Peninsular Florida LCC: Landscape conservation, Urbanization, and Climate Change Scenarios for the State of Florida: A decision support system for Strategic Conservation

Steve Traxler, Senior Biologist
South Florida Ecological Services, U.S. Fish and Wildlife Service
Outline of Presentation

I. PFLCC and Florida Threats
II. Scenarios
III. Visualization tool
IV. Scenario Uses
V. Next steps
LCCs – The Vision

• Partner agencies and organizations coordinate with each other while continuing to work within their existing authorities and jurisdictions
• Identify science needs and best management practices
• Connect ongoing efforts through establishment of a conservation forum
• Eliminate duplication through improved conservation planning and design
Rising Seas around Florida
Florida Through Time – Climate Change Happens!

120,000 years ago
+ 6 meters (20’)*
*~ ½ from Greenland

18,000 years ago
- 120 meters (420’)
*~ ½ from Antarctica

Today

Credit: Dr. Harold R. Wanless; University of Miami, Department of Geological Sciences; co-chair of Miami-Dade Climate Change Task Force
Seeing Impacts Already...

Courtesty: Paul Krashefski, Broward County
...But a picture is worth...

Average High Tide

Photo by Paul Krashefski

Extreme Seasonal High Tide
Total Population 2010 vs. Growth Trend

Legend
Population 2020 by RPC
- Blue: 470,356 - 500,000
- Light Blue: 500,001 - 750,000
- Turquoise: 750,001 - 1,000,000
- Light Green: 1,000,001 - 1,500,000
- Green: 1,500,001 - 2,000,000
- Yellow: 2,000,001 - 3,000,000
- Orange: 3,000,001 - 10,000,000

Legend
Florida Regional Planning Councils median 1990-2010 growth rate by RPC
- Light Yellow: 1%
- Light Orange: 1.1% - 4%
- Orange: 4.1% - 5%
- Brown: 5.1% - 6%
- Dark Brown: 6.1% - 8%

GeoAdaptive Spatial Technologies + Strategies
GEODESIGN TECHNOLOGIES
Total Population 2020 and 2060

Legend
Population 2020 by RPC
- 470,356 - 500,000
- 500,001 - 750,000
- 750,001 - 1,000,000
- 1,000,001 - 1,500,000
- 1,500,001 - 2,000,000
- 2,000,001 - 3,000,000
- 3,000,001 - 10,000,000
Landscape Change
-under climate change and urbanization-

Current urban areas
Strategic Ecological Areas
Existing DOI Conservation Areas
Future protected areas

Anticipating movement enables increased future protection

Vargas-Moreno, J.C. 2009. Climate Change and Landscape Planning. MIT
Tools for Planning
### Scenario Assumptions

Internally-consistent bundles of biophysical variables and socioeconomic and planning assumptions

#### Dimensions Selected:
- SLR
- Population Projections
- Financial Resources
- Planning Assumptions

#### Table:

<table>
<thead>
<tr>
<th>Biophysical</th>
<th>Socio-economic</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEA LEVEL RISE</td>
<td>LAND USE &amp; WATER PLNG. ASSUMPTIONS</td>
</tr>
<tr>
<td>(inches)</td>
<td>(all F.L. in millions)</td>
</tr>
<tr>
<td>No Change</td>
<td>No change (19)</td>
</tr>
<tr>
<td>3.6</td>
<td>Marginal decrease (12)</td>
</tr>
<tr>
<td>18.4</td>
<td>Trend (25)</td>
</tr>
<tr>
<td>39.1</td>
<td>Double (29)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEMPERATURE INCREASE</th>
<th>PRECIPITATION VOLUME</th>
<th>PRECIPITATION INTENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>(degrees F.)</td>
<td>(Annual Mean Precipitation)</td>
<td>(Avg. vol. increase per storm)</td>
</tr>
<tr>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
</tr>
<tr>
<td>(+) 5%</td>
<td>-5%</td>
<td>25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Dimensions Selected:</th>
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<tbody>
<tr>
<td>• SLR</td>
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<tr>
<td>• Planning Assumptions</td>
</tr>
</tbody>
</table>
Business as usual (trend) densities

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Business as usual densities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income</td>
<td>4.71 units/acre</td>
</tr>
<tr>
<td>Middle income</td>
<td>2.43 units/acre</td>
</tr>
<tr>
<td>High income</td>
<td>2.33 units/acre</td>
</tr>
</tbody>
</table>

Proactive densities

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Proactive densities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income</td>
<td>10 units/acre*</td>
</tr>
<tr>
<td>Middle income</td>
<td>7 units/acre*</td>
</tr>
<tr>
<td>High income</td>
<td>7 units/acre*</td>
</tr>
</tbody>
</table>
Alternative Futures Simulation Process

**DEMAND**
- Residential
- Conservation
- Agriculture

**ATTRACTIVENESS**
- Residential
- Conservation
- Agriculture

**ALTERNATIVE FUTURES (2020 -2040 -2060)**
Critical Lands & Waters Identification Project (CLIP)

- Derived from and updates existing data sources
- Prioritizes biodiversity, landscapes, water
- Multi-agency technical advisory group
Scenario C

Year: 2060

Future Land Use

Current Residential Year: 2010
Future Residential Year: 2020
Future Residential Year: 2040
Future Residential Year: 2060

Future Conservation Year: 2010
Future Conservation Year: 2020
Future Conservation Year: 2040
Future Conservation Year: 2060

Scenario B

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

Low Sea Level Rise – High Financial Resources
Proactive – Trend Population
## Alternative Scenario Architecture

<table>
<thead>
<tr>
<th></th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Resources</strong></td>
<td>30,000 acres /year</td>
<td>57,500 acres /year</td>
<td>57,500 acres /year</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>BEBR Medium Trend Population (~2x over 50 years)</td>
<td>BEBR Medium Trend Population</td>
<td>BEBR Medium Trend Population</td>
</tr>
<tr>
<td><strong>Conservation (strategy + mechanism)</strong></td>
<td>50% Fee Simple 50% Easement + Florida Forever targets</td>
<td>10% Fee Simple 90% Easement + Florida Forever targets</td>
<td>10% Fee Simple 90% Easement + P1-CLIP 3.0</td>
</tr>
<tr>
<td><strong>Urbanization</strong></td>
<td>BAU Existing distribution of density</td>
<td>PRO Green infrastructure + Redevelopment + Densification</td>
<td>PRO Green infrastructure + Redevelopment + Densification</td>
</tr>
<tr>
<td><strong>Sea Level Rise</strong></td>
<td>1 meter by 2100 (medium projection)</td>
<td>1 meter by 2100 (medium projection)</td>
<td>1 meter by 2100 (medium projection)</td>
</tr>
</tbody>
</table>
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
Tools

**EverVIEW Data Viewer**
- EverVIEW Extensions
- Slice and Dice
- Data Converter
- NetCDF Grid Converter

**Models**
- Alligator
- Amphibian
- Crayfish
- ELM
- ELVeS
- EverSnail
- Prey Fish Biomass
- Roseate Spoonbill
- Wood Stork

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**EverVIEW Data Viewer**

As EverVIEW matures, it will offer the end user a desktop environment where models can be parameterized and run, with their output immediately displayed geographically. Through a series of toolboxes, users will have access to data manipulation, modeling, and visualization tools.

**Download**
- Windows Version 2.6.0 (32-bit)
- Mac OS X Version 2.6.0 (64-bit)
- Linux Version 2.6.0 (32-bit)
- Linux Version 2.6.0 (64-bit)

**Software requirements**
- Update process walk-through
- Release notes
- Read more here...

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Subscribe to the JEM EverVIEW Email List
Scenarios Viewer: Walkthrough of capabilities

County Inundation Scenarios
Scenarios Viewer: Walkthrough of capabilities

CLIP Priorities

[Image of a map showing different CLIP Priorities regions with highlighted areas and priority levels.]
Scenarios Viewer: Walkthrough of capabilities

Statewide Scenarios
Using the Scenarios Viewer

1m SLR from ’20 to ’60

Scenario 3 (2020)  Scenario 3 (2060)
Three South Florida Projects

Vulnerability Analyses

INTEGRATING CLIMATE CHANGE VULNERABILITY ASSESSMENTS INTO ADAPTATION PLANNING

A CASE STUDY USING THE NATURESERVE CLIMATE CHANGE VULNERABILITY INDEX IN FLORIDA

A Report Prepared for the Florida Fish and Wildlife Conservation Commission

NATALIE DUBOIS, ASTRID CALDAS, JUDY BOSHoven & AMEE DELACH

Save something wild.

Scenario Planning

Considering Climate Change in State Wildlife Action Planning, Florida

Vulnerabilities and Adaptation Actions for Future Scenarios

Marine Adaptation Planning

KEYSMAP

KEYS MARINE ADAPTATION PLANNING FLORIDA KEYS, FLORIDA

Final Report: From Analyses to Action

September 24, 2012
Landscape Conservation and Climate Change Scenarios for the State of Florida
A Decision Support System for Strategic Conservation

Summary for Decision Makers | April 2014
Range Expansion under Different SLR Scenarios - The American Crocodile
Sea Level Rise Modeling and Habitat Succession

SLAMM
Everglades Headwaters NWR

Partnerships: Working with The Nature Conservancy, NRCS WRP, and other groups

Everglades Headwaters NWR:
50,000 acres fee,
100,000 acres easements
Florida Wildlife Corridor Goals:
Protect and restore habitat and migration corridors essential for the survival of Florida’s diverse wildlife, including wide-ranging panthers, black bears and other native species.

Restore water flow to the Everglades and sustain water supply to southern Florida.

Continue to safeguard the St. Johns River and water supply for central and north Florida.

Sustain the food production, economies and cultural legacies of working ranches and farms within the corridor.

Bolster local economies through increased opportunities such as hunting, fishing, birdwatching and other forms of eco-tourism.

Give wildlife and plants room to adapt to a changing climate and sea level rise.

http://www.floridawildlifecorridor.org/about/about-expedition/
Nest Steps

• Impact assessments and strategies
  – State of Florida
  – Southwest part of state including Panther refuge

• Implementation strategies
  – Incentives
    • PES including water storage and treatment
  – Fee Simple purchases vs Easements

• Site specific additional pilot studies
  – Scenario Planning at State WMAs and Federal Refuges

• Conservation outcomes
Questions

2500 scientists say we’ve caused global warming

I’d like a second opinion
(a warning)*

* The opinions expressed herein do not necessarily represent those of USFWS or DOI.
PFLCC LCD Process

Landscape
Conservation
Design

Stakeholder Engagement

Impact assessment

Scenarios

Scenario C
Scenario B
South West Florida

SCENARIO 2

SCENARIO 3