Planning for Sea Level Rise in the Matanzas Basin

A Closer Look at Community, Environment, and Legacy

February 24, 2013

UF | UNIVERSITY of FLORIDA

GUANA · TOLOMATO · MATANZAS
NATIONAL ESTUARINE RESEARCH RESERVE

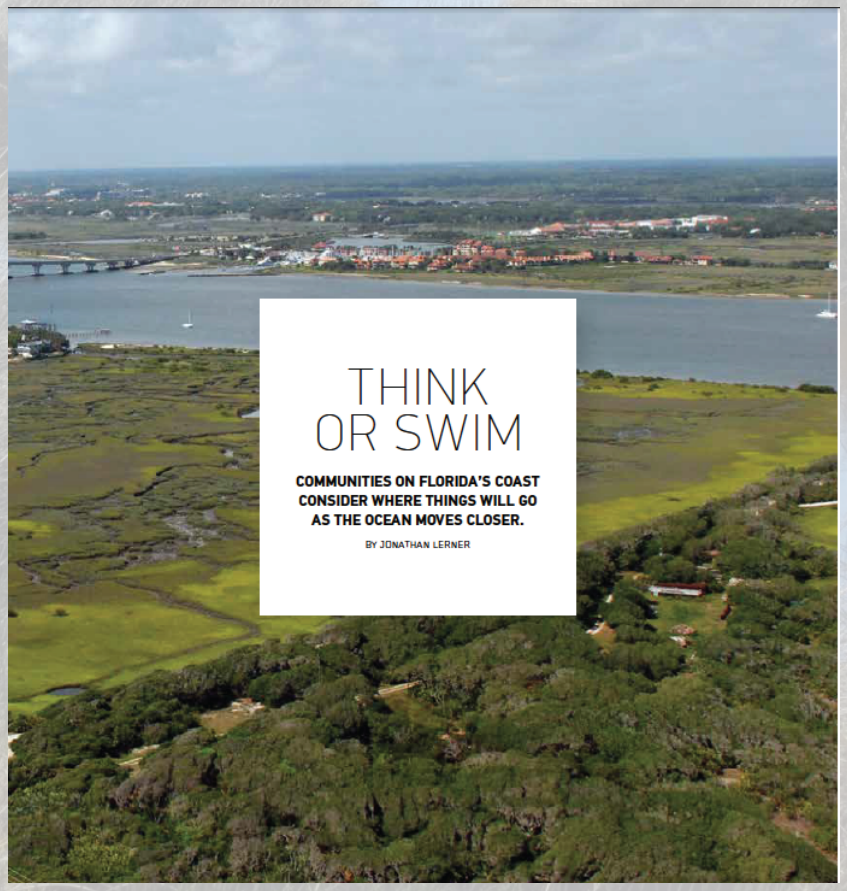
Project Purpose

Engage community members to discuss land use planning to account for significant changes, especially sea level rise.

We spoke to 330:

- **Residents**
- **Natural Resource Professionals**
- **Local Government Staff and Officials**
- **Development and Business Representatives**
- **Students (middle, high, community college)**

Positive Attention at a National Scale



Three Year Work Plan

Phase 1: Stakeholder Workshops

- Work with interested stakeholders to understand the potential implications of sea level rise in the Matanzas basin.

Phase 2: Large Public Workshop

- Analyze and compare possible future development and ecological conservation scenarios.

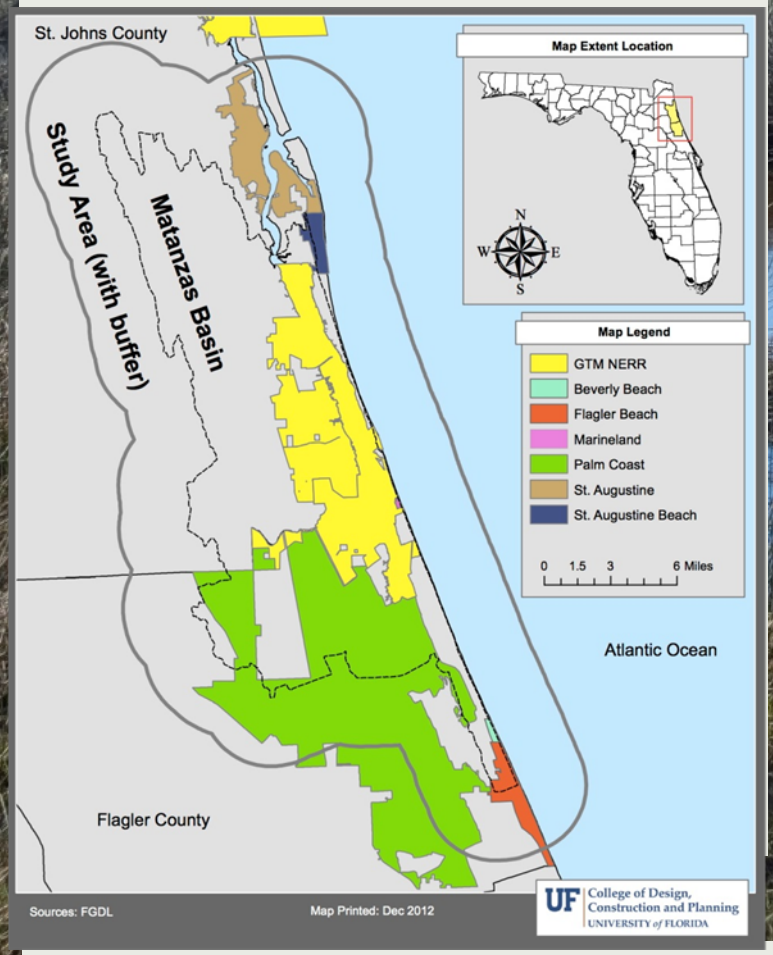
Phase 3: Final Open Meeting

- Identify and promote adaptation tools to bring future development and conservation strategies into fruition.

This Workshop

- Share the Findings from the Previous Workshops
- Learn About Your Preferences for Possible Approaches to Adaptation.
- *The best environmental planning is sound urban planning.*

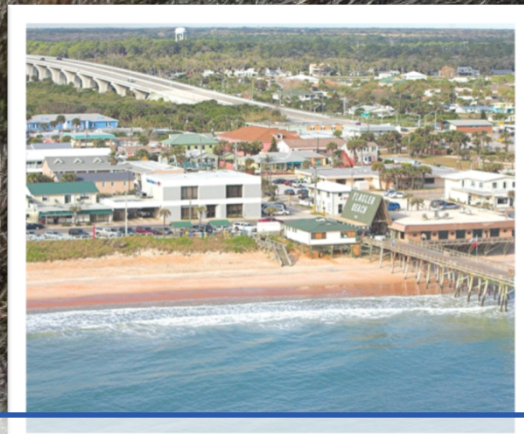
Study Area - Current



- Geographic scope – Matanzas basin plus buffer area
- Natural areas
  - 90% of basin is undeveloped
  - Coastal – esp. estuary
  - Inland – regional and statewide conservation priorities
- Natural buffer areas

Study Area

St. Augustine



Palm Coast-Flagler Beach

- Geographic scope – Matanzas basin plus buffer area
- Settlements
  - Cities and unincorporated communities
  - Population
- Transportation Corridors
  - 1-95 corridor
  - US 1
  - Intracoastal waterway

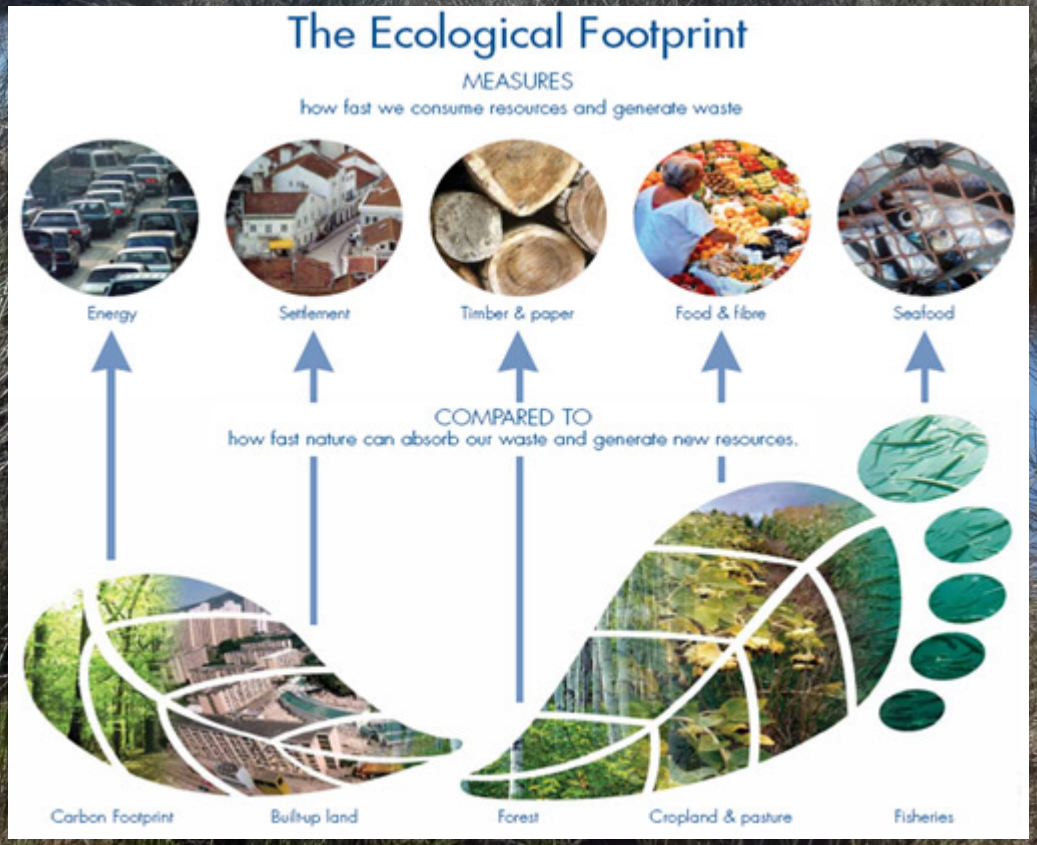
Study Area - Future

- Population and economic growth are anticipated.
- With growth, comes development.
- Care must be taken to ensure that development is done in places and ways that:
  - respect the need for conservation and
  - the need to adapt to SLR.

Potential Future Conflicts

- Desire to protect natural systems and quality of life
- Future development threatens natural systems
- Sea level rise threatens
  - Natural systems on the coast
  - Current development on the coast
  - Future development on the coast

Impact of SLR and Development

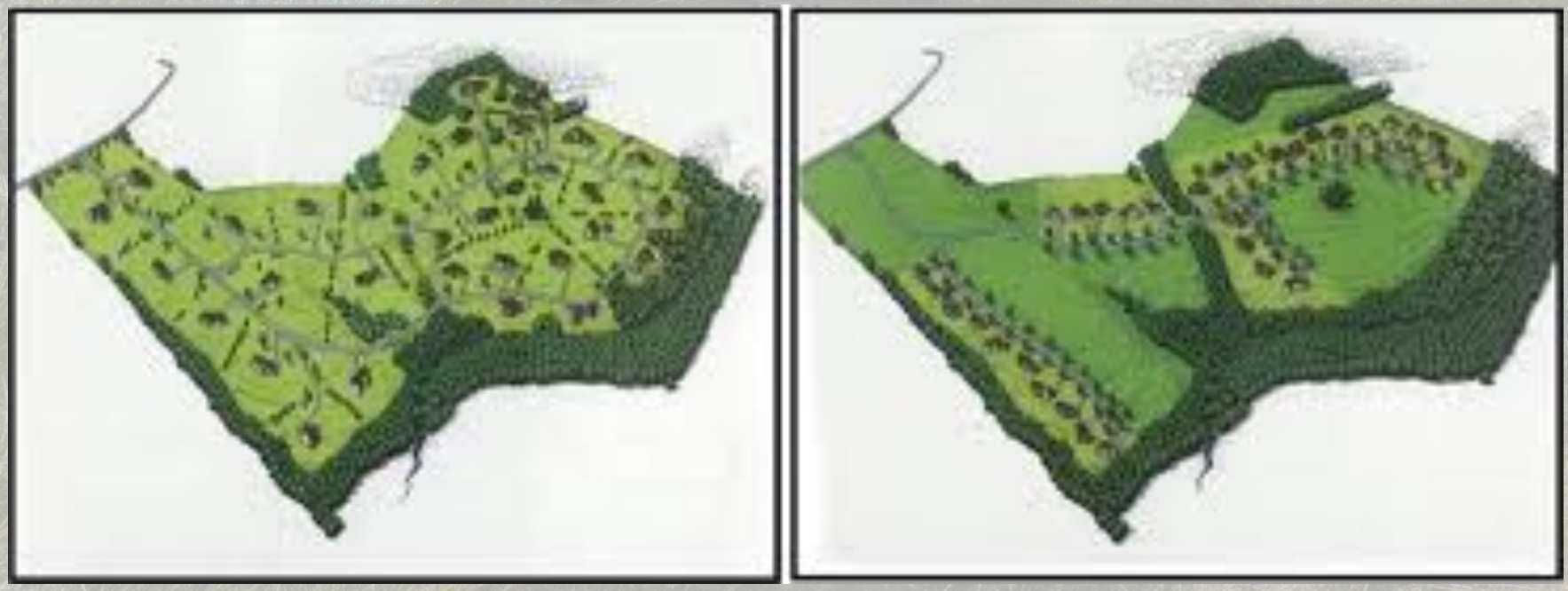


If Not Done Thoughtfully, Development Can Destroy Natural Habitat.

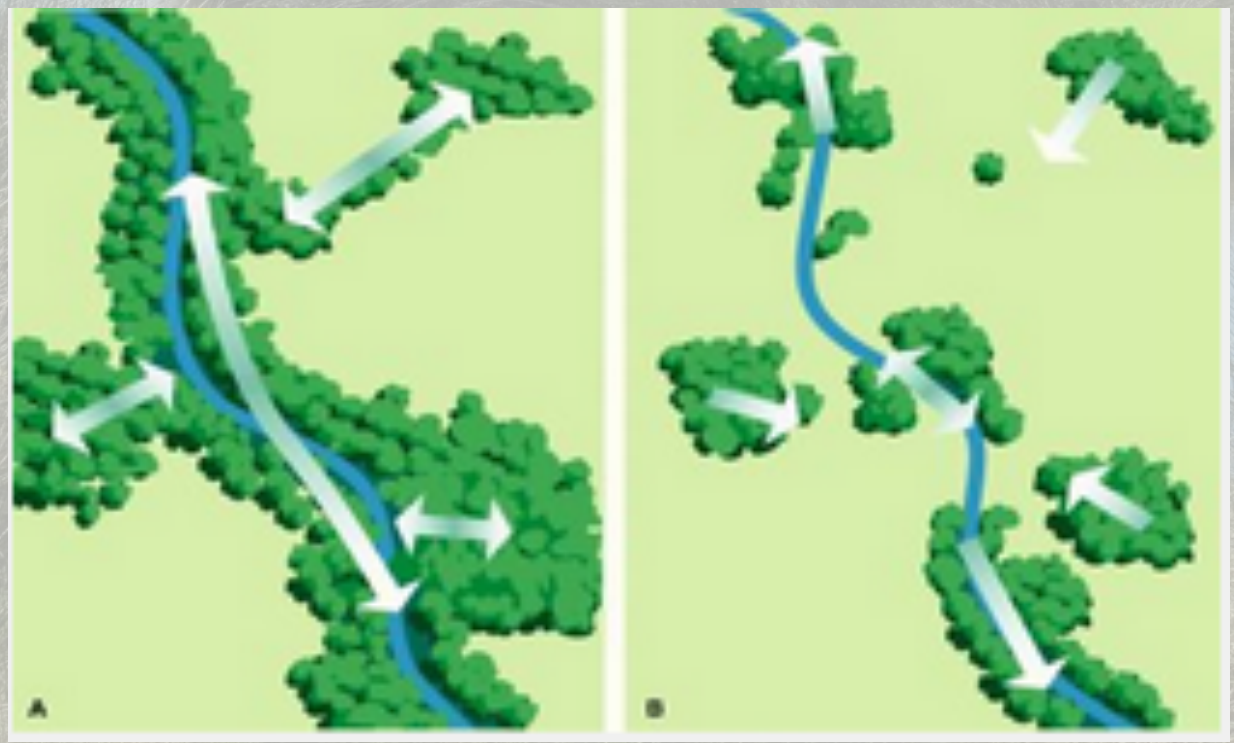
As a Result, Wildlife Perishes…

Or Adapts in Ways That Are Not Appropriate.

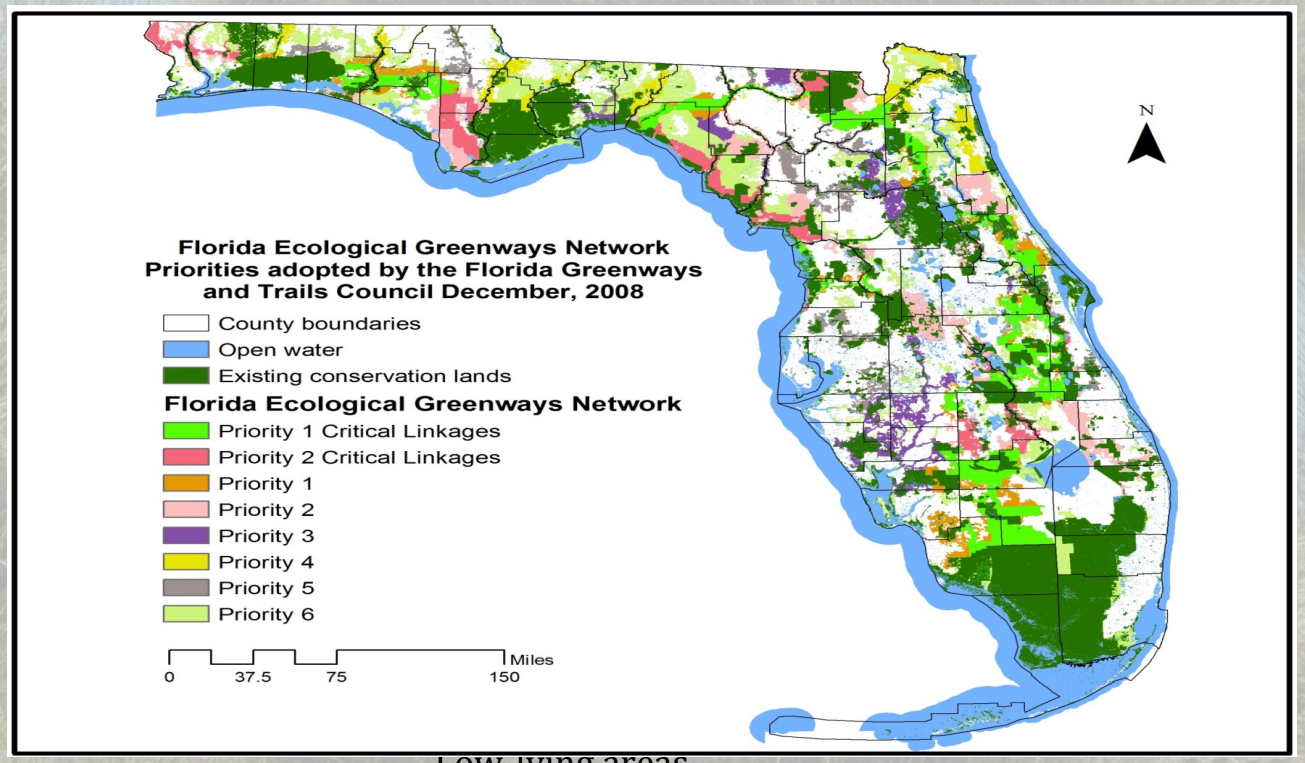
Good Development Seeks to Preserve Natural Habitat.



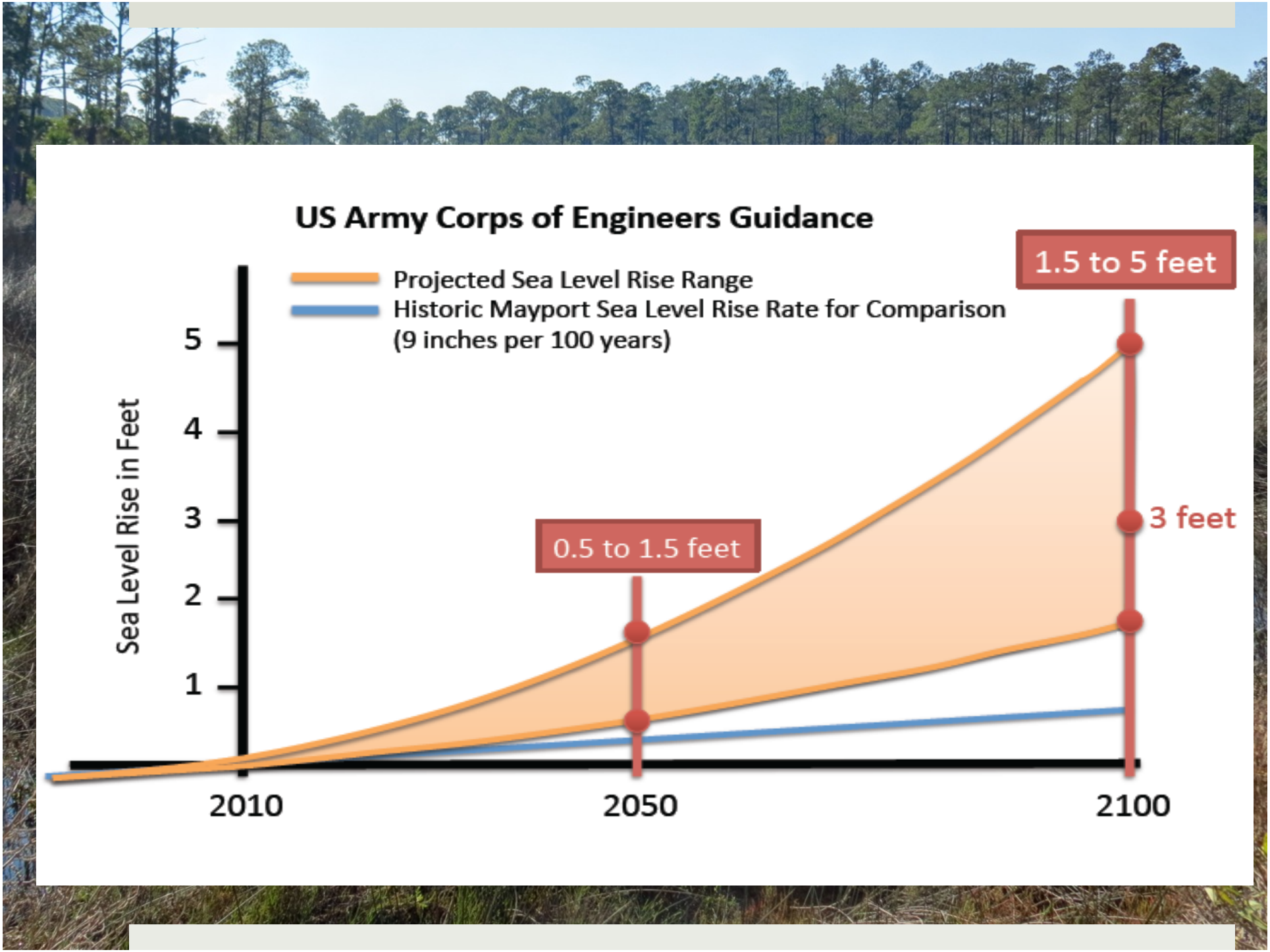
Good Development Connects Habitats.



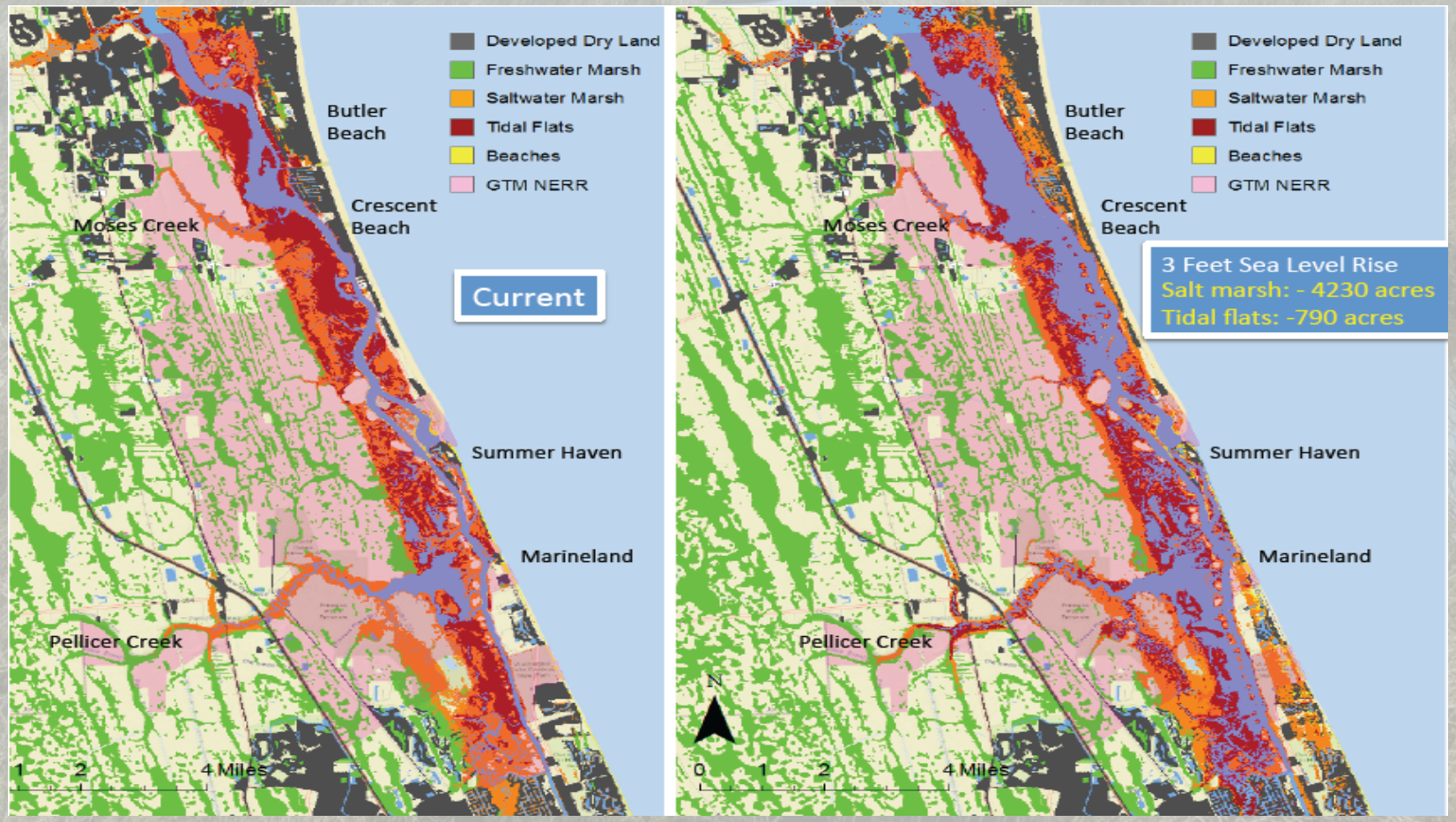
The State of Florida Has Embraced Efforts to Connect Habitat.



Low-lying areas


US Army Corps of Engineers Guidance
Projected Sea Level Rise Range
Historic Mayport Sea Level Rise Rate for Comparison
(9 inches per 100 years)
1.5 to 5 feet
0.5 to 1.5 feet
3 feet
Sea Level Rise in Feet
5
4
3
2
1
2010
2050
2100

The Impact of 1-Meter Sea Level Rise
1 M = 3 Feet



Acres Impacted by 1m SLR in the Matanzas Basin

Inundated acres for a 1-meter sea-level rise within the Matanzas Buffer Area.		
Land Use Descriptions	**Affected Lots**	**Affected Acres**
Acreage Not Zoned For Agriculture	246	1,690
Industry	117	94
Institutional	268	238
Commercial, Retail, or Service	1,446	609
Residential	13,362	2,456
Recreational	189	2,371
Government*	641	1,140
Agriculture	27	257
Vacant Commercial	310	268
Vacant Institutional	46	12
Vacant Industry	11	69
Vacant Residential	4,518	1,637
Total Affected Lots/Acres	**21,181**	**10,842**

Percentage of Acres Impacted by 1m SLR in the Matanzas Basin

Percentage of Inundated acres for a 1-meter sea-level rise within the Matanzas Buffer Area.		
Land Use Descriptions	**Affected Lots**	**Affected Acres**
Acreage Not Zoned For Agriculture	53%	20%
Industry	14%	6%
Institutional	24%	8%
Commercial, Retail, or Service	32%	12%
Residential	18%	11%
Recreational	45%	18%
Government*	55%	50%
Agriculture	3%	0%
Vacant Commercial	21%	7%
Vacant Institutional	27%	3%
Vacant Industry	5%	6%
Vacant Residential	16%	14%
Total Affected Lots/Acres	58%	10%

Basin Residents Are Concerned About…

1. Shoreline erosion & storm surge

   http://www.firstcoastnews.com/topstories/article/337087/483/Erosion-makes-homeowners-nervous
2. Lack of freshwater resources & saltwater intrusion
3. Loss of wildlife habitat
4. Loss of personal property

Impacts of SLR on Pristine Ecological Systems

- Shorelines and Beaches
  - Preferred Adaptation Strategies:
    - Incentivize Future Development Inland
    - Promote Living Shorelines

Impacts of SLR on Pristine Ecological Systems

Estuaries

- Preferred Adaptation Strategies:
  - Reducing stresses on ecosystem so that it can adapt to stressors.
    - Water conservation easement;
    - limitations on growth;
    - conservation corridors;
    - preparing lands; and
    - land management.

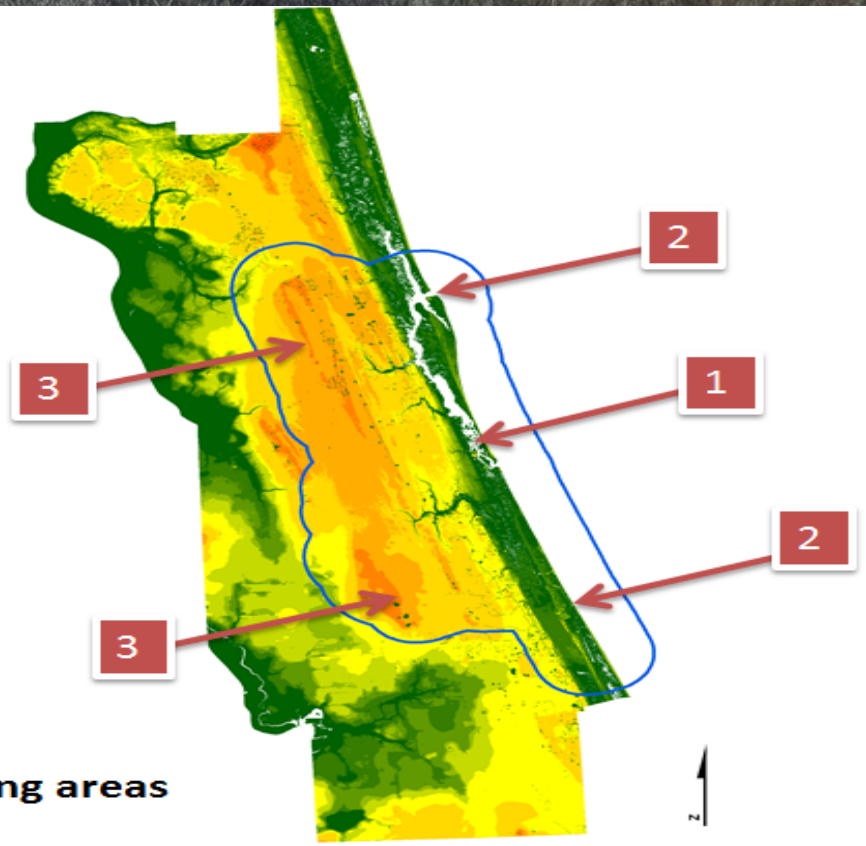
Impacts of SLR on Infrastructure and Future Development

Impacts of SLR on Cultural and Historical Resources.

Recommended Adaptive Design

Three Types of Areas for Adaptive Design

1. Coastal natural areas
2. Coastal development
3. Upland future development or conservation



Potential Adaptation Strategies

- Natural systems Focused- Protect, restore, and allow shifts
  - Considering future development, sea level rise, and conservation priorities
  - Through conservation easements, land acquisition, and land use policies

Potential Adaptation Strategies

- Current development
  - Sea level rise and coastal dynamics/hazards may lead some, but not all, to relocate upland in the study area; others may leave the study area
  - Develop upland areas compatible with conservation priorities
  - Through land and infrastructure availability and land use policies

Potential Adaptation Strategies

- Future development
  - Sea level rise and coastal dynamics/hazards may lead some, but not all, to occur upland in the study area; others may not occur in the study area
  - Develop upland areas compatible with conservation
  - Through land and infrastructure availability and land use policies

Participants Identified the Following as Important to Addressing Sea Level Rise at a Local Level

- **Policy reform at higher level**
- **Education and awareness**
- **Willingness to acknowledge the problem and adapt**
- **Insurance Reform**

All precursors to land conservation efforts

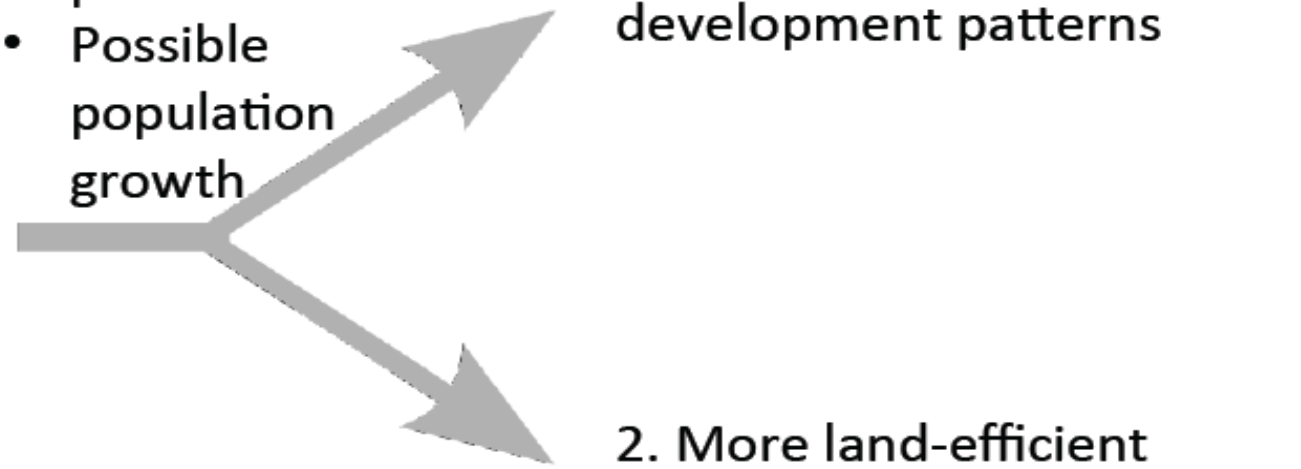
Planning Scenarios

- Scenarios are planning exercises to envision possible alternative futures
  - Prepare under uncertainty
  - Make policy choices, if we can affect the future
- Use data and models, with reasonable assumptions about system behavior

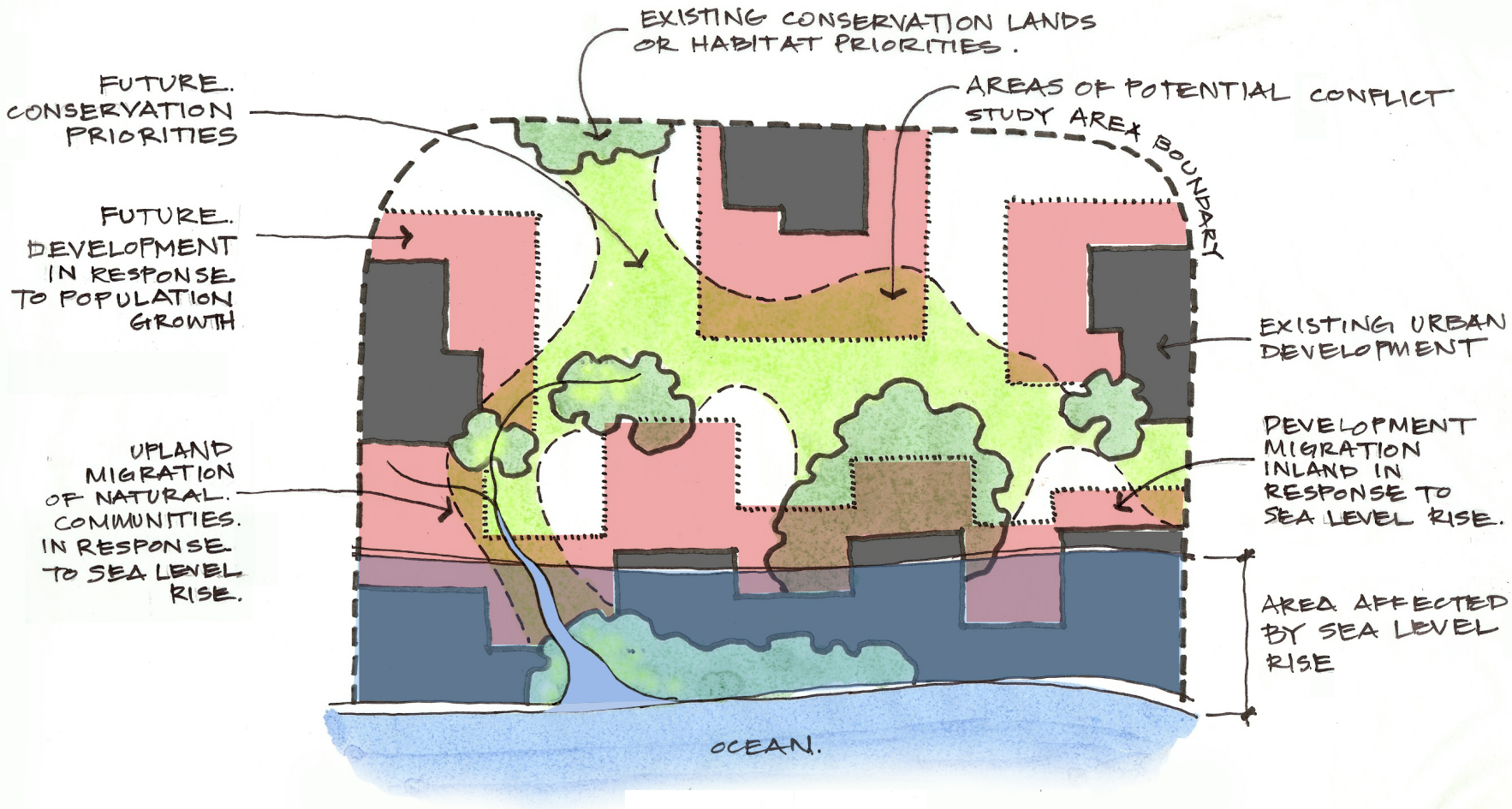
Two Land Use Scenarios for the Matanzas Basin

Future assumptions:

- Sea level rise impacts
- Conservation priorities
- Possible population growth



Land Areas of Potential Conflict



Identify Land with Conservation Priorities

- Undeveloped lands – coastal and inland
  - High percentage of study area
- Species, habitats, and ecosystem services
  - High value
- Sea level rise considerations (impacts and migration corridors)
  - Mainly along coastal strip
- Different levels of conservation priority (low to high)
  - Based on accepted principles of conservation ecology

Inputs to Conservation Priority Lands

- Focal species habitats
- Connectivity
  - Waterways
  - Coastal to upland
- Statewide conservation priority lands
- Fill in corridors

Current Focal Species List

Herps
Gopher Tortoise
Eastern Indigo Snake
Diamondback Rattlesnake
Florida Kingsnake
Florida Pine Snake
Spotted Turtle
Gopher Frog
Striped Newt
Diamondback Terrapin
Atlantic Saltmarsh Snake

Birds
Southeastern American Kestrel
Swallow-tailed Kite
Florida Scrub-Jay
Bachman's Sparrow
Sandhill Crane
Limpkin
Neotropical Forest Migrants
Migratory Waterfowl
Wading bird Guild
Black Rail
Wood Stork
Bald Eagle
American Oystercatcher
Mangrove Forest Bird Guild
Merlin
Worthington's Marsh Wren
MacGillivray's seaside sparrow

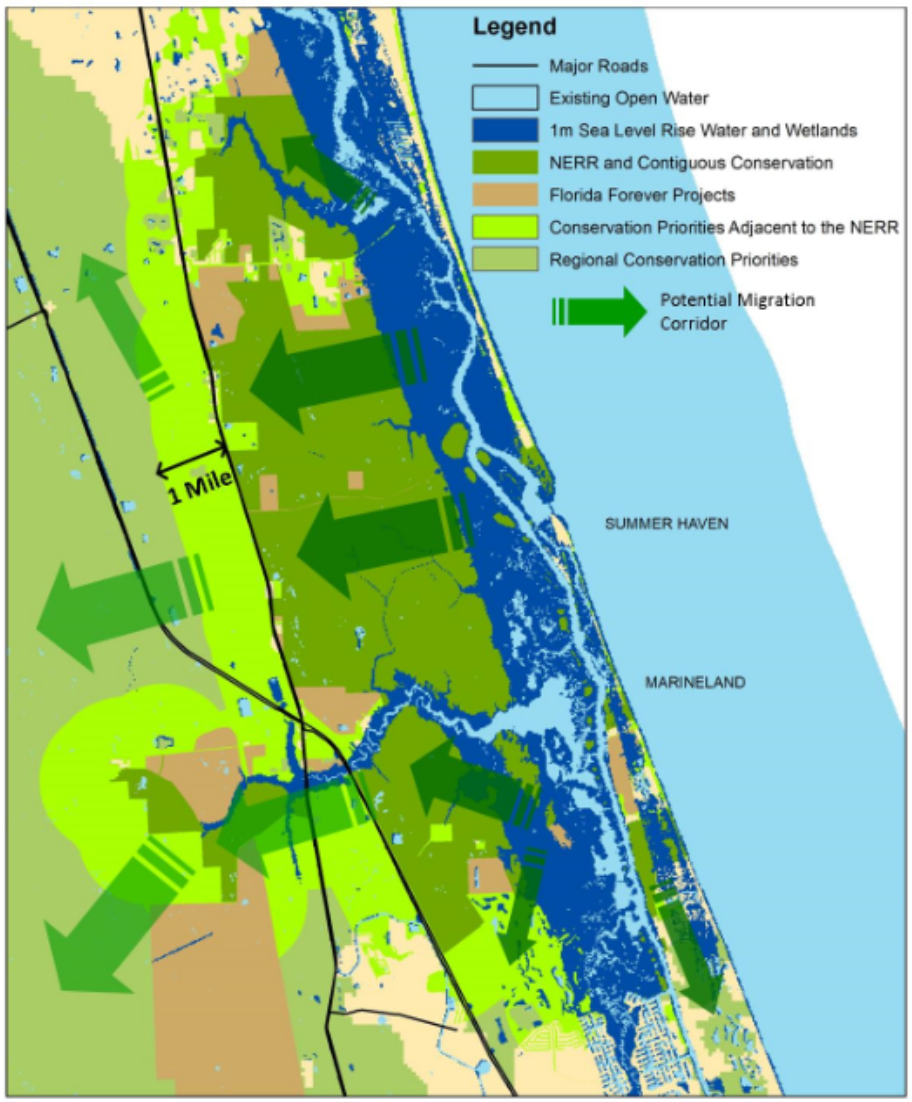
Mammals
Florida Mouse
Sherman's Fox Squirrel
Florida Black Bear
Round-tailed Muskrat
River Otter
Florida Mink

Legend: White = upland; Green = fresh wetlands; Blue = salt wetlands/coastal; Gold = Indicator

Conservation Priorities Near the GTM Reserve

Connectivity from GTM Reserve landholdings is a priority for habitat conservation.

Conservation lands can incorporate timber production



Habitat Migration Corridor Priorities Adjacent to the Reserve

Possible Future Development

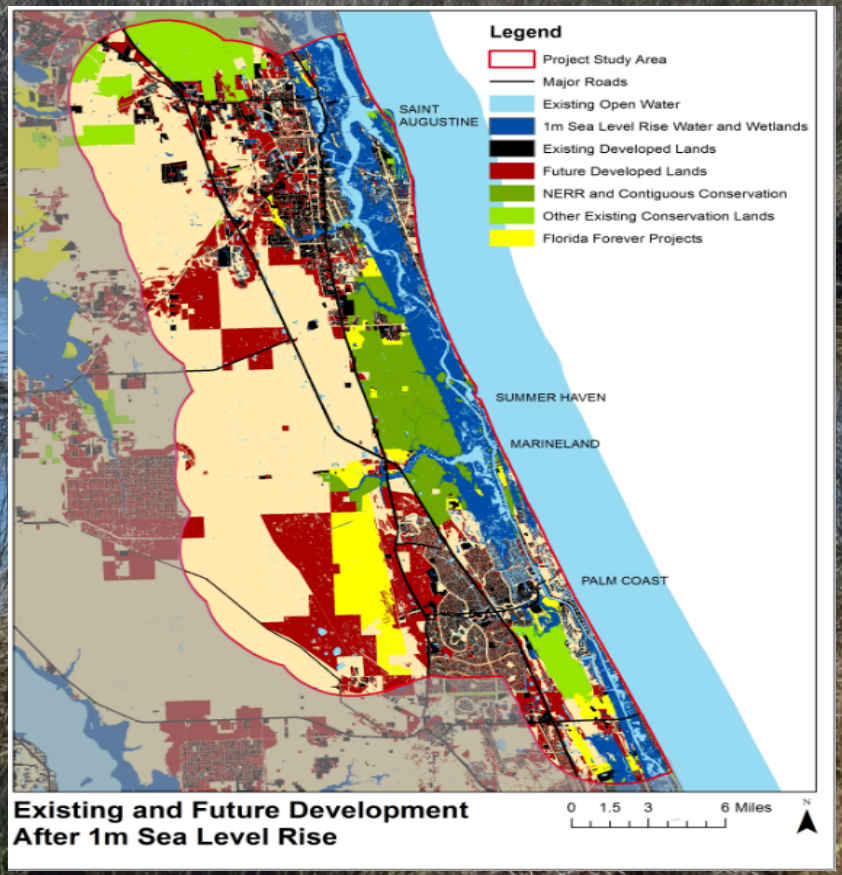
The accepted BEBR mid-range population projection for the two county region, including the Jacksonville Metro, is 511,000 by 2060.

Land Use Scenario 1: Continue Current Development Patterns

- Amount of land needed
  - Future development occurs at average densities of 2.4 units per acre
- Locations for new development
  - Higher "suitability" adjacent to infrastructure (roads) and existing development
  - Vacant platted parcels and approved, permitted developments (formerly known as DRIs)
    - In large greenfields (not infill)
  - But not in areas affected by sea level rise
    - Direct impacts mainly along coastal strip
    - Avoid impacted areas and areas turning into "islands"
    - Adds to the number of people moving into the inland areas

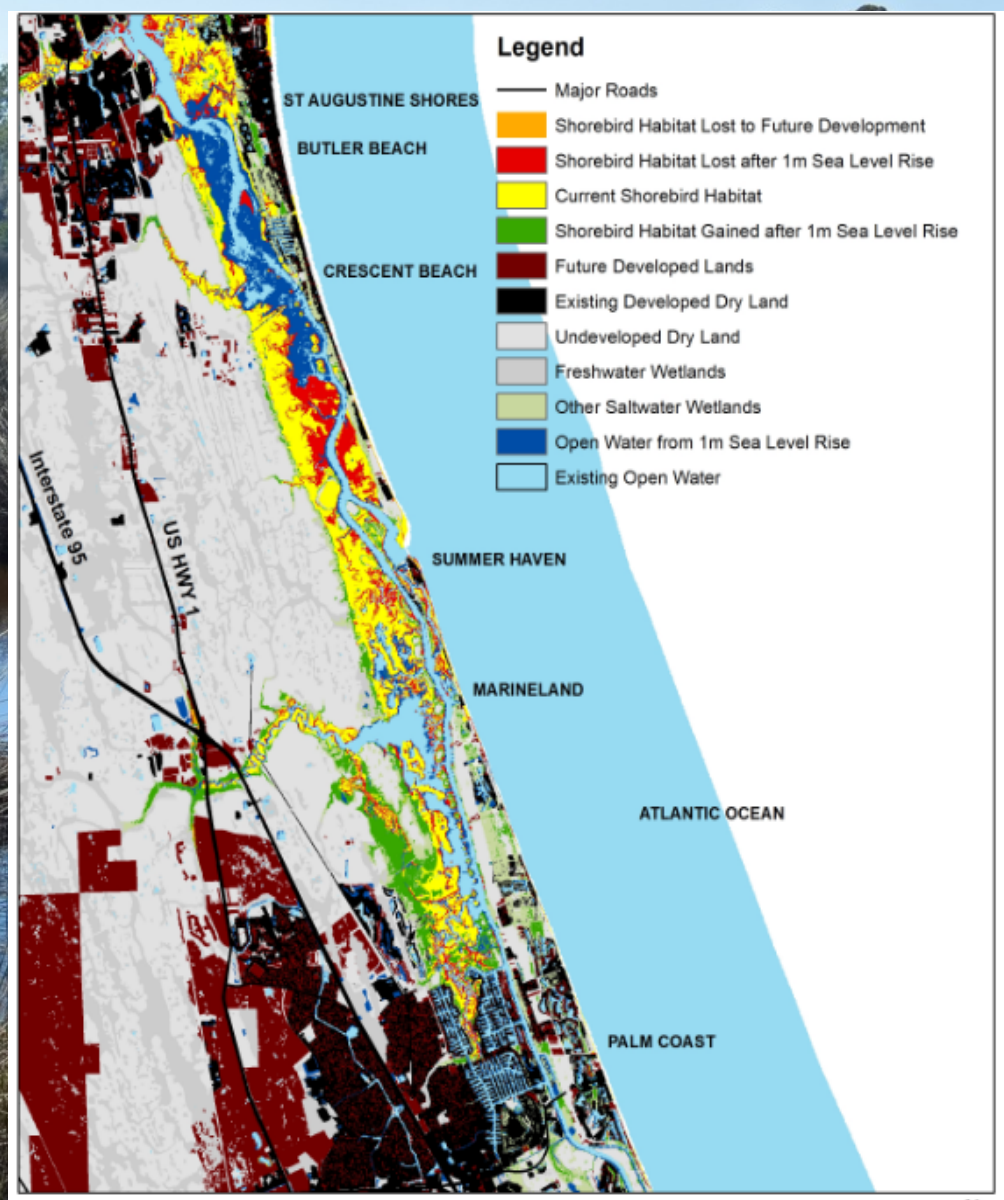
Land Use/SLR Conflicts

More than 312,000 Acres of Land Will Be Converted As A Result of Future Development Patterns and SLR In the Absence of A Concerted Conservation Strategy.



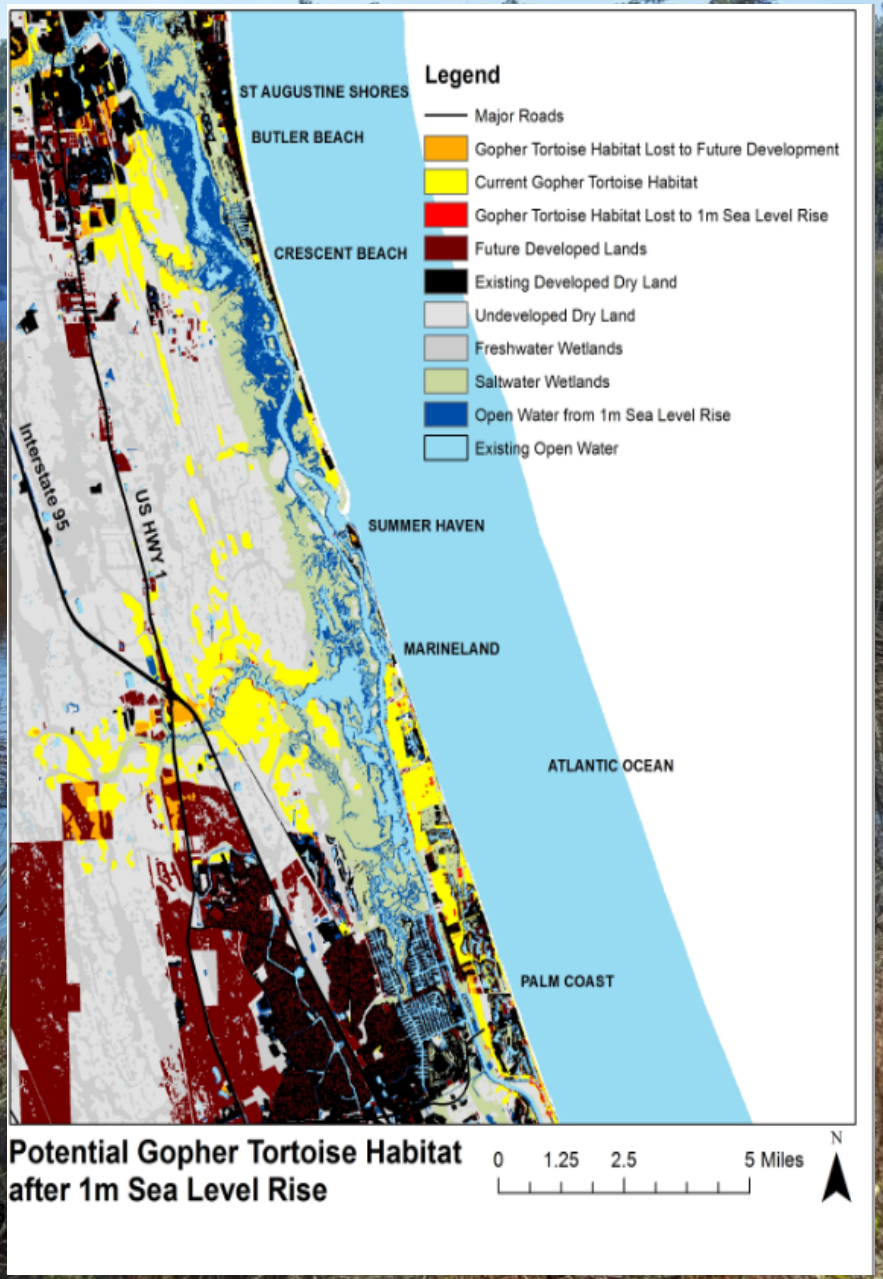
Existing and Future Development After 1m Sea Level Rise

Threats to Shorebird Habitats



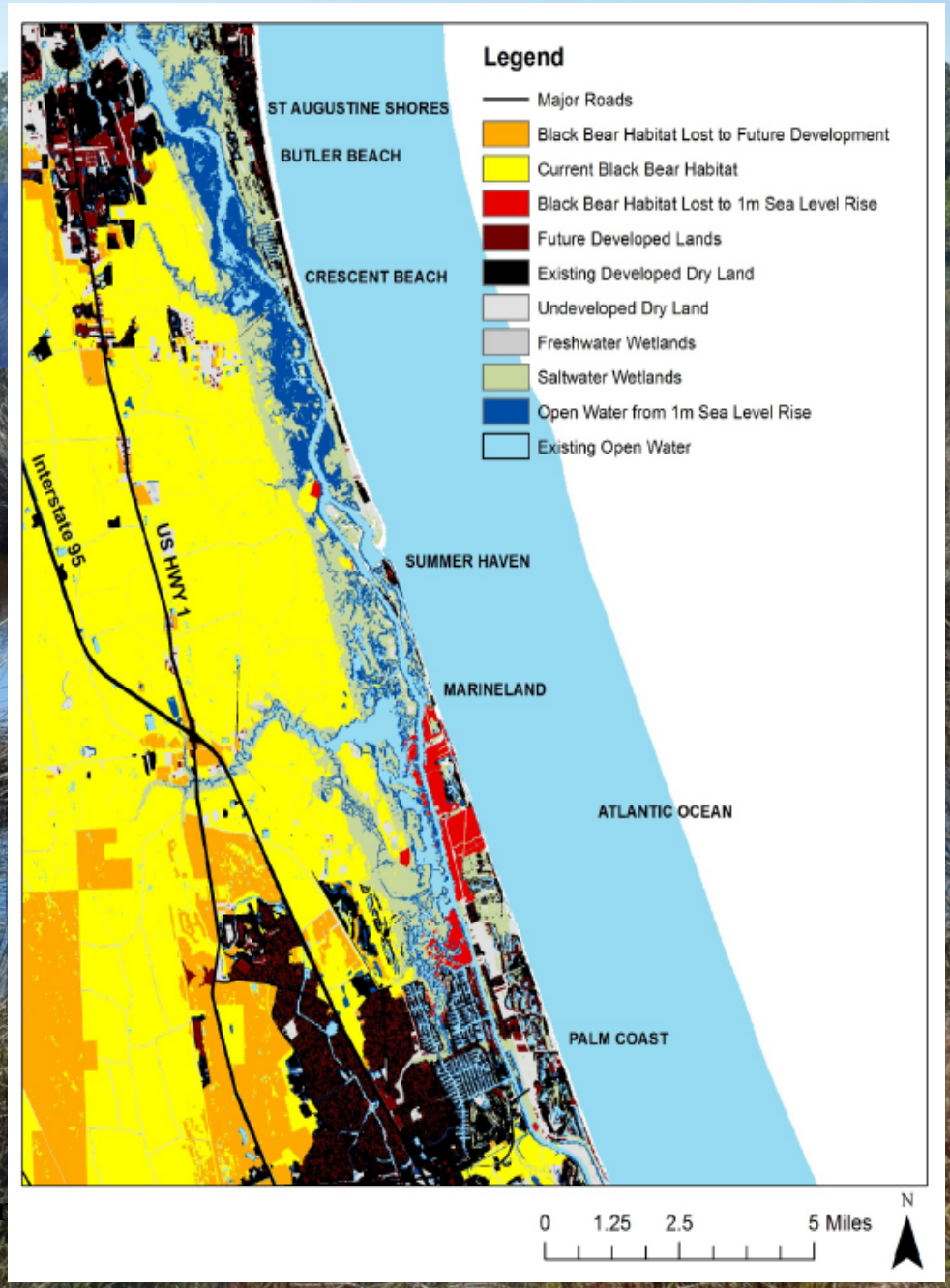
Low-lyi

Threats to Gopher Tortoise Habitat (1 M)



Low-lying areas

Threats to Black Bear Habitat



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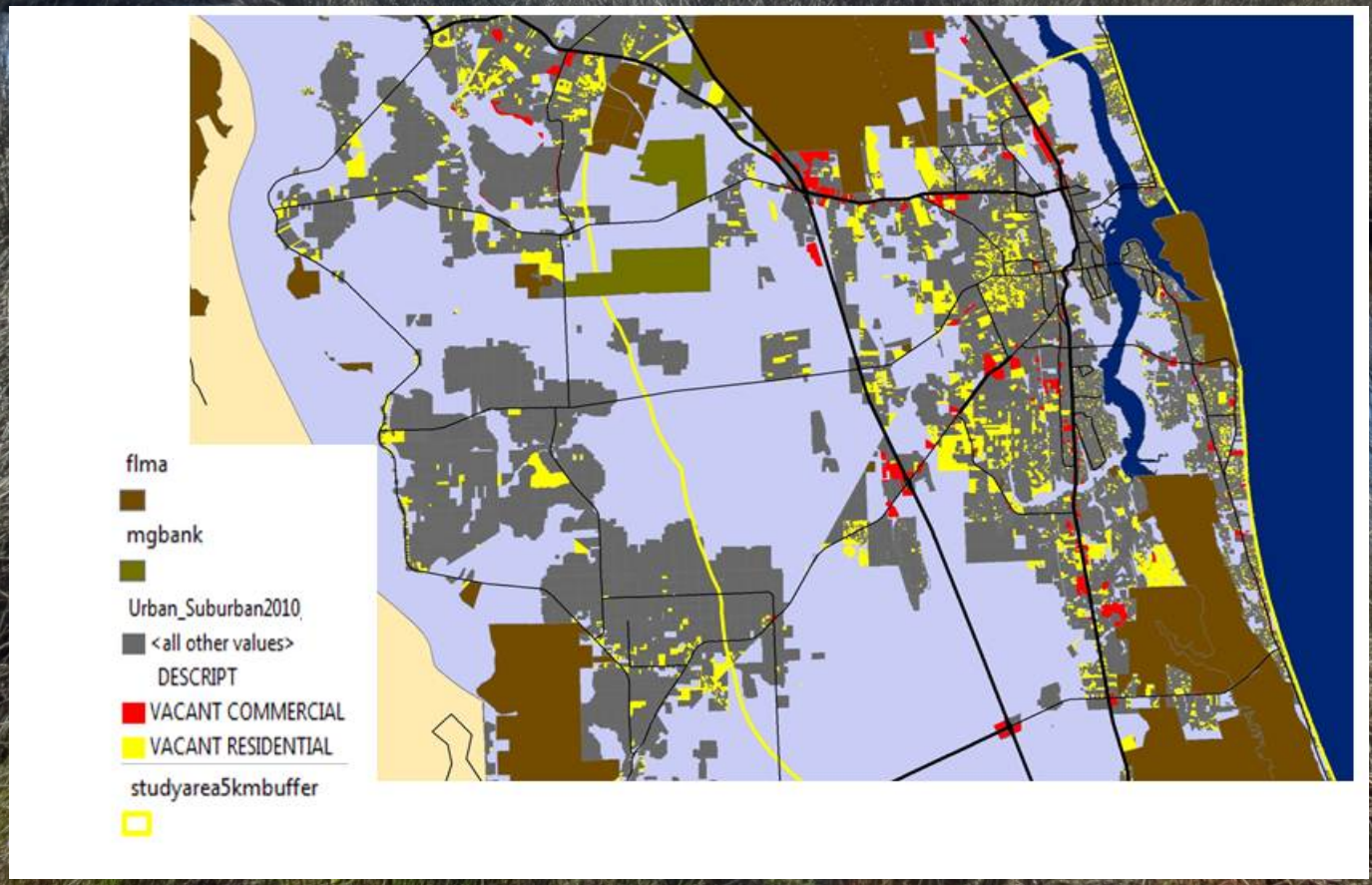
Land Use Scenario 1 Result

- Significant land use conflict between future development and conservation/ agriculture priorities
  - Cannot develop at current densities and sprawl patterns and maintain significant conservation lands

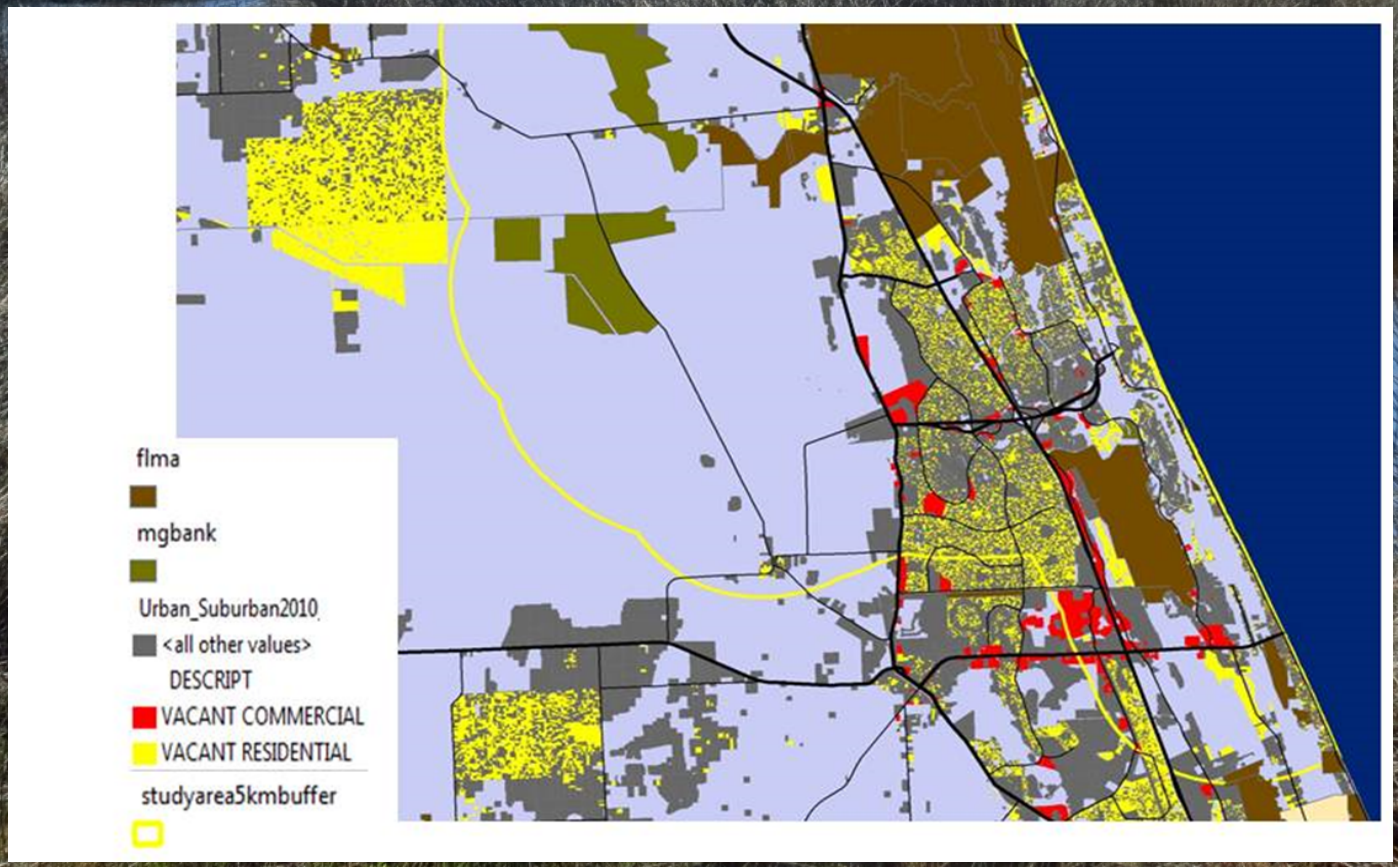
Land Use Scenario 2

- Significant use of in-fill, mixed use, and slightly higher development densities
- Much lower conflict between future development and conservation

Infill Appropriate Areas: Northern Portion of the Study Area



Infill Appropriate Areas:
Southern Portion of the Study Area



Preliminary Recommendations

- Population growth is difficult to stop and desirable to some (economic development)
- Community, regional, and state concern with natural system conservation is high
  - Focus on land conservation programs and policies
- At current development patterns, future land use conflict is high
- To avoid future land use conflicts
  - Focus on programs and policies that encourage more land-efficient development patterns, while maintaining good design for quality of life

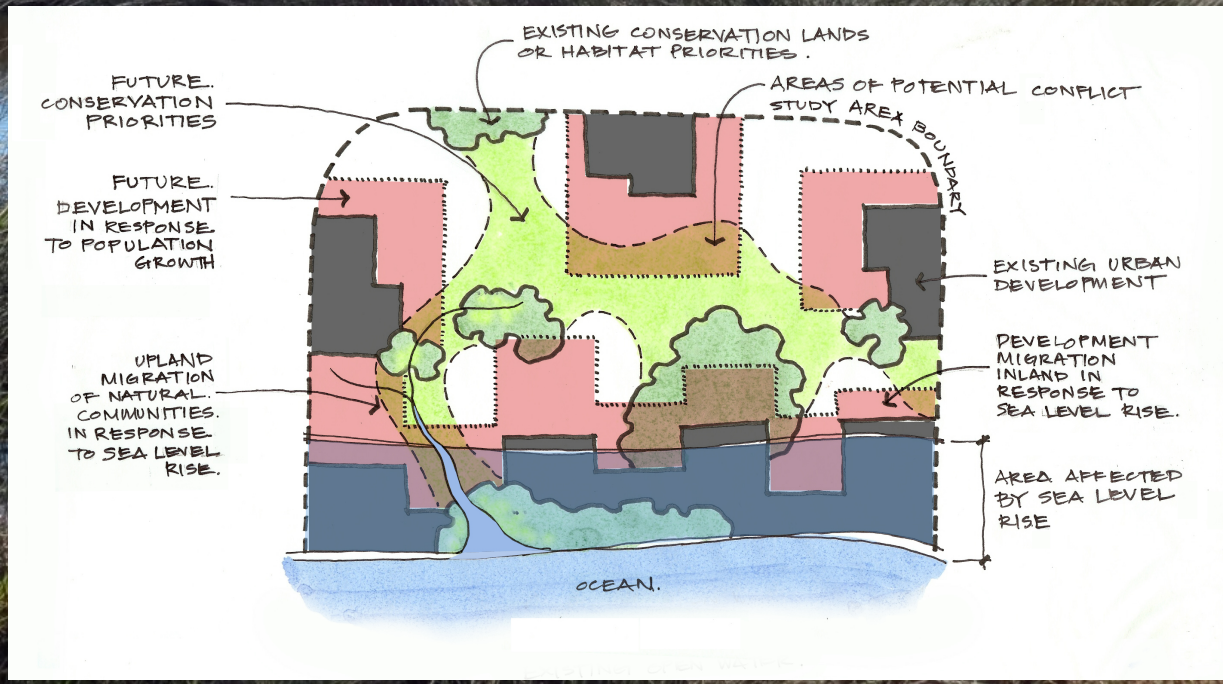
Scenarios and Uncertainty

- Scenarios are informative exercises; they are not policies or plans
- Many uncertainties, but some information is better than no information
  - Sea level rise amount and impacts
  - Species and habitat models, ecosystems
  - Future population (in-migration)
    - May change if coastal development is discouraged
    - Will be affected by national and international issues
  - Future development patterns
    - Depend on individual developers and market preferences
- The future depends on external factors, but it also local land use policies, programs, and decisions
  - Importance of citizen and community-based organization involvement

We need your help

We need to know…

If our vision of the future of the Matanzas Basin matches yours.



What Can High Quality, Land-Efficient Design Look Like?

- In-fill and mixed use
- Contiguous development
- Low impact development

Conservation requires a conservation about development patterns.

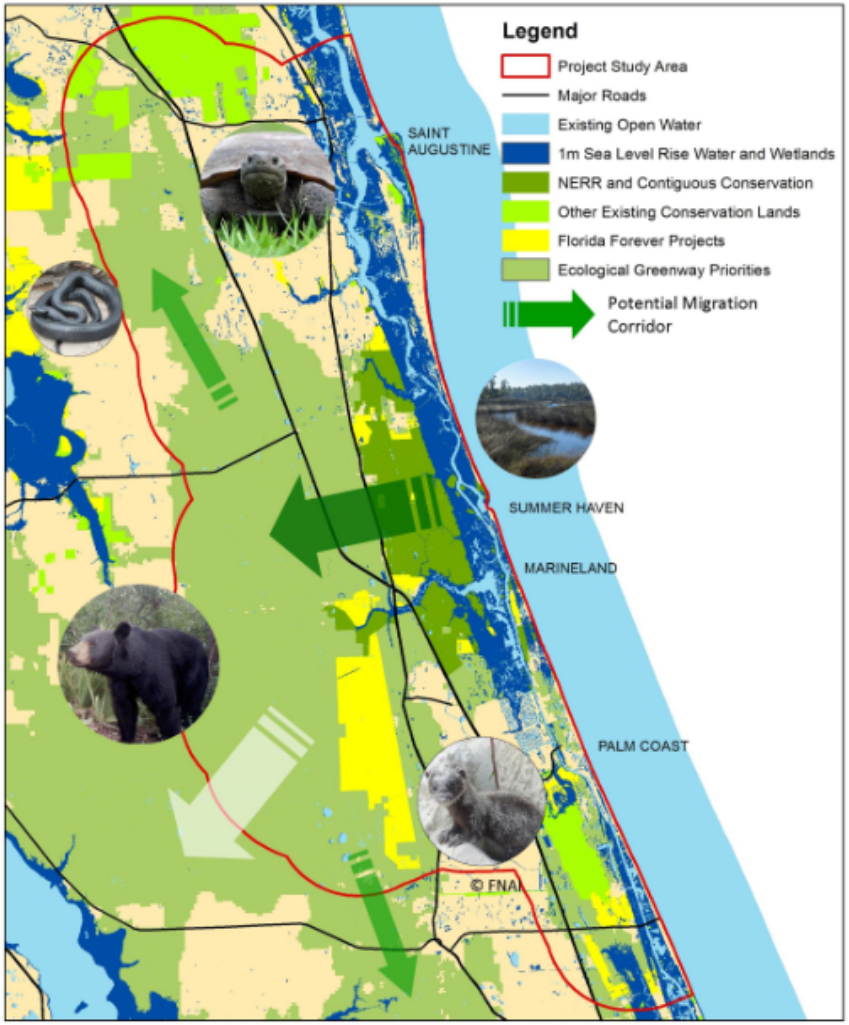
Corridor SWOT

Strengths

Weaknesses

Opportunities

Threats



Habitat Migration Corridor Priorities

Florida Mink photo: Courtesy of Florida Natural Areas Inventory, © FNAI

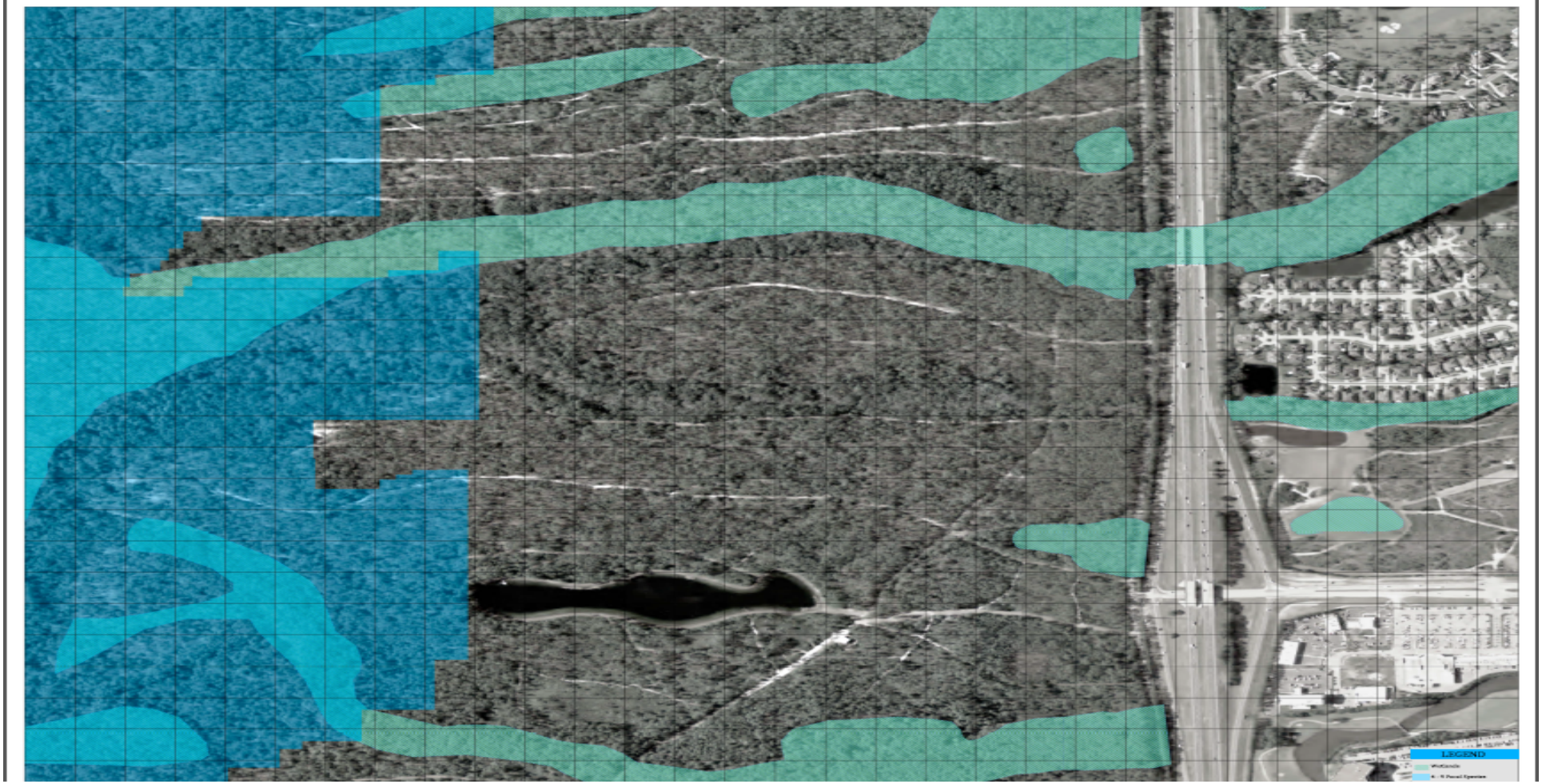
Gopher Tortoise photo: ONeal, Craig. (2008). Photo of the endangered Florida Gopher Tortoise (*Gopherus polyphemus*) taken in the Guana Tolomato Matanzas Reserve, Florida. [Photograph]. Retrieved November 2013, from: http://commons.wikimedia.org/wiki/File:Florida_Gopher_Tortoise.jpg

Princess Place photo: © Ed Siarkowicz Photographic Images, LLC

Game – How Should We Develop?

- Provides your input about development planning to this project
  - What are your preferences for future development? Be honest – this is not a test of whether you remember or agree with our recommendations.
- Educates you about land use planning and urban design, as well how others in your community think about future development

Density Vision Exercise- Upland



Exercise Debrief and Final Comments


Thank You!
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