NY/NJ Coastal Restudy Meeting

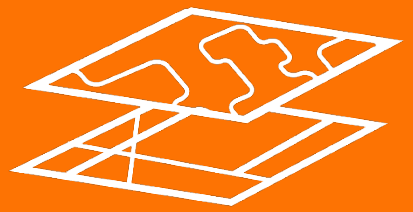
Community Meeting #2

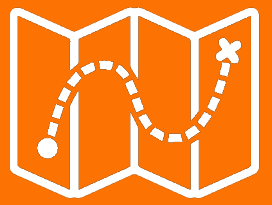
FEMA

Photo credit NOAA/NASA

Today's Goals

1	2	3
Coastal Restudy Overview	Latest Coastal Restudy Milestones	Opportunities for Collaboration





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Introductions – FEMA and State Agencies

	Title	Employee	Phone Number
FEMA	RII Risk Analysis – Acting Branch Chief	Michael P. Foley michael.foley3@fema.dhs.gov	(212) 680-3634
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FEMA	RII Mitigation Division – Resiliency Specialist	Thomas Song, CFM Thomas.Song@fema.dhs.gov	(917) 374-5475
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Introductions – Project Support

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Project Management	Floodplain Analysis and Mapping – Compass (Coastal Update, Storm Surge, and NJ and NYC Overland)	Jeff Smith, P.E., PMP, CFM jeff.r.smith@aecom.com	(215) 789-2166
	Floodplain Analysis and Mapping – STARR II (Westchester Overland)	Mike Salisbury, P.E. michael.salisbury@atkinsglobal.com	(321) 775-6650
Regional Support Center	Planner – STARR II	Rosemary Bolich, AICP, CFM Rosemary.Bolich@Stantec.com	(646) 490-3848
	Water Resources Engineer – STARR II	Trevor Cone Trevor.Cone@Stantec.com	(212) 330-6157
Outreach	Community Engagement and Risk Communication – Resilience Action Partners	Amber Greene amber.greene@ogilvy.com	(646) 522-9271
		Melissa Herlitz, AICP melissa.herlitz@mbakerintl.com	(646) 682-5558

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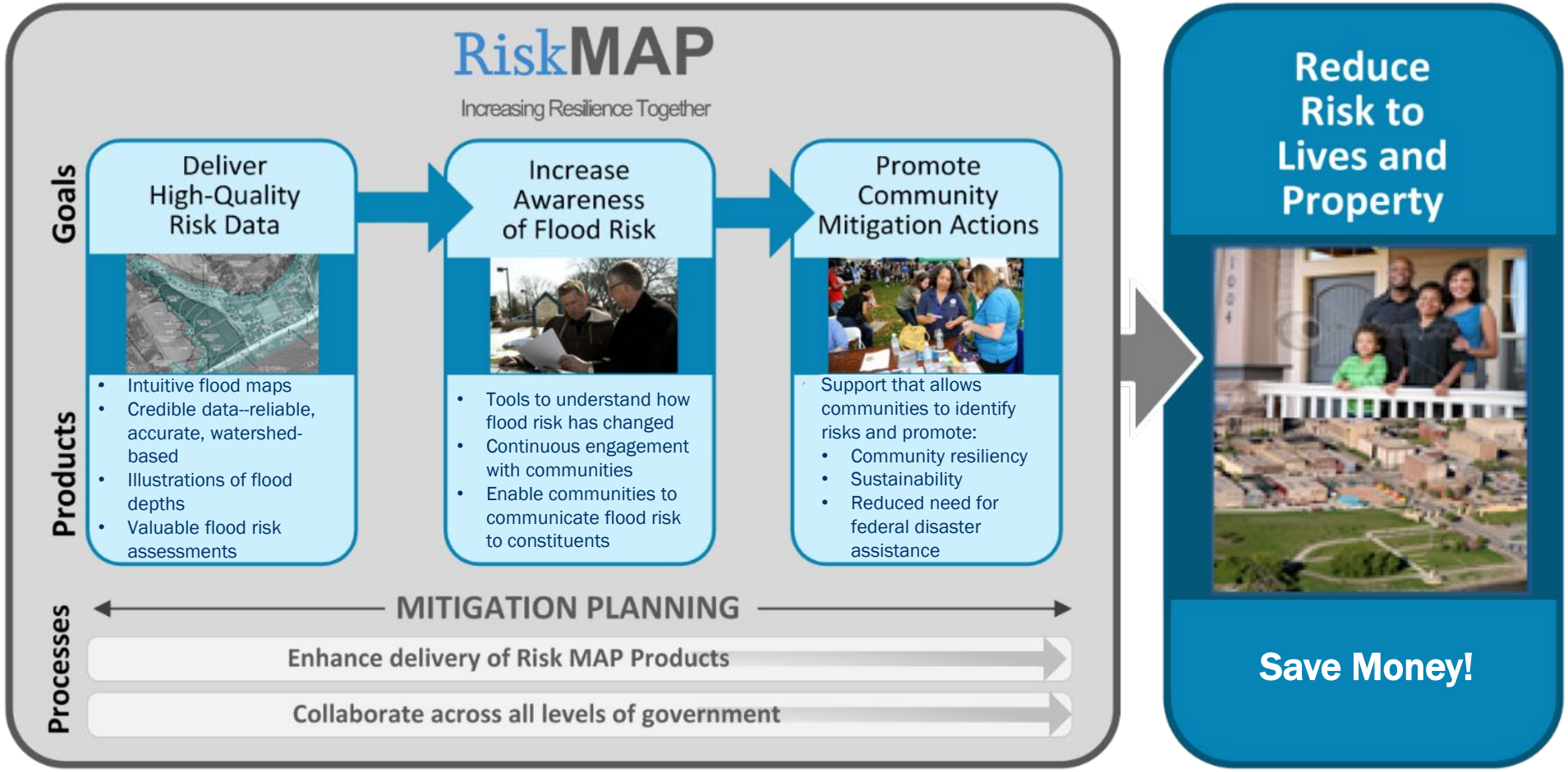
FEMA Mitigation Division

Risk MAP - Mapping Assessment and Planning:

Provide updated flood hazard data to 100% of populated U.S. coasts to create stronger and safer communities



Flood Maps Affect Important Decisions

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National Flood Insurance Program (NFIP)

- Voluntary program based on a mutual agreement between the Federal government and the local community.
- In exchange for adopting and enforcing a Floodplain Management ordinance, Federally-backed flood insurance is made available.

Federal	State	Local
• Identify and Map Risk • Set Building and Development Standards • Provide Flood Insurance	• Establish Building Codes • Set Enhanced Building and Development Standards • Provide Technical Assistance	• Adopt and Enforce Development and Building Standards • Issue Permits and Maintain Records

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Coastal Restudy Background

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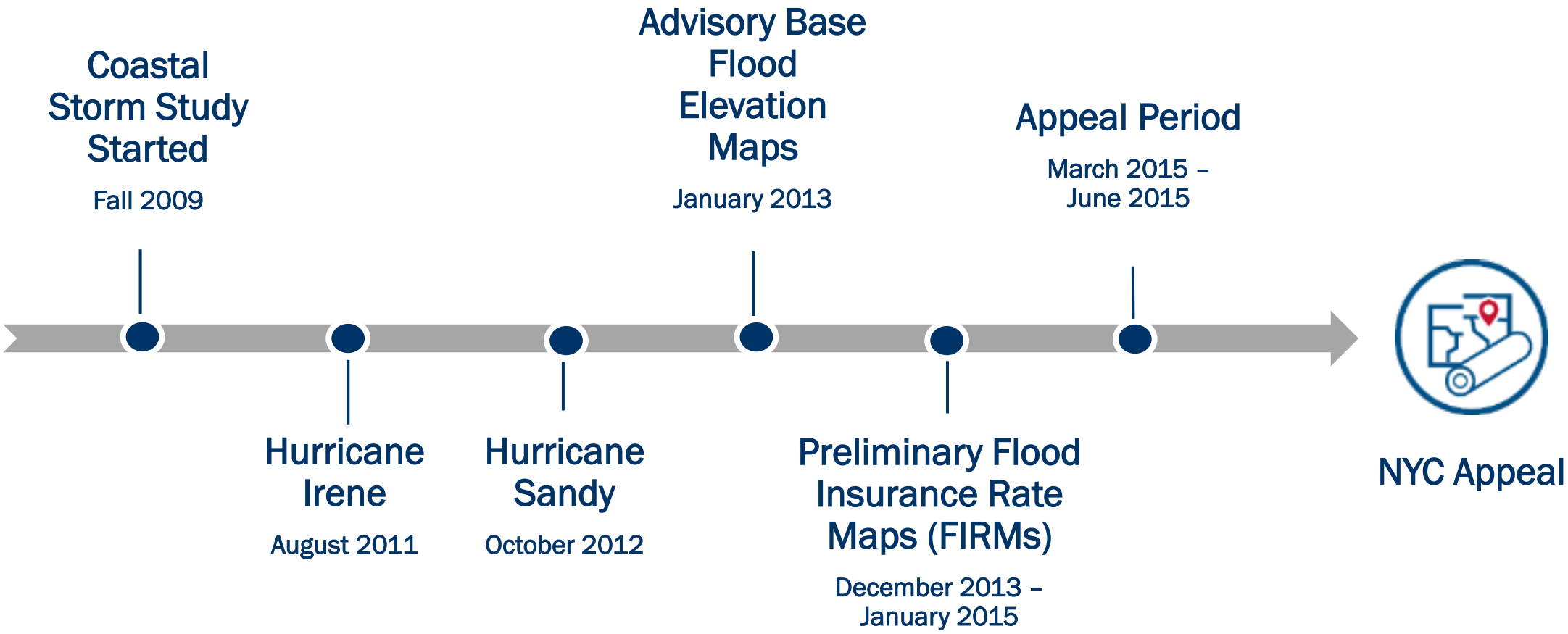
Coastal Study Analysis: 2009 - 2015



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Coastal Appeal Outcome

NYC Appeal

- New York City challenged two aspects of FEMA's storm surge analysis:
  1) Extra-tropical storm validation
  2) Representation of tidal effects

FEMA Response

- A third-party Independent Review Board (IRB) acknowledged NYC's findings and outlined next steps
- FEMA initiated a series of analyses and "sensitivity tests" to determine next steps
  - Sensitivity analyses conducted based on recommendations from the IRB and were finalized in Summer 2017. Results are informing restudy
  - Region II storm surge, started late 2017, and restudy data will include storms occurring post-2009 – Irene, Sandy, 2016 Nor'easter, etc.

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Post-Appeal Community Engagement

- **October 2016**
  - Met with City of New York to begin appeal resolution discussions
  - Briefed New Jersey and New York State government and congressional delegation

- **November 2016 – March 2017**
  - New Jersey briefings in coastal communities

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Effective Vs. Preliminary FIRMs

- **Effective FIRMs**
  - Flood insurance through the National Flood Insurance Program (NFIP) will continue to be based on current effective FIRMs

- **Preliminary FIRMs**
  - Some communities refer to the PFIRMs for best available data for development purposes
  - Federal Sandy recovery projects were informed by PFIRMs in New York City, Rockland, and Westchester Counties (NY) and coastal New Jersey counties

Preliminary Map Adoption

Several communities opted to adopt the 2015 Preliminary coastal maps

County	Communities	LFD Date	Effective Date
Atlantic	Absecon, Brigantine, Egg Harbor Township, Hamilton, Linwood, Longport, Margate City, Mullica, Weymouth	2/28/2018	8/28/2018
Cape May	Every community except Lower Township	4/5/2017	10/5/2017
Monmouth	Highlands, Little Silver, Matawan, Monmouth Beach	12/20/2017	6/20/2018
Ocean	Jackson, Point Pleasant Beach	12/20/2017	6/20/2018

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Coastal Restudy Overview

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Coastal Restudy Enhancements

Issue 1: Extratropical Storm Validation

Issue 2: Representation of Tidal Effects

Issue 3: Inclusion of Additional Storm Events

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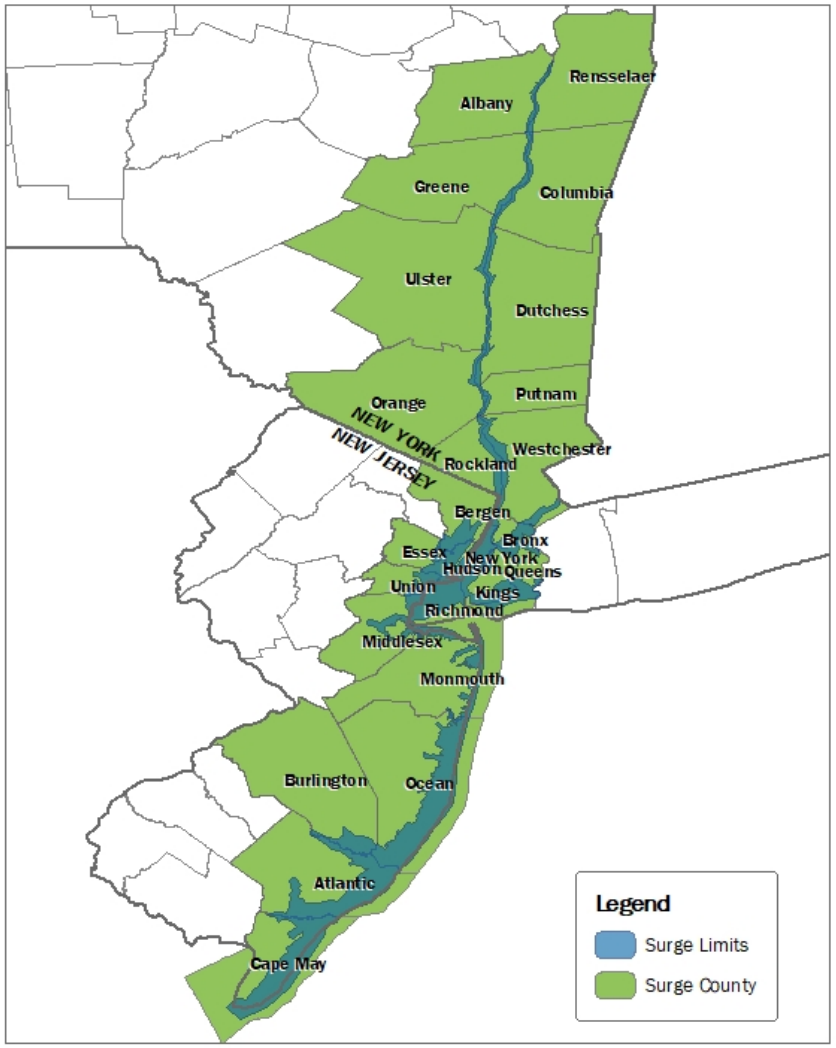
Overview of Restudy Area – Surge Study

- Tidal Hudson River
- Western Long Island Sound
- New York & Raritan Bay
- Atlantic Ocean
- Does not include Delaware Bay



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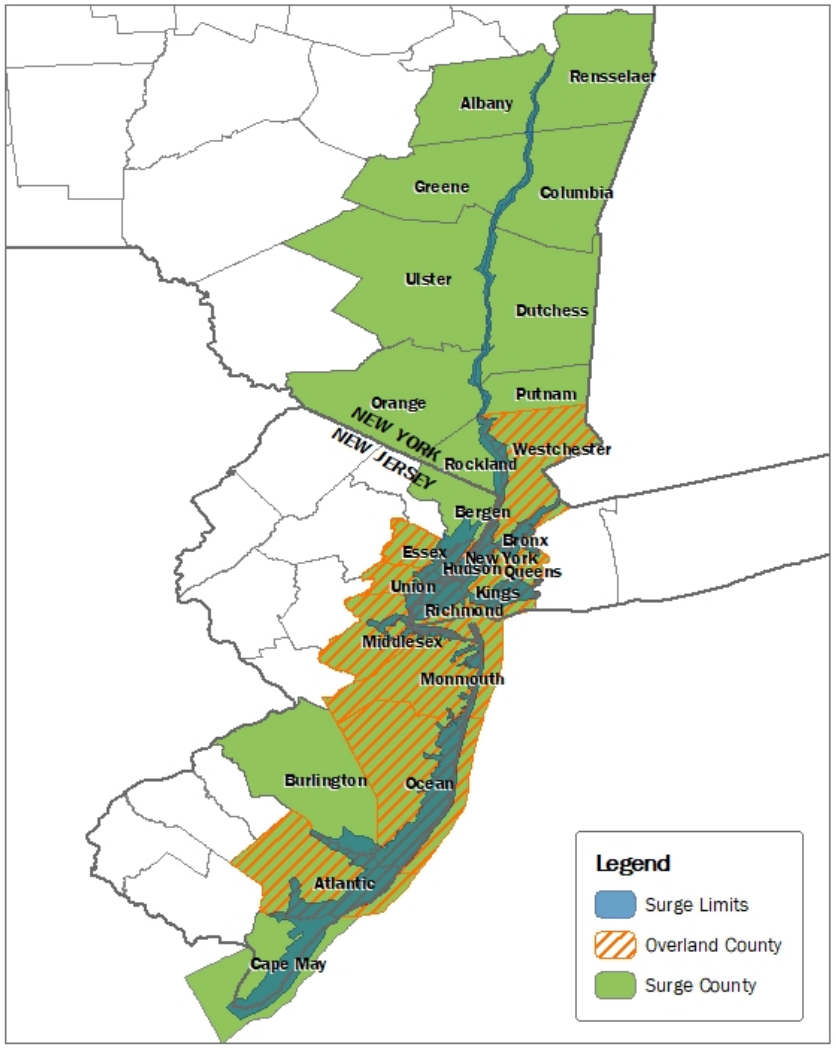
Overview of Restudy Area – Overland Analyses and Mapping

- NY: New York City boroughs and Westchester County
- NJ: Atlantic, Essex, Hudson, Middlesex, Monmouth, Ocean, and Union Counties



Quality Assurance

- **Coastal Steering Committee (CSC)**
  - Internal group of experts in storm surge modeling and FEMA coastal study process
  - Independent from study production

- **Coastal Advisory Panel (CAP)**
  - State of New Jersey, State of New York, Port Authority of NY and NJ, NYC, FEMA, and CSC

Key Milestones

Summer 2017	2017-2021	2018-2022	2022	2023	2024
Sensitivity Analysis	Storm Surge and Wave Conditions Reanalysis	Wave Hazard Analyses and Floodplain Mapping	Draft Work Maps - Flood Risk Review Meeting	Preliminary Maps – CCO and Open House Meetings	Appeal Period Followed by Letter of Final Determination and Effective Maps

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Coastal Restudy Phase 1

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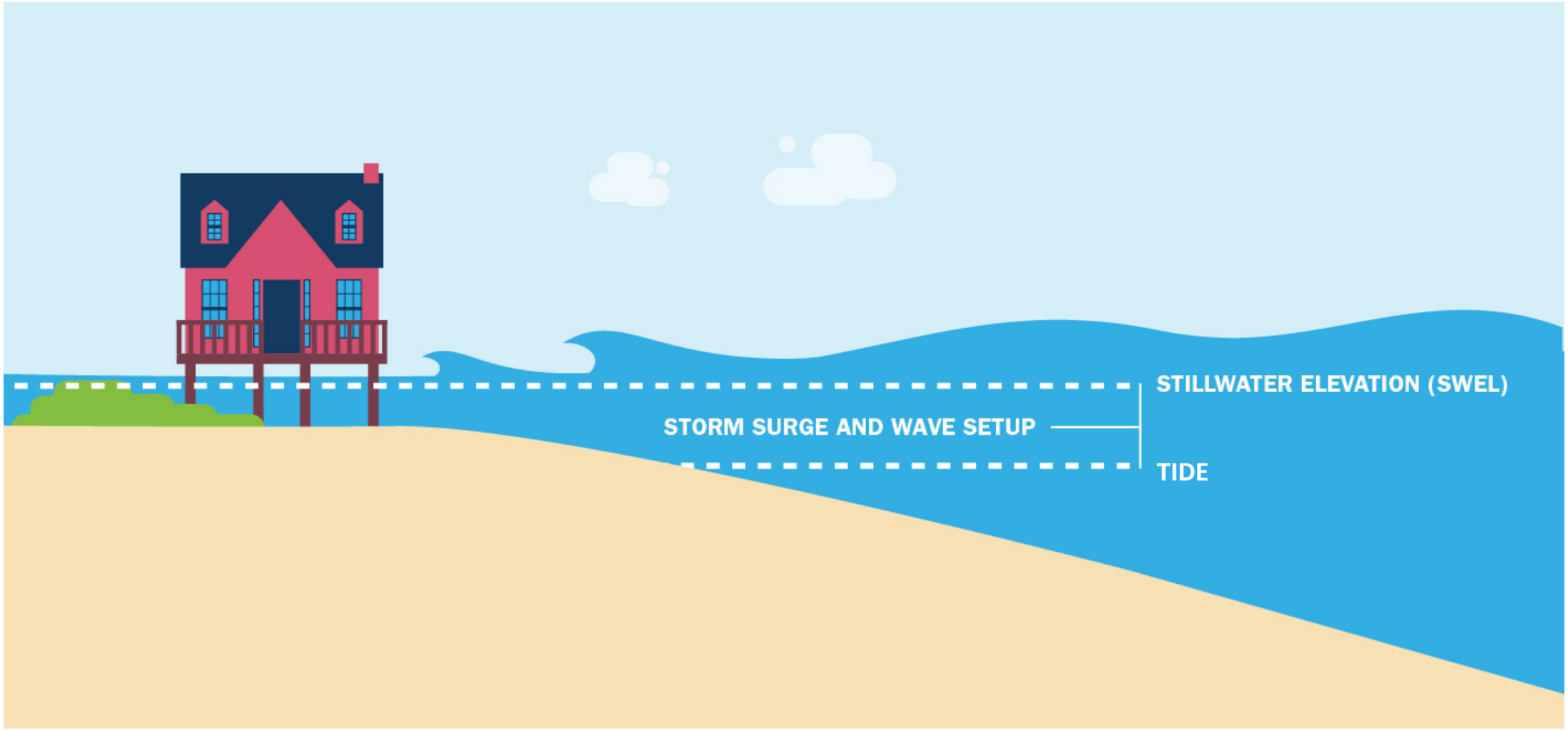
Coastal Restudy Phase 1: Storm Surge Study



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What is an Intermediate Data Submittal?

Intermediate data submittals are reports that document milestones for a coastal study's proposed technical approach and processes, including details about the storm surge study and modeling that will inform the wave analyses.

The reports provide detailed data that can later be used to reconstruct or support the study results.

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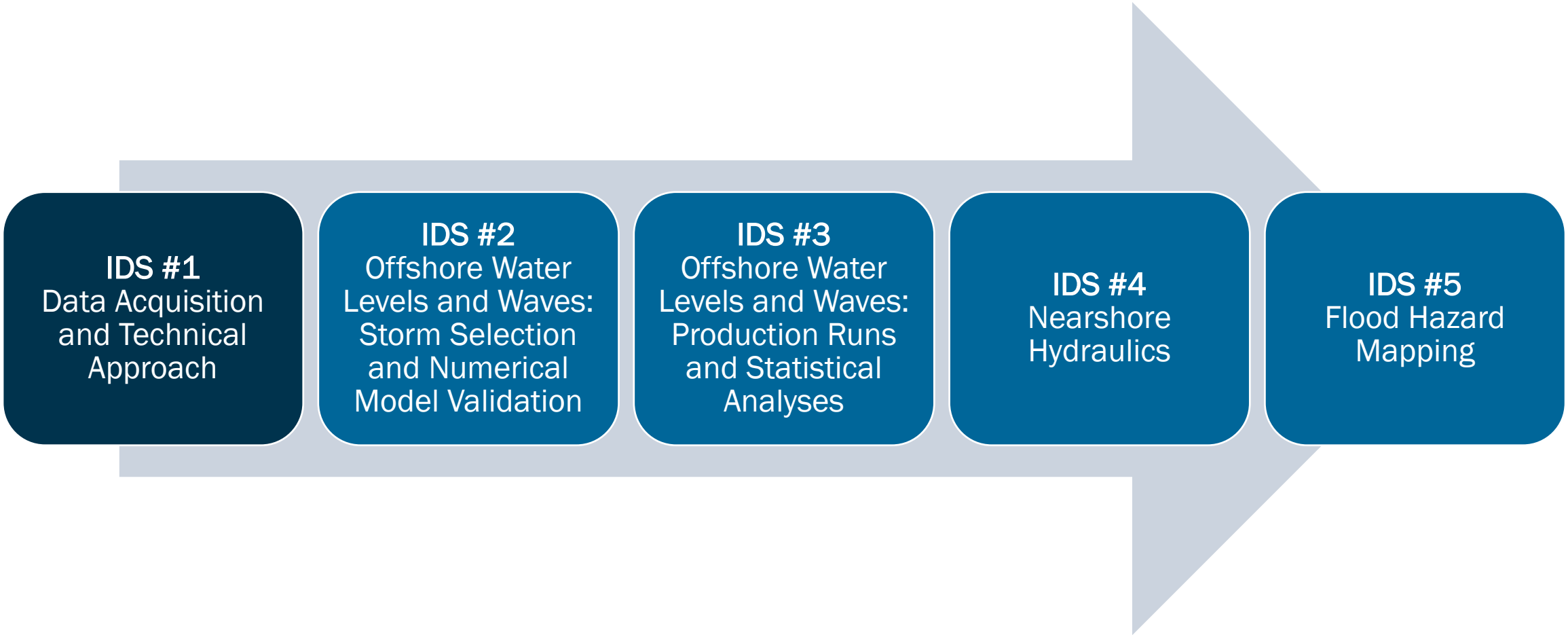
Intermediate Data Submittals



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Storm Surge Study: Intermediate Data Submittal #1

IDS 1: Understanding the Data and Technical Approach for the Storm Surge Study	
1	Technical Approach
2	GIS Analysis of Coastal Features, Study Area Characteristics and Site Reconnaissance
3	Review of STARR II Coastal Sensitivity Analysis Recommendations and Path Forward
4	Tropical Storm Validation Storm Selection
5	Extra-Tropical Storm Validation Storm Selection
6	Topo-Bathy-Digital Elevation Model (DEM) Development
7	Storm Climatology and Initial Probabilistic Model Development
8	Storm Wind Field Methodology
9	Hydrodynamic & Wave Model Development

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Coastal Restudy Enhancements: Issue 1

Extratropical Storm Validation

- Model error analysis and bias assessment
- Assessment of the 1950 storm event
- Reanalysis of historical wind fields
- Compare measured water levels to model results for all 50 extra-tropical cyclones in storm suite
- Develop uncertainty term from this extensive model validation

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Coastal Restudy Enhancements: Issue 2

Representation of Tidal Effects

- Improve analysis of non-linear tide/surge interaction
- Develop a modified linear superposition (MLS) method to develop site-specific regression curves to define tide and surge interaction
- Apply these MLS-derived regression curves to estimate tide effects for all 50 storms and develop associated uncertainty

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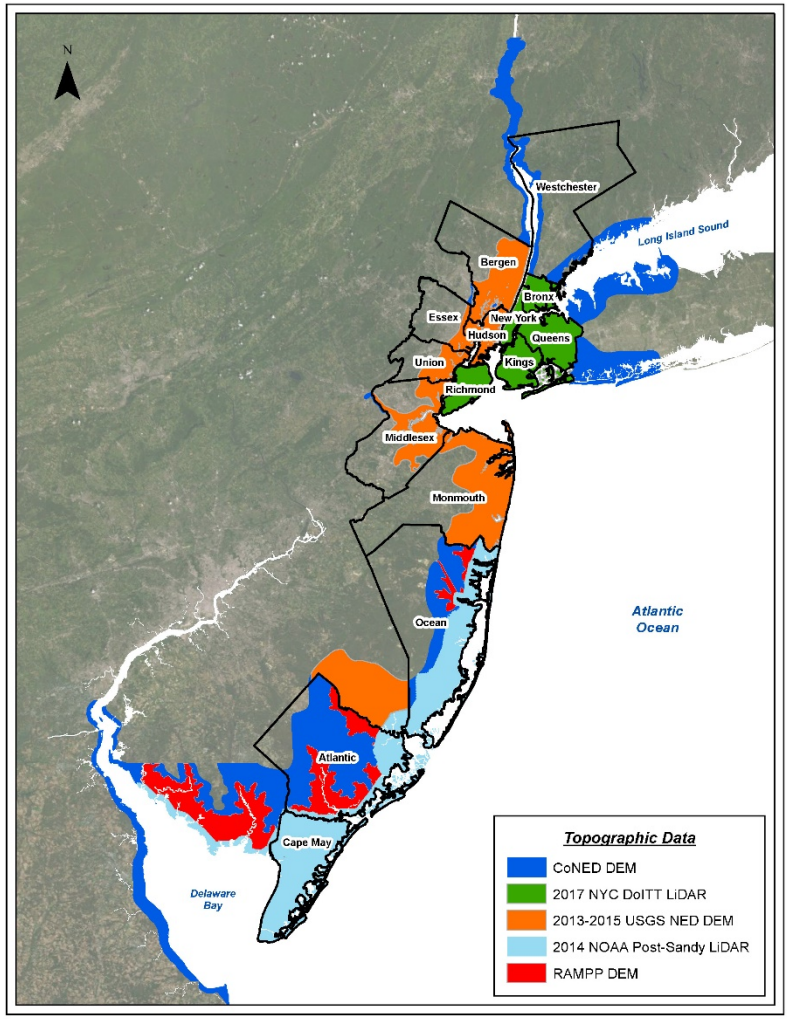
Coastal Restudy Enhancements: Issue 3

Inclusion of Additional Storm Events

- Expand validation effort to include additional tropical cyclones and post-2009 events, including Hurricanes Sandy and Irene, to improve study overall
- Cyclones provide recent events with extensive measured datasets to apply in validation effort

Topographic Datasets

Year	Description	Data Type	Source/ Owner
2014	2014 NOAA Post-Hurricane Sandy LiDAR Mapping for Shoreline Mapping/New Jersey	LiDAR-based DEM	NOAA
2014	New York CMGP Sandy LiDAR	LiDAR-based DEM	USGS
2013–2015	USGS NED DEM	LiDAR-based DEM	USGS
2017	NYC LiDAR	LiDAR-based DEM	NYC DoITT
Varies	CoNED	LiDAR-based DEM	USGS
Varies	FEMA Region II DEMs (FEMA, 2014)	LiDAR-based DEM	RAMPP



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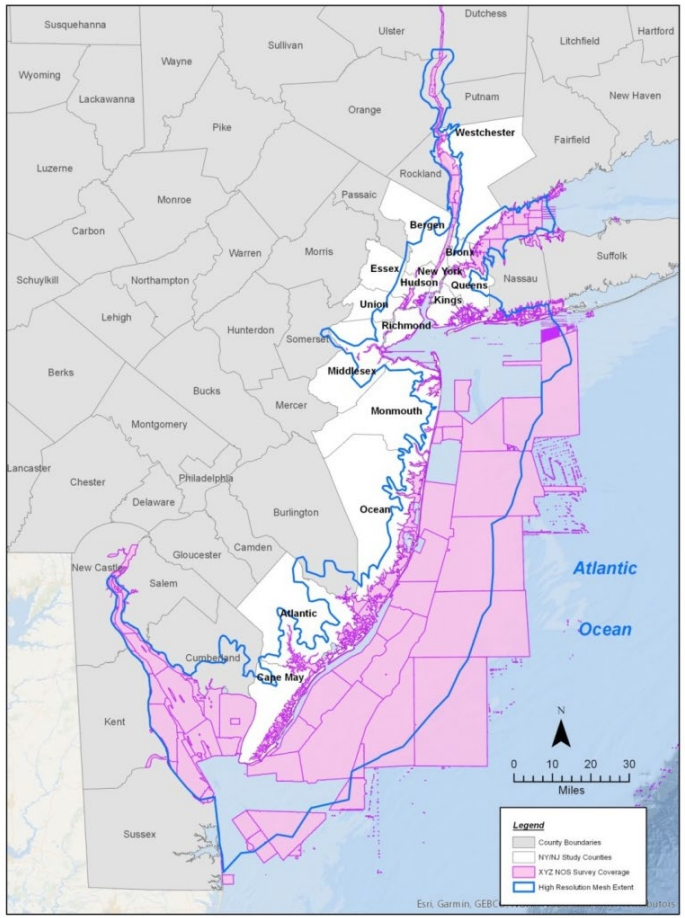
Bathymetric Datasets

Year	Description	Data Type	Source/ Owner
2017	NYC LiDAR Nearshore bathy	DEM	NYC DoITT
2014 to 2015	NJDOT Dredging surveys	Points	NJDOT
2014 to 2015	USACE Surveys for riverine and shipping channels	Points	USACE
2014	2014 NOAA Post-Hurricane Sandy LiDAR Mapping for Shoreline Mapping/New Jersey	DEM	NOAA
1998 to 2004	Hudson River Estuary Program	DEM	
1915 to 1980	National Ocean Service (XYZ and BAG)	Points	NOAA
Varies	Electronic Nautical Charts	Breaklines	NOAA



Example of bathymetric data: NOS XYZ surveys

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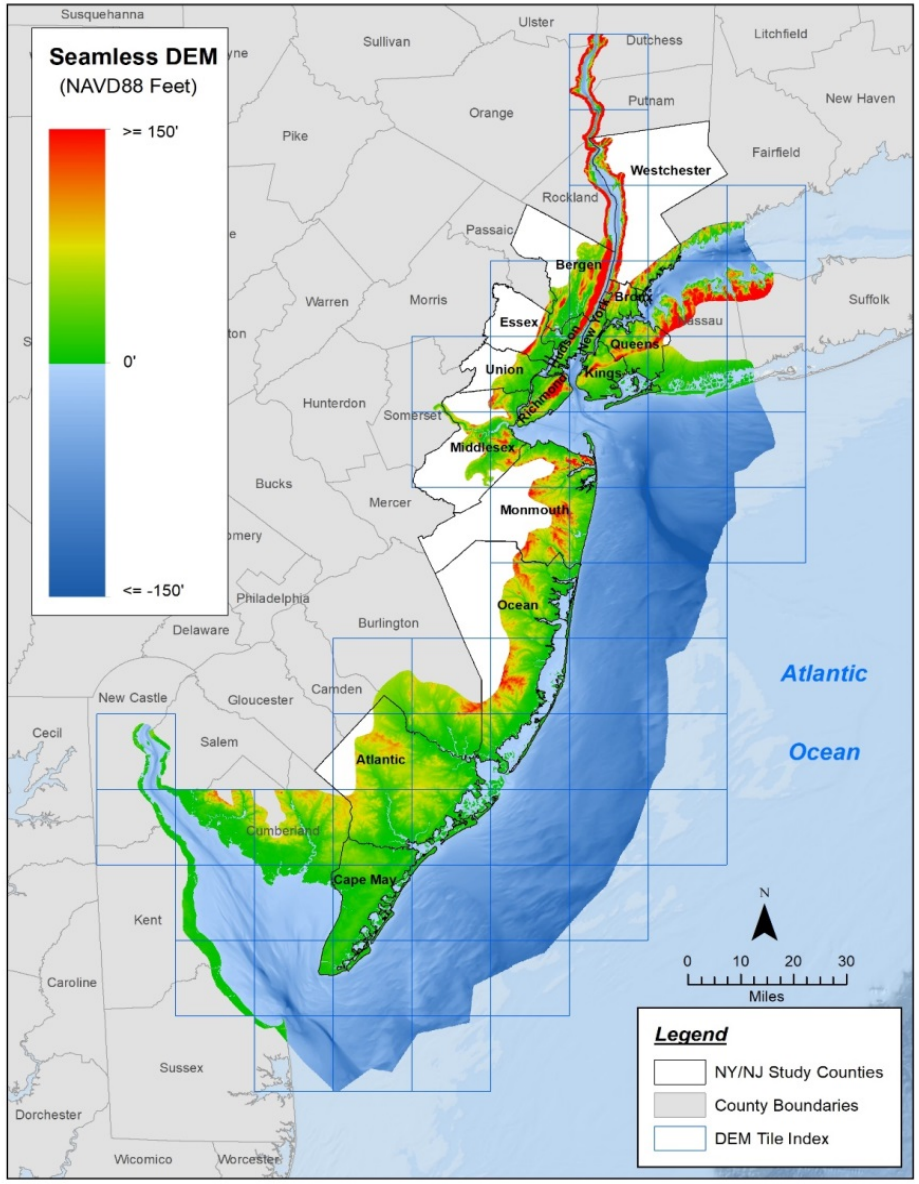
Final Seamless DEM



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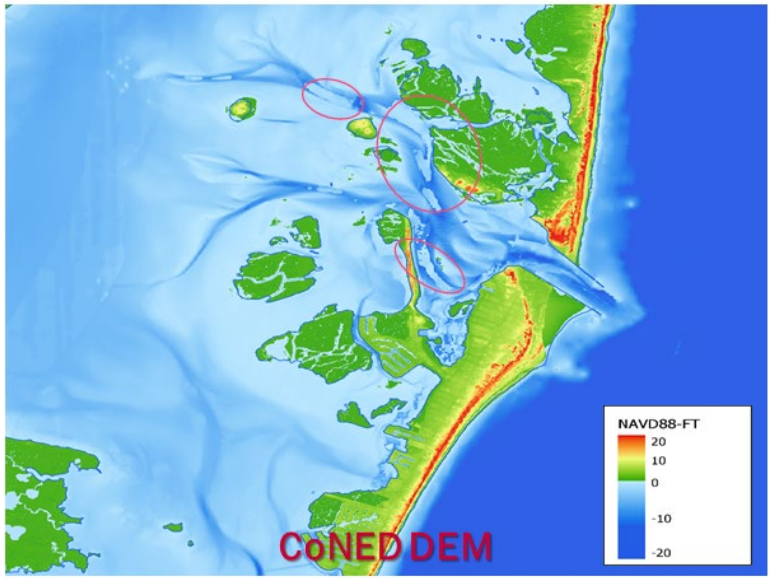
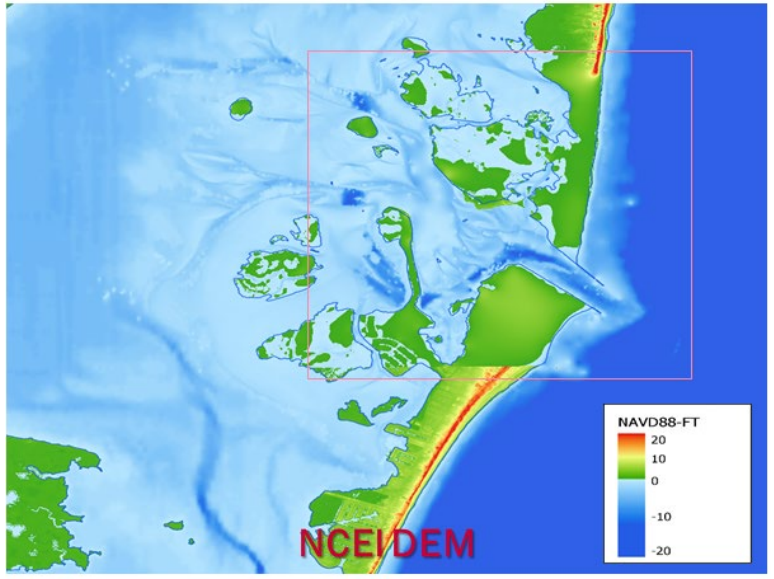
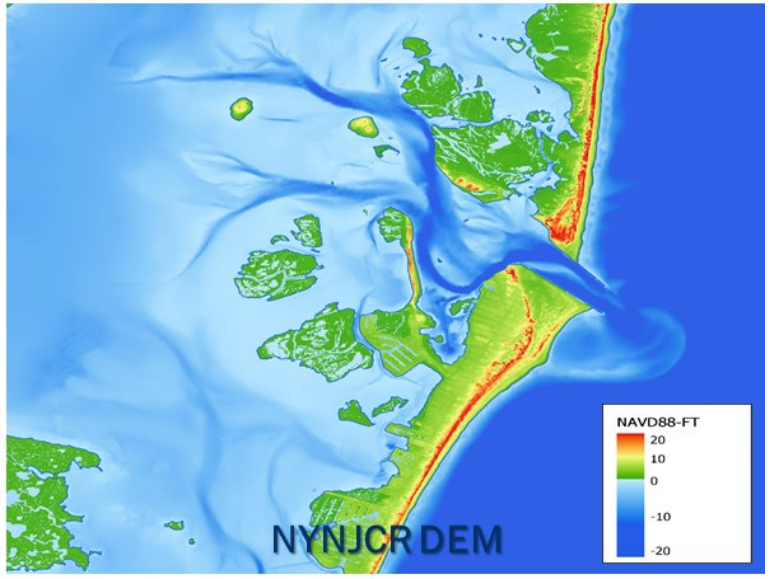
Higher Resolution for DEM Dataset







Barnegat Inlet, Ocean County, NJ

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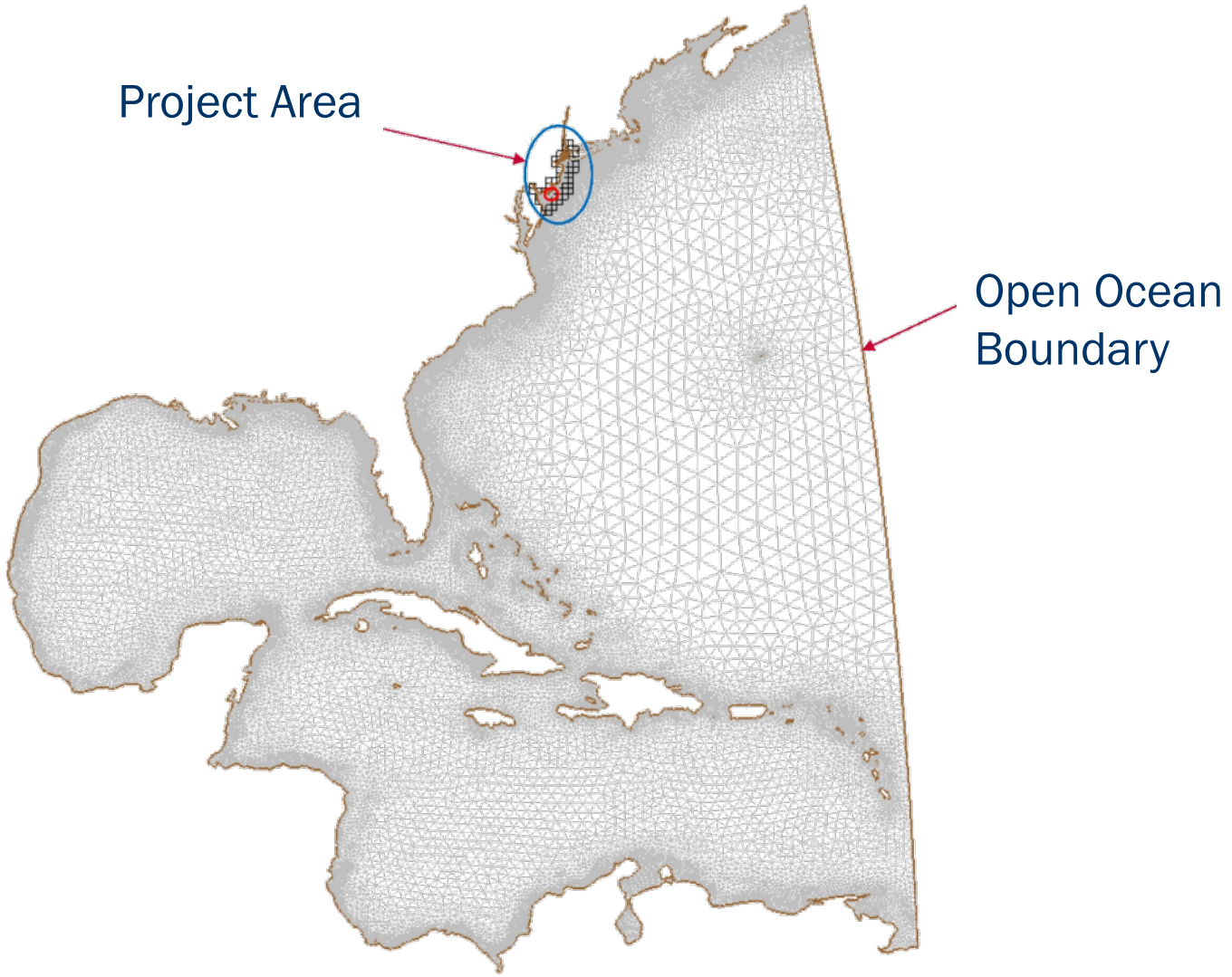
What is Mesh?

Previous Study Mesh

600k nodes

Current Restudy Mesh

900k nodes



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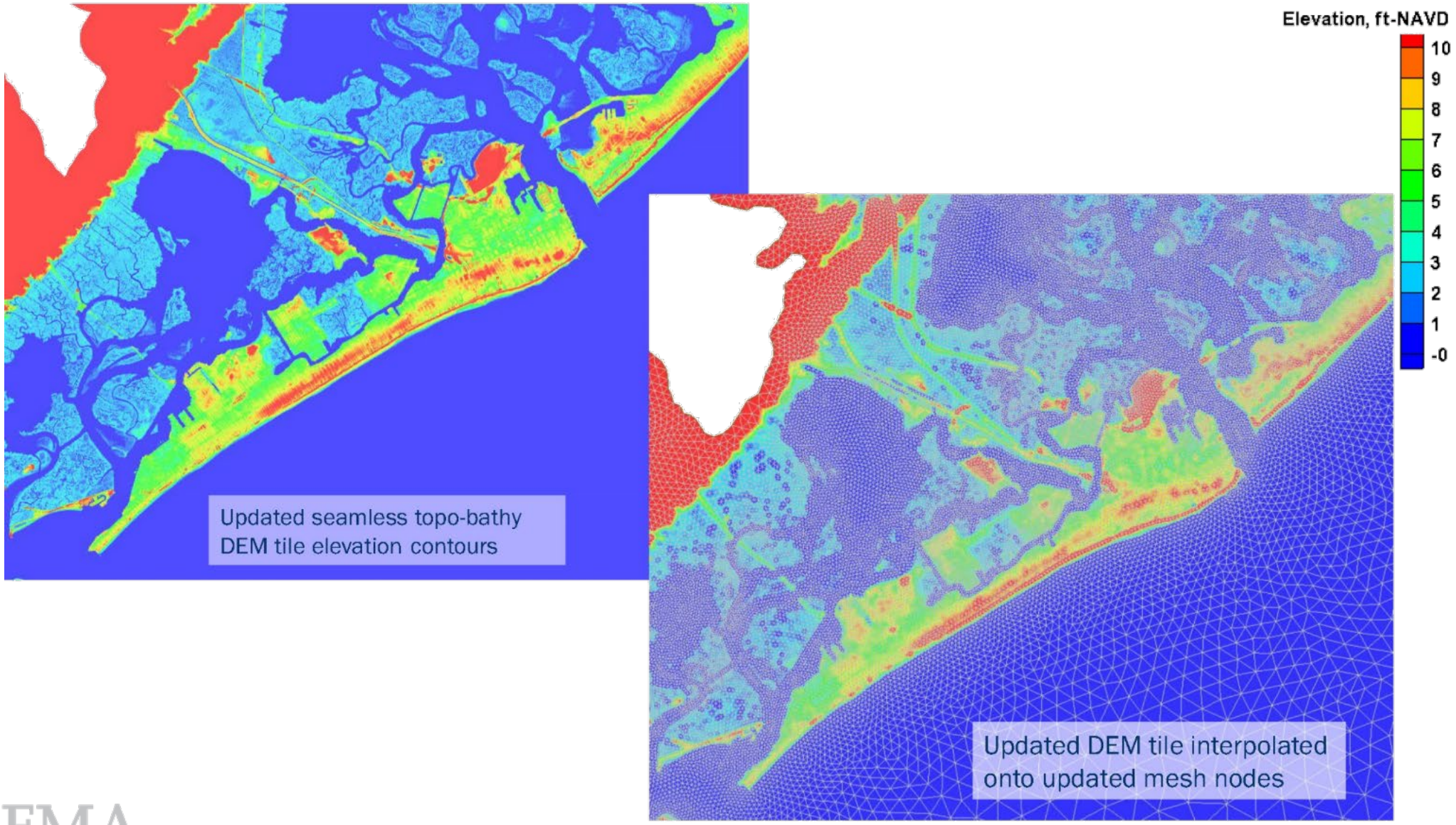
How Mesh is Used in the Restudy



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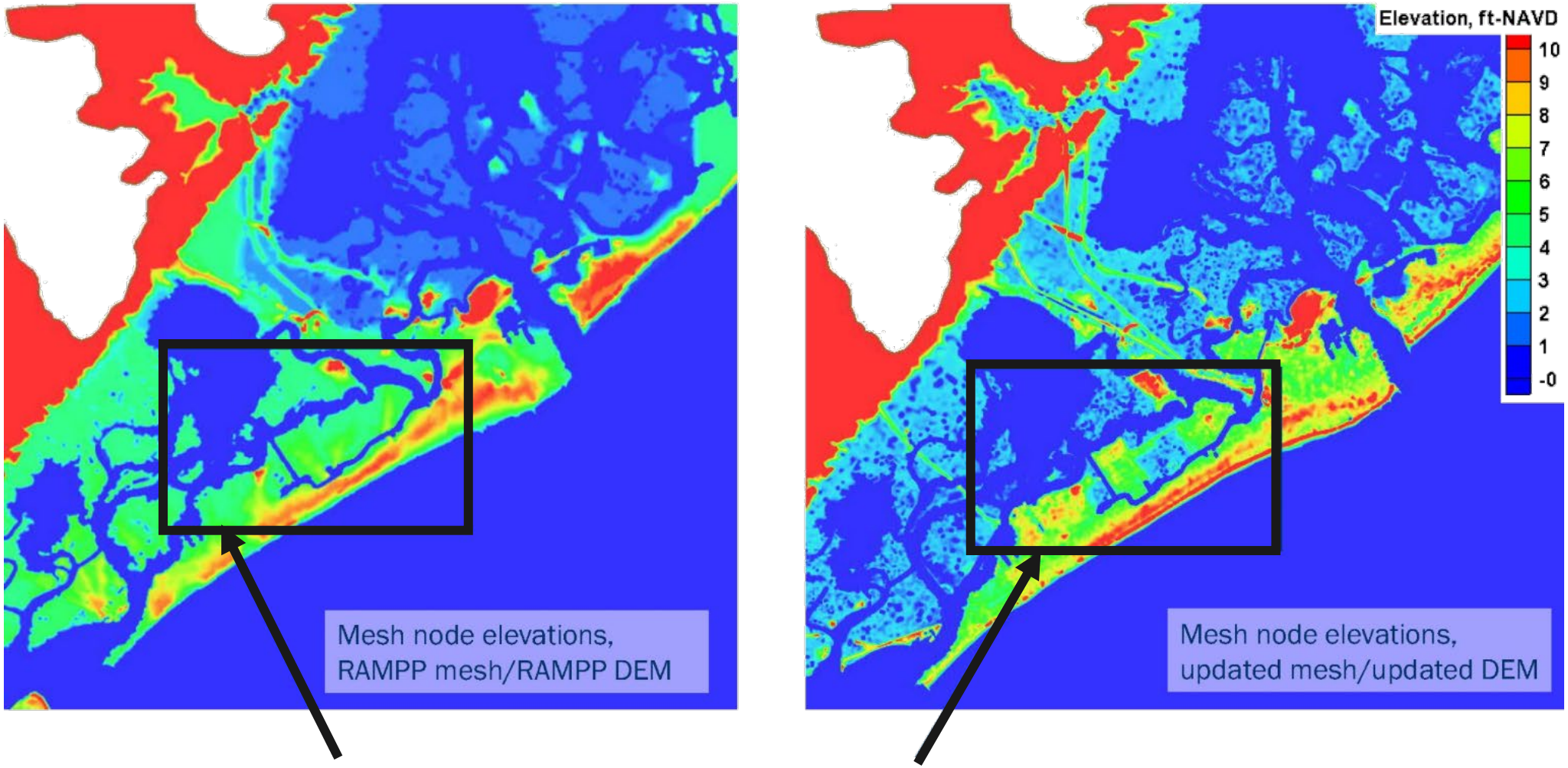
Improvements to Mesh in the Restudy



Example of area showing different mesh features

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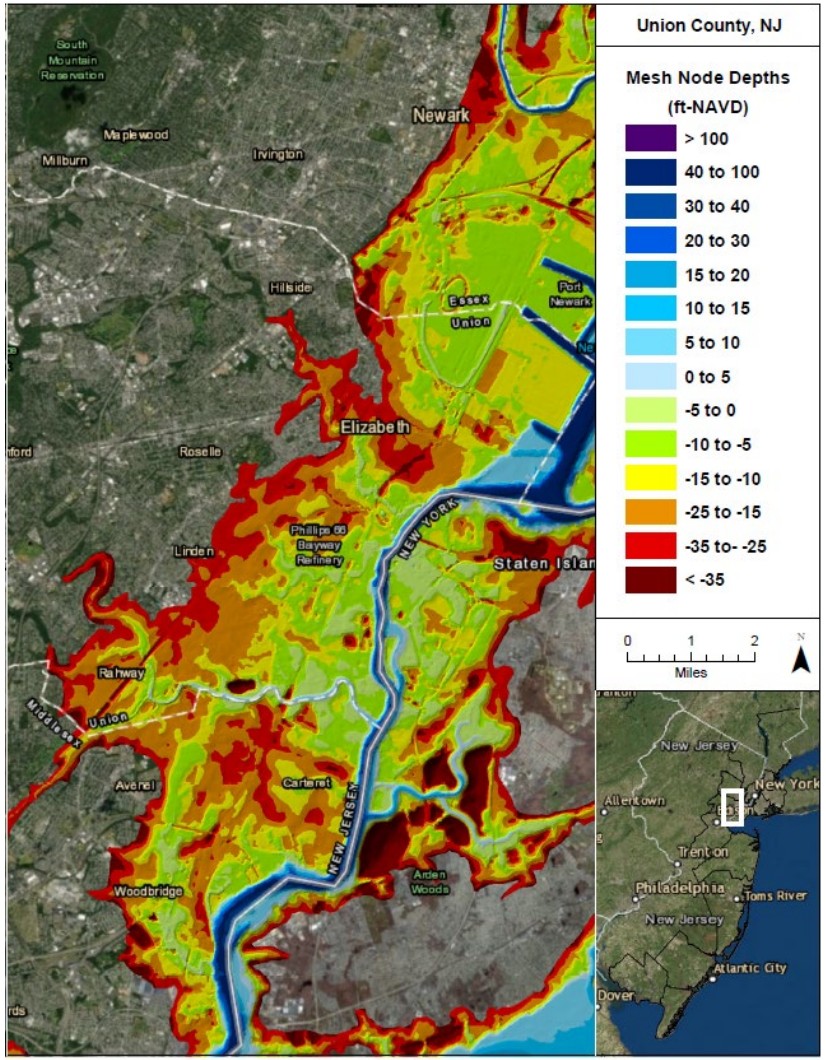
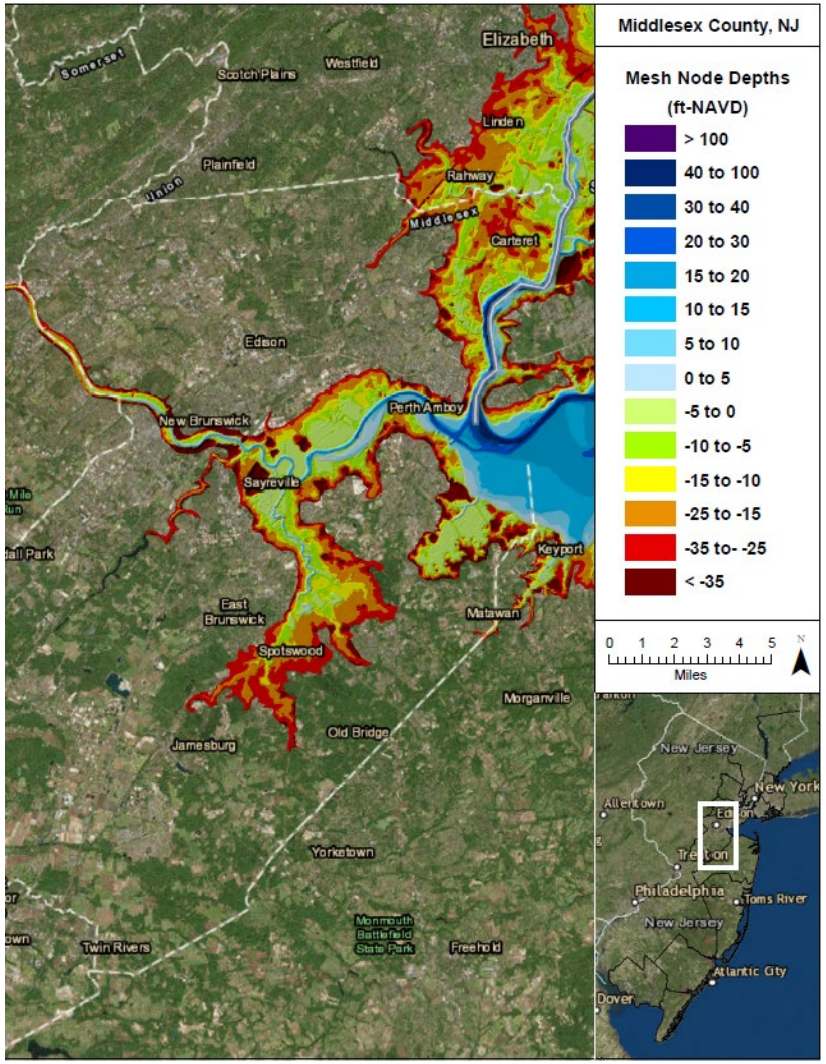
Mesh Node Depths in Union & Middlesex Counties





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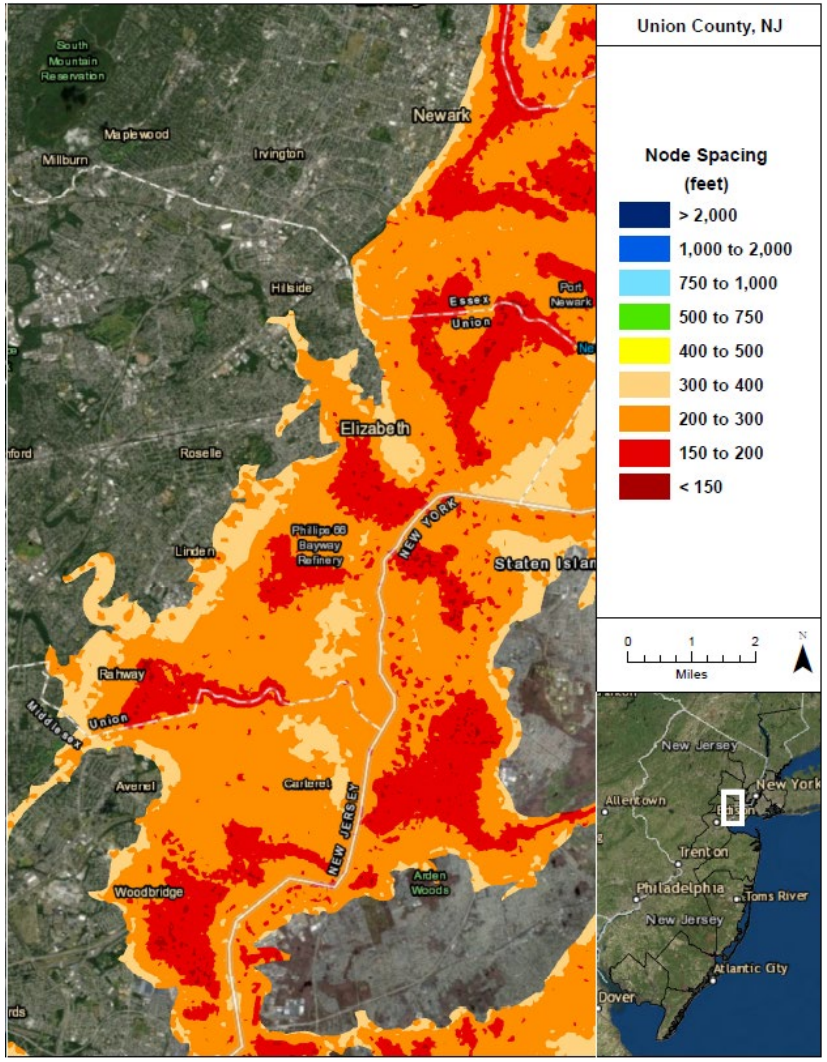
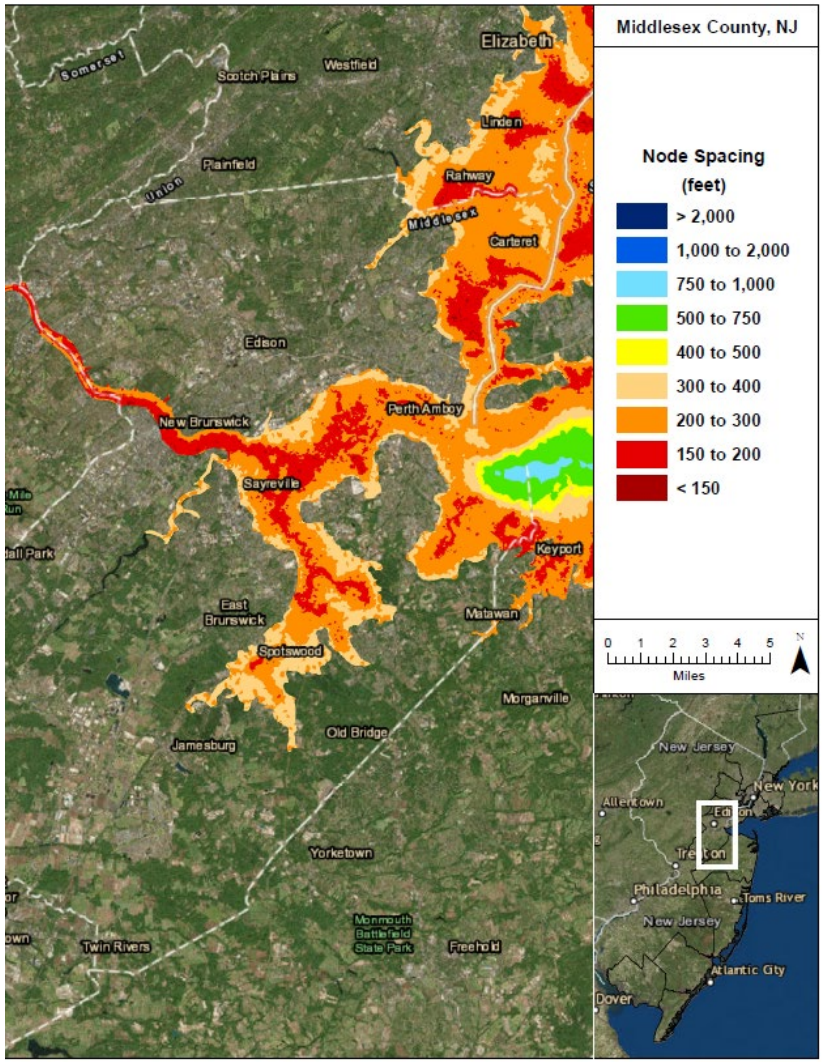
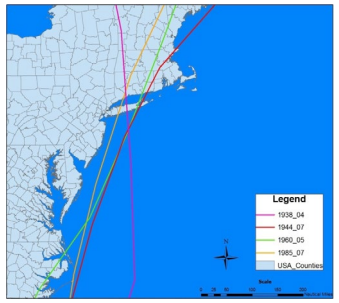
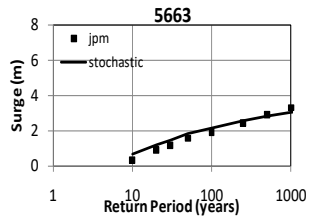
Mesh Node Spacing in Union & Middlesex Counties

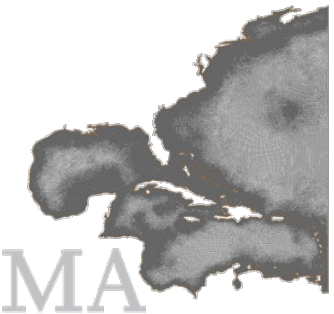




Storm Surge Study: Stillwater Elevation (SWEL)



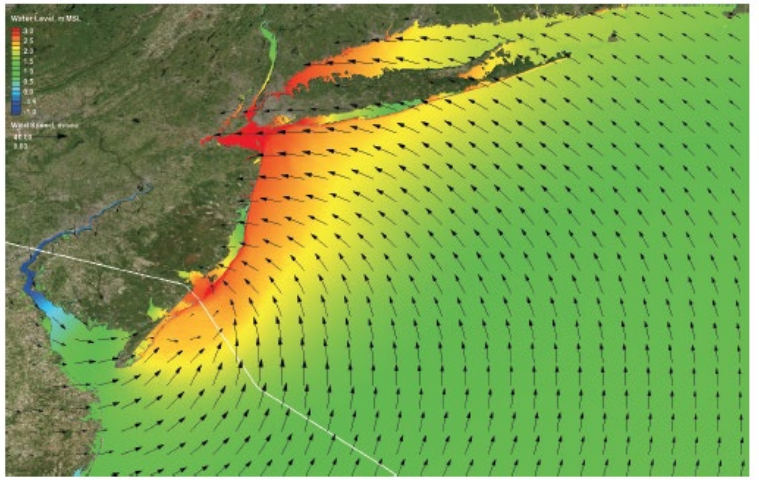




Storm Forcing
Tropical and Extra-Tropical Tracks

Storm Surge Modeling
Wind, Waves, Water Levels

High Resolution Mesh



Validation
Historical Storms & Tides

Return Period Analysis
JPM-OS for Tropical Storms (low freq.)
EST Analysis for Extra-Tropical Storms (high freq.)
Analysis to Develop Combined Probability

Stillwater Elevation

JPM-OS: Joint Probability Method - Optimum Sampling
EST: Empirical Simulation Technique

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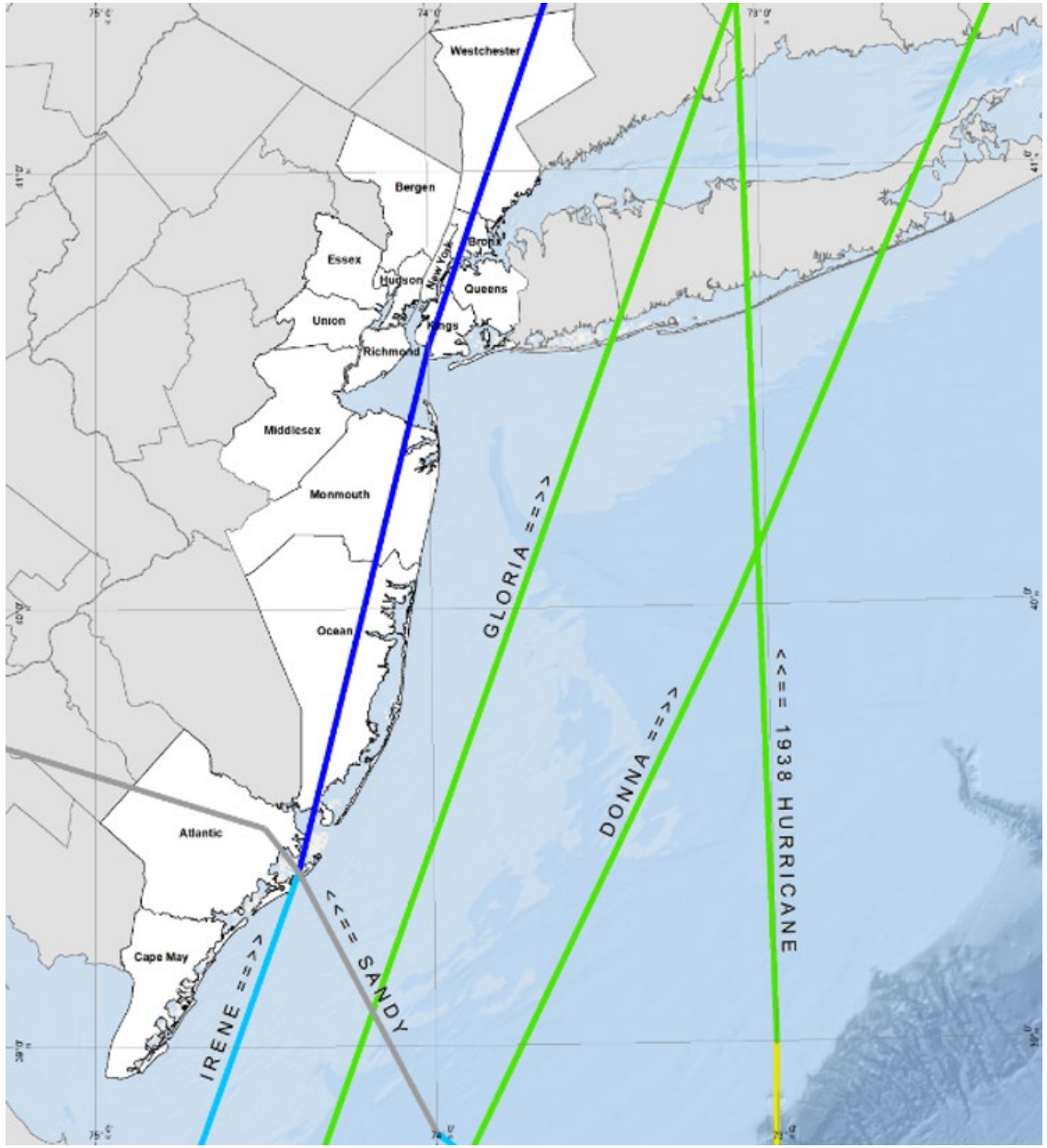
Storm Surge Study: Storm Climatology

- Reviewed historical storms
- Selected 5 tropical cyclones and 50 extra-tropical cyclones to validate the surge model
- Generated hundreds of hypothetical storms
- Analyzed important storm parameters
  - **Central pressure**
  - **Radius to maximum winds**
  - **Forward speed**
  - **Storm heading**
  - **Holland B (shape parameter)**

Storm Surge Study: Tropical Cyclone Storm Validation



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Storm Surge Study: Tropical Cyclone Storm Validation

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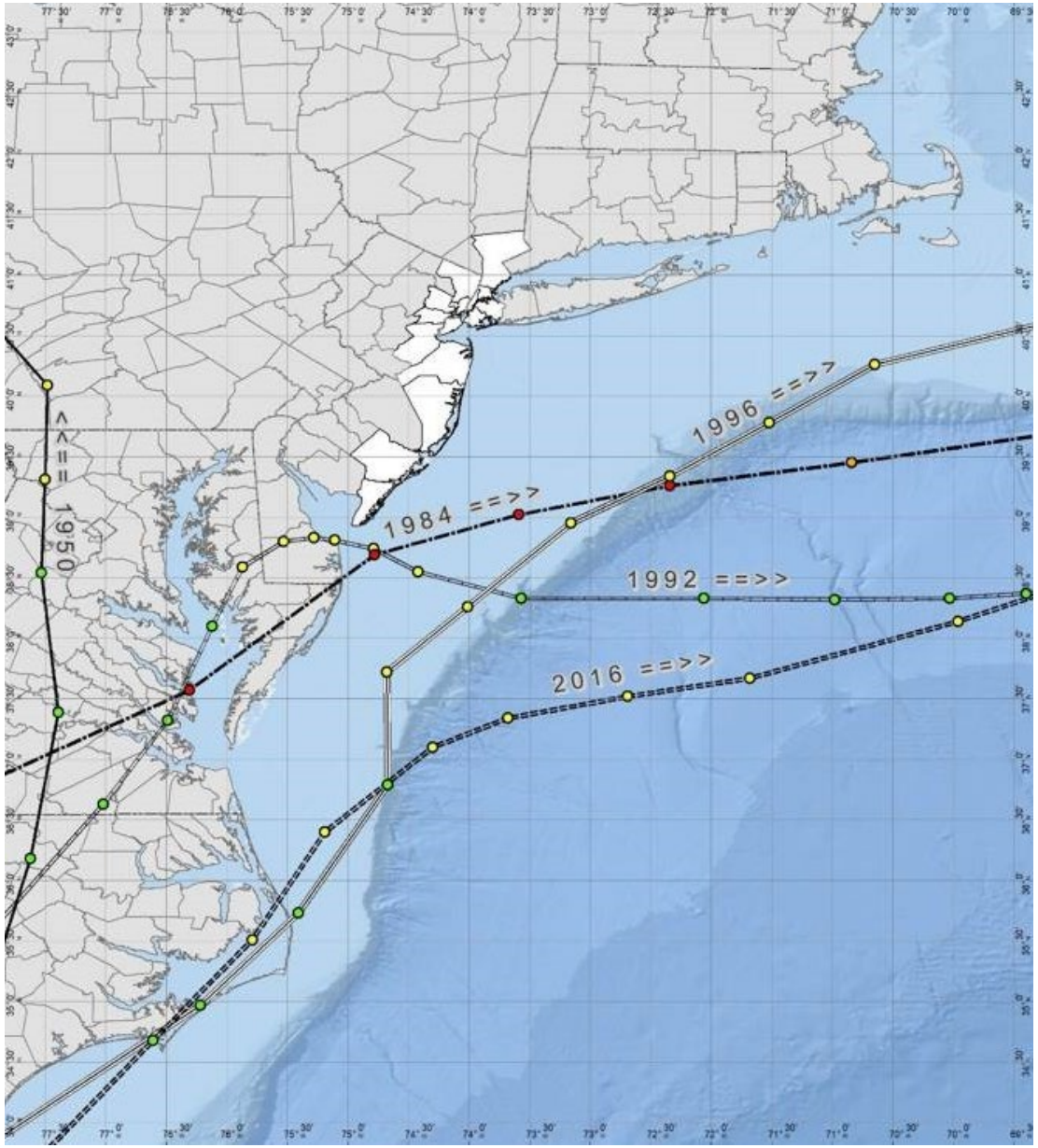
Storm Surge Study: Extra-Tropical Storm Validation



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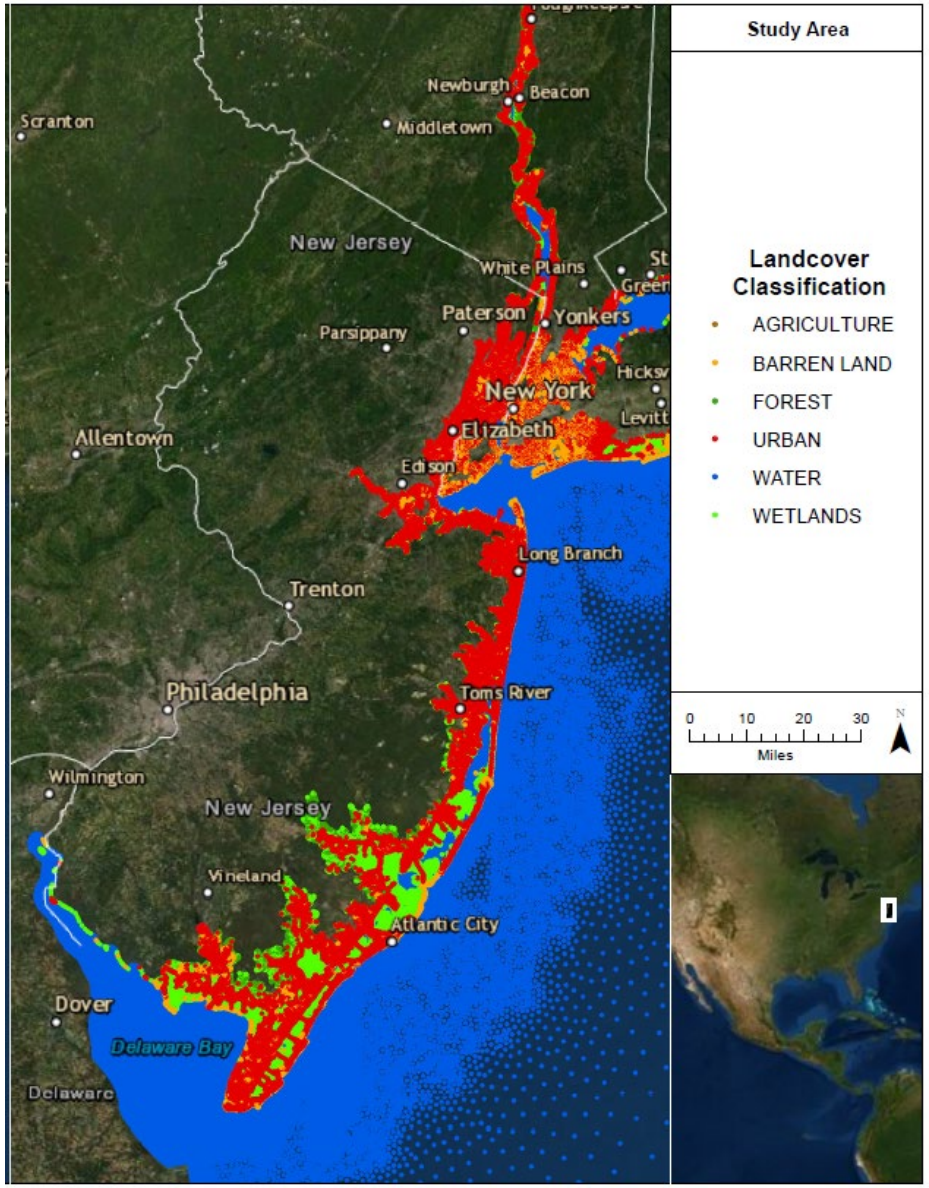
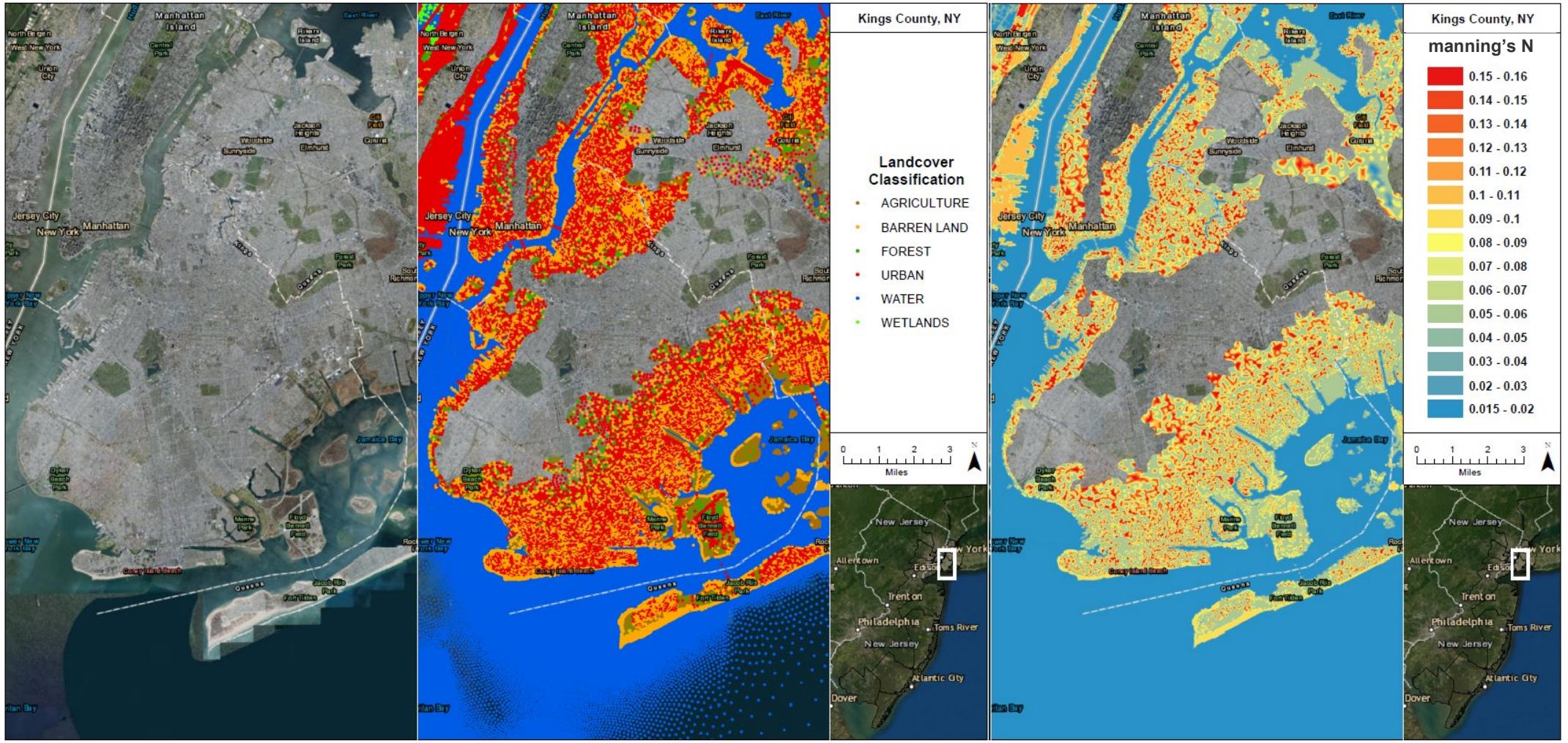
Storm Surge Study: Land Classification Data



Storm Surge Study: Land Classification Data



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Storm Surge and Wave Conditions Reanalysis Progress

Updating the Digital Elevation Model

- A DEM is a map of ground and sea floor elevation that is used in the storm surge and wave models

✓**The DEM has been completed using the latest elevation data**

Updating the Storm Surge Model

- Model has been updated and improved with additional assessments of coastal features like seawalls and beach nourishment
- Information from recent storm events were added
- This will generate more accurate maps

Model Validation

- Measured data from tide gauges and high-water marks during historic events are compared to estimates reproduced by the model

Field Research and Documentation

- Five Intermediate Data Submittals (IDSs) will document the study
- IDS #1-3 focus on storm surge
- IDS #4-5 focus on wave analyses and coastal mapping

✓**IDS #1 is complete**

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Preview of IDS #2 and #3

IDS #2

- Validates the storm surge model and summarizes Joint Probability Method-Optimum Sampling development
- Expected release in 2020

IDS #3

- Summarizes storm surge runs and frequency analysis
- Expected release in 2020

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Coastal Restudy Phase 2

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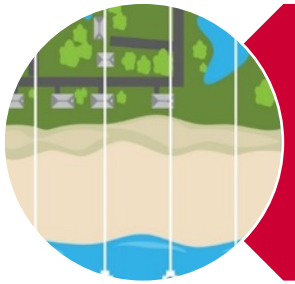
Coastal Restudy Phase 2: Wave Hazard Analysis



Define cross-shore transects

Evaluate storm-induced erosion and shore protection structures

Wave hazard modeling: overland wave propagation and wave run-up/overtopping

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Opportunities for Collaboration

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MIDDLESEX COUNTY, NJ

SEPTEMBER 2019

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809,860
POPULATION BASED ON 2010 CENSUS

3 % PENETRATION RATE IN THE SFHA

6 PUBLIC ASSISTANCE DECLARATIONS SINCE 2010

$113,251,100
TOTAL CLAIMS PAID SINCE 1978

2
NUMBER OF APPEALS RESOLVED

27
COASTAL MILES STUDIED *

$1,108,496,500
FLOOD INSURANCE COVERAGE

4,250
NUMBER OF INSURANCE CLAIMS RECORDED

66 % HOMEOWNERSHIP BASED ON ACS 5-YEAR ESTIMATE

3,810
NUMBER OF FLOOD INSURANCE POLICIES IN FORCE

KEEPING MIDDLESEX SAFE: Your Risk MAP Timeline

- Restudy Kick-off Meeting April 2018
- YOU ARE HERE* — Study Update Meetings 2019-2021
- Flood Risk Review Meeting 2022
- Preliminary Maps 2023
- Consultation Coordination Officer Meeting, Open House, Appeal Period 2023-2024
- Letter of Final Determination and Effective FIRMs 2024

*Numbers and dates are subject to change

UNION COUNTY, NJ | SEPTEMBER 2019

FEMA

536,500
POPULATION BASED ON 2010 CENSUS

7 % PENETRATION RATE IN THE SFHA

5 PUBLIC ASSISTANCE DECLARATIONS SINCE 2010

$97,835,400
TOTAL CLAIMS PAID SINCE 1978

7
NUMBER OF APPEALS RESOLVED

11
COASTAL MILES STUDIED *

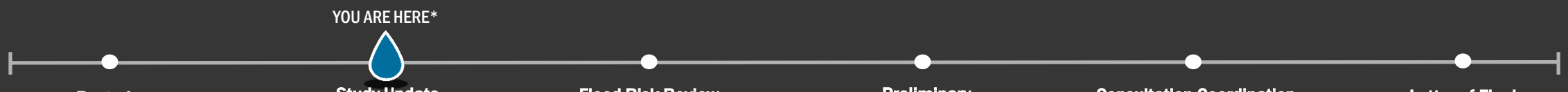
$1,303,582,700
FLOOD INSURANCE COVERAGE

5,710
NUMBER OF INSURANCE CLAIMS RECORDED

67 % HOMEOWNERSHIP BASED ON ACS 5-YEAR ESTIMATE

4,890
NUMBER OF FLOOD INSURANCE POLICIES IN FORCE

KEEPING UNION SAFE: Your Risk MAP Timeline



Numbers and dates are subject to change

Contacts – FEMA and State Agencies

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Questions & Discussion

Challenges, Innovation, The Way Forward