
Coastal Barrier Island Network (CBIN): Management strategies for the future

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Barrier islands

- Protect mainland and associated habitats from storm wind and wave action
- Form and maintain coastal and estuarine habitats – seafood and fish
- Nesting sites for birds and sea turtles



Satellite image of Topsail Island, NC



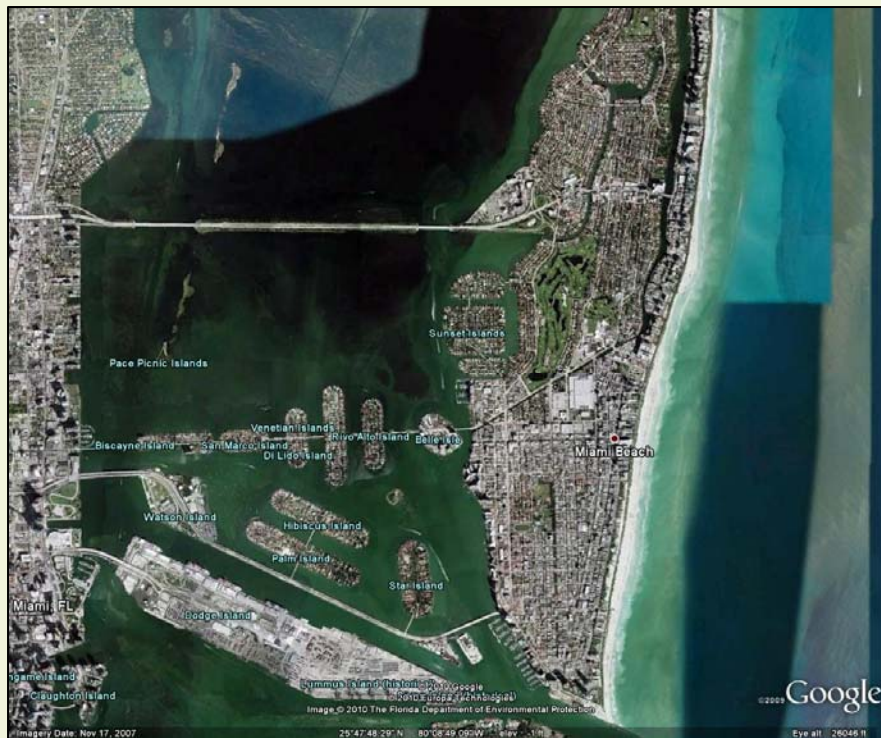
Sea turtle nest, Topsail Island, NC

Barrier islands

Miami, FL: 362,470

Miami Beach, FL: 87,933

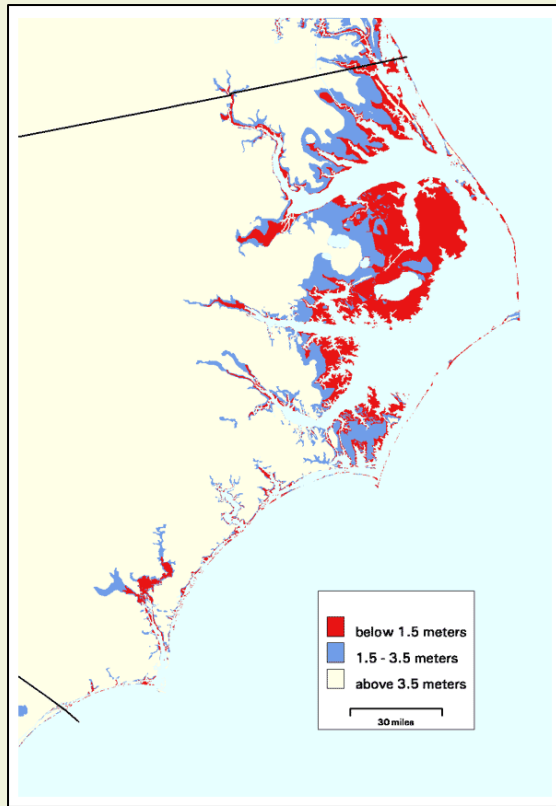
city-data.com



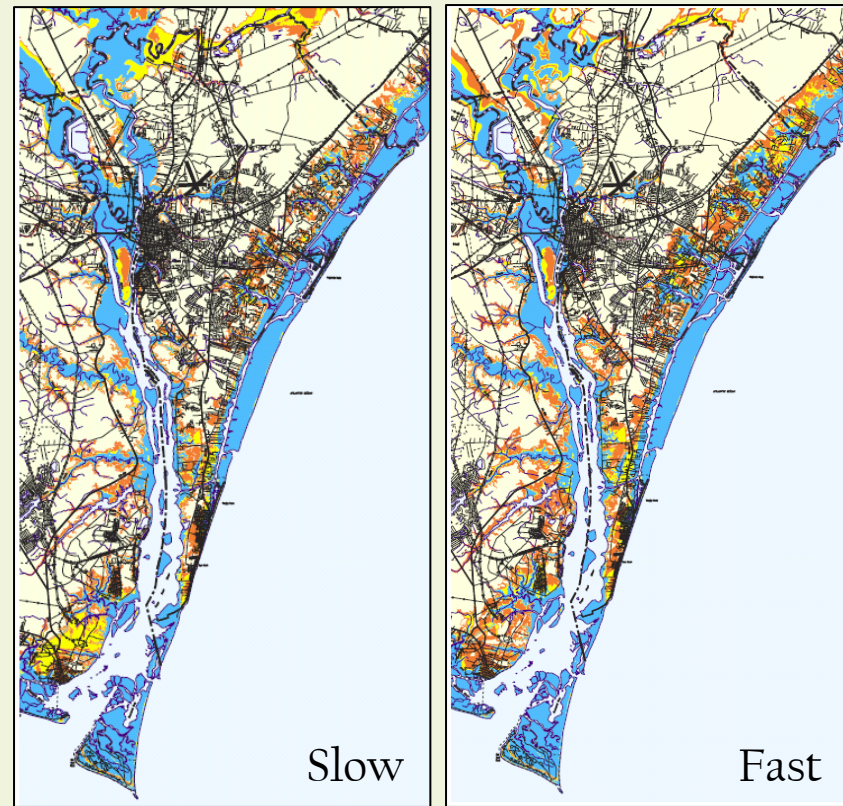
Hurricane Fran

http://www.nature.nps.gov/geology/coastal/c_web_images/hurricane_fran_nasa.jpg

Future impacts: hurricanes and sea-level rise



<http://www.epa.gov/climatechange/effects/maps/nc.gif>

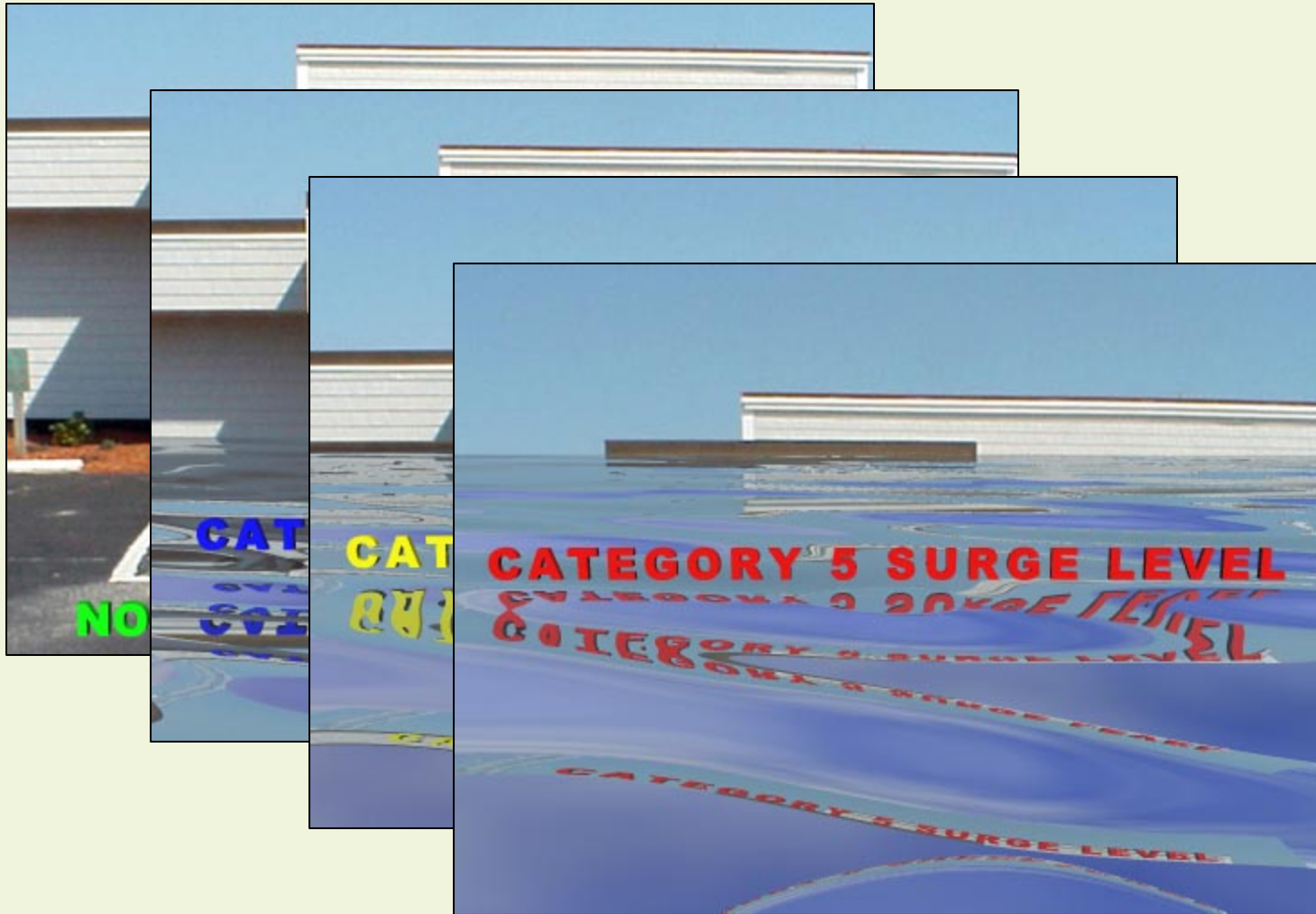


<http://www.hurricanetrack.com/ncstormsurge/newhan.html>

- How can barrier island ecosystems be sustained in a changing global environment?

Hurricane storm surge

<http://www.hurricanetrack.com/ncstormsurge/newhan.html>



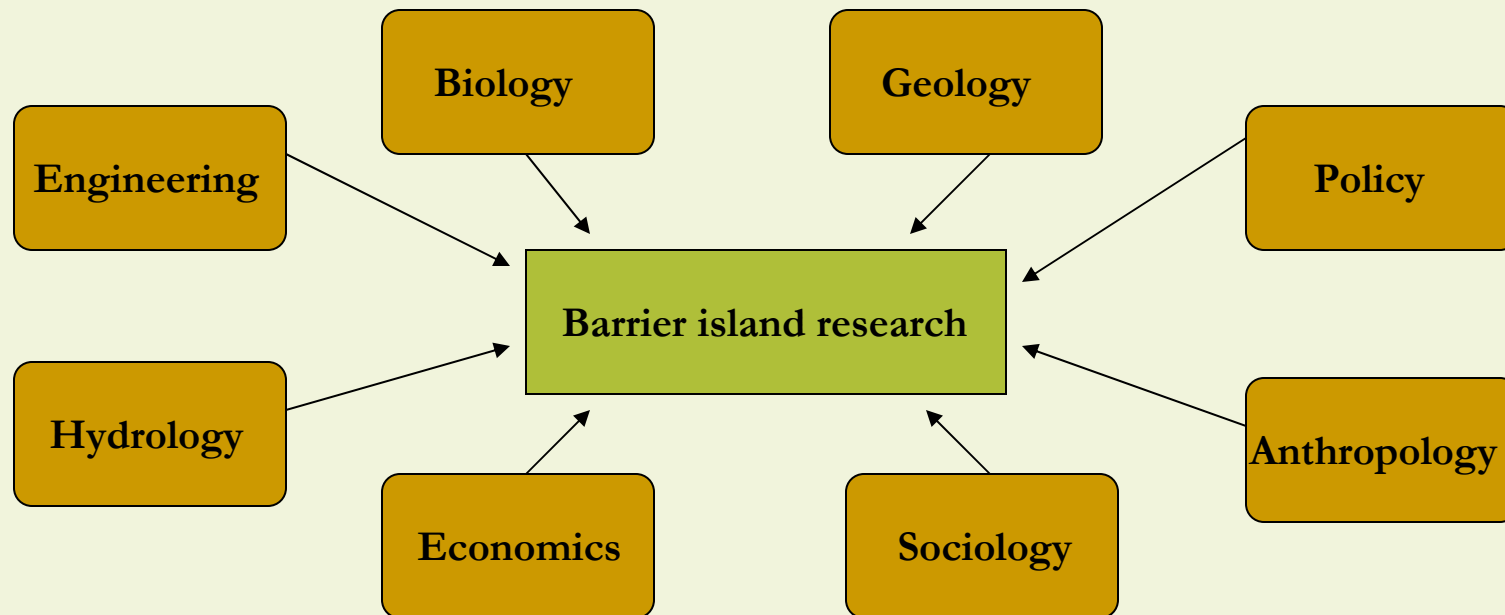
Wrightsville Beach Police Station

Native barrier island vegetation



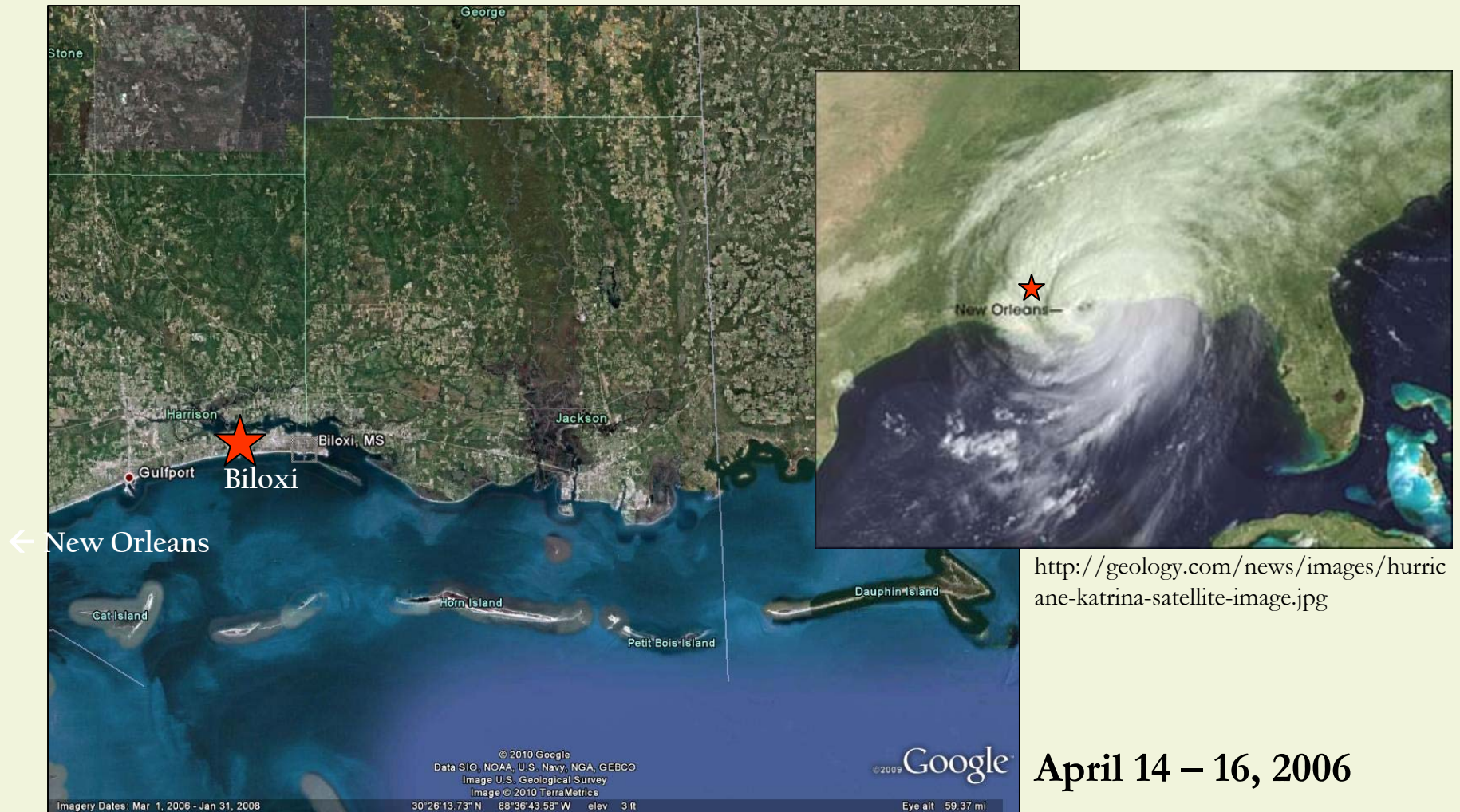
- ‘Ecological engineers’
- Capture sediment, increase elevation, and progress succession
- Resilience to impact of episodic extreme storm events (EASE)?

Coastal Barrier Island Network (CBIN)



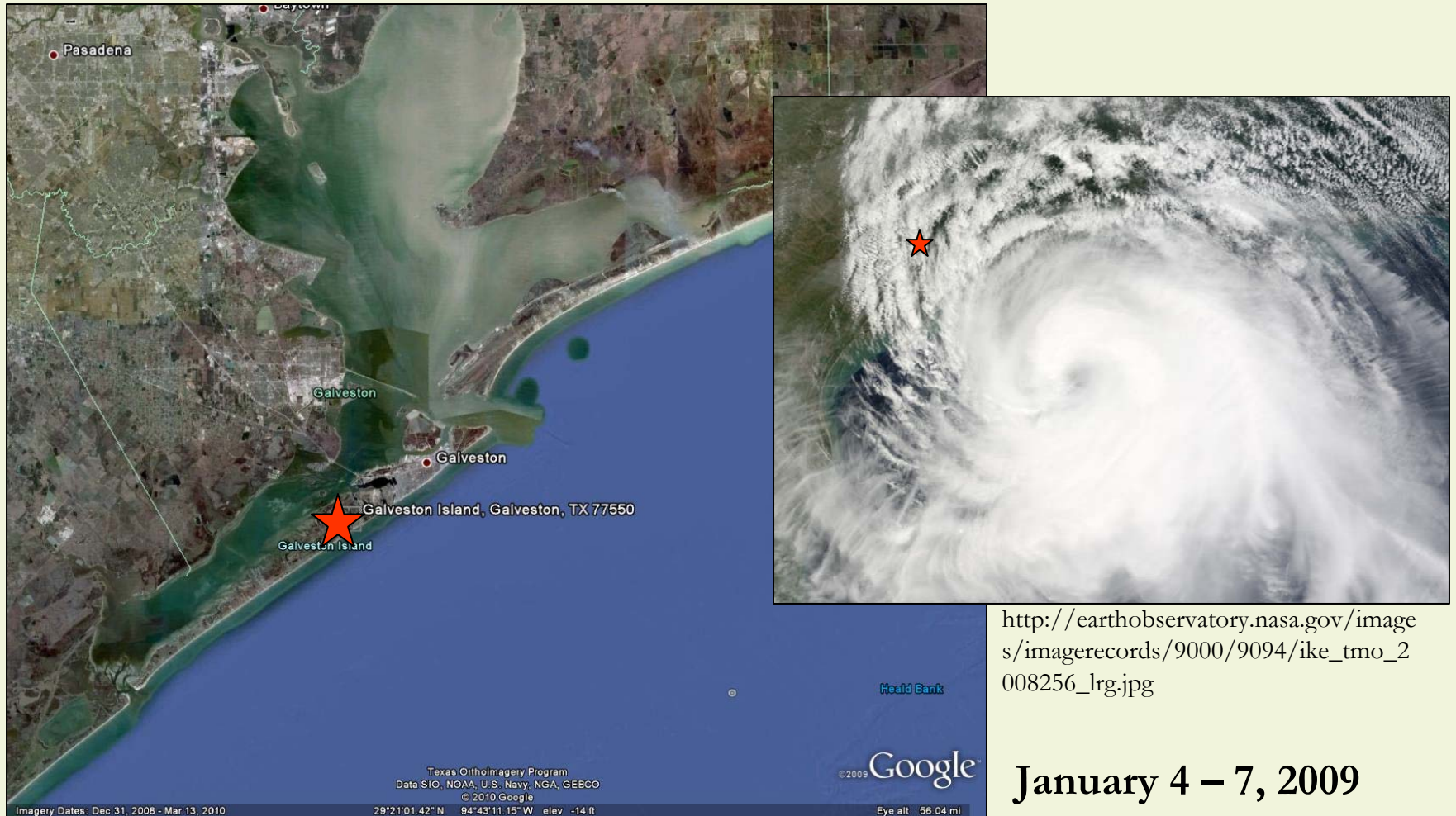
- International research group dedicated to creating solutions involving strategic compromise between anthropogenic development and ecosystem preservation

Post-Katrina Meeting: Biloxi, MS



Feagin et al., 2010. Coastal barrier islands: Coupling anthropogenic stability with ecosystem sustainability. *Journal of Coastal Research: in revision.*

Post-Ike Meeting: Galveston, TX

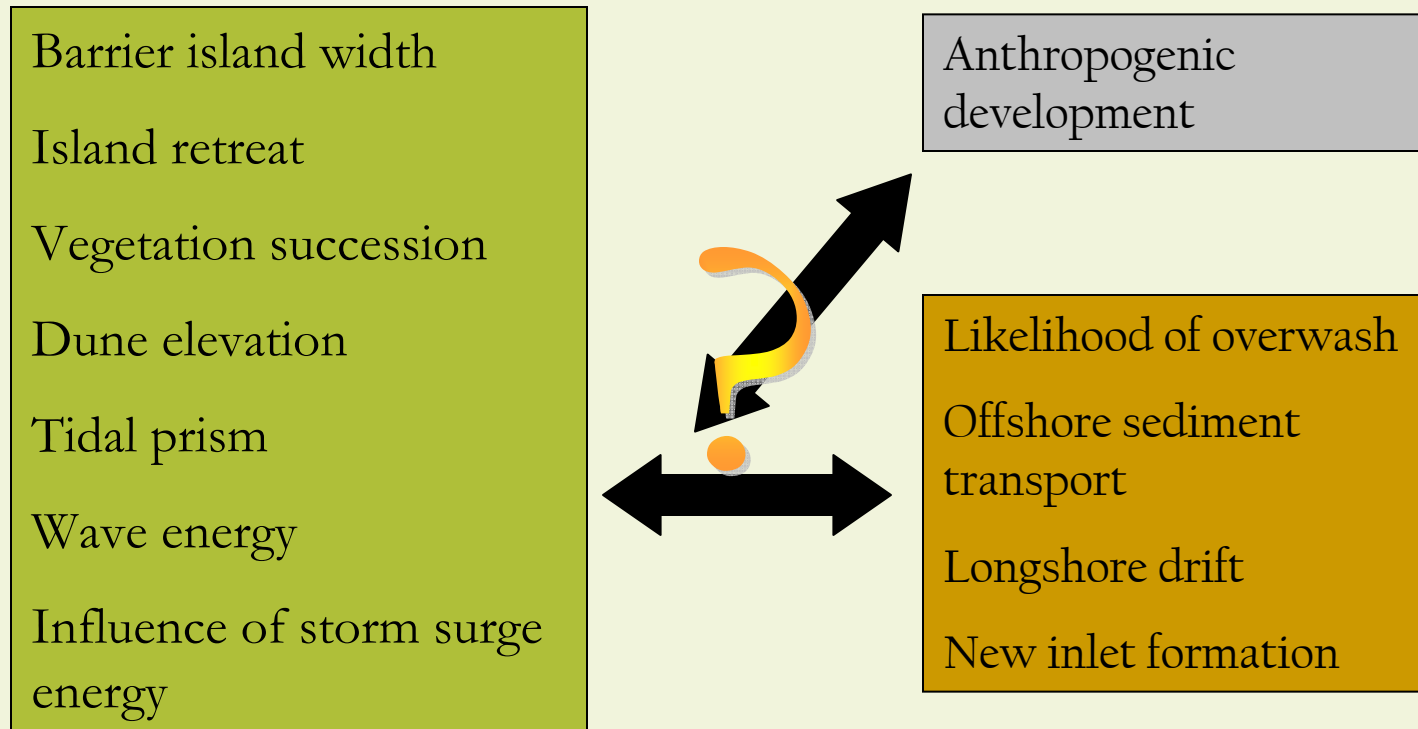


http://earthobservatory.nasa.gov/images/imagerecords/9000/9094/ike_tmo_2008256_lrg.jpg

January 4 – 7, 2009

Williams et al., 2009. Ecosystem impacts of Hurricane Ike on Galveston Island and Bolivar Peninsula: perspectives of the Coastal Barrier Island Network (CBIN). *Shore and Beach* 77: 71 – 76.

Goal of meetings

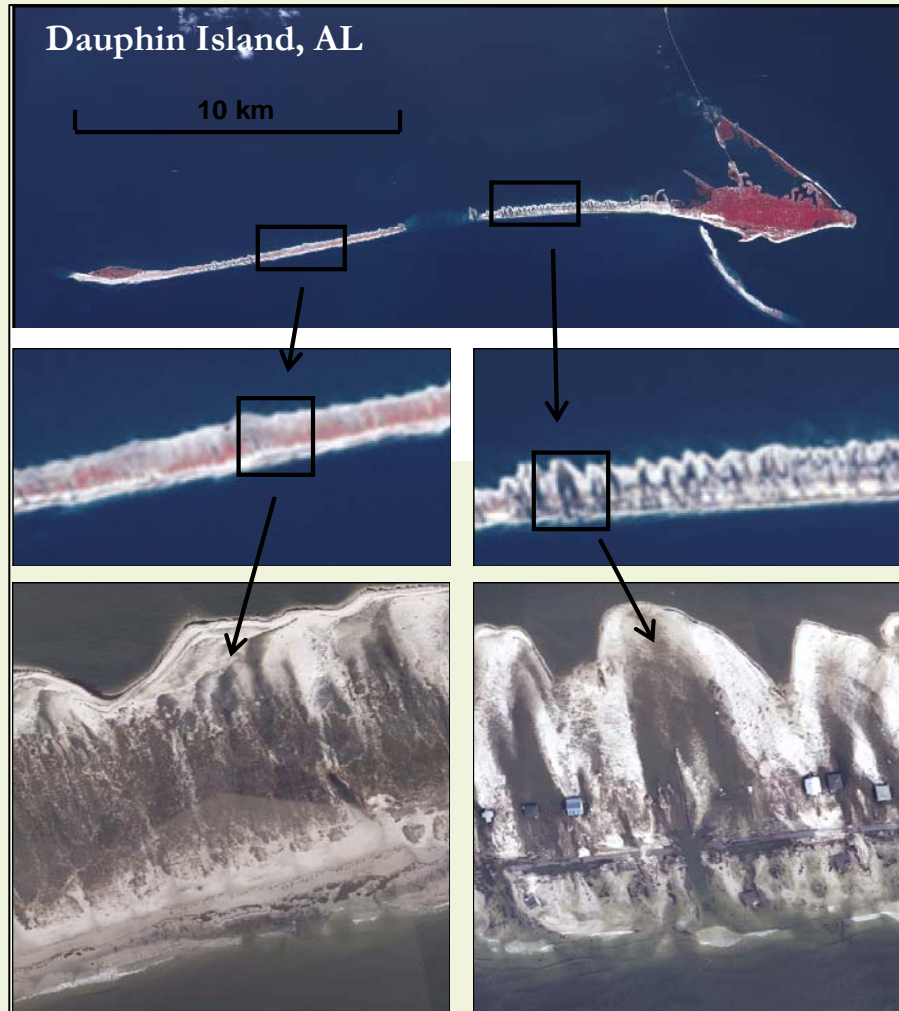


- Sustainable management strategy for barrier islands which compromises anthropogenic development and preservation of natural ecosystems

Main questions

- What are the interactions between geomorphic, hydrologic, abiotic, and biological processes on barrier islands?
 - How are these interactions impacted by anthropogenic development?
 - What is the level of landscape stability required for anthropogenic development of dynamic barrier island ecosystems?
 - How should a management strategy compromising development and natural processes be implemented?
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Emerging themes: Natural vs. engineered



Effect of vegetation on overwash during Katrina

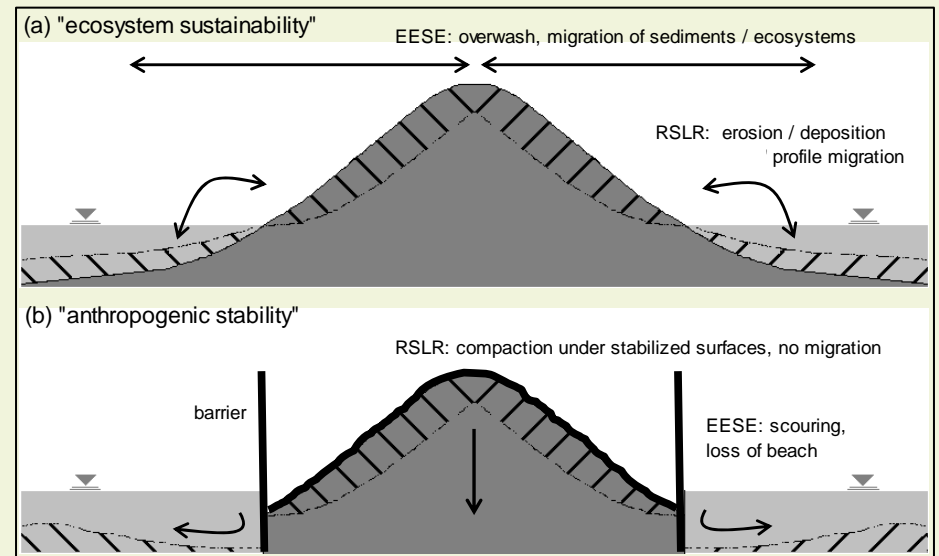
- There are critical differences between human-dominated and natural barrier islands
 - Biophysical processes
 - Spatial and temporal dynamics
 - Anthropogenic modification

Emerging themes: Natural vs. engineered



Emerging themes: Natural vs. engineered

- Management blending both natural and human-centered perspectives
- Utilization of native vegetation in place of engineered structures when possible



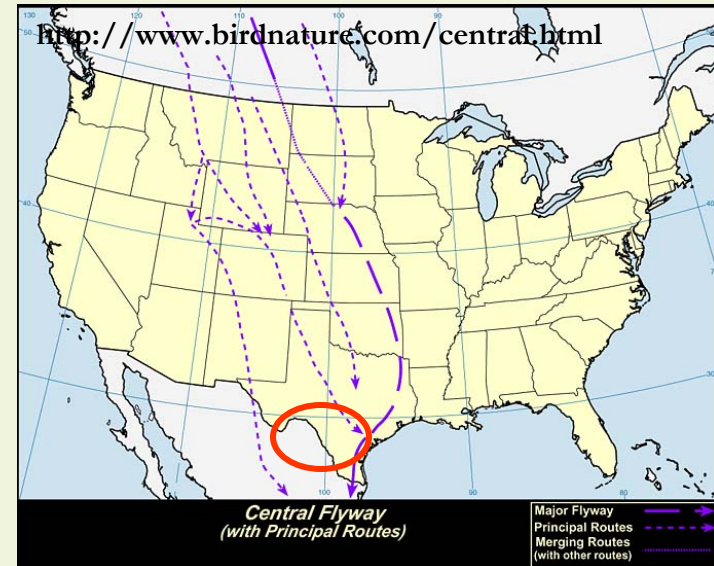
Feagin et al. 2010, Journal of Coastal Research, *in revision*

Emerging themes: Natural vs. engineered

- Example: plans for rebuilding Texas Highway 87

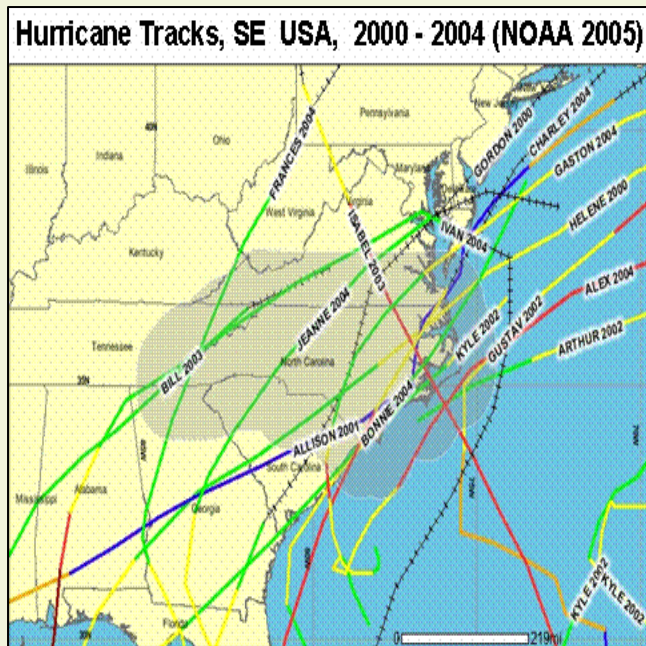


Williams et al. 2009, *Shore and Beach*



Emerging themes: Scaling issues

- The processes that influence the vulnerability and resilience of barrier islands occur along broad spectrum of spatial and temporal scales



Incorporate hurricanes into long-term planning



Calculate coastal sediment budgets and longshore drift at broad spatial and temporal scales

Emerging themes: Policy changes

- Laws fundamentally rooted in desire for stability
 - Public-private boundary
 - Coastal Zone Management Act 1972
 - Defines public-private property line division as high tide line, thus landowners strive to 'hold the line'
 - Ecologically defined boundaries
 - Open Beaches Act, Texas Natural Resources Code §61.011
 - Defines public-private line as vegetation line, thus when vegetation shifts landward, so does boundary
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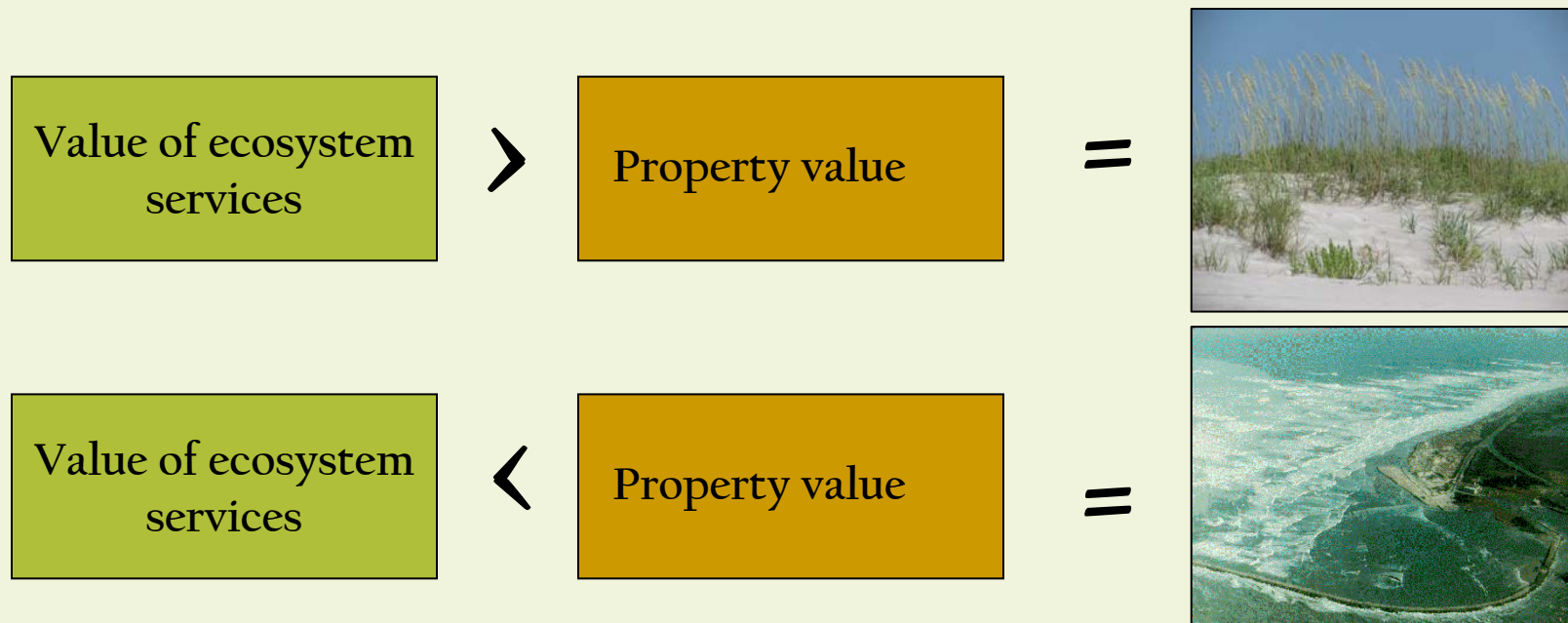
Emerging themes: Policy changes

- Laws needed to protect undeveloped beaches, sand dunes, maritime forests, and other critical habitats
- Armor most developed and valuable properties while declaring undeveloped 'off limits'



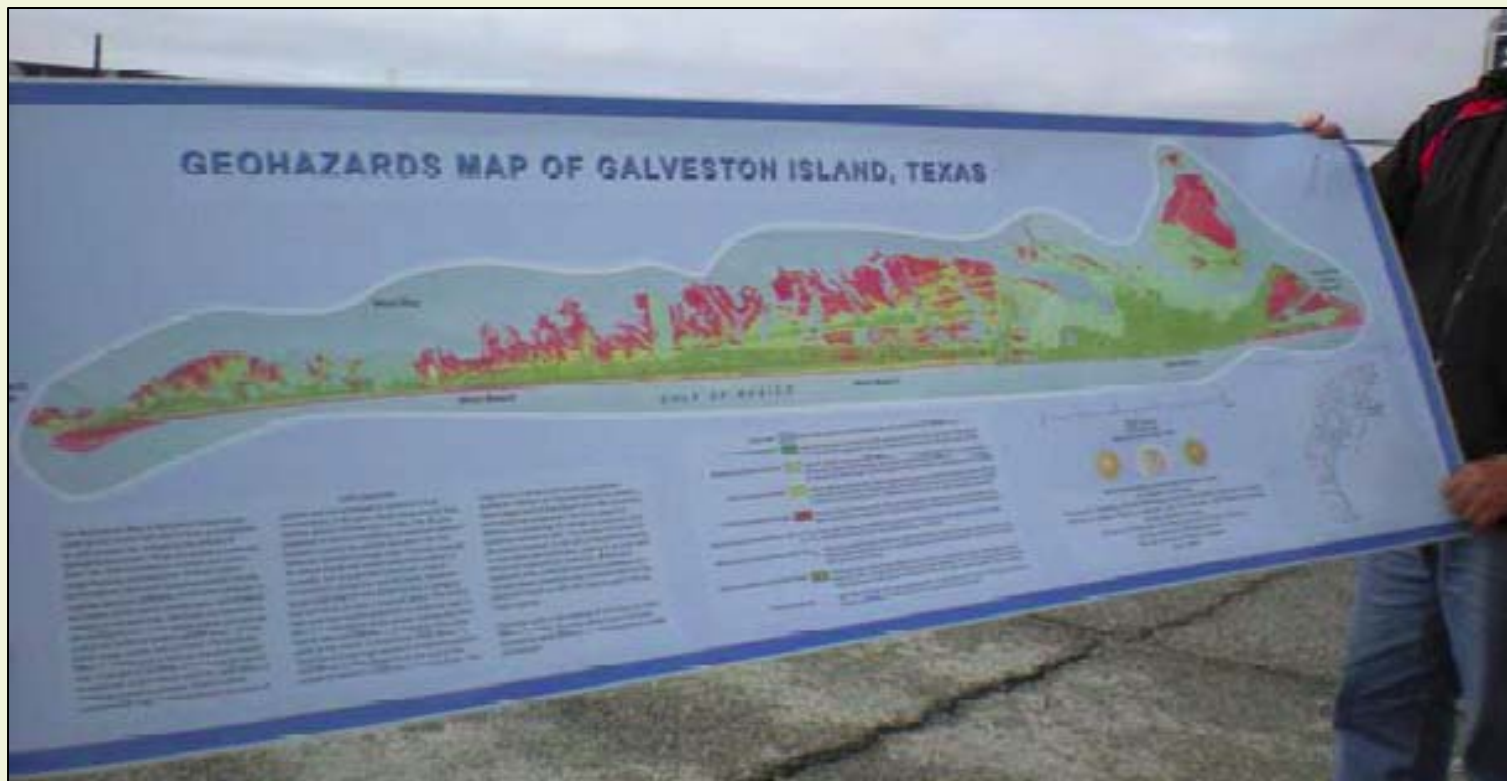
Emerging themes: Valuation tools

- Economic valuation tools such as cost-benefit analysis and rapid assessment methods can be used to generate collaborative solutions



Emerging themes: Valuation tools

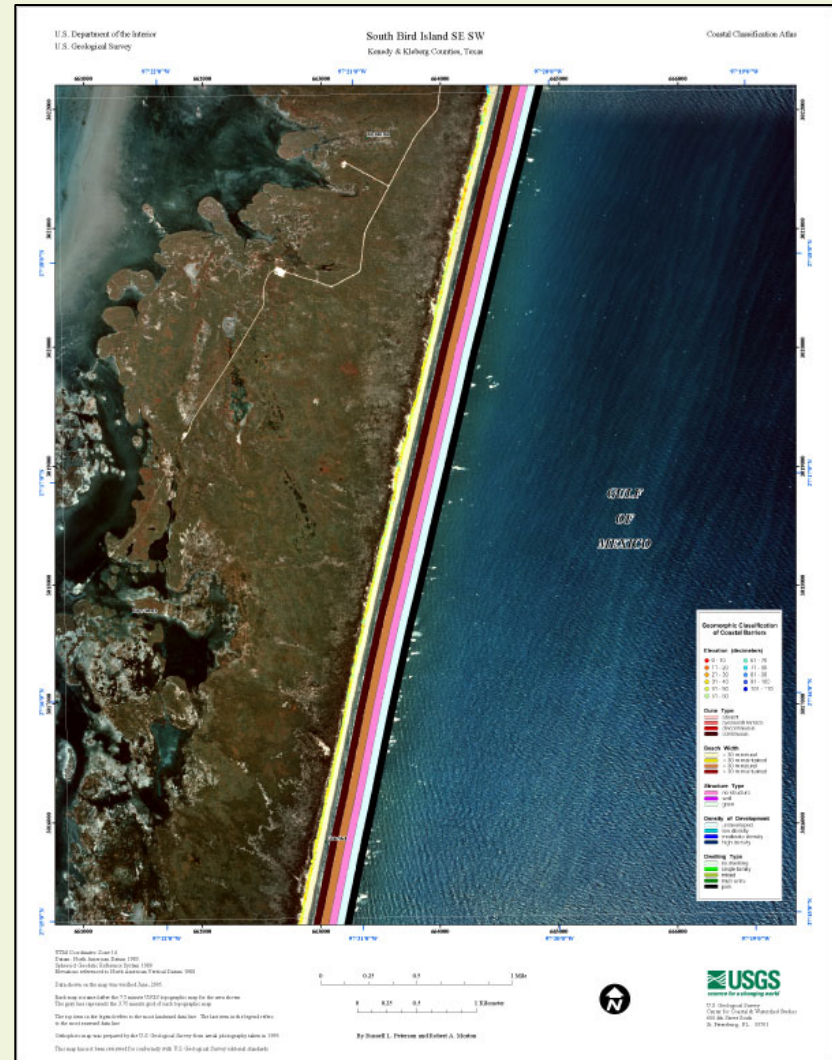
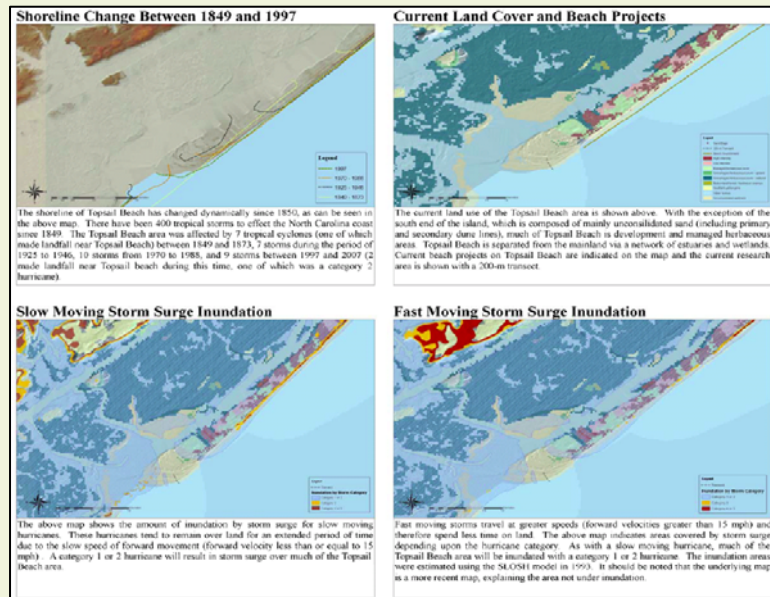
- Example: geohazards map of Galveston Island (Bureau of Economic Geology)



Williams et al. 2009, *Shore and Beach*

Emerging themes: Valuation tools

- GIS, remote sensing, and field valuation techniques will be valuable in understanding barrier island dynamism
- Create an index or proxy of current vulnerability and resilience of area

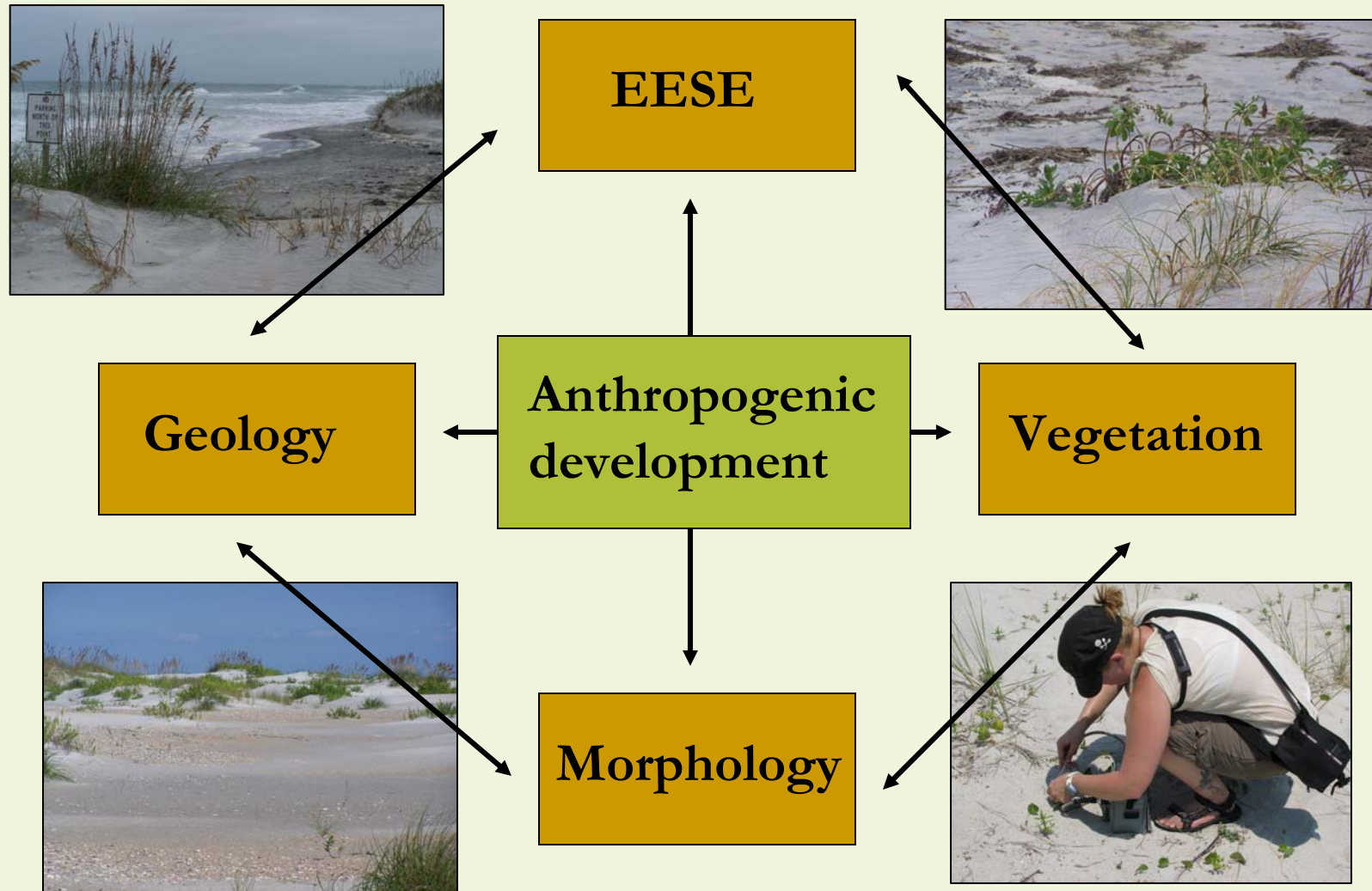


National assessment of Coastal Change program,
<http://coastal.er.usgs.gov/coastal-classification/>

Emerging themes: Education and outreach

- Need to improve communication with stakeholders about emerging science and the implementation of management strategies
 - Tangible products: maps, pamphlets, websites, etc.
 - CBIN offers opportunities to promote dialogue between scientists and stakeholders
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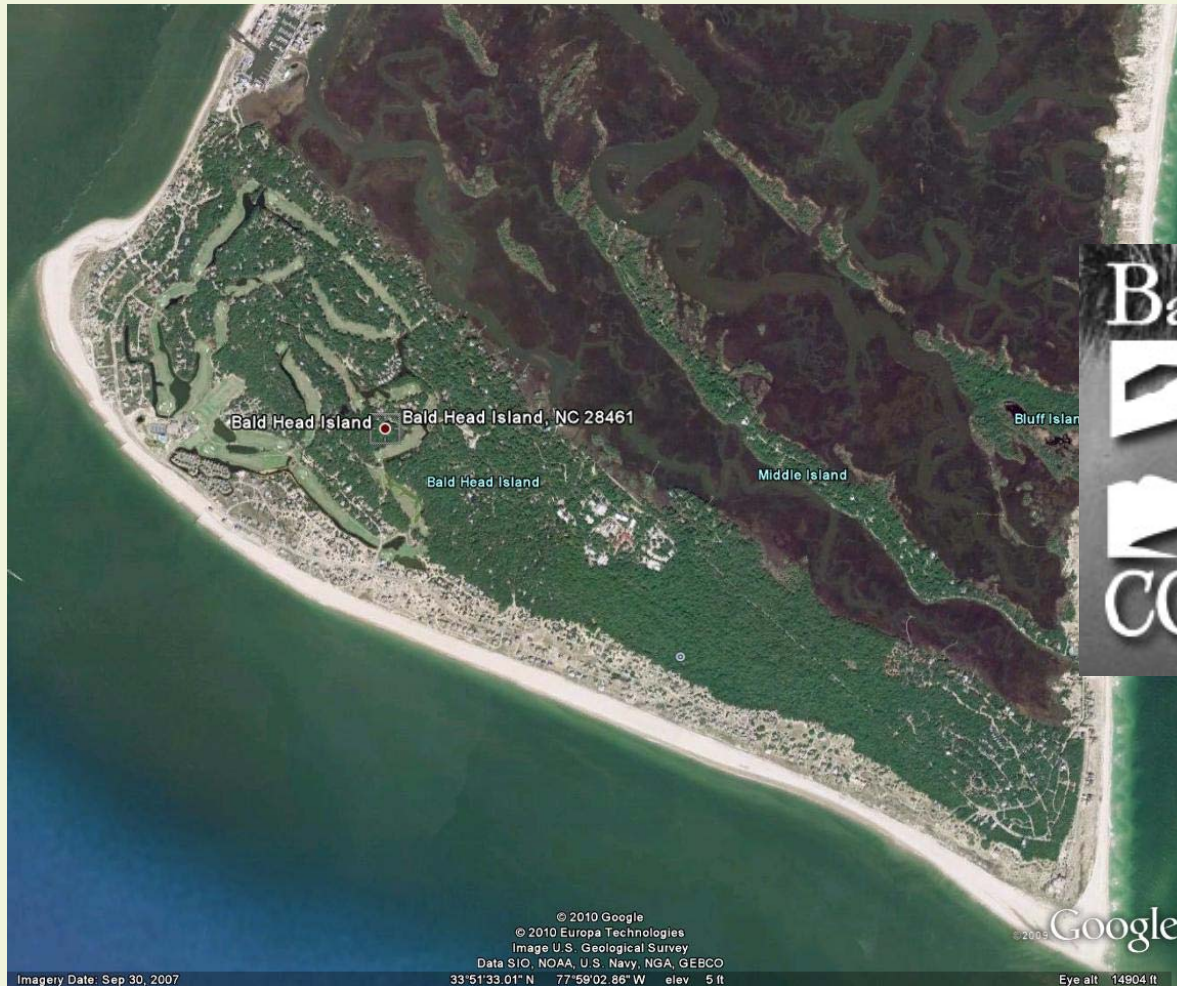
Emerging themes: Continued research



Remaining questions

- On what scale should development of policies be focused?
Local, regional, etc.?
 - How should development best evolve? Can coasts be developed in a way that maintains ecosystem functioning while creating smart growth development?
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Bald Head Island Conservancy Meeting



May 3 – 4, 2010

Proceedings paper in preparation

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Galveston, TX:



Visit CBIN online at:

<http://coastabARRIERISLAND.org>

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