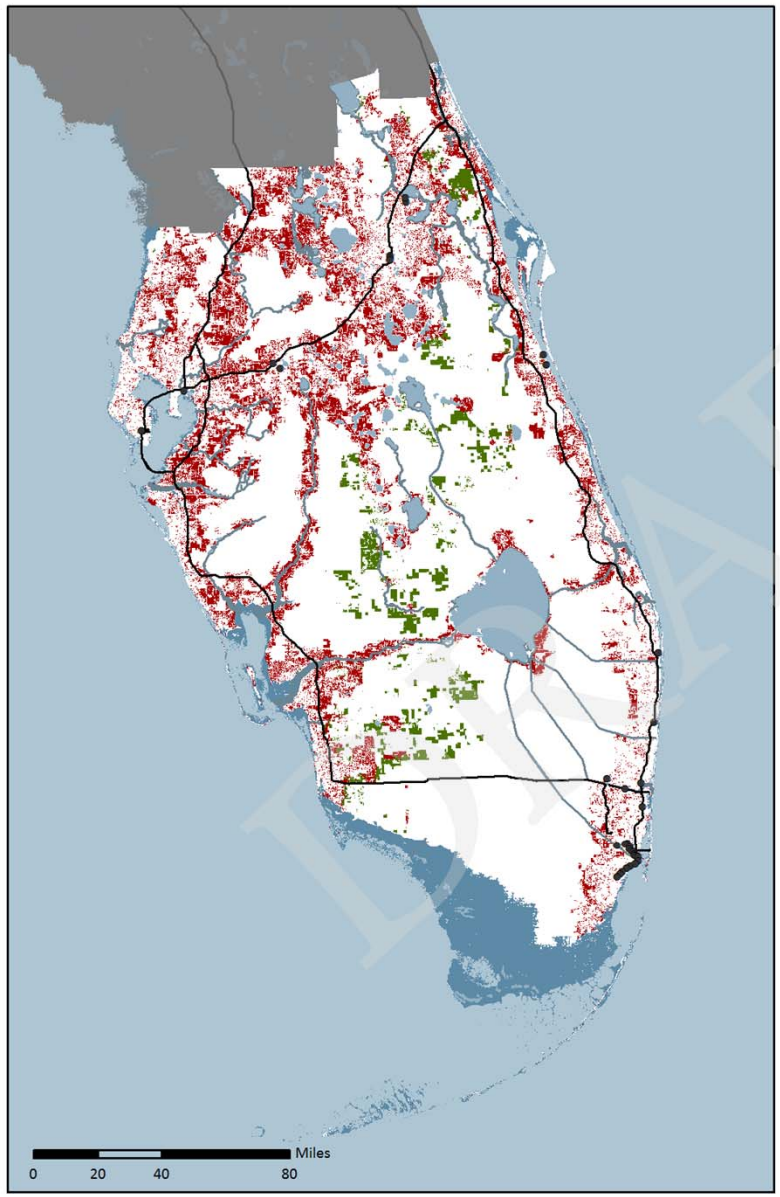
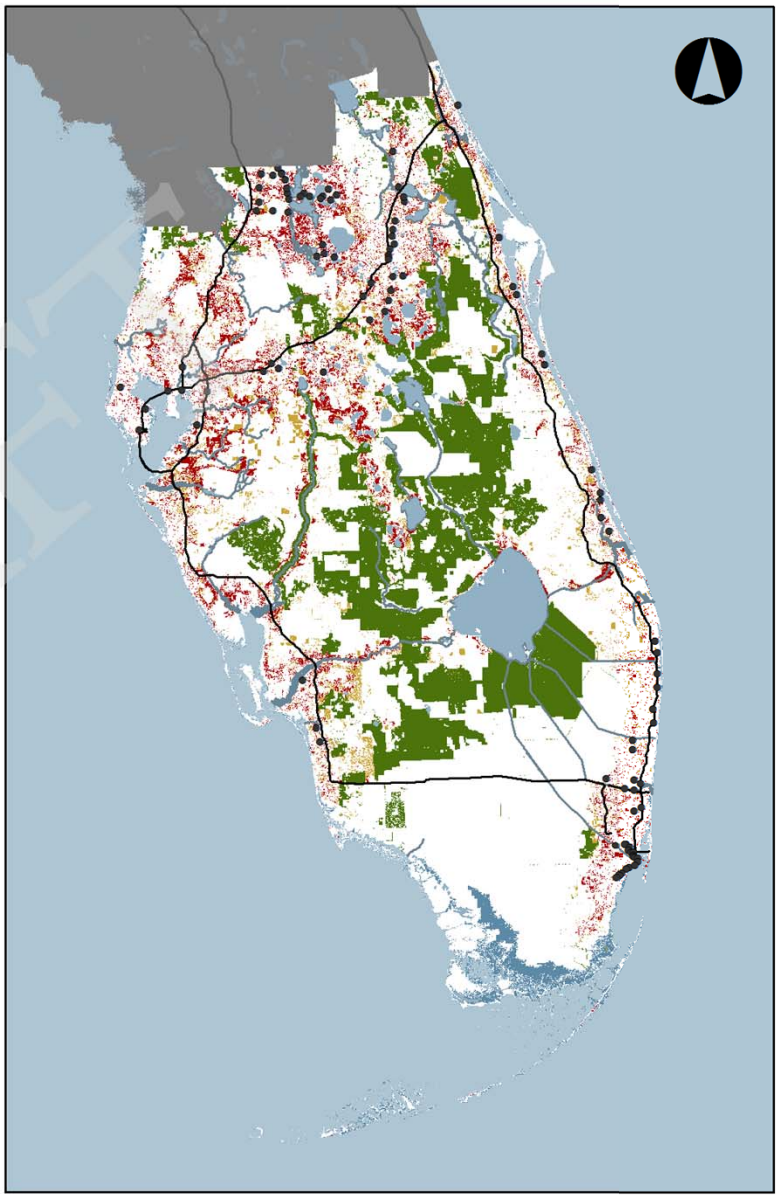
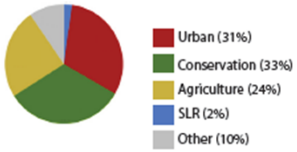




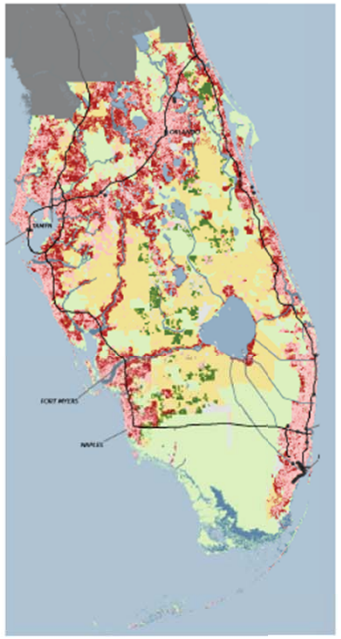
High Sea Level Rise – Low Financial Resources
Business as Usual – Double Population

Low Sea Level Rise – High Financial Resources
Proactive – Trend Population

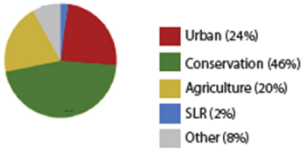
SCENARIO A



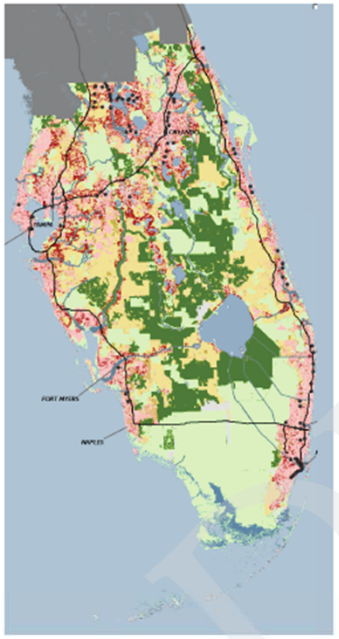
Scenario A:
Land use/land cover 2060



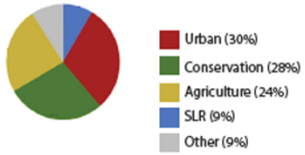
SCENARIO B



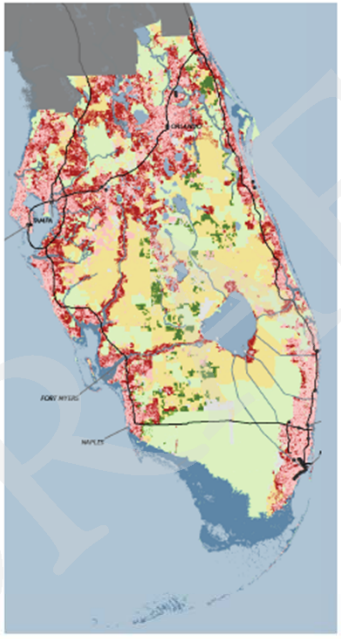
Scenario B:
Land use/land cover 2060



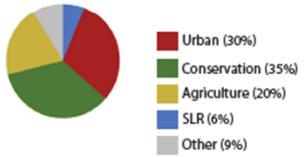
SCENARIO C



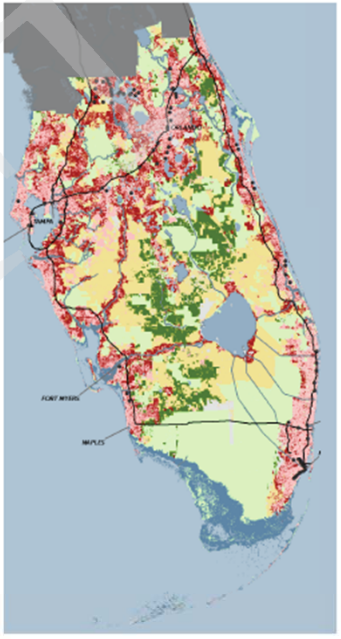
Scenario C:
Land use/land cover 2060



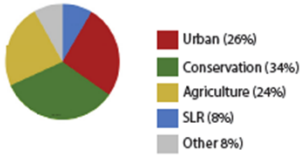
SCENARIO E



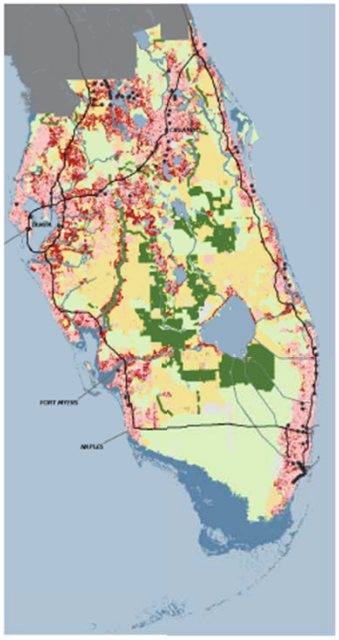
Scenario E:
Land use/land cover 2060

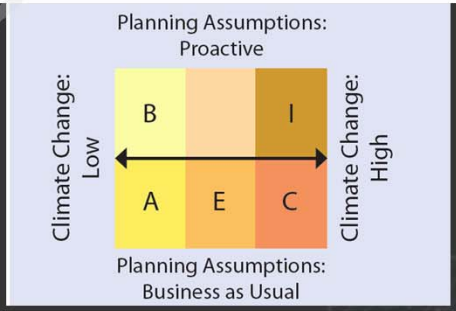


SCENARIO I



Scenario I:
Land use/land cover 2060





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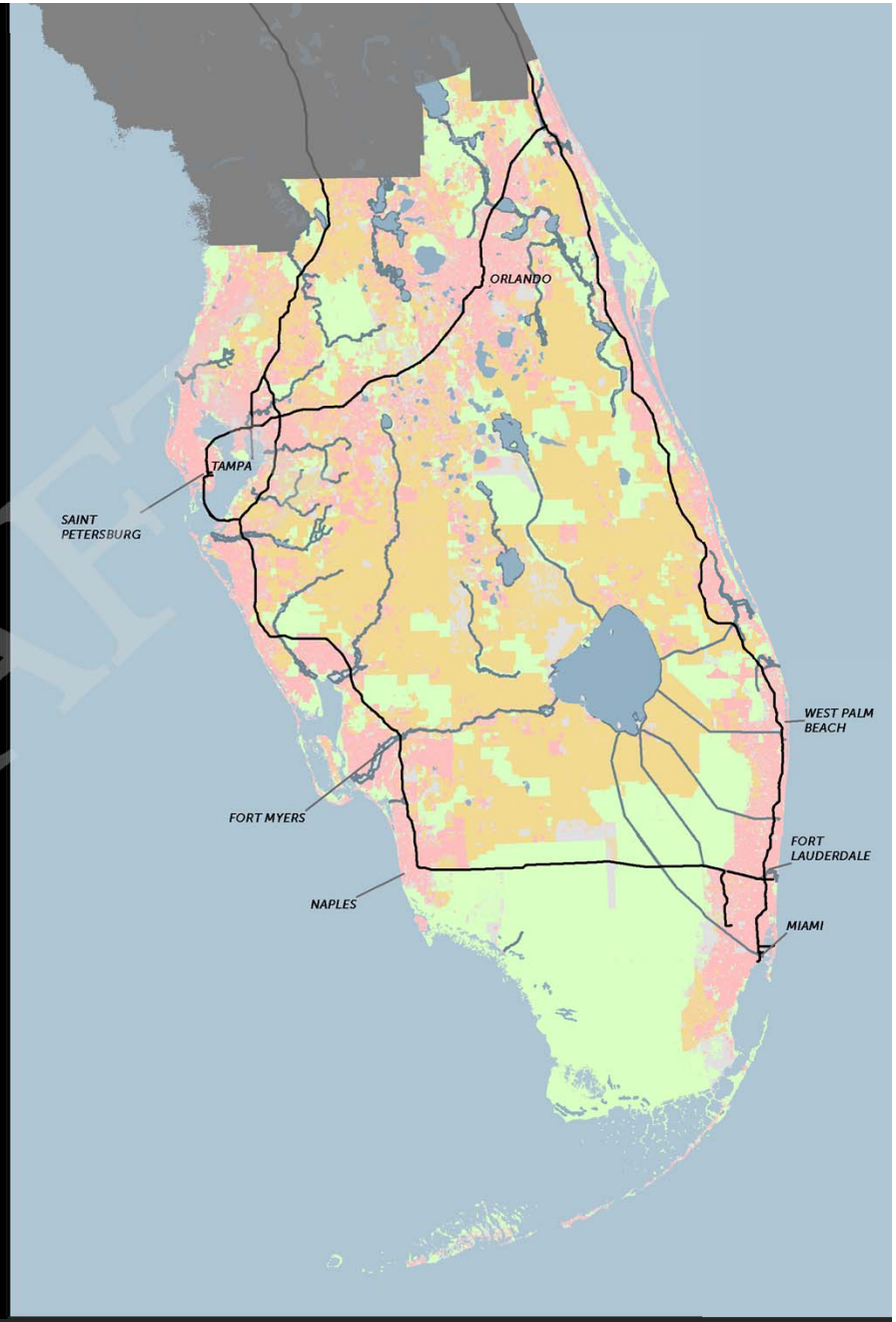
Current landuse 2010



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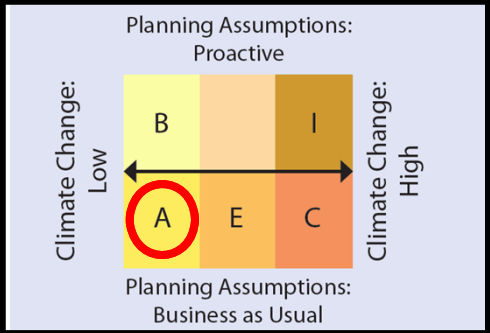
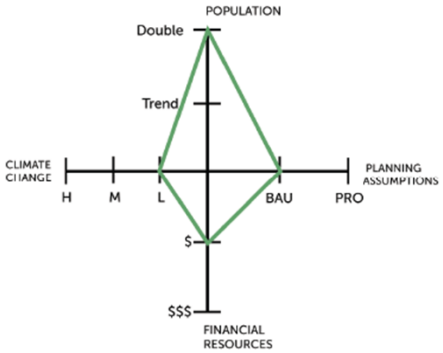
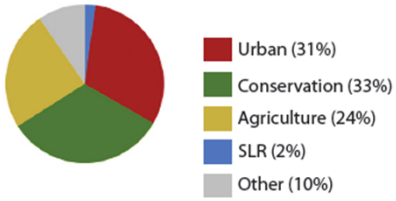
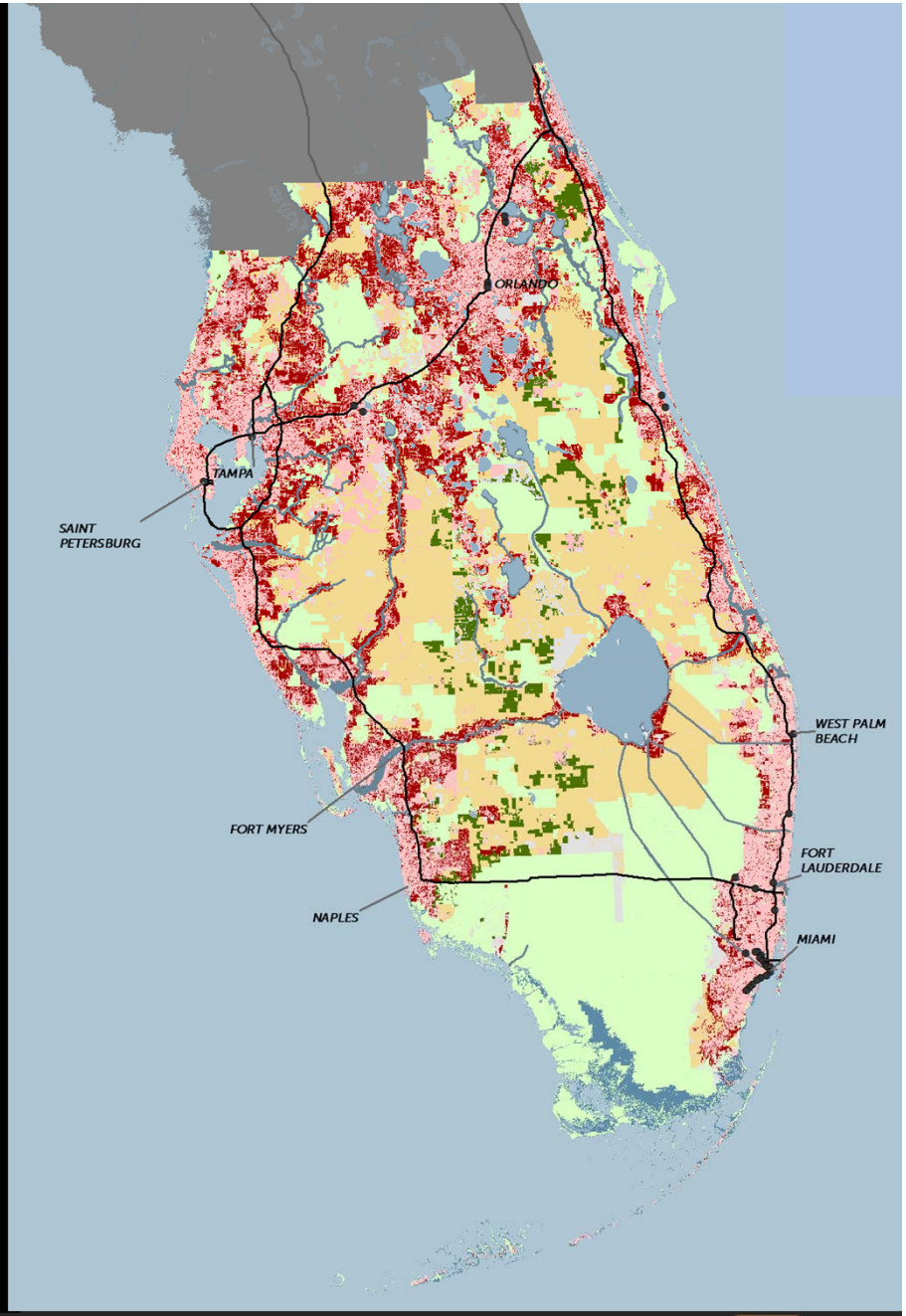
Scenario A



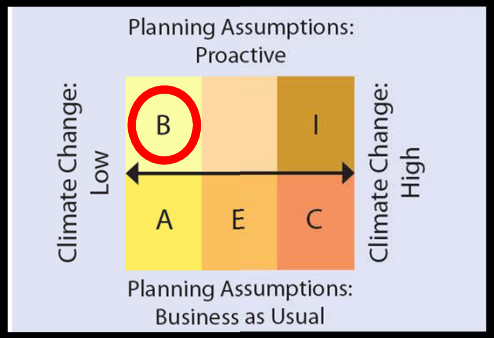
- **Planning Assumption:** Business as usual
- **Climate Change:** Low
- **Population:** Double
- **Financial Resources:** Low



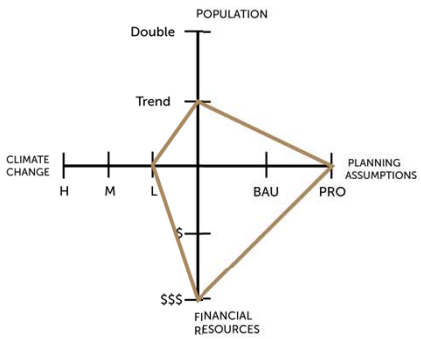


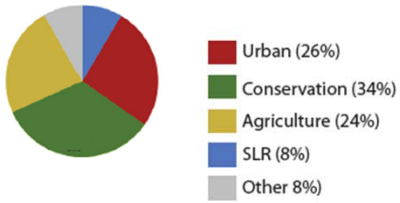


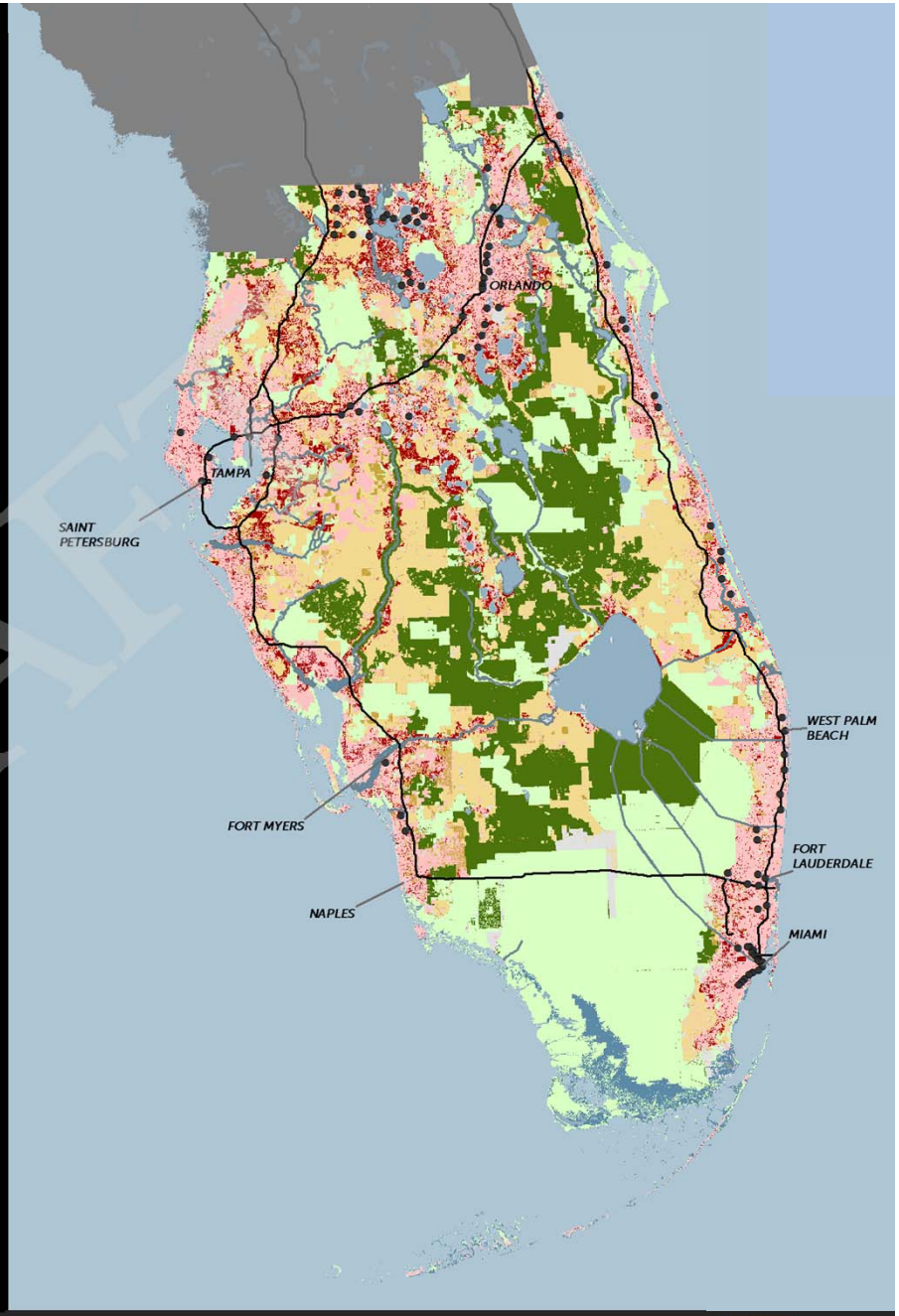
Scenario B



- **Planning Assumption:** Proactive
- **Climate Change:** Low
- **Population:** Trend
- **Financial Resources:** High







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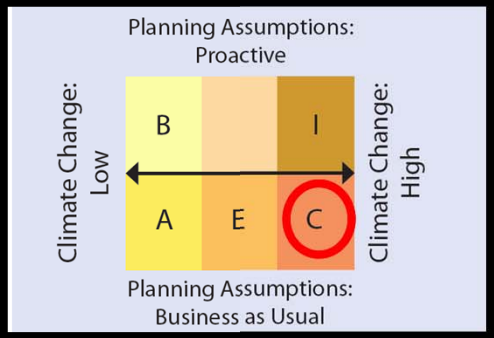
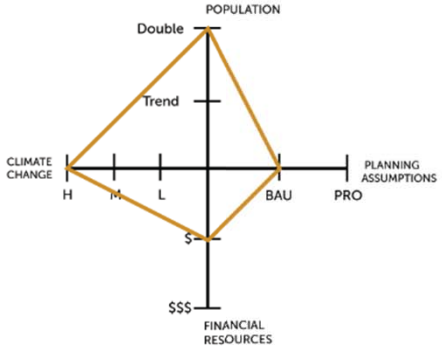
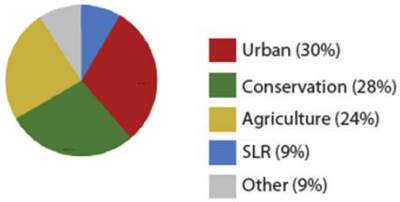
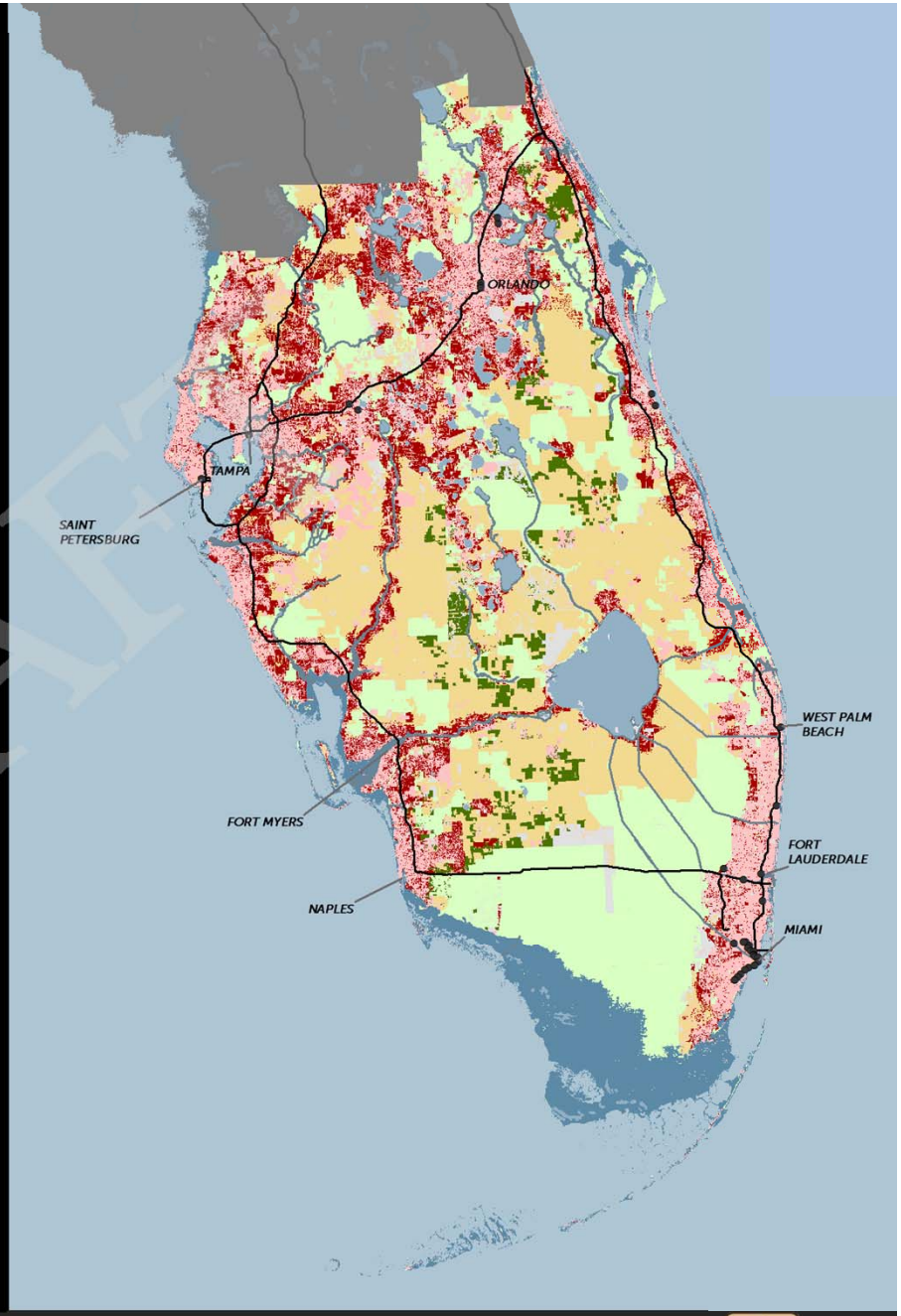
Scenario C



- **Planning Assumption:** Business as Usual
- **Climate Change:** High
- **Population:** Double
- **Financial Resources:** Low







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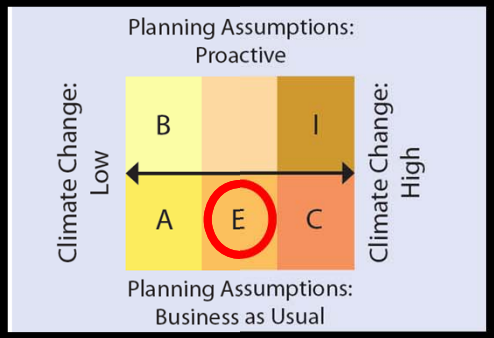
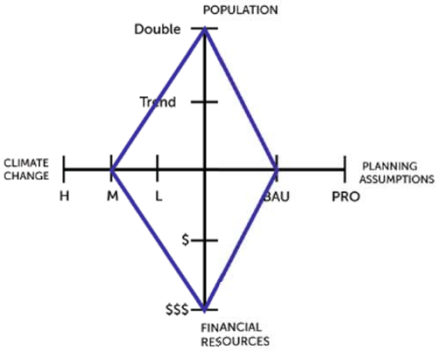
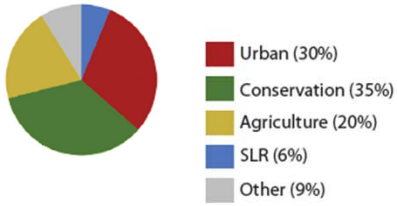
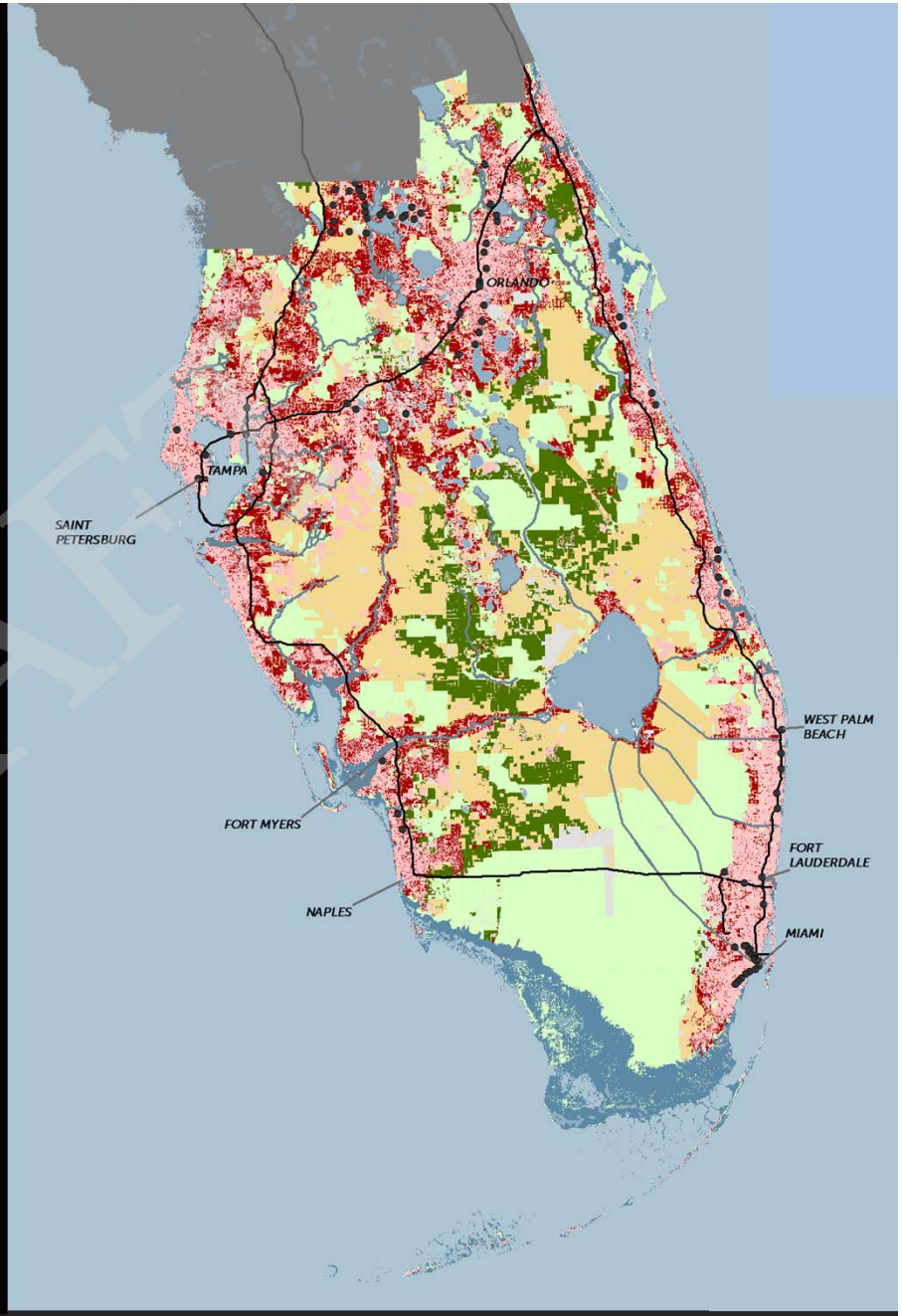
Scenario E



- **Planning Assumption:** Business as Usual
- **Climate Change:** Medium
- **Population:** Double
- **Financial Resources:** High







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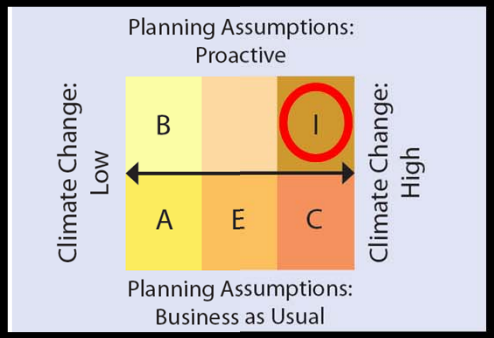
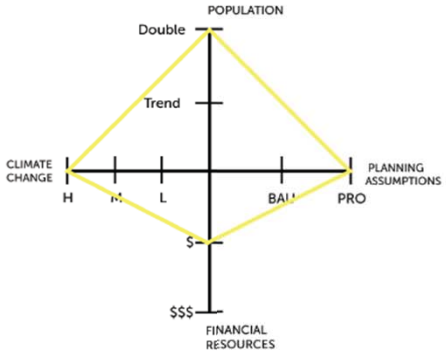
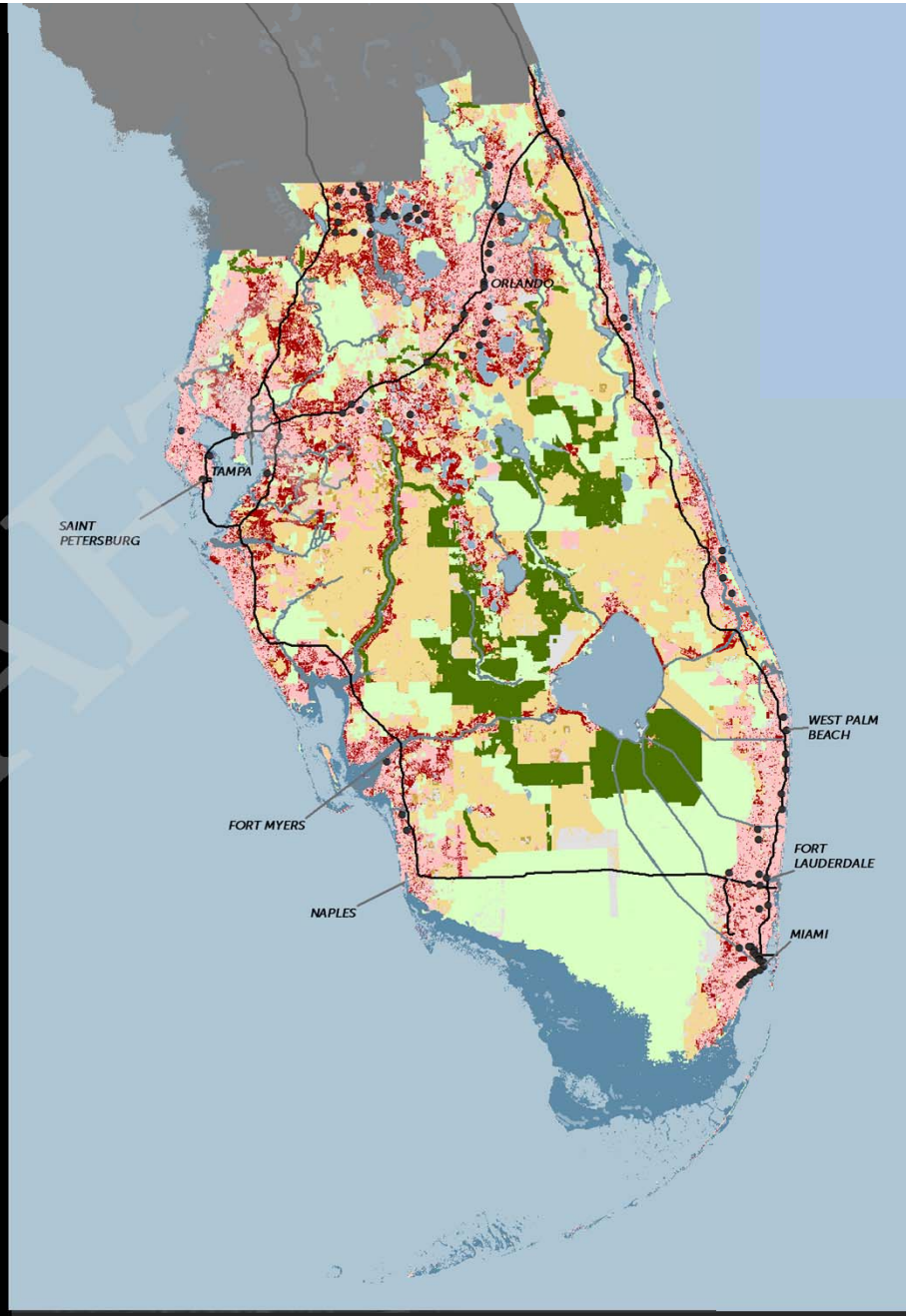
Scenario I



- **Planning Assumption:** Proactive
- **Climate Change:** High
- **Population:** Double
- **Financial Resources:** Low



- Urban (26%)
- Conservation (34%)
- Agriculture (24%)
- SLR (8%)
- Other 8%)



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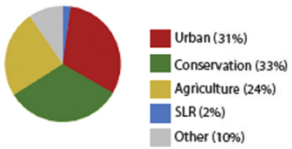
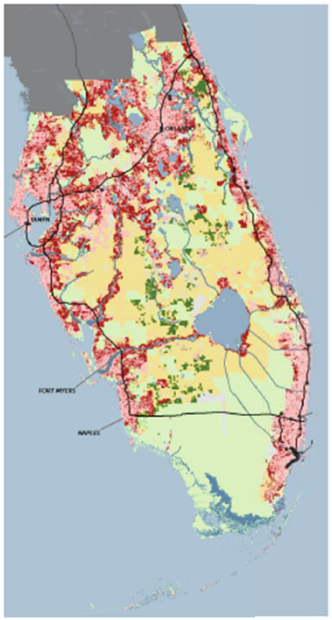
SCENARIO A



Scenario A:
Land use/land cover 2060



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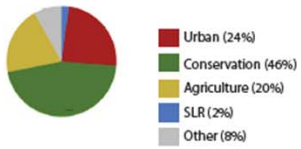
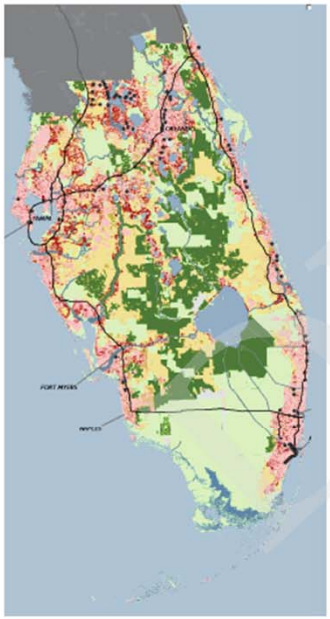
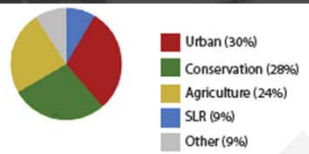


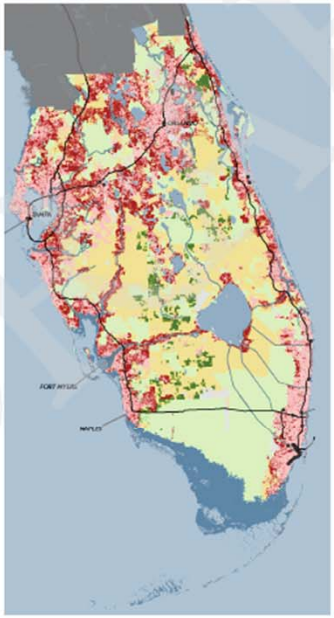
Scenario B:
Land use/land cover 2060



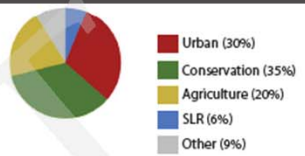
SCENARIO C



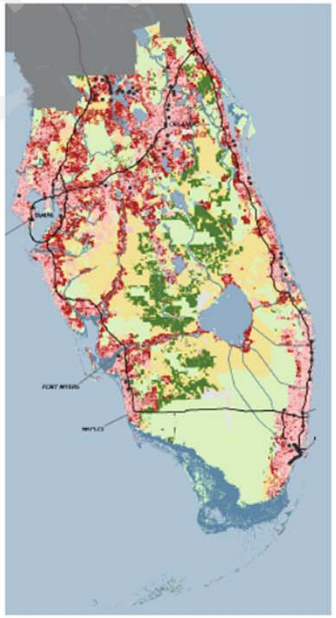
Scenario C:
Land use/land cover 2060



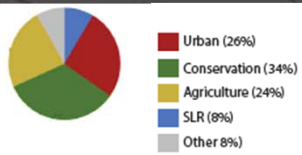
SCENARIO E



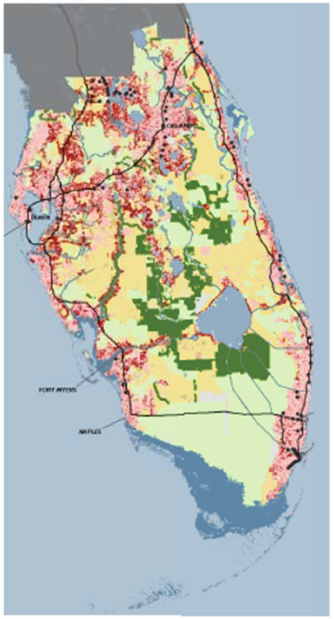
Scenario E:
Land use/land cover 2060



SCENARIO I



Scenario I:
Land use/land cover 2060



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Spatial Impact Models

Considerations

1. Should quantify changes to valued resources
2. Should be science-based
3. But must be sensitive to scenario parameters, often including a-historic policies or events

Preliminary Examples

- Species Habitat
  - Black Bear
  - Panther
  - Caracara
  - Scrub Jay
- Florida Greenways Project Network
- FNAI Endangered Natural Communities

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Development Conflict With Suitable Black Bear Habitat

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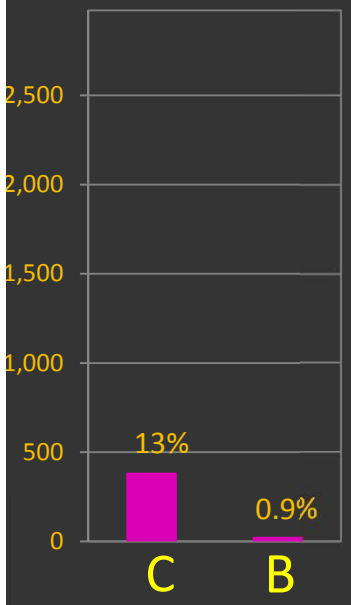
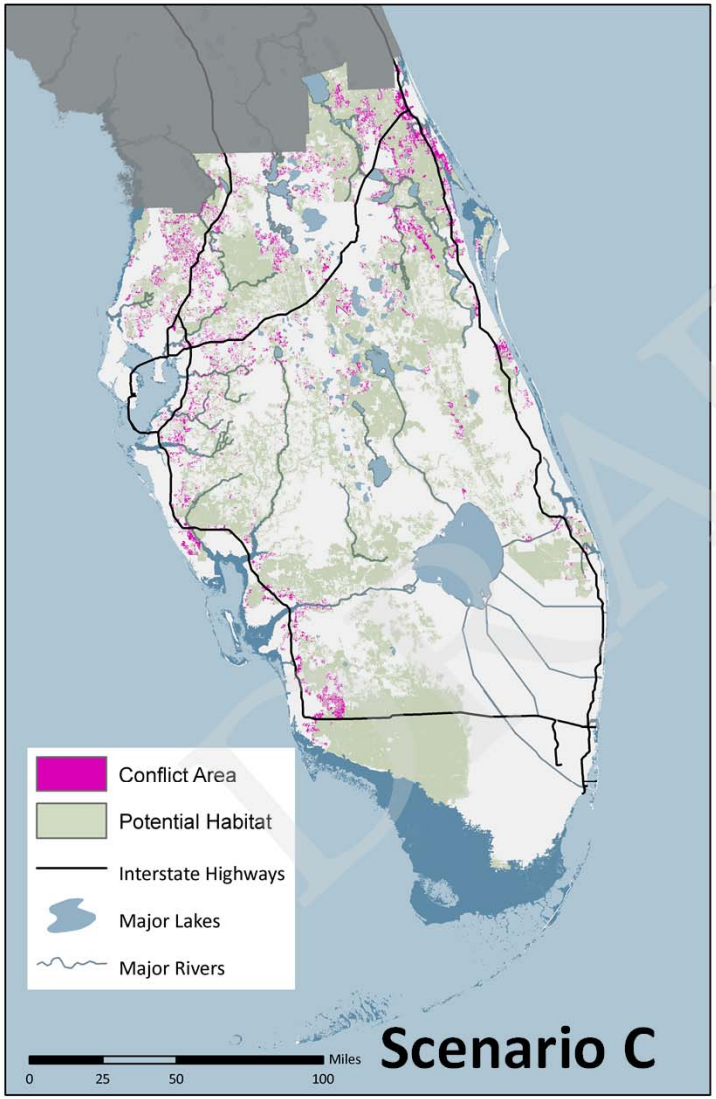
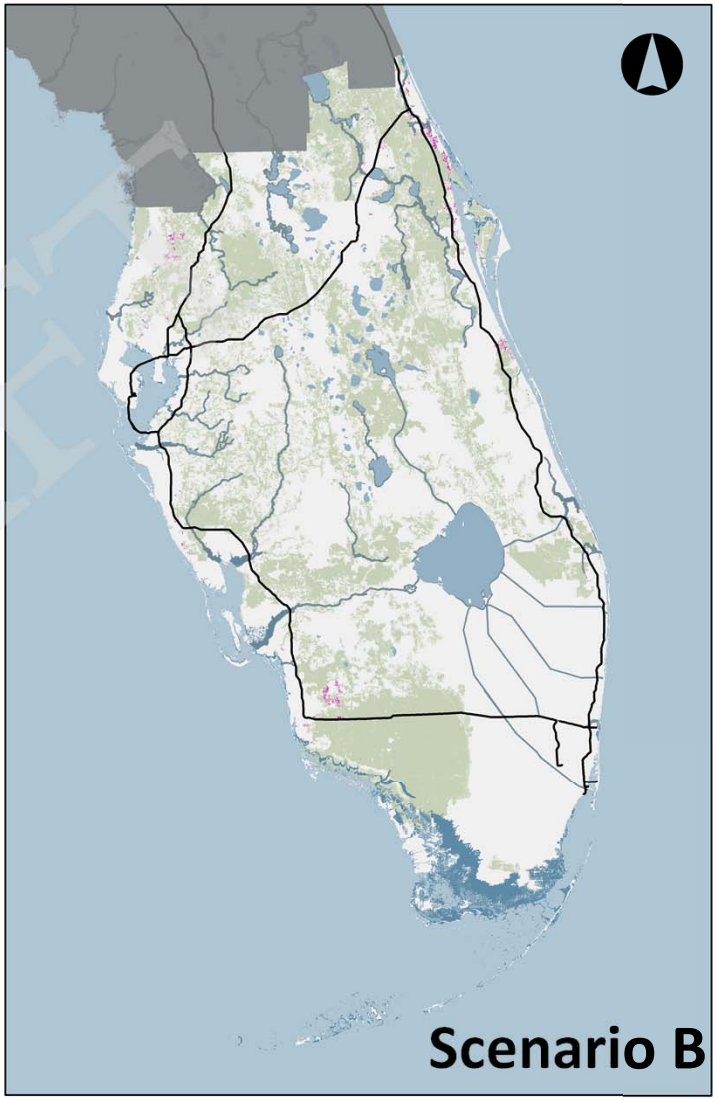
Total Habitat Acreage in Thousands:

3,000

Conflict Area:







High Sea Level Rise – Low Financial Resources
Business as Usual – Double Population

Low Sea Level Rise – High Financial Resources
Proactive – Trend Population

Massachusetts Institute of Technology

Department of Urban Studies and Planning

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ADDRESSING THE CHALLENGE OF CLIMATE CHANGE IN THE GREATER EVERGLADES LANDSCAPE

Florida Panther and Ten Thousand Islands National Wildlife Refuges Technical Brief Summary

Project Summary

"Addressing the Challenge of Climate Change in the Greater Everglades Landscape" is a research initiative funded by the U.S. Fish and Wildlife Service (USFWS) and the U.S. Geological Survey (USGS) and carried out by a group of researchers at the Department of Urban Studies and Planning at the Massachusetts Institute of Technology (MIT).

The study investigates possible trajectories of future transformation in Florida's Greater Everglades Landscape relative to four main drivers: climate change, shifts in planning approaches and regulations, population change, and variations in financial resources. Through a systematic exploration at the landscape-scale, this research identifies some of the major challenges to future conservation efforts and illustrates a planning method which can generate conservation strategies resilient to a variety of climatic and socioeconomic conditions.

This project integrates the best available scientific information on climate change with local knowledge and expertise in order to create a suite of management-relevant scenarios for Florida's Greater Everglades Landscape. Scenarios are conceived not as blueprints for the future, but rather as learning tools for management of uncertainty. The scenarios are internally-consistent bundles of assumptions with four dimensions. Each Alternative Future visualizes land use patterns and landscape changes such as coastal inundation, urbanization, and infrastructure expansion. Future changes in conservation lands are modeled and/or designed based on the input from local experts and managers and using the best available ecological information and data.

Refuge Context

Ten Thousand Islands and Florida Panther refuges are located in Southwest Florida, twenty miles east of Naples. While the refuges are only thirty miles from one another, they have very distinct habitats. Ten Thousand Islands abuts the Gulf of Mexico and is composed of a series of islands at its furthest reach, with seagrass beds, coastal hammocks of oak, cabbage palms, interspersed ponds, mangroves and freshwater marshlands further inland. Florida Panther, fully inland, contains pine forests, cypress domes and strands, wet prairies, hardwood hammocks and lakes.

The diversity of these two habitats supports distinct sets of species. Ten Thousand Islands is home to the following endangered species: the Florida manatee, American crocodile, Wood stork, Green sea turtle, as well as the threatened Loggerhead Sea Turtle. Florida Panther also supports the endangered Wood stork, in addition to the endangered Florida panther, Snail kite, Red-cockaded woodpecker, and the threatened Eastern indigo snake.

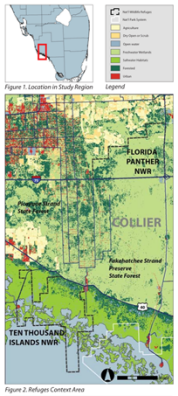


Figure 1. Location in Study Region — Legend

Figure 2. Refuges Context Area

Refuges Context Characterization		
	Florida Panther	Ten Thousand Isl.
Refuge Area	26,400 acres	35,000 acres
County	Collier	Collier
Trust Resources	Florida panther, snail kite, eastern indigo snake, red-cockaded woodpecker, wood stork	Florida manatee, American crocodile, Wood stork, Green sea turtle, Loggerhead Sea Turtle

MIT Scenarios for the Greater Everglades Landscape: 2010-2060

Given the range of uncertainties in dealing with climate change, the MIT research team developed a series of scenarios in collaboration with a wide range of stakeholders. The MIT scenarios consider how climate change (primarily sea level rise), conservation, demographics, the economy, and land use planning transform the future landscape of the Greater Everglades. Each scenario is comprised of a set of input assumptions that determine how these major factors interact and manifest themselves spatially over time.

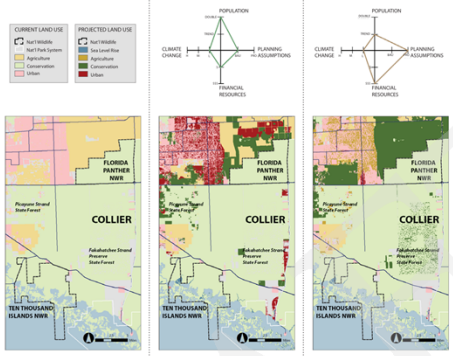
The research team assembled representatives from federal, state and local government to serve as the project's stakeholder group.

The stakeholder group was asked to discuss and prioritize potential scenario designs.

The stakeholder group articulated four top-level scenario dimensions: climate change, demographics, economic conditions, and land and water policies (Scenario Dimensions Figure). Within these dimensions, stakeholders developed a bounded range of possible values and picked a small set of measurable indicators from the best available science.

Scenarios

CURRENT LAND USE + LAND COVER | SCENARIO A | SCENARIO B



Climate Change Factors Methodology

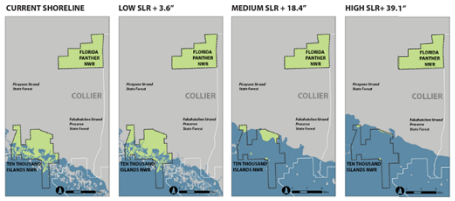
Sea level rise was computed in GIS using a "bathtub" model. In this form of modeling, sea level inundation is simulated based on areas currently within a given vertical elevation from the 0 elevation level of a digital elevation model (DEM). This process cannot distinguish between areas which are hydrologically connected to the ocean and those which are isolated. In Southern Florida, the prevalence of pervious bedrock means that most such areas near the coast will be inundated. In interior regions, the indicated regions are more likely to be subject to high water tables. However, this form of modeling does not take into account drainage, pumping and other active management methods which are common in Southcentral Florida.

A digital elevation model was created by mosaicing together the best available terrain elevation data. The base model was taken from the USGS National Elevation Dataset (NED). The Everglades Depth Estimation Network (EDEN) was used to provide improved vertical accuracy within its area of coverage. Similarly, a "bald earth" terrain model derived by NOAA from 2007 LIDAR was used for the four Southeastern-most counties where it was available. No attempt was made to correct the zero elevation points of the input DEMs to a tidal datum. Therefore, these results should be taken as an index of risk of inundation or high water table, rather than as a prediction of a certain specific water level.

NOTE: MIT low and moderate climate change scenarios are consonant with IPCC 2007 climate change results in that they fall within the range of values projected by current downscaled models for the study region. The climate variable ranges considered by our "low climate change" correspond to Constant CO_2 and 3.6° of SLR by 2060. Our "moderate climate change" corresponds to IPCC A2. Our stakeholders felt that it was important to consider the potential impacts of ice sheet melting in our "high" scenarios. Therefore we based its values on an average of temperature and sea level rise values obtained from peer-reviewed literature.

Climate Change Factor: Sea Level Rise in 2060

CURRENT SHORELINE | LOW SLR + 3.6" | MEDIUM SLR + 18.4" | HIGH SLR+ 39.1"



NWR Inundation (%) under Low SLR	
Florida Panther	0
Ten Thousand Islands	5.3

NWR Inundation (%) under Med. SLR	
Florida Panther	0
Ten Thousand Islands	77.2

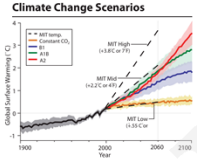
NWR Inundation (%) under High SLR	
Florida Panther	0
Ten Thousand Islands	83.7

Climate Change Temperature Methodology

Temperature predictions were obtained from the Nat'l Center for Atmospheric Research. These data represent the ensemble averages of several global climate change models. These were statistically downscaled by NCAR and provided as GIS point data with approximately 4km spacing between samples. We further downscaled this data using inverse distance weighting interpolation. This generated grids of resolution and extent comparable to our other study area grids, with 50m horizontal resolution. We converted temperatures from degrees Kelvin to degrees Fahrenheit. These grids were intersected with masks of FWS refuges and their context areas using map algebra. Zonal statistics were computed for each area to determine the average projected temperature shift under IPCC scenarios.

IPCC Scenario Terminology:
Constant CO_2 : Greenhouse gas concentrations fixed at 2000 levels. Assumes some form and level of intervention.
A2: Continuously increasing global population, regionally-oriented and slower economic development. *From IPCC Forth Assessment Report 2007 http://ipcc.ch/publications/ar4wg1/028.htm#storyline*

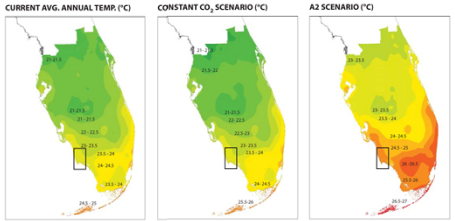
Climate Change Scenarios



Adapted from http://www.epa.gov/climatechange/science/images/pics_scenario_prediction.gif

Climate Change Factor: Average Annual Temperature in 2060

CURRENT AVG. ANNUAL TEMP. (°C) | CONSTANT CO_2 SCENARIO (°C) | A2 SCENARIO (°C)



Current Average Annual Temperature (degrees C or F)		
Florida Panther	23.5 - 24 °C	74 °F
Ten Thousand Islands	23.5 - 24 °C	74 °F

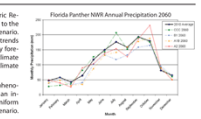
Average Annual Temperature (degrees C or F)		
Florida Panther	no change	no change
Ten Thousand Islands	no change	no change

Average Annual Temperature Increase (degrees C or F)		
Florida Panther	+1 - 1.5 °C	+1.8 - 2.7 °F
Ten Thousand Islands	+1 - 1.5 °C	+1.8 - 2.7 °F

Climate Change Factor: Phenology

We downscaled precipitation projections data from the Nat'l Center for Atmospheric Research using inverse distance weighted spatial interpolation. These data were clipped to the refuge extent, and an average value was computed for each month under each IPCC scenario. We plot here the "ensemble average" from all maps of the climate change models. The trends shown here continue and become even more pronounced in the end of the century forecasts. It should be noted that more detailed analyses show high variability between climate models (not shown here). Not shown here, but potentially of high significance, are climate shifts in the broader upstream contributing area.

With these caveats in mind, current data indicate some potentially important phenological impacts of climate change in this area. Florida Panther refuge may see an increase in spring, summer, and fall precipitation by 2060. These shifts are not uniform curve displacements relative to current conditions, and their form varies by IPCC scenario.



Ecological Impact Assessment

One of the beneficial aspects of scenarios-based planning is that it allows decision-makers to use scenarios as learning tools. For each scenario generated, we compute a set of potential impacts on trust resources. By systematically comparing these impacts against the scenario input assumptions, we can determine which impacts are likely across a range of future conditions, and where and when these are likely to occur. Because our scenarios include several conservation strategies played out against a range of exogenous conditions, this can directly inform strategic habitat conservation planning. We assessed scenario-level vulnerability based on the area directly impacted by either inundation from sea level rise, or urbanization. We also traced the fate of those lands proposed as conservation priorities but not currently protected under each scenario. This provides a causal explanation of which factors are likely to conflict with the conservation of these resources.

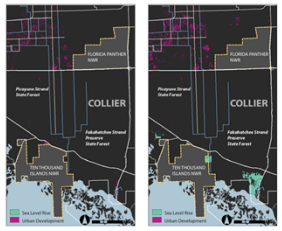
Our impact analyses are based on an extensive set of prior ecological studies and assessments, notably work by the Florida Natural Areas Inventory (FNAI), the University of Florida Geoplan Center, and the Florida Wildlife Commission (FWC). These geographically characterize the habitats of a number of individual species, important habitats, and general landscape patterns. In order to characterize these vulnerabilities, we spatially intersected existing classifications with our scenarios using GIS raster map algebra. For characterizations of ecosystems and habitats, we used FWC's "Strategic Habitat Conservation Areas" (SHCA) and FNAI's "Endangered Natural Communities" (ENC). For individual species, we used FWC or Geoplan habitat maps. In order to assess broad-scale landscape ecology, we used the Florida Greenways Plan. Because not all species are important across the full range of our study area, we used specific species assessments for particular National Wildlife Refuge context areas. For example, in the case of the Florida Panther NWR, we report impacts on the Florida Panther.

This type of analysis has three significant limitations which should be noted. The first is that we used static definitions of ecosystems, of species habitat, and of greenways. This does not simulate how these communities might change under the temperature, precipitation and fire regimes expected under climate change. Therefore, these estimates should be considered an estimate of vulnerability only to sea level rise and urbanization. The second limitation is that we considered only direct spatial impacts from habitat conversion or inundation. This analysis does not account for "neighborhood" or "upstream" changes which can cause habitat degradation. Similarly, it does not assess the landscape ecological effects of fragmentation, although these may be significant for some communities. Third, this study did not involve any form of hydrological modeling. Therefore, this methods does not address changes to hydrological regimes, or diversions of water, even though under some scenarios these would be highly likely.

Endangered Natural Communities (ENC)

The Endangered Natural Communities is a combination data layers created by the Florida Natural Areas Inventory (FNAI), specifically the under-represented natural communities and the coastal resources layers. This data prioritizes natural communities and coastal areas that are particularly vulnerable or inadequately represented on conservation lands.

Scenario B | Scenario C



General Findings

In scenarios with middle and high degrees of sea level rise, the Ten Thousand Islands NWR is almost entirely inundated. This threat, combined with urbanization moving inland from Naples and potential temperature increases of up to two degrees Fahrenheit, makes the ranch lands north of the Florida Panther NWR attractive to protect habitat and facilitate species migration.

In this critical area (north of the panther refuge), there is a discernable north-south boundary between existing development and agriculture. For conservation it is important to hold this line in order to avoid development cutting off opportunities for corridors to the north. In scenario A and C, where there is little conservation funding and business as usual planning assumptions, development leaps over the agricultural barrier and fragments new conservation. Looking at the other scenarios, a high conservation budget, proactive planning, or both, result in the maintenance of the current urban-rural boundary and an uninterrupted conservation corridor and expanded habitat.

Some scenarios show development pressure emanating not only from the West but also from the planned town development of Ave Maria. Both areas are strong growth poles in this context area.

Team Profile

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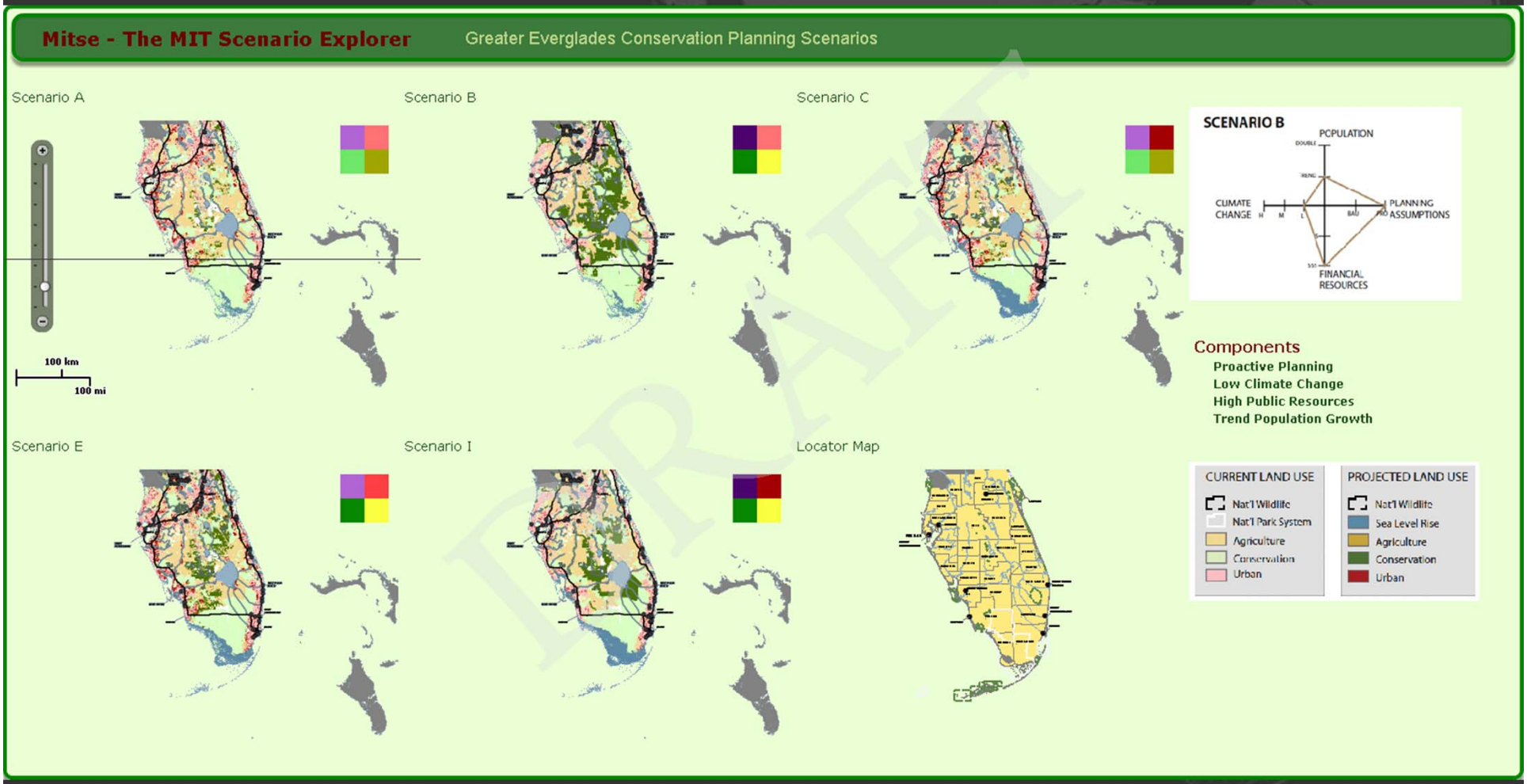
Draft only. Please do not circulate. Please contact jcvargas@mit.edu for final reference and additional materials

MITse : MIT Scenario Explorer



Conclusions

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Why Apply "Alternative Futures" Planning to LCCs?

1. Significant long-term uncertainty about
   1. Climate Change (sea level, temperature & precip)
   2. Human population decline / growth
   3. Plans and Policies (land management, water management, resource management)

2. Interested Stakeholders with Fragmented Decision Authority
   1. Fish and Wildlife Service (multiple refuges + 67 T&E species)
   2. Counties (primary responsibility for land use planning)
   3. State (FWC, also water districts)
   4. Other Federal Agencies (National Park Service, Army Corps, etc).

3. A Practical Method to Integrate Science with Decision-making
   1. Makes use of extensive existing science capacity
   2. Successfully applied in many other regions to "wicked" problems

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What is different about our approach?

Not just 'conceptual' scenarios

1. Spatially-simulated
2. Spatially and temporally "to scale"

Scenario parameters based on research / selected by managers

1. Conservation estimates based on real budgets and land costs
2. Climate change consistent with IPCC downscaled models
3. Land/water policies consistent with county plans and proposals

Urban growth modeling integrated with climate change planning.

1. Most conservation planning approaches oversimplify urban dynamics

Participatory simulation

1. Diverse stakeholders engaged in modeling
2. Iteratively developed

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Transportability of Process

1. Basic method has been applied in multiple locations.

2. Customization based on local issues and institutions possible.

3. Overall framework supports the integration of science and decision-making.

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Next webinar

Title:

Building climate adaptive conservation networks using alternative futures

Date
February, 17, 2011
1:30pm (EST)

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Thank you!

http://web.mit.edu/dusp/epp/music/everglades

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