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# You're Going to Need a Bigger Boat...

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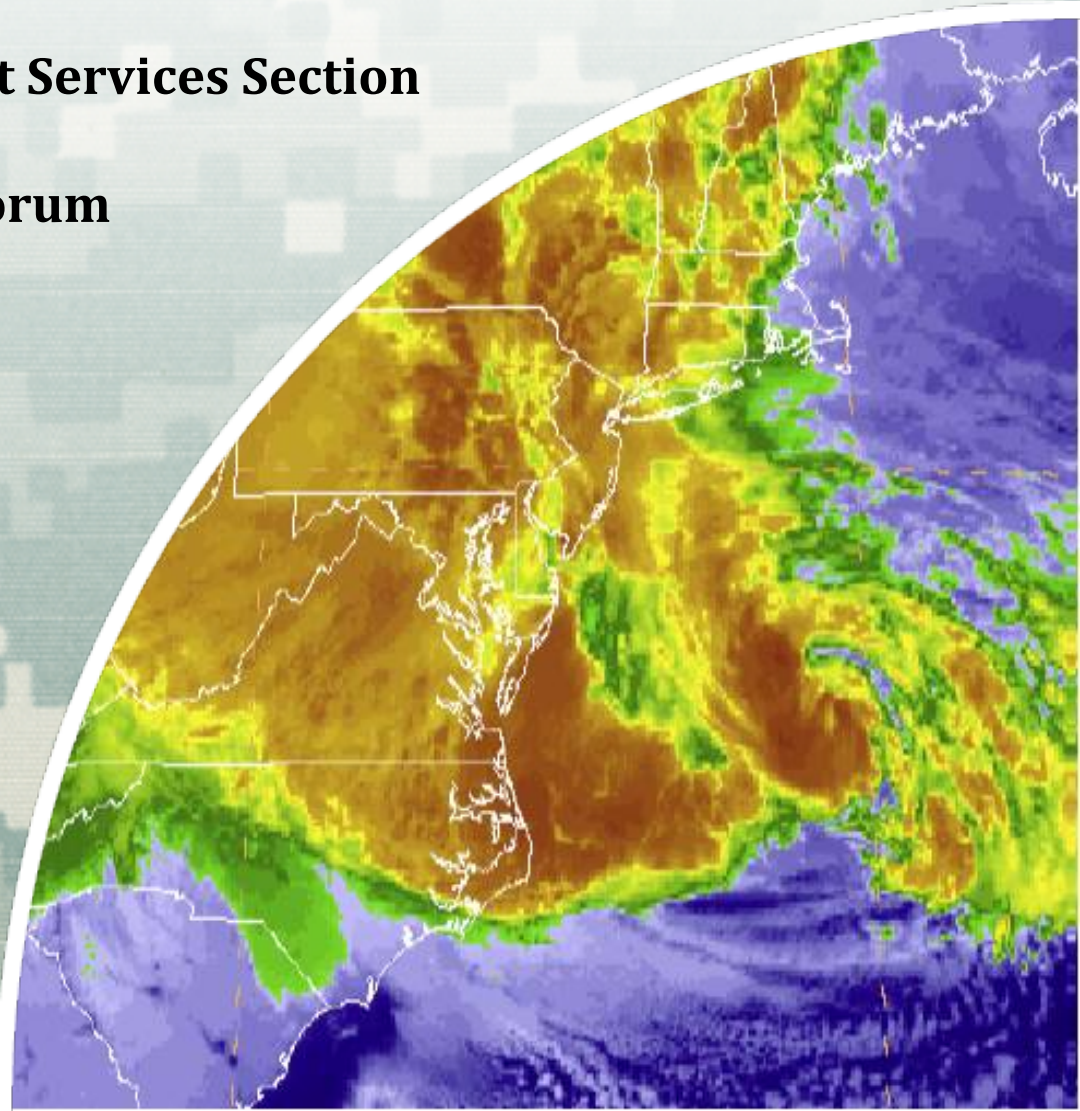
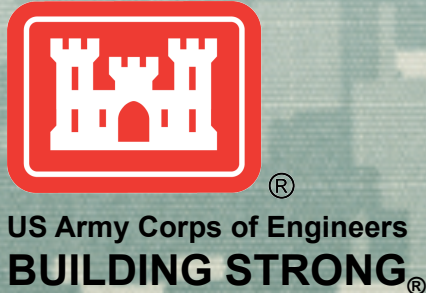
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# You're Going To Need a Bigger Boat...

**Michelle Hamor, CFM**  
**Chief, Flood Plain Management Services Section**

**Hampton Roads Adaptation Forum**  
**22 May 2015**



# You're Going to Need a Bigger Boat



We Like Regional Solutions!



**The definition of insanity is doing the same thing  
over and over and expecting different results.  
- Albert Einstein**



**We Like Regional Solutions!**





# T · E · A · M · W · O · R · K

TEAMWORK IS THE ABILITY TO WORK TOGETHER TOWARD A COMMON VISION.  
THE ABILITY TO DIRECT INDIVIDUAL ACCOMPLISHMENT TOWARD  
ORGANIZATIONAL OBJECTIVES, IT IS THE FUEL THAT  
ALLOWS COMMON PEOPLE TO ATTAIN  
UNCOMMON RESULTS.



We Like Regional Solutions!



To **measurably reduce risk**, we must **partner** on a statewide resilience plan to develop strategic **regional** interagency solutions beginning in areas of greatest risk.



Daily Press



# Water & Boundaries

Or... What Happens Upstream Does Not Stay Upstream



Newmarket Creek  
Hampton and Newport News

We Like Regional Solutions!



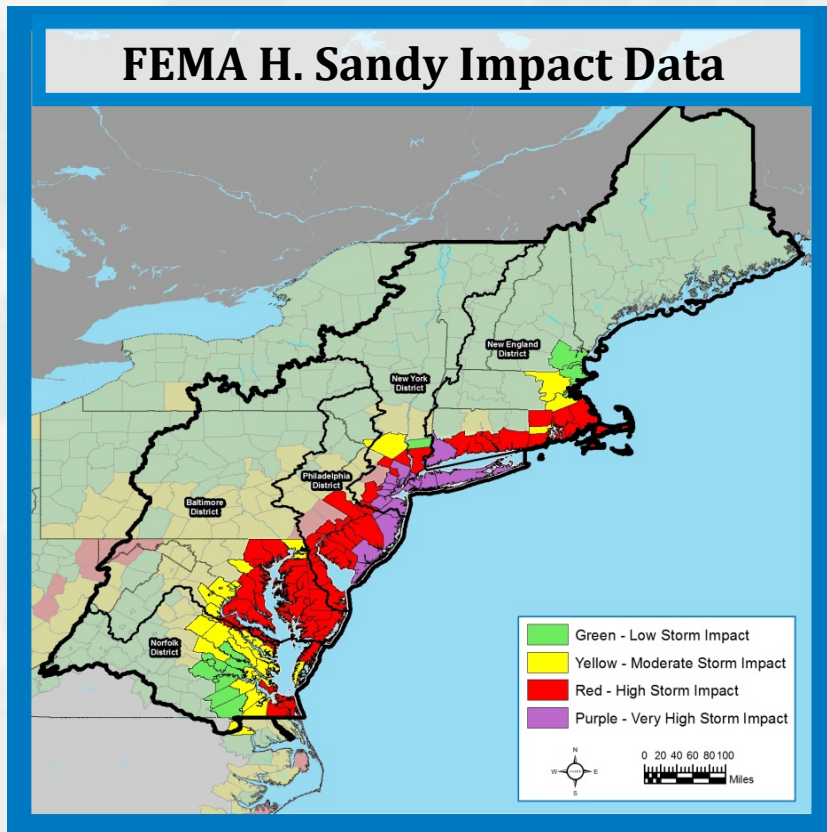
# North Atlantic Coast Comprehensive Study

“That using up to \$20,000,000\* of the funds provided herein, the Secretary shall conduct a **comprehensive study** to address the flood risks of **vulnerable coastal populations** in areas that were affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the Corps...” (\*\$19M after sequestration)

➤ Complete by Jan 2015

## Goals

- Provide a **Risk Management Framework**, consistent with USACE-NOAA Rebuilding Principles
- Support **Resilient Coastal Communities** and robust, sustainable coastal landscape systems, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable population, property, ecosystems, and infrastructure





# Background

## ➤ End State

- Address the legislative direction for a **comprehensive plan** to address vulnerable coastal communities
- Formalized and **consistent approach/framework** for more detailed, site specific coastal evaluations
- **Integration** of state-of-the-science techniques and collaboration
- Equip and link a broad audience and all levels of government with data, tools, and other stakeholders to make **INFORMED coastal risk management decisions**

[www.nad.usace.army.mil/CompStudy](http://www.nad.usace.army.mil/CompStudy)

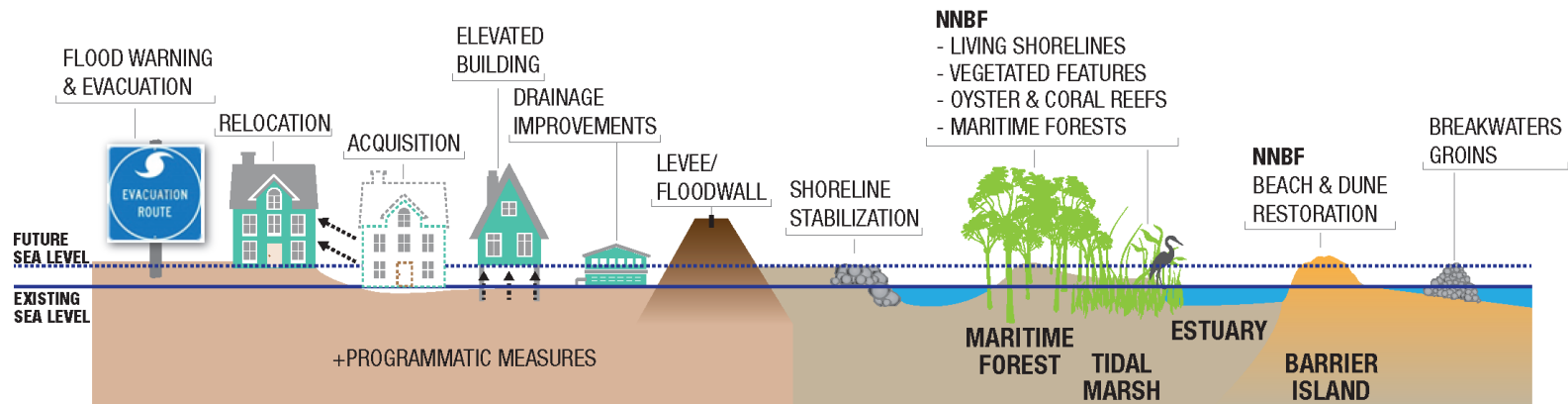
## ➤ NACCS is *not*:

- A decision document authorizing design and construction
- A NEPA document evaluating impacts of any specific solution
- A USACE-only application



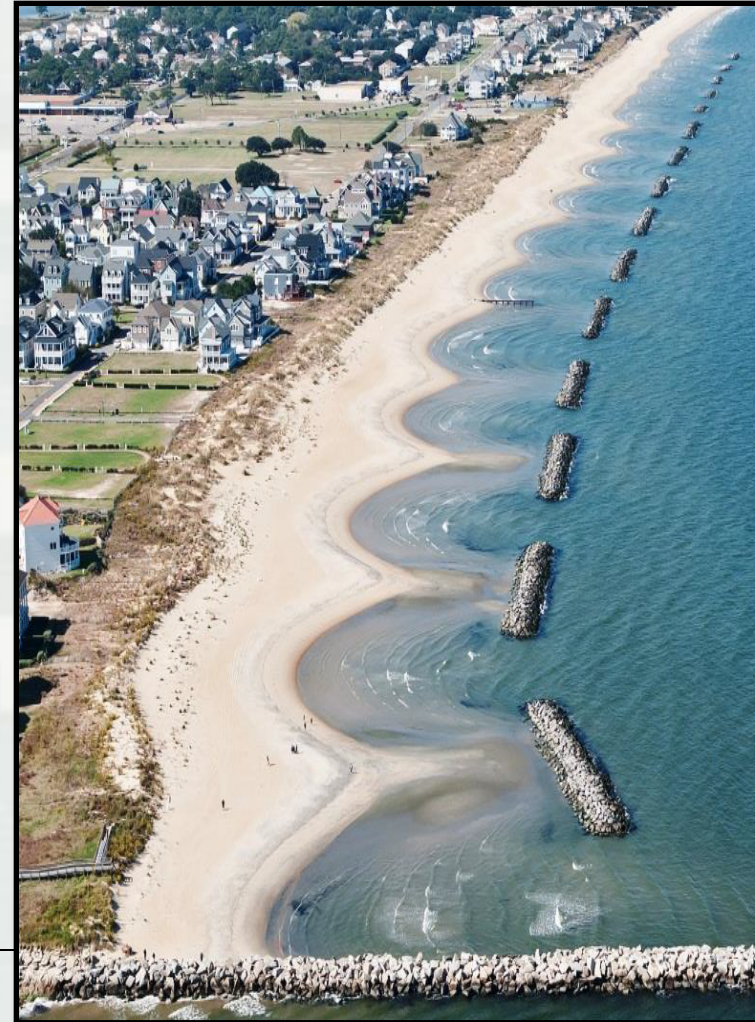
# Findings

- **Shared** responsibility of all levels of Government and partnerships
- Rethink approaches to **adapting to risk**
- Resilience and sustainability must consider a **combination and blend** of measures



# Outcomes

- **State-by-State Risk Management Frameworks** informing, strengthening and catalyzing the focus on regional resilience, redundancy and robustness in coastal planning and implementation
- **System-wide framework of solutions** and best practices
- **Interagency and Regional alignment** with others
- **Advanced the Science** and closed data gaps



# Opportunities

- Improved pre-storm planning
- Acceptable flood risk
- Prioritize critical infrastructure
- Rebuild with redundancy
- Creative incentives to promote use of resilience measures
- Utilize a collaborative regional governance structure
- Public-Private Partnerships
- Integrate nature-based features
- Encourage flexibility and adaptive management
- Advance efforts in the 9 focus areas:

- 1) Rhode Island Coastline
- 2) Connecticut Coastline
- 3) Nassau County Back Bays, NY
- 4) New York Bay –New Jersey Harbor and Tributaries

- 5) New Jersey Back Bays
- 6) Delaware Back Bays
- 7) City of Baltimore, MD
- 8) Washington, D.C.
- 9) City of Norfolk, VA



Daily Press/ Adrin Snider  
Nor'Ida – November 2009



# Coastal Storm Risk Management Framework

➤ Managing coastal storm risk is a shared responsibility and requires:

- Shared tools
- Common methodology that all parties can follow together to assess risk and identify solutions

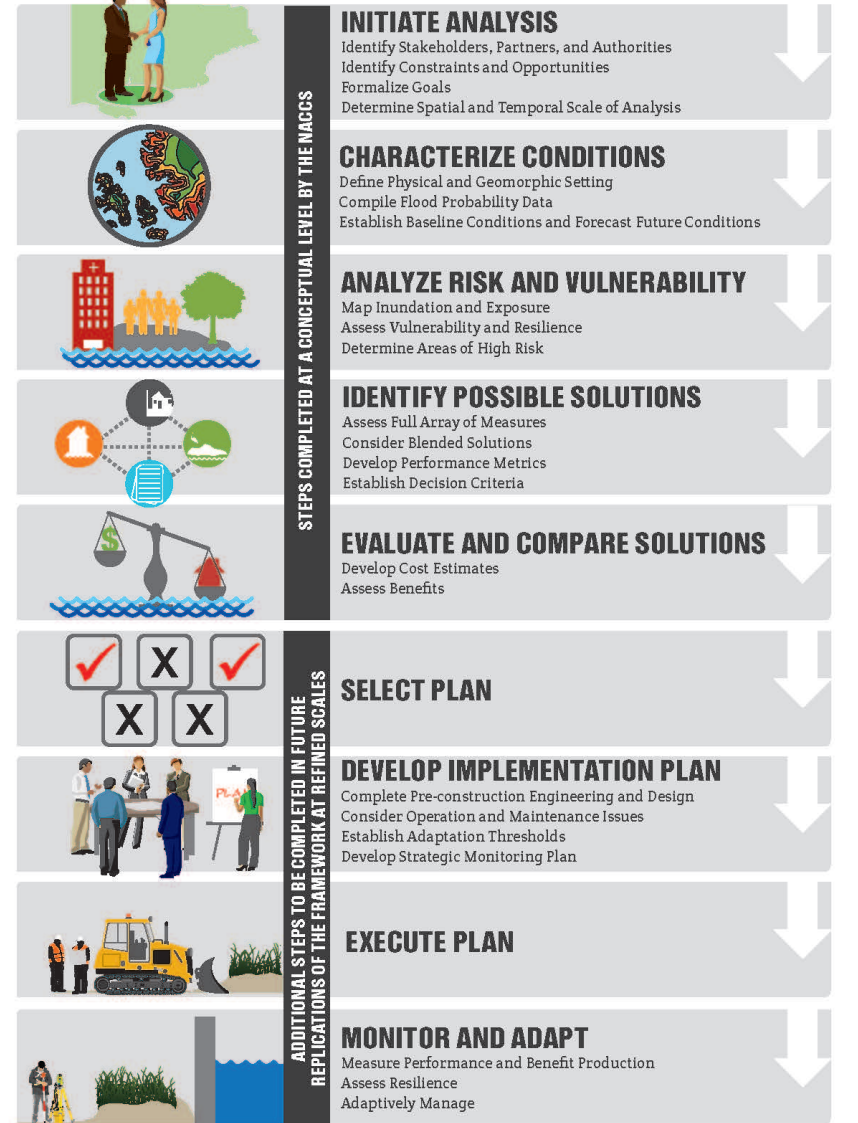
➤ The framework is:

- A 9-step process
- Customizable for any coastal area or watershed
- Repeatable at state and local scales
- Transferable to other areas of the country



## NACCS Coastal Storm Risk Management Framework

(Repeat initial five steps for each Tier 1, 2, and 3 Evaluations)



# Coastal Storm Risk Management Framework

## Trends

### ➤ **Climate and Sea Level Change**

- Sea level is increasing throughout the study area
- Shorelines are changing in response to sea level change
- Historic erosion patterns will continue and accelerate

### ➤ **Socioeconomic Trends**

- Population is aging (i.e. more difficult to evacuate/relocate during flooding)
- Population is increasing in coastal zone (more people exposed to flooding)
- Importance of operating channels and ports will become more critical to regional and national economy

### ➤ **Environmental Trends**

- Habitats subject to more stress with population increase, climate change, and other effects



# Coastal Storm Risk Management Framework

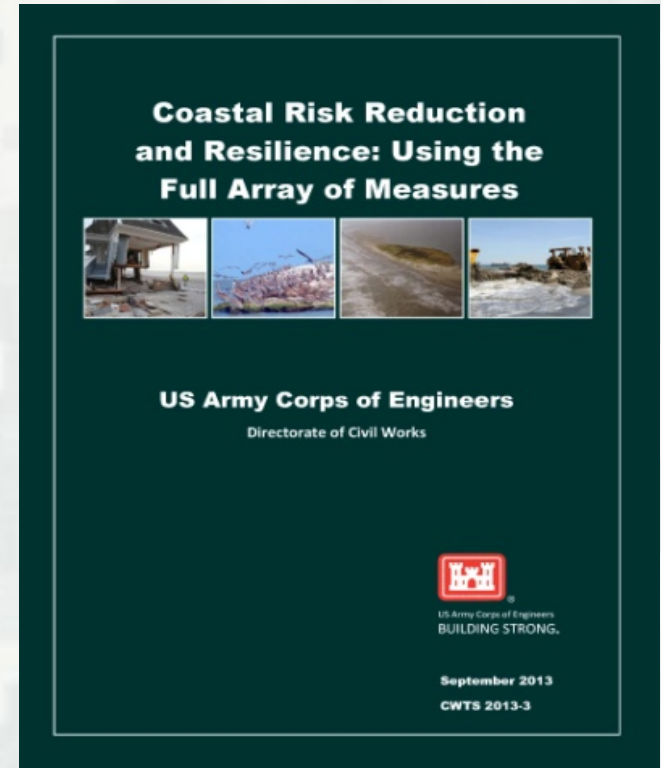
## Risk Management Measures

### ➤ **Structural**

- Storm surge barriers
- Levees, breakwaters, shoreline stabilization
- Natural and Nature-Based Features (e.g., beaches and dunes, living shorelines, wetlands, oyster reefs, SAV restoration)

### ➤ **Non-Structural** (e.g., floodproofing, acquisition and relocation, flood warning, etc.)

### ➤ **Programmatic** (e.g., floodplain management, land use planning, State/municipal policy, natural resources, surface water management, education, flood insurance programs, etc.)



# Coastal Storm Risk Management Framework:

## Risk Management Measures

### Natural and Nature-Based Infrastructure at a Glance

#### GENERAL COASTAL RISK REDUCTION PERFORMANCE FACTORS:

STORM INTENSITY, TRACK, AND FORWARD SPEED, AND SURROUNDING LOCAL BATHYMETRY AND TOPOGRAPHY



#### Dunes and Beaches

##### Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer

##### Performance Factors

- Berm height and width
- Beach Slope
- Sediment grain size and supply
- Dune height, crest, width
- Presence of vegetation



#### Vegetated Features:

#### Salt Marshes, Wetlands, Submerged Aquatic Vegetation (SAV)

##### Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer
- Increase infiltration

##### Performance Factors

- Marsh, wetland, or SAV elevation and continuity
- Vegetation type and density



#### Oyster and Coral Reefs

##### Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer

##### Performance Factors

- Reef width, elevation and roughness



#### Barrier Islands

##### Benefits/Processes

- Wave attenuation and/or dissipation
- Sediment stabilization

##### Performance Factors

- Island elevation, length, and width
- Land cover
- Breach susceptibility
- Proximity to mainland shore



#### Maritime Forests/Shrub Communities

##### Benefits/Processes

- Wave attenuation and/or dissipation
- Shoreline erosion stabilization
- Soil retention

##### Performance Factors

- Vegetation height and density
- Forest dimension
- Sediment composition
- Platform elevation

Natural  
and  
Nature-  
Based  
Features





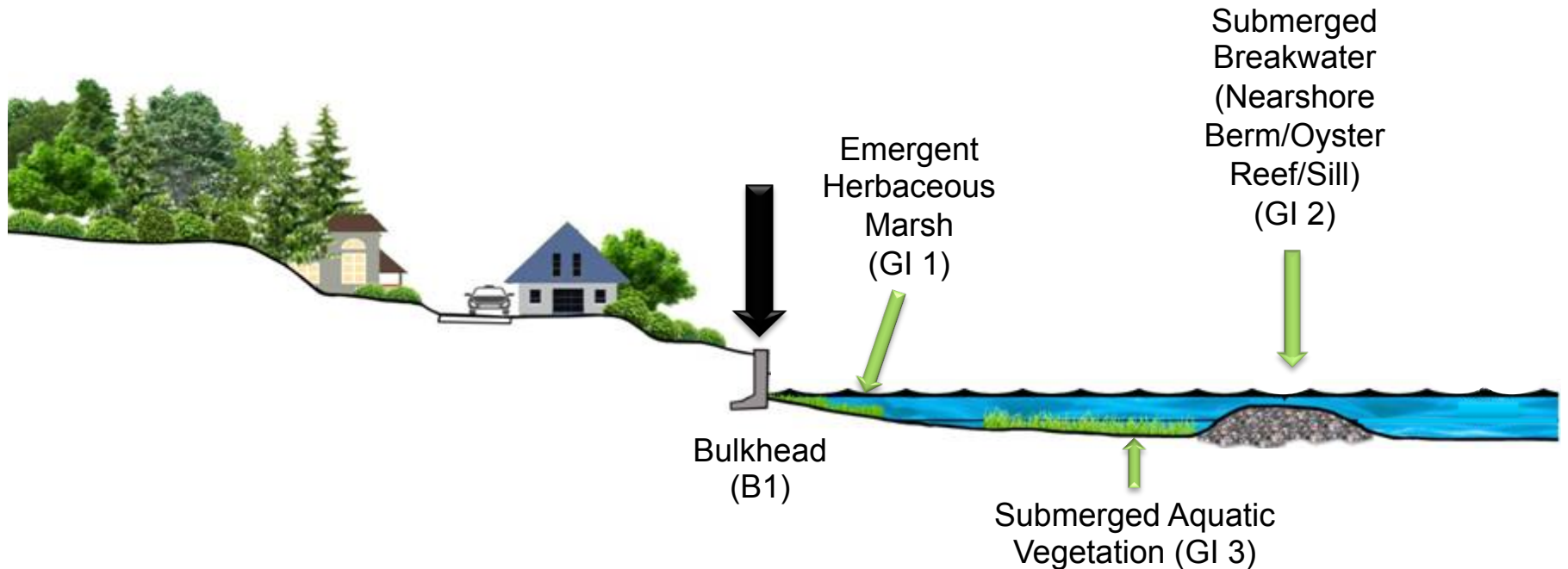
# Coastal Storm Risk Management

## Framework:

### Risk Management Measures

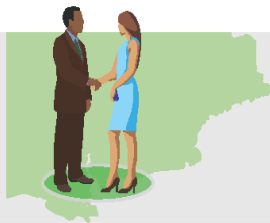
## Integration of Measures

	SB1	NBI 1	NBI 2	NBI 3	ALL
S1	✓		✓		✓
S2	✓		✓	✓	✓
S3			✓		✓
S4				✓	✓
S5		✓	✓		✓
S6		✓		✓	✓



# Technical Products Supporting the Framework

## NACCS Coastal Storm Risk Management Framework



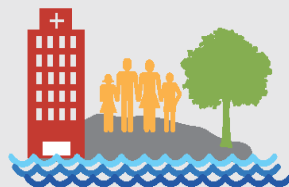
### INITIATE ANALYSIS

Identify Stakeholders, Partners, and Authorities  
Identify Constraints and Opportunities  
Formalize Goals



### CHARACTERIZE EXISTING CONDITIONS

Define Physical and Geomorphic Setting  
Compile Flood Probability Data  
Establish Baseline Conditions



### ANALYZE VULNERABILITY AND RISK

Map Inundation and Exposure  
Assess Vulnerability and Resilience  
Determine Areas of High Risk



### IDENTIFY POSSIBLE SOLUTIONS

Assess Full Array of Measures  
Consider Blended Solutions  
Develop Performance Metrics  
Establish Decision Criteria



### EVALUATE AND COMPARE SOLUTIONS

Develop Cost Estimates  
Assess Benefits

STEPS COMPLETED AT A CONCEPTUAL LEVEL BY THE NACCS

### Technical Products Advanced by NACCS to Close Identified Data Gaps

- Visioning Sessions Report & Focus Area Analyses
- Institutional & Other Barriers Report

- NACCS GIS Geodatabase
- Environmental & Cultural Resources Conditions Report

- Storm Suite Modeling
- NACCS GIS Geodatabase
- NACCS Barrier Island Sea Level Rise Inundation Assessment Report

- Natural & Nature-Based Features Report
- Conceptual Regional Sediment Budget
- State Appendix
- Vulnerability Decision Tree

- Enhanced Depth-Damage Functions for Coastal Storms

Several products, planning tools, and models were developed to assist decision makers in navigating the Coastal Storm Risk Management Framework



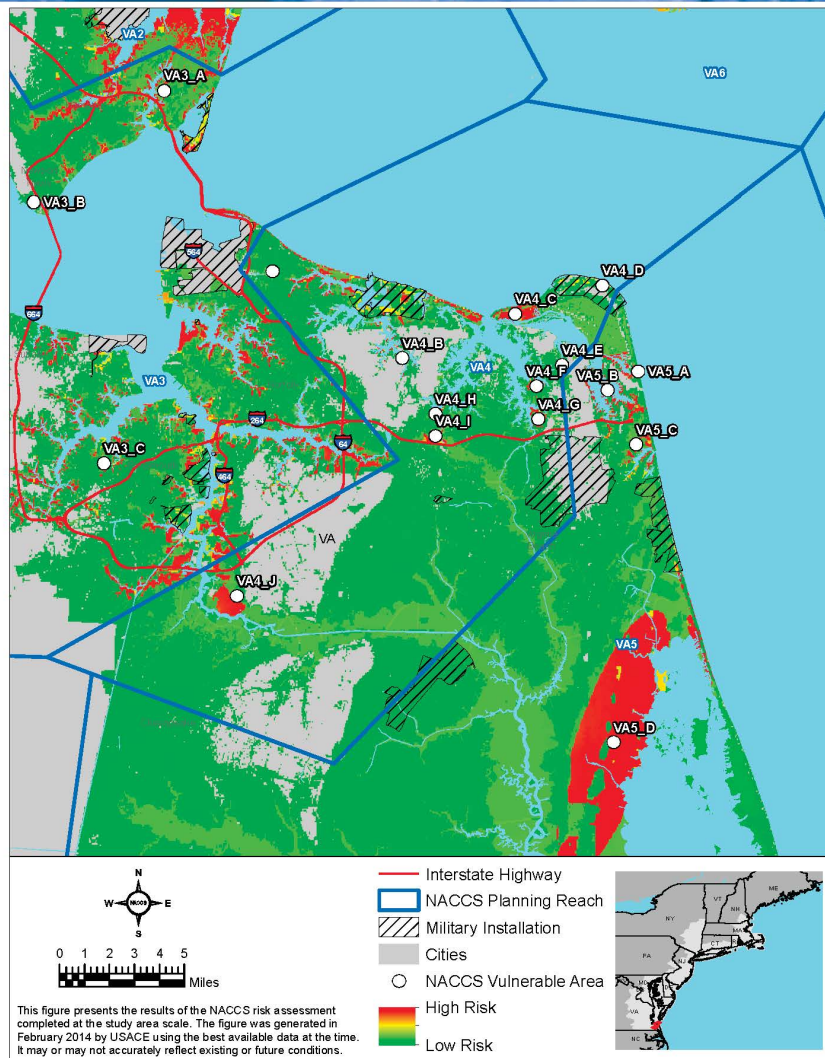


Figure 22. VA4 Risk Areas

54 - D-10: Commonwealth of Virginia



# Summary

- Refine a statewide analysis.
- Develop regional plans.
- Coordinate.
- Invest in hazard mitigation plans and align regional plans with state priorities.
- Standardized data collection.
- Pre-disaster planning – vulnerabilities and projects.
- Develop a vision.
- Rebuild with resilience.
- Combine and blend measures.
- Monitor and adapt.



# Questions?

