

Towards a Resilient East Coast: the USACE North Atlantic Coast Comprehensive Study and Hurricane Sandy Recovery Program

Roselle Henn, Deputy Director

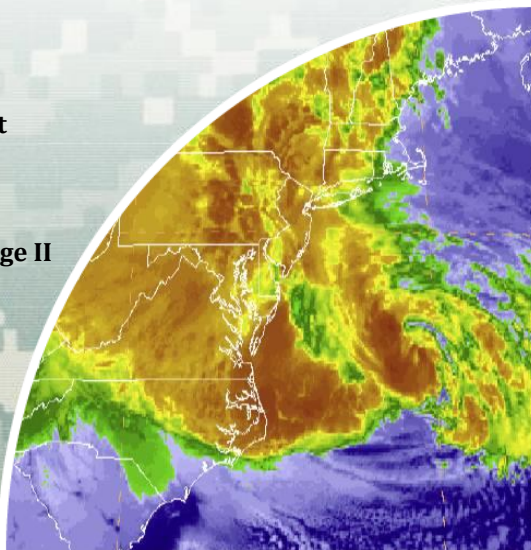
National Planning Center for
Coastal Storm Risk Management
U.S. Army Corps of Engineers

24 September 2014

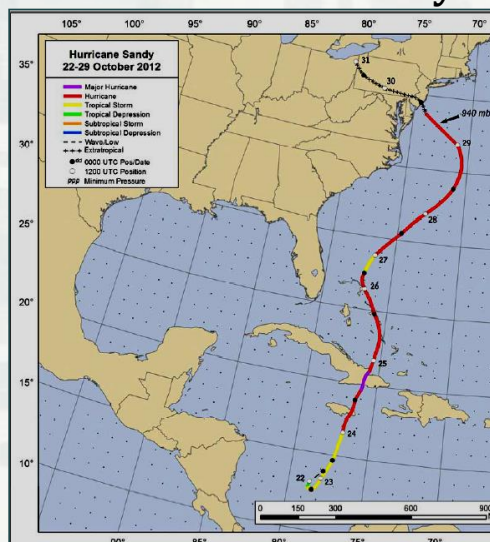
Deltas in Times of Climate Change II
Rotterdam, The Netherlands



US Army Corps of Engineers
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Sandy's Track



- Sandy originated in the Caribbean on 22 October 2012
- Severely impacted Jamaica, Cuba, Haiti, Dominican Republic, and Cuba, reaching the USA Atlantic coastline 29 October
- In the USA, effects extended from Florida to Maine, and west to Great Lakes
- States of New Jersey, New York, and Connecticut greatly impacted; NY-NJ Harbor devastated by catastrophic surge



National Hurricane Center 12 Feb 2013

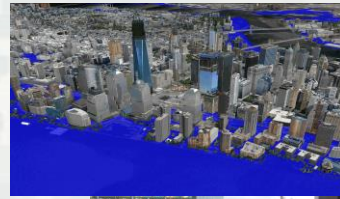


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Sandy's Impact in the USA

➤ Human

- 159 lives lost
- 500,000 mandatory evacuations
- 20,000 temporary shelter
- Extensive community dislocations



➤ Economic

- \$65B in damages
- 650,000 houses damaged/destroyed



➤ Infrastructure: Loss off

- Telecommunications, transit
- Fuel, power



*US Army Corps of Engineers – Partnered projects
credited with an estimated
\$1.9B in damages prevented



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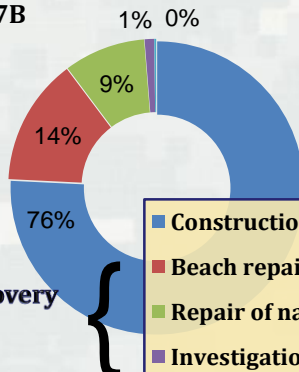
Public Law 113-2 Disaster Relief Appropriations Act 2013

Total Appropriation \$47.9B

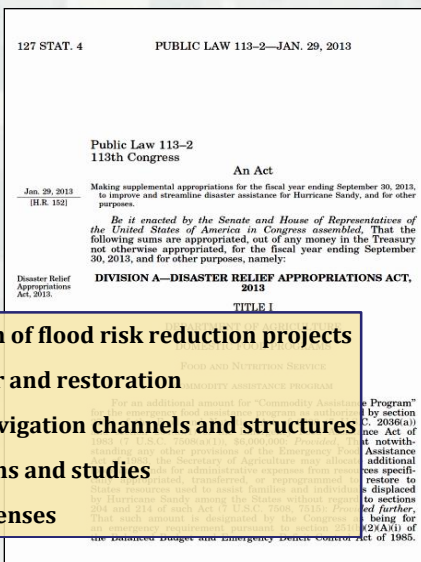
HUD \$15.20B

DOT \$12.42B

DHS \$11.47B



**USACE
Sandy Recovery
Program
\$5.1B**



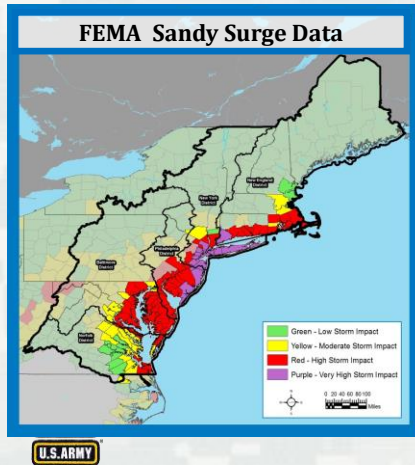
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North Atlantic Coast Comprehensive Study

"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

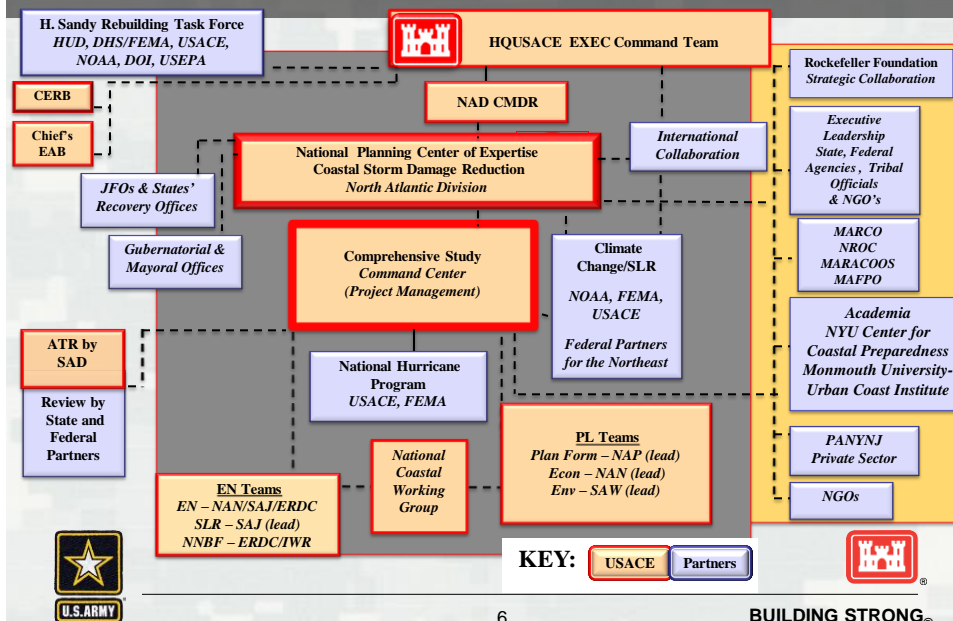
- Provide a **Risk Reduction Framework**, consistent with USACE-NOAA Rebuilding Principles
- Support **Resilient Coastal Communities** and robust, sustainable coastal landscape systems, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable population, property,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



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NACCS Collaboration

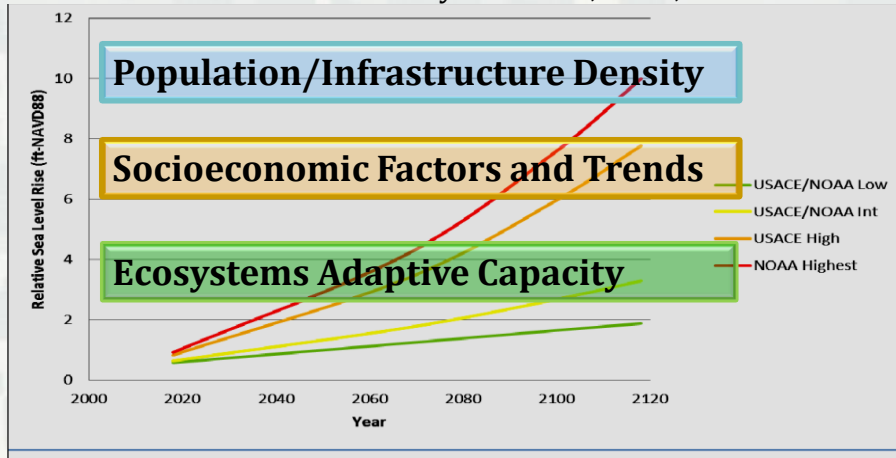


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NACCS Future Scenarios and Flooding Exposure

Sea level rise* evaluated for the years 2018, 2068, 2100** and 2118

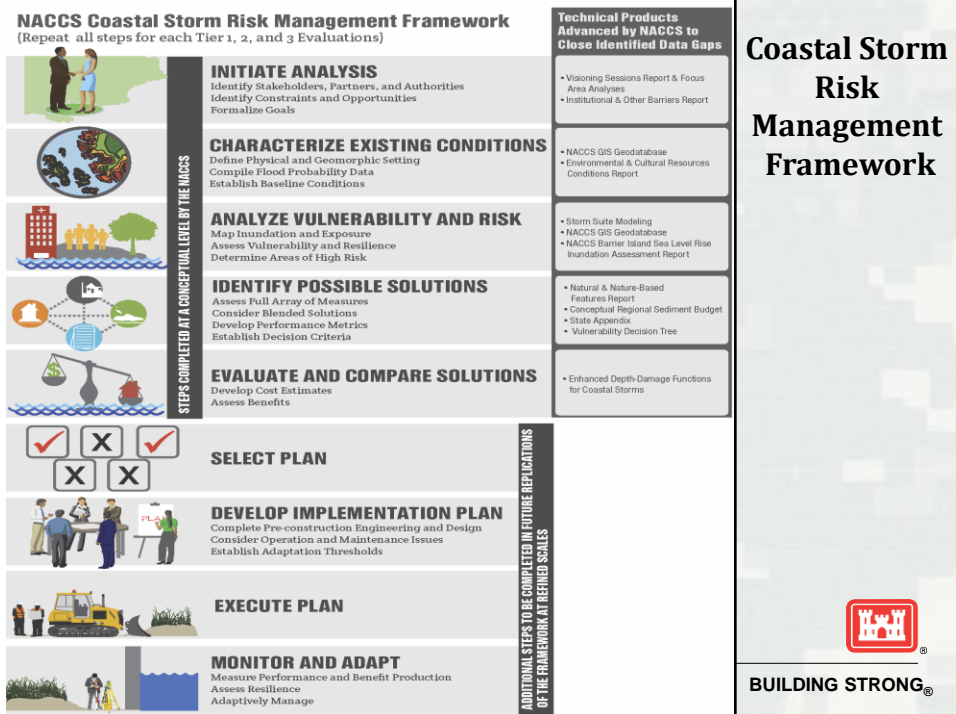


* USACE Engineer Circular (EC) 1165-2-212
 ** Intergovernmental Panel on Climate Change scenario



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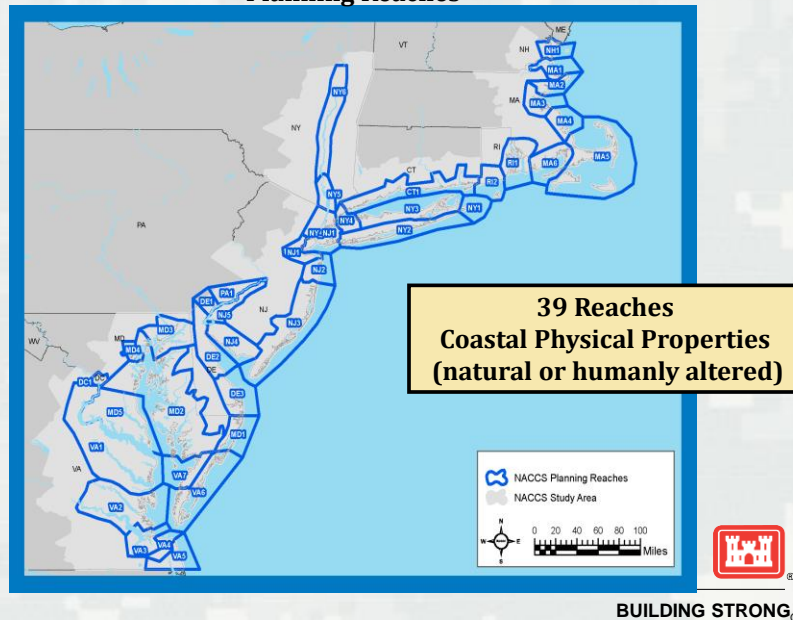
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Coastal Storm Risk Management Framework

Planning Reaches

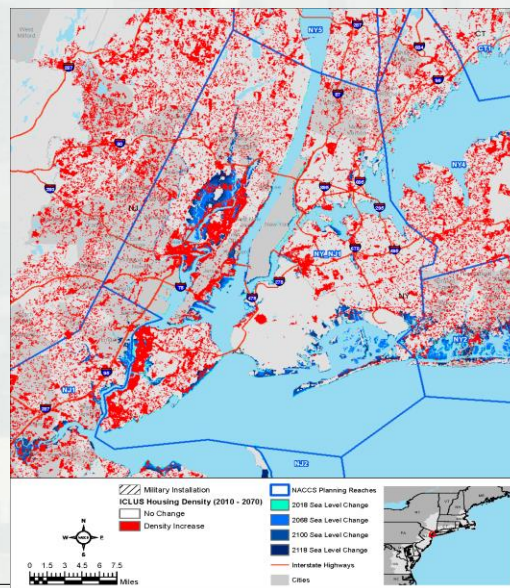


Coastal Storm Risk Management Framework

Flood Exposure and Risk Assessment

Forecasted Population and Sea Level Rise

- Percent change in county populations from 2010 to 2070 and projected 2018, 2068, 2100, 2118 SLR future conditions
- National-Scale Housing-Density Scenarios Consistent with Climate Change Storylines (USEPA June 2009)
- Assumes moderate rates for economic development, fertility, mortality, and migration



Coastal Storm Risk Management Framework

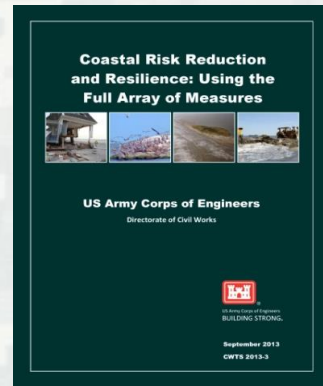
Risk Management Measures

➤ 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.)

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



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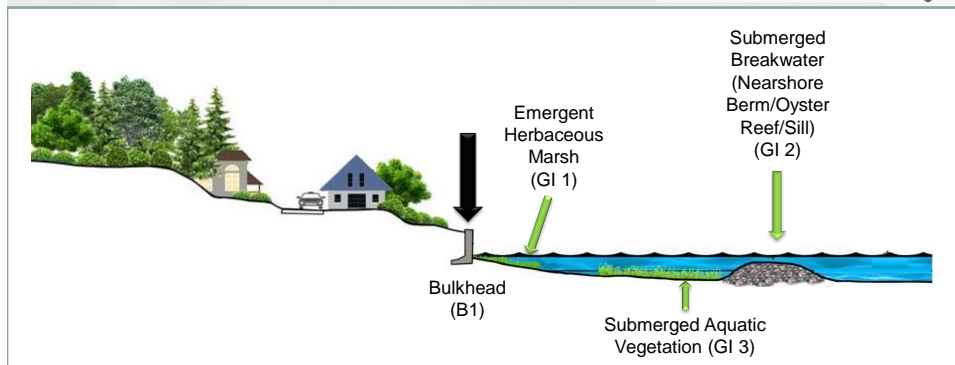


Coastal Storm Risk Management Framework

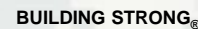
Risk Management Measures

Integration of Measures Relative Parametric Costs

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



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NACCS Findings

- **Shared** responsibility of all levels of Government and partnerships
- Rethink approaches to **adapting to risk**
- Areas of highest (and growing) population density and economically critical urban centers are most **vulnerable**
- Resilience and sustainability must consider a **combination and blend** of measures
- Consider **stormwater and fluvial** aspects of coastal risk management
- **Interior, low-lying** areas highly susceptible to small changes in water level



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NACCS Outcomes

- **ERDC's Coastal Storm-Modeling System (ERDC CSTORM-MS)**
 - Application of high-resolution numerical models in a tightly integrated modeling system with user friendly interfaces
 - Provides for a robust, standardized approach to establishing the risk of coastal communities to future occurrences of storm events
- **Depth-Damage Functions**
 - Assessment of Damages to Structures and Their Contents
 - Loss of Life Projection
 - Emergency Costs, Secondary and Tertiary Effects
- **Conceptual Regional Sediment Budget**
- **Coastal Program Guide (modeled after the Silver Jackets Interagency Flood Mitigation Program Guide)**
- **US Fish and Wildlife Planning Aid Report**



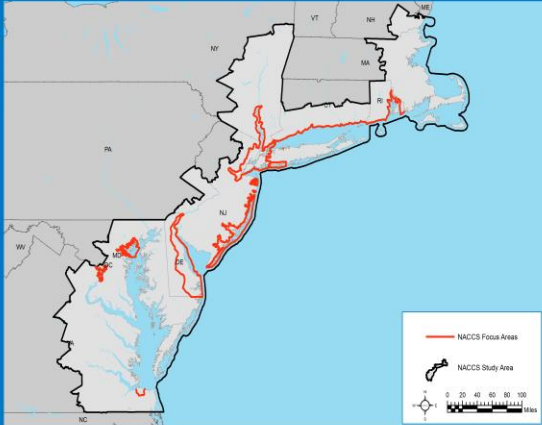
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NACCS Opportunities


NACCS Focus Areas




Map showing NACCS Focus Areas (red lines) and NACCS Study Area (black outline) along the Northeast and Mid-Atlantic coastlines. Includes a scale bar (0 to 100 miles) and a north arrow.

9 Focus Areas:
Locations not having partnered projects/studies when Sandy occurred

- 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



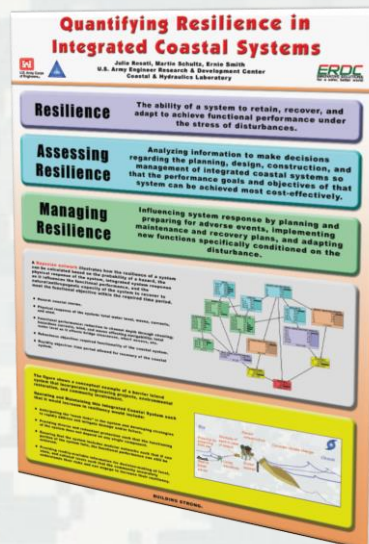
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Systems Approach and Resilience

- **Quantify the resilience** of an integrated coastal system incorporating
 - Natural and Nature-Based Features
 - Engineering Projects
 - Community Values

- What are the **best practices** for assessing, operating and maintaining a resilient coastal system?





INTERNATIONAL CONFERENCE

DELTA IN TIMES OF CLIMATE CHANGE II

OPPORTUNITIES FOR PEOPLE, SCIENCE, CITIES AND BUSINESS

ROTTERDAM
THE NETHERLANDS

24 - 26 SEPTEMBER 2014

