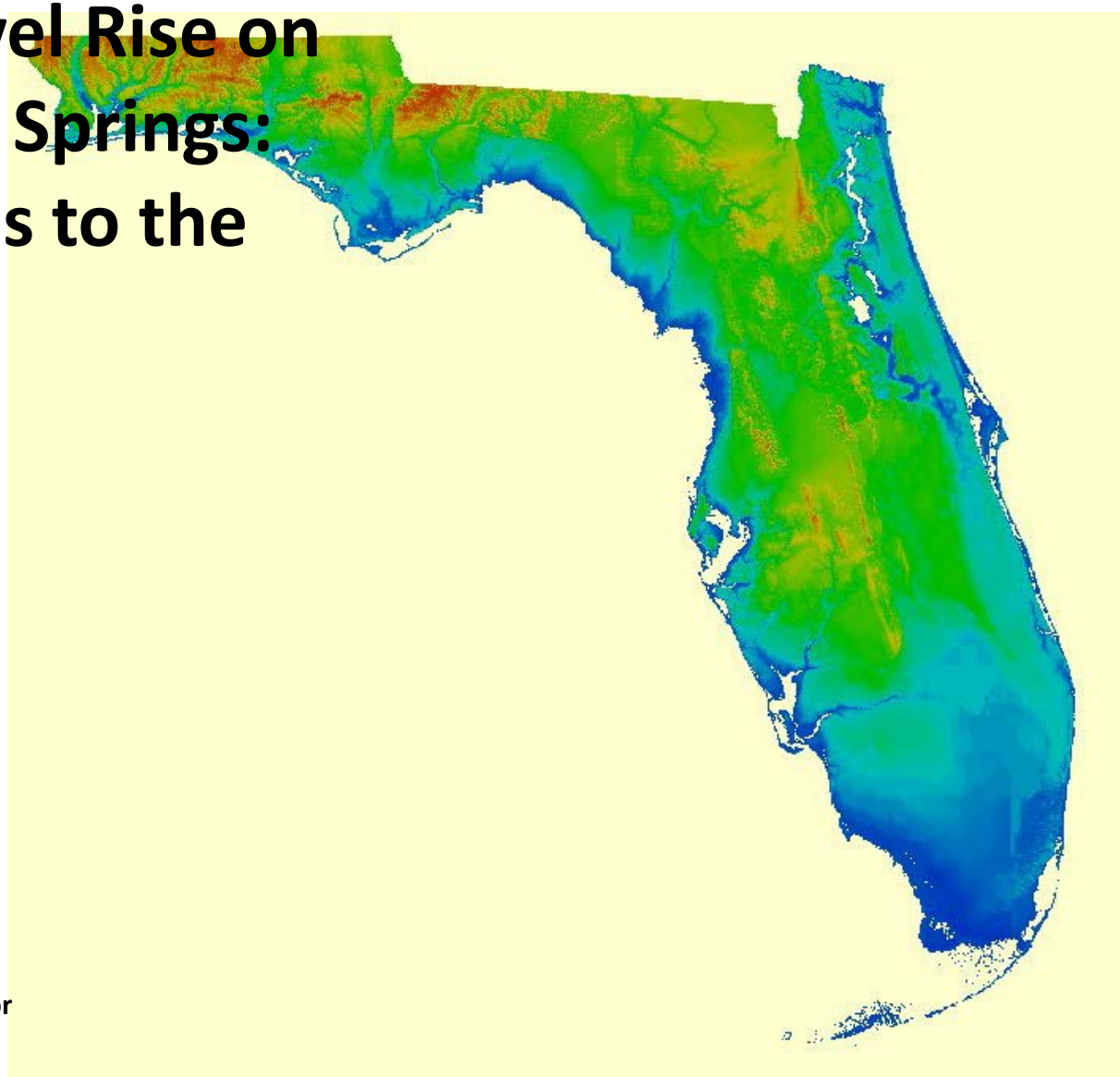
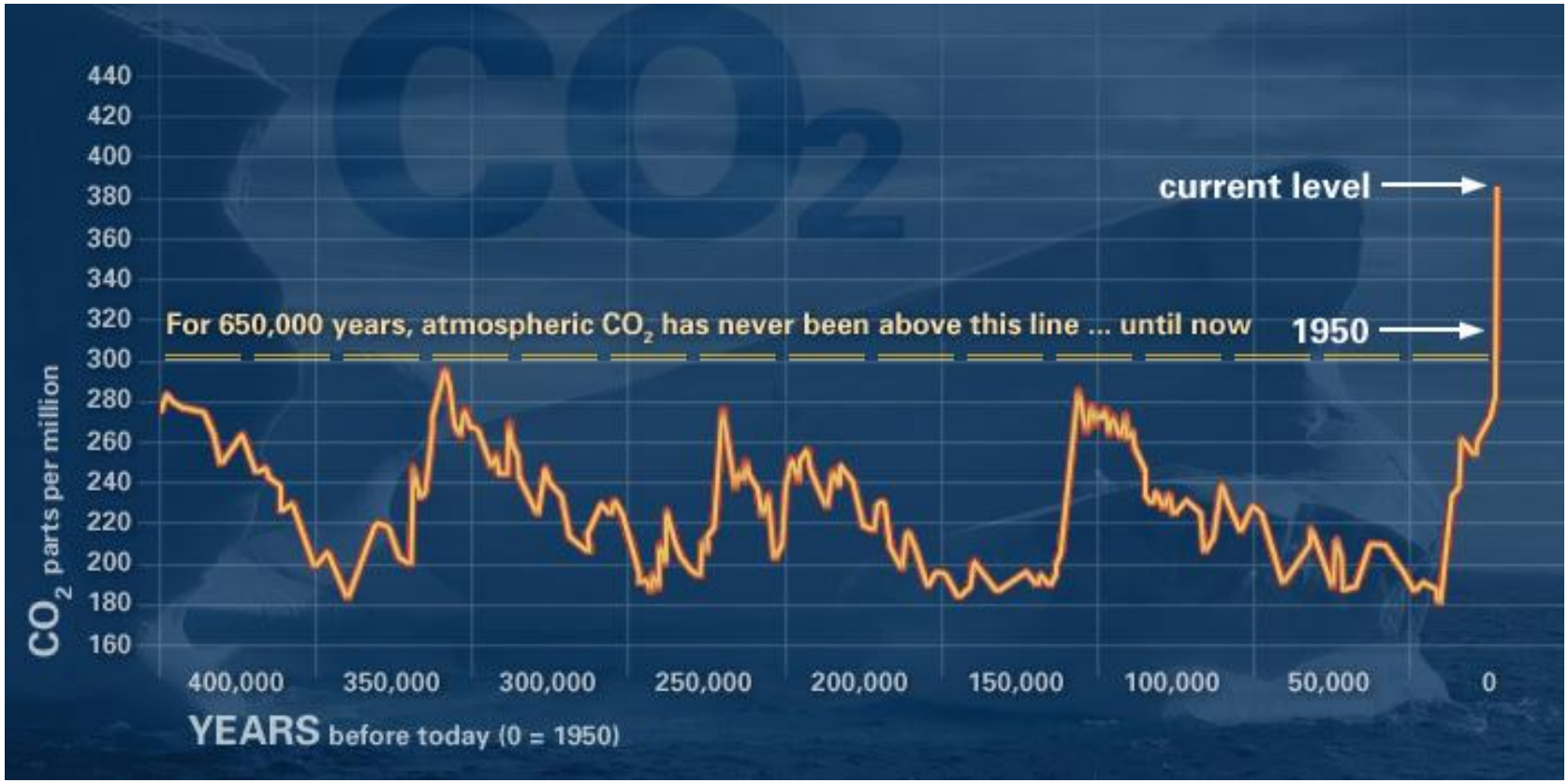
Potential Effects of Climate Change and Sea Level Rise on Florida's Rivers and Springs: From the Coastlands to the Headwaters



Whitney Gray, Sea Level Rise Coordinator
FWC/Florida Sea Grant

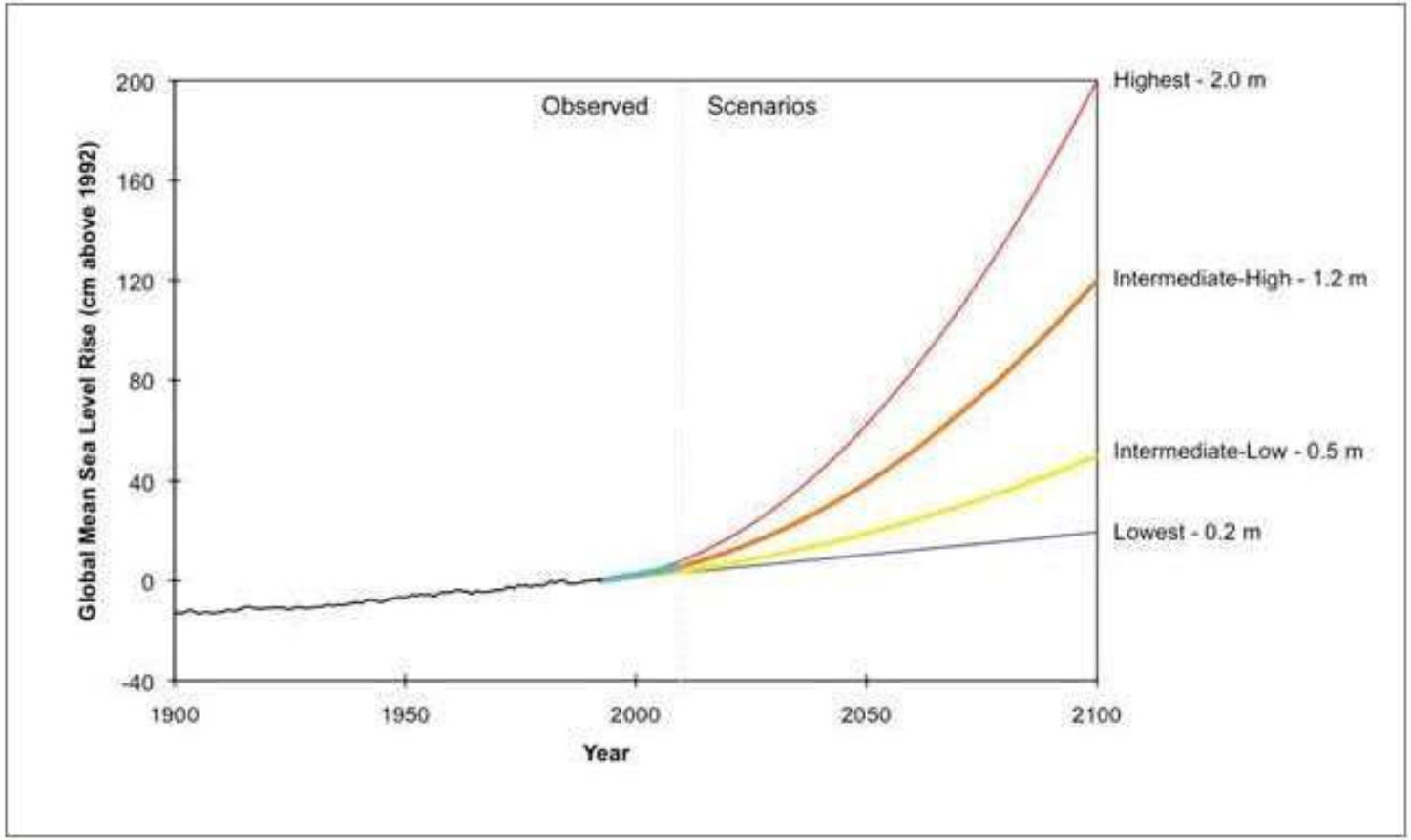
March 6, 2013

Sustainable Water Resources Roundtable



http://climate.nasa.gov/evidence

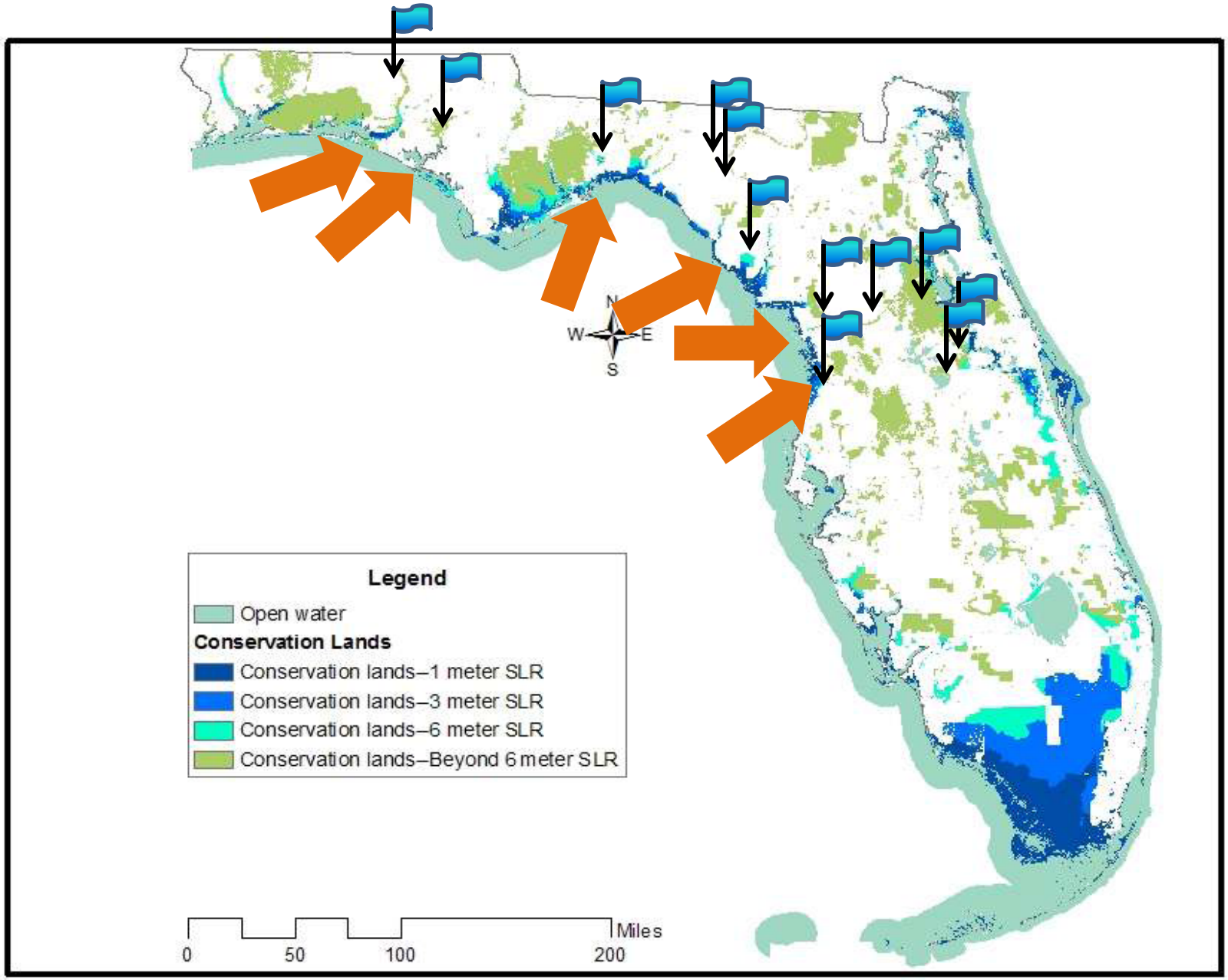
What's driving climate change and sea level rise?



Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

* Using mean sea level in 1992 as a starting point.

Draft National Climate Assessment


N
W
E
S
Legend
Open water
Conservation Lands
Conservation lands–1 meter SLR
Conservation lands–3 meter SLR
Conservation lands–6 meter SLR
Conservation lands–Beyond 6 meter SLR
Miles
0
50
100
200

Sea Level Rise at the Coasts

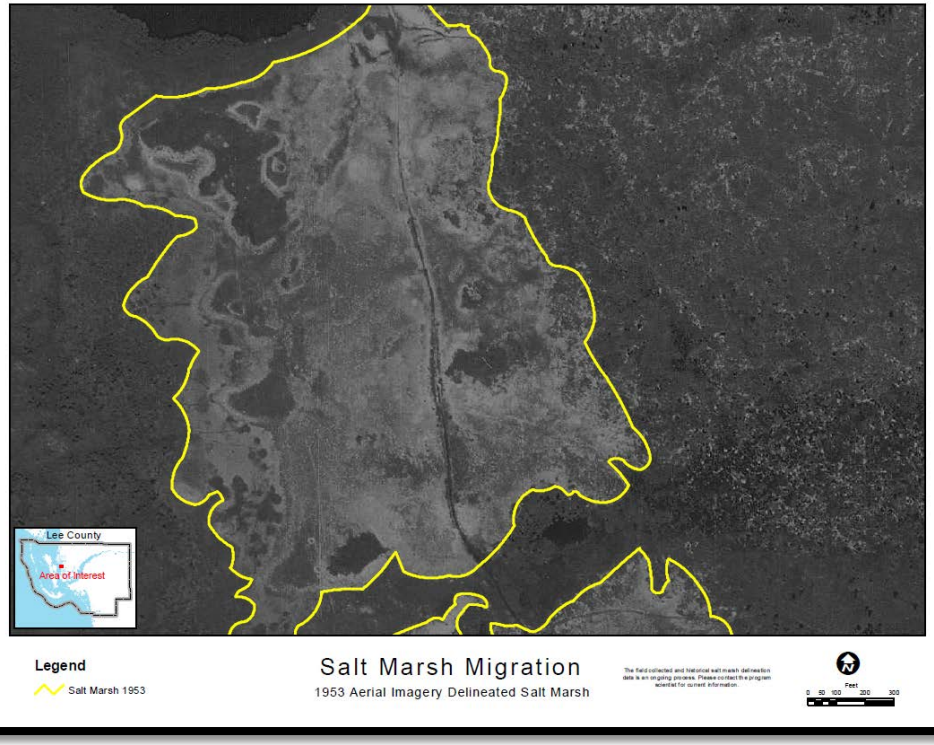
Effect of Climate Change

- **Inundation**
- **Changes to tidal regimes**
- **More frequent overwash from storms**
- **More intense wave action during storms**

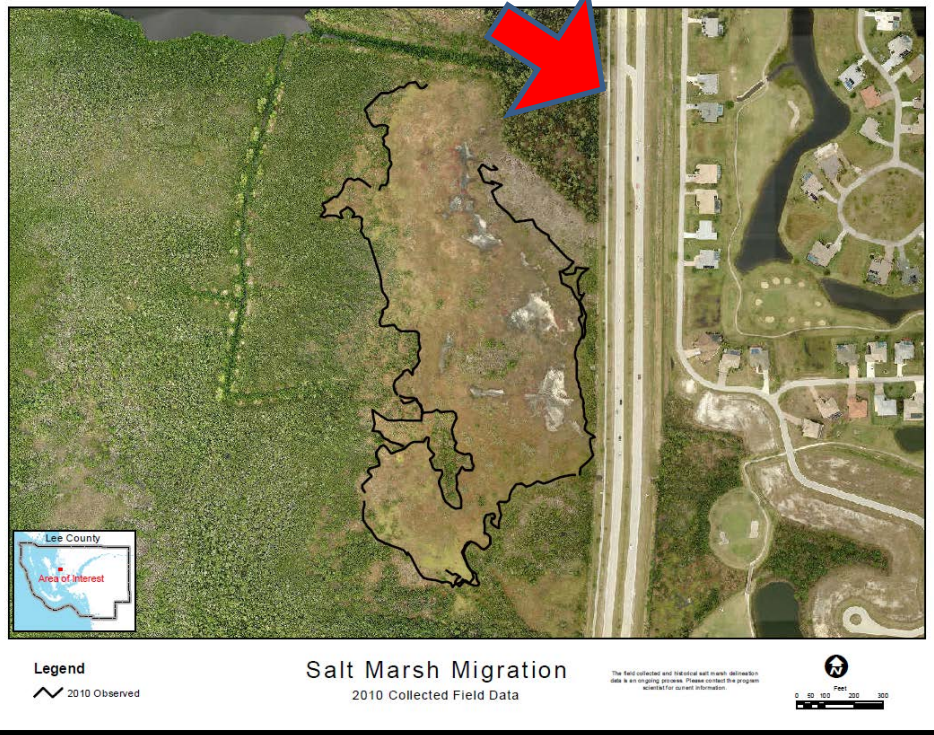
Response

- **Habitat migration**
- **Changes to plant and animal communities**
- **Local extirpation**

Salt Marsh Migration

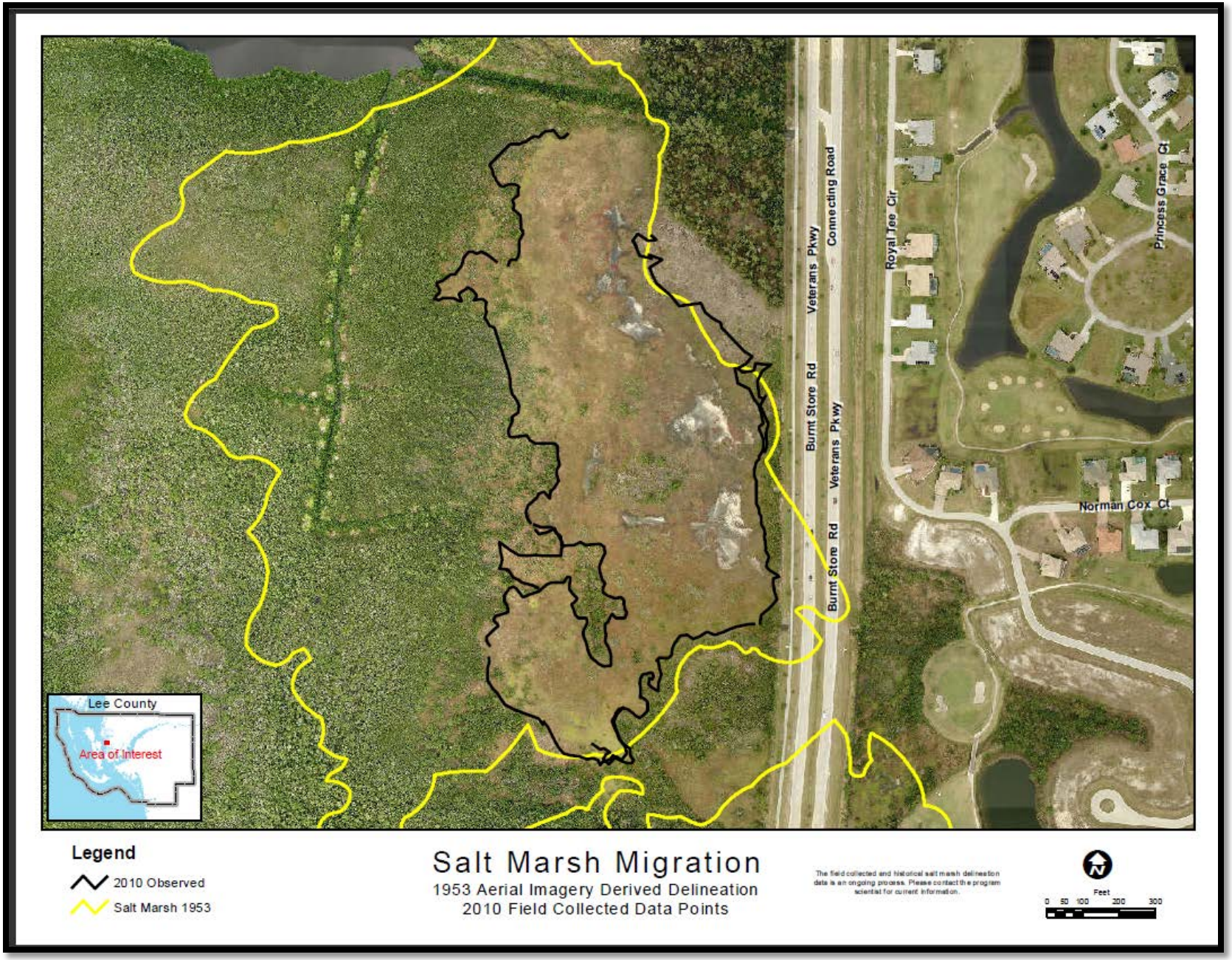


1953

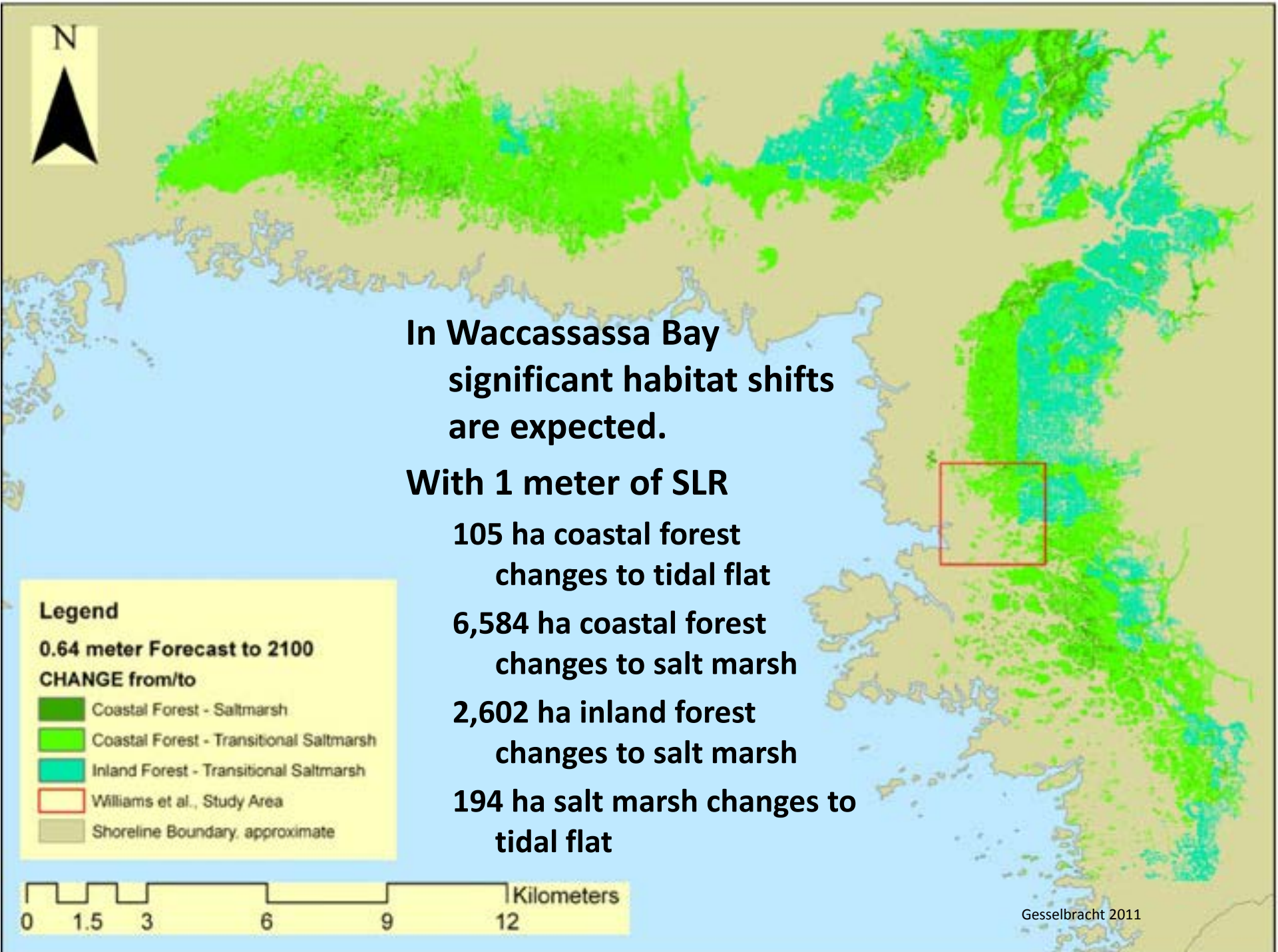


2010

SWFRPC 2011


Lee County
Area of Interest
Legend
2010 Observed
Salt Marsh 1953
Salt Marsh Migration
1953 Aerial Imagery Derived Delineation
2010 Field Collected Data Points
The field collected and historical salt marsh delineation data is an ongoing process. Please contact the program scientist for current information.
Feet
0 50 100 200 300
Burnt Store Rd
Veterans Pkwy
Connecting Road
Royal Tee Cir
Princess Grace Ct
Norman Cox Ct

SWFRPC 2011

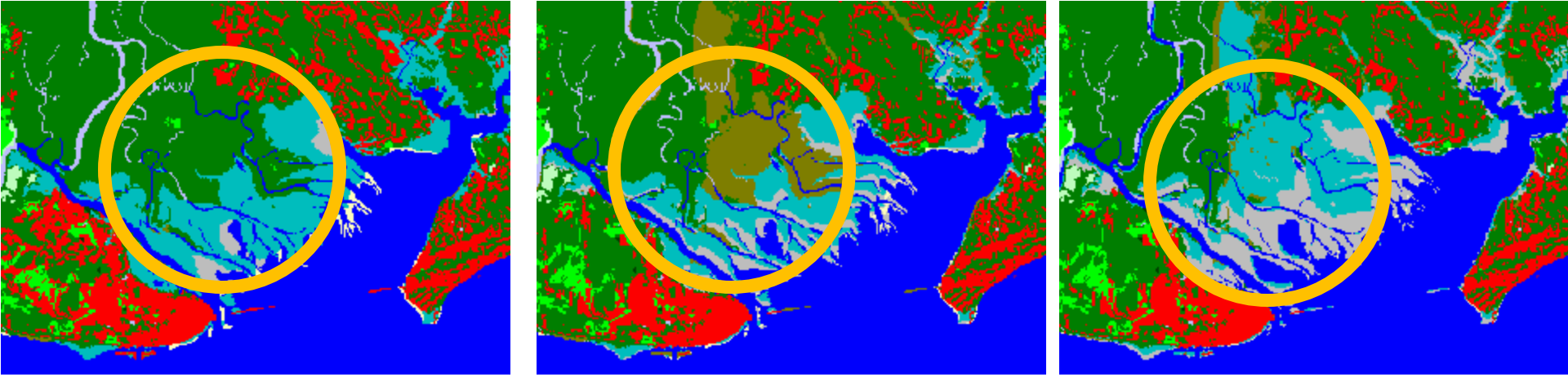


In Waccassassa Bay significant habitat shifts are expected.

With 1 meter of SLR

- 105 ha coastal forest changes to tidal flat
- 6,584 ha coastal forest changes to salt marsh
- 2,602 ha inland forest changes to salt marsh
- 194 ha salt marsh changes to tidal flat

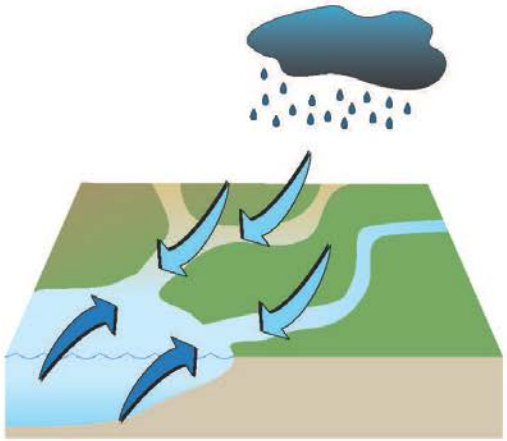
Gesselbracht 2011



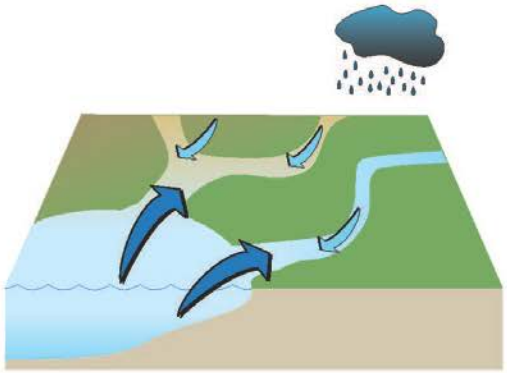
	0.4 m SLR
Undeveloped Dry Land	-26.31%
Swamp	-9.72%
Transitional Salt Marsh	4544.96%
Regularly Flooded Marsh	-25.26%

"The low relief nature of the Apalachicola delta makes it especially vulnerable to accelerated sea level rise. The size and distribution of coastal wetlands in the Apalachicola study area are particularly sensitive to freshwater flows in the Apalachicola River. Sea level rise will have a substantial impact on these wetland systems, in particular *forested wetland*, which would lose in excess of 20,000 hectares in the next 100 years based on the 1 meter by 2100 SLR scenario. *Reductions of freshwater flows in the Apalachicola River would substantially exacerbate these impacts.*"

Geselbracht, 2012

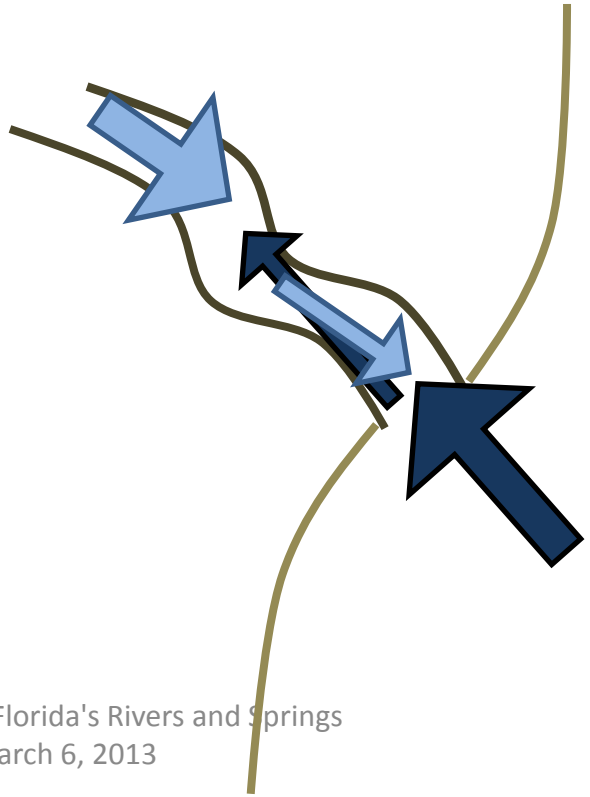


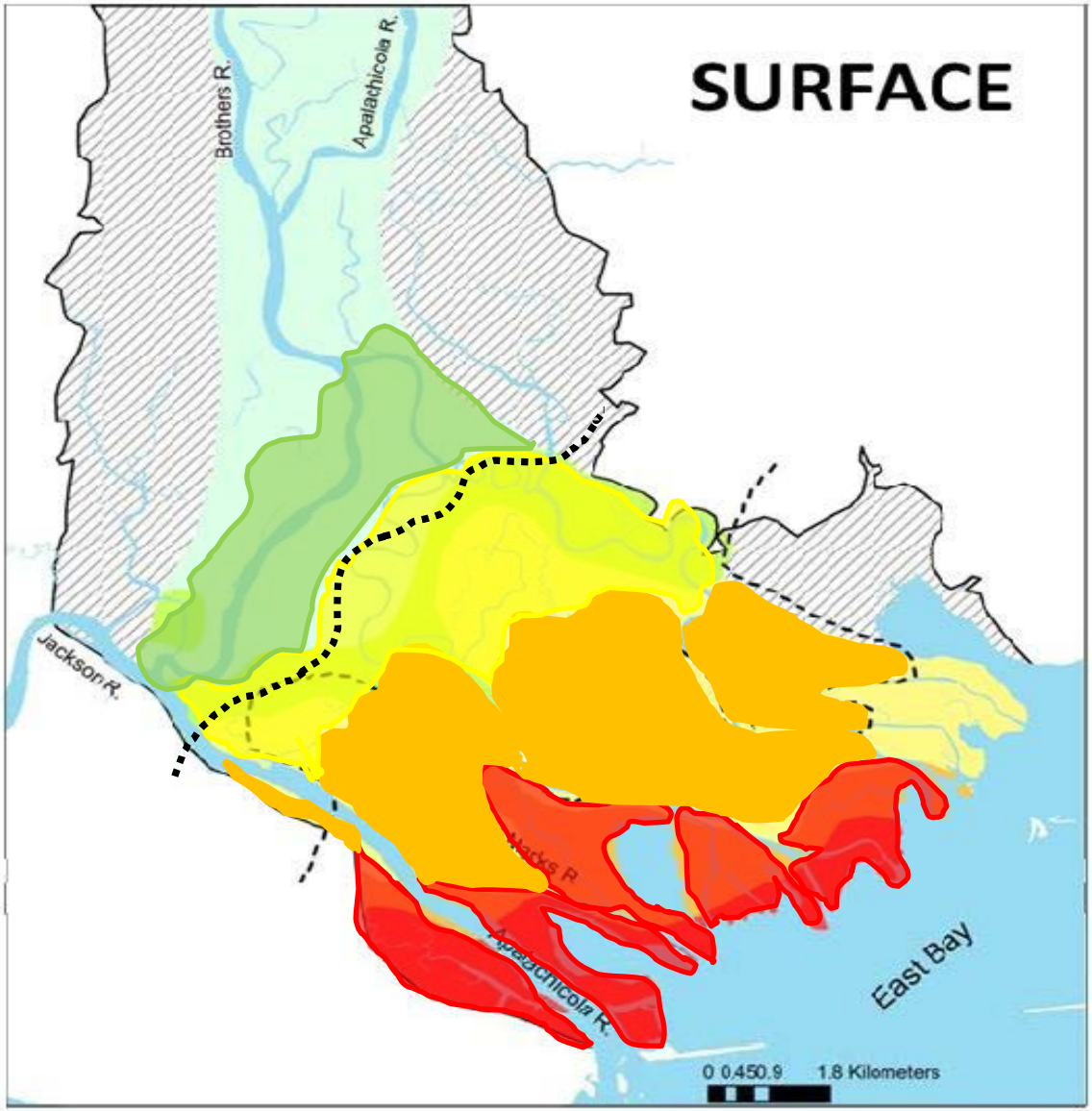
Current



With Sea Level Rise

Lower stream flow from reduced precipitation => less fresh water in the estuary and salinity moving further upstream.





FXPLANATION

- Floodplain boundary (extent of annual flooding)
- Tree line (forest/marsh boundary)
- Salinity unknown
- < 0.5 ppt -- Fresh
- 0.5-5 ppt
- 5-10 ppt
- 10-18 ppt
- 18-30 ppt

Brackish

USFWS, 2011

Oysters and other fisheries?
Salinity upstream?
Effects on springs?
Effects on groundwater?
Effects on forestry?

Coastal Pinewoods and Forests

- **Human relocation will eliminate the rarest of the upland habitats along with endemic animals, such as the red-cockaded woodpecker, Florida scrub jay, and plants, such as the pygmy fringe tree.**
- **Conflicts with wildlife may become more common.**

http://www.fws.gov/rcwrecovery

Vulnerable Species:

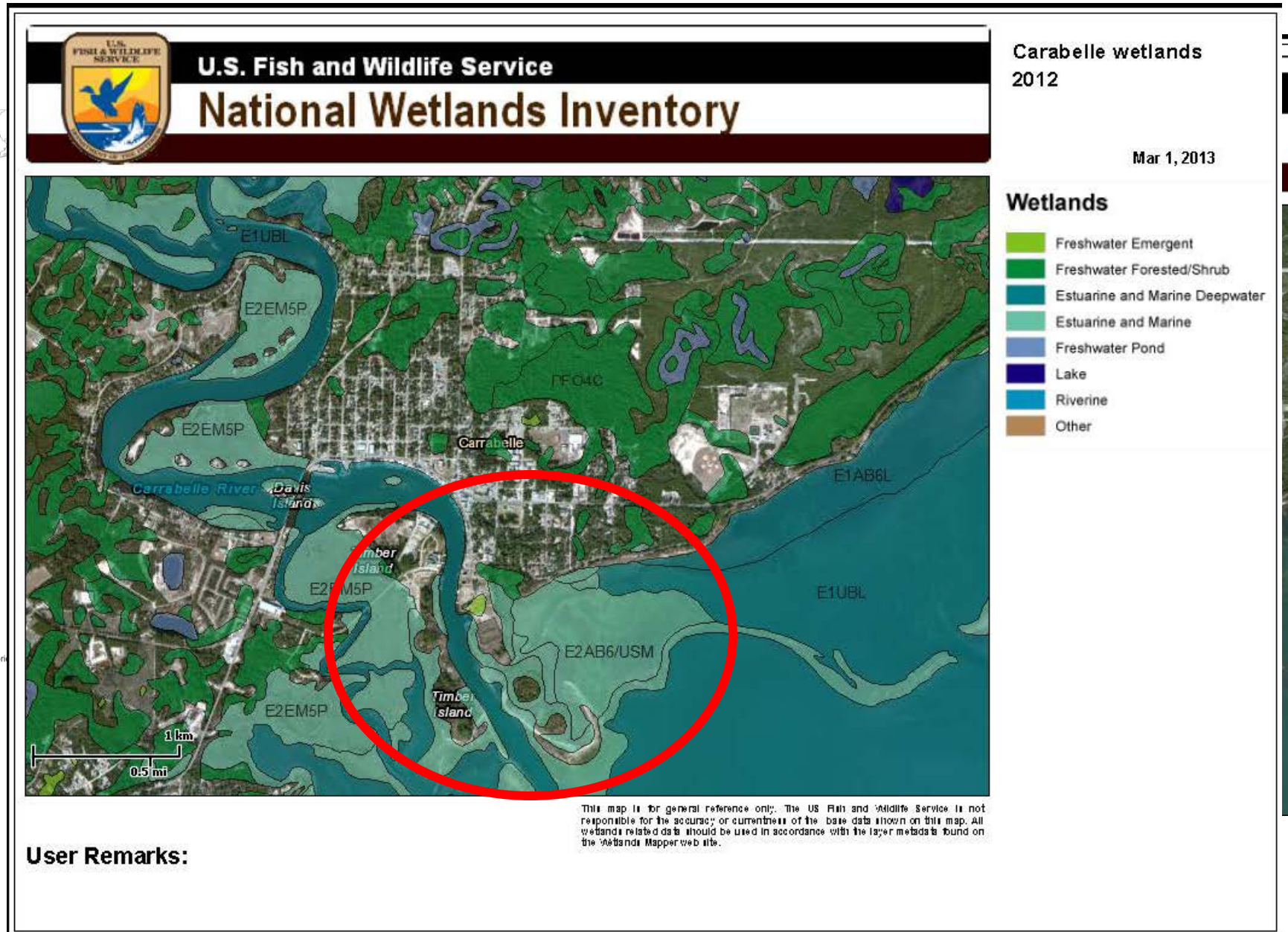
Red-cockaded Woodpecker

(Picoides borealis)

How can we preserve our vital coastal and aquatic ecosystems?

- Identify and maintain places where ecosystems can move upland.
  - Planning/Zoning
  - Natural Resource Adaptation Action Areas (Comprehensive Plan)
  - Removal of abandoned infrastructure
- Restore degraded habitats
  - Oyster reef restoration
  - Exotic species removal
  - Living shorelines

Natural Resource Adaptation Action Areas



U.S. Fish and Wildlife Service

National Wetlands Inventory

Air Force Property wetlands

Mar 1, 2013

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Questions, Comments, Help?

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