Adaptive Strategies Workshop

Planning for Coastal Change in Levy County

February 27, 2013
Cedar Key Public Library

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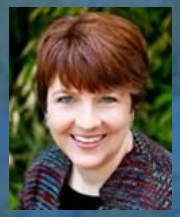
Welcome and Workshop Goals

- Dr. Kathryn Frank
  - Project Principal Investigator

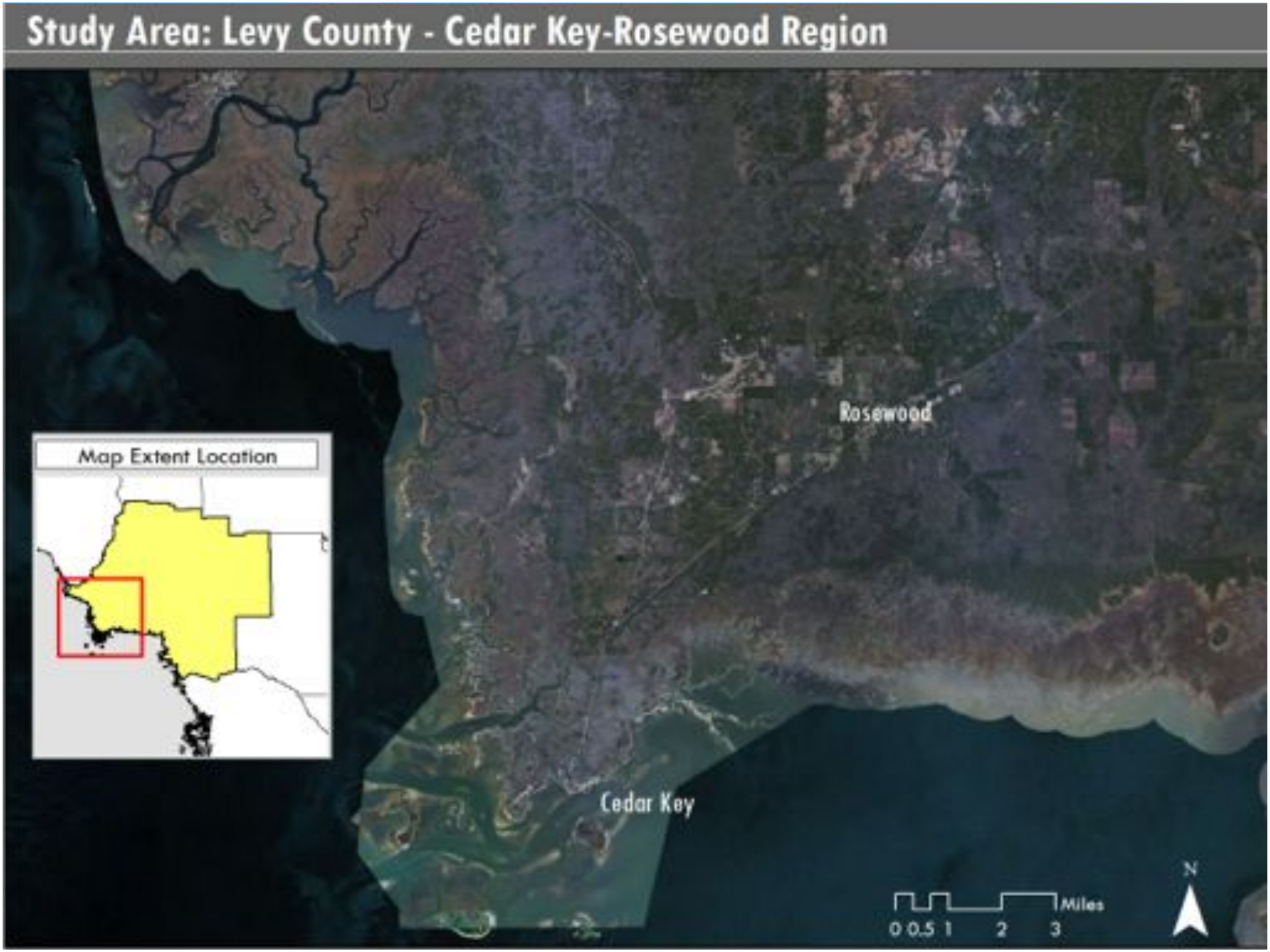


- Dr. Joseli Macedo
  - Professor, Spring 2013 Studio

- Sean Reiss
  - Graduate Research Assistant

- Goals: Collaboration
  - Provide you with specific information about coastal change issues in the Cedar Key-Rosewood area
  - Receive your input of local knowledge, priorities, and ideas for adaptive strategies
  - To guide our adaptive design recommendations

Study Area: Levy County - Cedar Key-Rosewood Region



Workshop Agenda

- Participant Introductions
- Project Update and Sea Level Rise Scenarios
- Detailed Geographic Analyses for Cedar Key-Rosewood
- Current Impacts and Planning Priorities
- Adaptive Planning and Strategies Overview
- Adaptive Strategies Game
- Closing Remarks and Next Steps

Participant Introductions

- Coastal change (ChangingLevyCoast.org)
  - Short-range
    - Tides and storms
  - Mid-range
    - Drought induced saltwater intrusion into aquifer
  - Long-range
    - Sea level rise

- Why should people plan for coastal change in small towns and rural areas?

Project Update and Sea Level Rise

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Why We're Here

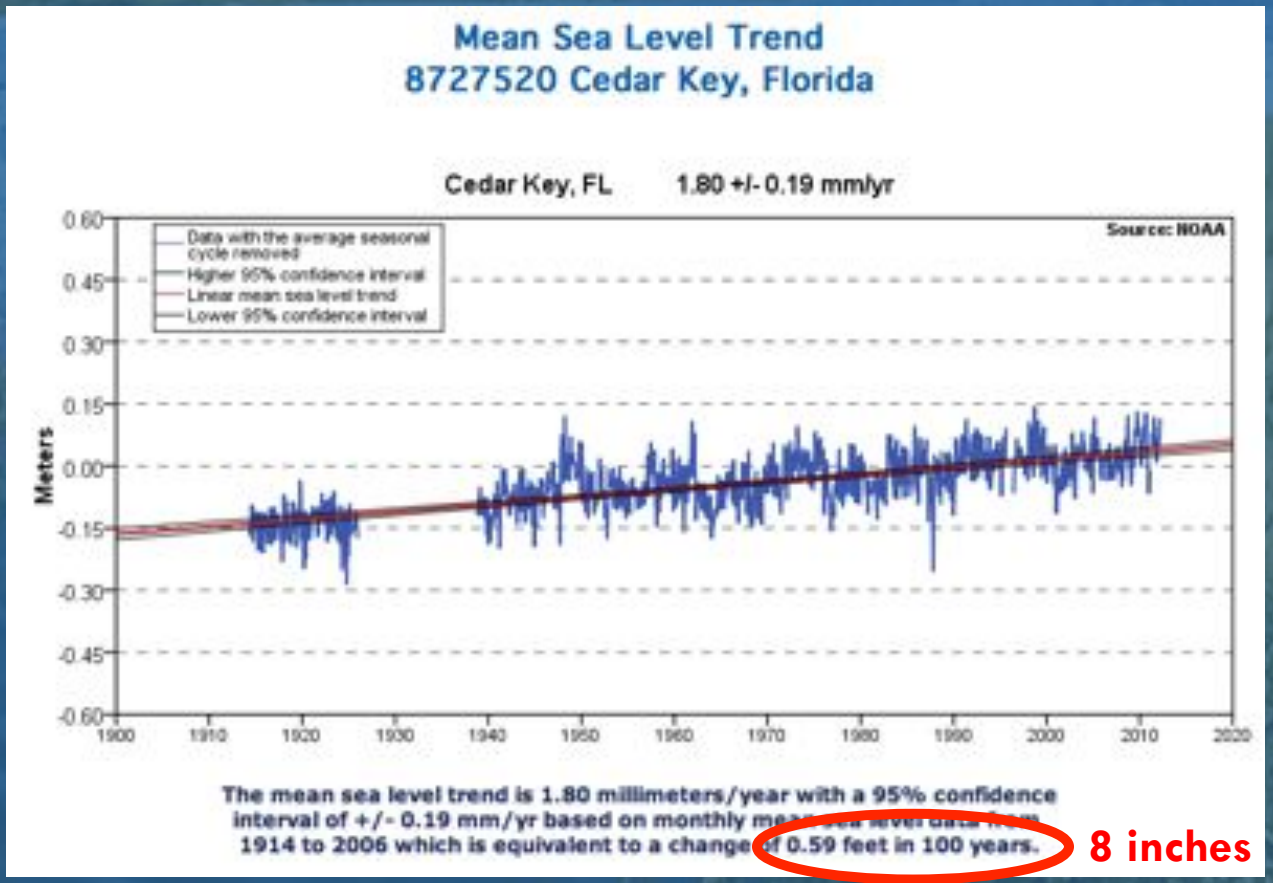
- The coast is changing and will change faster in the future.
- We should start now – planning and policy implementation are slow… contemplate your legacy.
- Actionable information – respond to community questions and concerns – reduce uncertainty and liability.
- Sea level rise can be an opportunity. Tactical planning and good planning in general.
- Preserve the community's safety, health, and welfare…overall quality of life.

Project Activities and Results

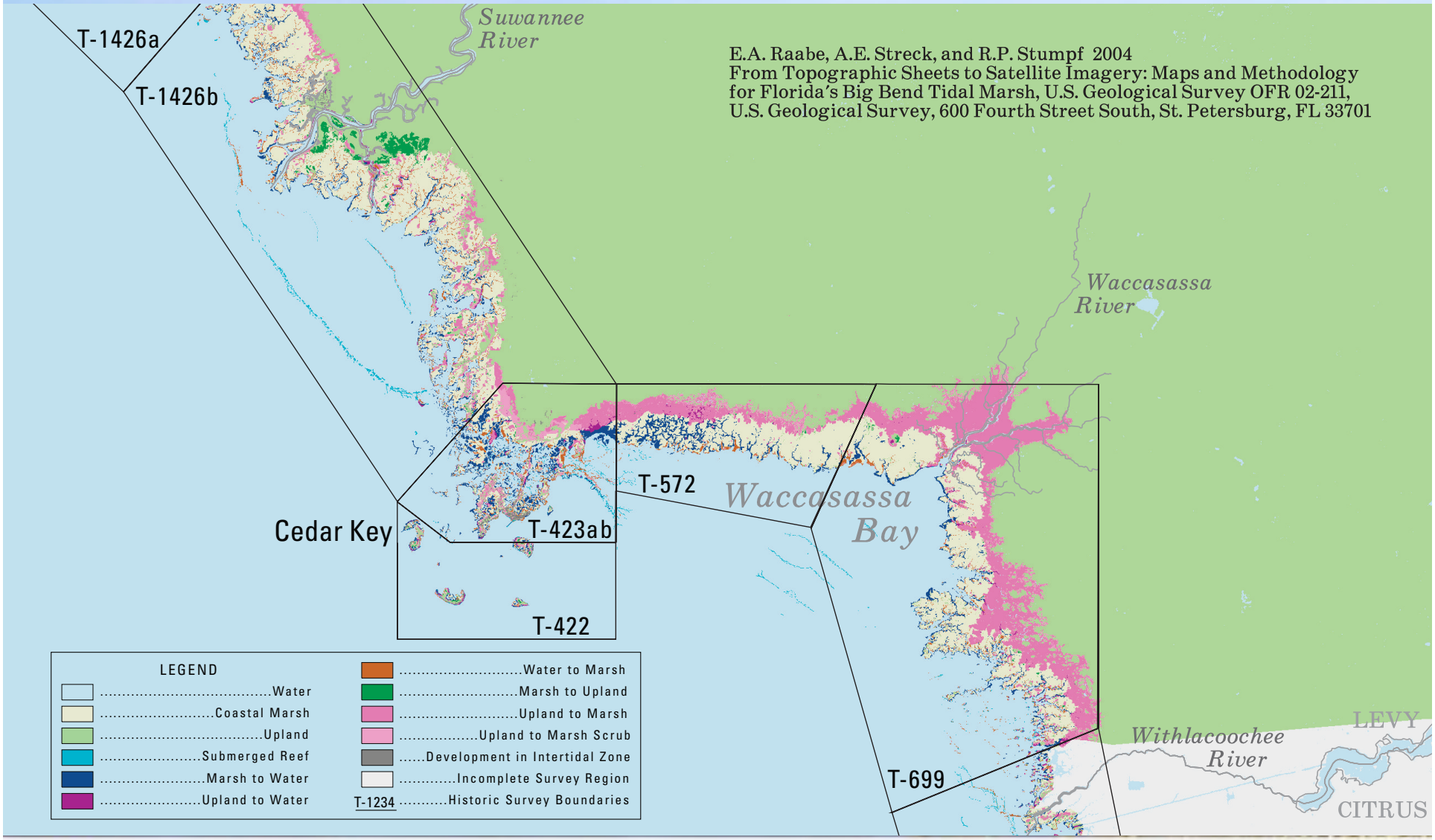
- Research about Levy County and sea level rise – ongoing
- Cedar Key Summer Youth Program – Summer 2012
- Community outreach – Fall 2012
- Adaptive design in Cedar Key-Rosewood – Spring 2013
- Oral environmental histories – Spring 2013
- Adaptive design in Yankeetown-Inglis – Summer 2013
- Cedar Key Arts Center – Fall 2013
- Levy County next steps and Big Bend workshops – Fall 2013

Historic Sea Level Rise

Cedar Key tide gage



Coastal Change in Past 150 Years



Historic Shorelines

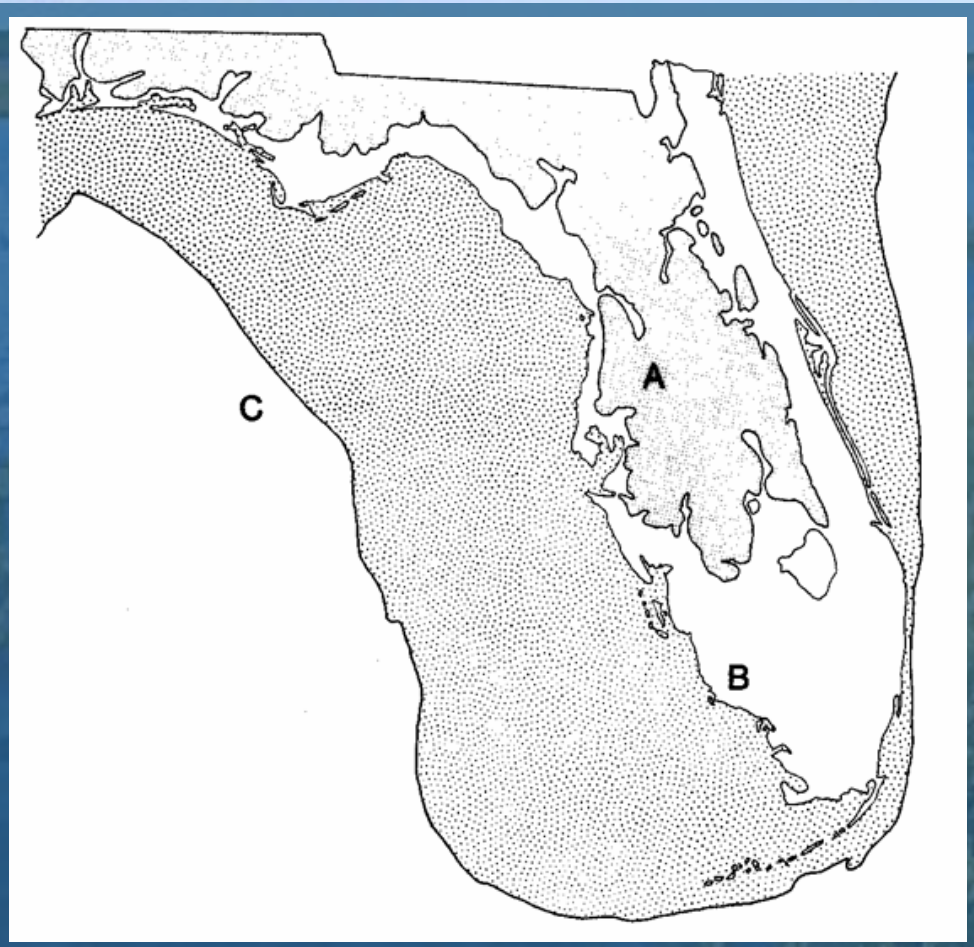


Figure 3: Three shorelines of Florida during the Quaternary Era. A. Early Pleistocene Interglacial Shoreline B. Present Shoreline C. Wisconsinan Glacial Shoreline (Webb, 1990)

Reasons Why the Sea is Rising

Global

- Warmer temperatures expand ocean water
- Glacial melt and land stored water drain into the ocean

Regional

- Changes in ocean circulation
- Land movement
- Changes in freshwater outflows to the ocean

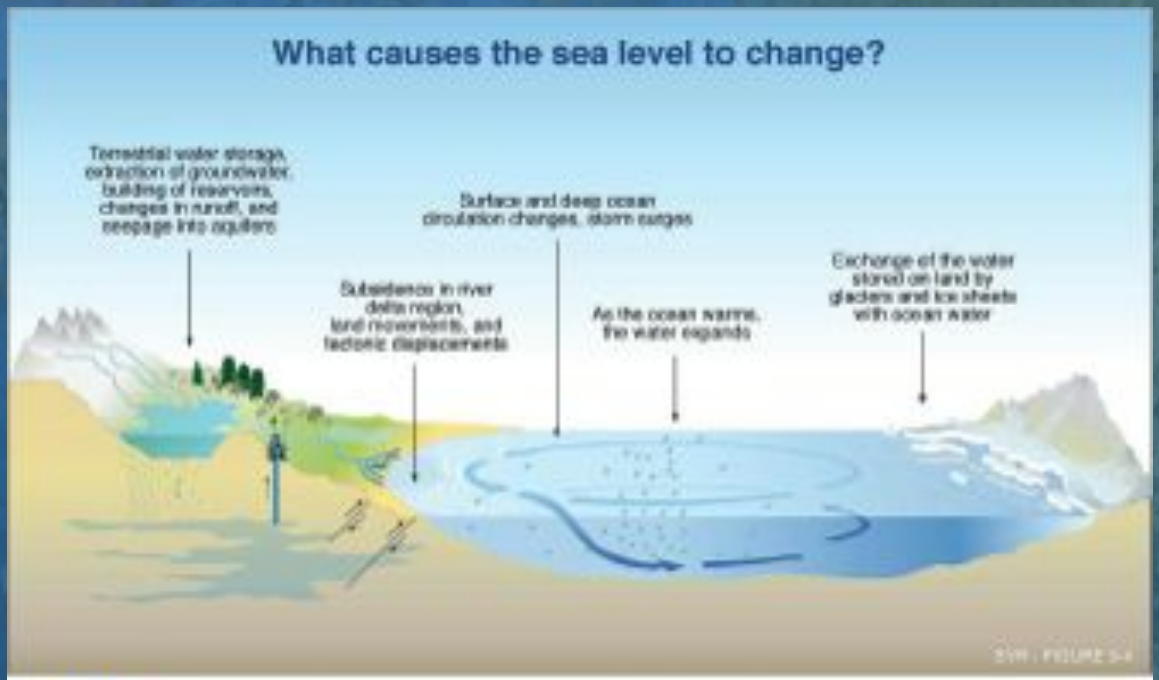
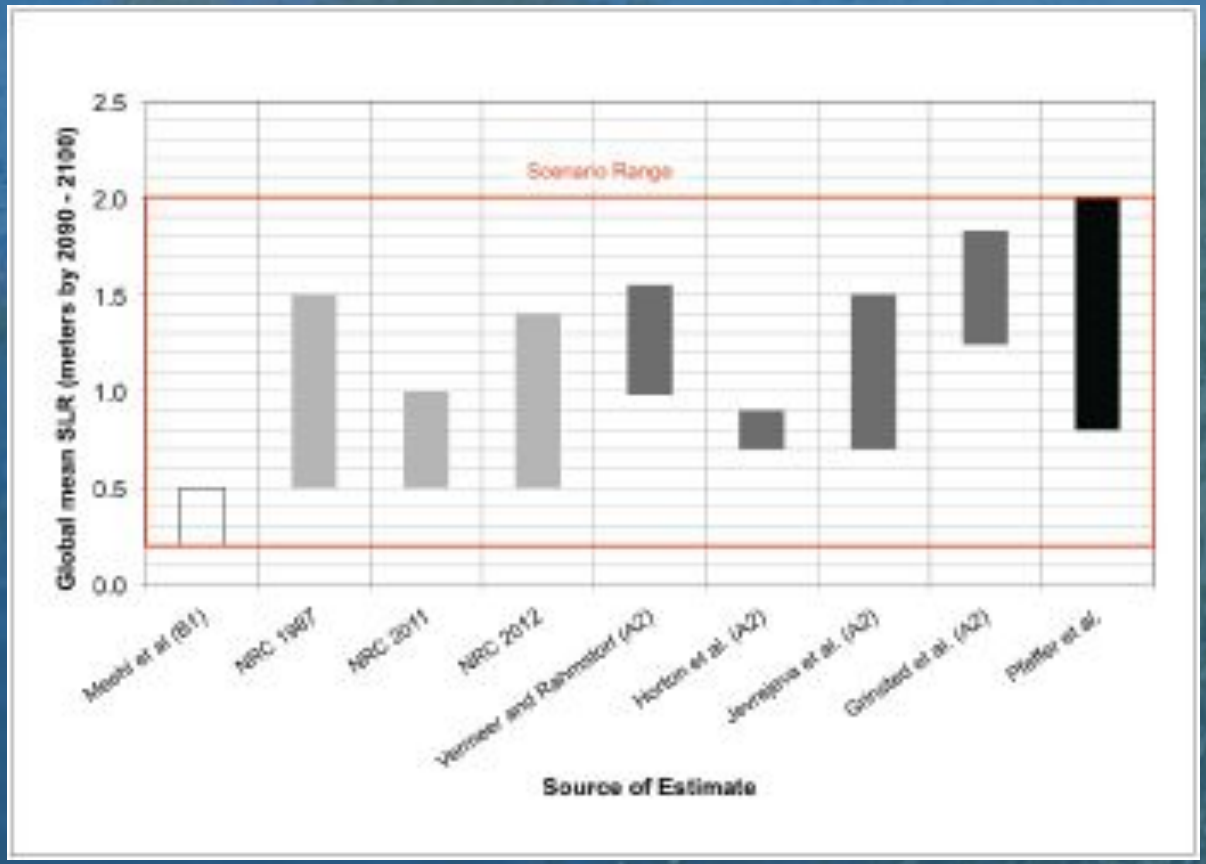


Figure 1. Causes of sea level change. (IPCC 2001)

Global Sea Level Rise Projections

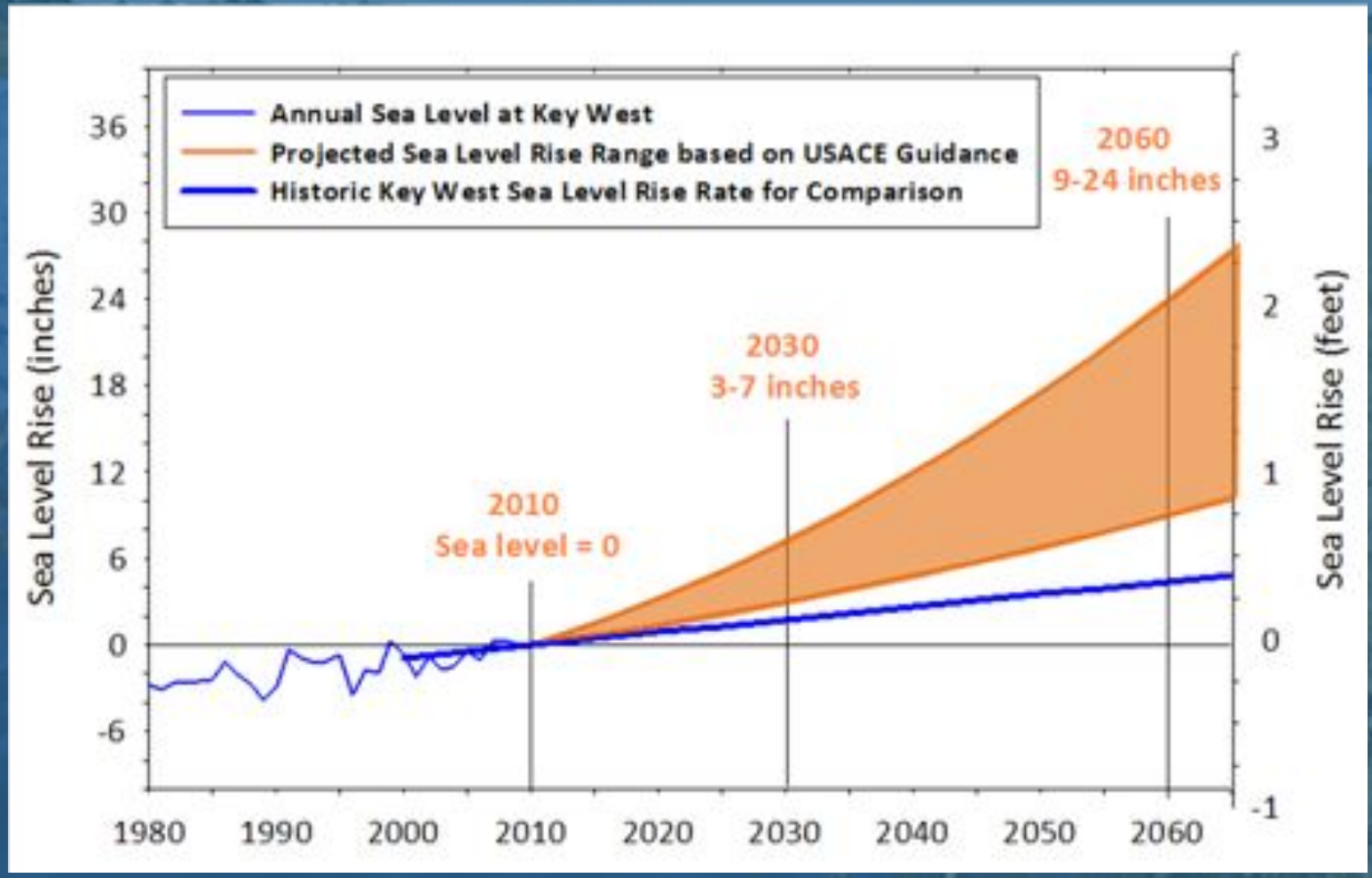
- Range from 8 inches to 6.6 feet by 2100

Global Sea Level Rise Scenarios for the U.S. National Climate Assessment (2012)

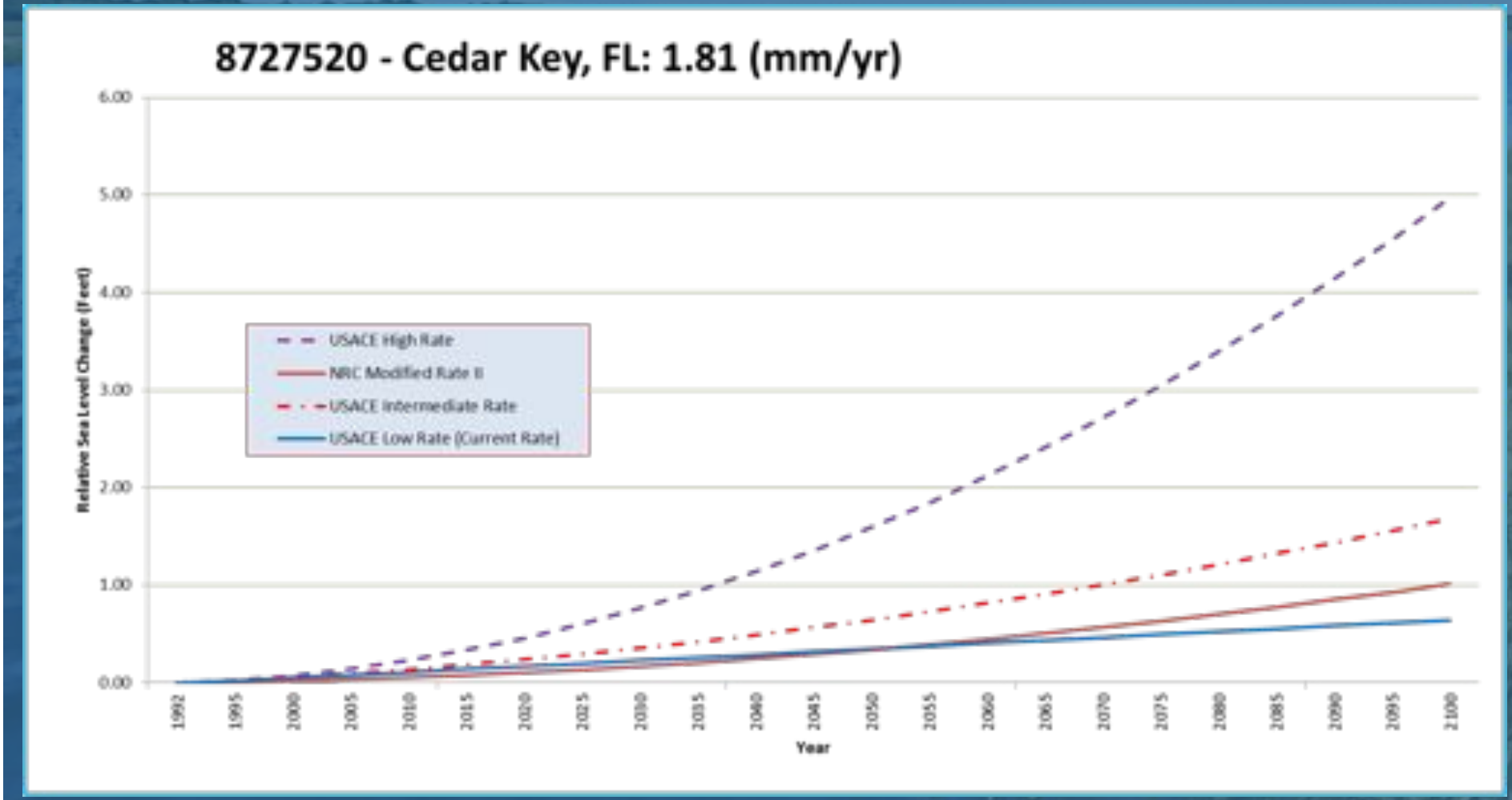


South Florida Sea Level Projections

Southeast Florida Regional Climate Change Compact, 2011



Curves for Cedar Key



Impacts of Sea Level Rise

- **Habitat** and species changes
- More frequent **flooding** at high tide
- **Erosion** and **corrosion** of infrastructure
- Release of **pollutants**
- Saltwater intrusion into **aquifers**
- **Storm surges** farther inland

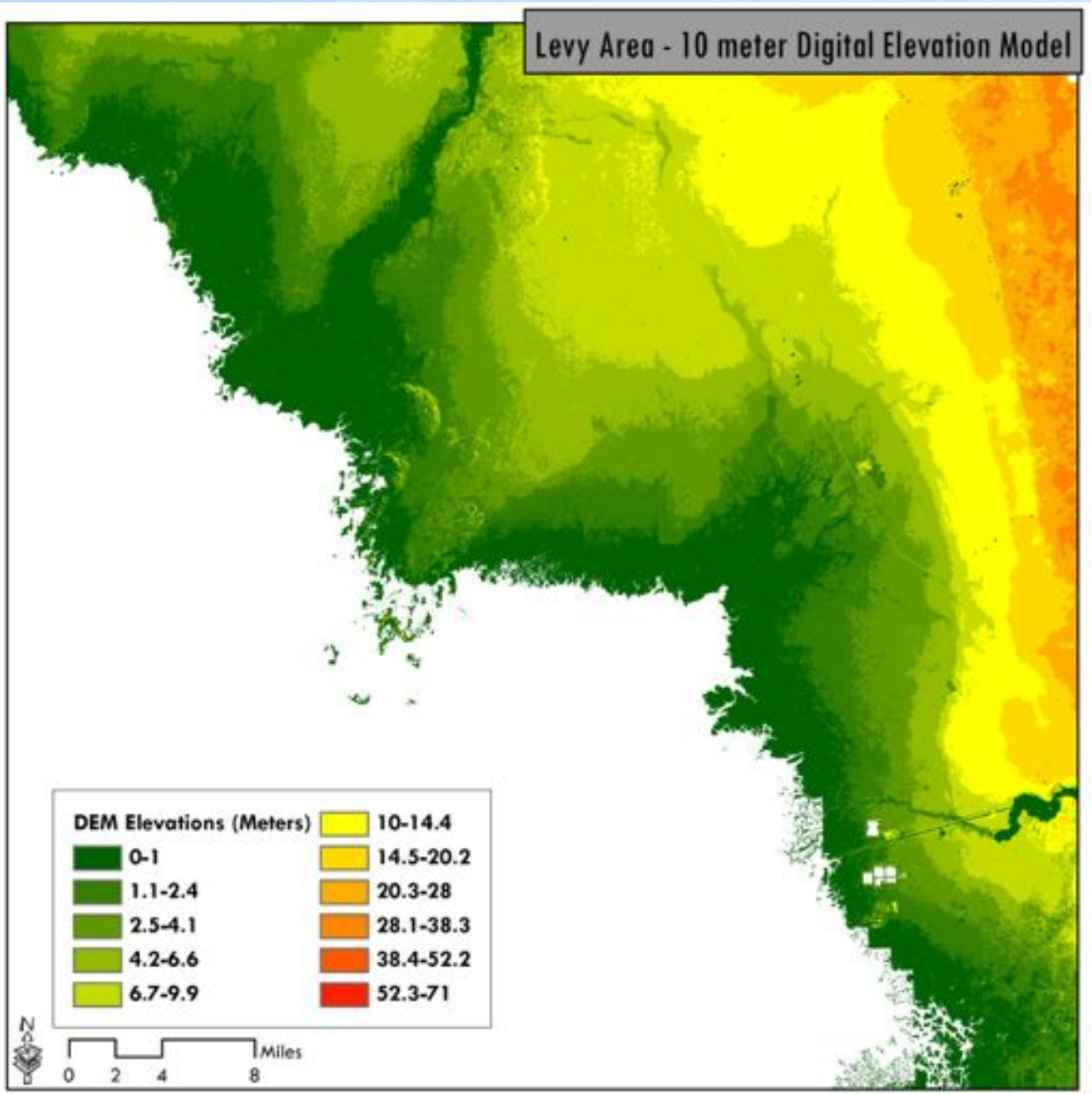
Thresholds and Scenarios

- At what sea level rise do significant changes occur?
- When might this threshold, or tipping point, occur?
  - What are the scenarios?
- How fast will things be changing at that time?
- How does this affect planning now?

Vulnerabilities & coastal hazards

Understanding local topography & geomorphology

- Need to understand thresholds
- Gradually sloping coastline
- Extensive areas below 3 feet along the coast
- Higher elevation peninsula feature extending to the southwest
- Cedar Key has several high elevation points



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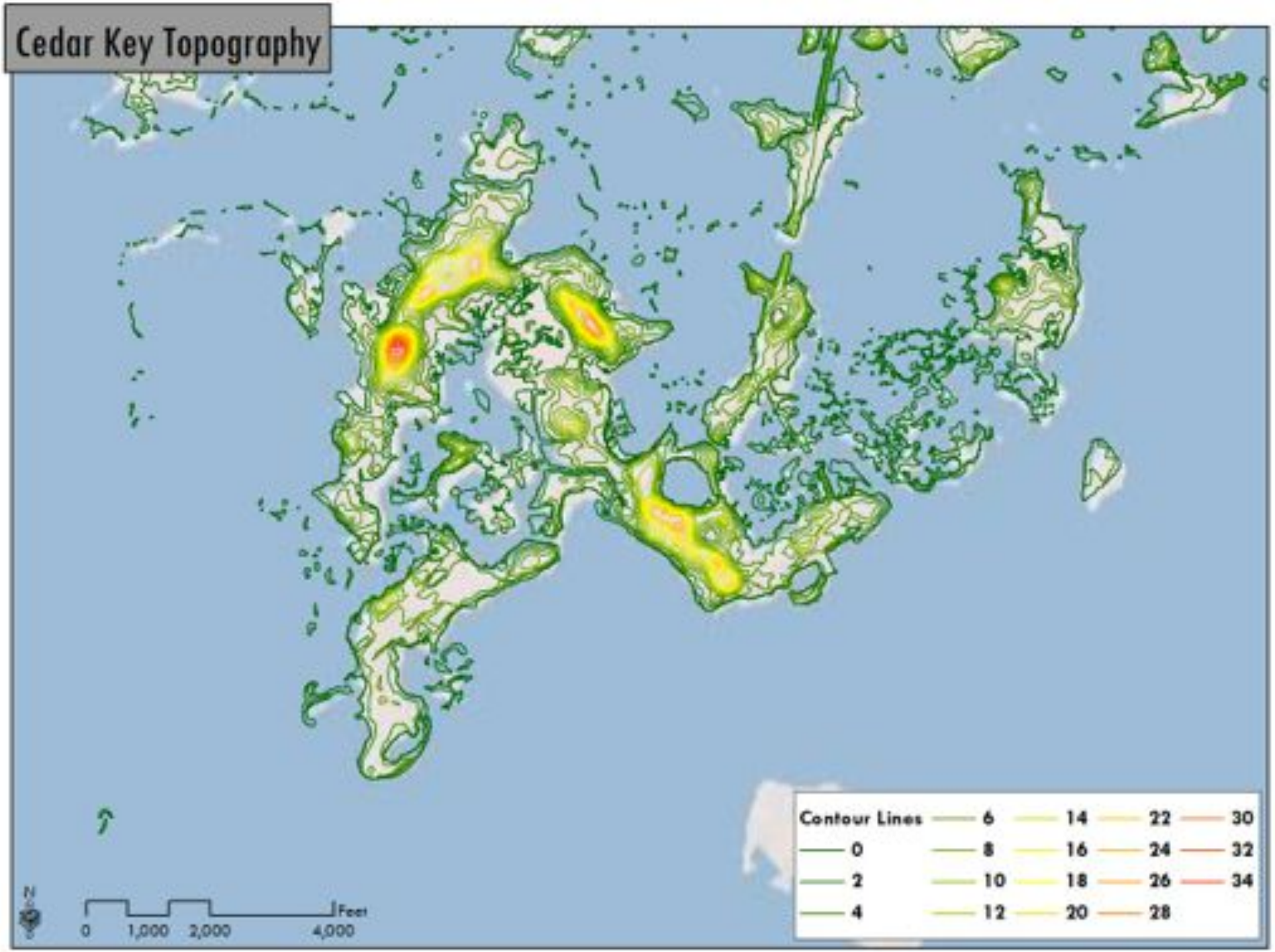
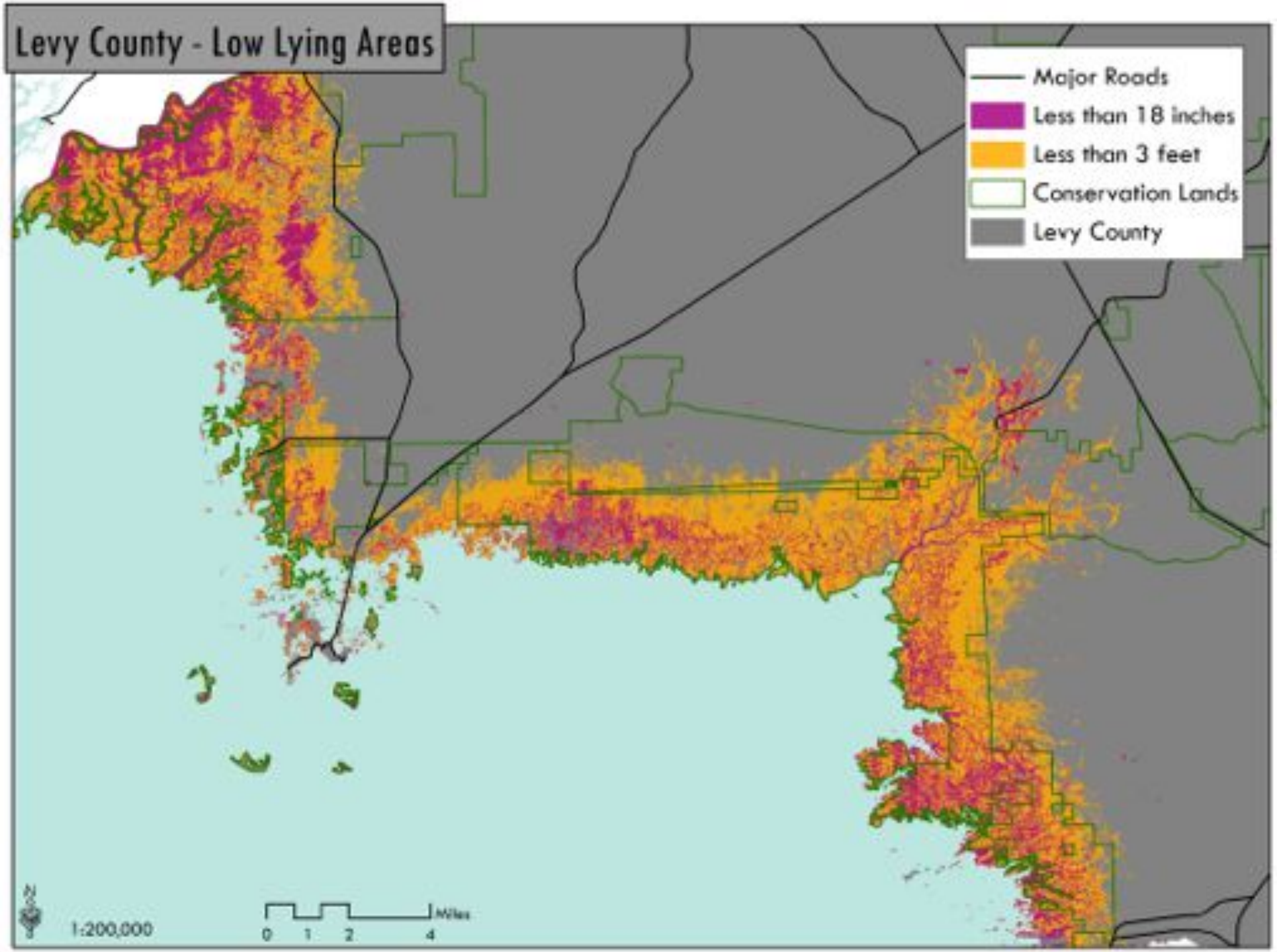

Cedar Key Topography
Contour Lines
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
N
0
1,000
2,000
4,000
Feet


Levy County - Low Lying Areas
Major Roads
Less than 18 inches
Less than 3 feet
Conservation Lands
Levy County
N
1:200,000
0 1 2 4
Miles


Cedar Key - Low Lying Areas
Less than 4 feet
City Blocks
Shoreline
1:24,000
0
1,000
2,000
4,000
Feet

Low lying areas

Identifying thresholds

- Thresholds may be dependent on planning goals
- May vary based on scale or area

Levy County Low Lying Areas	Total Acres	Additional Acres
Less than 1.5 feet	22,385	22,385
Less than 3 feet	69,391	47,006
Less than 4 feet	84,388	14,997
Less than 5 feet	96,827	12,439
Less than 6 feet	109,060	12,233
	Total acres below 6 feet	382,051

Cedar Key Low Lying Areas	Acres (parcel acreage)	Additional Acres
Less than 1.5 feet	134	134
Less than 3 feet	320	186
Less than 4 feet	377	57
Less than 5 feet	449	72
Less than 6 feet	513	64
	Total acres below 6 feet	1,793

Cedar Key Low Lying Areas	Acres (parcel acreage with structures)	Additional Acres
Less than 1.5 feet	26	26
Less than 3 feet	74	48
Less than 4 feet	105	31
Less than 5 feet	149	44
Less than 6 feet	193	44
	Total acres below 6 feet	547

Changing coastal dynamics & sea level rise

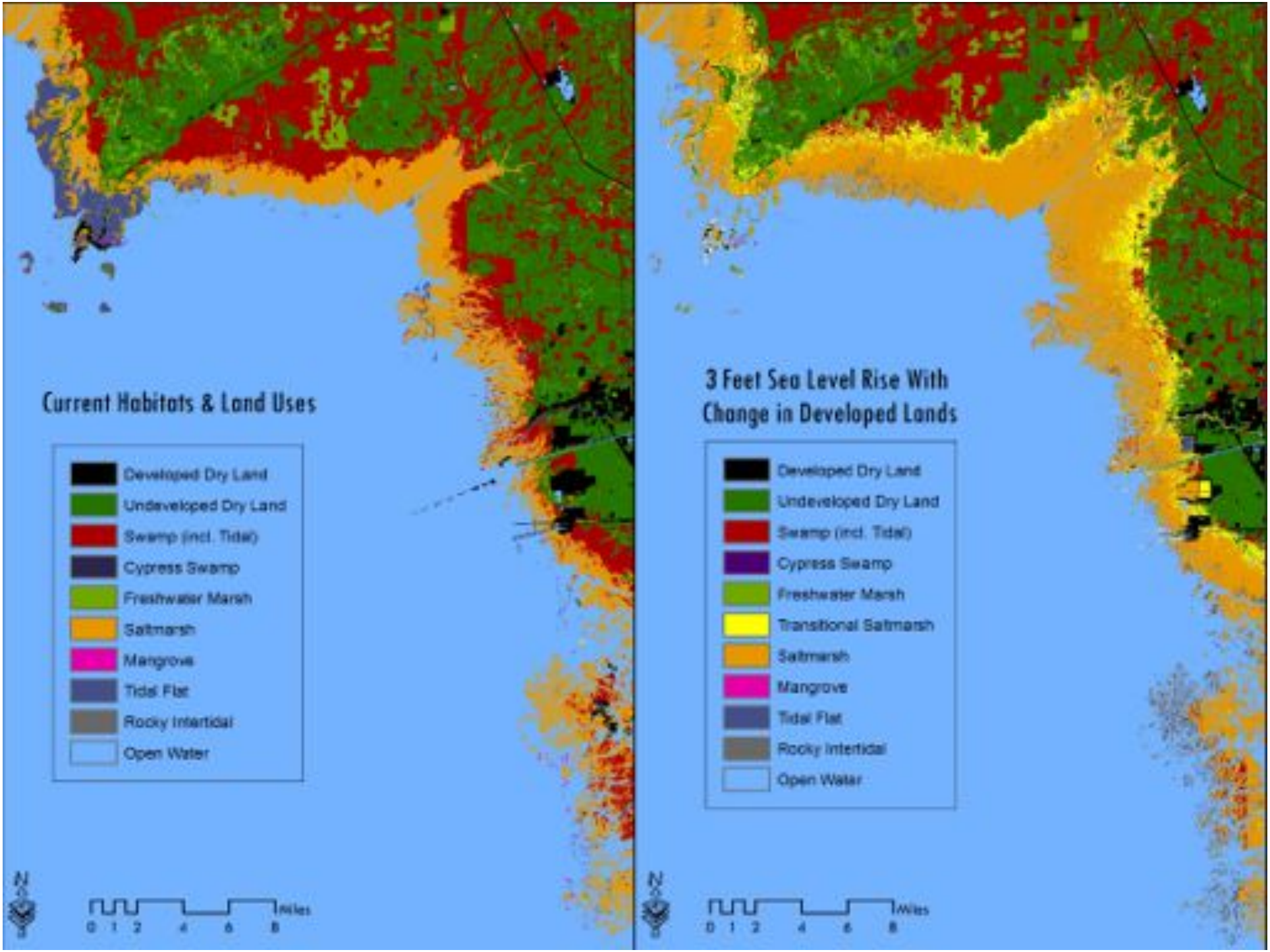
- Changes to the coast
  - Changes in coastal habitat
  - Coastal erosion
  - Storm Surge and flooding
  - Saltwater intrusion

All of these are intensified by sea level rise

- These changes can have significant impacts on coastal communities

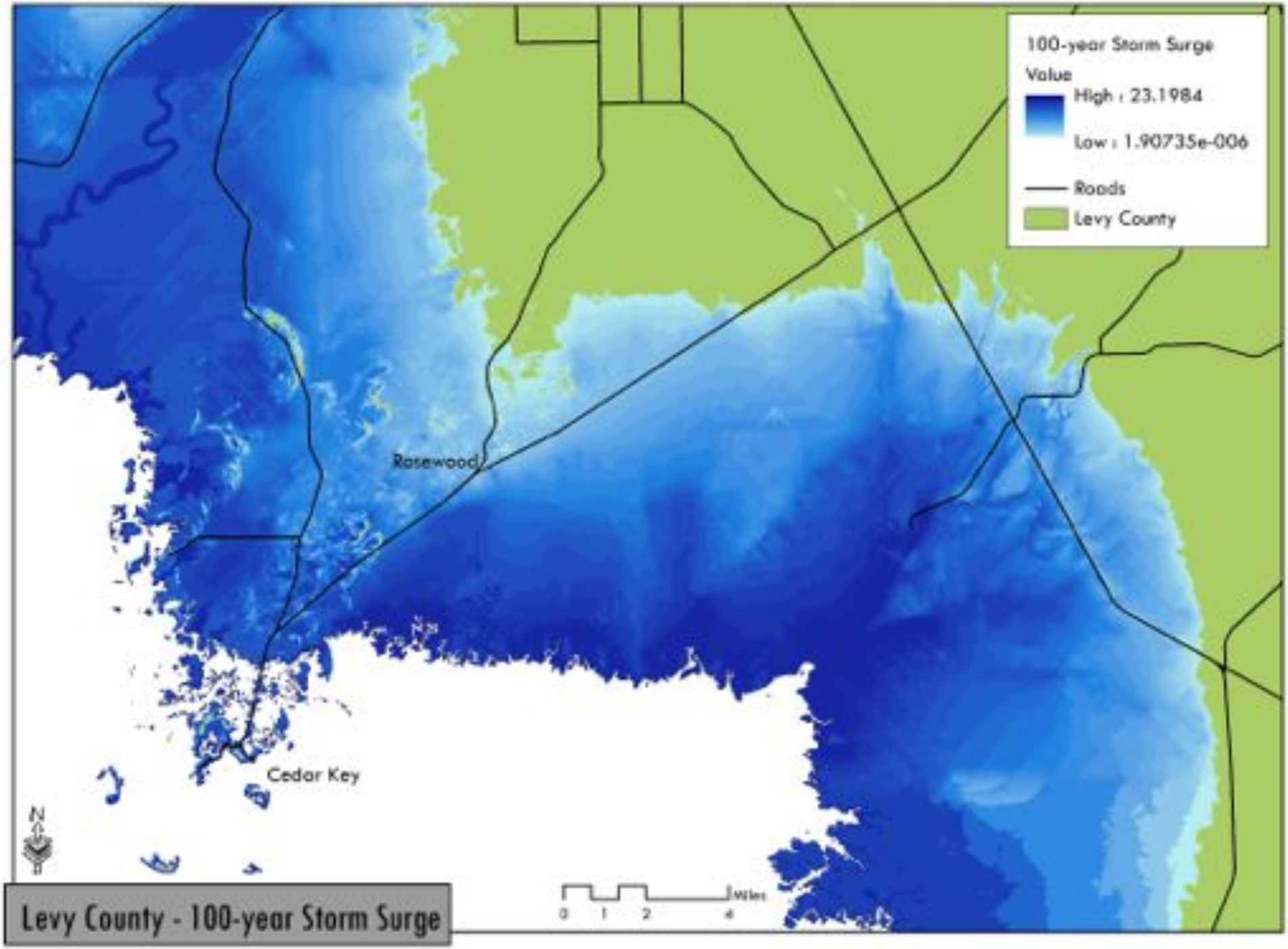
Habitat Changes

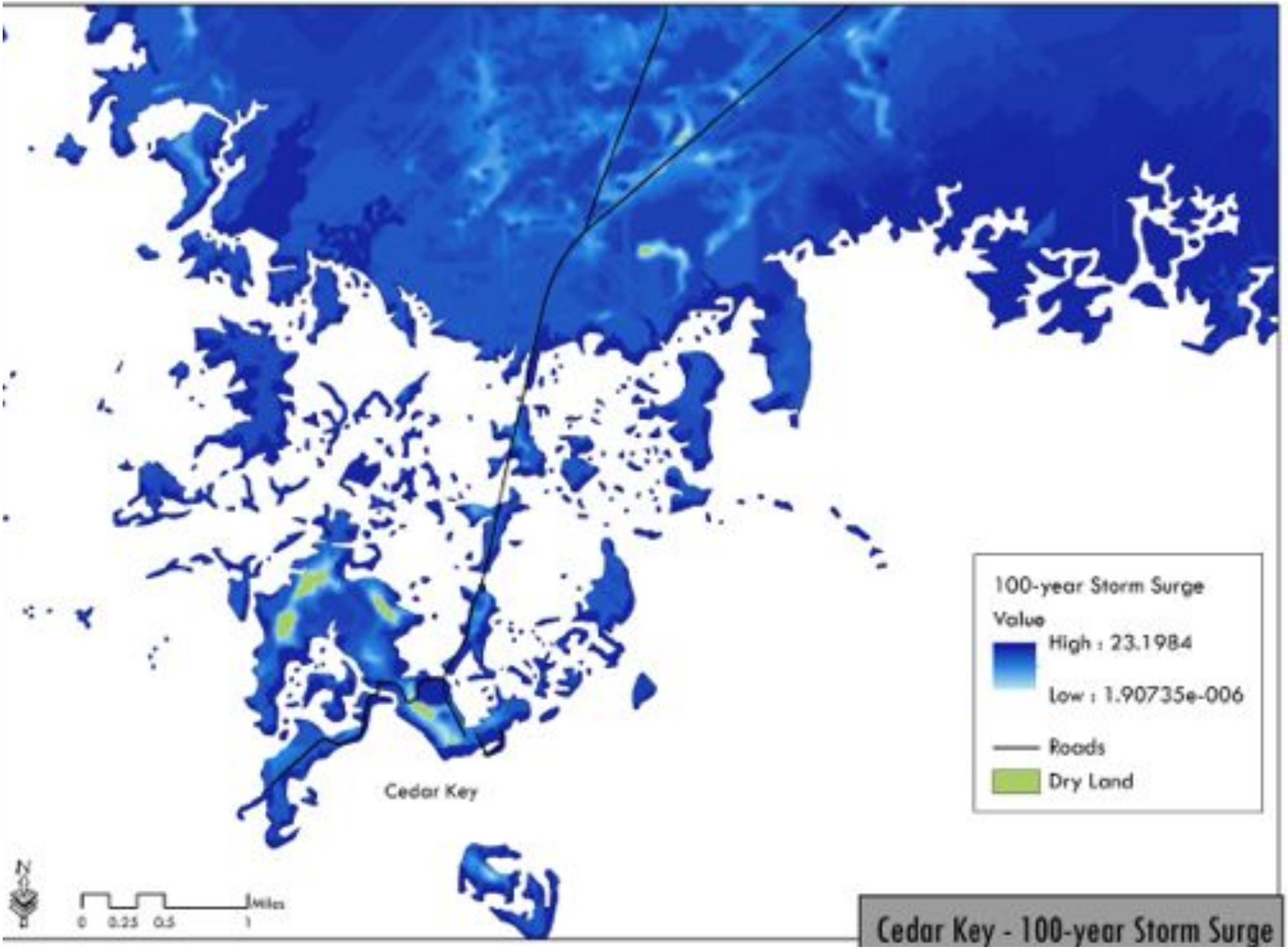
- Existing coastal land is ecologically significant
  - Critical Lands and Waters Identification Project (CLIP) identified significant portions of coastal Levy County as high priority conservation areas (level 1)
    - Based on protecting biodiversity, landscape attributes, and high quality surface water resources at statewide scale
- Changes to coastal habitat are already occurring
  - Increases in sea level will exacerbate these changes – coastal forests ➔ saltmarsh
  - We need to understand how habitats will change so we can better integrate planning for the natural and built environments to lessen negative impacts


Current Habitats & Land Uses
Developed Dry Land
Undeveloped Dry Land
Swamp (incl. Tidal)
Cypress Swamp
Freshwater Marsh
Saltmarsh
Mangrove
Tidal Flat
Rocky Intertidal
Open Water
N
0 1 2 4 6 8 Miles
3 Feet Sea Level Rise With
Change in Developed Lands
Developed Dry Land
Undeveloped Dry Land
Swamp (incl. Tidal)
Cypress Swamp
Freshwater Marsh
Transitional Saltmarsh
Saltmarsh
Mangrove
Tidal Flat
Rocky Intertidal
Open Water
N
0 1 2 4 6 8 Miles

Storm Surge & Flooding

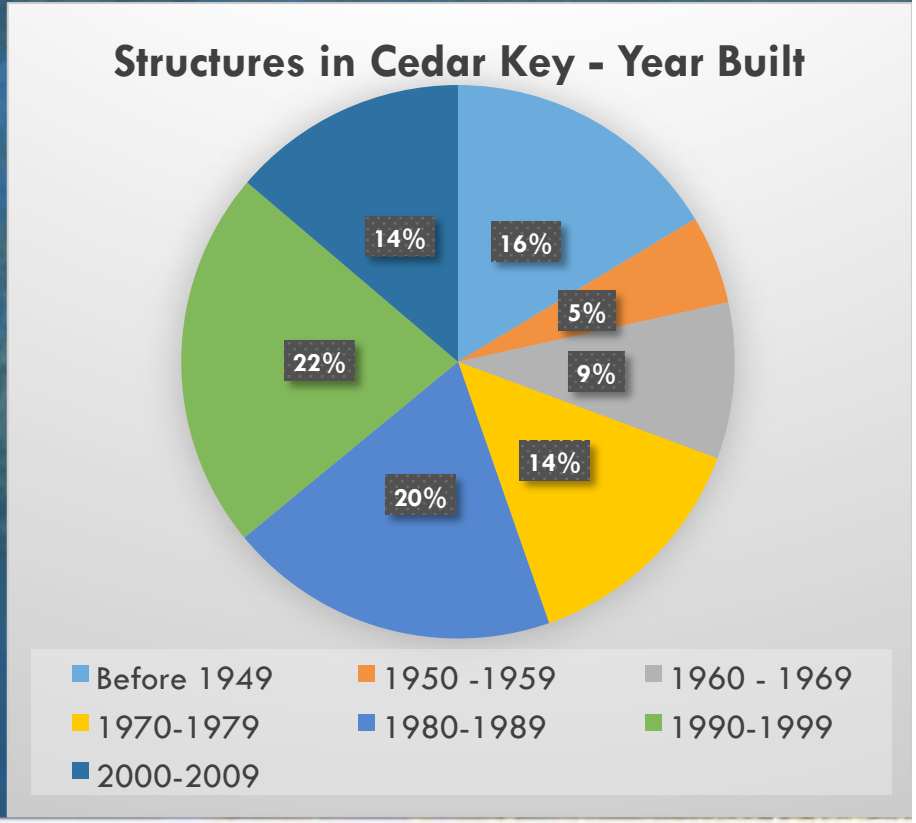
- Levy county and its coastal communities are already highly exposed to storm surge and coastal flooding
  - Sea level rise makes an existing problem worse


100-year Storm Surge
Value
High : 23.1984
Low : 1.90735e-006
Roads
Levy County
Rosewood
Cedar Key
N
0 1 2 4
Miles
Levy County - 100-year Storm Surge


100-year Storm Surge
Value
High : 23.1984
Low : 1.90735e-006
Roads
Dry Land
Cedar Key
N
0 0.25 0.5 1
Miles
Cedar Key - 100-year Storm Surge

Storm Surge and flooding

- Forces us to reevaluate existing and future development in light of hazards in an integrated manner - safe growth audit
  - Are our building codes robust enough?
  - Cedar Key has a large number of older structures – is existing development capable of withstanding current hazards? What about new or more frequent hazards?
  - Is new development being directed to safer areas?
  - Are we thinking about hazards when we make capital improvement decisions?
  - Are we preserving protective ecosystems?



Local economy and infrastructure

- We need to consider how current decisions will be affected by rising seas → wise future investment
- What does this mean for:
  - Drinking water supply?
  - Capital investments/improvements?

    -Roads, real estate, buildings, future development, etc.
  - Infrastructure and utilities?
  - Tourism?
  - Other industries?

Current Impacts and Priorities

Current Impacts and Priorities

- Groups
  - Low-lying areas
  - Storm surge
  - Water supply
  - Habitat
  - Future development

- Label and place post-it notes on
  - Areas of current impacts of coastal change
  - Priority areas for planning

Adaptive Planning and Strategies

Planning and Design Approach

- Integrate planning for sea level rise with other coastal change
- Start planning and capacity building now
- Monitor and be flexible

- Adaptive strategies
  - Preserve natural lands and systems
  - Prioritize infrastructure investments
  - Move special places
  - New development on higher ground

Preserve Natural Lands and Systems

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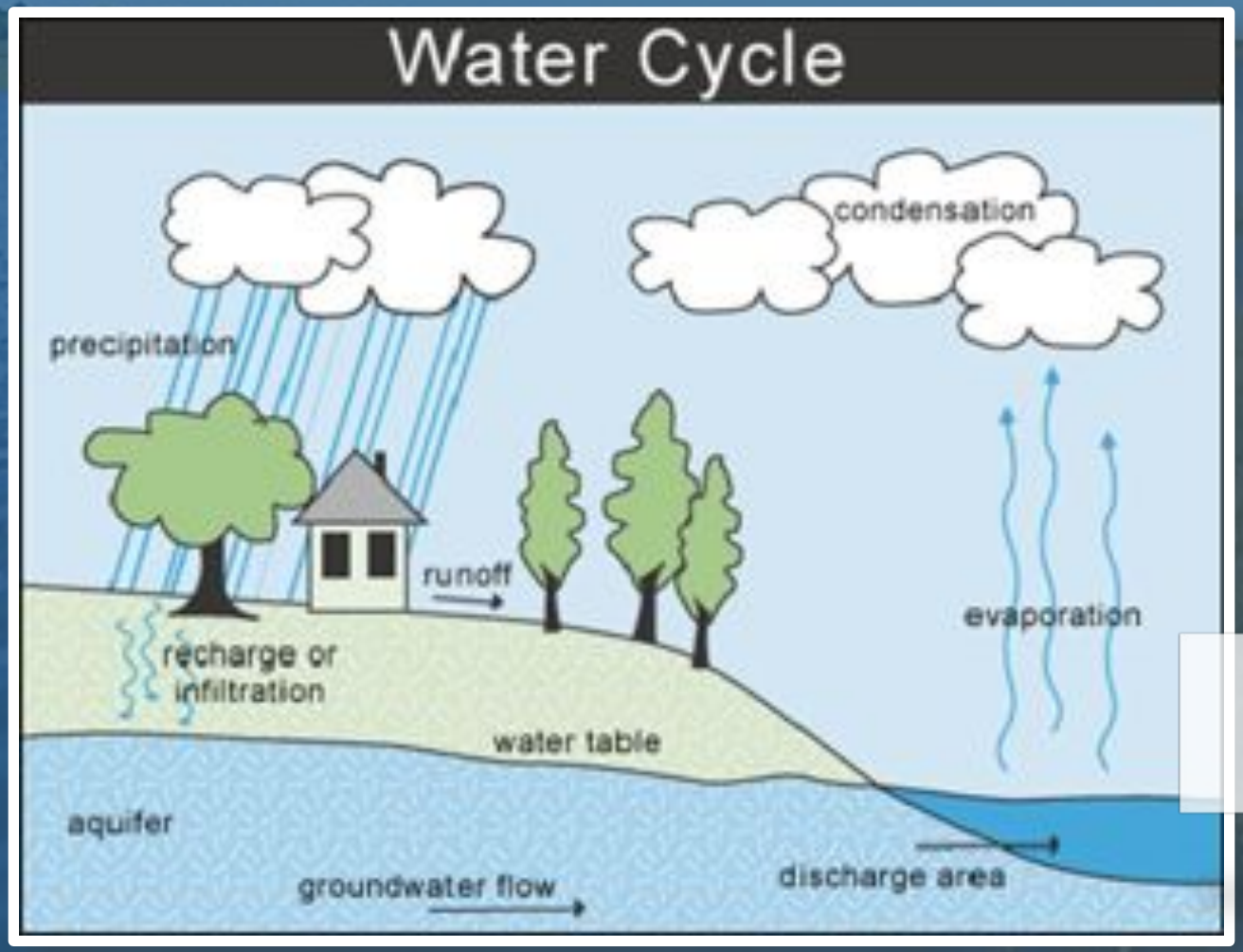


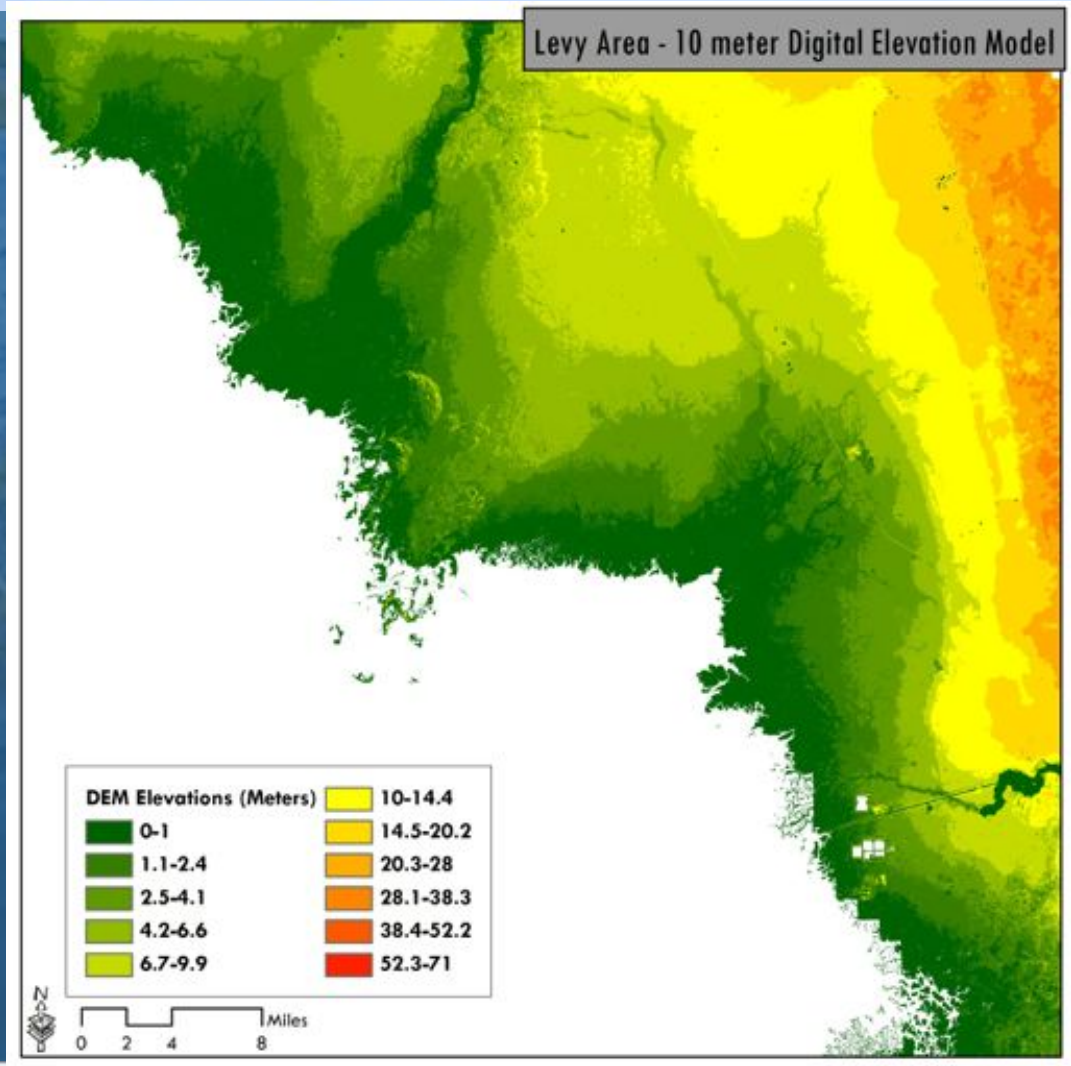
Protect Aquifer Recharge

Prioritize Infrastructure Investments

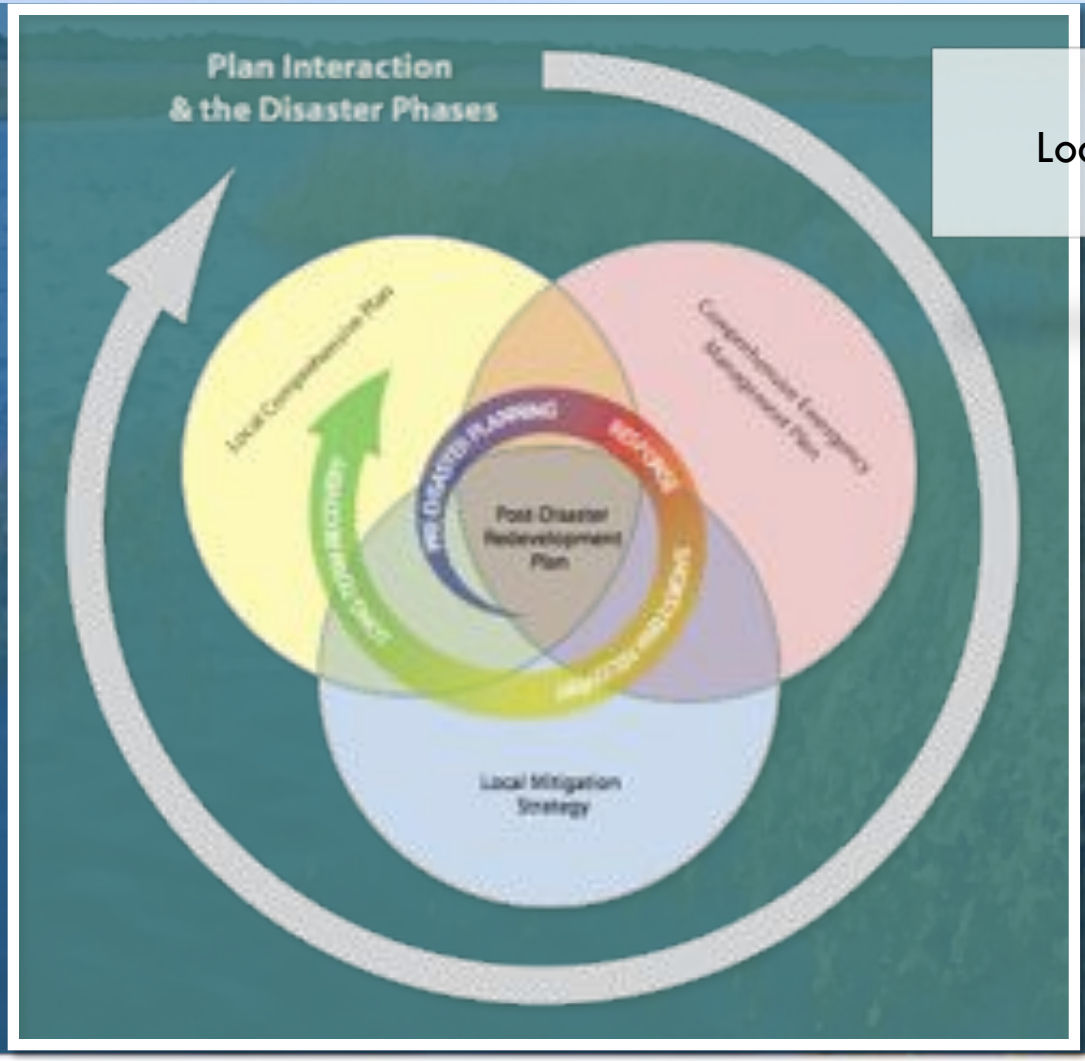
Prioritize Infrastructure Investments

Move Special Places

New development on higher ground



New development on higher ground



Local Planning

Development compatible with habitat migration

And other principles of good planning

Adaptive Strategies Game

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Closing Remarks and Next Steps