Wicked R&D Problems: Coastal Texas Protection and Restoration Feasibility Study

CSRM and ER Proposed Measures

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Natural and Nature-Based Features Workshop

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A Road Map for Today

"A beginning is the time for taking the most delicate care that the balances are correct."

—Frank Herbert
Dune (1965)

1. Where we are in the study
2. Proposed Plans
3. Problems & Opportunities
   - Sea Level Rise - Sustainability
   - Hybrid Solutions – Will they work?
   - Ecosystem Goods & Services – Metrics (Non-monetized & Monetized)
   - Resilience Indices – Metrics Again
   - BU Mapping & Regional Sediment Mgmt

Research Questions Behind the Study

- **How to plan** and implement effective protection and restoration plans for hundreds of miles of TX coastline over the long-term (50-100+ years) when shifting, oftentimes conflicting political, social, and ecological agendas influence the decision outcomes?

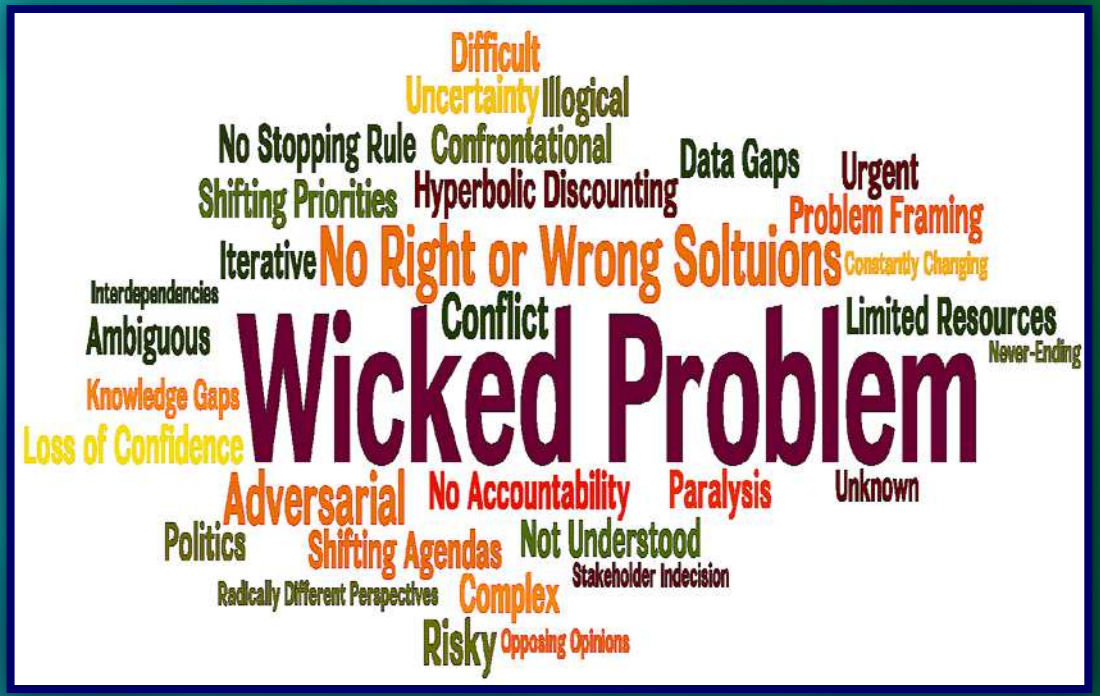
- **How to measure success** when ecosystem integrity or system wholeness cannot be assured and SUSTAINABILITY is questioned in the face of urbanization and climate change (specifically SLR)

- **How to efficiently integrate** data, models and expert knowledge in a transparent manner that is prescriptive (sufficient, relevant, and reliable), visually engaging (promoting rapid communication), and adaptive (proactively responsive to uncertainty) in dynamic decision making environment over the long-term?

- **How to effectively engage** stakeholders and scientists alike in formulating sustainable and resilient solutions?

The Overarching Concern

- **Wicked problems**
  like this cannot be resolved in time solely with hard science or technical solutions – their complexity mandates rapid & prescriptive R&D to fill knowledge gaps and promote transparency and confidence in the proposed solutions.

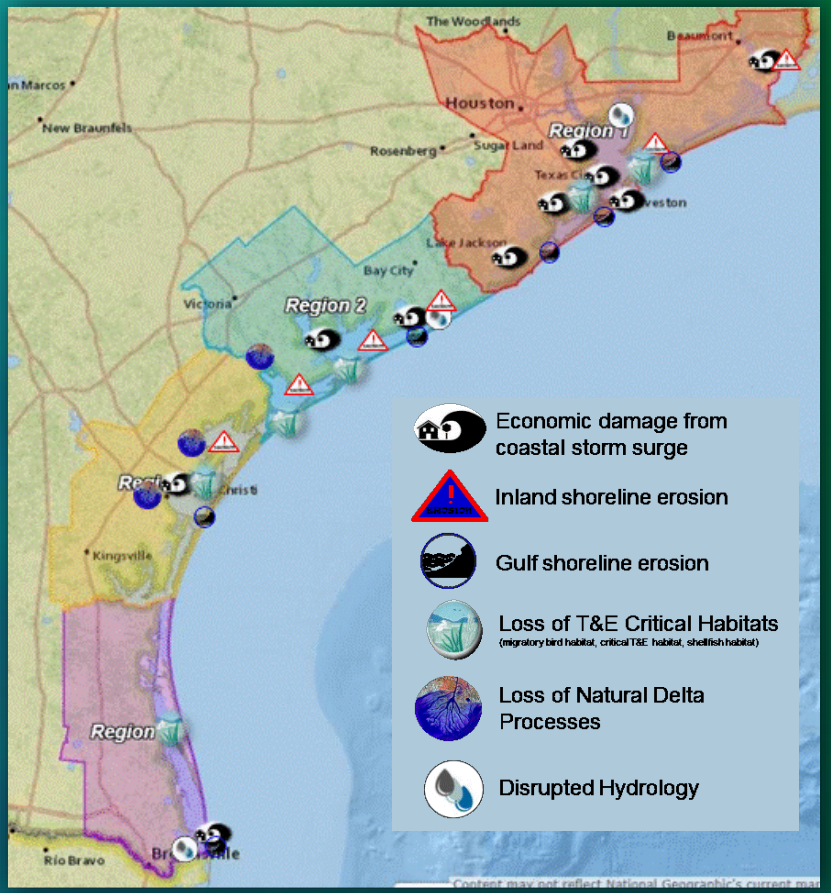


"Wicked problems have numerous intervention points, have consequences difficult to envision, and are surrounded by a dynamic uncertainty wrapped in a moving frontier of knowledge."

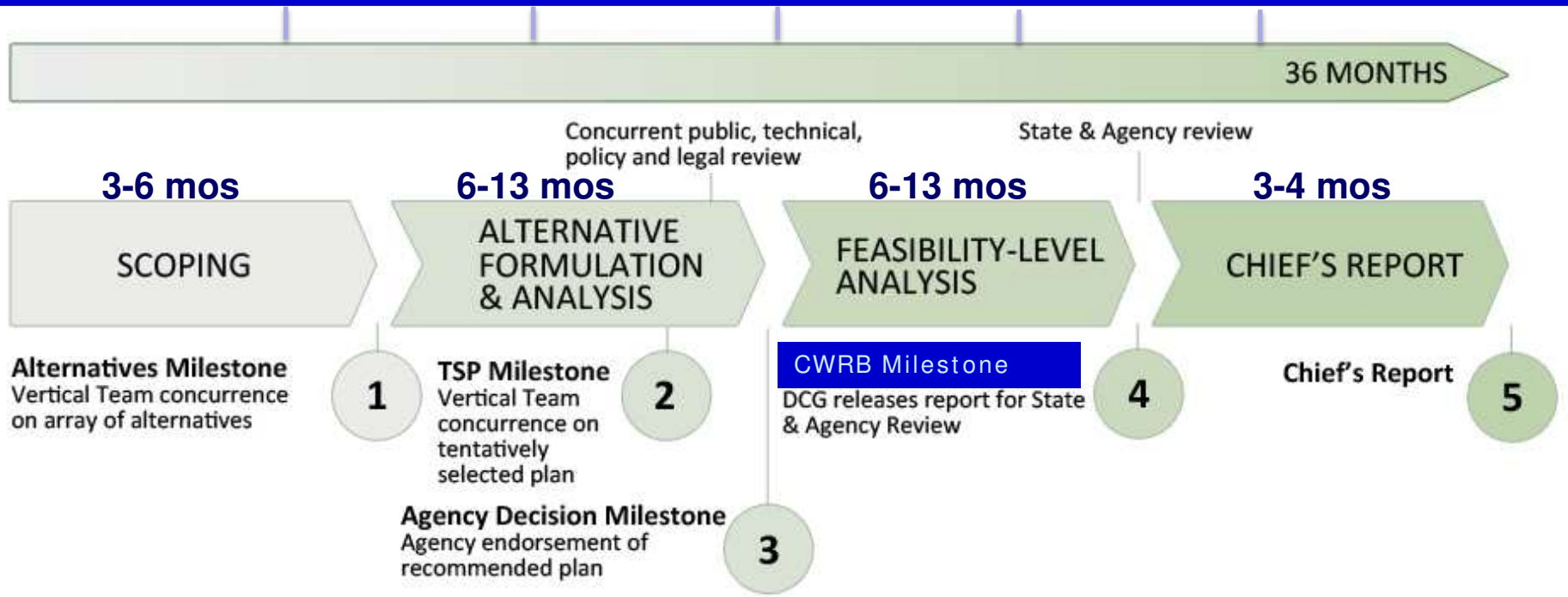
—Ioannis Petrus, 2009

Overarching Themes for the R&D Agenda

- **System-Based Approach** requires creative problem solving and critical thinking at both the strategic (future-oriented) and tactical (near-term) scales and encourages a systems-level characterization of ecosystem integrity based on scientifically-defensible performance metrics comparing/contrasting potential interventions and adaptively managing solutions
- **Spiraling framework** utilizes an interactive group approach that encourages stakeholders to identify problems, deliberate, propose solutions and respond to contextual changes in recursive reflection cycles (centered around information presented at each workshop/web meeting)
- **Transdisciplinary teams** draw knowledge not only from academic researchers coming from different unrelated disciplines, but also from experiential perspectives garnered from non-academics in applied disciplines (e.g., natural resource managers, end-user groups and the general public)

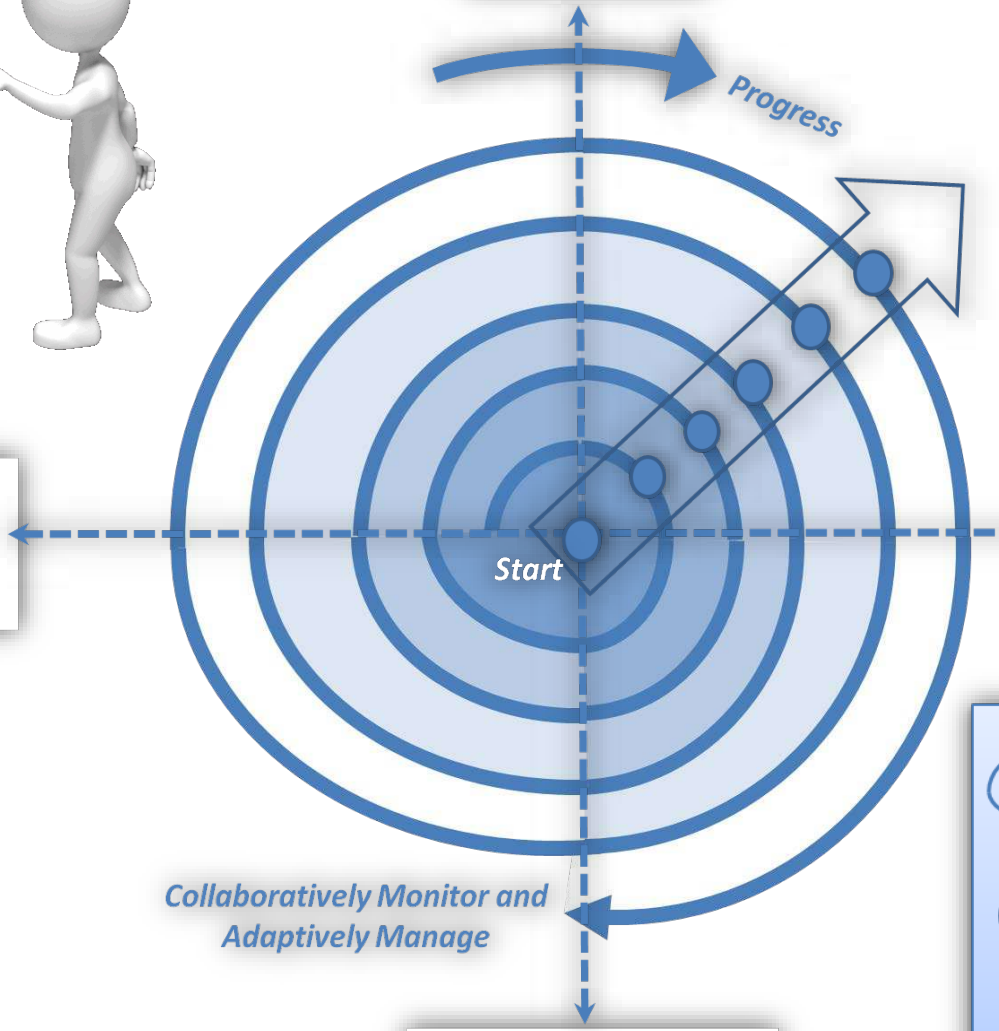


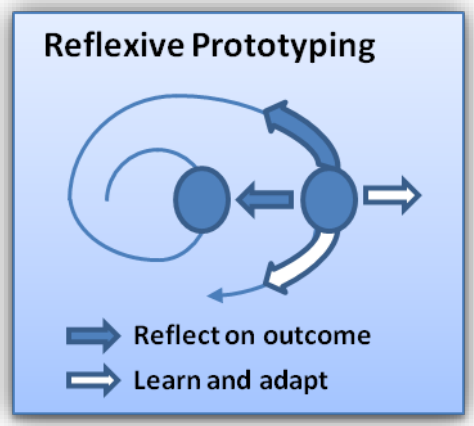
SMART Feasibility Study Process

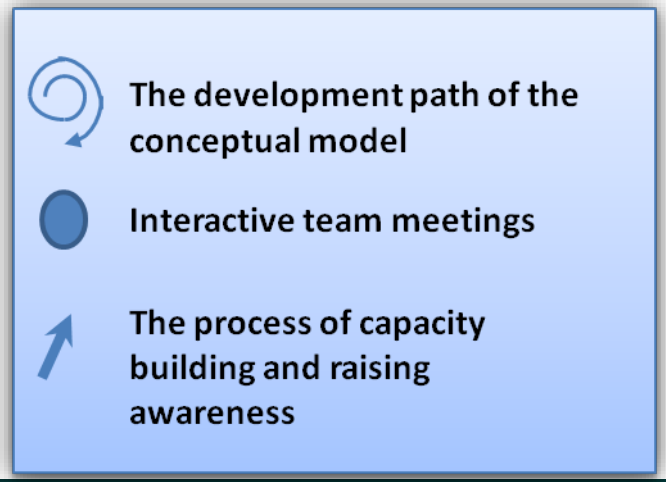


- Apply critical thinking throughout the study
- Develop the Feasibility Report as you go
- Target Completion: No more than 3 years for Chief's Report

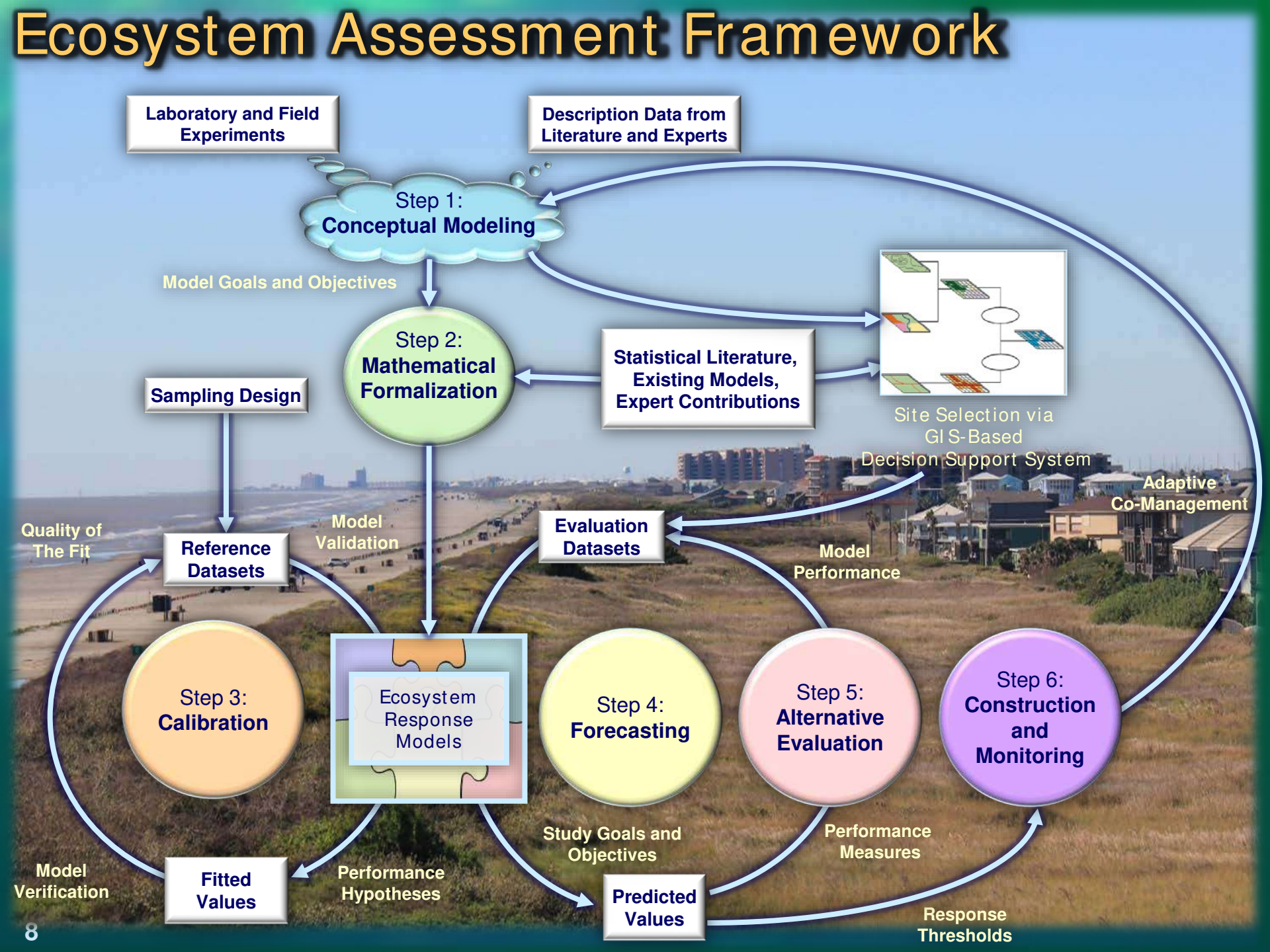
Spiral Framework in Action



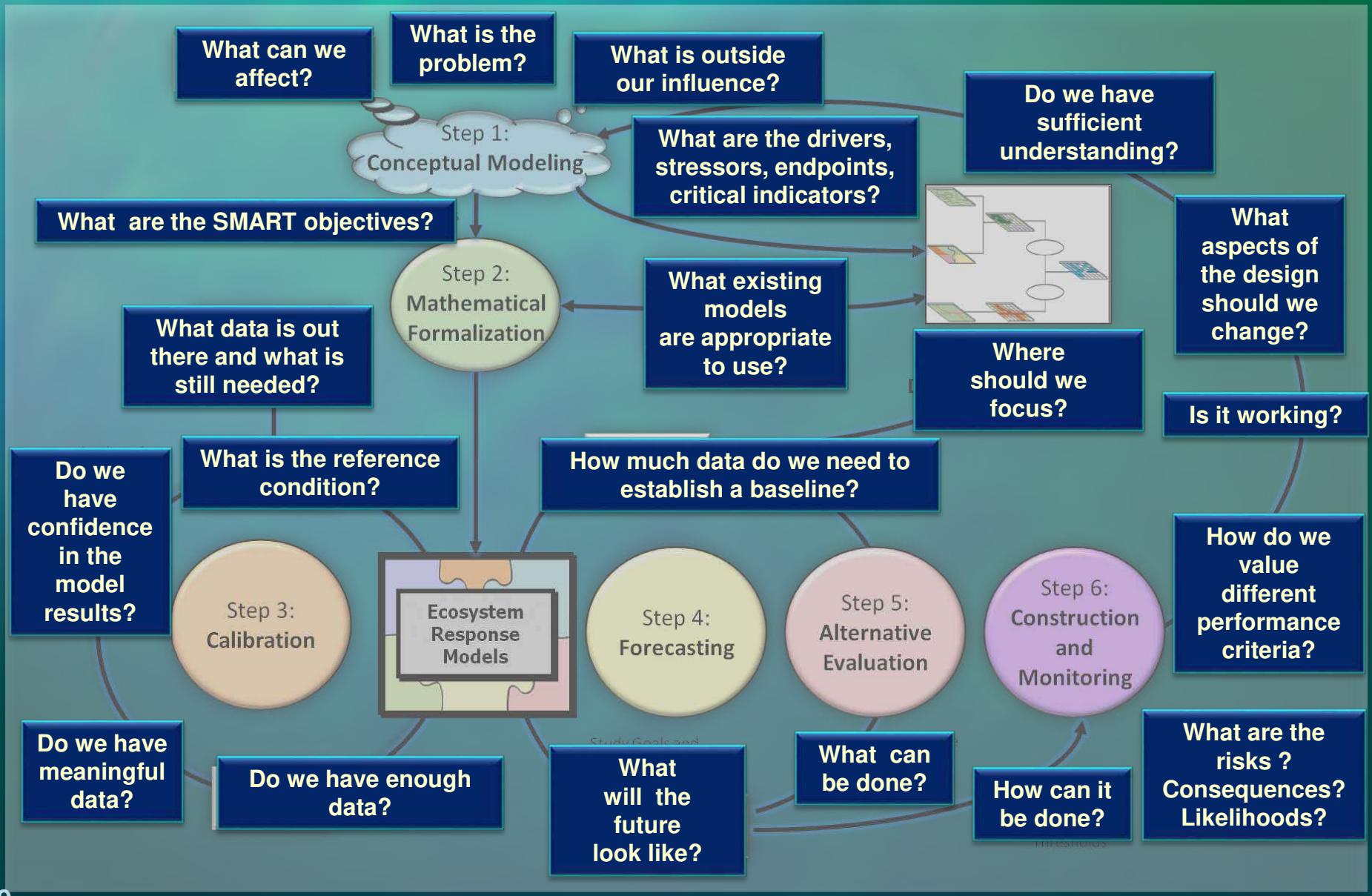




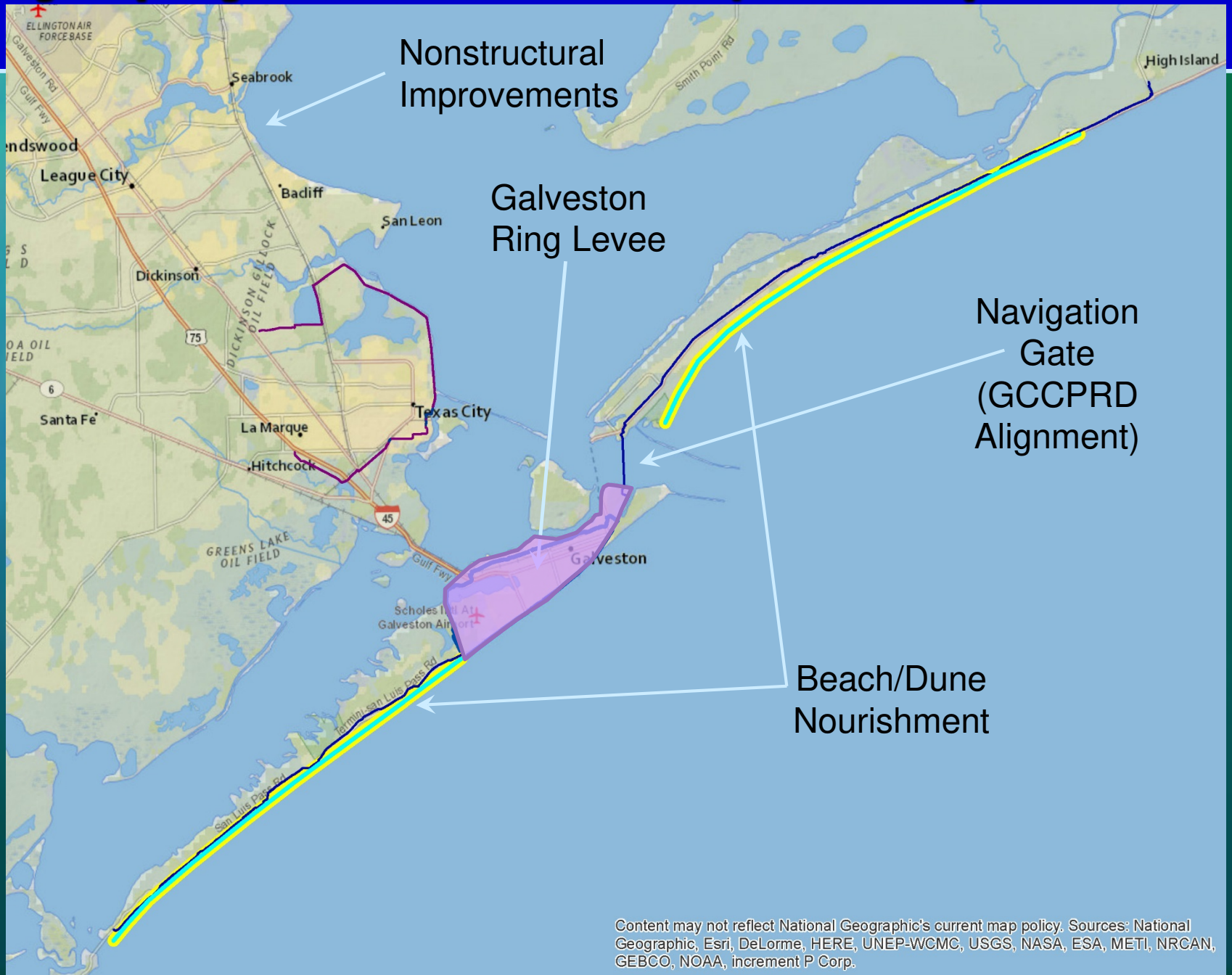
Ecosystem Assessment Framework



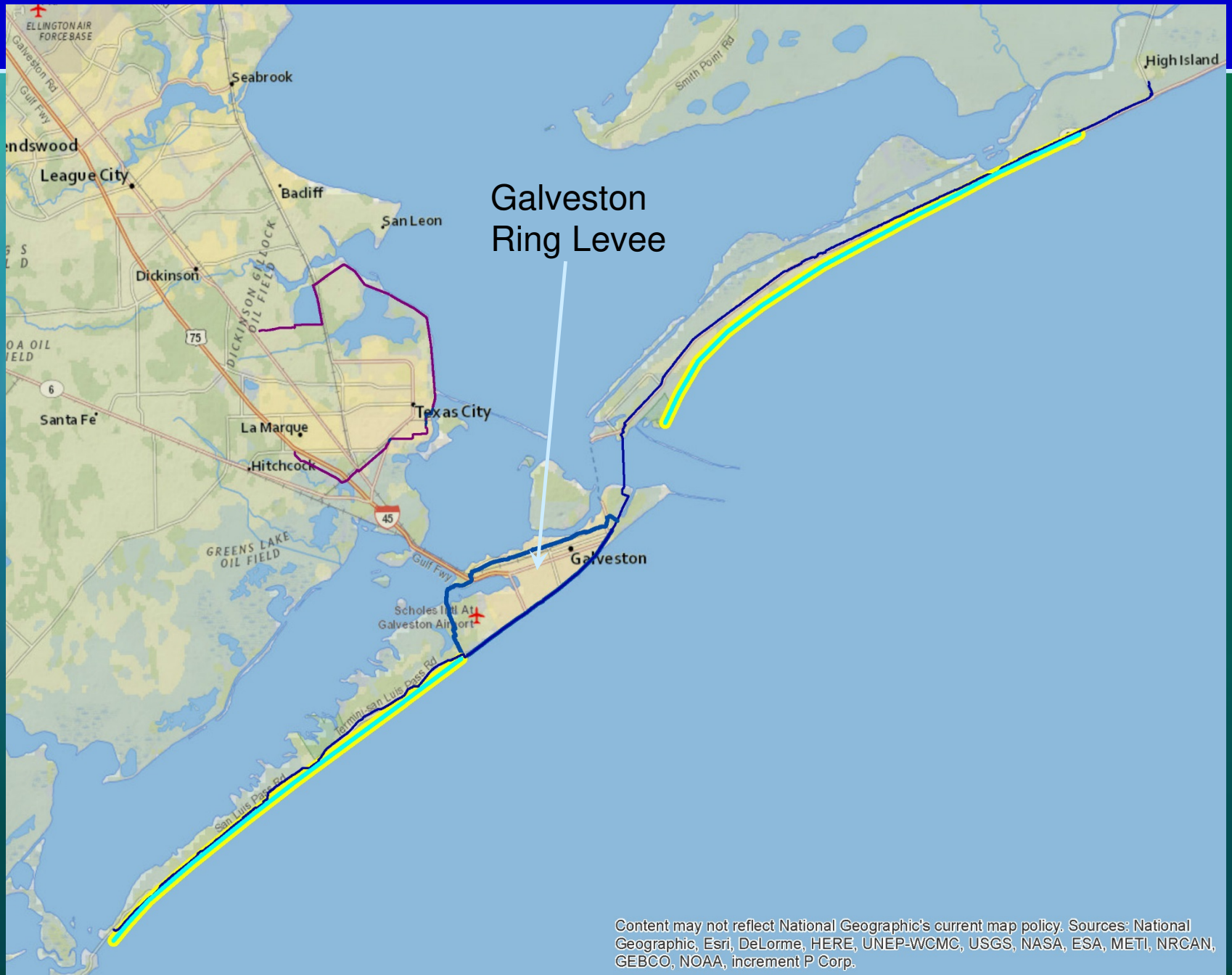
All the BIG questions



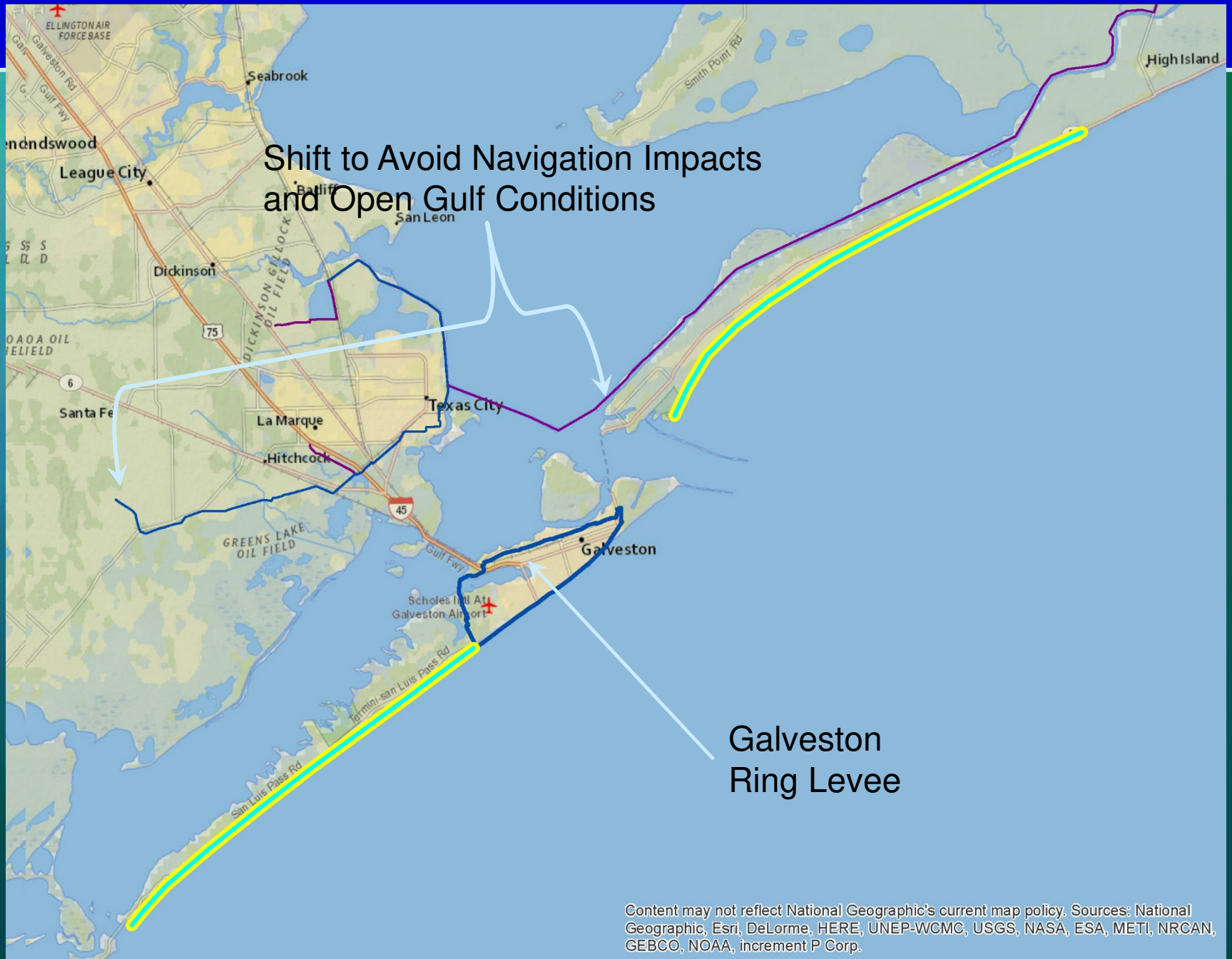
Planning Example Region 1: Alternative A - Coastal Barrier/ Nonstructural System



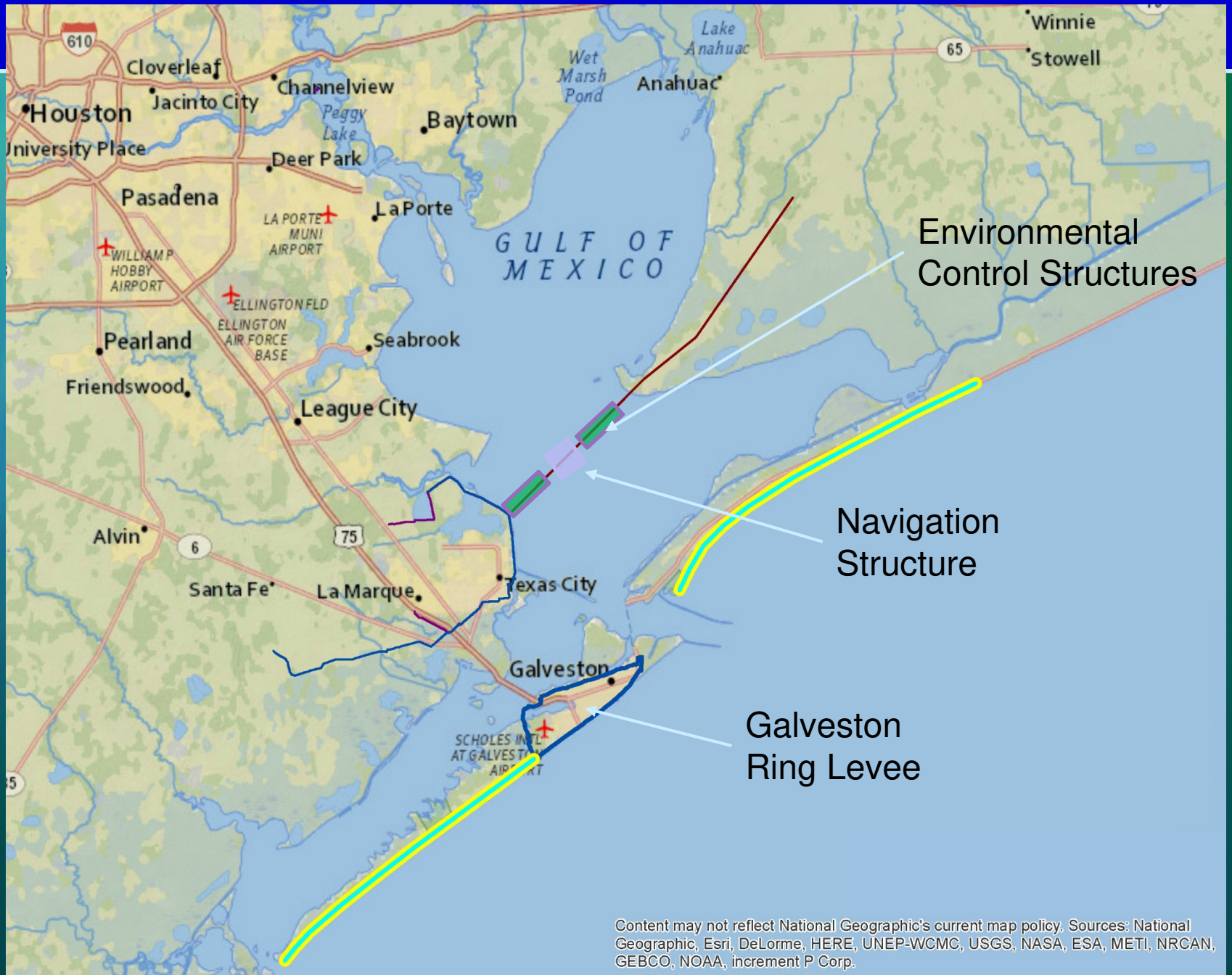
Planning Example Region 1: Alternative B - Coastal Barrier



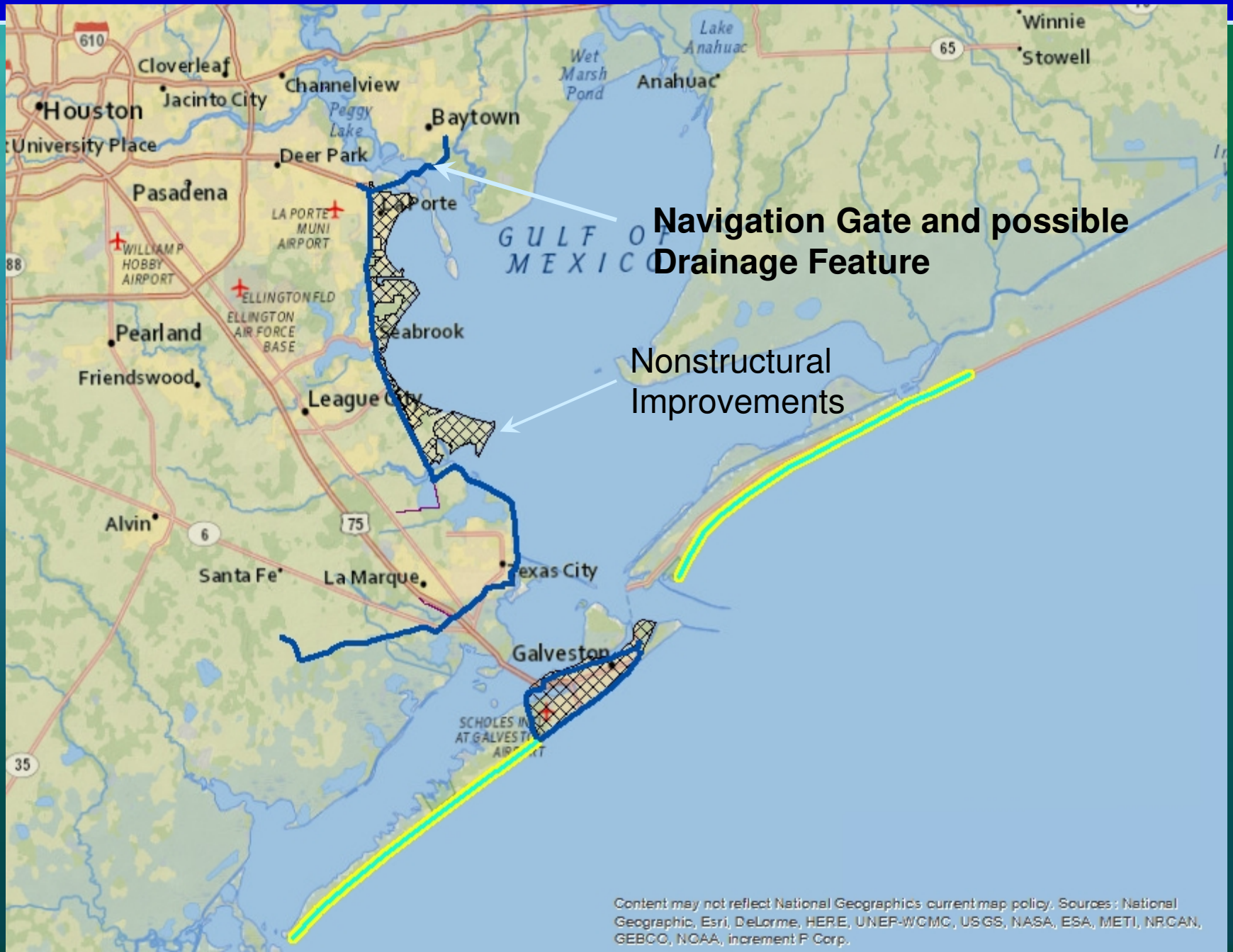
Alternative B - Coastal Barrier (Eng. Workshop Discussions)



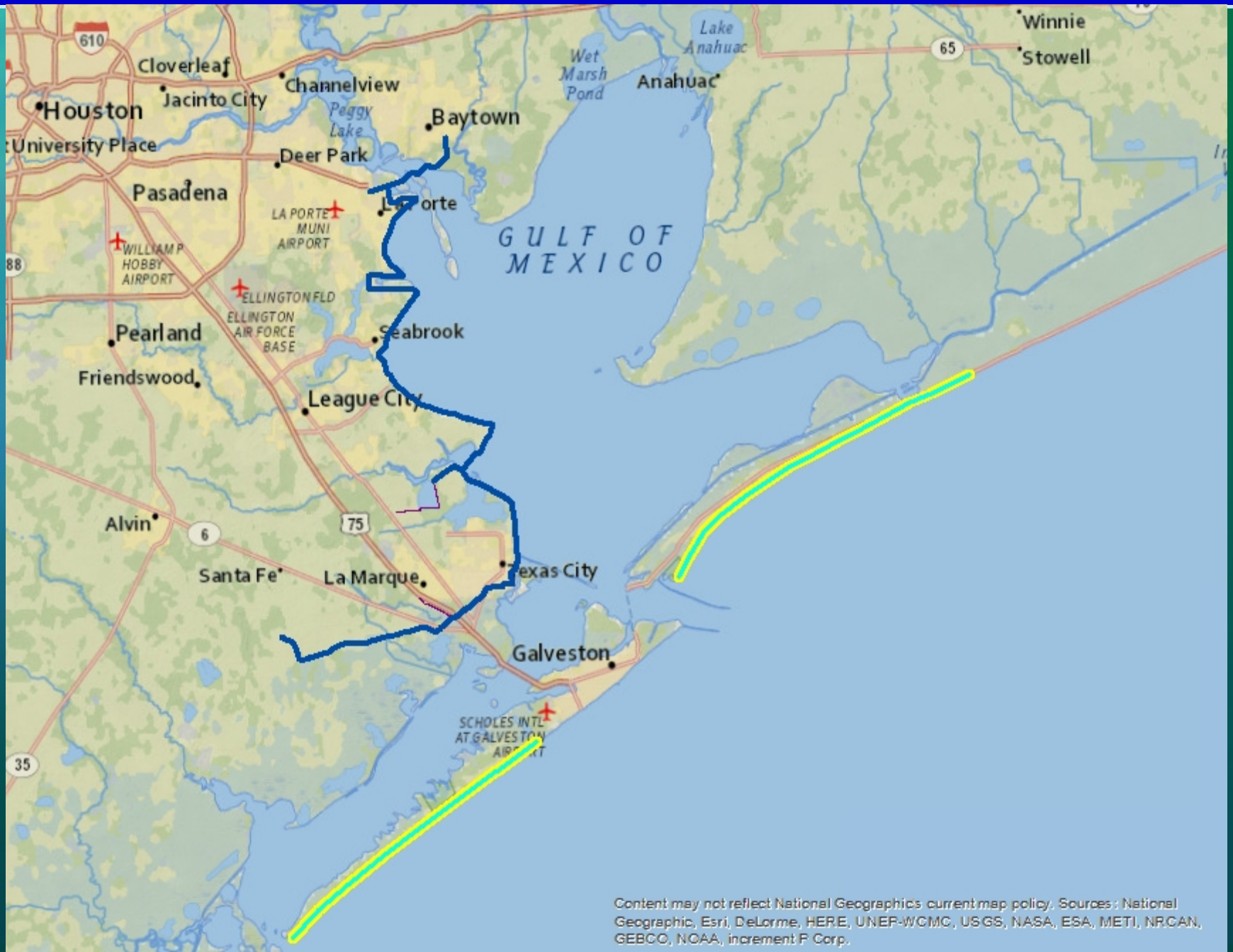
Planning Example Region 1: Alternative C – Mid Bay



Planning Example Region 1: Alternative D Upper Bay Barrier/ Nonstructural System



Planning Example Region 1: Alternative D - Options Reviewed based on GCCPRD Comments



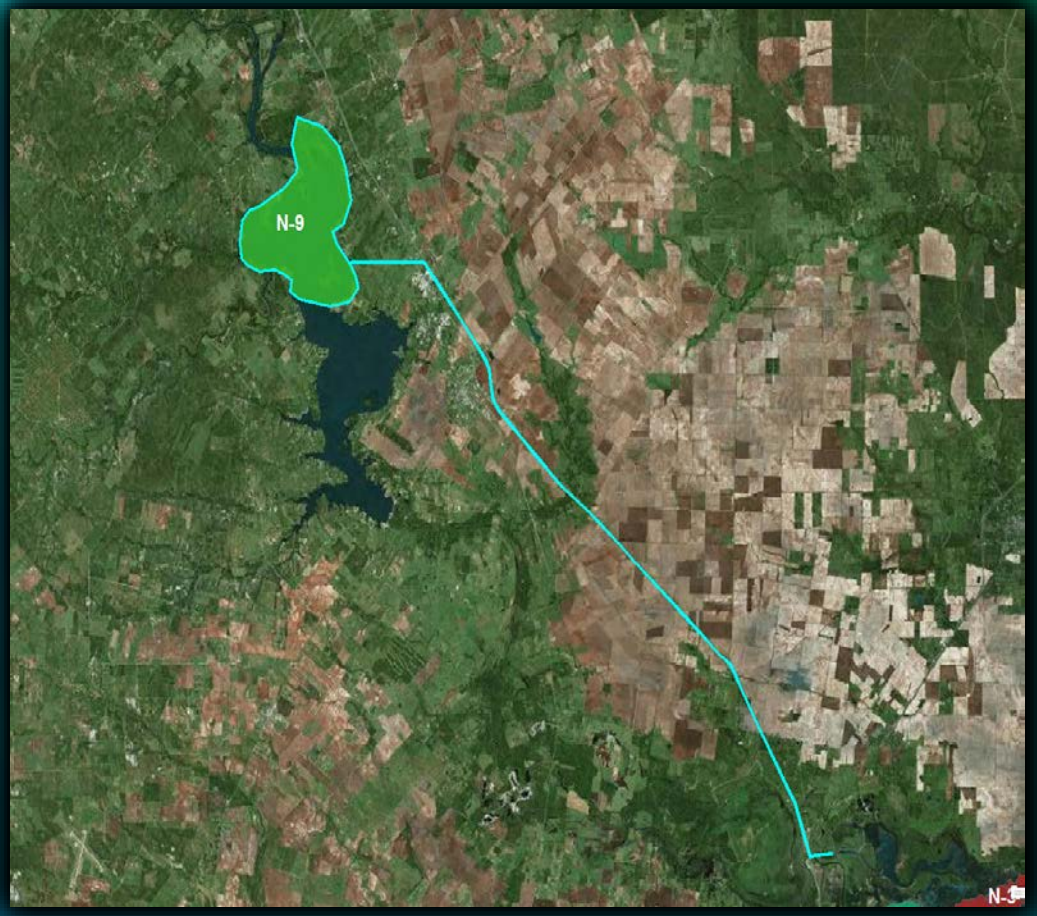
Conceptual Ecological Model

Coastal TX Plans to Date

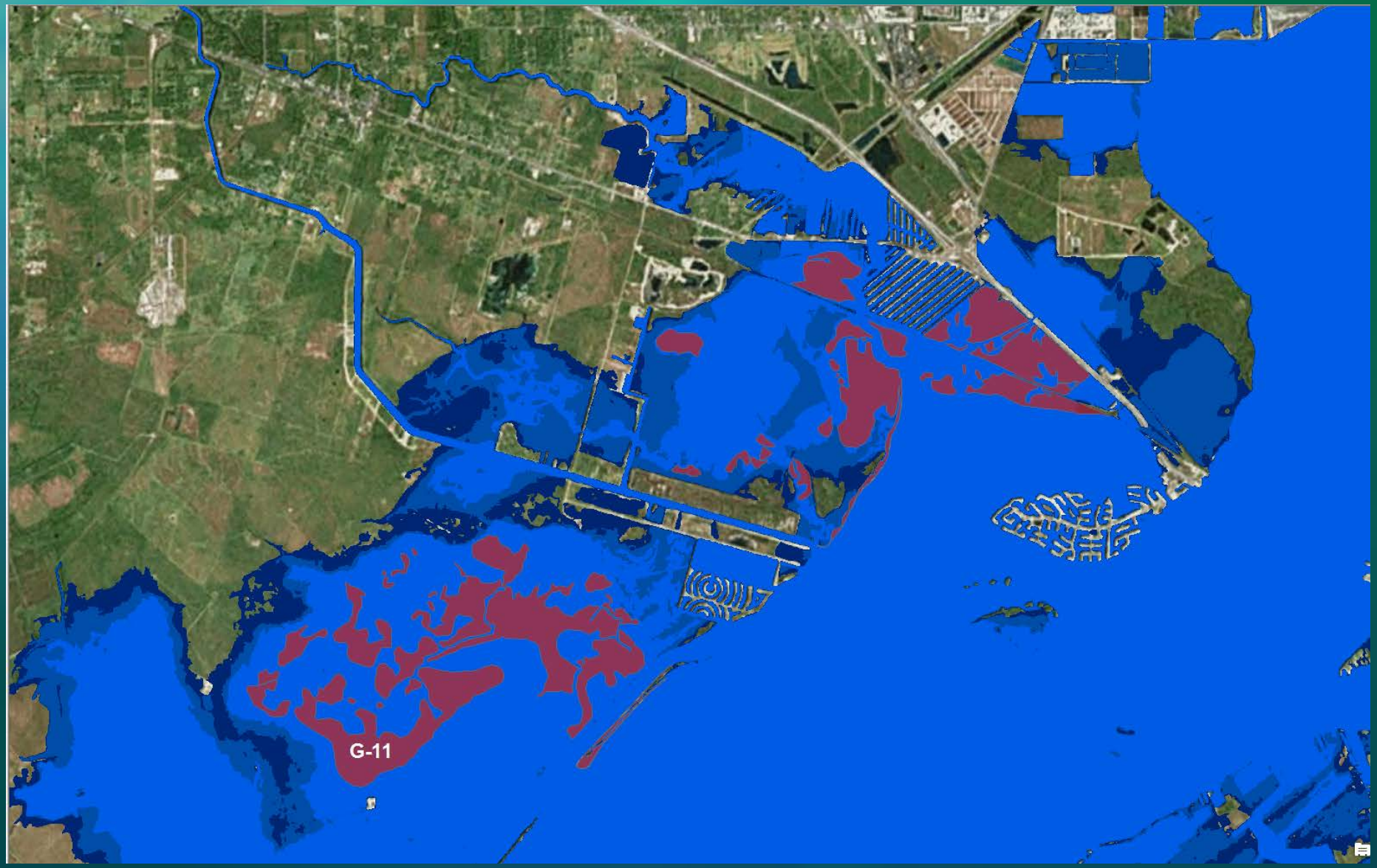
Ecosystem Restoration Plans

Multiple Lines of Defense:

- Wetland Restoration
- Dunes and Beaches
- Hydrologic Restoration
- Island Restoration
- Revetment/Breakwaters
- Sediment Bypass & Sediment Management



Sustainability in the face of threats?

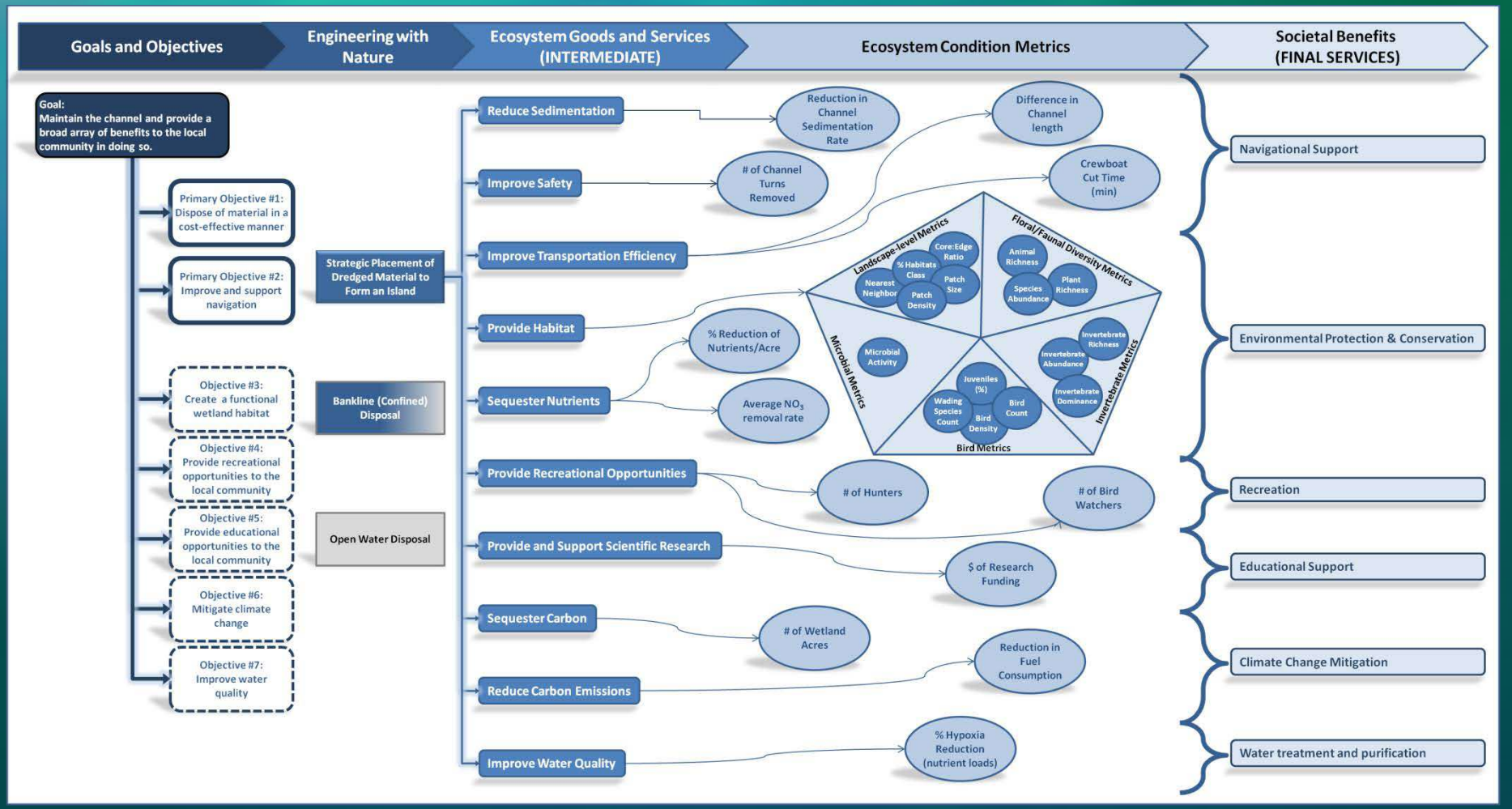


Multiple Lines of Defense – Hybrid Success?

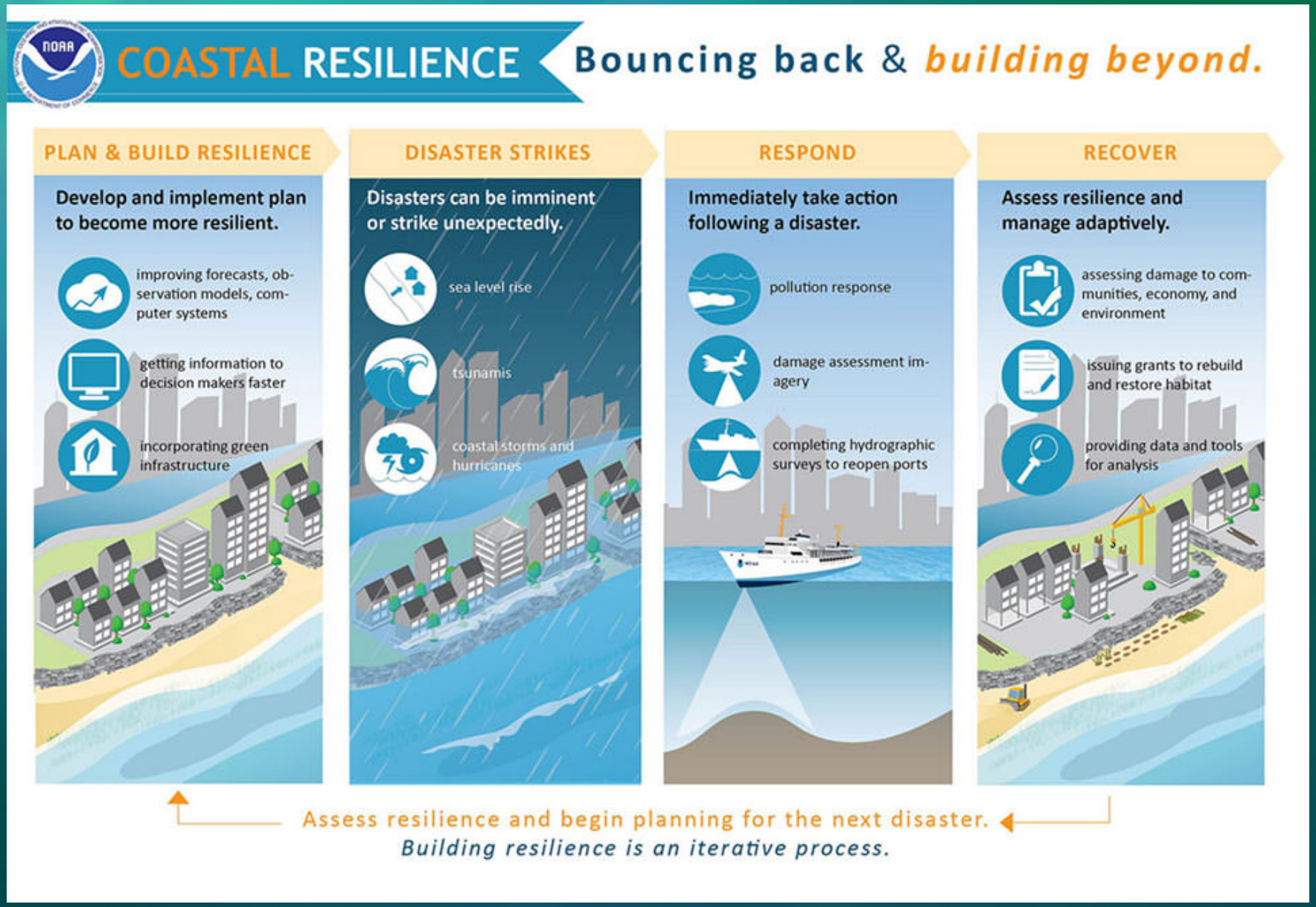
Benefit Quantification?

- Community-based index modeling
- Ecosystem goods & services
- Multiple account tradeoffs

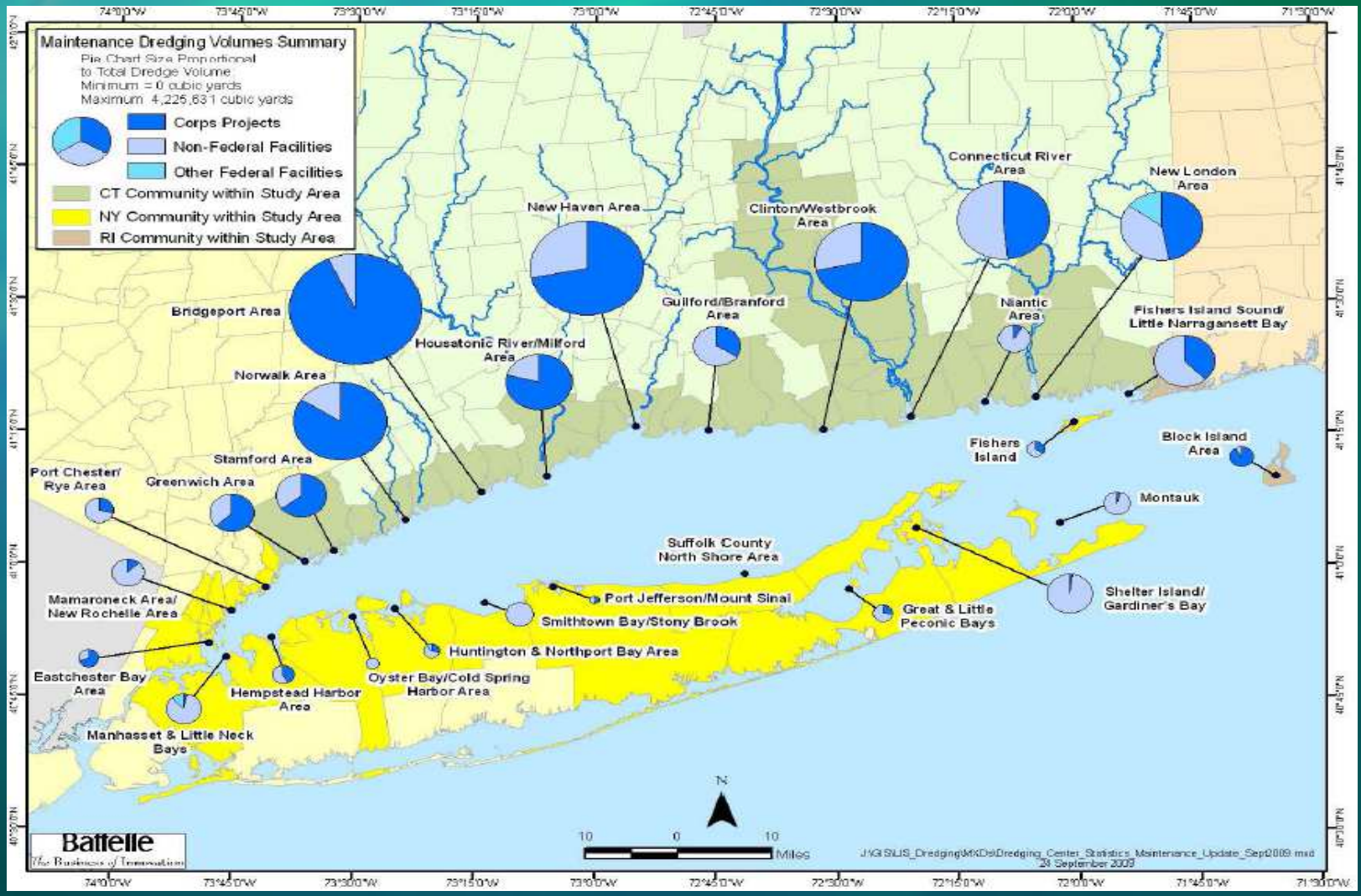
Model Certification is Key



Resilience Indices?



Regional Sediment Management



Research Agenda

- Metrics for Ecosystem Response:
  - Community-based Models
  - Resilience
  - Goods & Services
- Regional Sediment Management
  - BU Maps
  - Particle Tracking
  - Stockpiling
- Sustainability
  - SLR & Urbanization
  - Hybrid Solutions Proving Grounds

	Milestone	Date
Scoping	Exemption Approval by Senior Leaders	Sep 2015
	Exemption Approval by ASA(CW)/ OMB	Nov 2015
	Execute FCSA with GLO	Nov 2015
Alternative Evaluation and Analysis	Alternatives Milestone	June 2016
	Tentatively Selected Plan (TSP) Milestone	May 2018
Feasibility Level Analysis	Agency Decision Milestone (ADM)	Oct 2018
	Feasibility Report Complete	Oct 2020
	Civil Works Review Board (CWRB)	Jan 2021
	S&A Review	Feb 2021
	Chief's Report	Apr 2021

Questions?