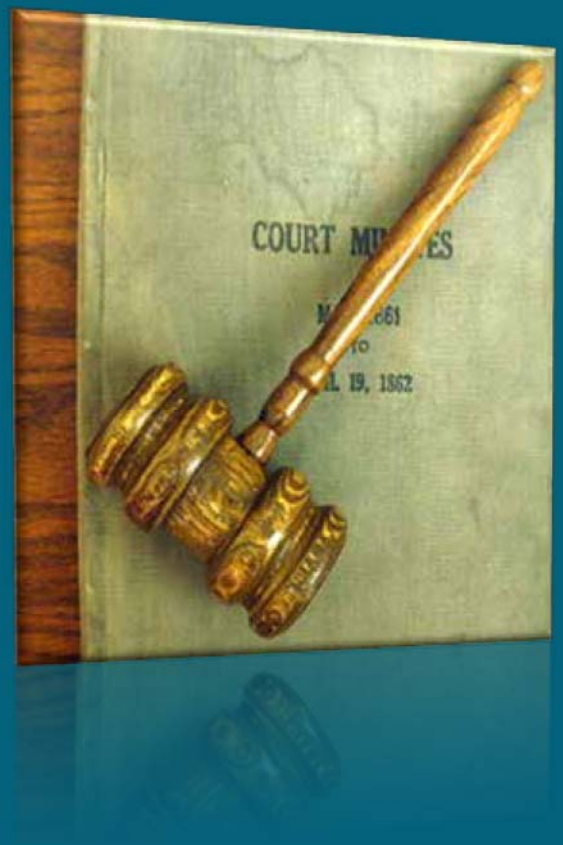

Legal Aspects

NO ADVERSE IMPACT: A Common Sense Approach to Flood Risk Management

Disclaimer

This presentation is neither intended to be, nor may it be taken as legal advice. For legal advice, consult with an attorney licensed to practice in your jurisdiction and demonstrating expertise in applicable subject matter.

Statements of fact and opinions expressed are those of the presenters individually and, unless expressly stated to the contrary, are not the opinion or position of the Association of State Floodplain Managers, ASFPM Foundation, New York State Floodplain and Stormwater Managers Association, or National Committee on Levee Safety.

Briefing Overview

- Background
- The Public Trust Doctrine
- 5th Amendment Takings
- From *Paterno* to *Katrina* to Sandy
- NAI & Legal Liabilities

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Policies Contribute to Risk

Federal Policies

- NFIP & the 100-Year Standard
- Emphasis on structural approaches
- Disaster relief environment

States & Communities

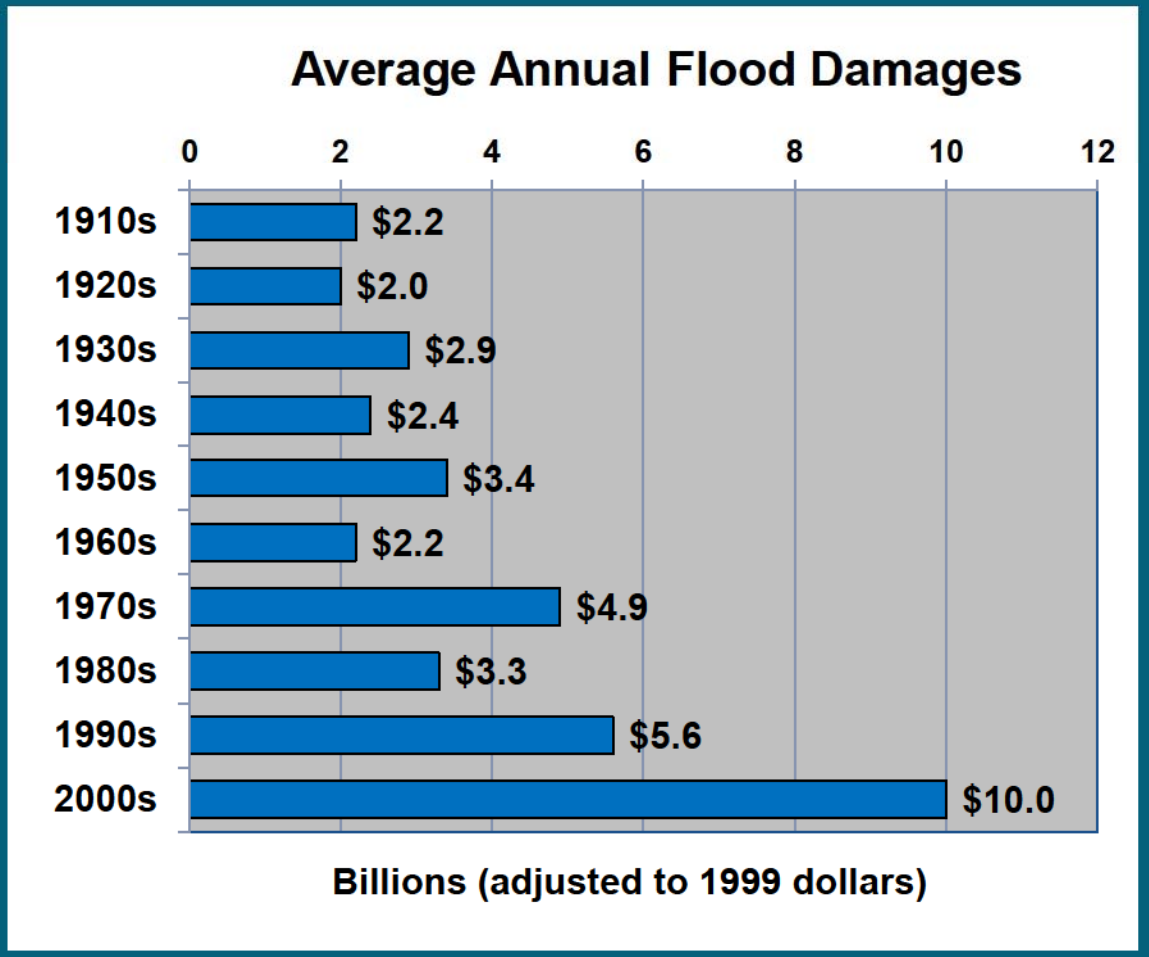
- Control land use for short-term benefits
- Perceive flooding to be a federal problem
- Externalize the costs & consequences

Public

- Unaware of – or unwilling to accept - residual risk
- Misplaced concern about having to obtain flood insurance

Trends in Flood Damages

- 30-Year Average Annual Flood Loss = $8.17 Billion
- Four-fold increase from early 1900s
- Per capita damages increased by more than a factor of 2.5 in the previous century in real dollar terms



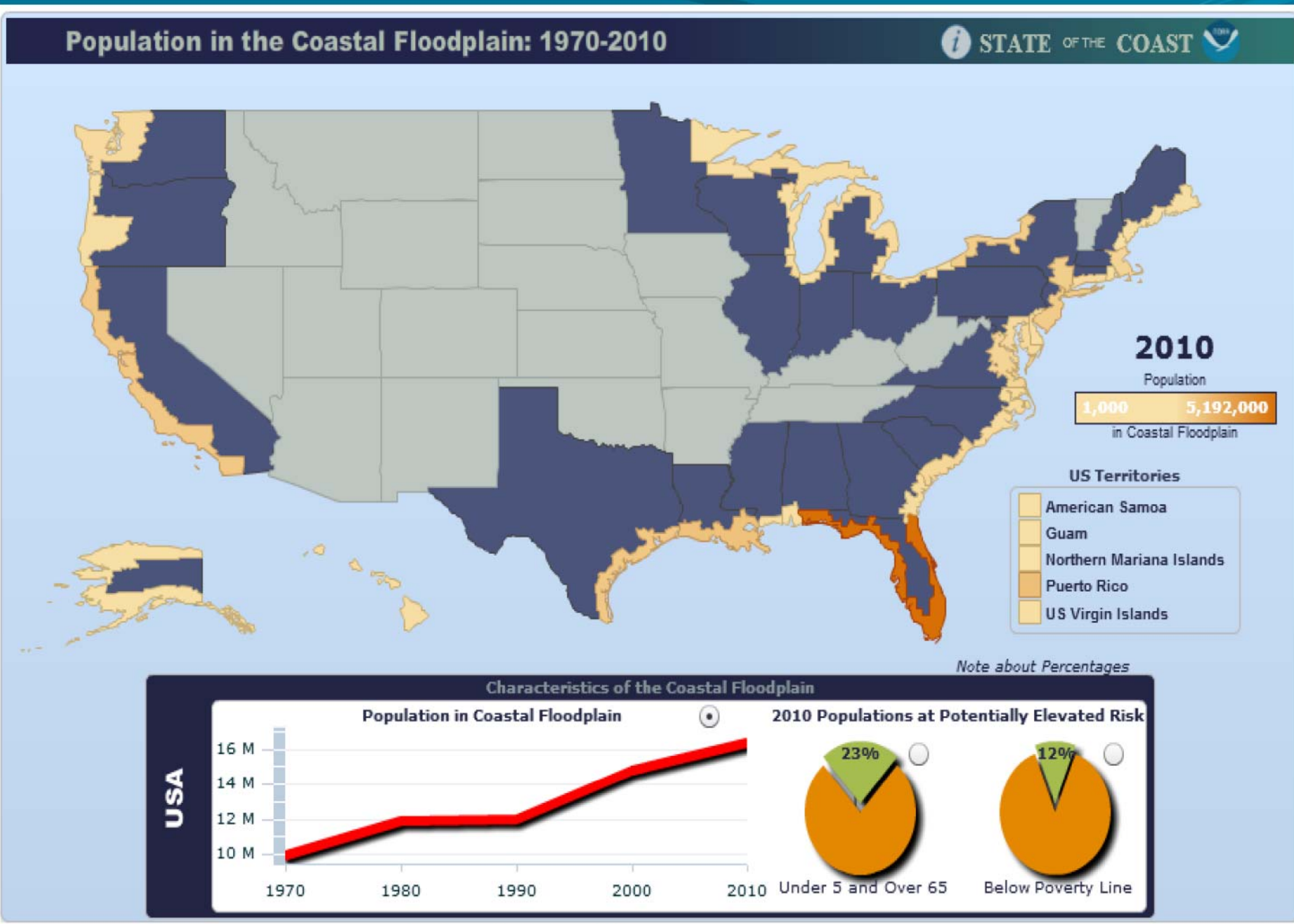
Flood Losses 2000-2011

Katrina: 1/3 of losses insured
Sandy: < 1/10 of losses insured*

(in millions)

2012	$496
2011	$8,640
2010	$5,329
2009	$1,044
2008	$6,405
2007	$2,787
2006	$4,497
2005	$52,516
2004	$18,277
2003	$3,452
2002	$1,725
2001	$10,726
2000	$2,003

Source: NOAA, NCDC; FEMA



http://stateofthecoast.noaa.gov/

Damage Drivers

Federal Policy Increases Risk:

- **Allows new development and redevelopment in hazardous areas**
- **Ignores adverse impacts to adjacent and downstream properties**
- **Undervalues natural protective coastal and floodplain functions**

- These impacts may results in successful common law or "takings" suits brought against a developer or a community despite community compliance with minimum federal standards.

- In general, if your community permits development that results in an adverse impact, your community may be liable, even if you meet the minimum federal standards.

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Public Trust Doctrine: Legal Origins

By the law of nature these things are common to all mankind, the air, running water, the sea and consequently the shores of the sea… The seashore extends as far as the greatest winter flood runs up.

- Institutes of Justinian
535 CE

Public Trust Doctrine: Legal Origins

US Constitution

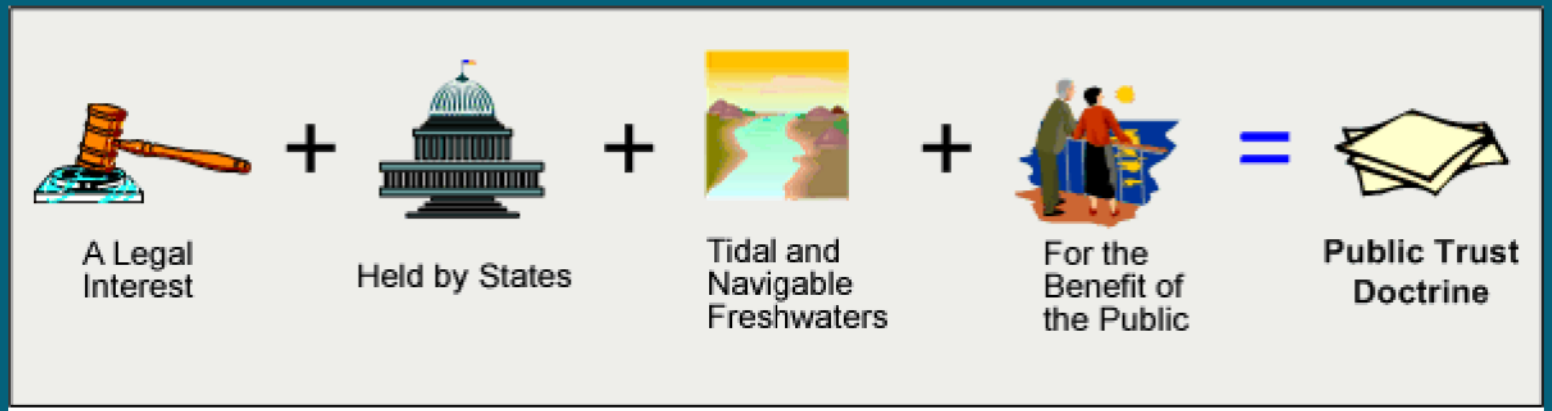
Amendment X (1791):

"The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Public Trust Doctrine: Legal Origins

US Constitution

- States retain ownership of the lands beneath navigable waters
- Federal government retains supreme, but not exclusive, control over navigation

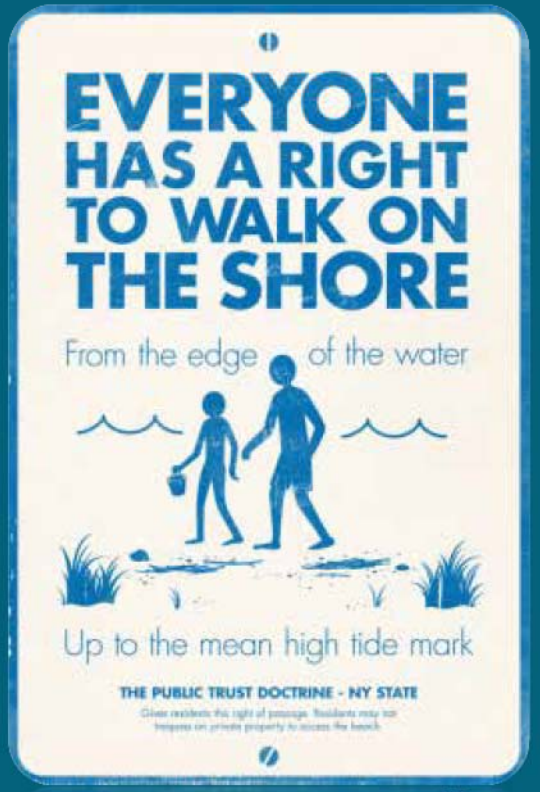


The Public Trust Doctrine

Source: NOAA http://www.csc.noaa.gov/ptd/

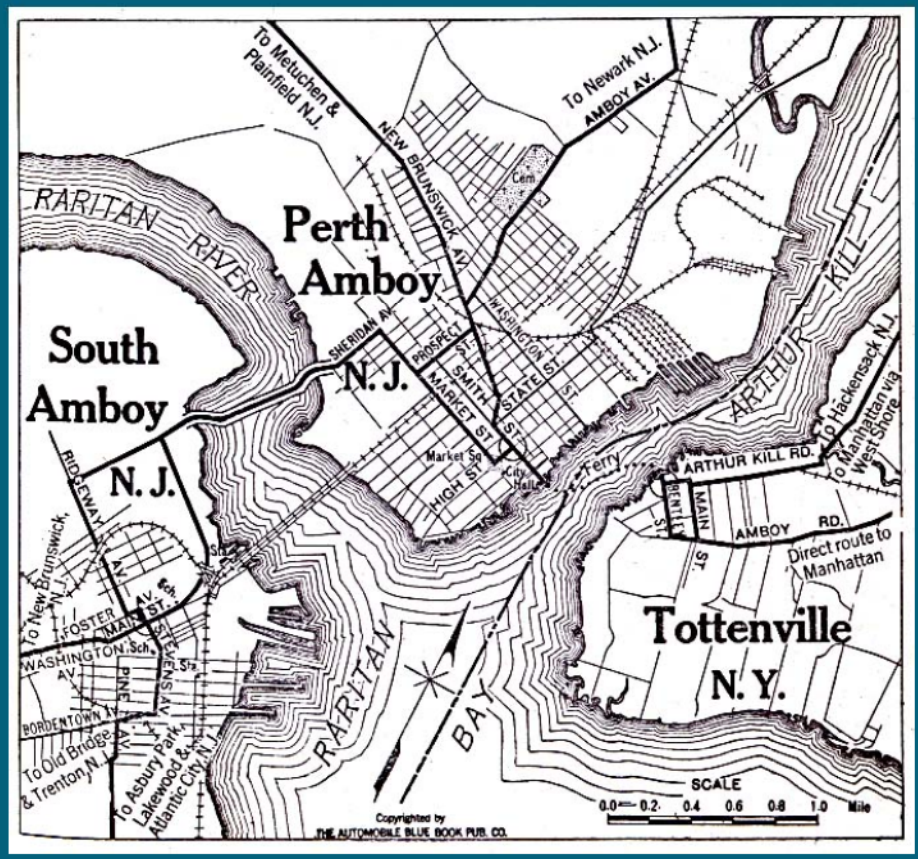
Public Trust Doctrine

- Colonies followed English common law
- Recognized public rights in navigable waters & their shores
- Modern Era => Public Uses
  - Access for commerce & transportation
  - Environmental protection
  - Recreation



Arnold v. Mundy (1821)

- New Jersey Supreme Court
- "Navigable rivers, where the tide ebbs and flows, the ports, bays, coasts of the sea…are common to all the people of New Jersey."
- First major articulation of the public trust doctrine in the United States



Illinois Central RR v. Illinois (1892)

U.S. Supreme Court held that the State had abdicated its responsibility to preserve the waters for public use.

"The common-law doctrine as to the dominion, sovereignty, and ownership of lands under tide waters on the borders of the sea applies equally to the lands beneath the navigable waters of the Great Lakes."

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5th Amendment to US Constitution

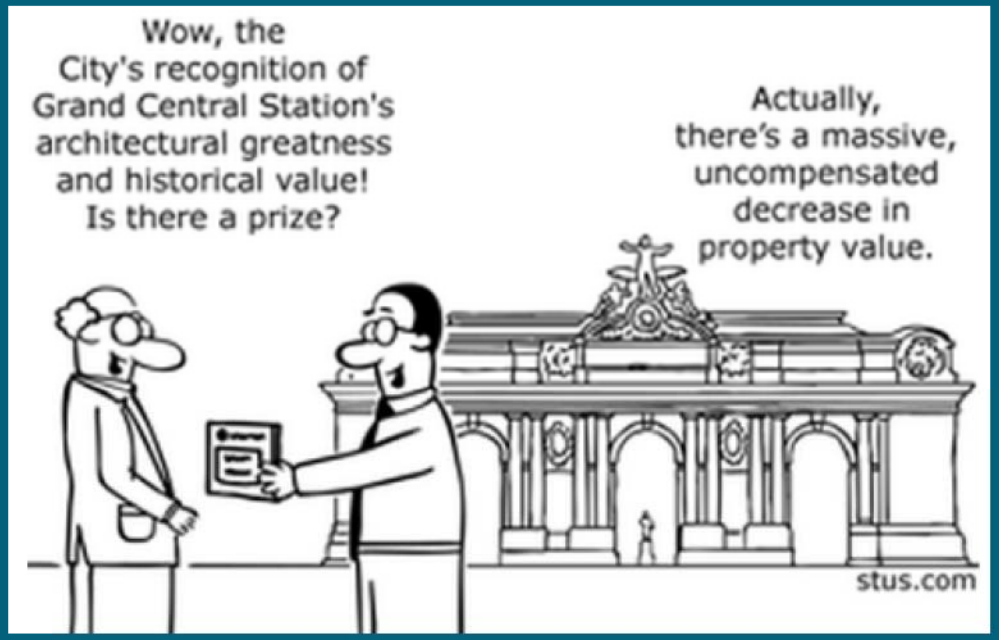
No person shall be … deprived of life, liberty or property, without due process of law;

Nor shall private property be taken for public use without just compensation.

Key Takings Cases

Penn Central v. The City of New York (1978)

Restrictions on proposed development of Grand Central Station did NOT amount to a taking, since Penn Central could use transferrable development rights and secure a reasonable return on the property.



Key Takings Cases (cont.)

- *Loretto v. Teleprompter Manhattan CATV Corporation* (1982) - Any physical occupation is a taking, no matter how de minimus.

- *First English Evangelical Church of Glendale v. Co of Los Angeles* (1987) – Where the government's activities have already effectuated a taking of all use of property, no subsequent action by the government can relieve it of the duty to provide compensation for the period during which the taking was effective.

Key Takings Cases (cont.)

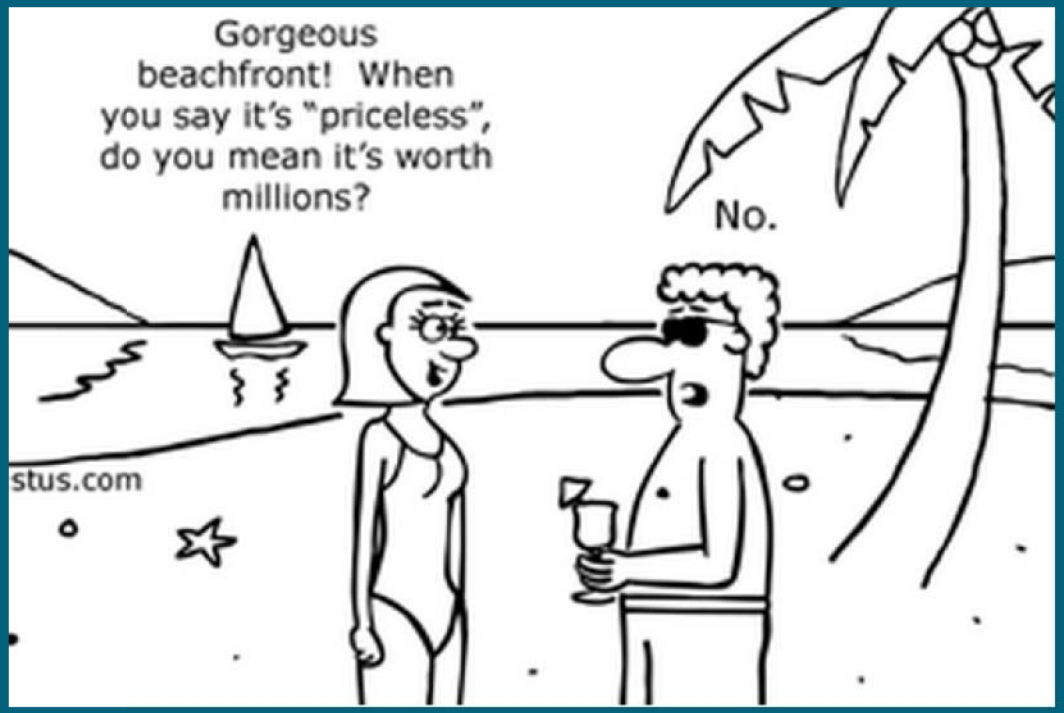
Nollan v. California Coastal Commission (1987)

- The Nollans appealed from a decision of the California Court of Appeal, which ruled that the California Coastal Commission could condition its grant of permission to rebuild their house on the transfer to the public of an easement across their beachfront property.
- Court concluded that unless the permit condition serves the same governmental purpose as the development ban, the building restriction is not valid regulation of land use but an out and out plan of extortion.
- Land use regulation does not constitute a taking if it substantially advances legitimate state interests and does not deny an owner economically viable use of his land.

Key Takings Cases (cont.)

Lucas v. South Carolina Coastal Council (1992)

When the owner of real property has been called upon to sacrifice all economically beneficial uses in the name of the common good, that is, to leave his property economically idle, he has suffered a taking.

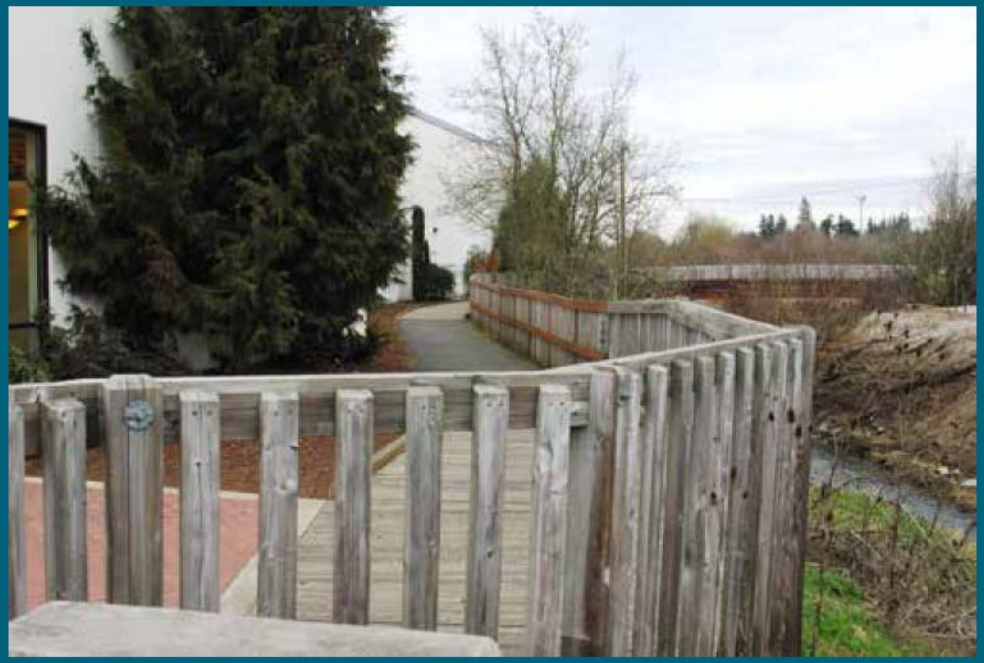


Key Takings Cases (cont.)

Dolan v. City of Tigard (1994)

In this case Dolan (Petitioner) challenges the decision of the Supreme Court of Oregon, which held that the City of Tigard could condition the approval of her building permit on the dedication of a portion of her property for flood control and traffic improvements.

The Court extended Nollan's essential nexus test to require "rough proportionality" between development impacts and conditions on development.



Key Takings Cases (cont.)

Palazzolo v. Rhode Island (2001)

Enactment of the wetlands act did not automatically amount to a valid regulation by virtue of Petitioner's succeeding to ownership after the regulation was passed. If the regulation accomplished a taking under the constitutional precedents, then the mere fact that Petitioner took exclusive ownership after the regulation could not bar a claim for compensation.

A State may not evade the duty to compensate on the premise that the landowner is left with a token interest. Here, however, the evidence showed that Petitioner was left with more than a token interest.

Key Takings Cases (cont.)

- 2002 – *Tahoe-Sierra Preservation Council v. Tahoe Regional Pln. Agency* – Sanctioned the use of moratoria & reaffirmed the "parcel-as-a-whole" rule for takings review. Moratoria on development not a per se taking under the 5th amendment, but should be analyzed under the multi-factor Penn Central test.

- 2005 – *Lingle v. Chevron* - case was brought by Chevron based on an Agins-type claim that one of Hawaii's statutes did not "substantially advance legitimate state interests." Justice Connor, however, ruled that even though Governor Lingle could not be upheld on that issue, it did NOT overturn the 1980 Agins case in the whole.

- 2005 – *Kelo et al. v. City of New London* – A taking by eminent domain will be upheld as long as it is "rationally related to a conceivable public purpose" and "just compensation" is paid to the owner. A valid public purpose can be found in a plan for economic rejuvenation of an overall condemned community, even though some individual properties within that community may not be blighted.

Case Study - A Cape Cod Community Prevents New Residences in Floodplains

Lessons learned from Chatham's legally successful conservancy districts

Gove v. Chatham (444 Mass. 754) (2005)

"It is undisputed that [the parcel at issue] falls within a floodplain, and that its potential flooding would adversely affect the surrounding areas if the property were developed. Reasonable government action mitigating such harm . . . typically does not require compensation."

Testimony of first responders was significant.

Case Study - A Cape Cod Community Prevents New Residences in Floodplains

Lessons learned from Chatham's legally successful conservancy districts

Gove v. Chatham (444 Mass. 754) (2005)

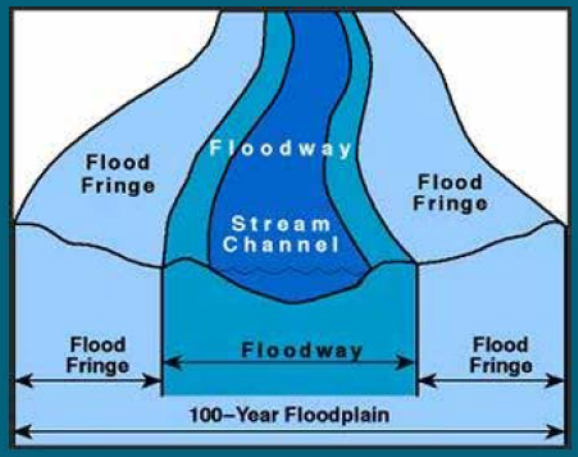
- Bylaw designed to protect people & property
- Bylaw fair & consistently applied
- Allows for alternative uses
- Testimony of risk to emergency workers
- Town willing to defend itself

Key Takings Cases (cont.)

Mansoldo v. New Jersey (187 N.J. 50) (2006)

When action by government denies *all* economically beneficial or productive use of land, the regulatory agency must provide just compensation to the affected property owner unless background principles of the State's law of property and nuisance would restrict the owner's intended use of the property.

Remanded to follow *Lucas*.



FRANCES MANSOLDO AND RONALD G. MANSOLDO,

Plaintiffs-Appellants,

- versus -

STATE OF NEW JERSEY,

Defendant-Respondent.

SUPREME COURT OF NEW JERSEY

Docket No. 58,344

Civil Action

On Appeal from the Superior Court of New Jersey, Appellate Division, Docket No. A-3109-03T1, Hon. H. Weissbard and Hon. H. Hoens

BRIEF OF AMICUS CURIAE ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC. IN SUPPORT OF THE STATE OF NEW JERSEY

Key Takings Cases (cont.)

Stop the Beach Renourishment, Inc. v. FL DEP (2010)

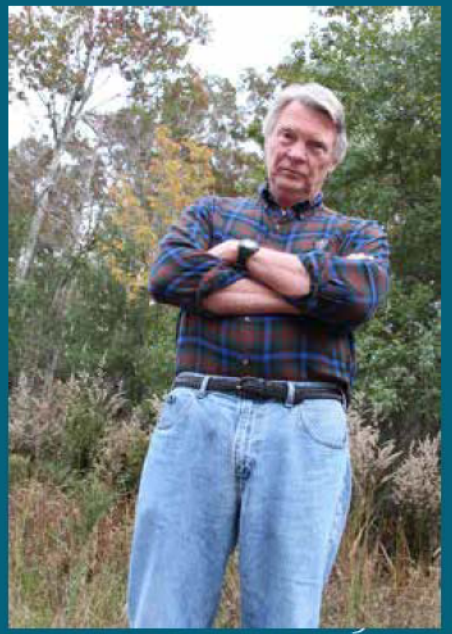
- Unanimous that artificial avulsions = NOT a taking
- Judicial Takings?
- Four Justices: Yep

Key Takings Cases (cont.)

Koontz v. St. John's River Water Mgmt. District (2013)

- The government's demand for property from a land-use permit applicant must satisfy the *Nollan/Dolan* requirements even when it denies the permit.
- Governments may choose whether and how a land use permit applicant is required to mitigation the impacts of a proposed development,…

BUT, may not leverage its legitimate interest in mitigation to pursue ends that lack an essential nexus and rough proportionality to those impacts. Does not matter whether the government approves a permit with conditions or denies a permit when applicant refuses to cede to those conditions.



Key Takings Cases (cont.)

Koontz v. St. John's River Water Mgmt. District (2013)

- The Nollan-Dolan standard of nexus and rough proportionality applies to conditions requiring off-site mitigation.
- The Nollan-Dolan standard of nexus and rough proportionality applies expenditures of funds, such as fees-in-lieu.

SCOTUS: Permissible to impose the full costs of development impacts on permit applicants.

What Constitutes a Taking?

- Physical occupation of private land
- Regulation that "goes too far"
- Permit condition lacks a rational connection or "essential nexus" with a valid public purpose
- No "rough proportionality" between permit condition and impact of development
- Total deprivation of economic use
- Interference with "reasonable investment-backed expectations"
- Compensable taking may occur even when restriction is temporary

Avoiding A Taking

1. Clearly Relate Regulation to Preventing Harm. *Gove v. Zoning Board of Appeals*, 444 Mass.754 (2005)
2. Avoid interfering with owner's right to exclude. (*Loretto*)
3. Avoid denial of all economic uses. (*Lucas*)
4. Consider Transferable Development Rights or similar residual rights and uses to retain economic value. (*Penn Central*)
5. Demonstrate relationship between permit condition and harm avoided. (*Koontz*)

Landowner Rights Limited

- No Right to be a Nuisance
- No right to Violate the Property Rights of Others
- No Right to Trespass
- No Right to be Negligent
- No Right to Violate Laws of Reasonable Surface Water Use; or Riparian Laws
- No Right to Violate the Public Trust

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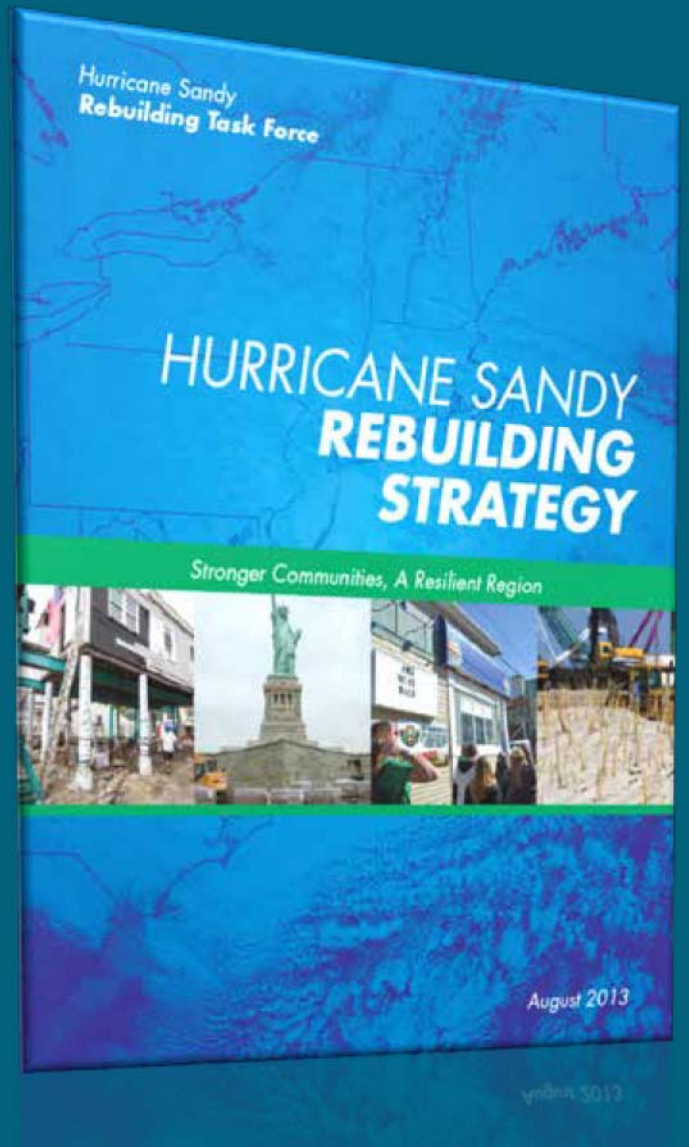
Paterno v. State of California (1999) 74 Cal. App. 4th 68

- As operator of levee which had been built almost a century previously with porous, uncompacted mining debris, State was liable, under inverse condemnation theory, for damages caused by unreasonable state plan which resulted in failure of levee.
  - Failure was foreseeable,
  - Levee system benefited all of California and saved billions of dollars, and
  - Landowner could not be required to bear cost of partial failure of that system caused by construction, operation, and deferred maintenance of unstable levee.

Katrina Consolidated Litigation

- The Mississippi River Gulf Outlet (MRGO)
- The Federal Flood Control Act & Sovereign Immunity
- Federal Tort Claims Act & the Discretionary Function Exception
- Environmental Impacts & Negligence
- Foreseeability & Liability

Federal Policy Responses to Flood Disasters



- Supplemental Appropriations
- Water Resources Development Act
- Principles and Guidelines
- Executive Orders
- Federal Sandy Rebuilding Task Force
  - Sea Level Rise Planning Tool
    - http://www.globalchange.gov/what-we-do/assessment/coastal-resilience-resources
  - Uniform Flood Risk Reduction Standard:
    - Best-available-data for elevation plus 1' freeboard
    - http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding/FRRS

Federal Policy Responses to Hurricane Sandy

Uniform Flood Risk Reduction Standard:

The specific steps that these types of structures will need to take include:

- Elevating – the standard would require structures to elevate their bottom floor one foot higher than the most recent flood risk guidance provided by FEMA; and/or
- Flood-proofing – in situations where elevation is not possible, the standard will require structures to prepare for flooding a foot higher than the most recent flood risk guidance provided by FEMA – for example, by relocating or sealing boilers or other utilities located below the standard elevation

http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding/FRRS

Federal Policy Responses to Hurricane Sandy

Uniform Flood Risk Reduction Standard:

Only those that have funding for construction agencies in the Sandy supplemental (Public Law 113-2) are involved. This includes:

- Department of Transportation (FHWA Emergency Relief Program; FTA Public Transportation Emergency Relief Program)
- Department of Housing and Urban Development (CDBG-DR)
- U.S. Army Corps of Engineers (Construction; Operations & Maintenance)
- Federal Emergency Management Agency (Disaster Relief Fund)
- Environmental Protection Agency (State and Tribal Assistance Programs)
- Department of Health and Human Services (Social Services Block Grants)

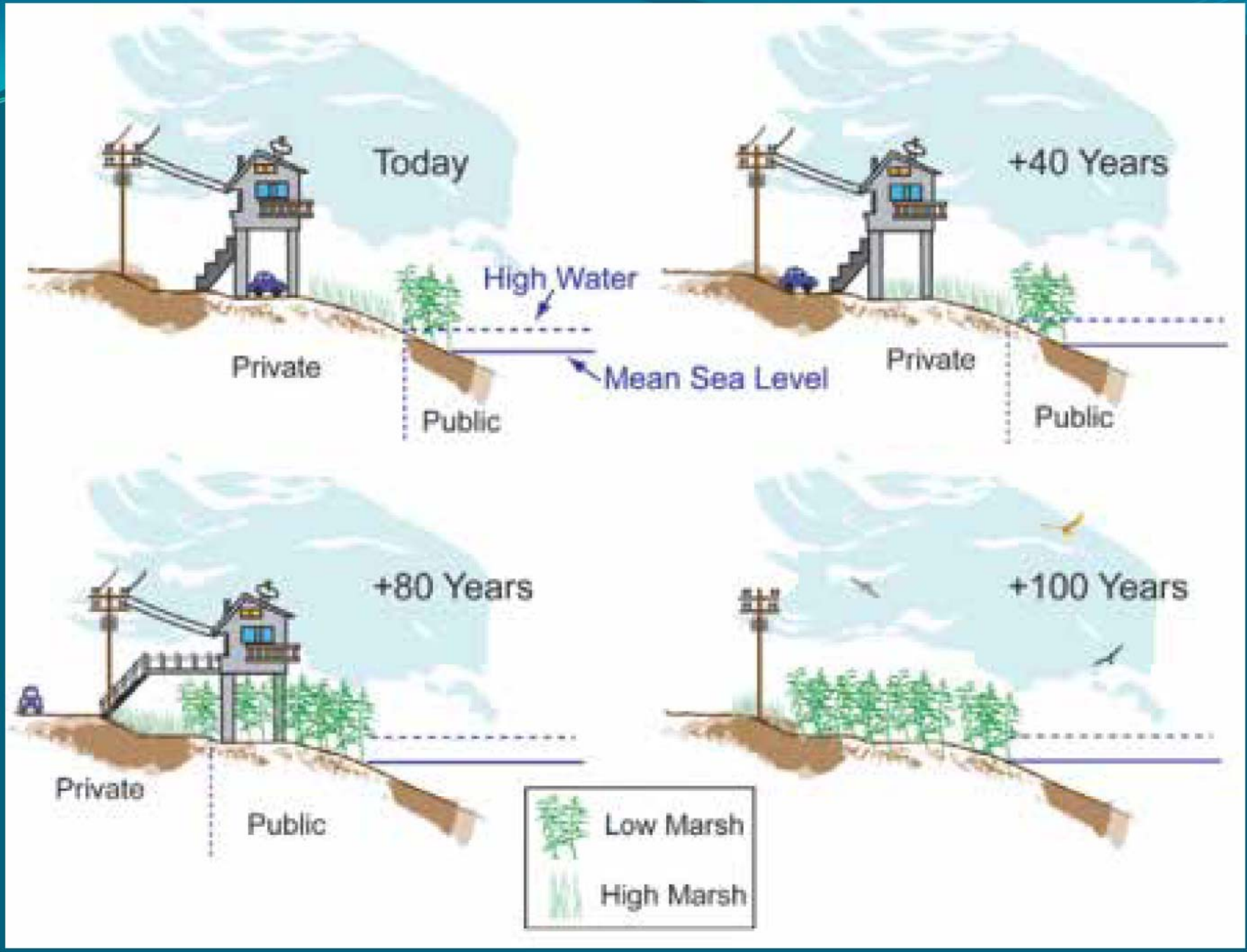
http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding/FRRS

Sidebar: Rolling Easements

Premise: Some low-lying coastal lands must give way to the rising sea.

Designing a rolling easement policy requires deciding:

- The specific rights that will be altered, and
- The legal approach to alter those rights.


Today
High Water
Private
Mean Sea Level
Public
+40 Years
Private
Public
+80 Years
Private
Public
+100 Years
Low Marsh
High Marsh

Sidebar: Rolling Easements

Local Authority: Zoning is typically required to accomplish the purposes of a locality's comprehensive plan for land use. Therefore, two questions will typically be:

1. Does sea level rise fit within the authorized purposes for comprehensive planning?
2. Do the restrictions fit within the zoning authorization?

Sidebar: Rolling Easements

Constraints on State and Local Authority

1. The common law of property limits the ability of private parties to voluntarily transfer some property rights;
2. State laws have abolished or limited options that the common law allowed;
3. State law limits the power of local governments; and
4. The federal constitution prevents property from being taken for a public purpose without just compensation; some state constitutions do so as well.

Sidebar: Rolling Easements

If the land will otherwise be developed but later abandoned to the rising sea, a rolling easement can:

- Reduce unexpected losses and disruption;
- Avoid the hazards associated with shore protection that subsequently fails;
- Lower flood insurance rates if the National Flood Insurance Program community rating system gives the community credit for planning for sea level rise;
- Promote community awareness and dialogue about long-term sea level rise; and
- Reduce potential community liabilities associated with flood damage to private property.

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NAI Defined…

Activities that could adversely impact (increase flood risk or damage potential) another property or community will be allowed *only* to the extent that the impacts are mitigated or have been accounted for within an adopted community-based plan.

Potential Community Liabilities

- Construction of a Road Blocks Drainage
- Stormwater System Increases Flows
- Structure Blocks Watercourse
- Bridge Built Without Adequate Opening
- Permitting development at risk
- Failure to maintain flood control structure

Potential Community Liabilities

- **Grading Land Increases Runoff**
- **Flood Control Structure Causes Damage**
- **Filling Wetland Causes Damage**
- **Issuing Permits for Development that Causes Harm to a Third Party**

Local Planning & Regulations I

- Incorporate Flood Mitigation in Local Planning
- Raise Public Awareness
- Form Partnerships to Support Floodplain Management
- Limit or Restrict Development in Floodprone Areas
- Adopt and Enforce Building Codes and Development Standards
- Align Floodplain and Stormwater Planning and Management
- Adopt Policies to Reduce Stormwater Runoff

Local Planning & Regulations II

- Update Community Hazard Mitigation Plan
  - Robust Flood Risk Assessment
  - Plan for gradual restoration of floodplains
- Remove and Prohibit Critical Facilities from Floodprone Areas
- Join NFIP Community Rating System
- Establish Local Funding Mechanisms for Flood Mitigation
- Conduct Regular Maintenance of Drainage Systems and Flood Control Structures

Local Planning & Regulations III (Sea-Level Rise)

- Map and Assess Vulnerability
  - Adopt the "Substantive Knowledge Standard"
- Manage Development in High-Risk Areas
  - New Development
  - Redevelopment
  - Infrastructure

- Restore and Protect Natural Buffers
- Tie Land Use Planning and Regulations to Public Safety

NAI Benefits

- **Helps ensure the actions of any community or property owner do not adversely impact others/coastal resources**
- **Incorporates multi-objective-management and watershed planning principles**

NAI Benefits (cont.)

Benefits of NAI to your community:

- **Reduce your flood losses and costs over time**
- **Reduce likelihood of your actions increasing flood damage to others**
- **Reduce challenges and lawsuits**

NAI Benefits (cont.)

Benefits of NAI to your community:

- **Reduce flood insurance premiums through the Community Rating System**
- **Incorporate multiple objectives**
- **Protect natural resources and values of floodplains**

Summary

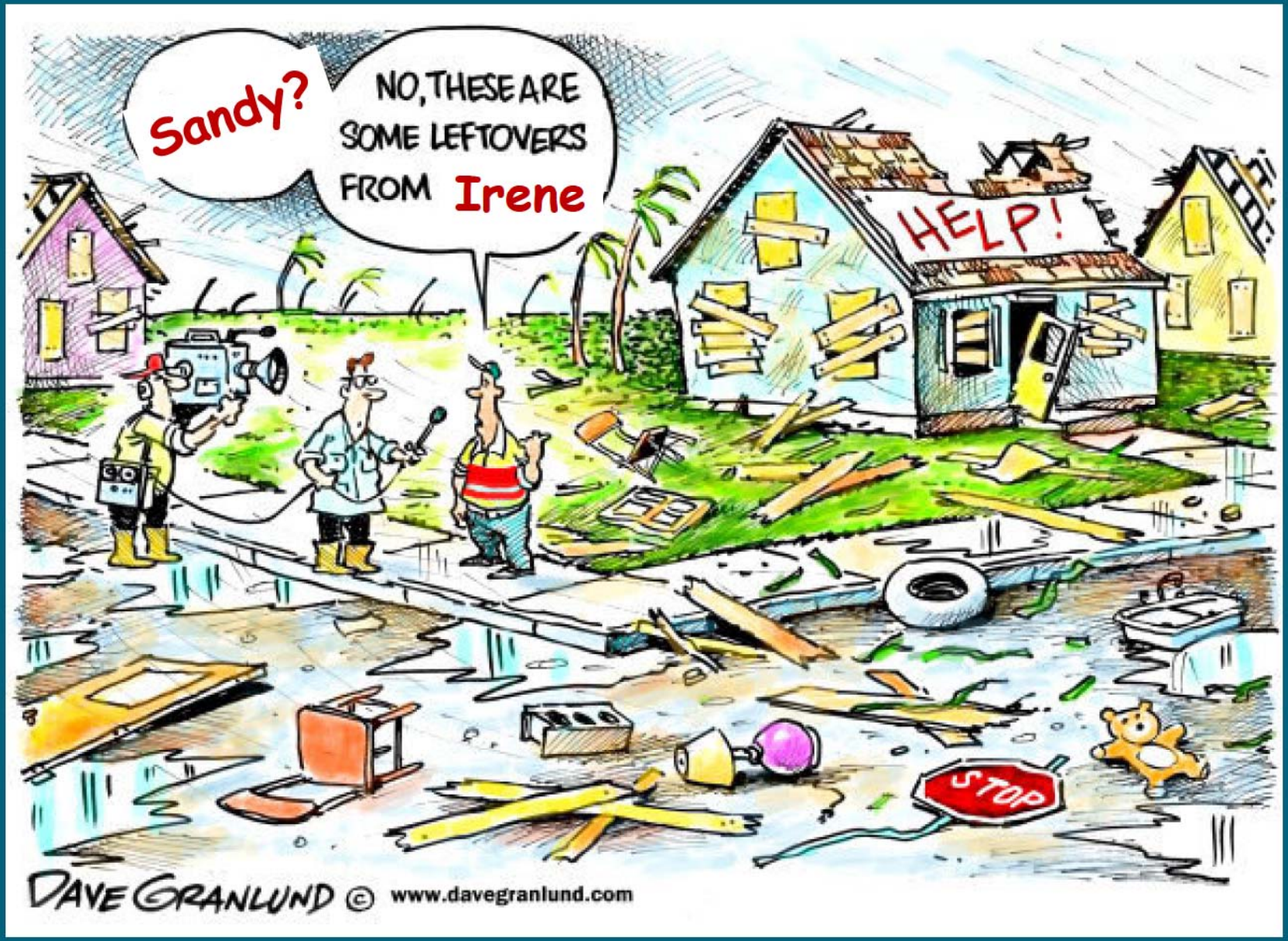
- You are more likely to be successfully sued for permitting risky development than for preventing it.
- You are your community's first and last line of defense against tomorrow's flood disaster.
- NAI Steps:
  - Adopt higher standards tied to public safety and tailored to your community.
  - Identify ALL the Impacts of a Proposed Development.
  - Notify Potentially Impacted Property Owners and Communities of the Impacts of Any Proposed Development.
  - Mitigate Impacts.

Today's Choices Avoid or Create Tomorrow's Disasters

If we continue to encourage at-risk development and ignore the impact to others, can we accept the consequences…

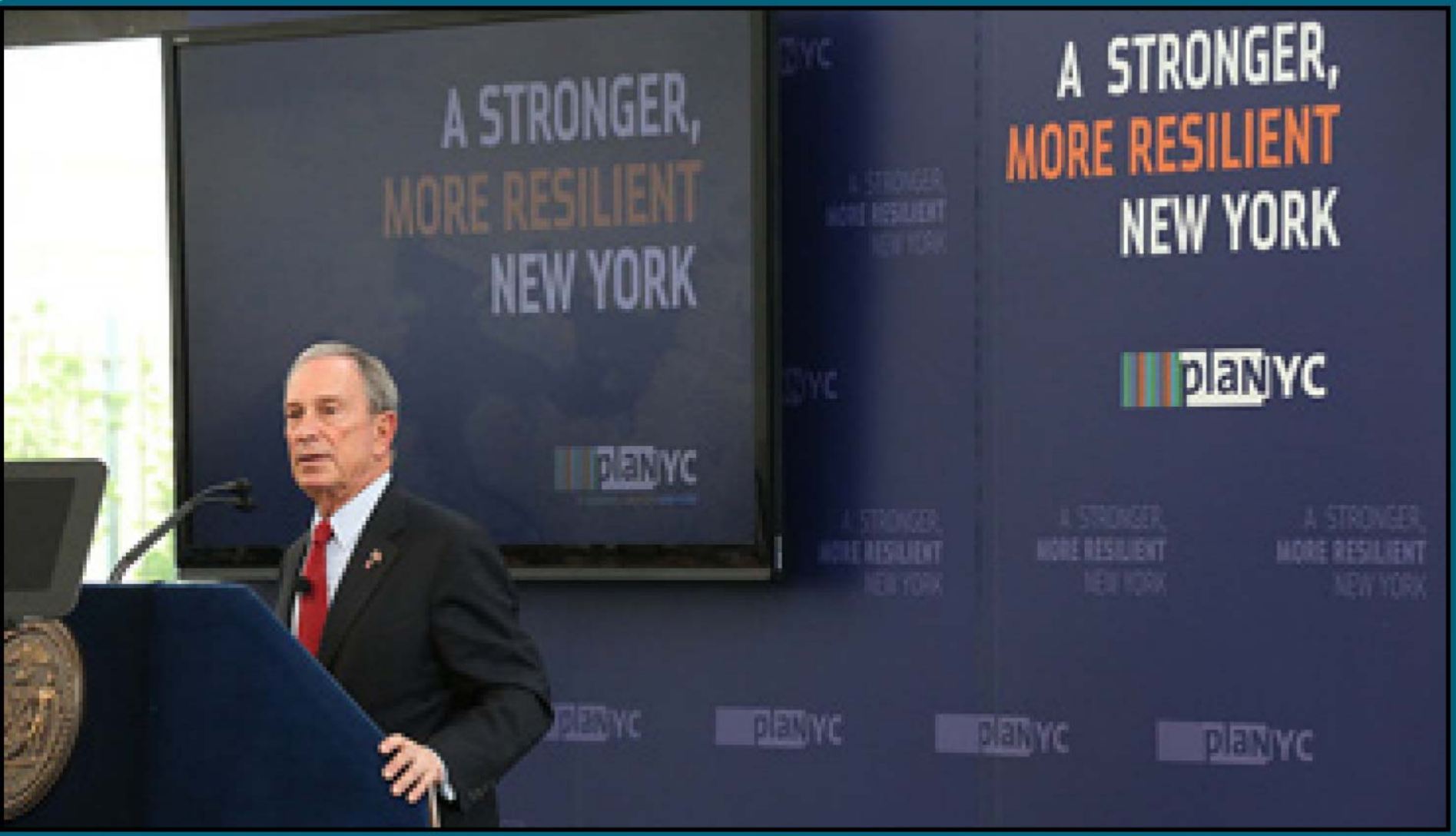
… and, are you willing to pay for it?

Thank you!


Sandy?
NO, THESE ARE SOME LEFTOVERS FROM Irene
HELP!
STOP
DAVE GRANLUND © www.davegranlund.com

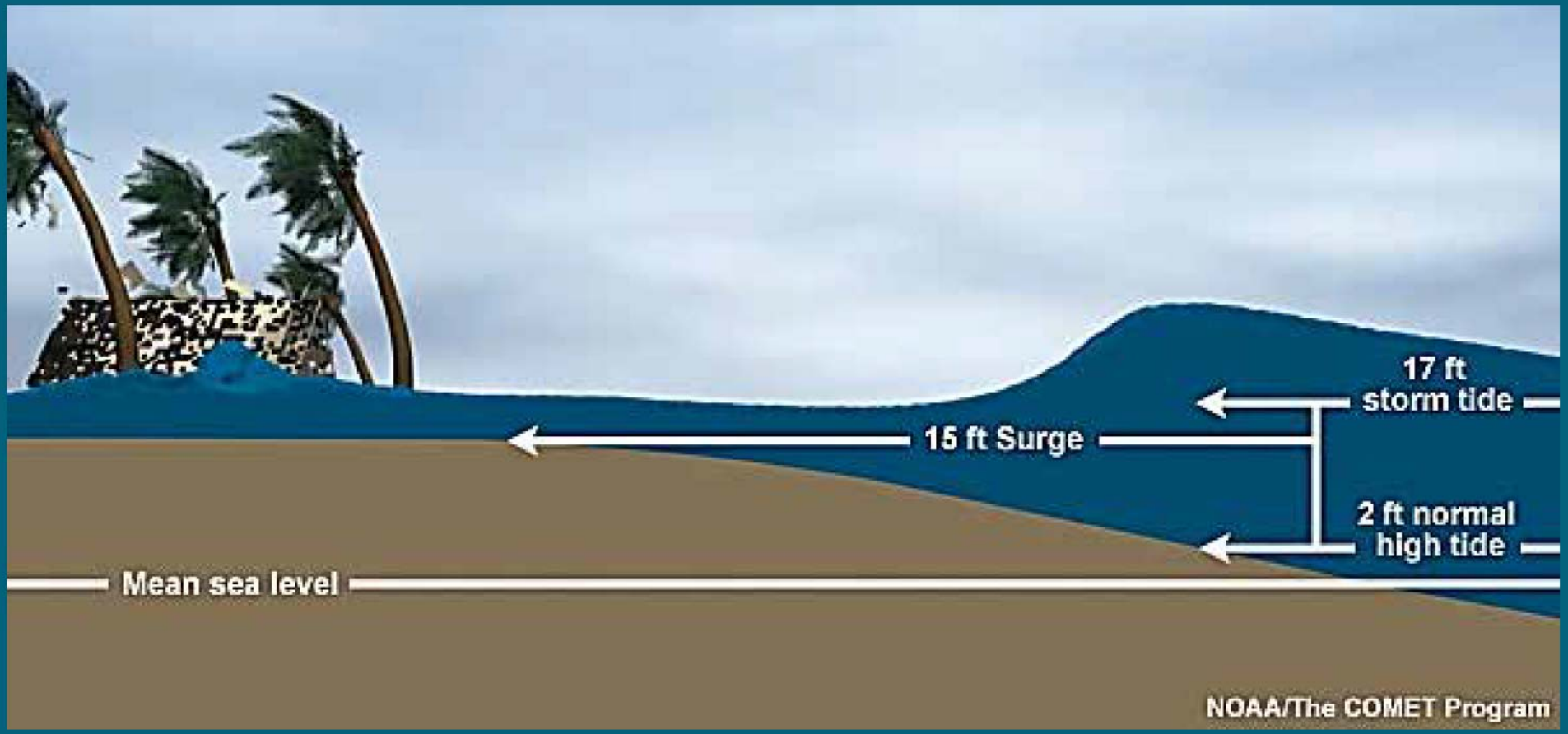
Applications of CNAI in a Post-Disaster Environment

NAI®
No Adverse Impact

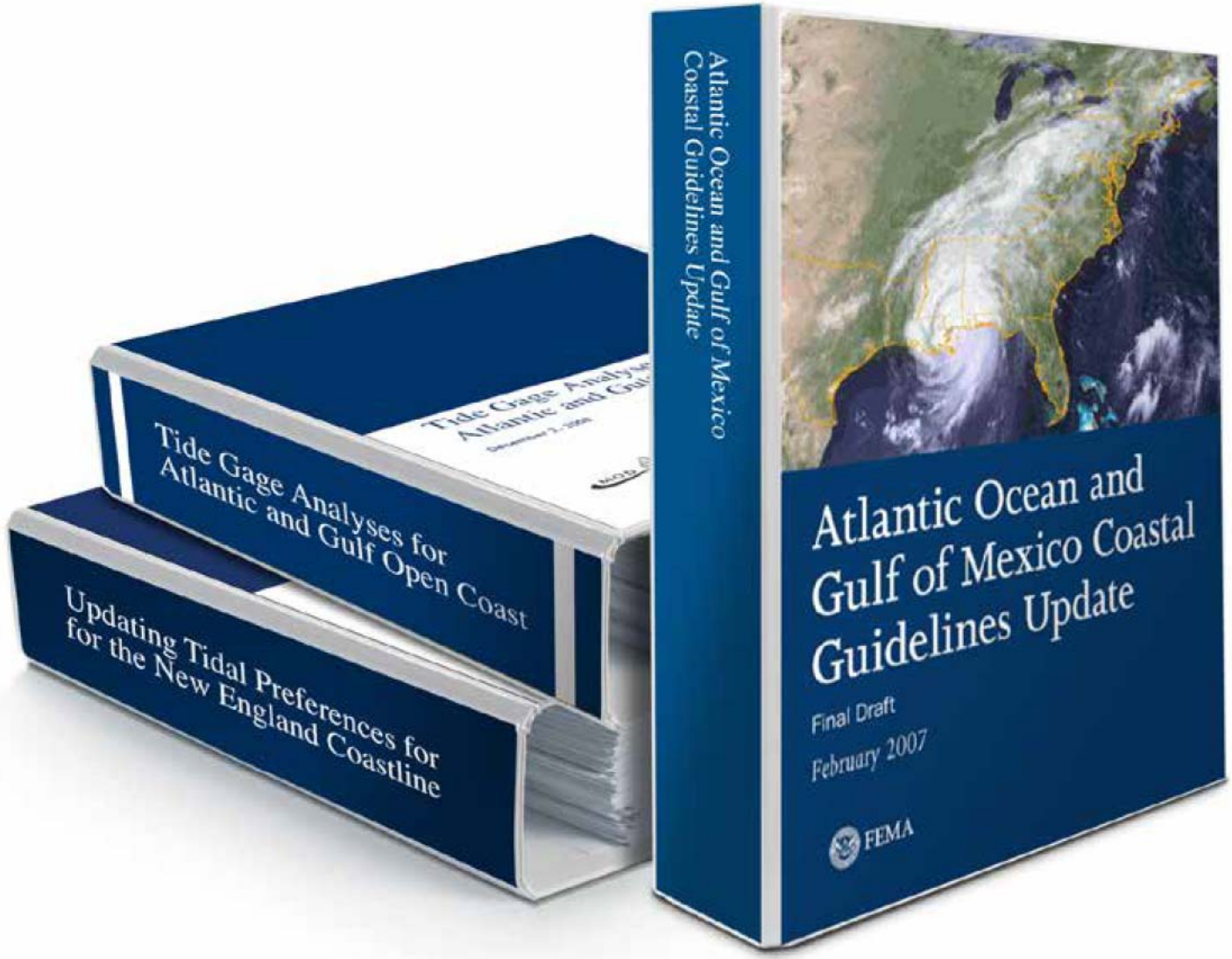

A STRONGER,
MORE RESILIENT
NEW YORK
PLANYC

Was Super Storm Sandy a Once-in-a- Lifetime Event? An Analysis of the Risks

Storm Surge Frequency



Tide Gage Analysis



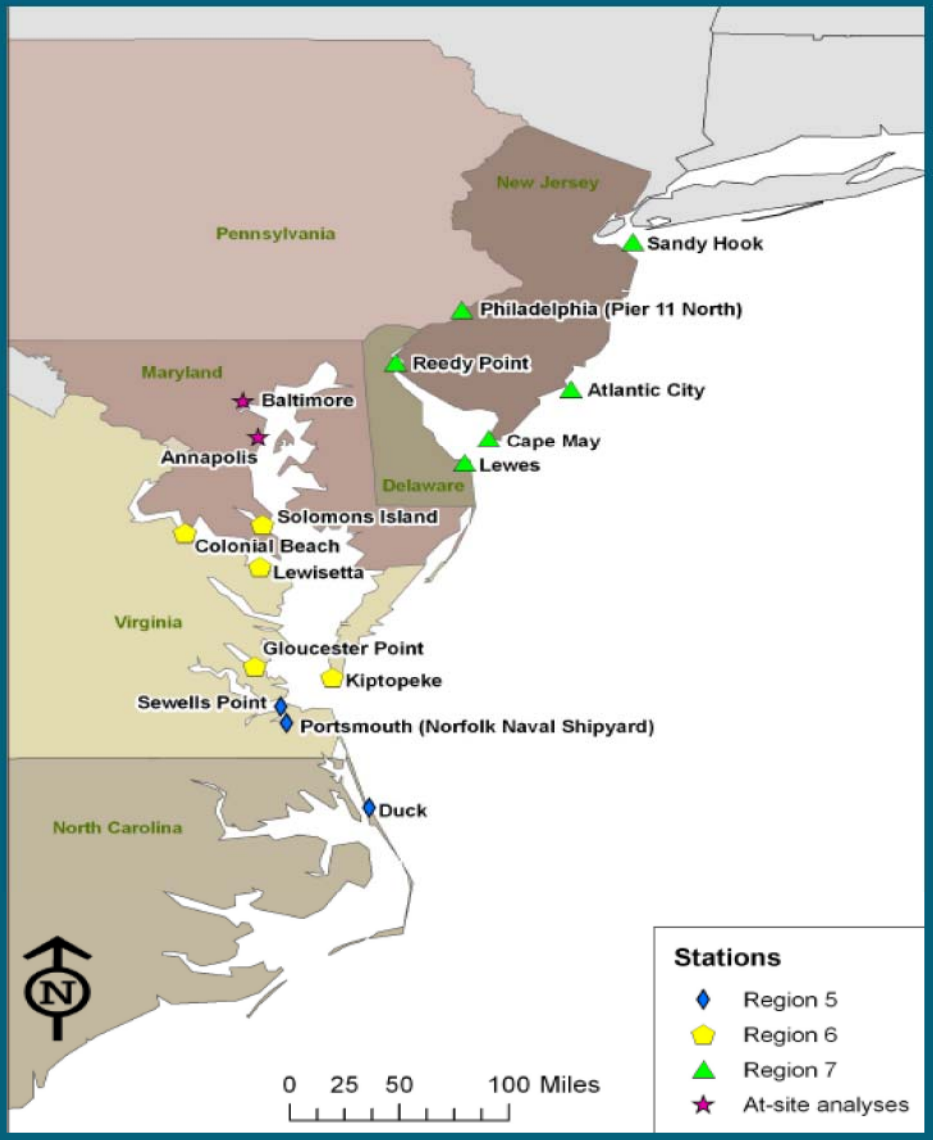
Source of Data

- Data for 37 tide stations through 2007 were obtained from:
  - NOAA/NOS Headquarters in Silver Spring, MD
  - CO-OPS data base http://co-ops.nos.noaa.gov
- All stations had at least 19 years of record; 34 stations had more than 30 years of record, and 8 stations had 80 or more years of record
- Annual maximum elevations were in feet (NAVD) and determined from monthly maximums

Tide Gage Stations

SOUTH ATLANTIC AND GULF AREA

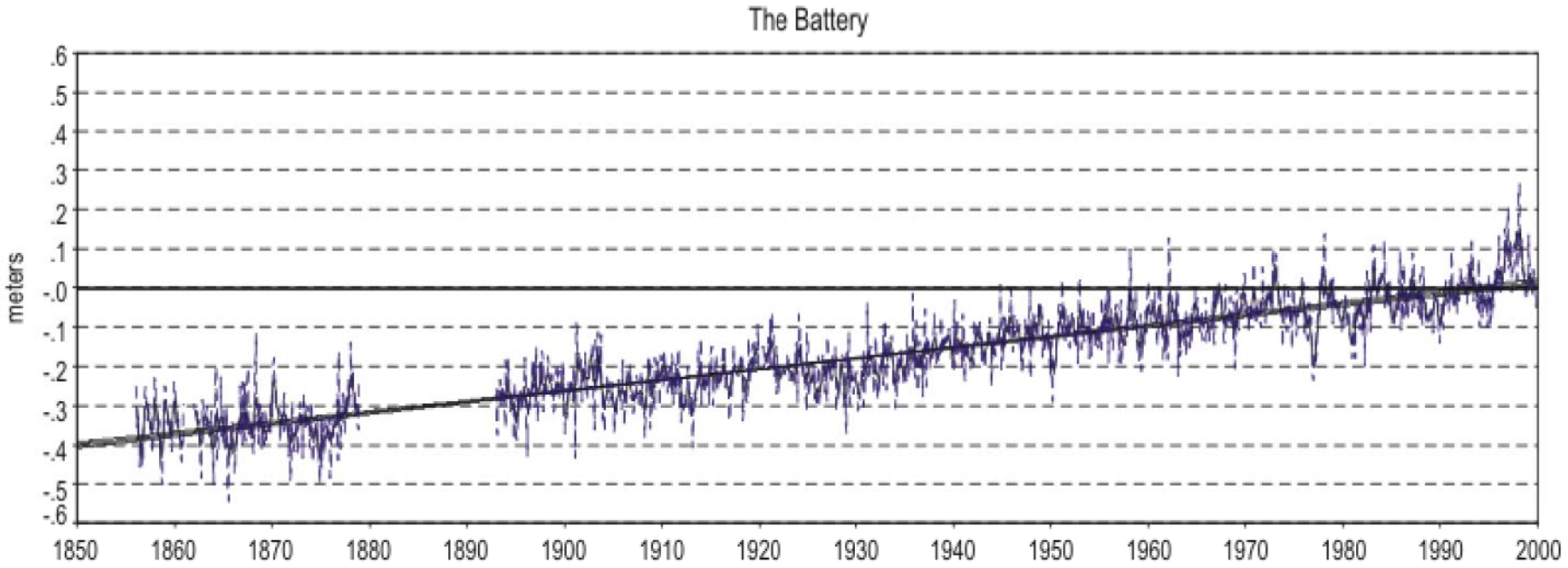
MIDDLE ATLANTIC AREA



Historic Sea Level Rise

8518750 The Battery, New York

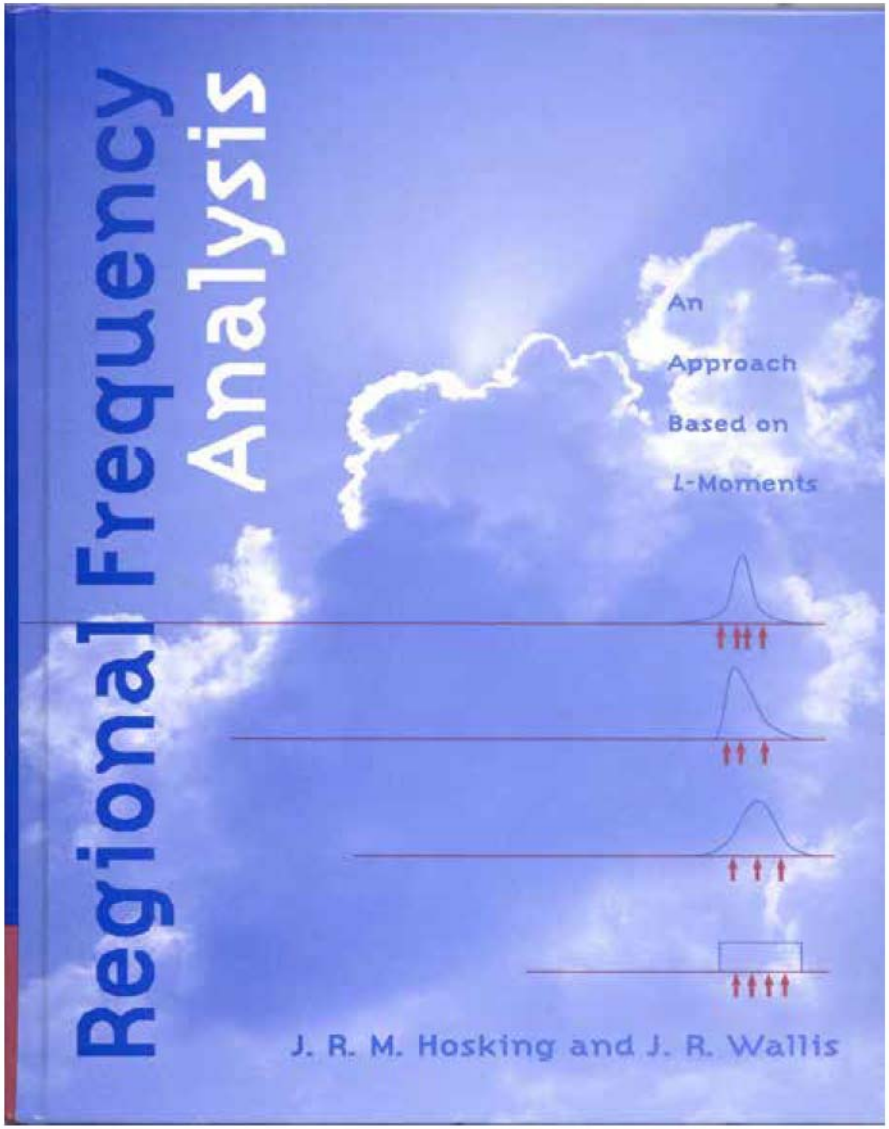
Trend is 2.77 millimeters/year (0.91 feet/century).



Source: NOAA

Analysis Approach

- Regional analysis using the L-moment method
- The L-moment method includes screening data, partitioning stations into homogeneous regions, and fitting probability distributions in each region

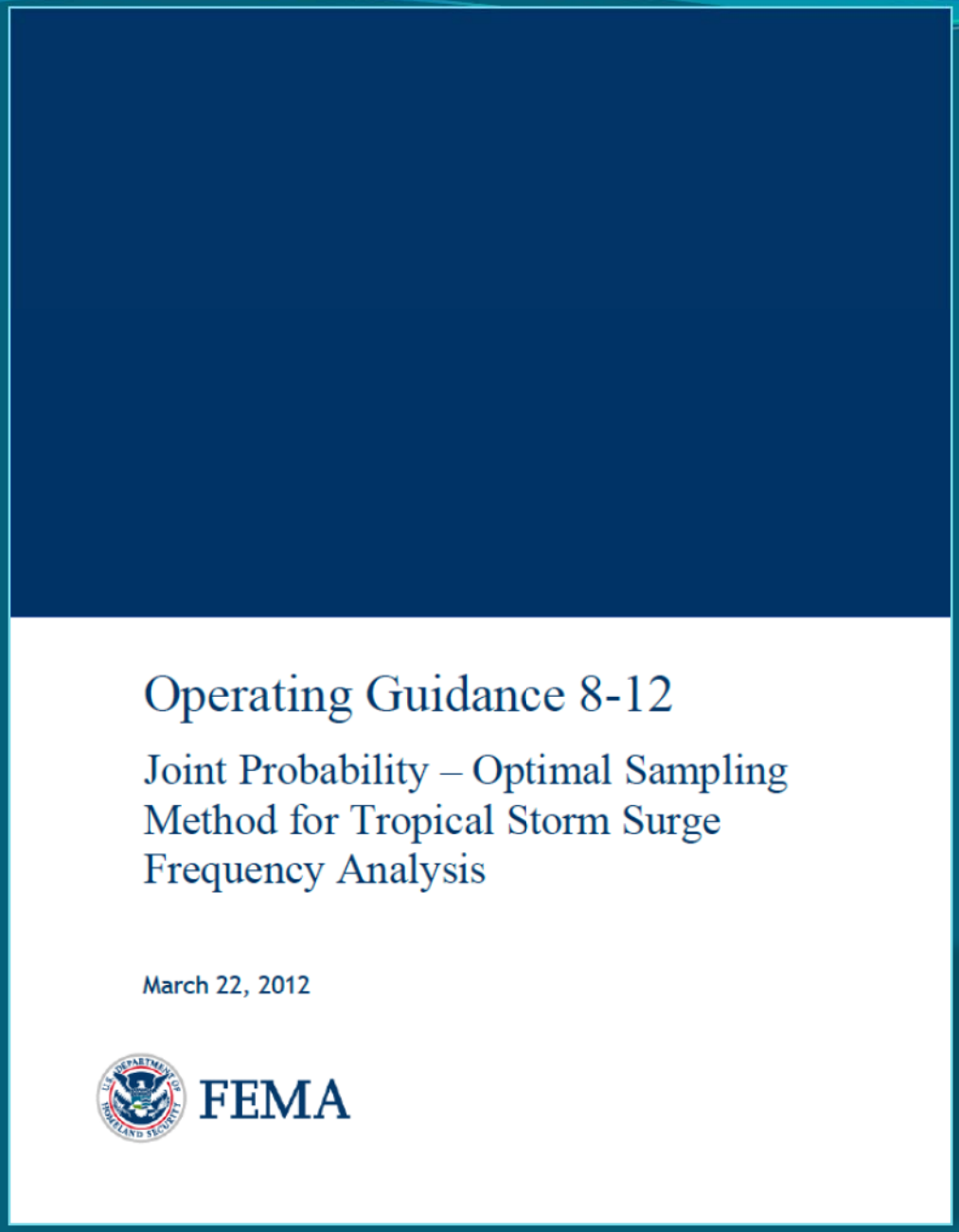


Analysis Results

- Seven homogeneous regions were defined for the Atlantic and Gulf Coast from New Jersey to Alabama
- Within each region, an average slope of the frequency curve was estimated
- The x-percent-chance flood elevation was estimated

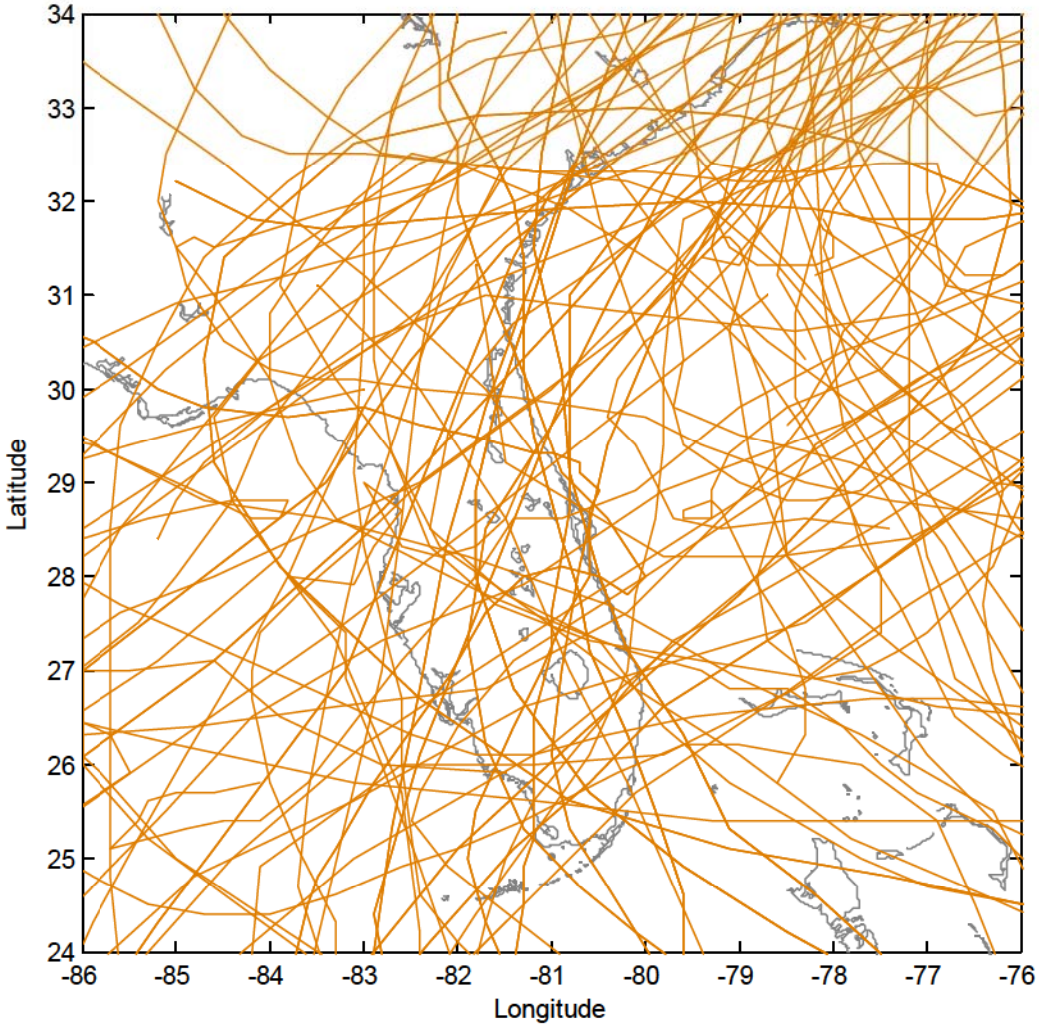
REGION	10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
1	4.1	6.8	8.7	16.4
2	3.0	4.3	5.0	7.7
3	5.3	6.2	6.7	8.4
4	4.3	5.0	5.3	6.1
5	5.0	6.4	7.1	9.3
6	3.7	5.0	5.7	8.1
7	5.9	7.0	7.5	9.2

JPM Guidance



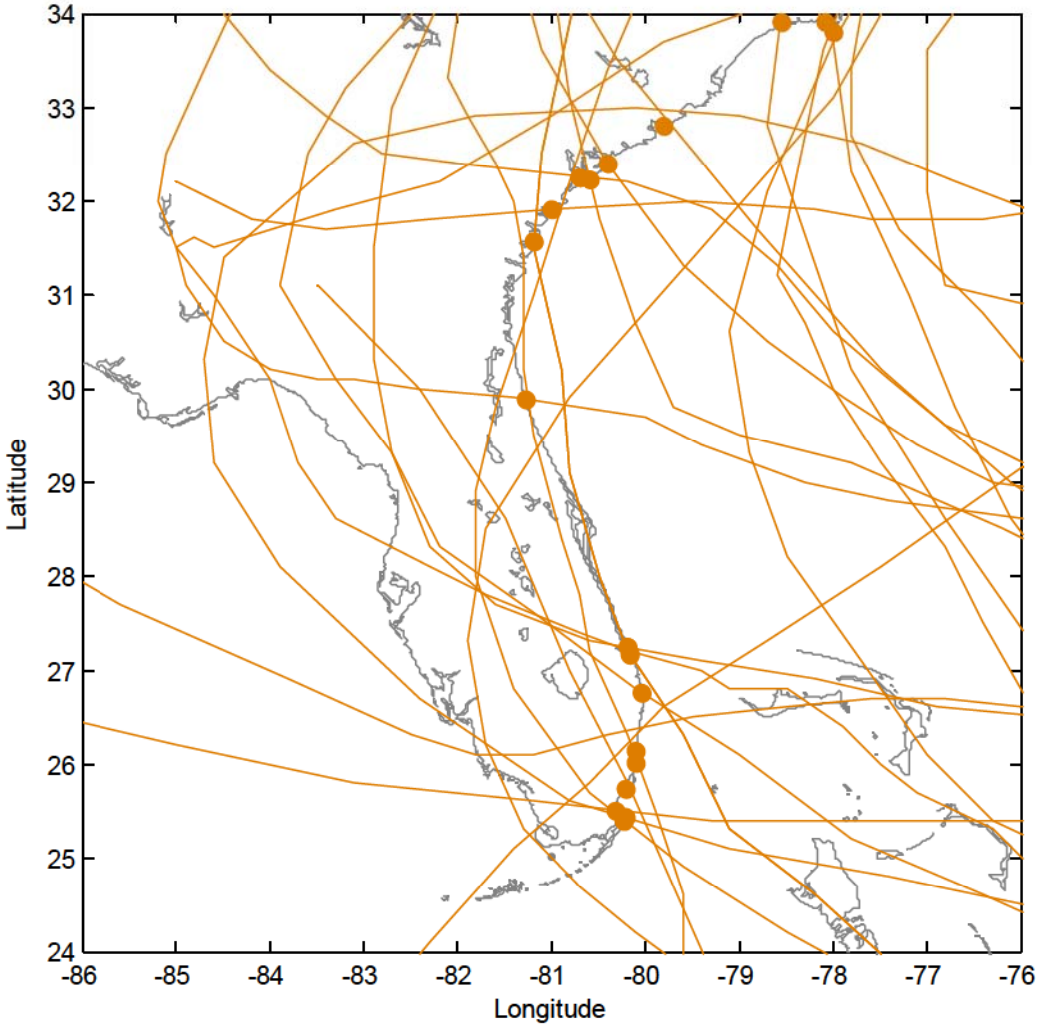
Data Availability

- Storm surge observations are scarce
- There are rich archives of meteorological data that contains information about storms dating back over 100 years
- It is relatively easy to reconstruct the storm surge events from meteorological information



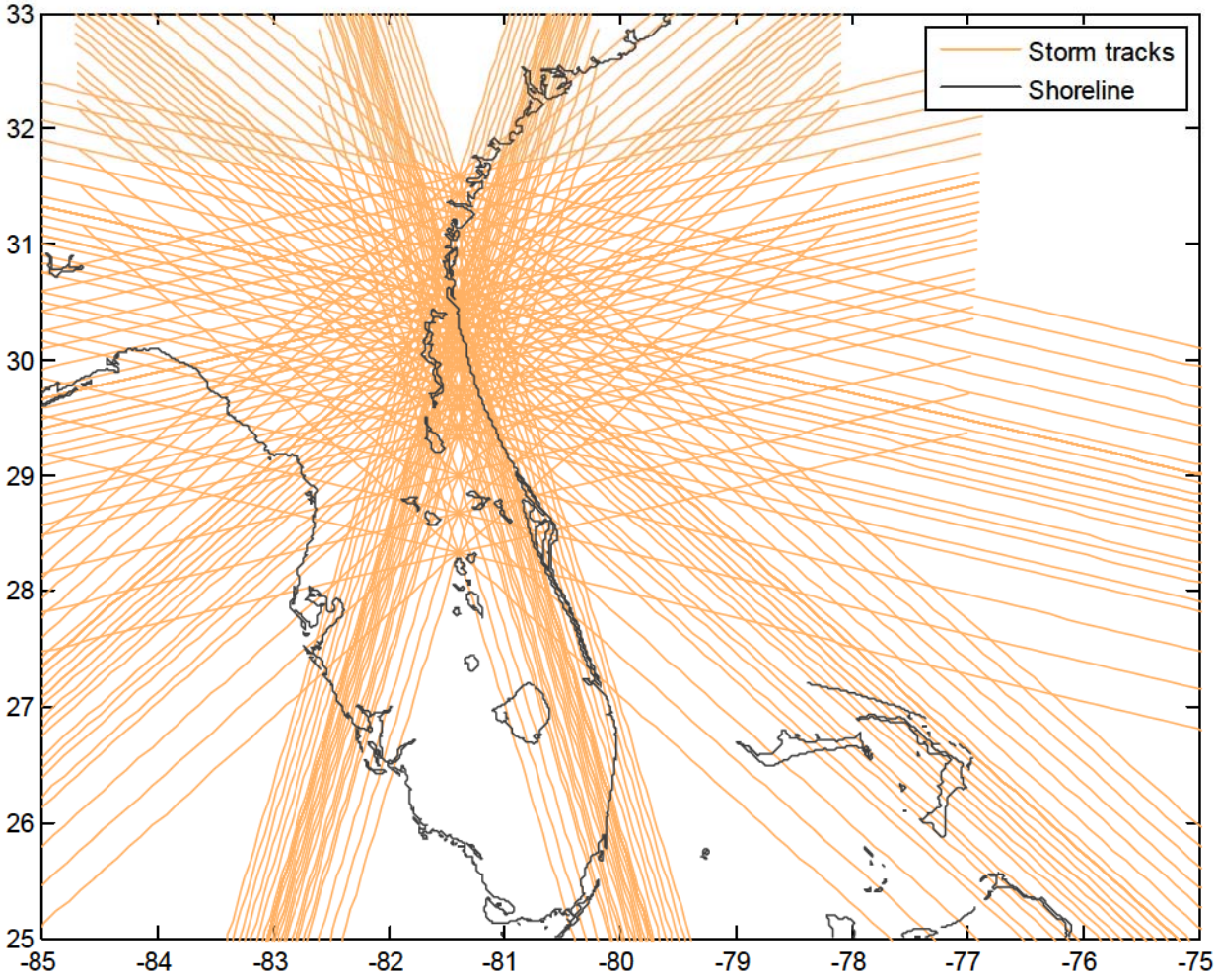
Sampling Error

- Hurricanes are rare and random phenomena
- Statistical inferences based on historical observations alone may possess significant sample bias, stemming from the "luck of the draw"



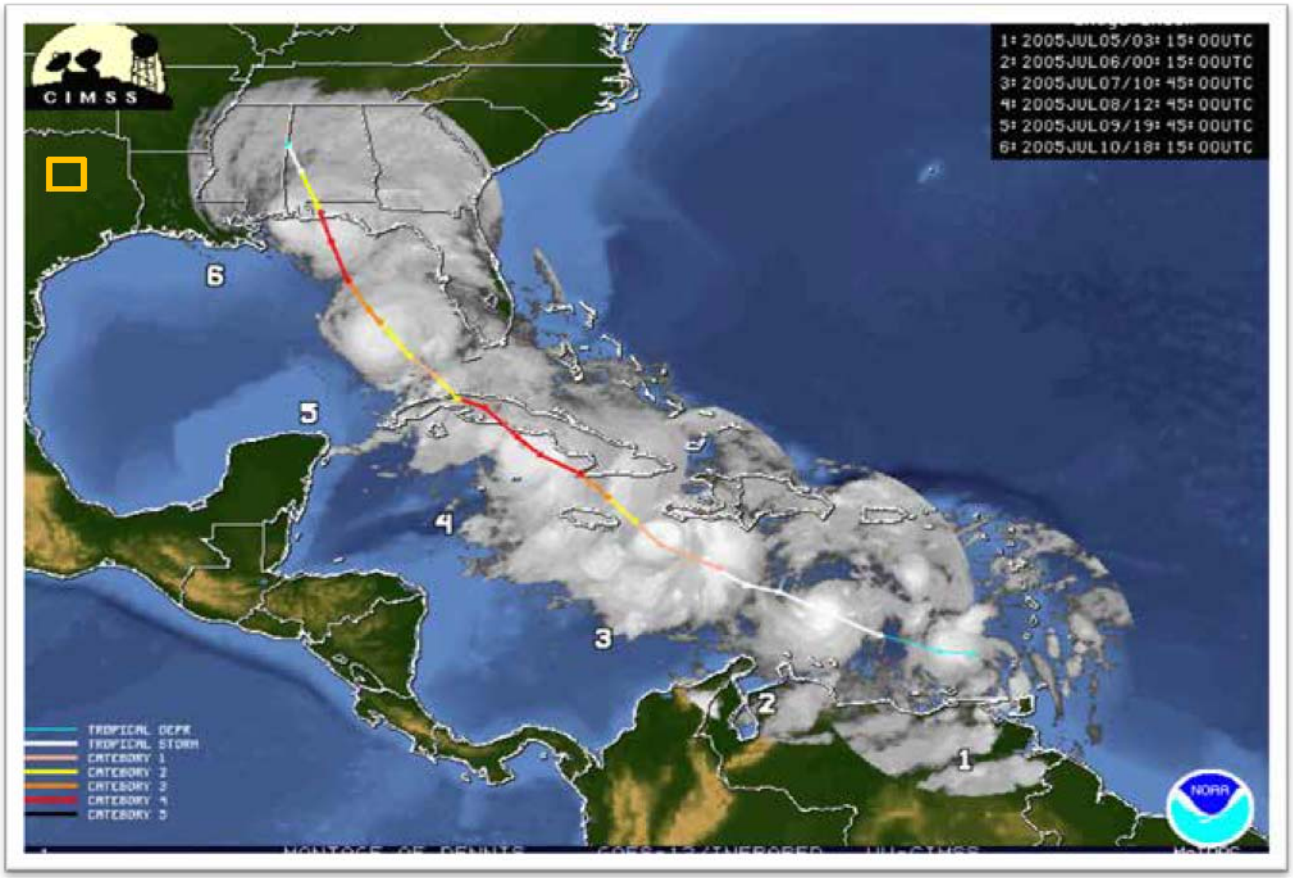
The Joint Probability Method

- The Joint Probability Method (JPM) attempts to reconstruct the climatology of a study area from the historical storm record
- Uses a synthetic suite of storms
- This way, we circumvent sampling error associated with sole reliance on sparse storm surge records

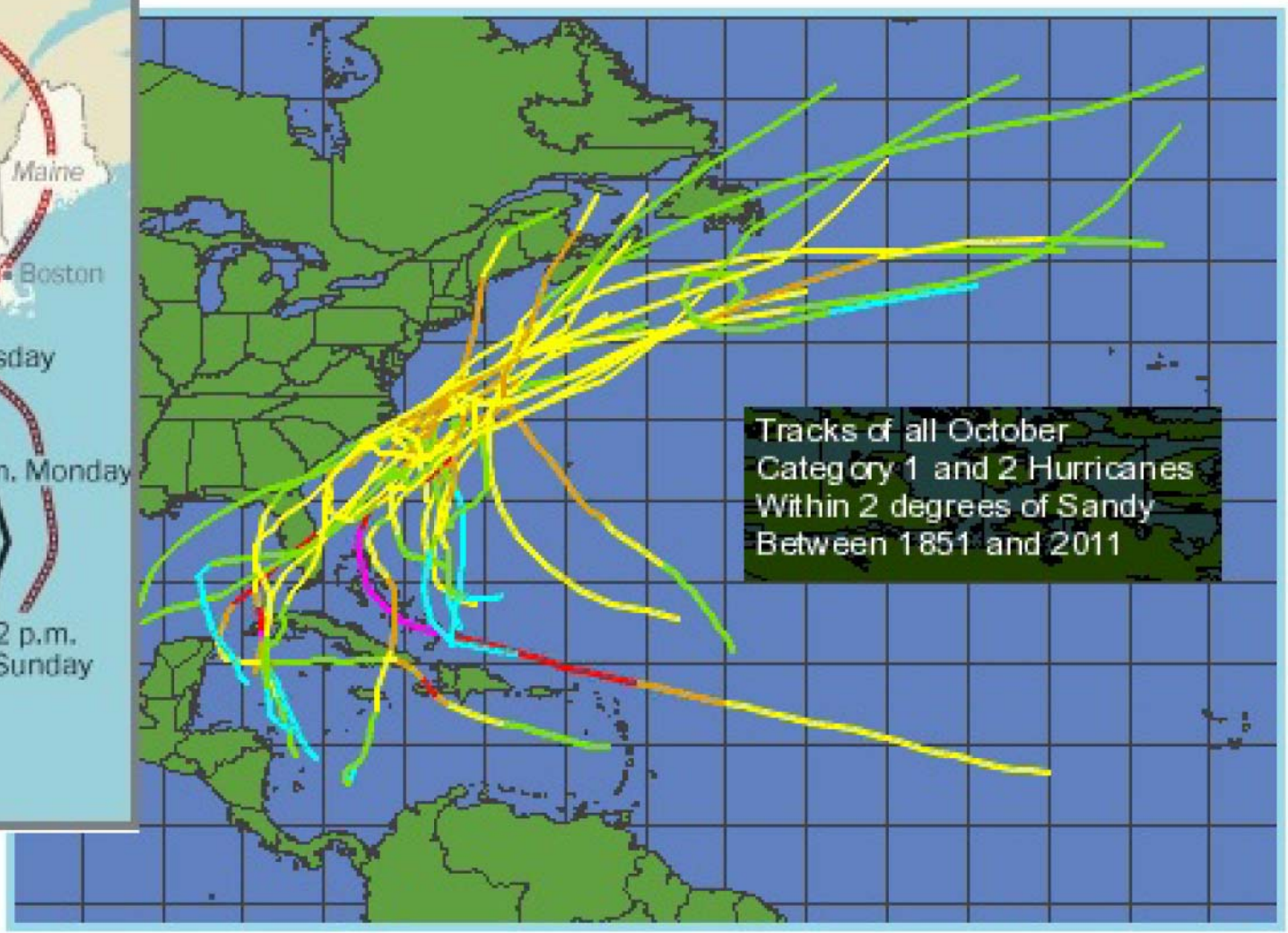


Storm Forcing

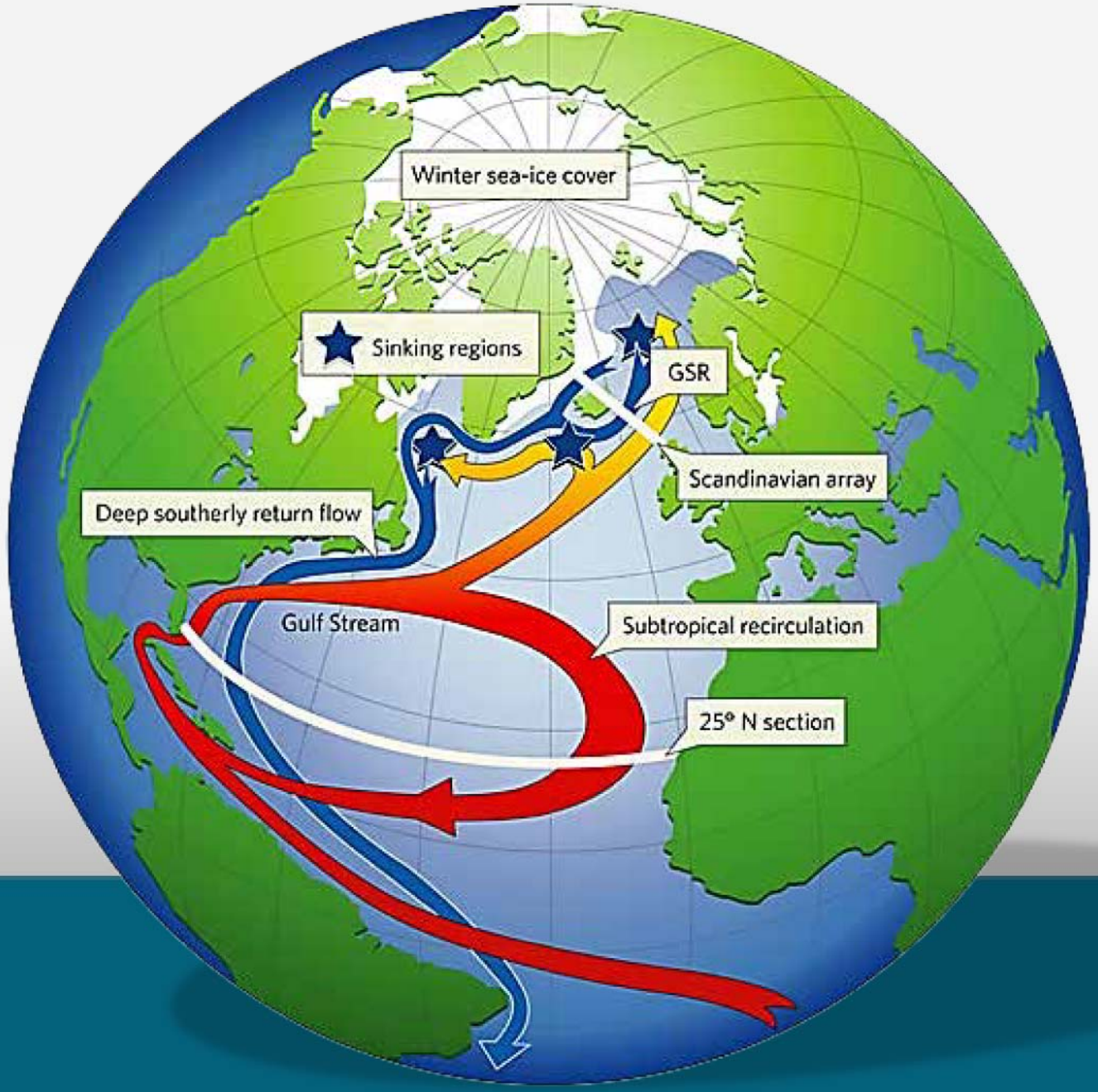
- Storm Rate and Storm Characterization
- JPM-OS and Representative Synthetic Storms
- Validation of “OS” using ADCIRC mesh



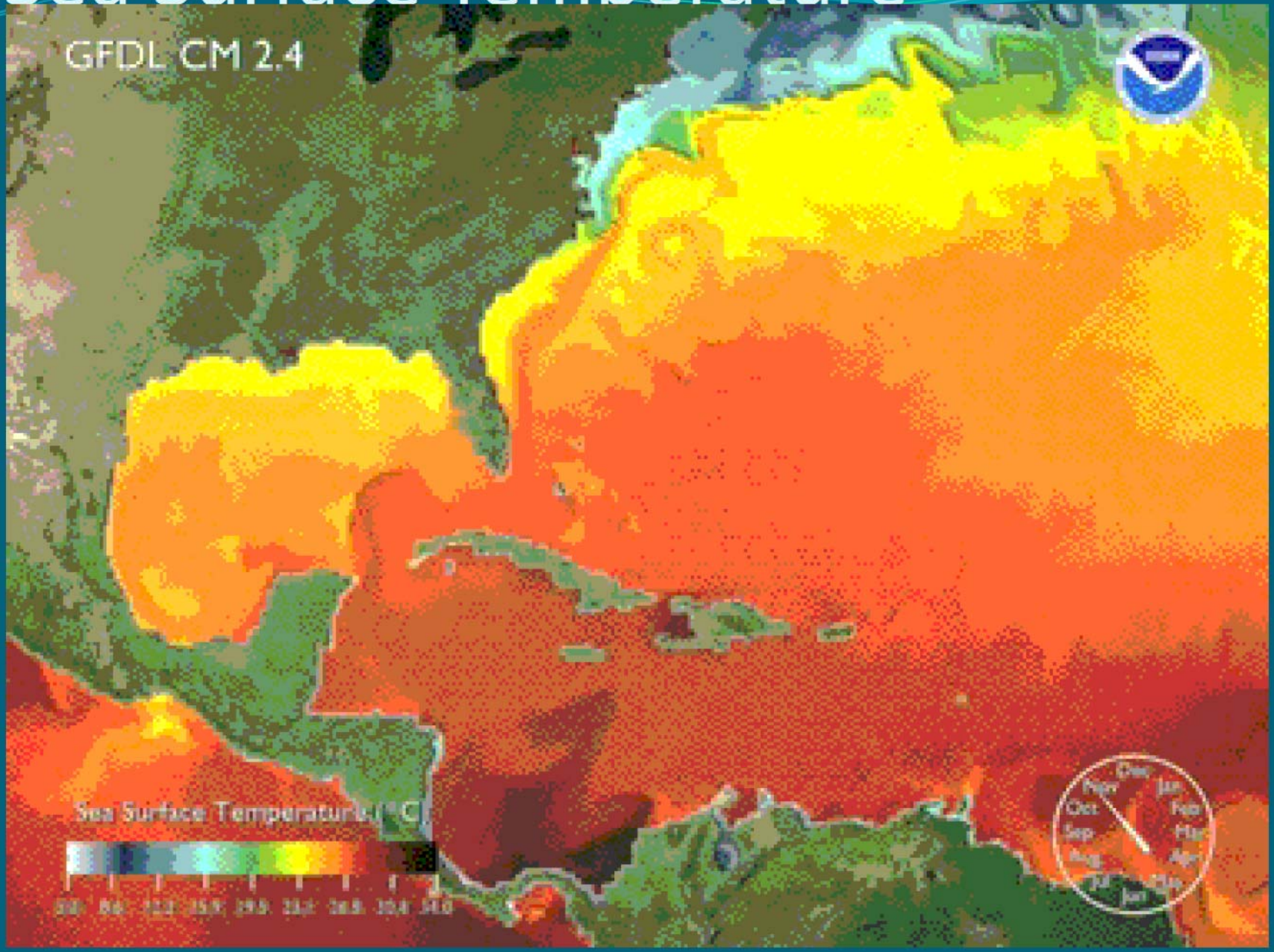

0
250
MILES
CANADA
2 p.m. Thurs.
Maine
U.S.
N.Y.
2 p.m. Weds.
New York
Boston
Pa.
Ohio
2 p.m. Tuesday
W. Va.
D.C.
Va.
2 p.m. Monday
N.C.
Potential track area
S.C.
Ga.
2 p.m. Sunday
Hurricane Sandy
5 p.m. Saturday
Fla.


Tracks of all October Category 1 and 2 Hurricanes Within 2 degrees of Sandy Between 1851 and 2011

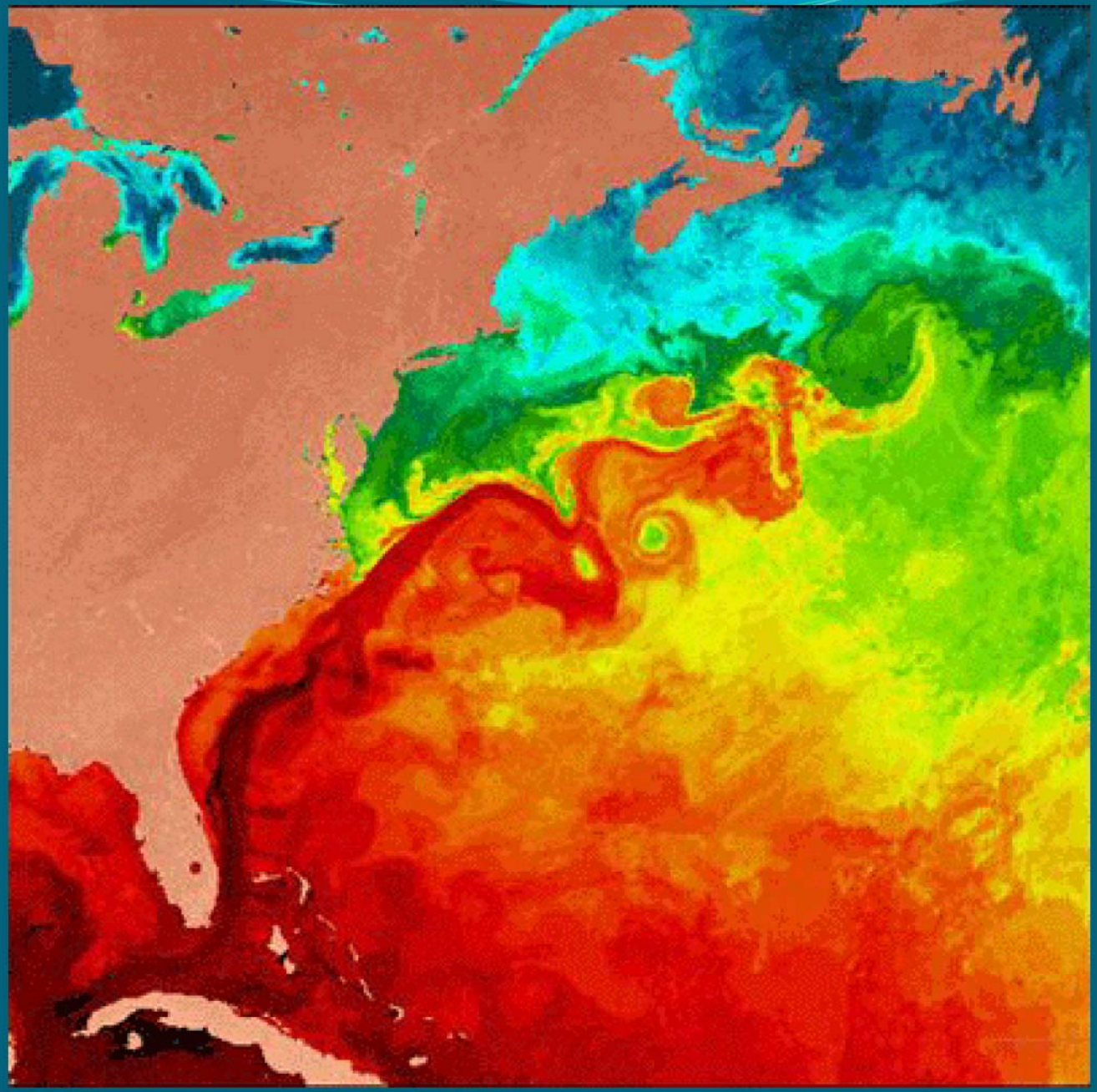
Baker


Winter sea-ice cover
Sinking regions
GSR
Scandinavian array
Deep southerly return flow
Gulf Stream
Subtropical recirculation
25° N section

Sea Surface Temperature

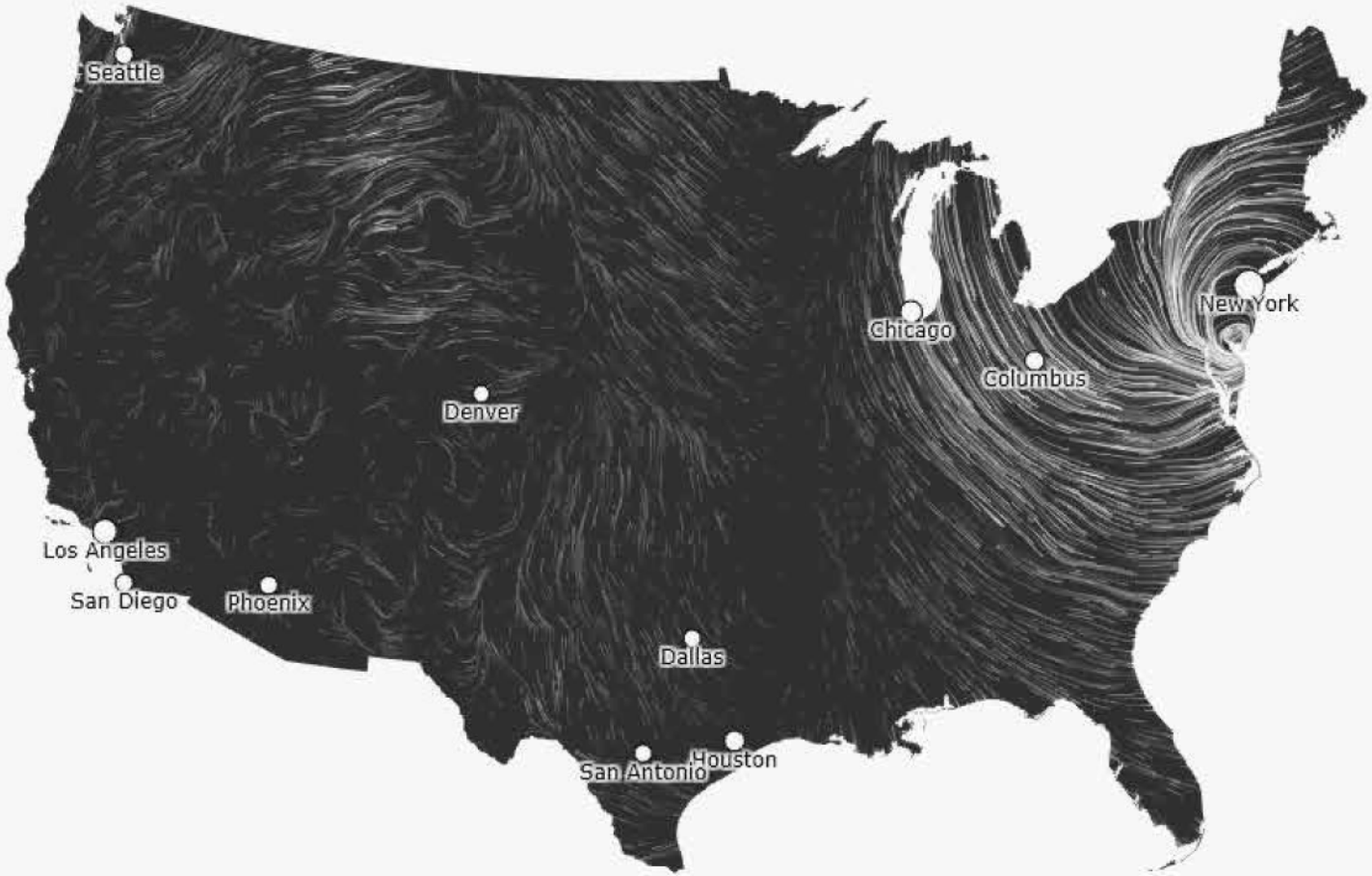


Gulf Stream



October 29, 2012
8:59 pm EST
(time of forecast download)

top speed: **45.1 mph**
average: **9.4 mph**

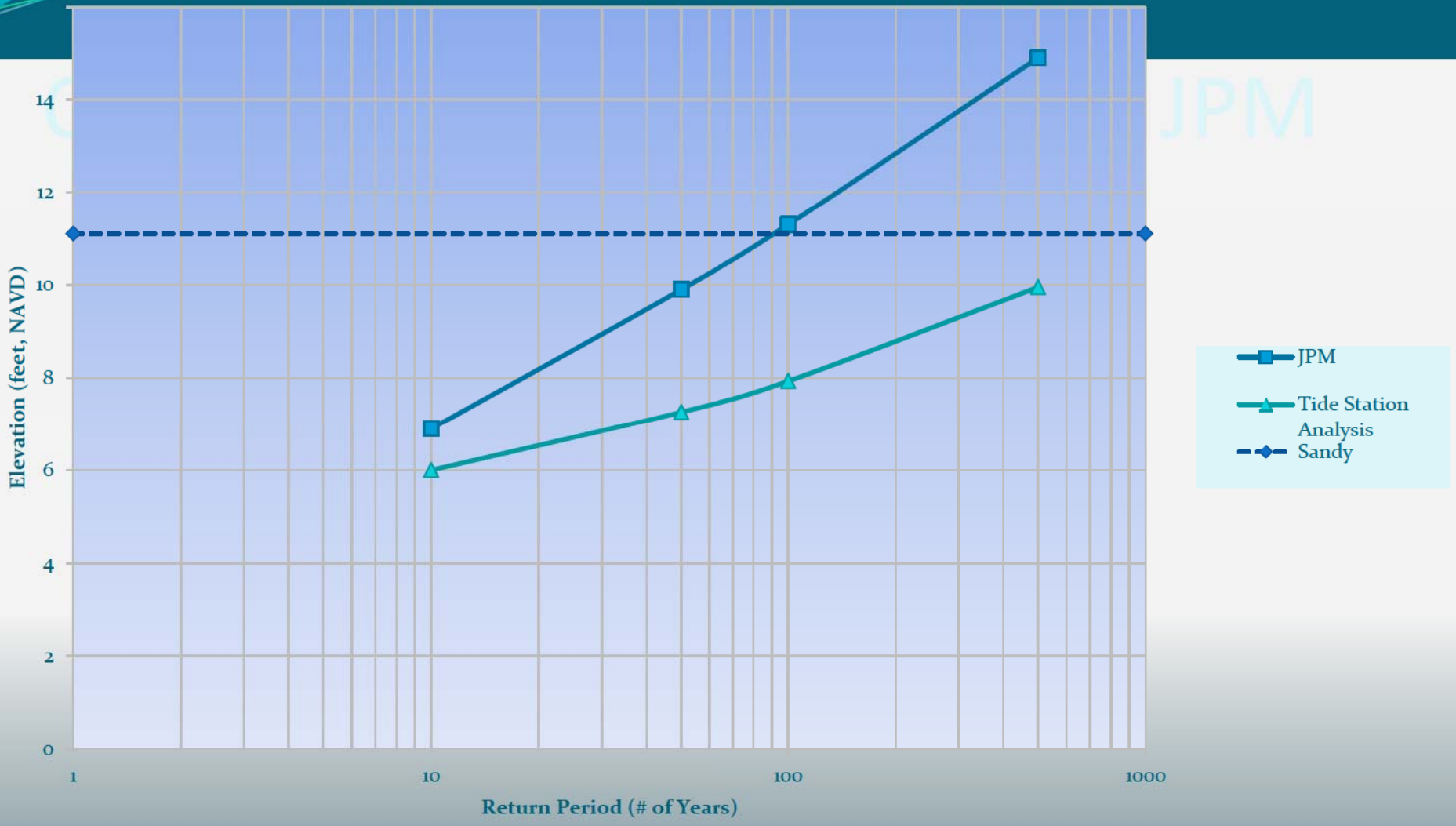


Findings From Sandy

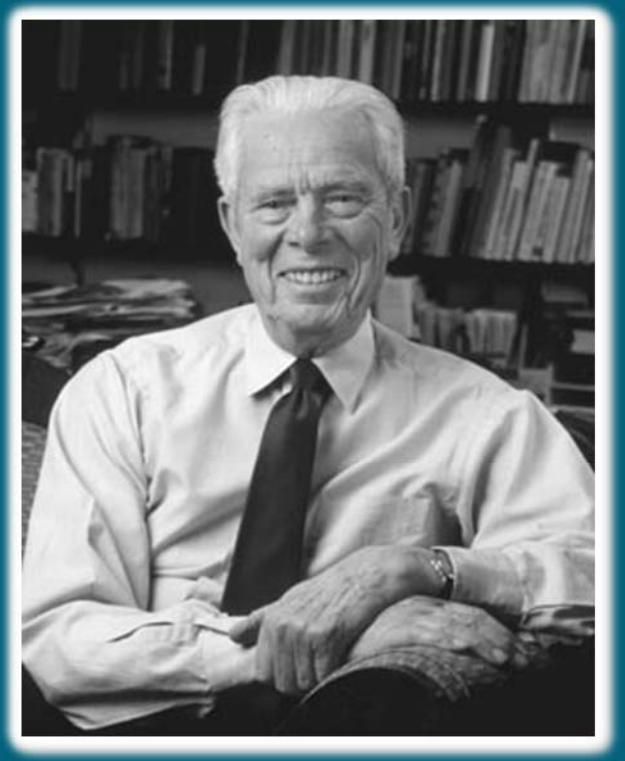
An Evaluation of the Impact of Hurricane Sandy on Coastal Elevations in New York and New Jersey

Prepared for Federal Emergency Management Agency

November 29, 2012


JPM
14
12
10
8
6
4
2
0
Elevation (feet, NAVD)
1
10
100
1000
Return Period (# of Years)
JPM
Tide Station Analysis
Sandy

Dr. Gilbert White



"Floods are Acts of Nature; But Flood Losses Are Largely Acts of Man"

LIVE | COLORADO FLOODING

7NEWS

EVACUATIONS UNDERWAY IN BOULDER

BOULDER CREEK CRESTING WITHIN THE HOUR

Post- Disaster CNAI Applications

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Activities that can be best incorporated after an event

CAN YOU ANSWER THE WHAT NEXT / WHAT DO WE DO NOW QUESTION?

- Incorporate best available flood data into maps/regulations
  - Sea Level Rise
  - High water marks
- Post-disaster recovery planning
  - http://www.planning.org/sandy/workshops/
- Reviewing regulations and adding better land use management standards
  - Size and type of development in hazard areas
  - Critical facility standards
  - Natural or “soft” buffers, setbacks

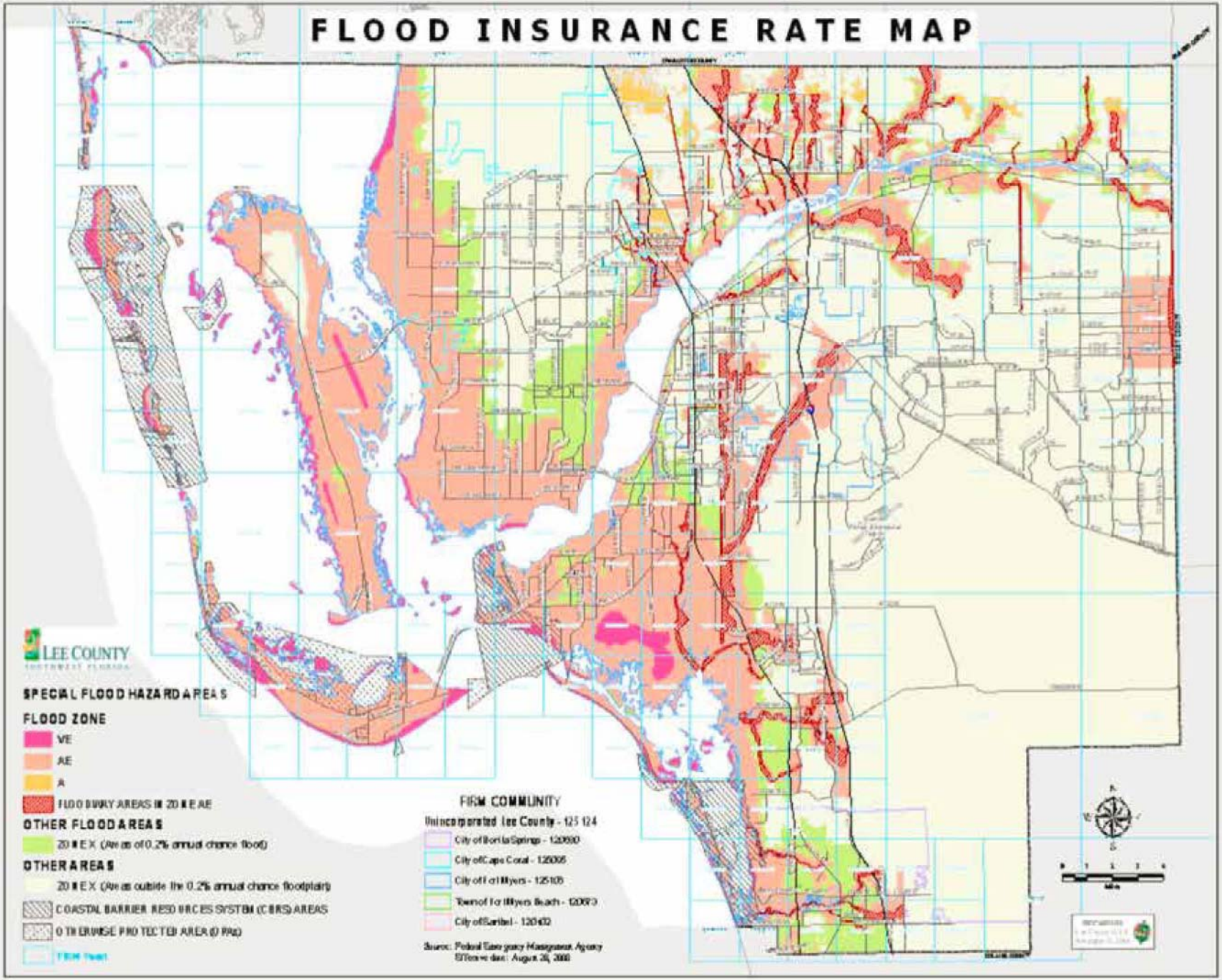
- Mitigation projects
  - Include acquisitions as part of overall strategy to also include good land use practices for acquired properties
    - Dune restoration?
  - Develop local funding program for mitigation or implementing open space program
- Infrastructure
  - Take advantage of 406 mitigation – demand mitigation to at least 500-year protection
  - Analyze alternatives to relocate critical infrastructure outside of flood hazard area wherever possible

- Emergency services/actions
  - Account for adverse impacts of emergency protective measures on neighboring properties
  - Reduce potential liability

- Public education
  - Disseminate educate property owners on multiple mitigation options, NAI options
  - http://www.floods.org

Dr. Dennis Mileti, Professor Emeritus and former Director of the Natural Hazards Center, University of Colorado

FLOOD INSURANCE RATE MAP



- Lee County Florida

Using Risk Reduction to Address Coastal Resiliency through:

- Open Space Preservation
- Zoning (low density)
- All Hazards Municipal Service Taxing Unit MSTU)
- Land Development Code Regulations
- Post Disaster Redevelopment Policies

- Lee County Florida

All Hazards Protection District

- Comprehensive Plan Requirement
- Resolution Passed in Public Hearing
- Adopted In 1990 After Hurricane Hugo
- Assigned Millage Rate in 1993 After Hurricane Andrew
- Unincorporated Areas, Cape Coral

- Lee County Florida

Open Space Land Use Fund
Cost to Property Taxpayer

- Current Millage Rate - .0733 mills
- Cost to Person Owning:*
  - $100,000 Home: $ 7.33
  - $200,000 Home: $14.66
  - $300,000 Home: $21.99
- Millage Cap - .5 mill

- Lee County Florida

Coastal Risk Infrastructure Requirements:

- New/substantially improved critical facilities built to 1 in 500 year flood elevation
  - Police, Fire, EMS Stations
  - Public/Private utilities vital to health and safety
  - Hazardous material sites
  - Hospitals, Nursing Homes, Assisted Living Facilities in Coastal High Hazard Area (Category 1) built to Category 5 wind and storm surge threat levels

Community Resiliency After Sandy

A "No Adverse Impacts" (NAI) Approach

Community Resiliency After Sandy

Background Briefings

Association of State Floodplain Managers

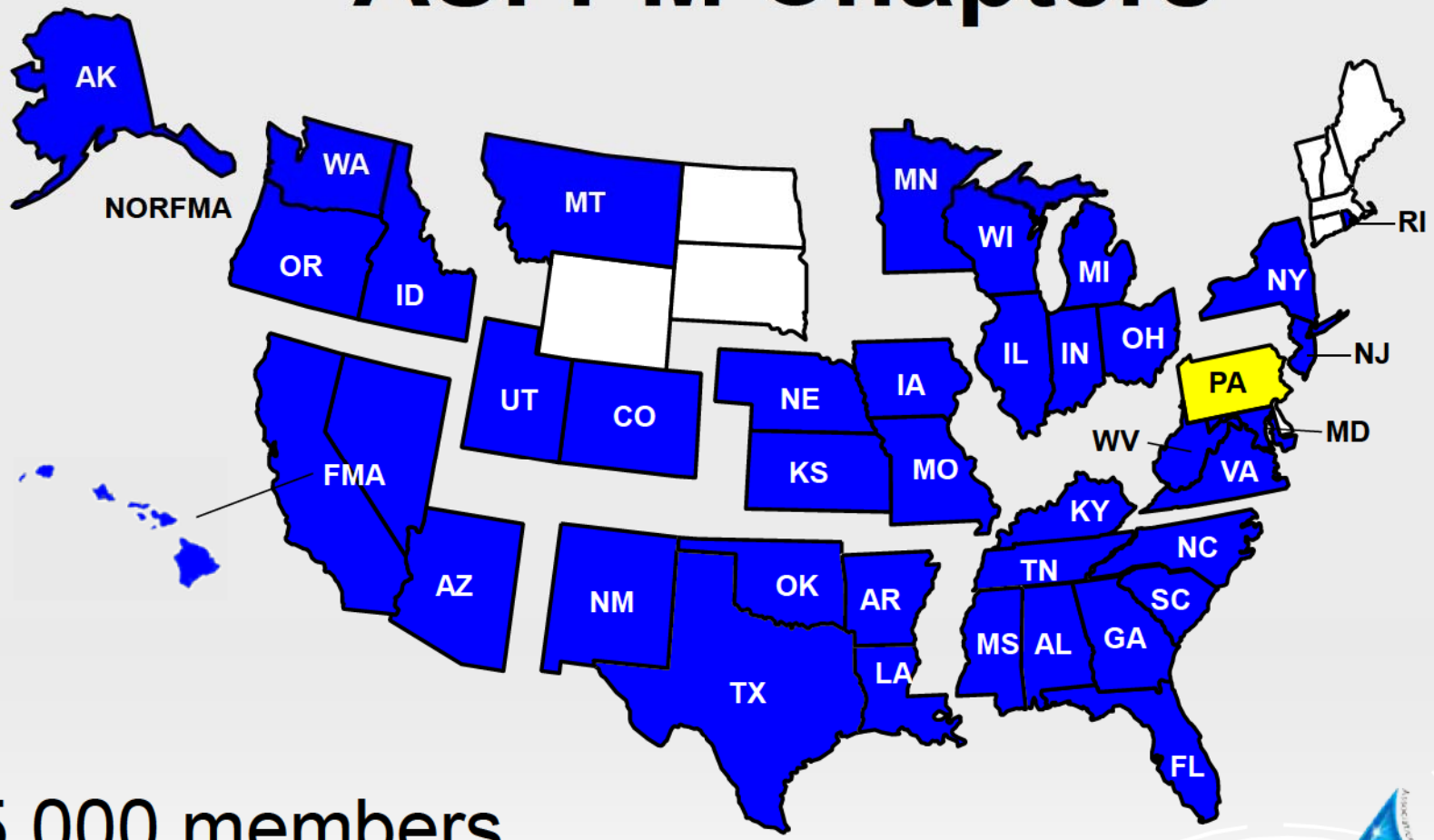
Mission:

Mitigate the losses, costs, and human suffering caused by flooding.

and

Protect the natural and beneficial functions of floodplains.

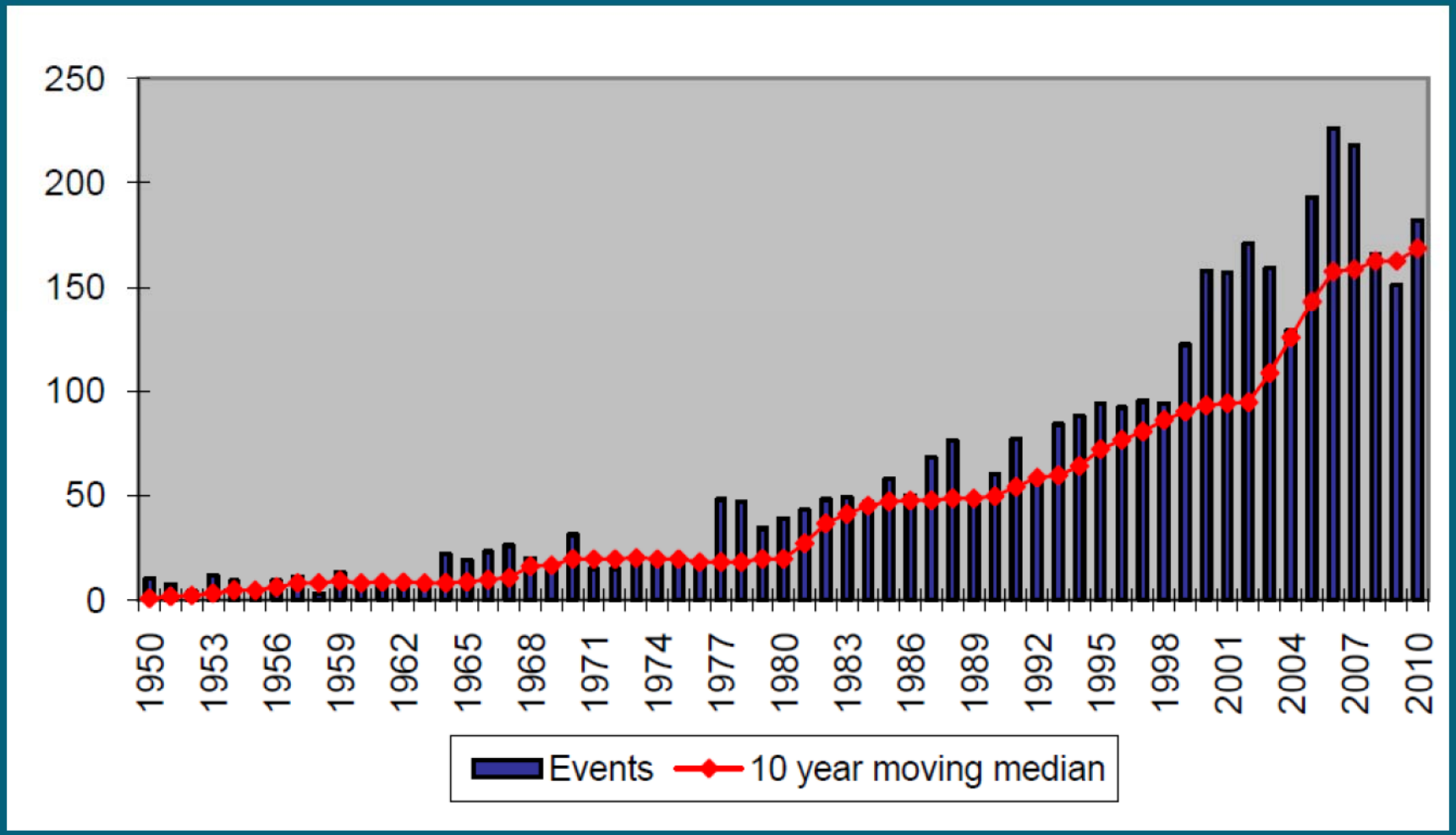
ASFPM Chapters



15,000 members

- 35 Chapters
- State Assoc. & Pending Chapters

Trends: Reported Flood Events



Floodplain Management: Roles

- So, who manages flood risk, anyway?
- Federal Role
  - National Flood Insurance Act
  - FEMA, Corps, EPA & other federal agencies
  - National Flood Insurance Program
- State Role
- Local Role
- Personal Role

Floodplain Management: Roles

- So, who manages flood risk, anyway?
- Federal Role
- State Role
  - State Floodplain Managers
  - State Land Use Programs & Policies
  - State Emergency Management
  - Cooperating Technical Partners
- Local Role
- Personal Role

Floodplain Management: Roles

- So, who manages flood risk, anyway?
- Federal Role
- State Role
- Local Role
  - Development Standards & Review
  - Permitting & Codes Enforcement
  - Local Emergency Management Programs
  - Community Rating System
- Personal Role

Floodplain Management: Roles

- So, who manages flood risk, anyway?
- Federal Role
- State Role
- Local Role
- Personal Role
  - Risks & Decisions
  - Information & Preparation
  - Responsibility & Expectations

Basic Flood Facts

- Flooding is the #1 natural hazard in the US
- More than 50% of all properties that are in high-risk areas do not have flood insurance
- 25% of all flood insurance claims are outside the mapped special flood hazard area (SFHA)
- There is a 26% chance of flooding during a 30-year mortgage (compared to 9% chance of fire)
- 30% of flooded small businesses never reopen
- Per Capita Damages increased by more than a factor of 2.5 in the previous century in real dollar terms

Central Message

Even if we perfectly implement the current standards, **damages will increase** because we are putting development in the path of disaster.

Remember, we have done a number of positive things, both non-structural and structural, but It is not enough!

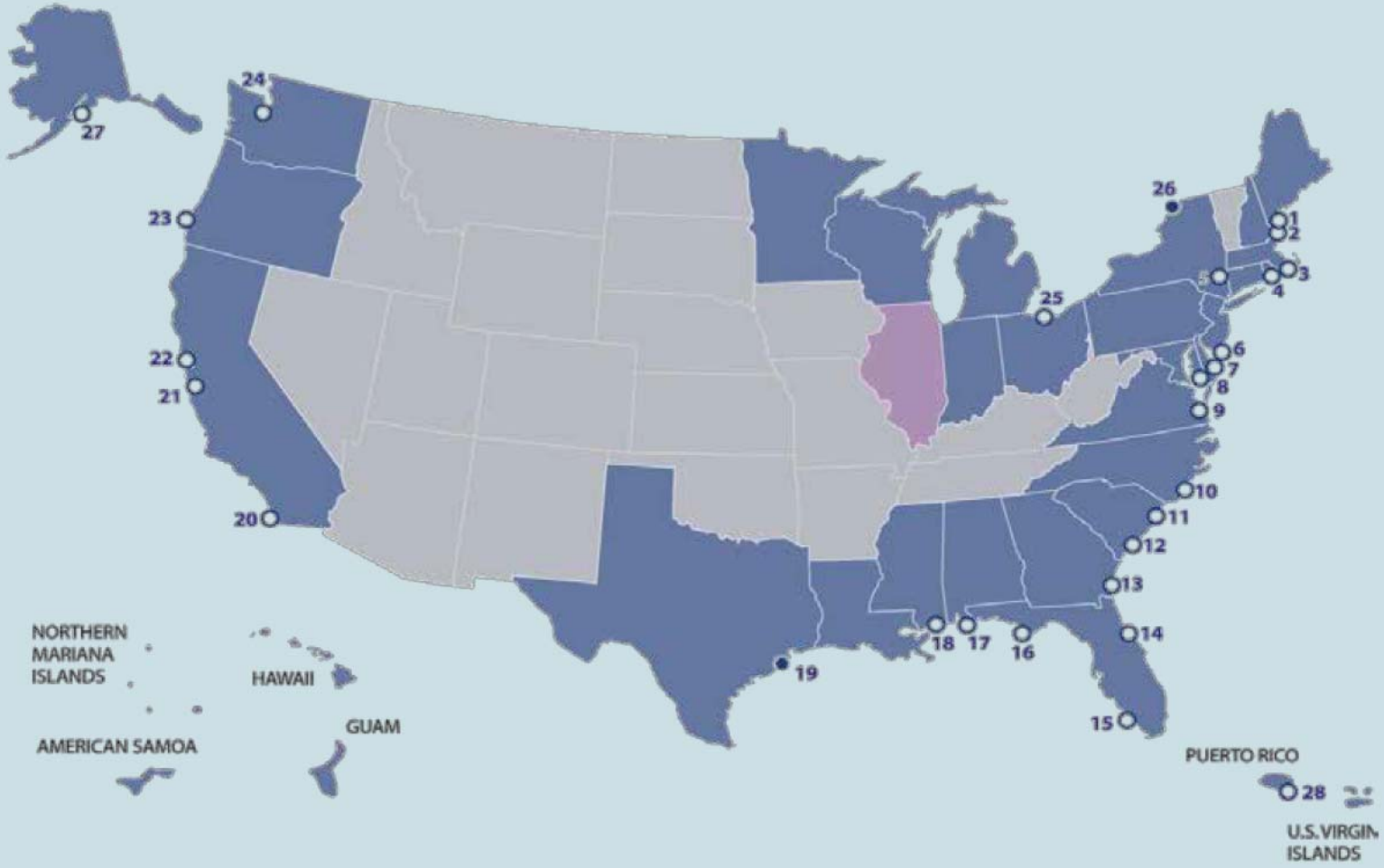
We'll discuss why that is…

Dr. Gilbert White Shares a Bit of Wisdom:

"Floods are Acts of Nature; But Flood Losses Are Largely Acts of Man"

The Coast –
high energy environment

Coastal States/Territories and Designated Estuaries

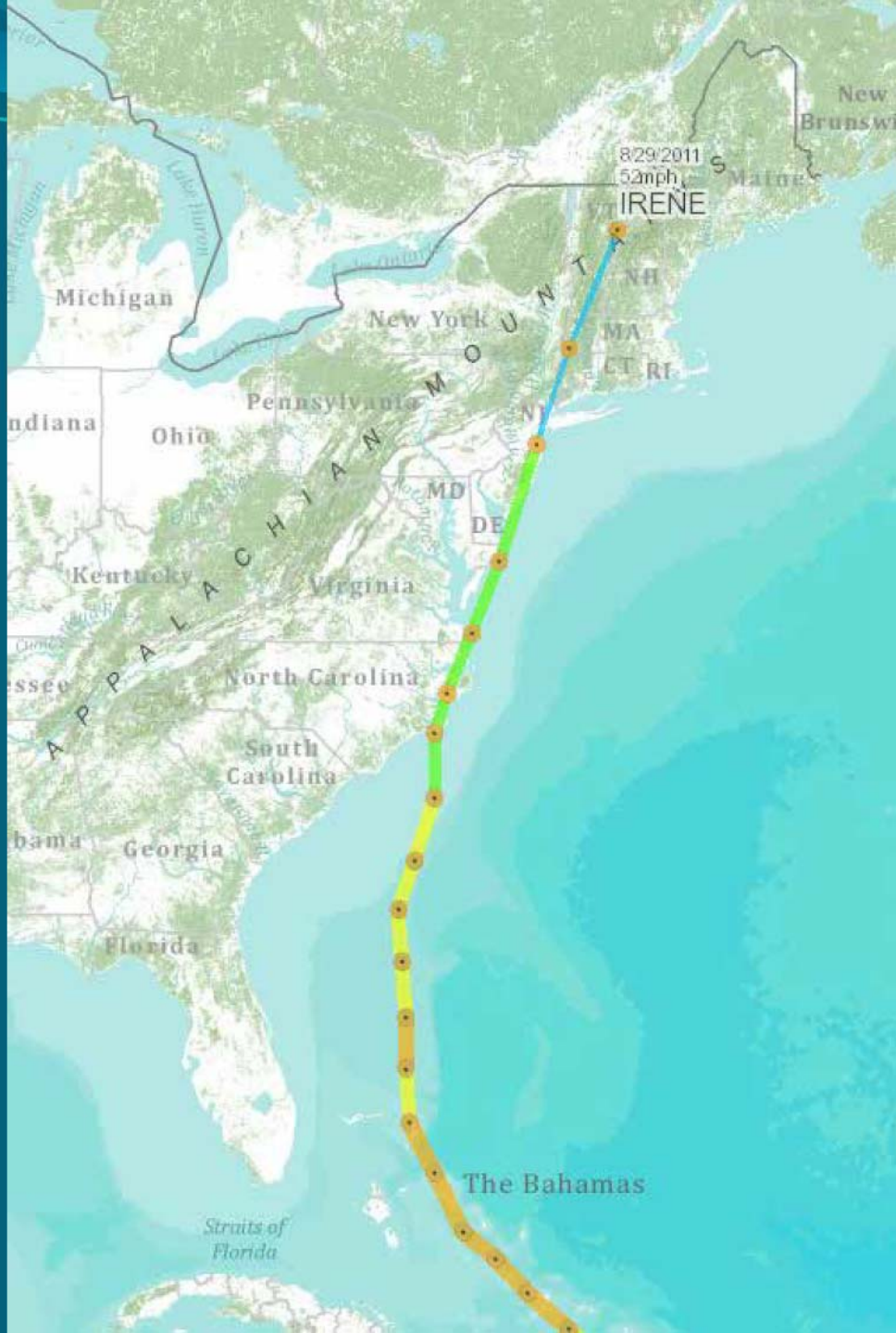


Hurricane Irene

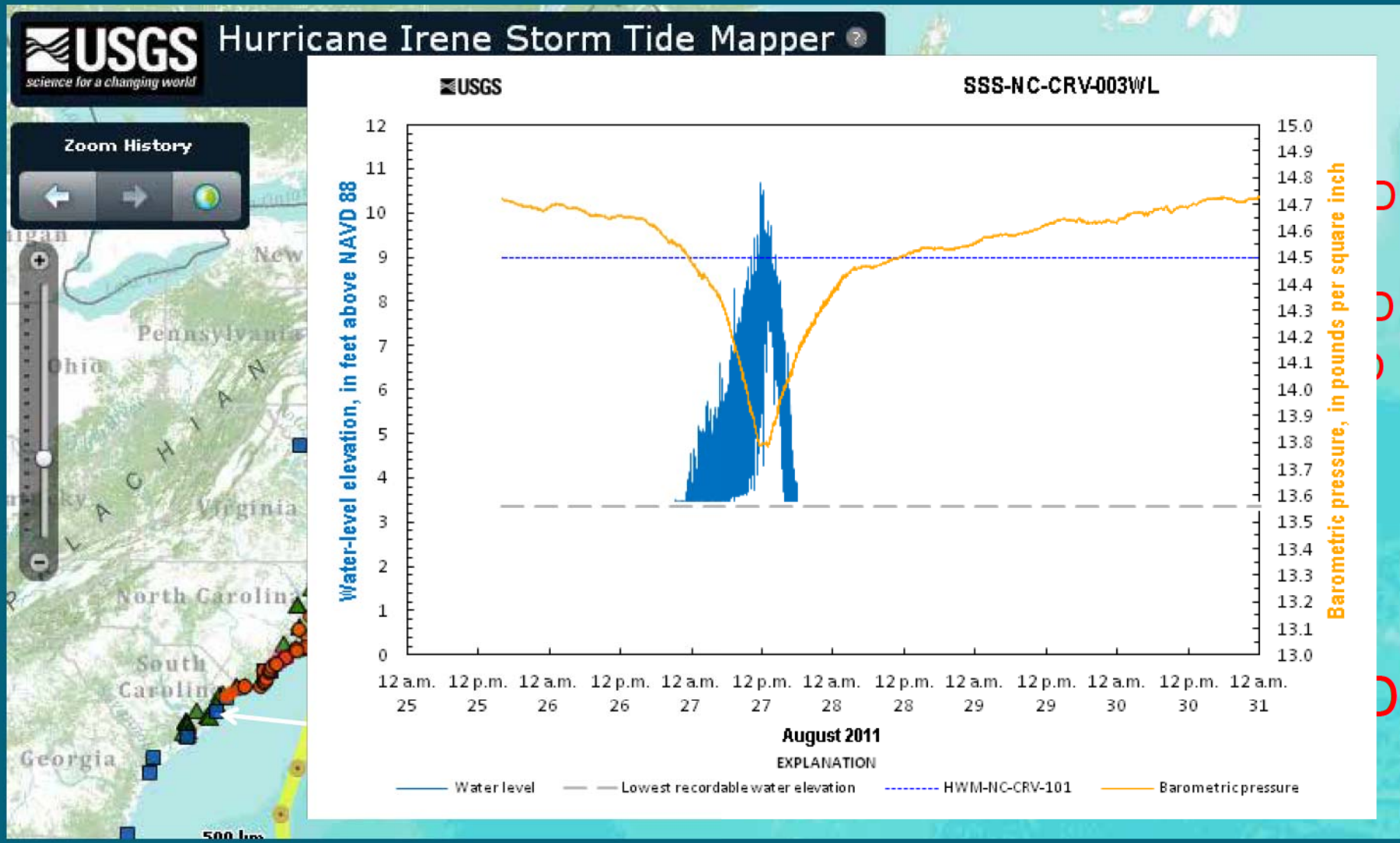
Ninth named storm of the 2011 season

First hurricane of season

Cat 3 classification



Hurricane Irene - HWMs



Hurricane Sandy

18th named storm of the 2012 season

Second U.S. hurricane landfall of season

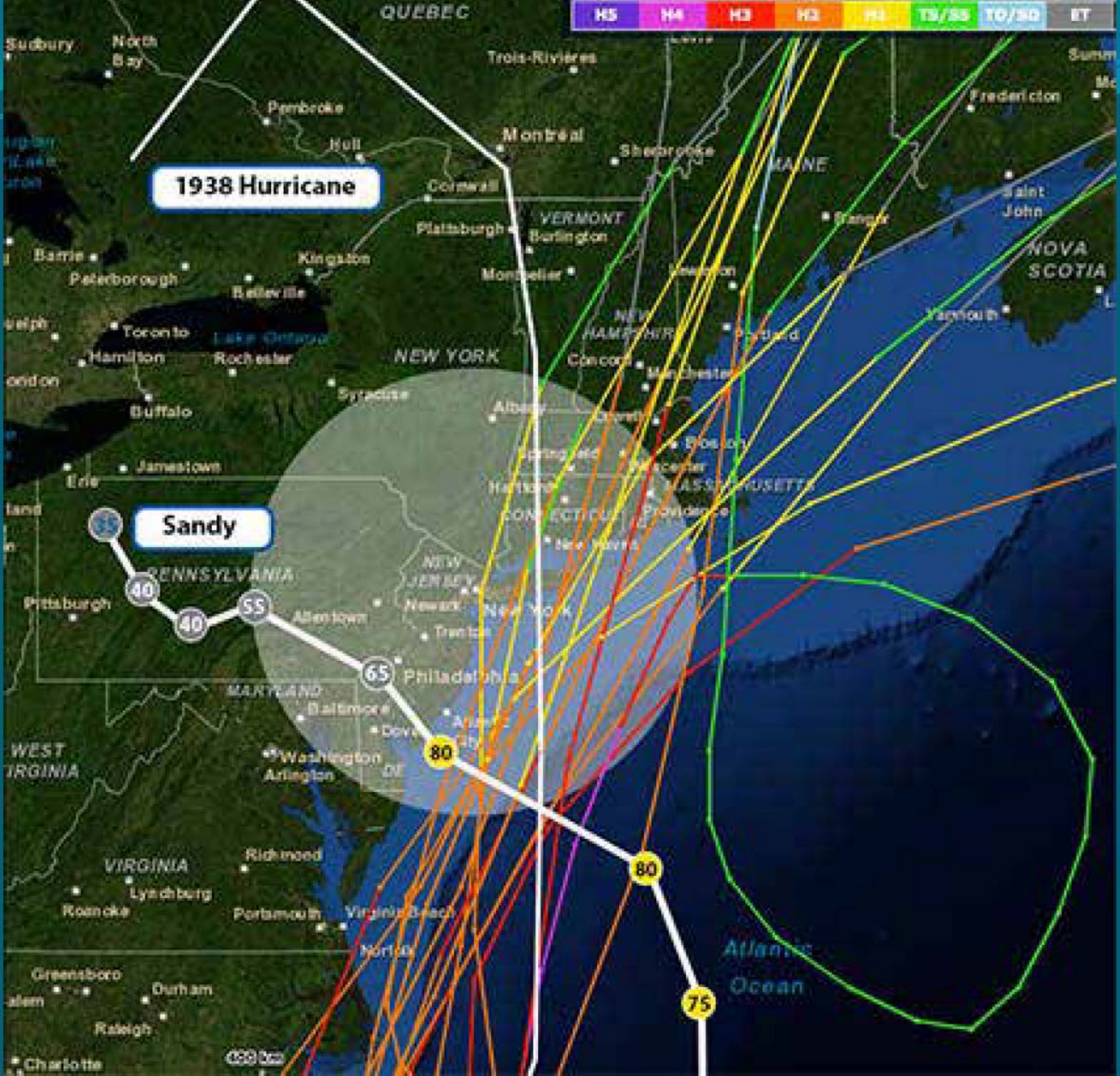
Cat 2 storm across Cuba with Cat 1 landfall forecast along New Jersey

Largest storm (size) to hit US

Storm combined with approaching storm from west, increasing winds at landfall

Second costliest storm in US history

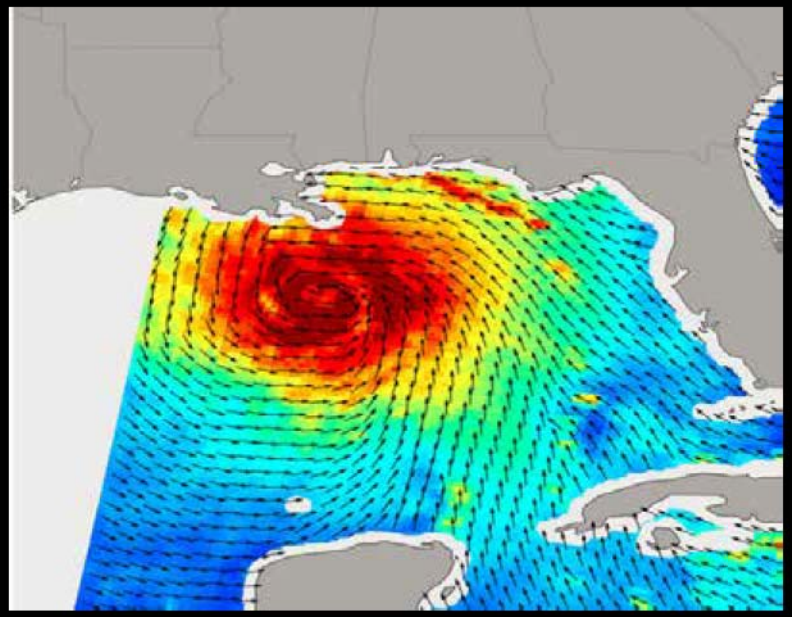
253 lives lost



H5
H4
H3
H2
H1
TS/SS
TD/SD
ET
1938 Hurricane
Sandy
QUEBEC
NEW YORK
VERMONT
MAINE
NOVA SCOTIA
PENNSYLVANIA
MARYLAND
WEST VIRGINIA
VIRGINIA
Atlantic Ocean
Montréal
Trois-Rivieres
Fredericton
Pembroke
Toronto
Hamilton
Rochester
Buffalo
Syracuse
Albany
Boston
Jamestown
Erie
Pittsburgh
Allentown
Philadelphia
Baltimore
Washington
Arlington
Richmond
Lynchburg
Roanoke
Portsmouth
Norfolk
Greensboro
Durham
Raleigh
Charlotte
55
40
40
55
65
80
80
75

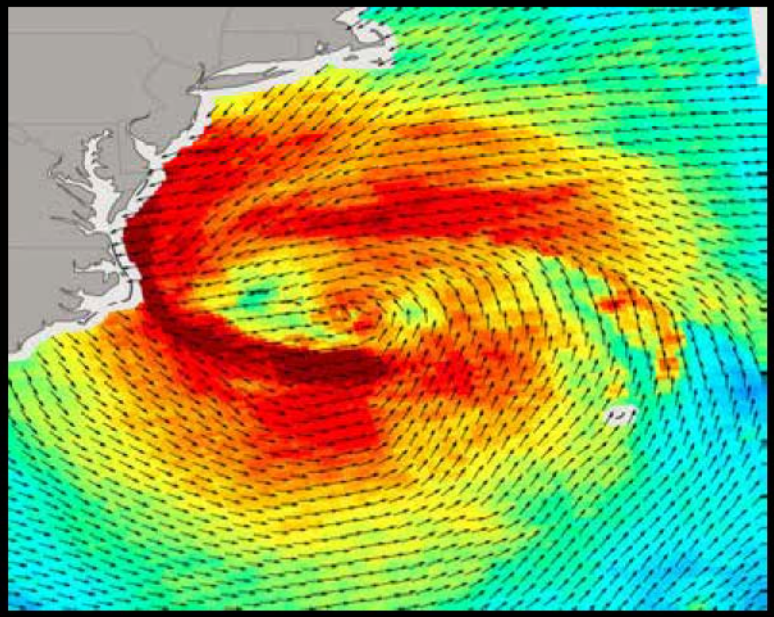
- Hurricane Sandy was a highly idiosyncratic storm. For example, its wind field was almost three times that of Katrina . . .

Hurricane Katrina (August 28, 2005)

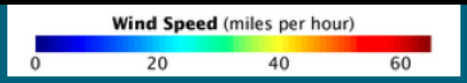


Gusts extended **300 miles**

Hurricane Sandy (October 28, 2012)



Gusts extended **1,000 miles**



- . . . Sandy's path also included a rare "westward hook," rather than a more traditional eastward track

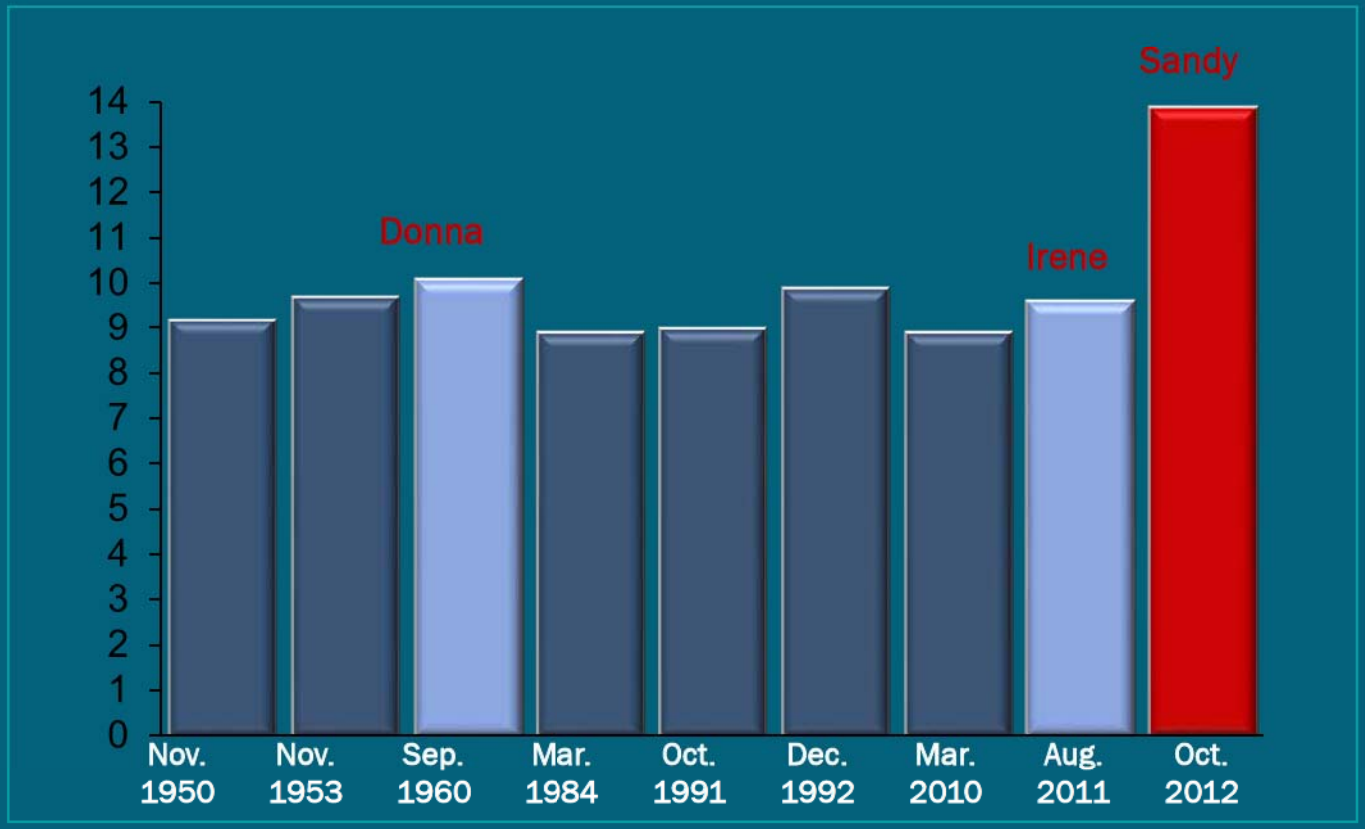
Sandy was only the third direct "hurricane strike" on New Jersey's coast since 1878

Cause of the Westward Hook:

- **Jet stream:** Hurricane Sandy was steered between a blocking high pressure system in northern Canada and a low pressure trough over the Southeast U.S.

Source: Bostinno.com, NOAA, AGU Blogosphere, National Weather Service, Slate.com

- . . . And experienced, among other things, a record-shattering storm surge



Sandy eclipsed the previous record, set in 1960, by more than 30%

[1] Water height is in feet above 1983-2001 MLLW
Source: UCAR/ NCAR, NOAA

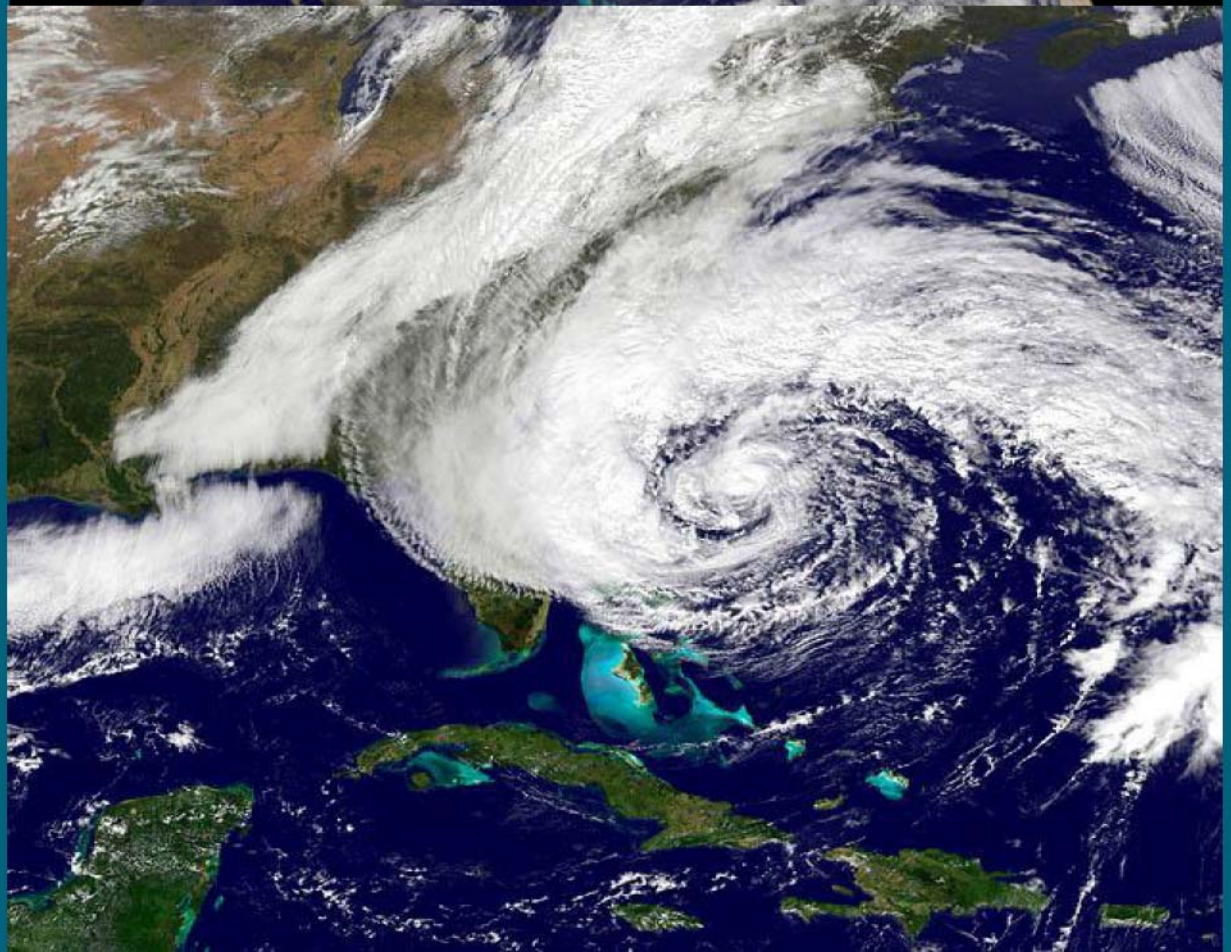
Coastal hazards

- Surge
- Waves
- Erosion
- Sea-level change

Coastal Processes/Dynamics

- Surge
- Waves
- Erosion
- Sea-level change

Storms



Coastal Processes/Dynamics

- Surge
- Waves
- Erosion
- Sea-level change

Meteorology-storm

Meteorological

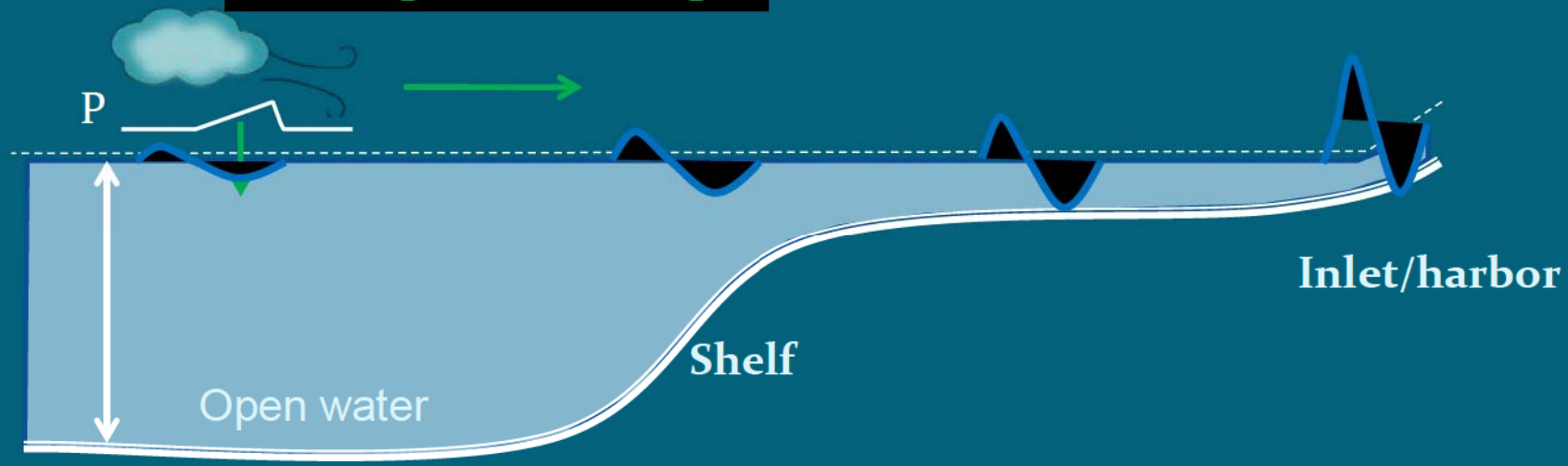
Atmospheric disturbance

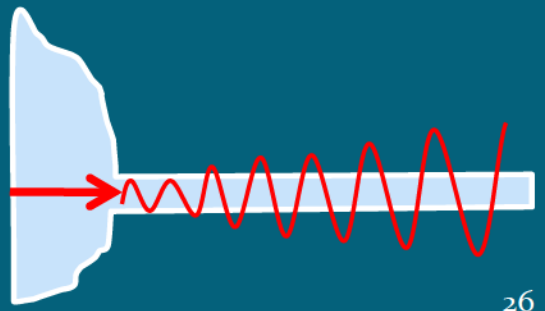
Propagation Resonance

Shoaling

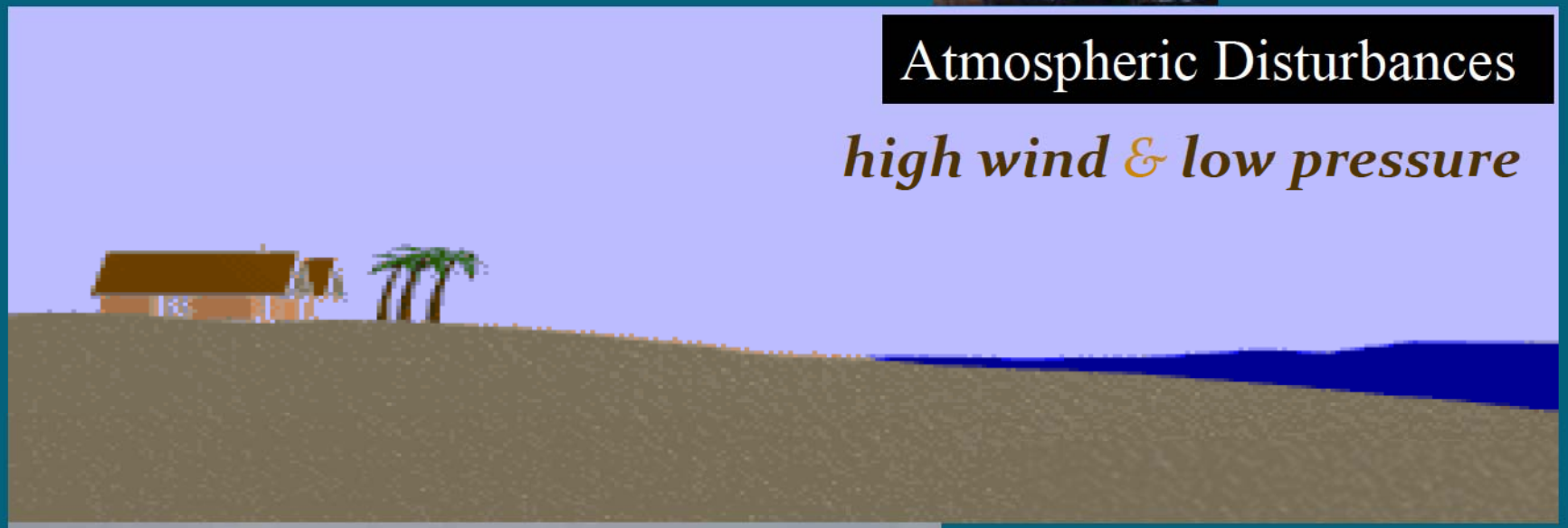
Harbor Resonance

Storm speed ≈ Wave speed





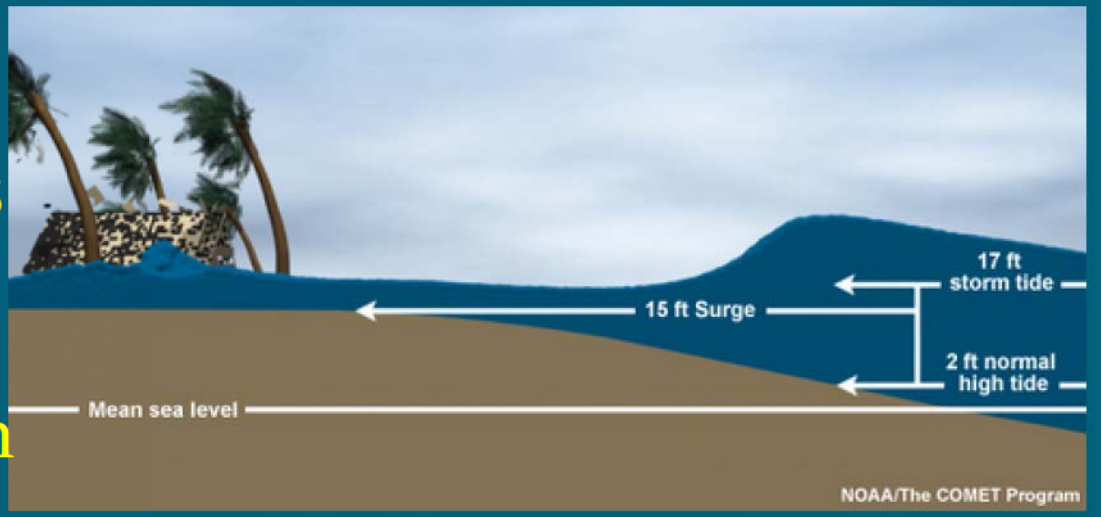
Wind + Pressure Storm



Is it Tide or Surge?

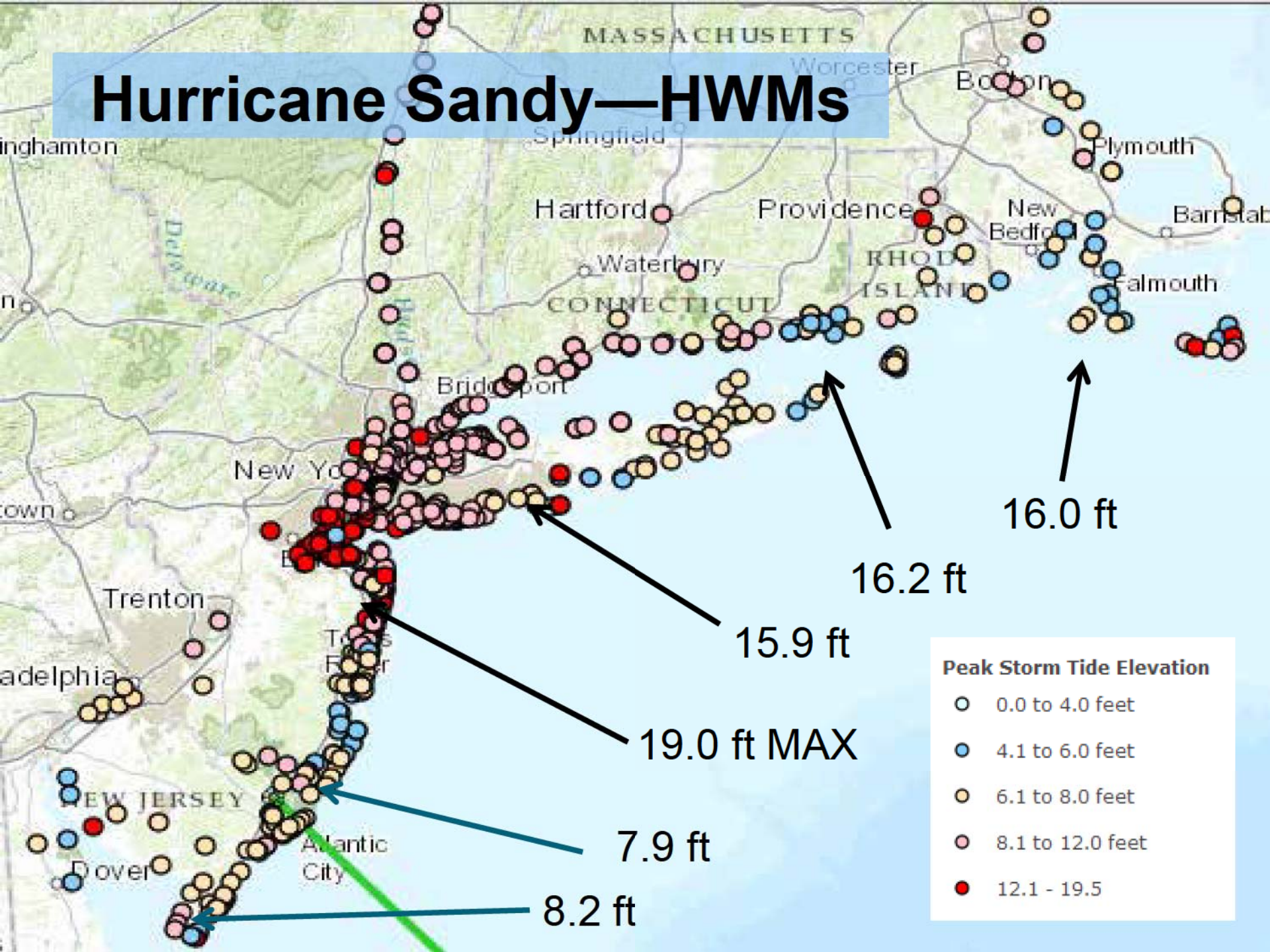
Storm surge is the abnormal rise of water generated by a storm, over and above the predicted astronomical tides.

Storm tide is defined as the water level rise due to the combination of storm surge *AND* the astronomical tide.

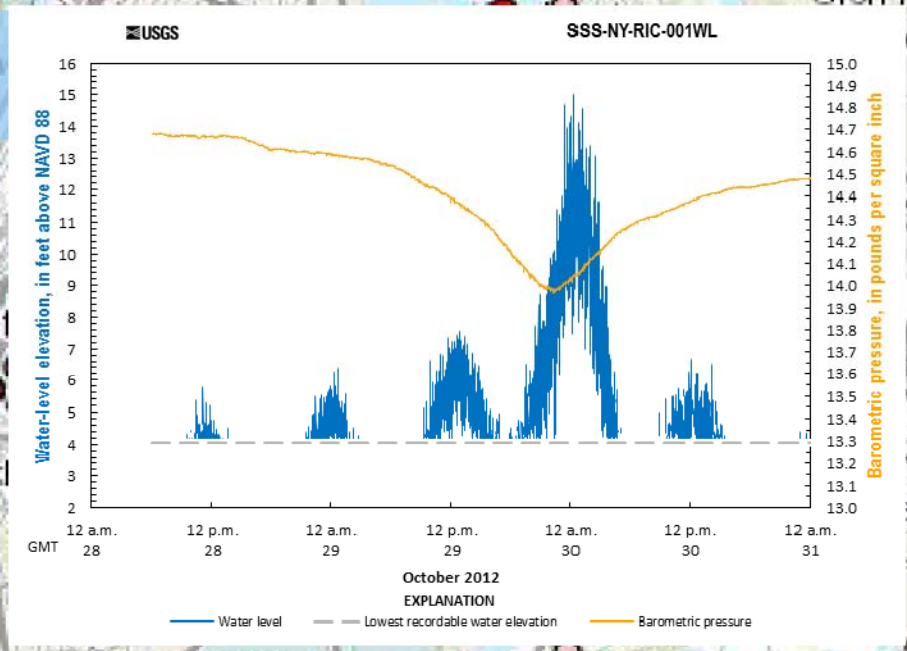


Source: NOAA

Hurricane Sandy—HWMs



Hurricane Sandy



11.4 ft

15.1 ft

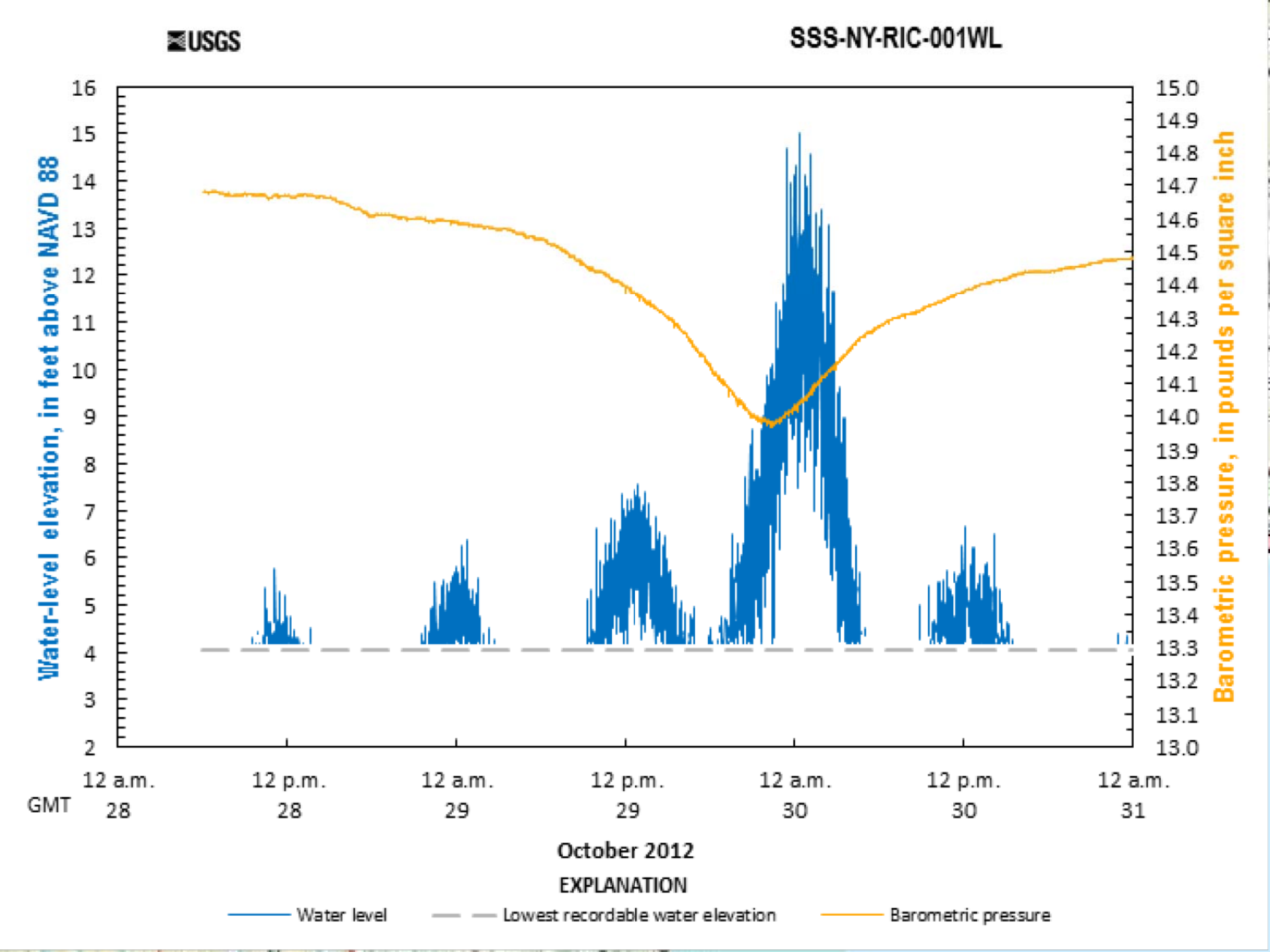
16.0 ft

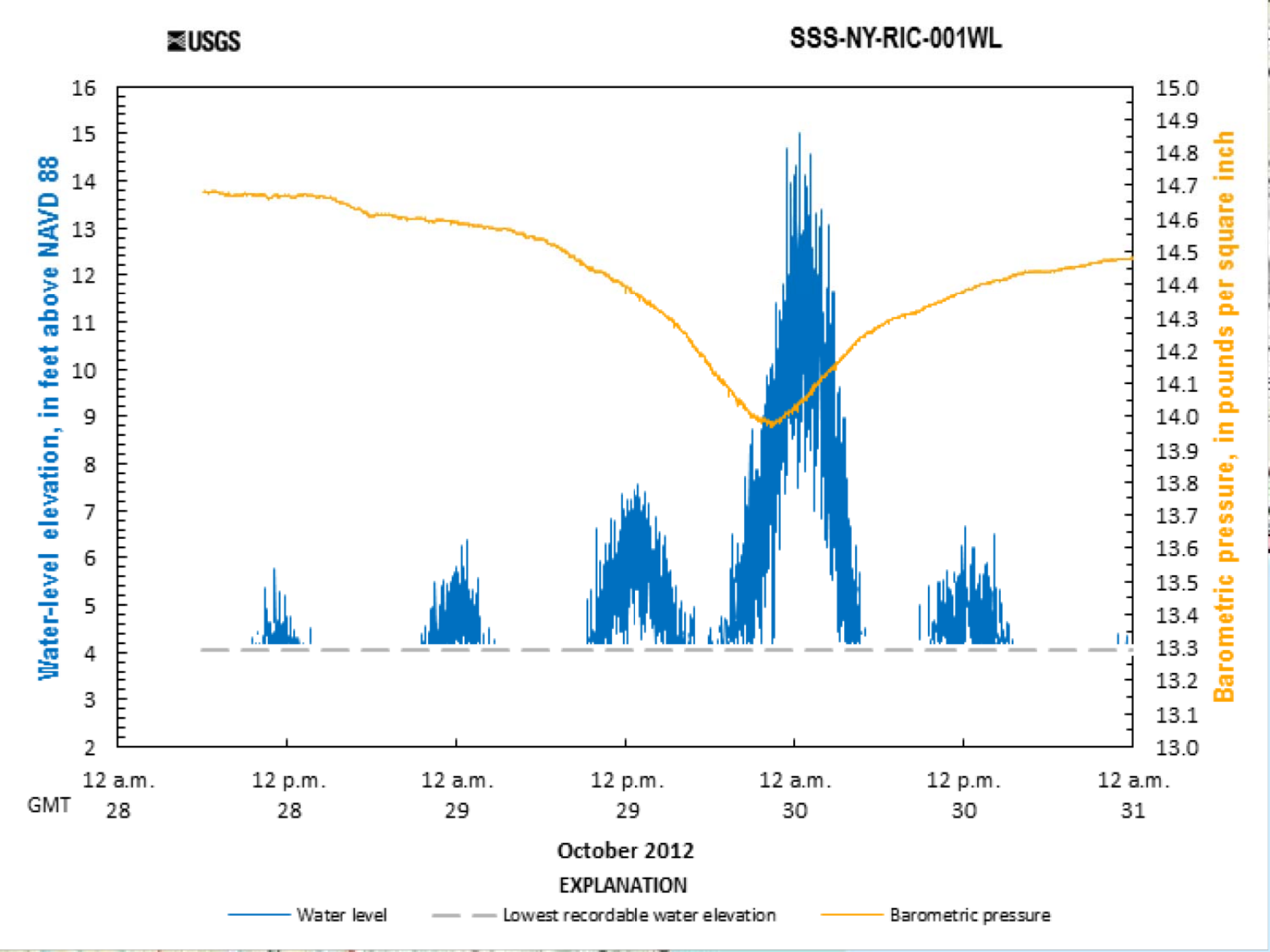
11.5 ft

14.5 ft

Peak Storm Tide Elevation

- 0.0 to 4.0 feet
- 4.1 to 6.0 feet
- 6.1 to 8.0 feet
- 8.1 to 12.0 feet
- 12.1 - 19.5


USGS
SSS-NY-RIC-001WL
Water-level elevation, in feet above NAVD 88
Barometric pressure, in pounds per square inch
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
15.0
14.9
14.8
14.7
14.6
14.5
14.4
14.3
14.2
14.1
14.0
13.9
13.8
13.7
13.6
13.5
13.4
13.3
13.2
13.1
13.0
12 a.m.
12 p.m.
12 a.m.
12 p.m.
12 a.m.
12 p.m.
12 a.m.
GMT
28
28
29
29
30
30
31
October 2012
EXPLANATION
Water level
Lowest recordable water elevation
Barometric pressure


USGS
SSS-NY-RIC-001WL
Water-level elevation, in feet above NAVD 88
Barometric pressure, in pounds per square inch
16
15
14
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11
10
9
8
7
6
5
4
3
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15.0
14.9
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13.2
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12 p.m.
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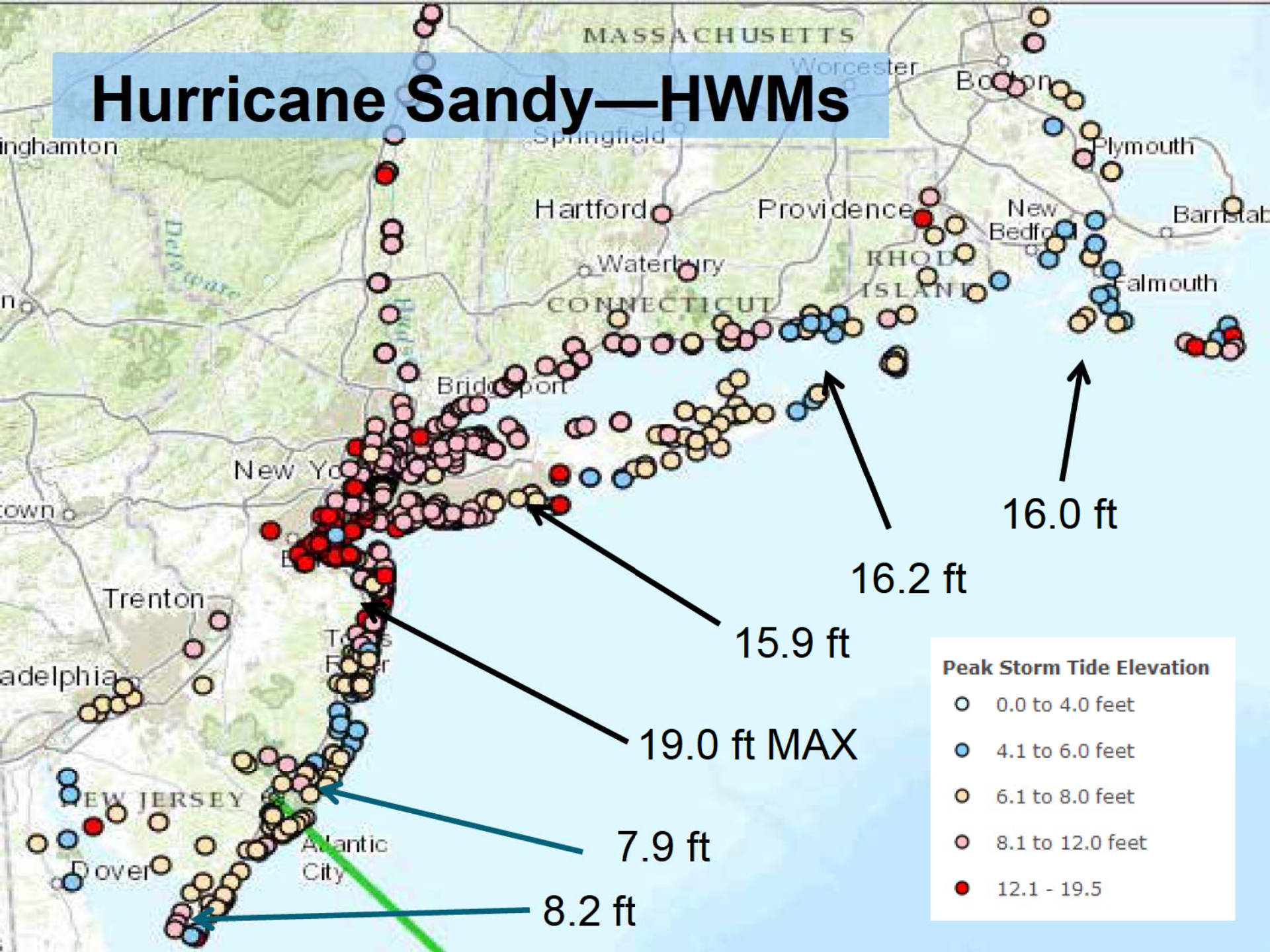
October 2012
EXPLANATION
Water level
Lowest recordable water elevation
Barometric pressure

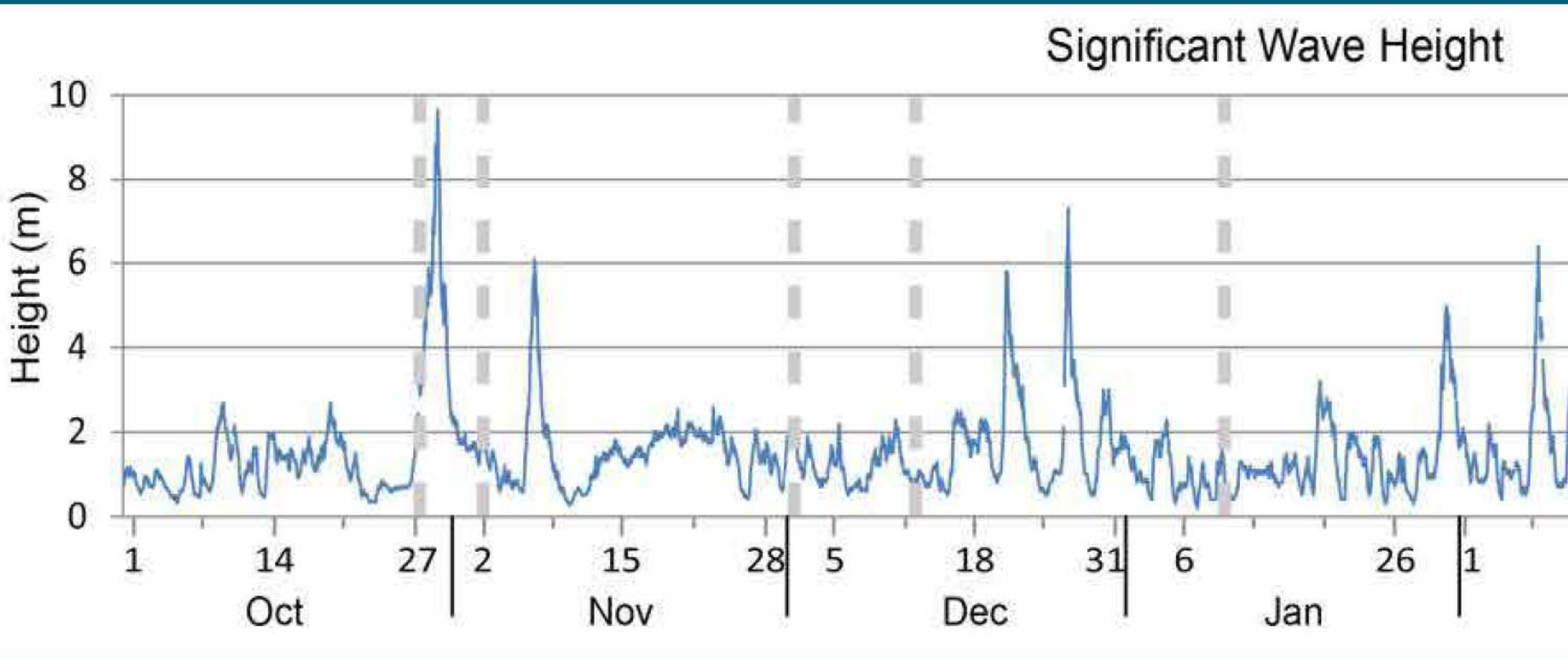
Coastal Processes/Dynamics

- Surge
- Waves
- Erosion
- Sea-level change

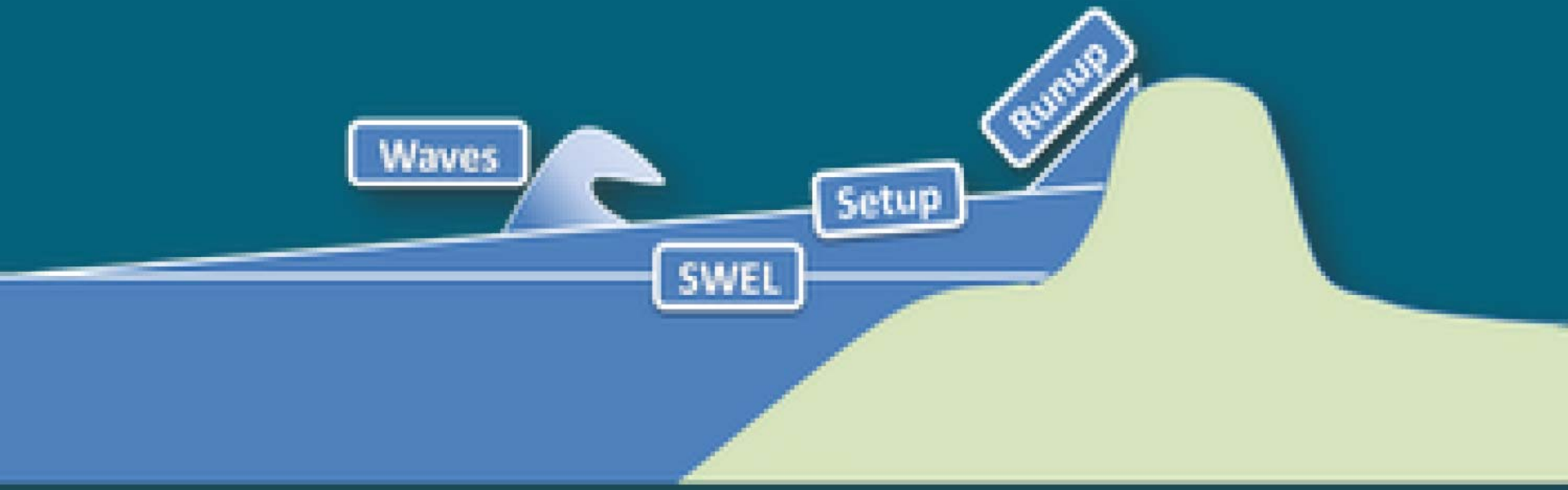
Hurricane Sandy—HWMs

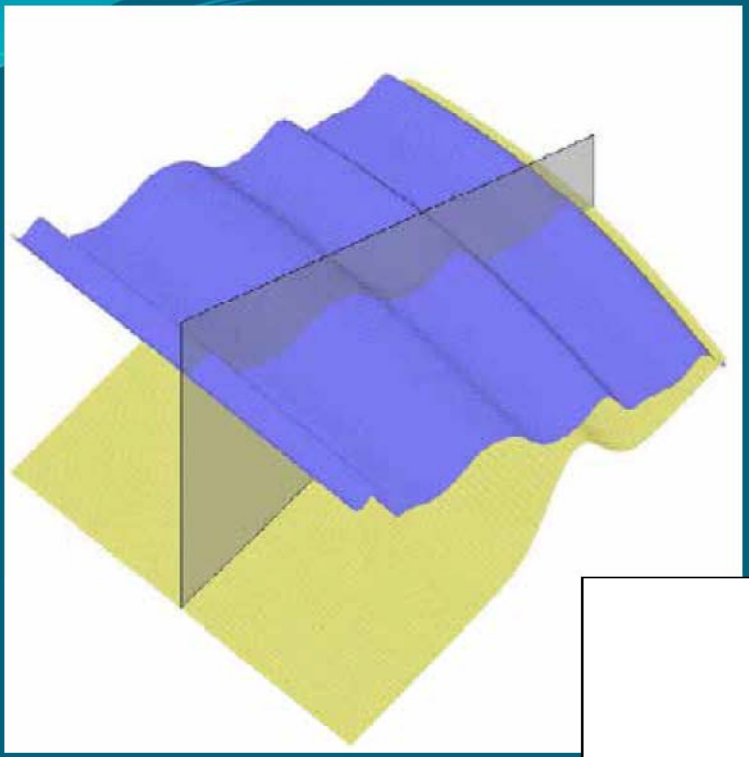


Wave Heights – Fire Island

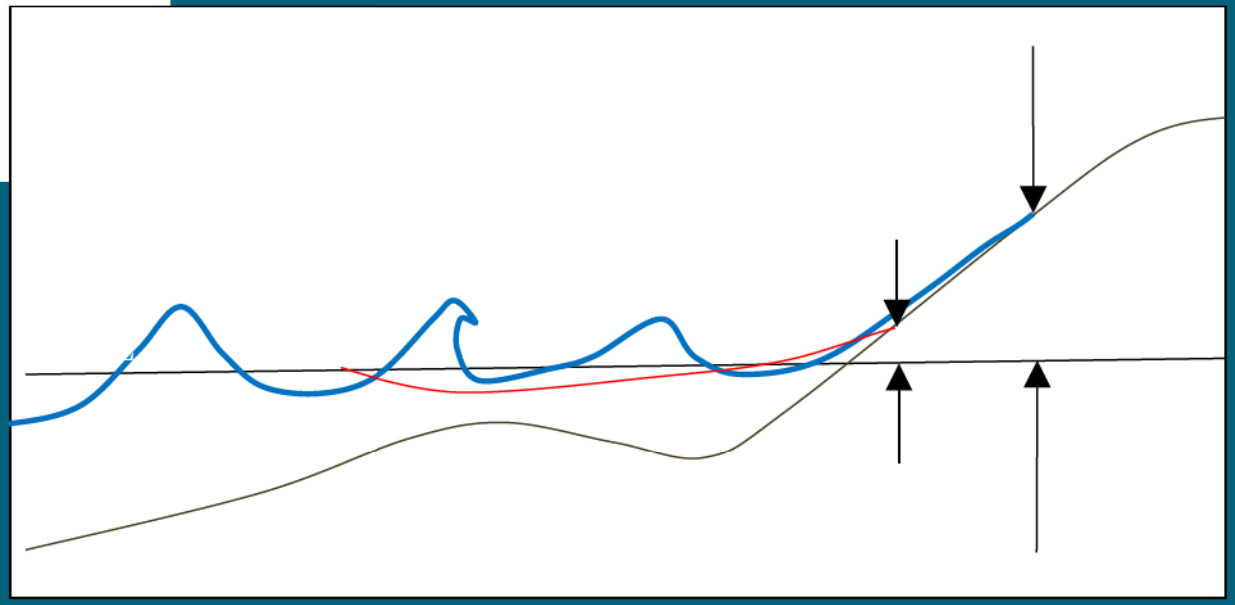


Generalized Coastal Zone Schematic



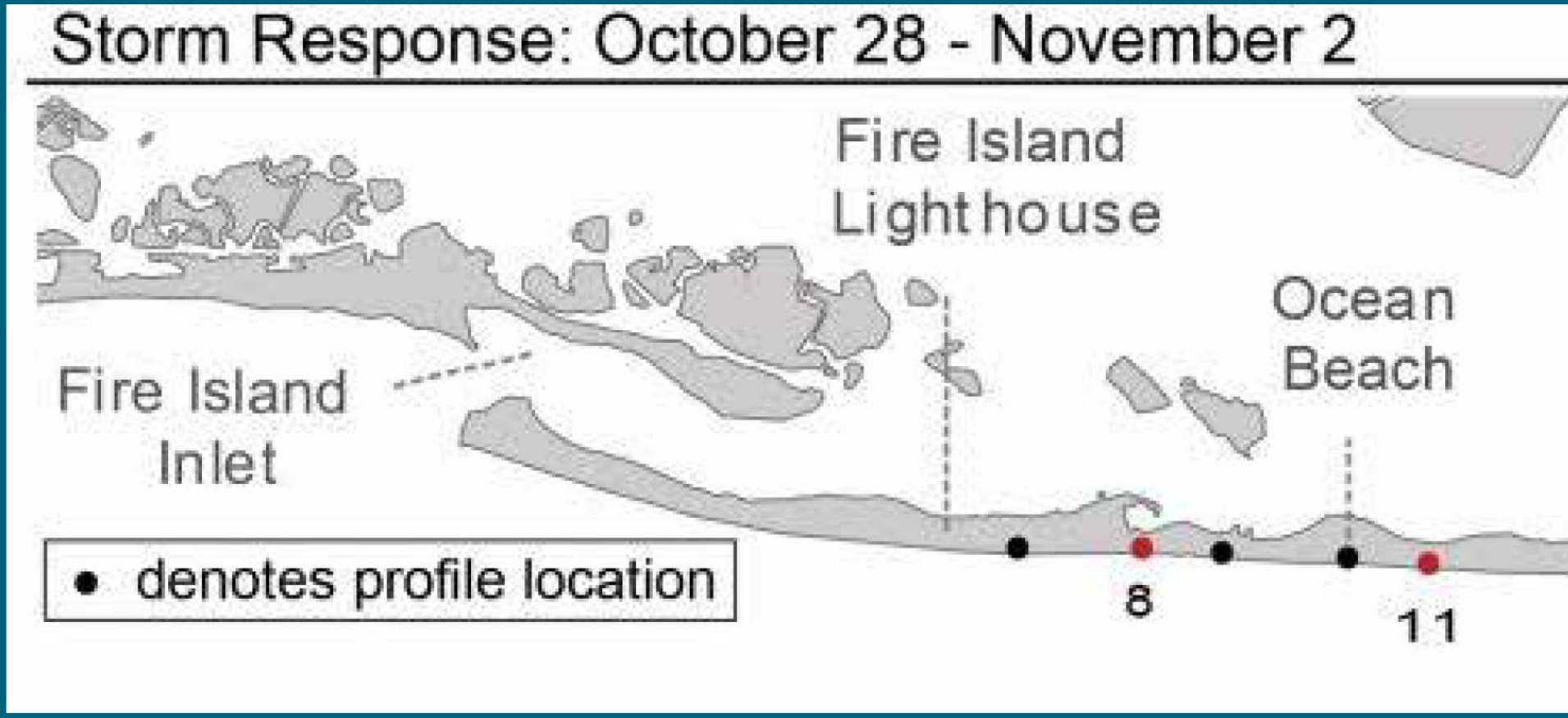


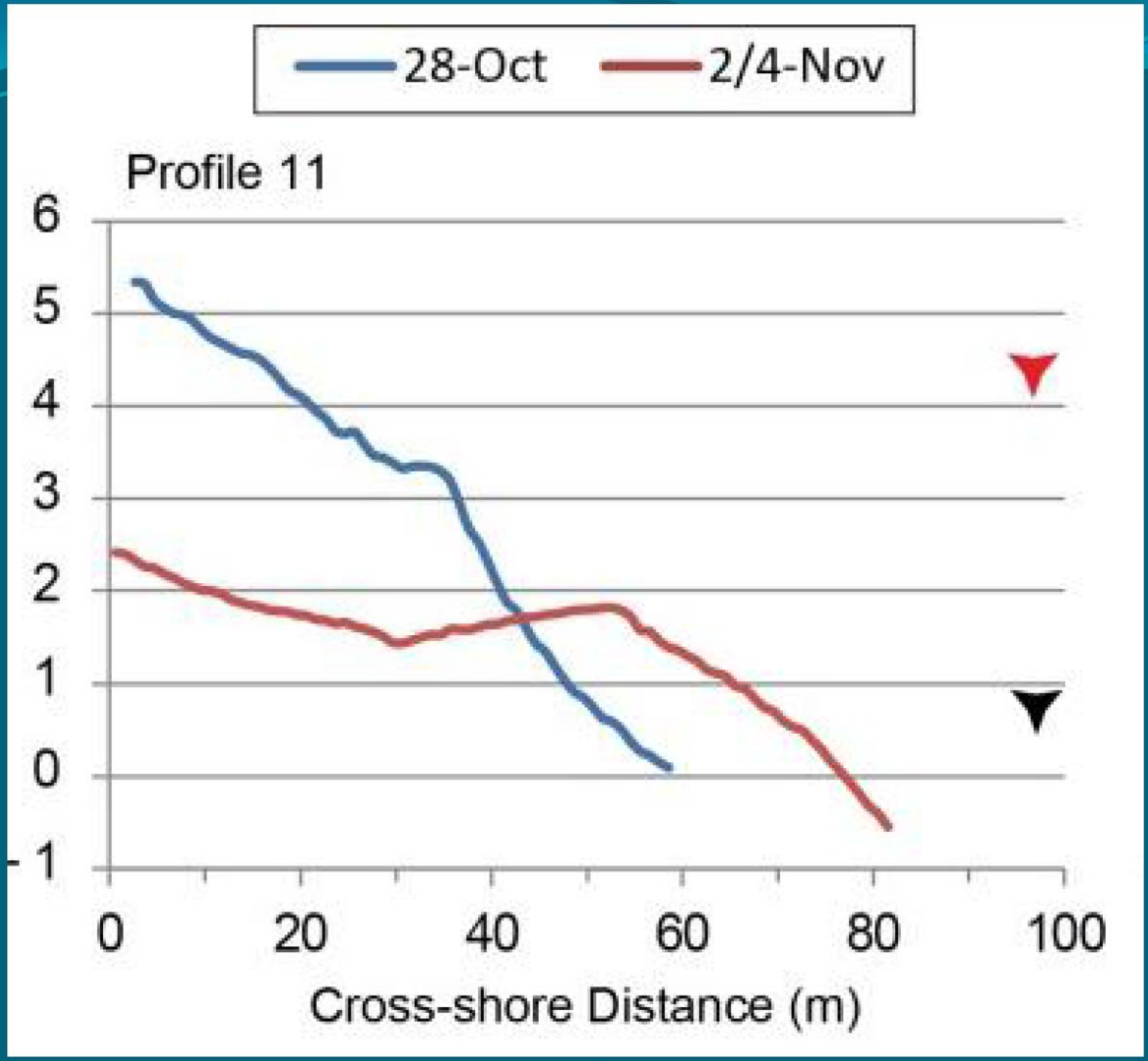
Nearshore Dynamics and Wave Run-up Modeling



Coastal Processes/Dynamics

- Surge
- Waves
- Erosion
- Sea-level change


Storm Response: October 28 - November 2
Fire Island Lighthouse
Ocean Beach
Fire Island Inlet
• denotes profile location
8
11


28-Oct
2/4-Nov
Profile 11
6
5
4
3
2
1
0
-1
0
20
40
60
80
100
Cross-shore Distance (m)

Coastal Processes/Dynamics

- Surge
- Waves
- Erosion
- Sea-level change

Sea Level Change - water

- Evaporation
- Inflow (precip + watershed runoff)
- Thermal Expansion
- Gravitational pull of the moon/sun

Sea Level Change - land

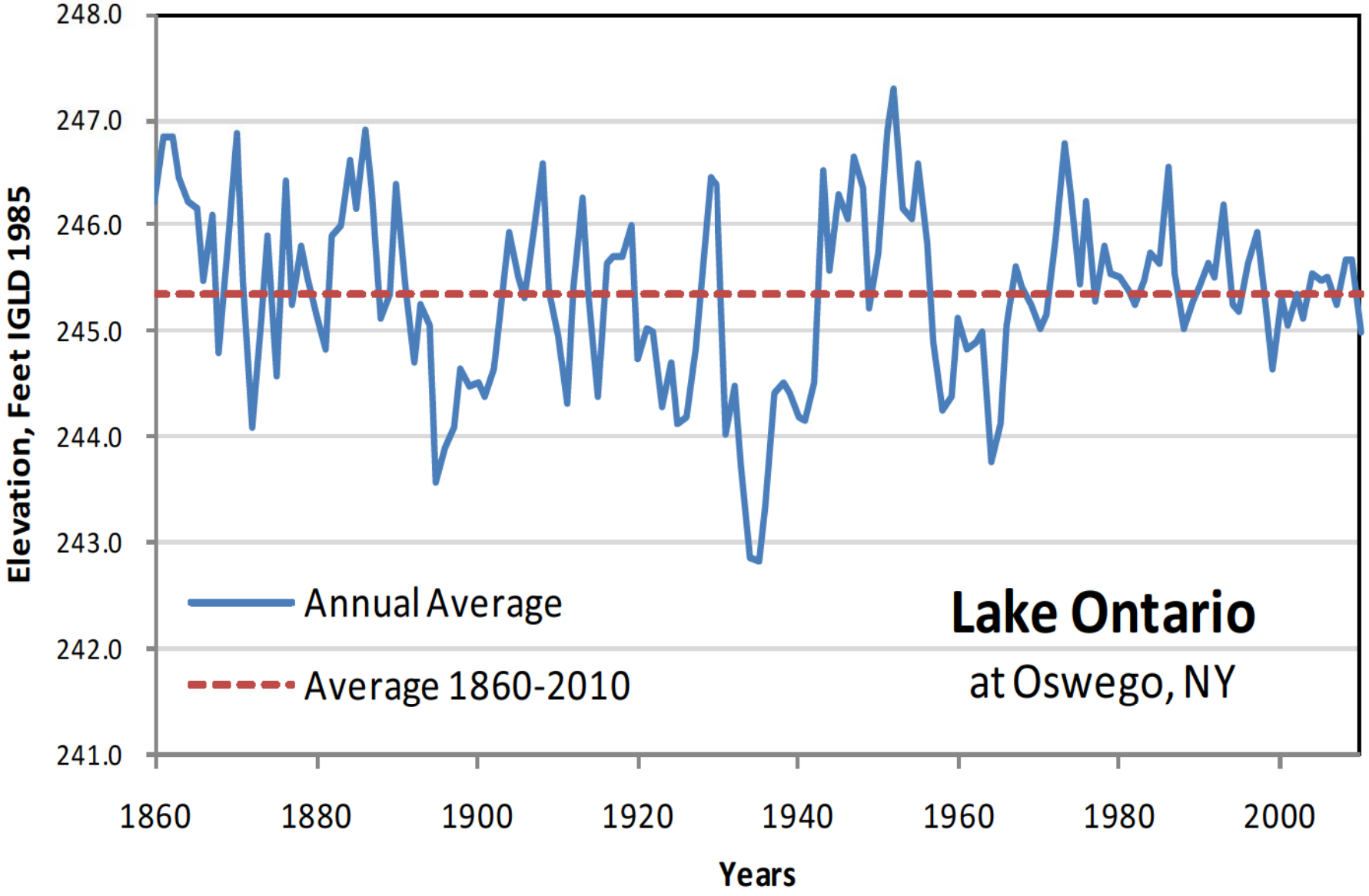
Isostatic Adjustment

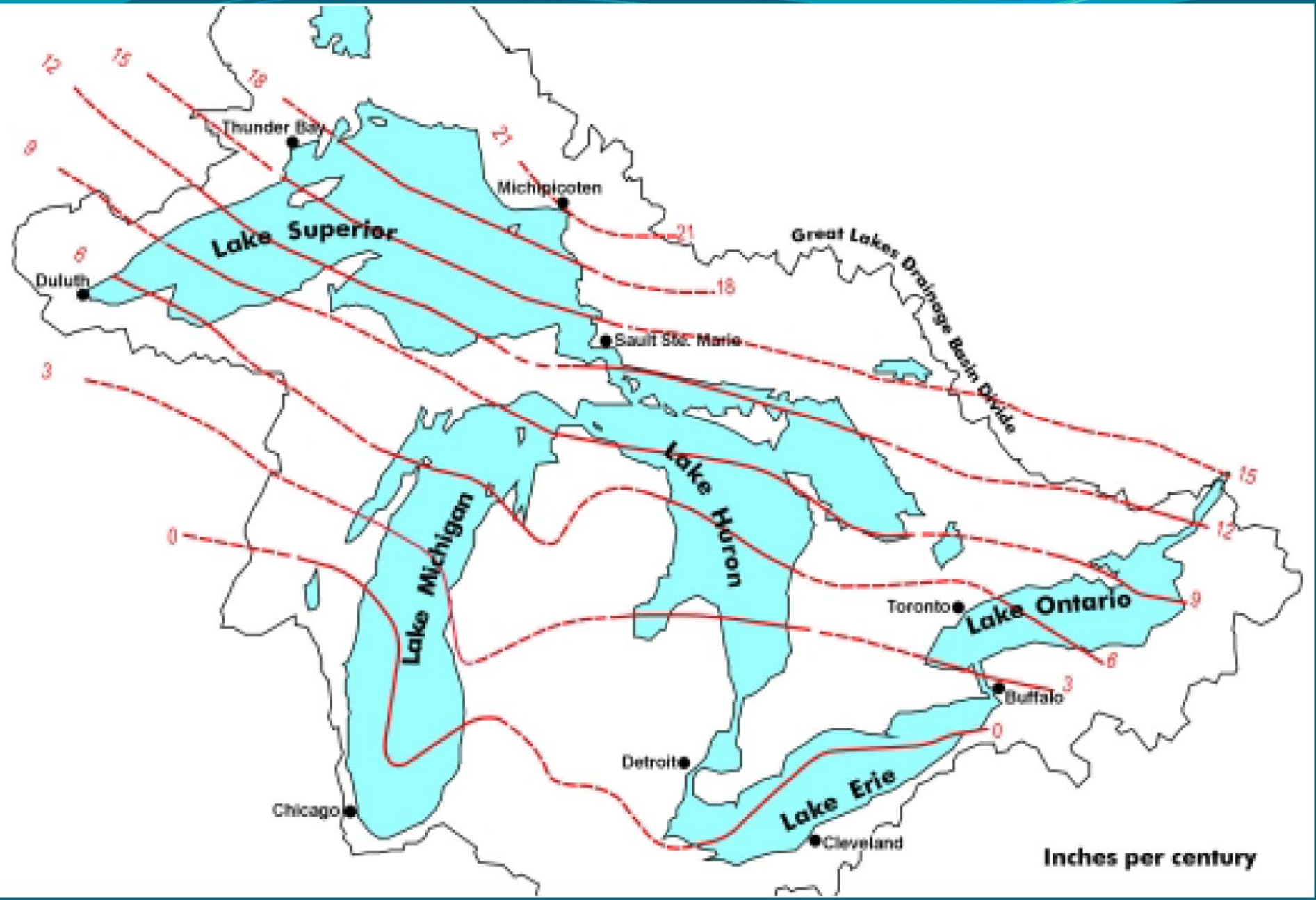
Subsidence

Uplift

Great Lakes – major factors

- Water
  - Inflow (precip + watershed runoff)
  - Evaporation
- Land
  - Isostatic Adjustment


248.0
247.0
246.0
245.0
244.0
243.0
242.0
241.0
Elevation, Feet IGLD 1985
Annual Average
Average 1860-2010
Lake Ontario
at Oswego, NY
1860
1880
1900
1920
1940
1960
1980
2000
Years


Thunder Bay
Michipicoten
Lake Superior
Great Lakes Drainage Basin Divide
Duluth
Sault Ste. Marie
Lake Michigan
Lake Huron
Toronto
Lake Ontario
Buffalo
Detroit
Lake Erie
Chicago
Cleveland
Inches per century
12
15
18
21
9
6
3
0
18
15
12
9
6
3
0

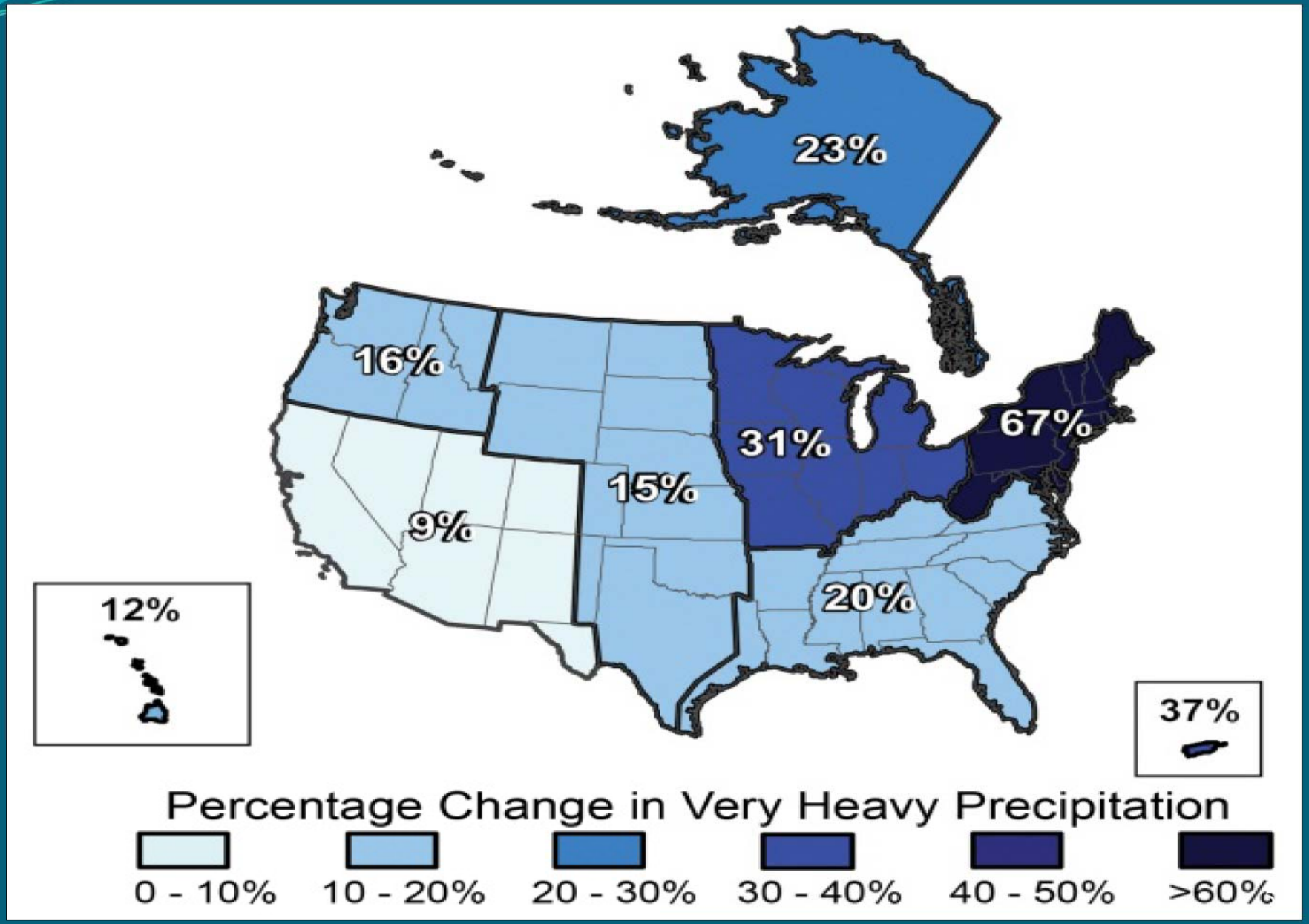
Open Coast – major factors

- Water
  - Thermal Expansion
  - Inflow (ice cap/glacial melting)
  - Gravitational pull of the moon/sun
- Land
  - Subsidence
  - Uplift/Isostatic Adjustment

Climate Change Impacts

- Accelerated Sea Level Rise
- Increased Storm Intensity

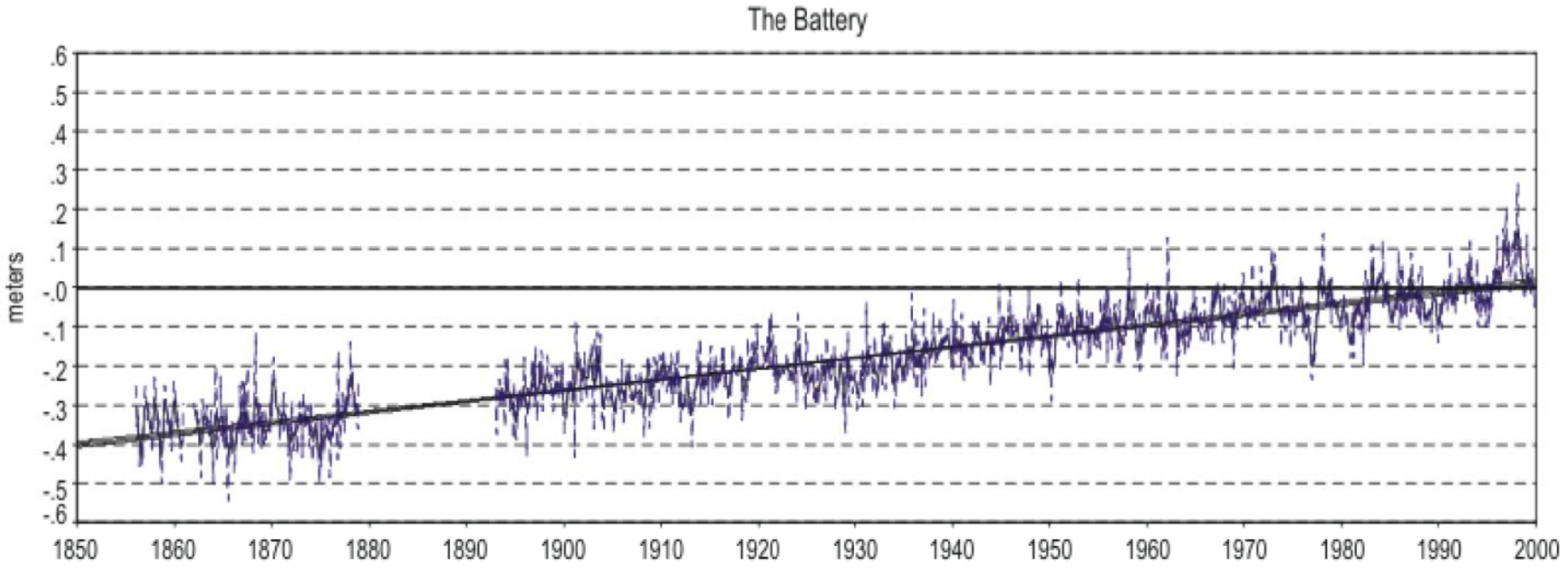
Very Heavy Precipitation Events (1958-2007)



Historic Sea Level Rise

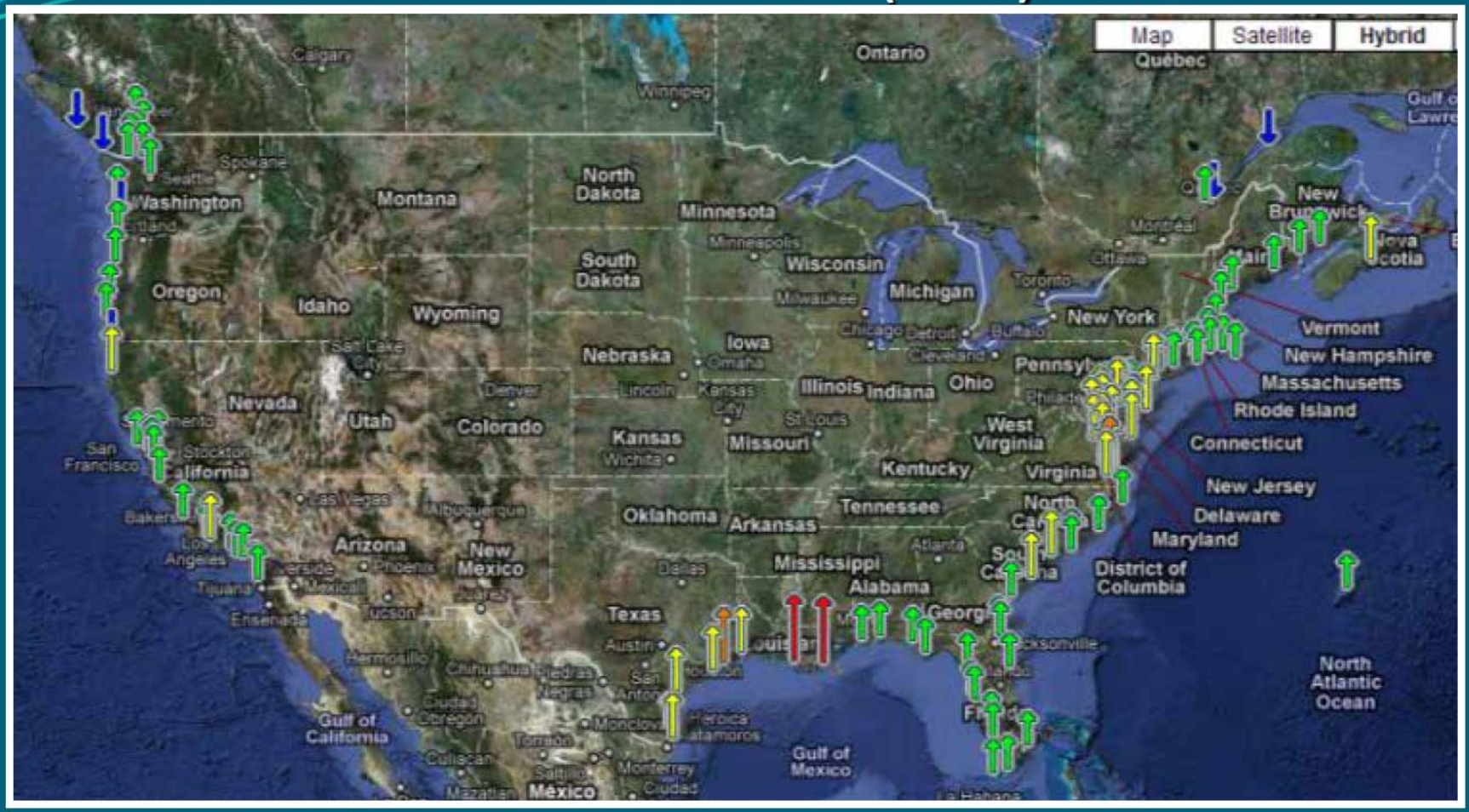
8518750 The Battery, New York

Trend is 2.77 millimeters/year (0.91 feet/century).



Source: NOAA

Local Sea Level Rise (SLR) Trends



The map above illustrates regional trends in sea level, with arrows representing the direction and magnitude of change.

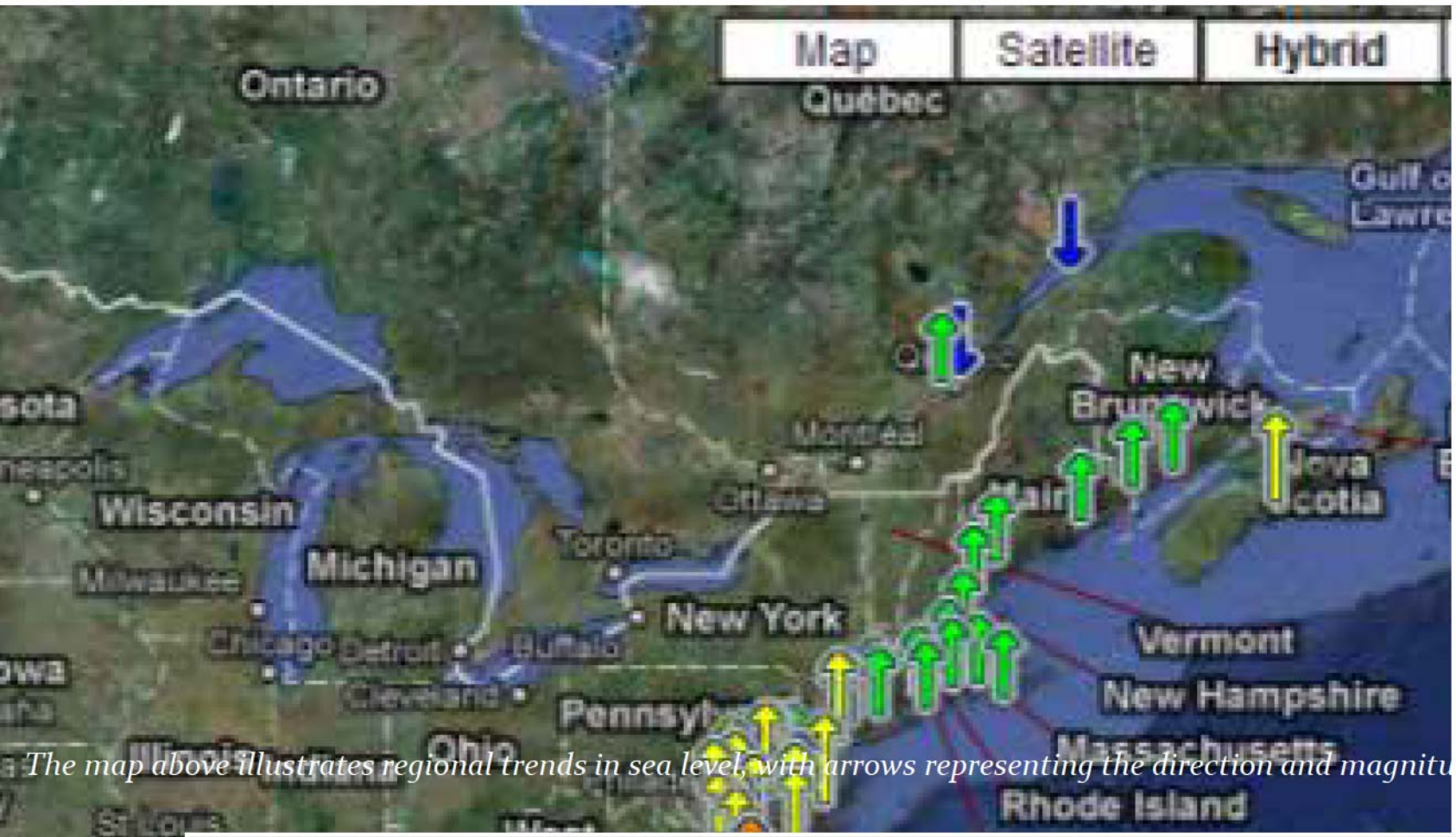
Sea Level Trends

mm/yr (feet/century)

9 to 12 (3 to 4)	3 to 6 (1 to 2)	-3 to 0 (-1 to 0)	-9 to -6 (-3 to -2)	-15 to -12 (-5 to -4)
6 to 9 (2 to 3)	0 to 3 (0 to 1)	-6 to -3 (-2 to -1)	-12 to -9 (-4 to -3)	-18 to -15 (-6 to -5)

http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

Local Sea Level Rise (SLR) Trends



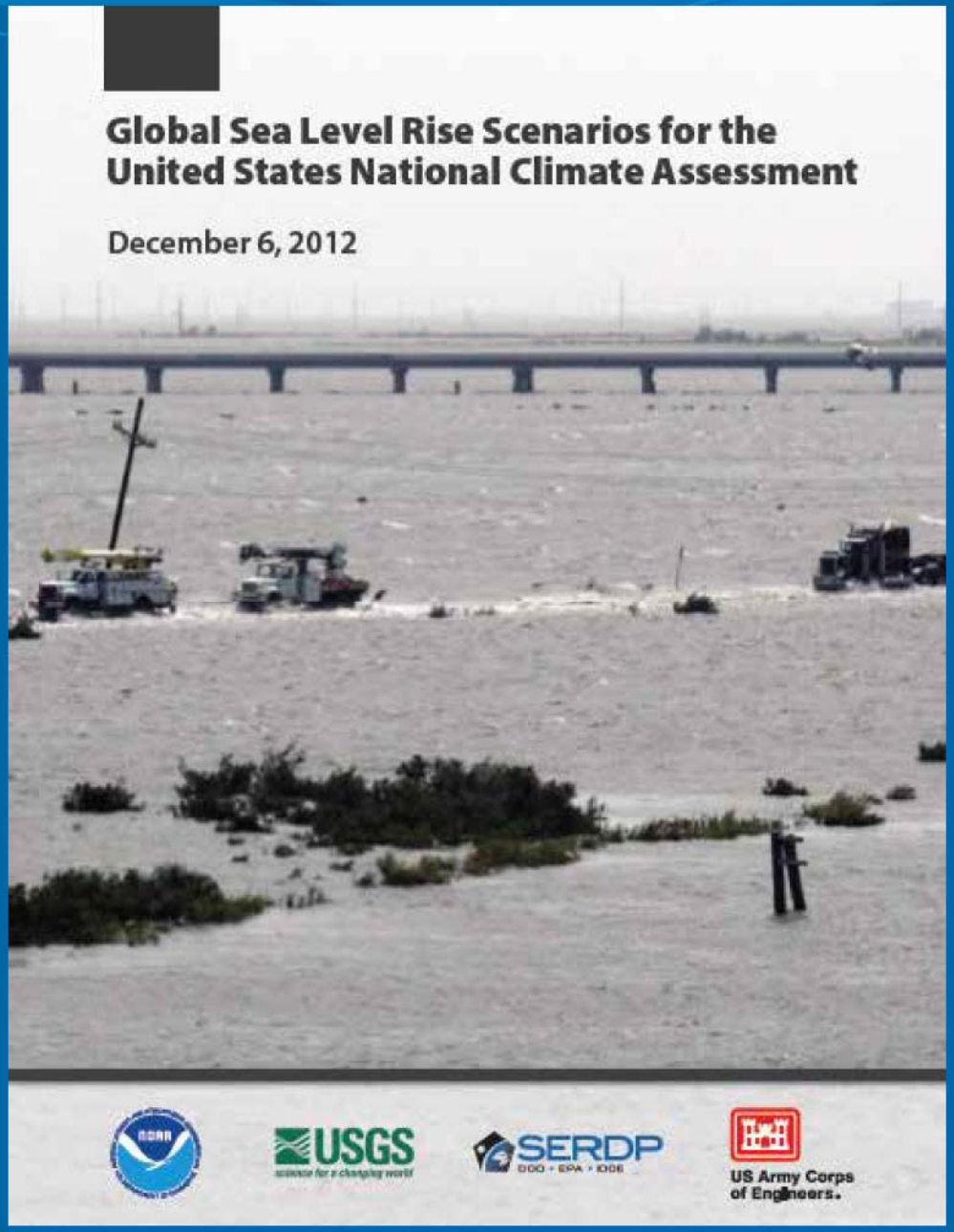
The map above illustrates regional trends in sea level, with arrows representing the direction and magnitude of change.

http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

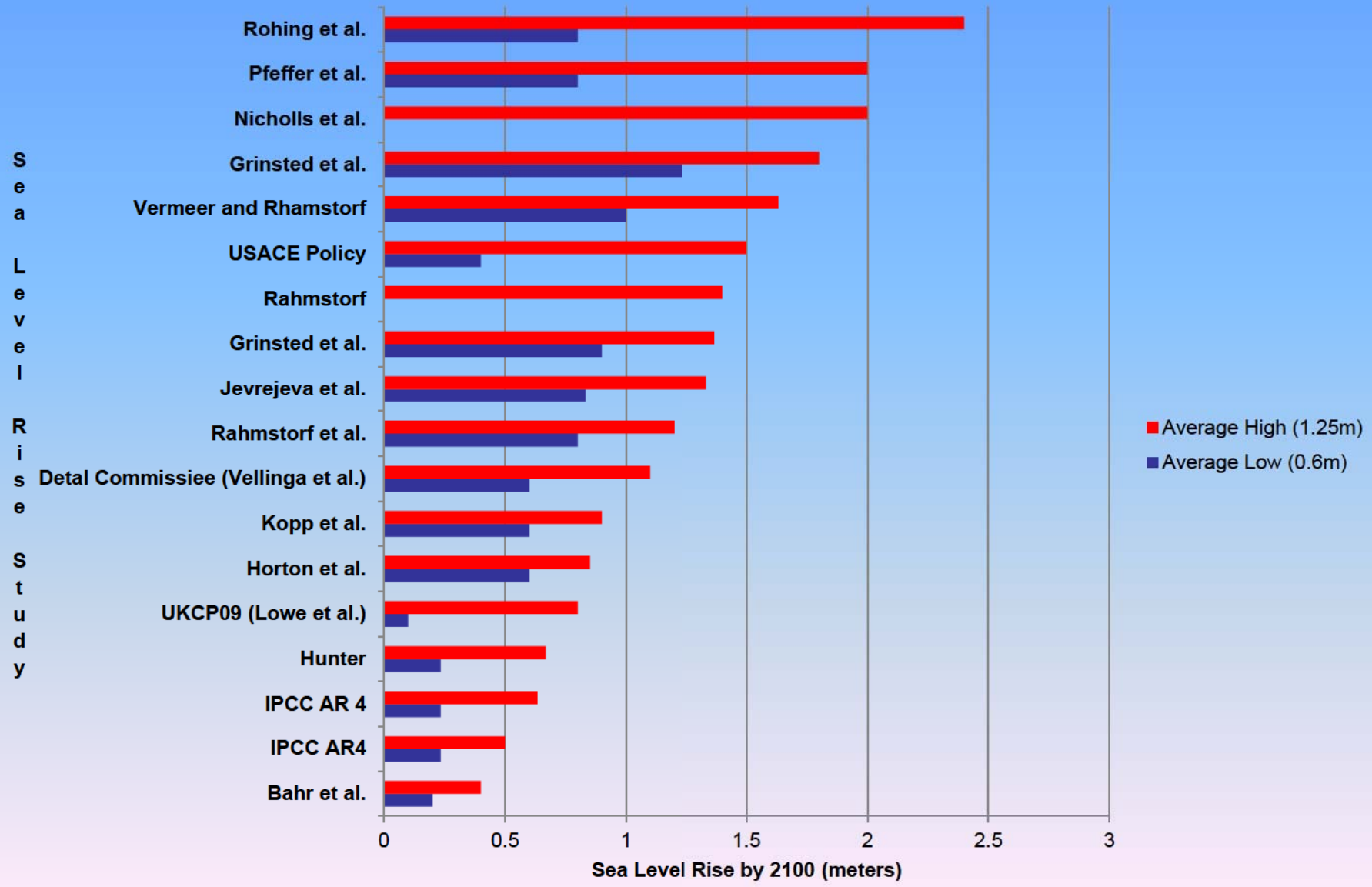
Global Sea Level Rise Scenarios for the United States

National Climate Assessment

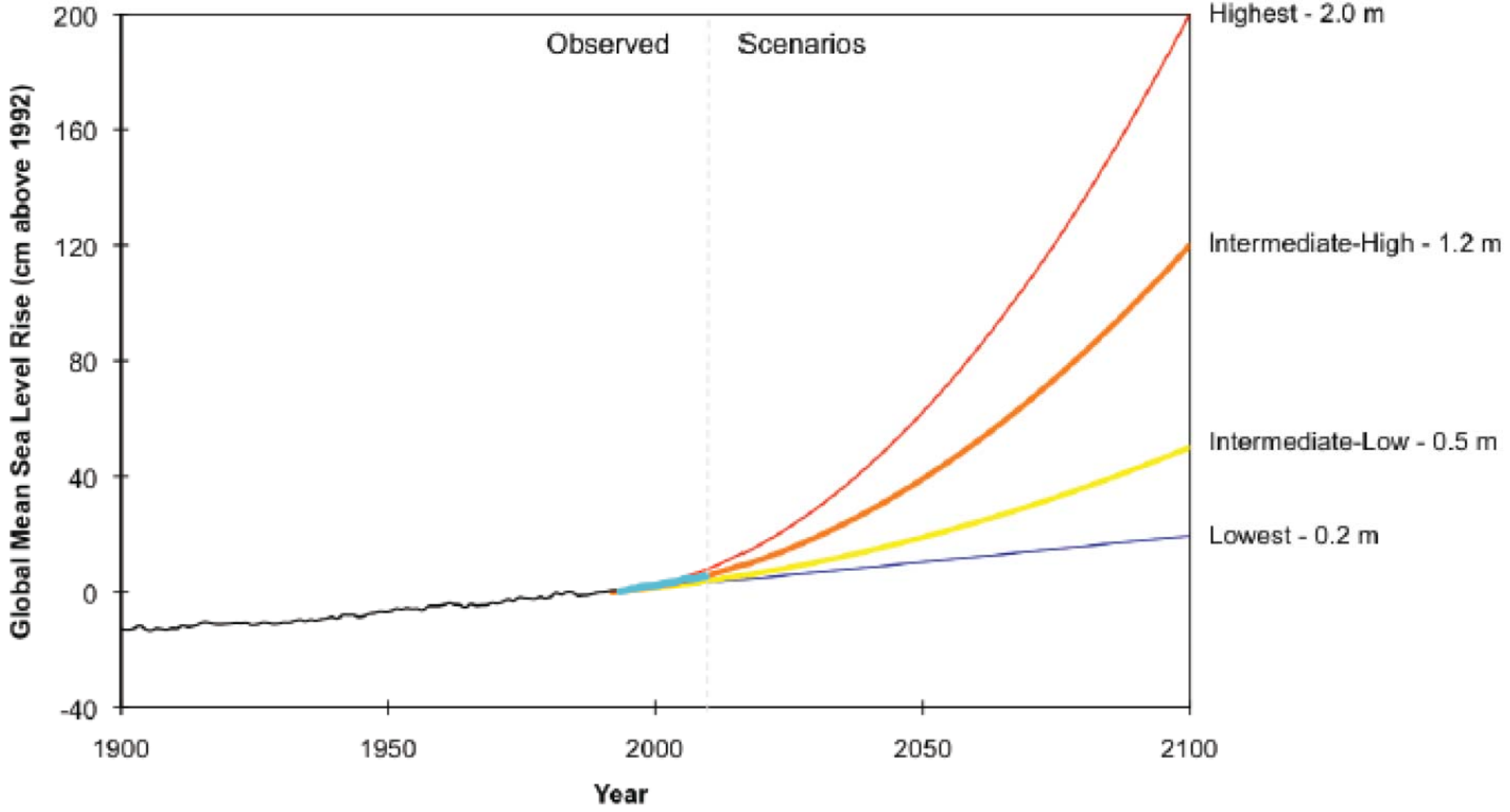
http://www.cpo.noaa.gov/sites/cpo/reports/2012/NOAA_SLR_r3.pdf



Sea Level Rise Projections (based on various climate scenarios)



Global Sea Level Rise Scenarios for the United States National Climate Assessment



Global Sea Level Rise Scenarios for the United States National Climate Assessment

http://www.cpo.noaa.gov/sites/cpo/reports/2012/NOAA_SLR_r3.pdf

Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

* Using mean sea level in 1992 as a starting point.

Community Resiliency After Sandy

No Adverse Impacts Overview

An Introduction to No Adverse Impact (NAI)

No Adverse Impact (NAI) is an approach that ensures that the action of any community or property owner, public or private, does not adversely impact the property and rights of others.

The true strength of the No Adverse Impact approach is that it encourages local decision making to ensure that future development impacts will be identified, considered on a watershed-wide basis and mitigated

It is a truly comprehensive strategy for reducing flood losses and costs.

Activities that could adversely impact flood damage to another property or community will be allowed only to the extent that the impacts are mitigated or have been accounted for within an adopted community-based plan.

The Pluses of the NAI Approach

- Reduced future flood damages
- Less future human suffering
- Improved protection of community natural resources and amenities
- Improved the quality of life
- More sustainable growth within the community
- Reduced community's liability

Other Potential Community Benefits of the NAI Approach

- Improved water quality and reductions in non-point pollution impacts
- Green corridors which also serve as additional areas for floodwater storage
- Improved groundwater recharge
- Better bank stabilization and better erosion control
- Increased property values near these “green” areas

NAI Strategies are grouped by:

- **Basic**
- **Better**
- **No Adverse Impact**

Communities are encouraged to go beyond basic strategies

http://www.floods.org/index.asp?menuid=340&firstlevelmenuid=187&siteid=1

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Community Activities that can Incorporate NAI

Strategies & Actions for
Responsible Floodplain Management

No Adverse Impacts Strategies

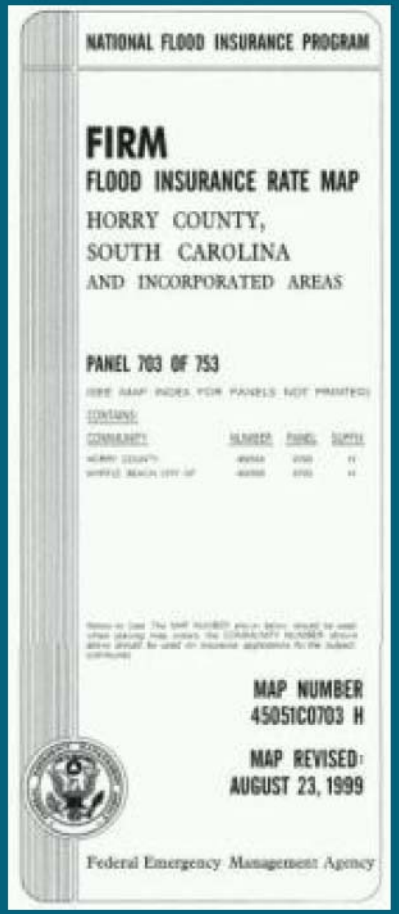
NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Hazard Identification

BASIC

The Flood Insurance Rate Map



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

HORRY COUNTY,
SOUTH CAROLINA
AND INCORPORATED AREAS

PANEL 703 OF 753

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HORRY COUNTY	450104	0703	H
MYRTLE BEACH, CITY OF	450250	0703	H

MAP NUMBER
45051C0703 H

MAP REVISED:
AUGUST 23, 1999

Federal Emergency Management Agency

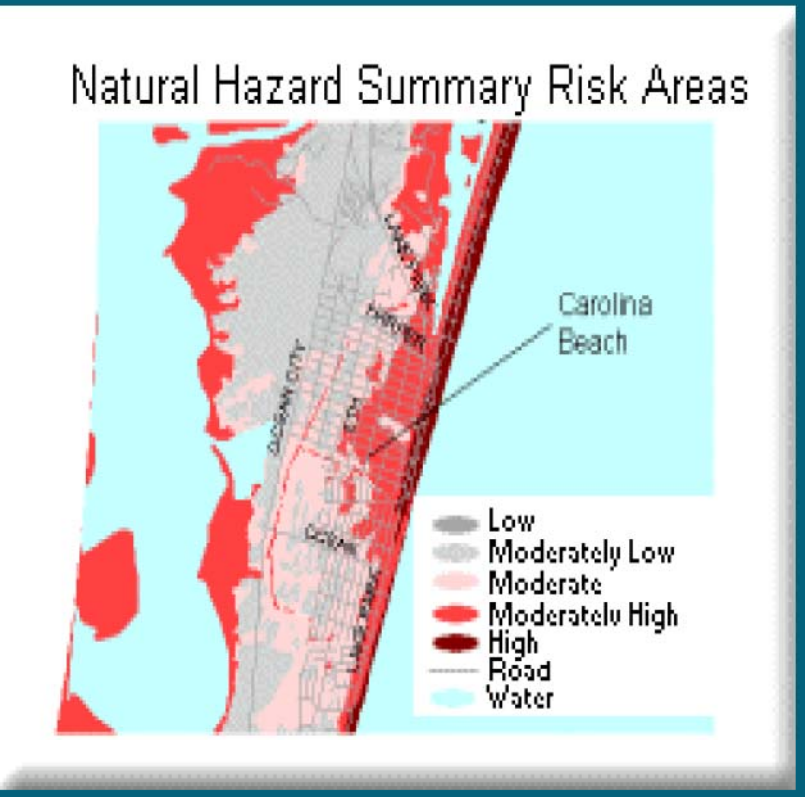
Hazard Identification

BETTER

Fill in the Gaps

- Require developers to provide detailed flood data in approximate zones or unmapped areas
- Overlay other jurisdictional lines, coastal barrier resource areas, jurisdictional wetlands and other protected areas over the FIRM
- Map other flood-related hazards (areas with local flood history; tsunami zones; stream erosion; dam failure inundation; mudflow hazard)
- Purchase flood insurance for community property in (or near) the floodplain
- Document High Water Marks from significant storms to aid in FIS/FIRM updates and to build a case for policies exceeding the minimum NFIP requirements

Hazard Identification



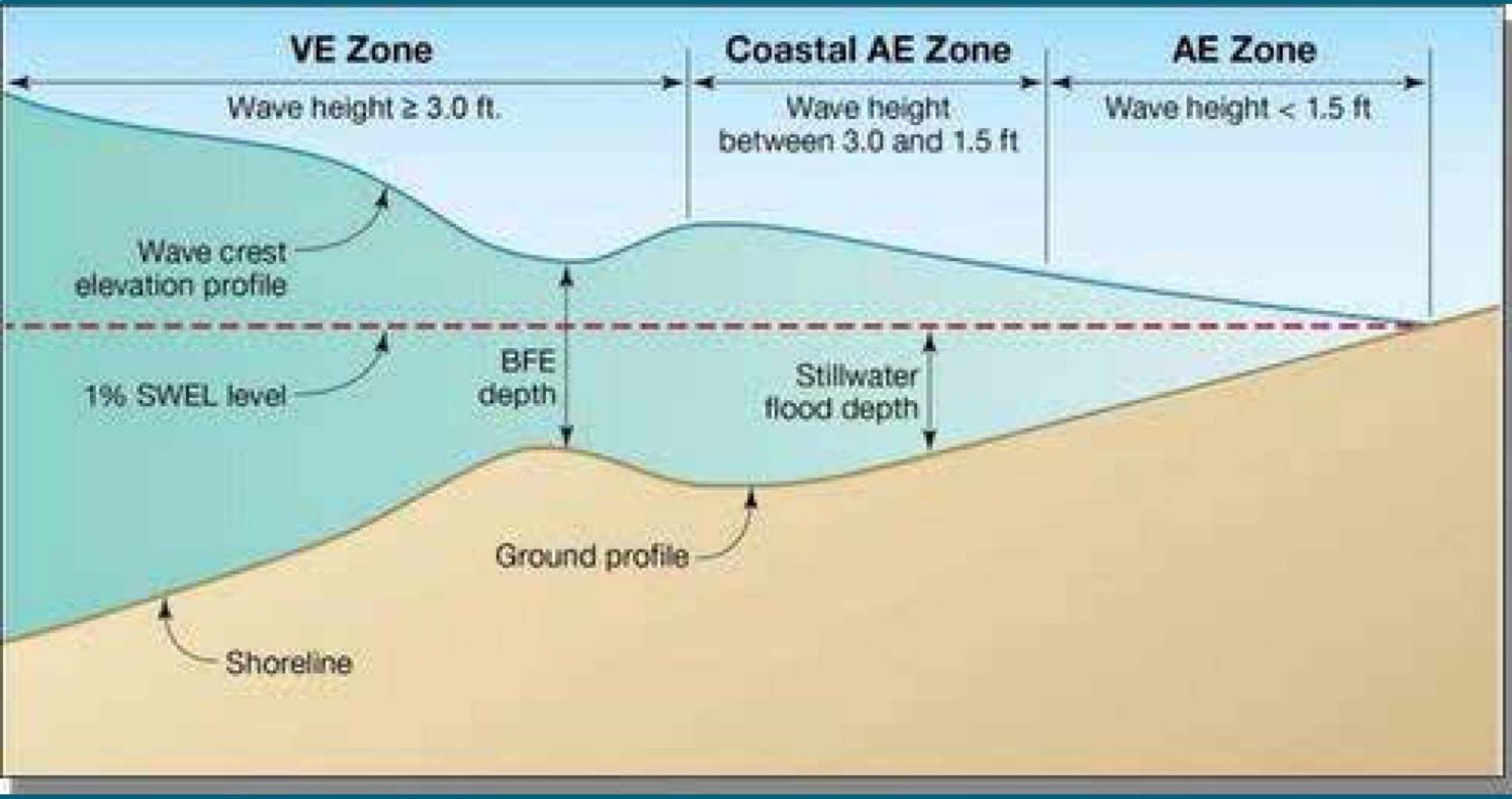
NAI Strategies

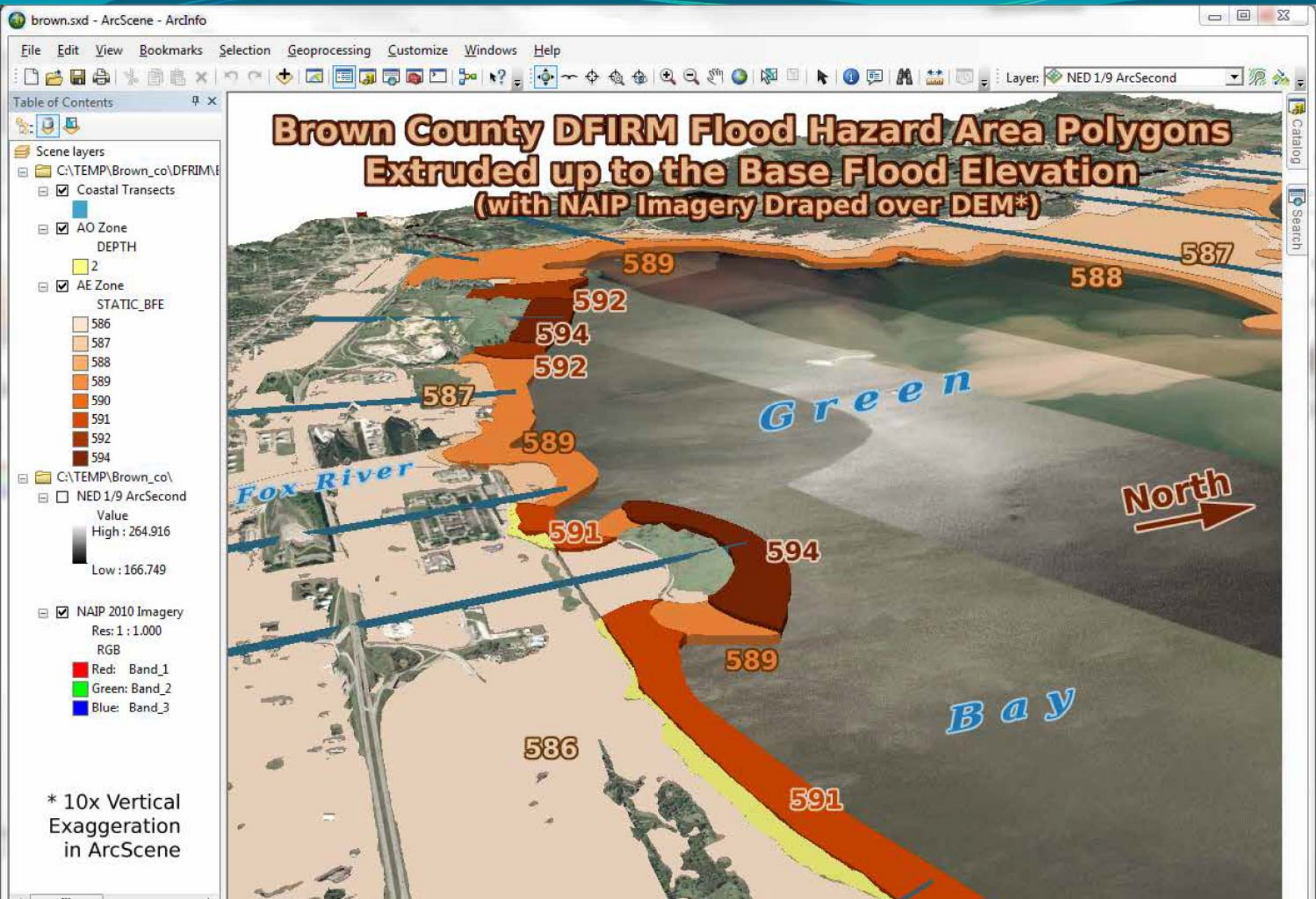
- Higher Mapping Standards
- Natural & Beneficial Functions
- Information Sharing

Hazard Identification

NAI *Higher Mapping Standards*

- Use future conditions hydrology (flood discharges based on build-out scenarios for current zoning)
- Prevent a loss of storage and/or an increase in velocity (restrict allowable rise in floodplain development, allowable increase in velocity)
- Enforce the coastal A Zones as you would the V Zones (Coastal A Zone)
- Map hazards not shown on FIRM (localized flooding, tsunami areas, unstable bluffs, etc)


VE Zone
Wave height ≥ 3.0 ft.
Coastal AE Zone
Wave height
between 3.0 and 1.5 ft
AE Zone
Wave height < 1.5 ft
Wave crest
elevation profile
1% SWEL level
BFE
depth
Stillwater
flood depth
Ground profile
Shoreline


brown.sxd - ArcScene - ArcInfo
File Edit View Bookmarks Selection Geoprocessing Customize Windows Help
Layer: NED 1/9 ArcSecond
Table of Contents
Scene layers
C:\TEMP\Brown_co\DFIRM\
Coastal Transects
AO Zone
DEPTH
2
AE Zone
STATIC_BFE
586
587
588
589
590
591
592
594
C:\TEMP\Brown_co\
NED 1/9 ArcSecond
Value
High : 264.916
Low : 166.749
NAIP 2010 Imagery
Res: 1 : 1.000
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
* 10x Vertical Exaggeration in ArcScene
Brown County DFIRM Flood Hazard Area Polygons
Extruded up to the Base Flood Elevation
(with NAIP Imagery Draped over DEM*)
589
587
588
592
594
592
587
589
Fox River
Green
Bay
North
591
594
589
586
591
Catalog
Search


ZONE VE
(EL 588)
1218
ZONE AE
(EL 584)
1217C
ZONE VE
(EL 586)
1217B


586
588


ZONE VE
(EL 586)

Hazard Identification

Identify Sensitive Resources - NAI

Natural & Beneficial Functions
Environmentally Sensitive Areas

- Wetlands
- Barrier Islands and Beaches
- Cheniers
- Critical Habitat for Threatened & Endangered Species
- Submerged Aquatic Vegetation
- Shellfish Reefs and Beds

Hazard Identification

Information Sharing

- Make Community Data Available
- Limit Fee and/or Licensing Requirements
- Host Website for Downloading Data
- Develop Disaster Contingency for Data Access

Hazard Identification

Think big and small, current & future…

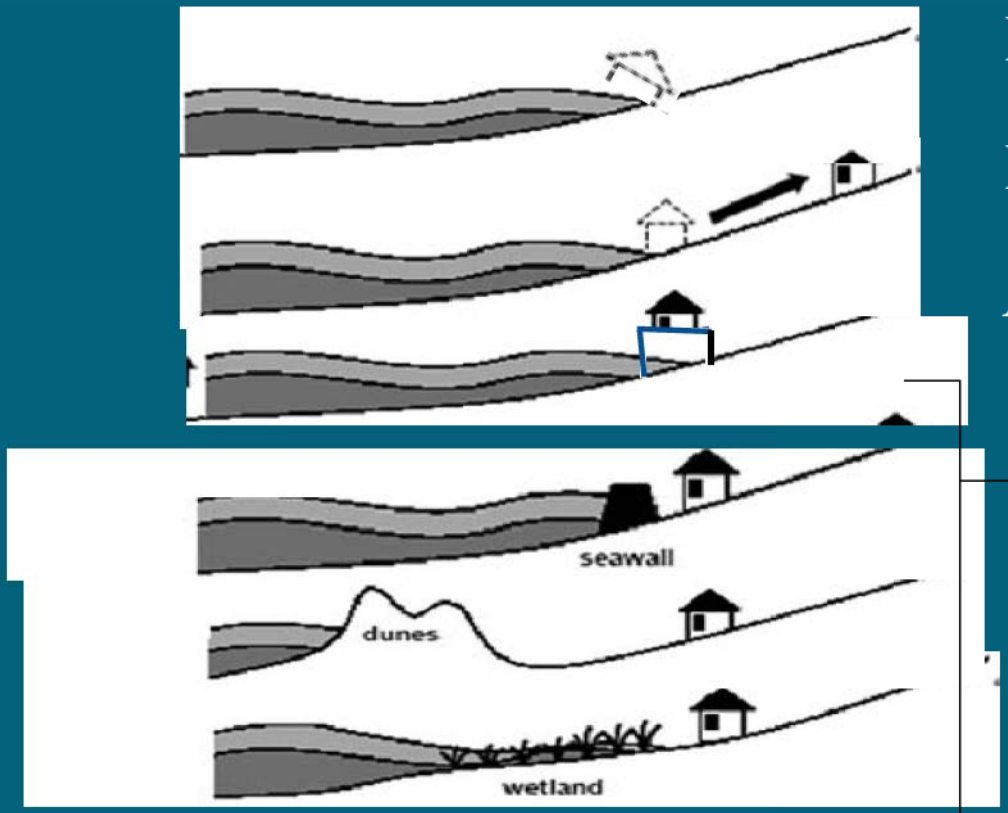
Explore hazards history & impacts…

Find stories (examples, anecdotes and photos) to supplement other data sources…

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Adaptation Strategies



Do nothing

Retreat

Accommodate

Protect

Planning

Think beyond emergency management:

- water supply availability and quality
- growth management in high-risk areas
- stormwater runoff and management

Consider your at-risk populations:

- Those with health & disabilities issues
- Those without transportation
- Those in high hazard areas

Planning

Involve key stakeholders

Elected Officials
Utilities
Planning
Public Safety
Developers
Businesses
Public Works
Infrastructure
Conservation
Homeowners
Social Services
Natural Resources
Recreation
Realtors

Planning

Consider the effects of existing policies on future vulnerability of natural resources

- Natural resources planning & decision-making processes
- Conservation strategies and partnerships
- Incentives for maintaining natural & beneficial functions

Planning

BASIC *Planning & Implementation*

- Prepare comprehensive land use plans
  - Identify hazard areas
  - Identify appropriate land uses
- Develop special subject plans to supplement comprehensive plans
  - Economic development plans
  - Habitat protection plans
  - Watershed management plans
- Adopt zoning or other ordinances to enforce plans

Planning

BETTER *Risk Analysis and Strategy*

- Identify flood-risk areas on plans and restrict development
- Adopt low-density zoning in floodplains
- Use specialized tools (ex: GIS, HAZUS, etc.)
- Prepare FPM, storm water management plans to supplement comprehensive plans
- Prepare multi-hazard mitigation plans

Planning

Better Strategies

Floodplain Management Plans

- Identify flood prone/repetitive loss areas
- Evaluate various flood damage reduction measures
- Recommend actions for the community
- Identify mapping needs

Multi-Hazard Management Plans

- Identify all natural hazard areas
- Evaluate various hazard mitigation measures
- Recommend actions for the community

Planning

NAI *Sustainability*

Include watershed, MOM and sustainable development principles in land use planning

- Consider current and future development
- Coordinate floodplain planning with other planning activities (economic development, housing, recreation, ecosystem restoration, water quality, etc.)
- Identify long-term implications of alternative land uses
- Promote “sustainable” development

Planning

Sustainable development is "…meeting the needs of the present without compromising the ability of future generations to meet their own needs."

ASFPM, *NAI Toolkit*

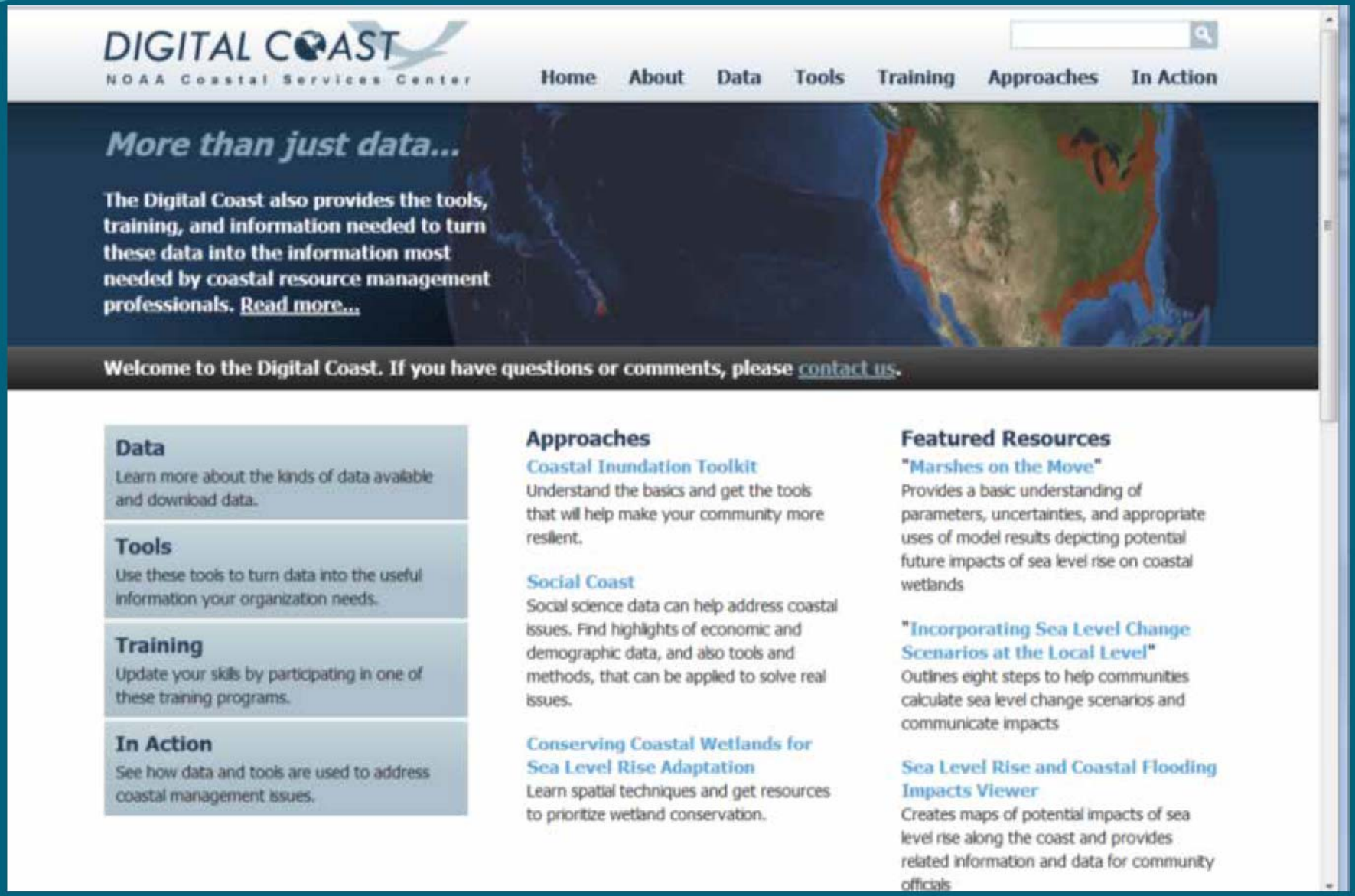
Source:

***The 1987 Brundtland Report* to the United Nations**

Planning

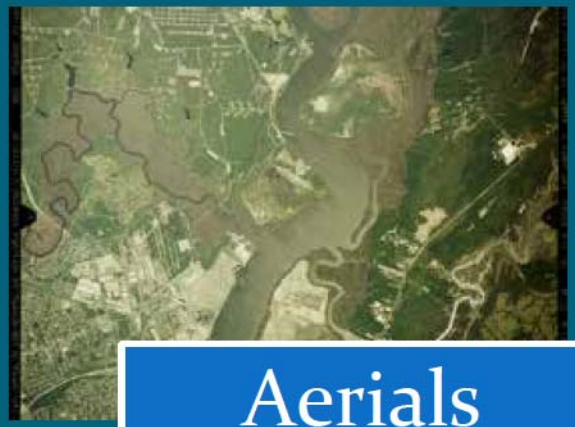
Some great planning tools:

Digital Coast

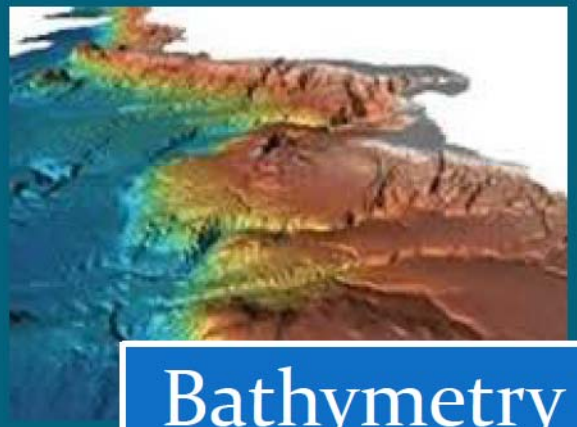


www.csc.noaa.gov/digitalcoast/

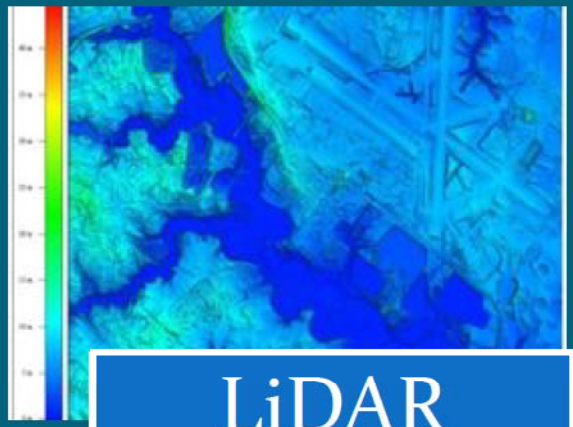
Digital Coast Data



Aerials



Bathymetry



LiDAR

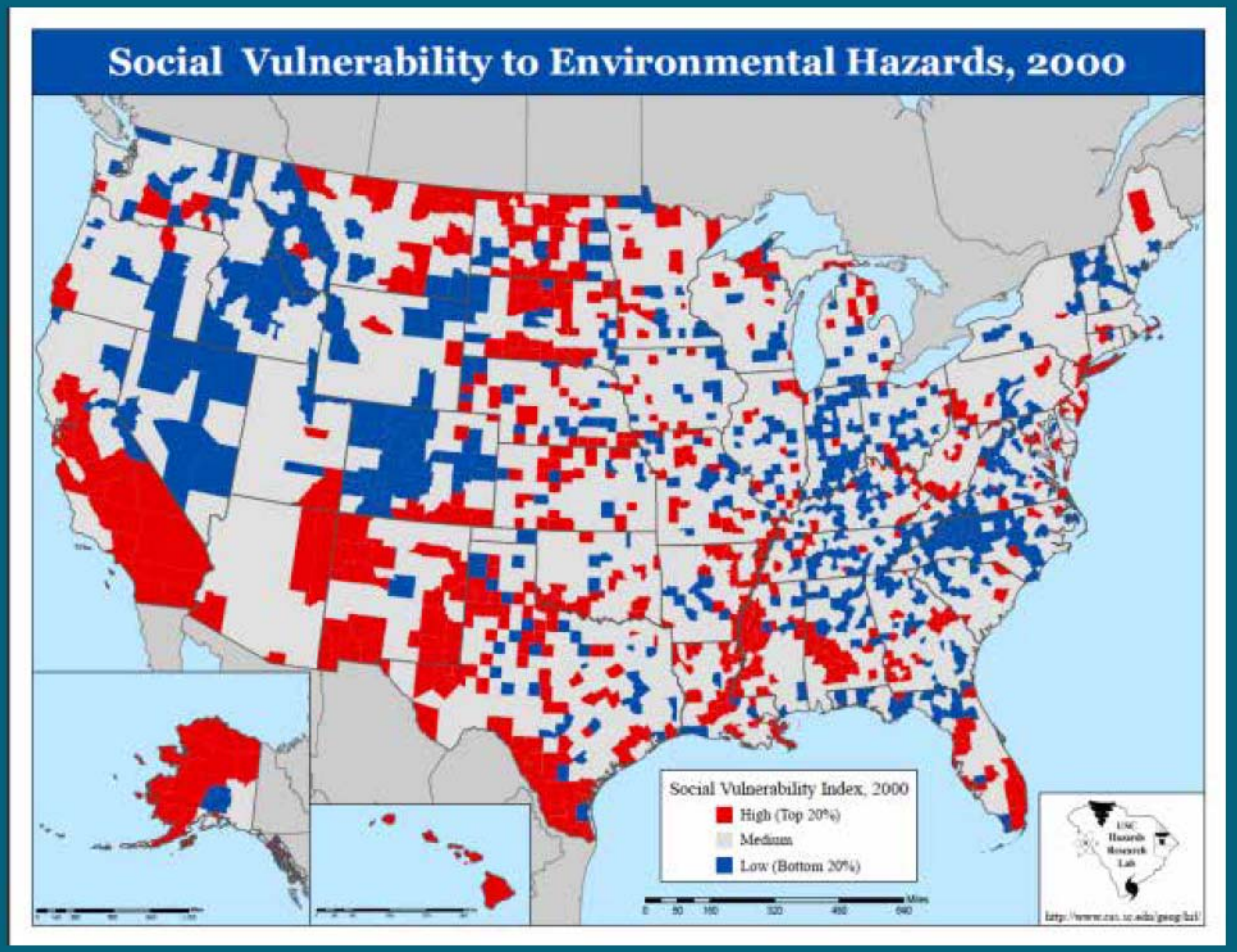
LandCover

Social Vulnerability Index (SoVI)

42 socioeconomic and built environment variables

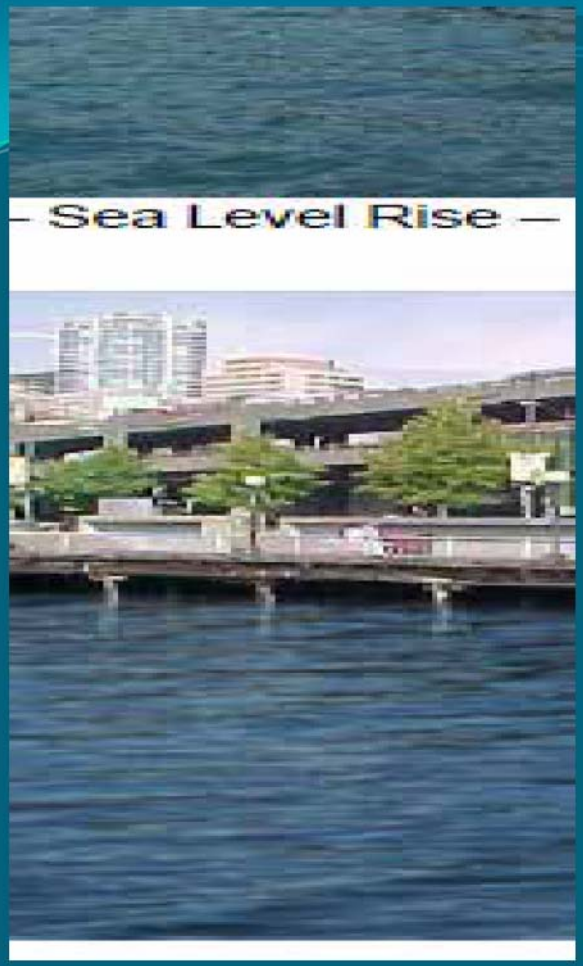
Examples

- Socioeconomic status
- Gender
- Race and ethnicity
- Age
- Commercial development
- Employment loss
- Rural/urban
- Infrastructure
- Renters
- Occupation
- Family structure
- Education



Produced by the Hazards Research Lab at the University of South Carolina

CanVis Tool



Visualization

Alternatives

Communication

Sea Level Rise and Coastal Flooding Impacts Viewer

Sea Level Rise and Coastal Flooding Impacts Viewer

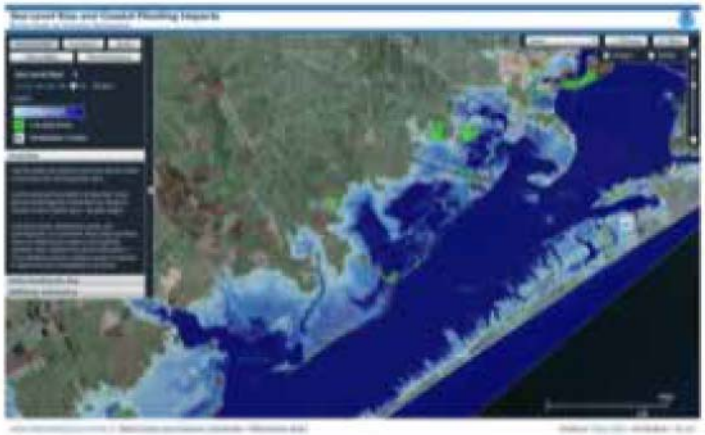
NOAA Coastal Services Center

Overview | In Action | Support | Get It Now

Overview

View the current status of the tool.

Being able to visualize potential impacts from sea level rise is a powerful teaching and planning tool, and the Sea Level Rise Viewer brings this capability to coastal communities. A slider bar is used to show how various levels of sea level rise will impact coastal communities. Completed areas include Mississippi, Alabama, Texas, Florida, and Georgia, with additional coastal counties to be added in the near future. Visuals and the accompanying data and information cover sea level rise inundation, uncertainty, flood frequency, marsh impacts, and socioeconomics.



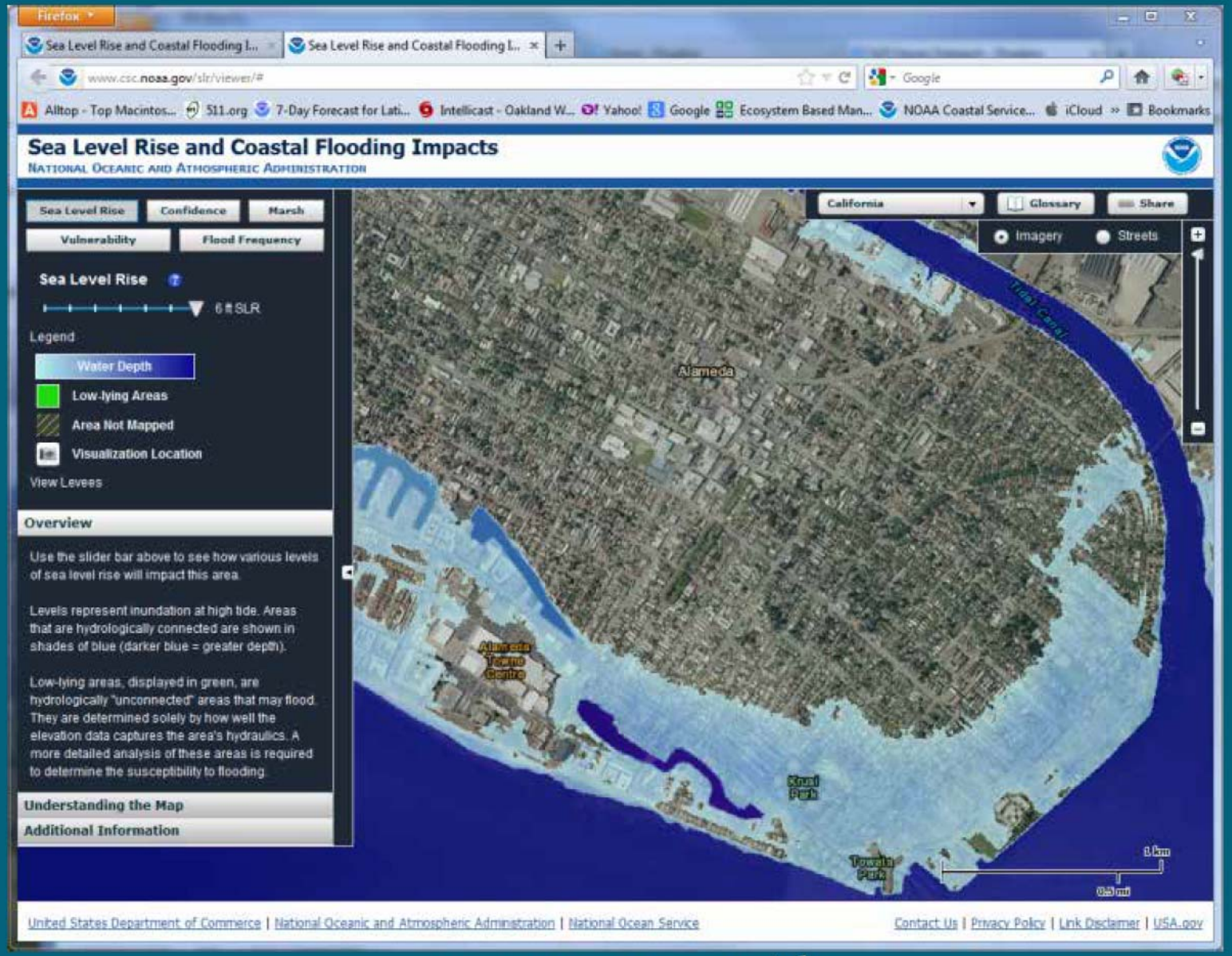
Launch Now

Features

- **Displays** potential future sea levels
- **Provides** simulations of sea level rise at local landmarks
- **Communicates** the spatial uncertainty of mapped sea levels
- **Models** potential marsh migration due to sea level rise
- **Overlays** social and economic data onto potential sea level rise
- **Examines** how tidal flooding will become more frequent with sea level rise

www.csc.noaa.gov/slr

Sea Level Rise and Coastal Flooding Impacts Viewer



www.csc.noaa.gov/slr

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Regulation & Development Standards

BASIC *Core Regulations*

Adopt separate FPM ordinance with minimum FPM regulations

- NFIP estimates that buildings built to minimum standards suffer 70% less than unprotected buildings
- Flood damage can still occur with minimum standards
- BFEs subject to change, particularly as development occurs in watershed

Regulation & Development Standards

BETTER *Higher Regulations*

- Adopt NFIP regulations with higher standards
  - Receive Community Rating System Credit for higher standards and lower insurance premiums for your community
- Adopt International Building Codes which include flood reduction standards
- Adopt subdivision standards that require structures to be built outside of hazard areas

Regulation & Development Standards

BETTER *Higher Regulations*

- Require additional height requirement above BFE ("freeboard")
- Strengthen "substantially improved" building requirements
- Adopt higher health/safety regs
- Utilize "green infrastructure"
- Adopt storm water regulations

Regulation & Development Standards

NAI *Natural Floodplain Functions*

Preserve beneficial natural floodplain functions

- Adopt setback standards to establish minimum distances from river channels or shorelines
- Adopt buffer zone requirements between sensitive and developed areas
- Adopt proactive development requirements
- Implement stream restoration programs

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Mitigation

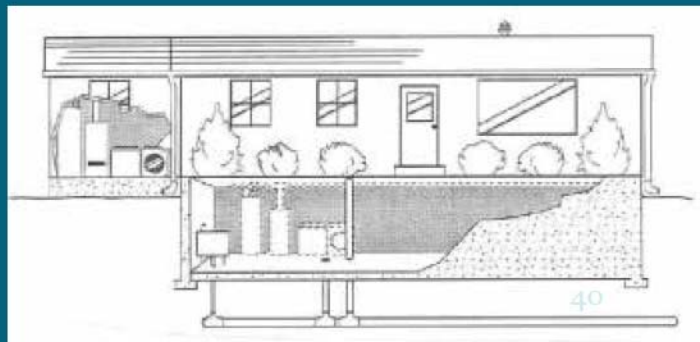
BASIC *Structural Controls, Insurance*

- Structures used to control flooding
  - Reservoirs
  - Levees, floodwalls, seawalls
  - Groins
  - Channel modification
  - Dredging
- Flood Insurance

Mitigation

BETTER *Human Adjustment to Flooding*

- Enforcing the rules you *do* have
- Elevating structures
- Building barriers around a structure
- Wet and dry floodproofing



Mitigation

NAI *Human Adjustment to Flooding*

- Include Ecosystem Services in BCA
- Relocate structures out of the floodplain
- Acquire properties in the floodplain

Dune Nourishment & Artificial Dunes

Dune nourishment

- Add compatible sediment to eroded dunes
- Vegetation

Artificial Dune

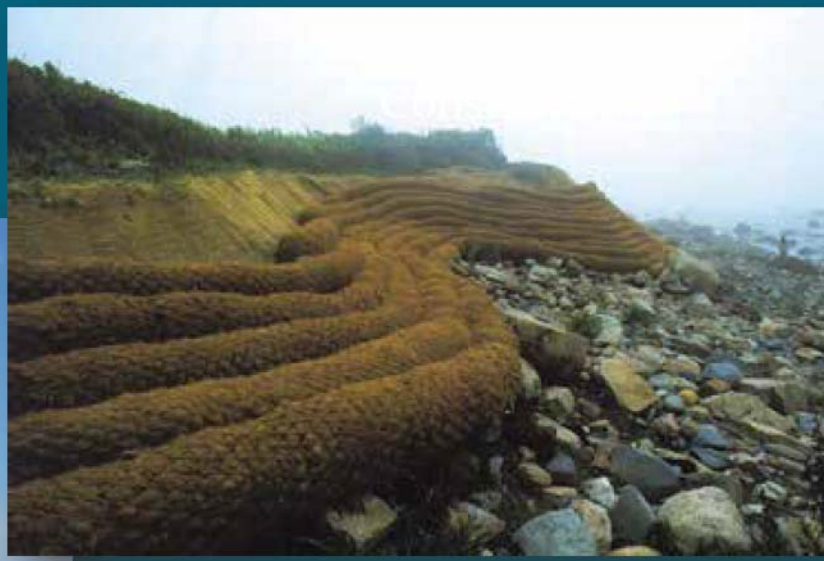
- Construct dune seaward of an eroding coastal bank/bluff
- Vegetation
- Sand Fencing

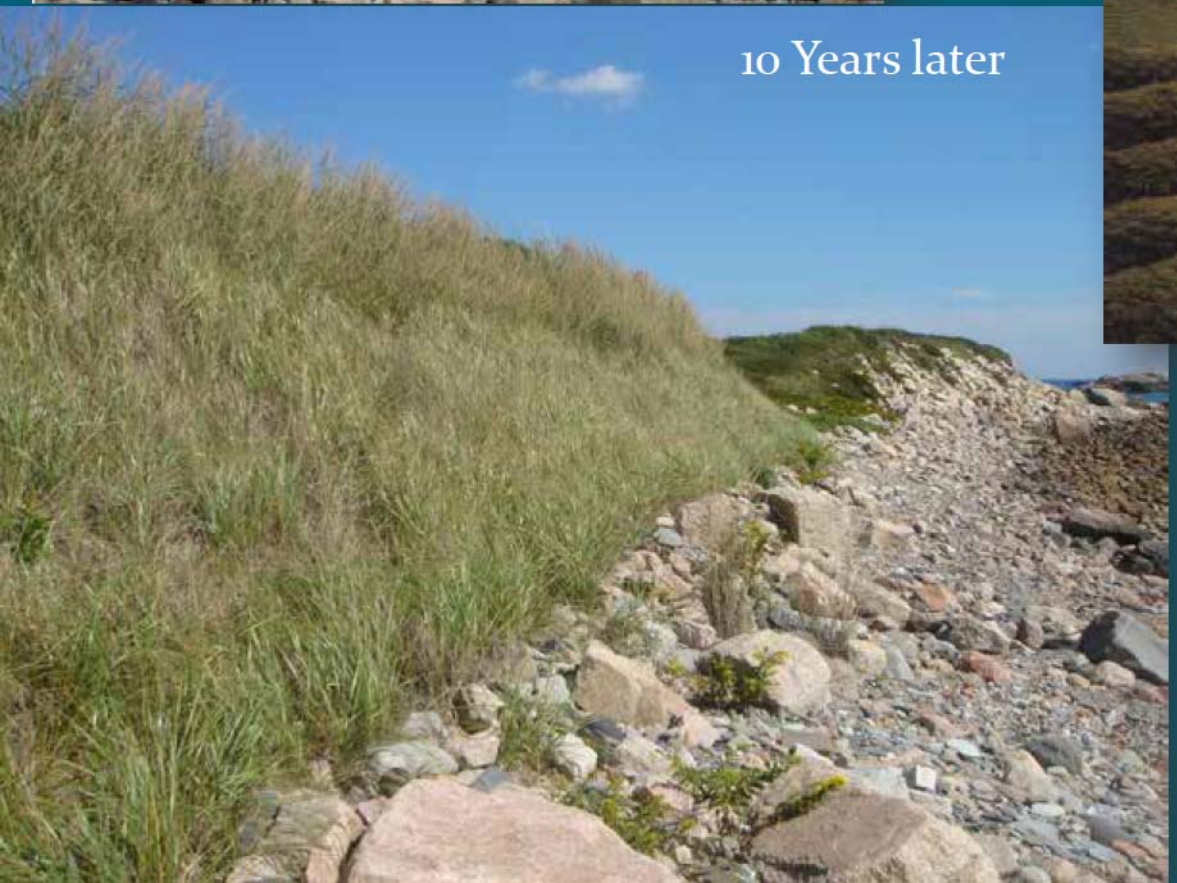
Beach and Dune Nourishment

Vegetation

- Use native, salt-tolerant plants with extensive root systems
- Establish stable slope
- Address invasives

Bioengineering: Coir Rolls & Vegetation





- Native salt-tolerant plants with extensive root systems
- Establish a stable slope
- Combined with natural fiber blankets
- Natural fiber mesh

Bioengineering – Natural Fiber Blankets

- Blankets stabilize soils while vegetation gets established
- Use in conjunction with coir rolls
- No synthetic fibers

Sand Fencing

- Thin wood slats & twisted wire preferred
- Site landward of annual storm waves
- Avoid plastic, metal, fences that become structures

Runoff Control

- Remove and reduce impervious surfaces
- Capturing runoff
- Redirecting water
- Minimize maintained lawn areas

Mitigation

NAI *Master Planning and Monitoring*

- Take a "master plan" approach to flood protection

Involve all levels of services…

- Utilities (water, sewer, power)
- Stormwater
- Streets
- Building services
- Planning
- Parks
- Budget/Finance

Involve the public…

- "Town Hall" meetings
- Workshops with Planning Commission
- Owners of properties affected
- Other interested parties

MITIGATION

How-To Guide for No Adverse Impact

July 2013

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Infrastructure

BASIC *Response and Replacement*

- Doing the minimum to maintain the infrastructure and repair it after a flood or other disaster
- Includes roads, bridges, utilities, parks, drainage systems

Infrastructure

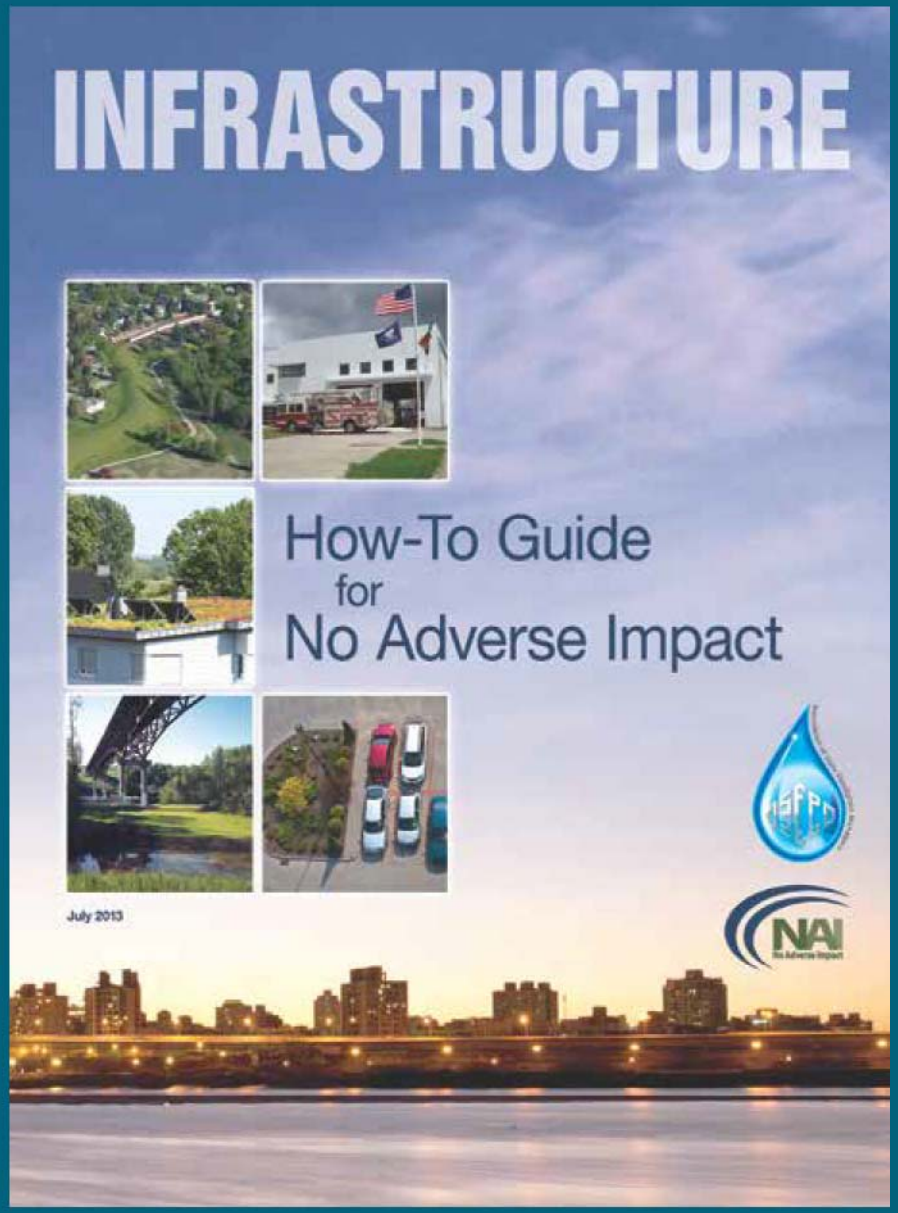
BETTER *Protection Measures, Procedures*

- Routine inspections of bridges, culverts, etc. after a flood event, with resulting corrective measures
- Set higher flood standards for new construction
- Do a “flood audit” of all public buildings in relation to the floodplain
- Participate in the development of emergency action plans

Infrastructure

NAI *Plans and Alternatives*

- Use a capital improvement plan (CIP) to acquire land for public uses – parks in the floodplain, channels and drainage structures, etc.
- Restrict road development through flood-prone areas (wetlands, marshes, floodplains, etc)
- Create a master greenway plan to link open spaces
- Stream restoration
- Regulate critical facilities out of flood zones



How-To Guide for
No Adverse Impact

INFRASTRUCTURE

July 2013

NAI

URS

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Emergency Services

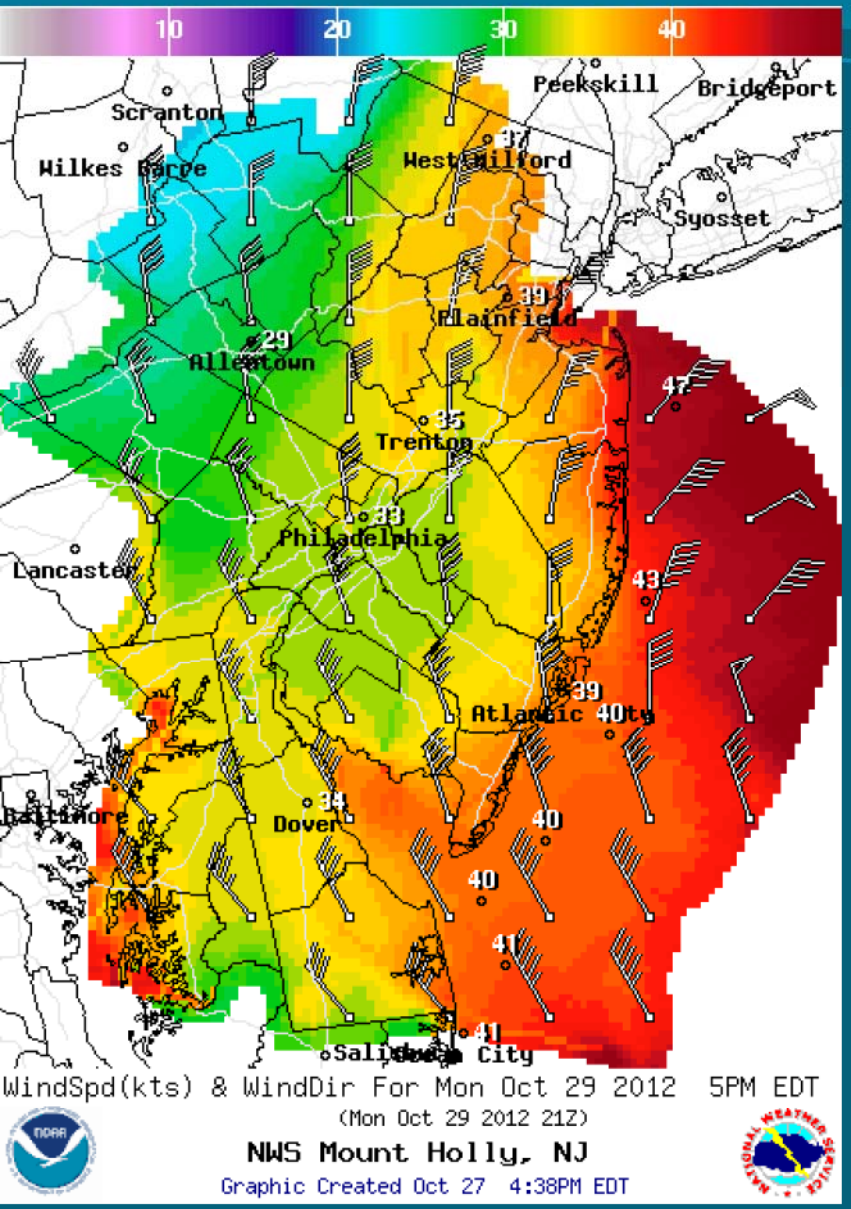
BASIC *Generic Response Plan*

- Treats all disasters alike
- No specific actions for different types of hazards

Emergency Response

BETTER *Flood Preparedness Plan*

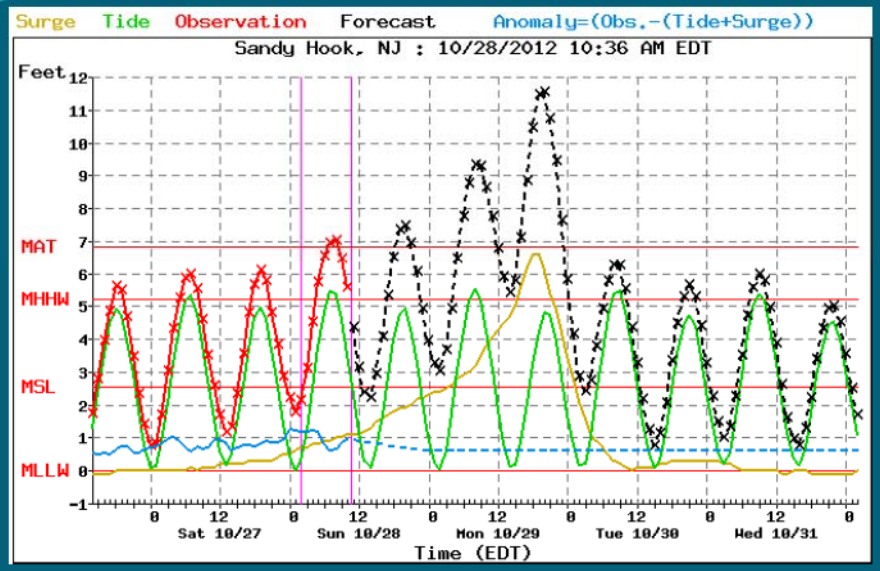
- Implement a flood threat recognition system
- Work with the NWS for a flood warning program (both internal – for staff – and external – for the public)
- Use your outreach program (education) to advertise the warning programs
- Become a StormReady/TsunamiReady community
- Map out the predicted flood stages

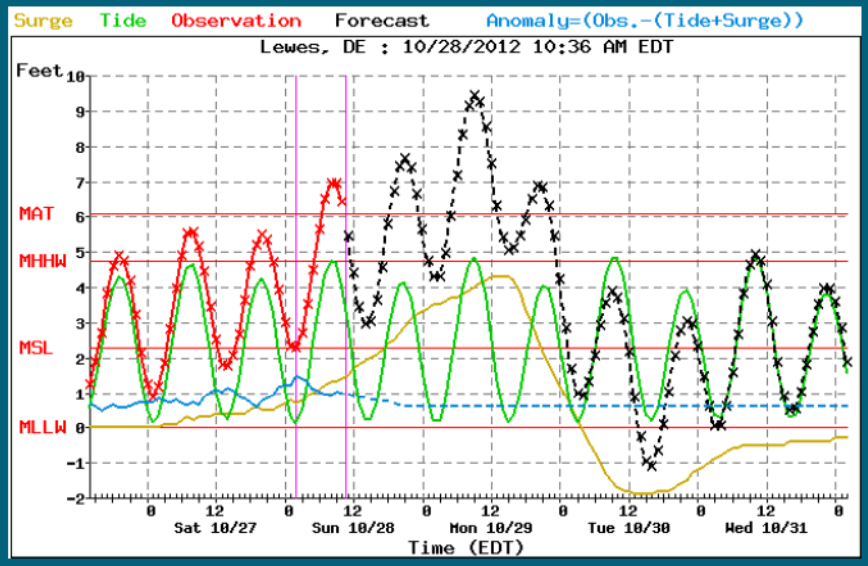


NWS – Wind Info.

- Strong winds will develop along coastal sections today and spread inland. Strong damaging winds will continue from late Sunday night through Monday into Tuesday morning.
- Winds gusts over 75 mph are possible over coastal sections. Inland locations will see peak wind gusts of 60 to 75 mph at the height of the storm.

Coastal flooding tools





- Major coastal flooding is expected based on the current track forecast. **Record coastal flooding is likely.**
- A 12 to 15 foot storm tide (surge + astronomical tide) is possible in the Raritan Bay. This would produce record coastal flooding.
- A 10 to 12 foot storm tide is possible along the Atlantic Coast & the Delaware Bay. This would result in record coastal flooding in many locations.
- A 3 to 5 foot storm tide (surge + astronomical tide) is possible in the Chesapeake Bay based on where the storm center comes ashore. This would produce moderate coastal flooding.

Emergency Response

NAI *Pre- and Post-Disaster Preparedness*

- Pre-Disaster:
  - Pre-plan your emergency response for flood events
  - Educate the public about mitigation options
  - Apply for grants to pro-actively deal with repetitive losses
- Post-Disaster
  - Use the Residential Substantial Damage Estimator (RSDE) to determine level of structural damage
  - Regulate post-disaster construction to newer regulations

NAI Strategies

- Hazard Identification
- Planning
- Regulations and Standards
- Mitigation Actions
- Infrastructure
- Emergency Services
- Education and Outreach

Education/Outreach

- Target specific audiences
- Modify existing outreach efforts
- Your message should be:
  - know your hazards
  - understand how your actions could adversely impact others
  - identify how community members can protect themselves and others

Education/Outreach

BASIC *Answer Questions*

- Am I in the floodplain?
- What regulations apply to my floodplain property?
- Make public documents available for review

Education/Outreach

BETTER *Outreach Projects*

- Provide map information to the public via non-traditional routes (web sites, using FIRMettes, etc)
- Send out floodplain information brochures to all residents in their utility bills or tax bills
- Post signs in the floodplain showing historical flood heights or required elevations
- Create a flood section in your local library
- Offer flood protection advice to the public

Education/Outreach

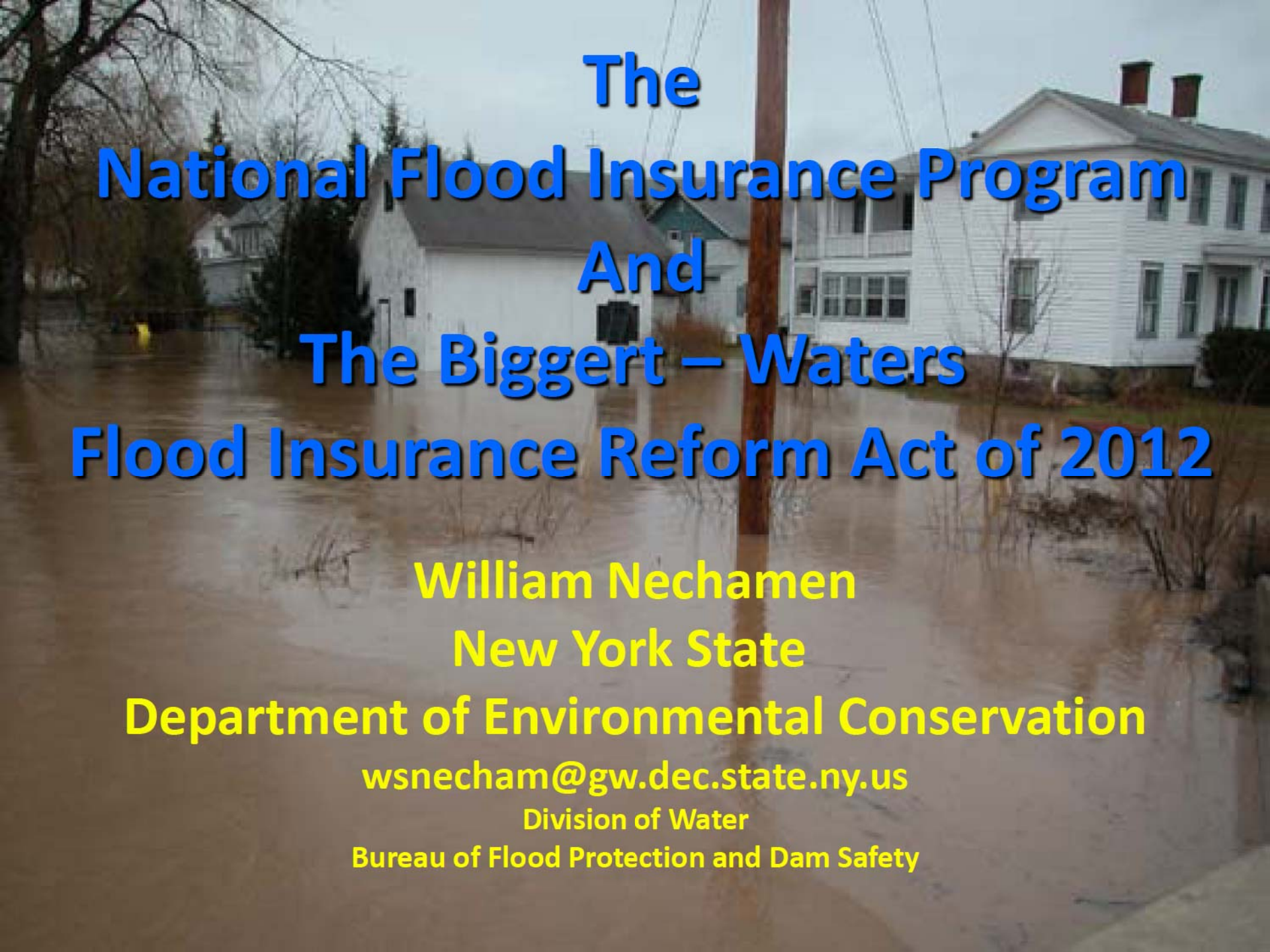
NAI *Education and Outreach*

- Train staff to CFM level
- Host or participate in workshops, conferences, etc. where you can speak about NAI and distribute related materials
- Help educate children about environmental issues and flood/hurricane/tsunami safety education

To Summarize…

Every piece of property in your community has some element of risk

Remember you are looking to support better decisions while still moving forward!



The National Flood Insurance Program And The Biggert – Waters Flood Insurance Reform Act of 2012

William Nechamen

New York State

Department of Environmental Conservation

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Division of Water

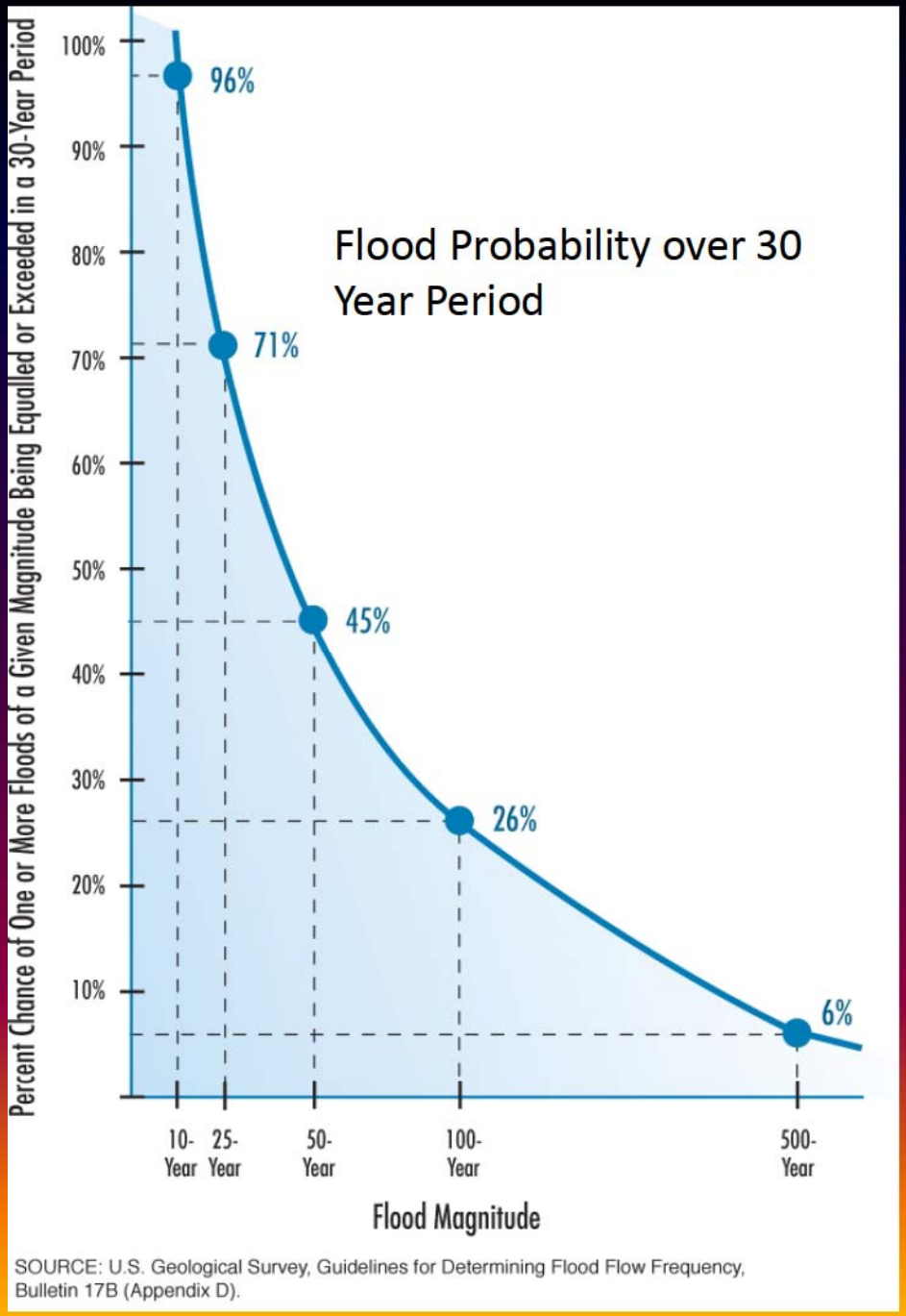
Bureau of Flood Protection and Dam Safety

Floods are the Nation's Most Common Disaster

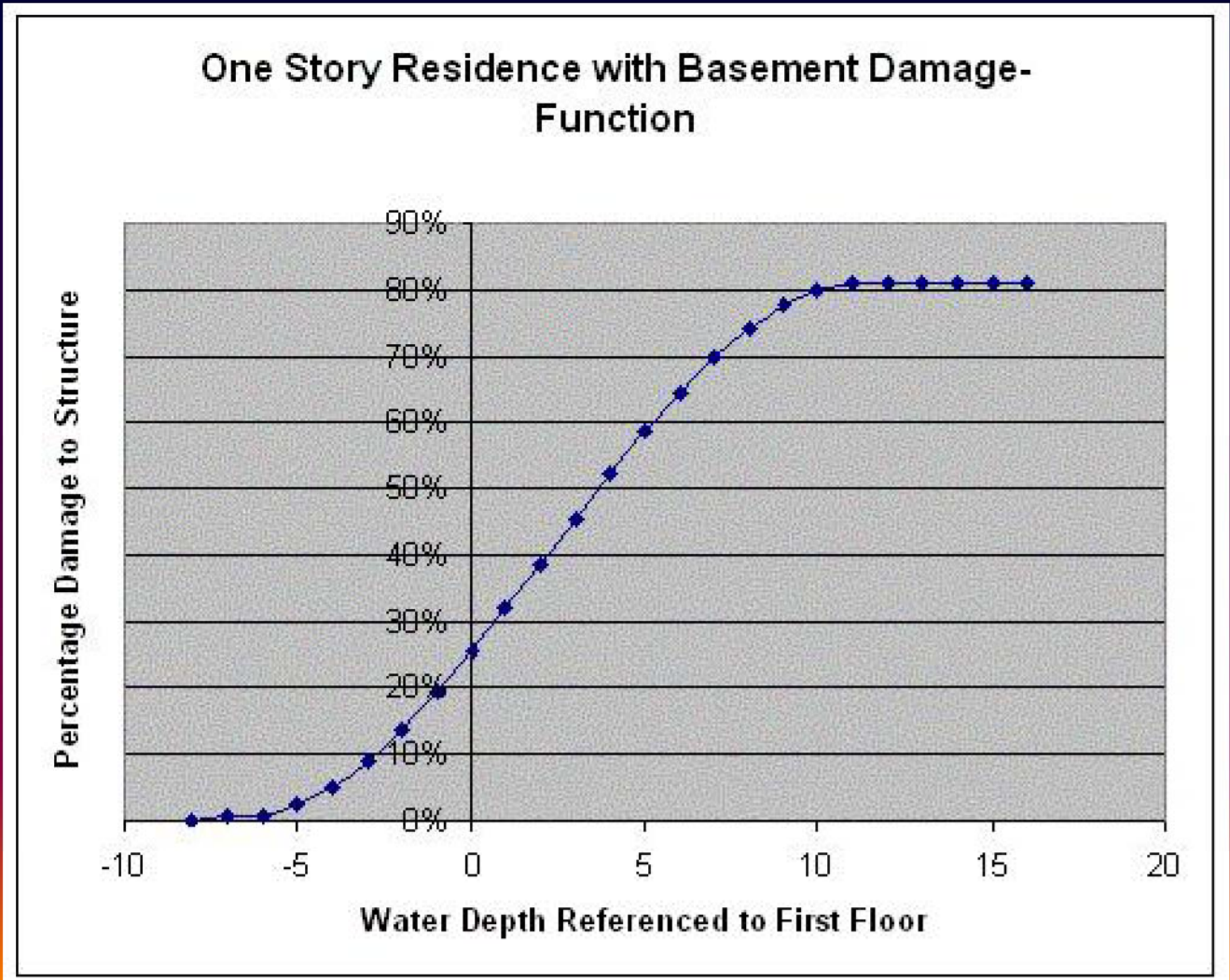
- 80% of all Presidentially Declared Disasters involve flooding - $5 Billion in 2010
- Sandy will be one of the most expensive flood disaster ever
- Flooding is one disaster that can be mapped
- Flood maps are vital tools:
  - Sustainable Community Development
  - Emergency Management
  - Personal Protection
  - Property Protection

What is the Risk?

- 100-year flood?
- One percent chance per year
  =26% chance over 30 years
- 500-year flood?
  – 6% over 30 years
- *Your Flood may not have been a One – Percent Event*



What are the Damages to Structures?



A 500-Year Flood? How did That Happen?

- This is a statistical concept
- 0.2% Probability per Year
- 6% Probability over 30 Years
- Greater Than Chance of Fire

Where Are We: NFIP?

	NYS, 11/10	NYS 8/12	NYS, 3/13	U.S., 1/13
Policies	162,965	167,455	176,000	5.6 million
Premiums	$147 Million	$157 Million	$170 million	$3.6 billion
Coverage	$38.6 Billion	$41.4 Billion	$42 billion	$1.3 trillion
Claims to Date	84,825	105,674	162,504	2.0 million
Claim Payments	$631 Million	$1.2 Billion	$3.1 Billion	$45.5 billion
National NFIP Program Debt	$18.8 billion before Sandy. $6 billion more?			

- Prior to 2005, Program was largely self supporting.
- Policy structure not set up to handle catastrophic losses.
- Fund was never capitalized.
- 1% of policies represent 1/3 of all claims.
- Congress wants program to be on a sounder financial footing.
- It will take years to pay off debt.

Biggert-Waters Flood Insurance Reform Act of 2012

Changes to the NFIP

- Flood Insurance
- Mapping
- Mitigation Programs
- Levees and Flood Protection
- Building Code Enforcement
- Assortment of Studies

Flood Insurance Categories

- Pre-FIRM
  - Built prior to Community's First Flood Insurance Rate Map or 1974, Whichever is Later
  - 79% of the state's building stock was built prior to 1980
  - 132,882 of 176,000 policies in NYS are Pre-FIRM (75.5%)
  - About 65,000 of them are paying subsidized rates
- Flood Zones
  - VE: Coastal Flood Zone with Wave Runup >3'
    - 1,973 Policies
  - A or AE Stillwater Flood Zone: Coastal, Lake or Riverine
    - 83,441 Policies
  - B, C or X zone
    - 90,916 Policies

Flood Insurance Costs

- Post FIRM: Actuarial
  - The Higher the Lowest Floor; The Less the Cost
  - $100,000 coverage with lowest floor BFE+2' = $230 - $270
- Pre-FIRM: Subsidized (actually a discount)
  - Typical home with Basement Pre-FIRM Rates $1050 - $2750 (not including contents)
  - Actuarial costs could be up to $9000

Flood Insurance Costs*

- V zones are Highest;
  - Built to Code (BFE + 2'): $1120 - $5000
    - Depending on amount of coverage and value of structure
  - Pre-FIRM: $1680 - $5200
- A zones
  - Built to Code (BFE + 2'): $230 - $540
  - Pre-FIRM: $1050 - $2750
- B, C or X zones, Less than 1% Annual Chance of Flood
  - Preferred Risk Rate: $282 - $417
  - X Zone Rate (If claim history): $721 - $1390

*Assumes $100,000 to $250,000 coverage, single family home. Rates will vary based on amount insured and deductable.

Flood Insurance: What's Changing?

- Phases out Pre-FIRM (subsidized) Rates for:
  - Non Primary Residences (being implemented now)
  - Business Properties (beginning Aug 2013)
  - Property Damages that Cumulatively Exceed Market Value or Severe Repetitive Loss Buildings (beginning Aug 2013)
- Rates Increase 25%/year until Actuarial Rate Achieved

Flood Insurance continued

- Removes Pre-FIRM Rates **immediately** for:
  - Sale or Purchase of a Property
  - New or Lapsed Policy
  - Policy for Refused FEMA Mitigation Offer
  - Substantial Damage or Substantial Improvement (should be to code anyway)
- FEMA expects this to begin fall 2013
- No Phase In: Instant Actuarial Rate
- This will make it difficult to sell a pre-FIRM structure!

Grandfathering of Insurance Premiums Phased Out Beginning in 2014

- When Maps Change, Grandfathered Rates will No Longer Apply
- New Rates phased in over 5-years.
- Applies to Non-Subsidized Policy Holders
- Also Applies to Previously Uninsured Properties Newly Mapped into Flood Zones
- FEMA Unclear of Scope:
  - Entire Remapped Community?
  - Only Areas with Flood Zone Changes?
- Editors note: Pushback could hold back flood map adoption

Other Flood Insurance Changes

- Limit of Annual Rate Increases capped at 20% up from 10%
- Premiums Paid Annually or by Installments
- Limits on Bank's Practice of Forced Placement
- Lender Penalties Increase from $350 to $2000 per Property
- Lender Penalty Fine Limit of $100,000 Removed
  - Banks will be taking this seriously!

Flood Insurance Goal

- Pay Down Program Debt
- Establish Reserve Fund
- Rates set to Cover Average Historic Loss Years
  - Includes Previously Excluded Catastrophic Loss Years in Average
- Ten-year Repayment Plan for Current Debt
  - Unlikely after Sandy
- Allows Private Insurance to Satisfy Coverage Requirements
  - May see some private insurers getting into the game BUT
  - If this happens, we'll see cherry picking, with riskier policies in the NFIP fund
- Establish Process to Allocate between Wind & Flood Damage

Other Changes

- Mapping Changes
  - Residual Risk; Levees; Interagency Coordination, Others
- Flood Mitigation Programs Consolidation
- FEMA/COE Flood Mitigation Structure Accreditation Task Force
- Lots of Studies
  - Private Flood Insurance
  - Affordability
  - Pre-FIRM Data

Saving Money on Flood Insurance

- Community Resiliency
- Retrofit
- Consult with insurance agent –
- Get an Elevation Certificate
- Higher Deductibles?

The smartest way to save is to build higher.

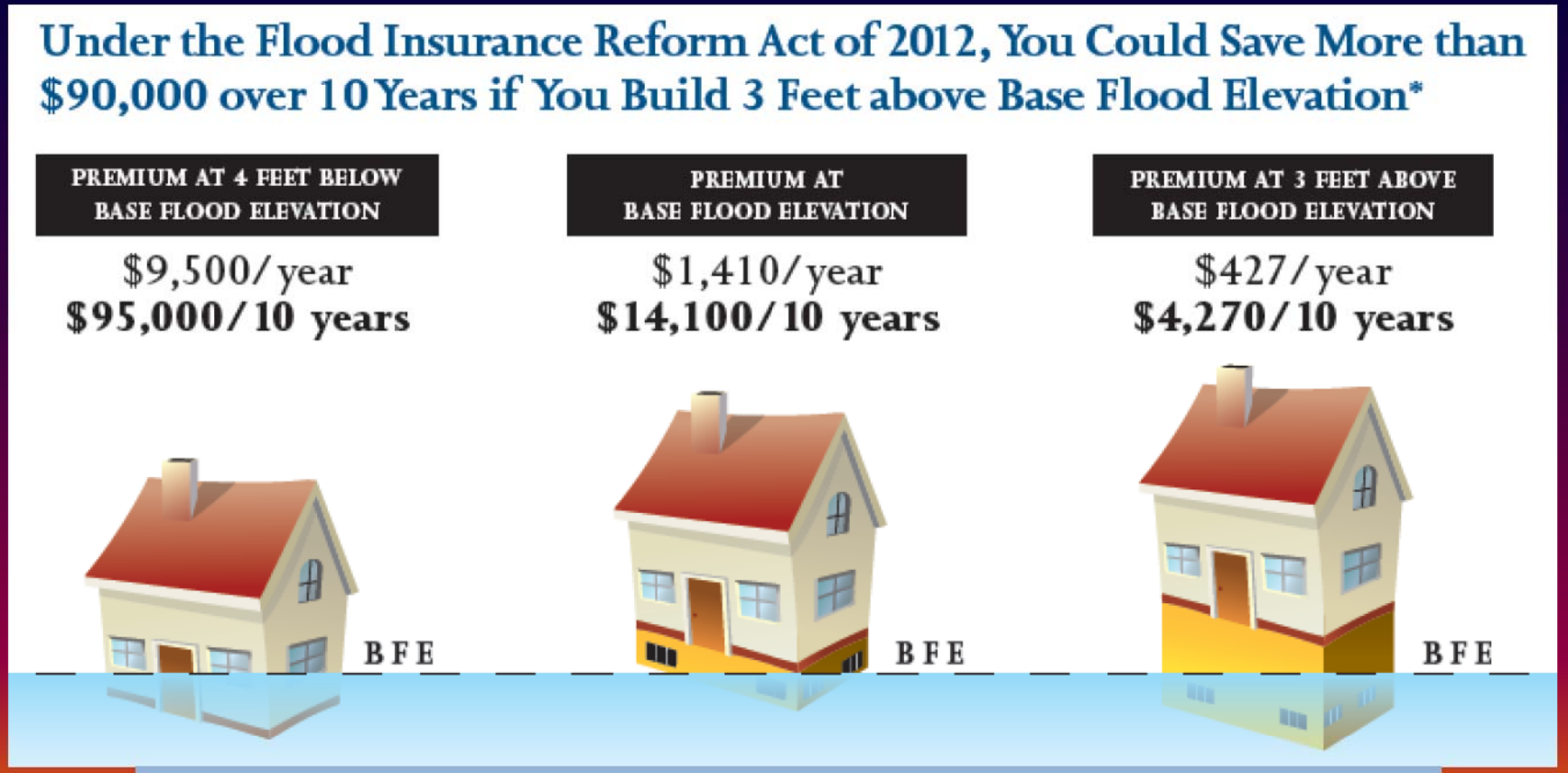
Ways to Lower Costs

- Flood and Hazard Mitigation Grants
  - www.fema.gov/hazard-mitigation-assistance
- Community Rating System
  - www.fema.gov/national-flood-insurance-program/community -rating-system
- Increased Cost of Compliance
- Invest in Elevating your House. The annual cost will likely be less than the added flood insurance cost.

Costs to Elevate Structure

- About $90,000 Average depending on Structure and Amount of Elevation
  - Downstate figures. Costs will vary.
- Additional Cost of Each Foot of Added Elevation = @ $1.06 per Square Foot of Building Footprint
  - 1000 Square Foot Footprint = $1060 for each extra foot of elevation.

Need to Build Higher!



NYS Residential Building Code: 2' Freeboard, New or Substantial Improvement/Damage

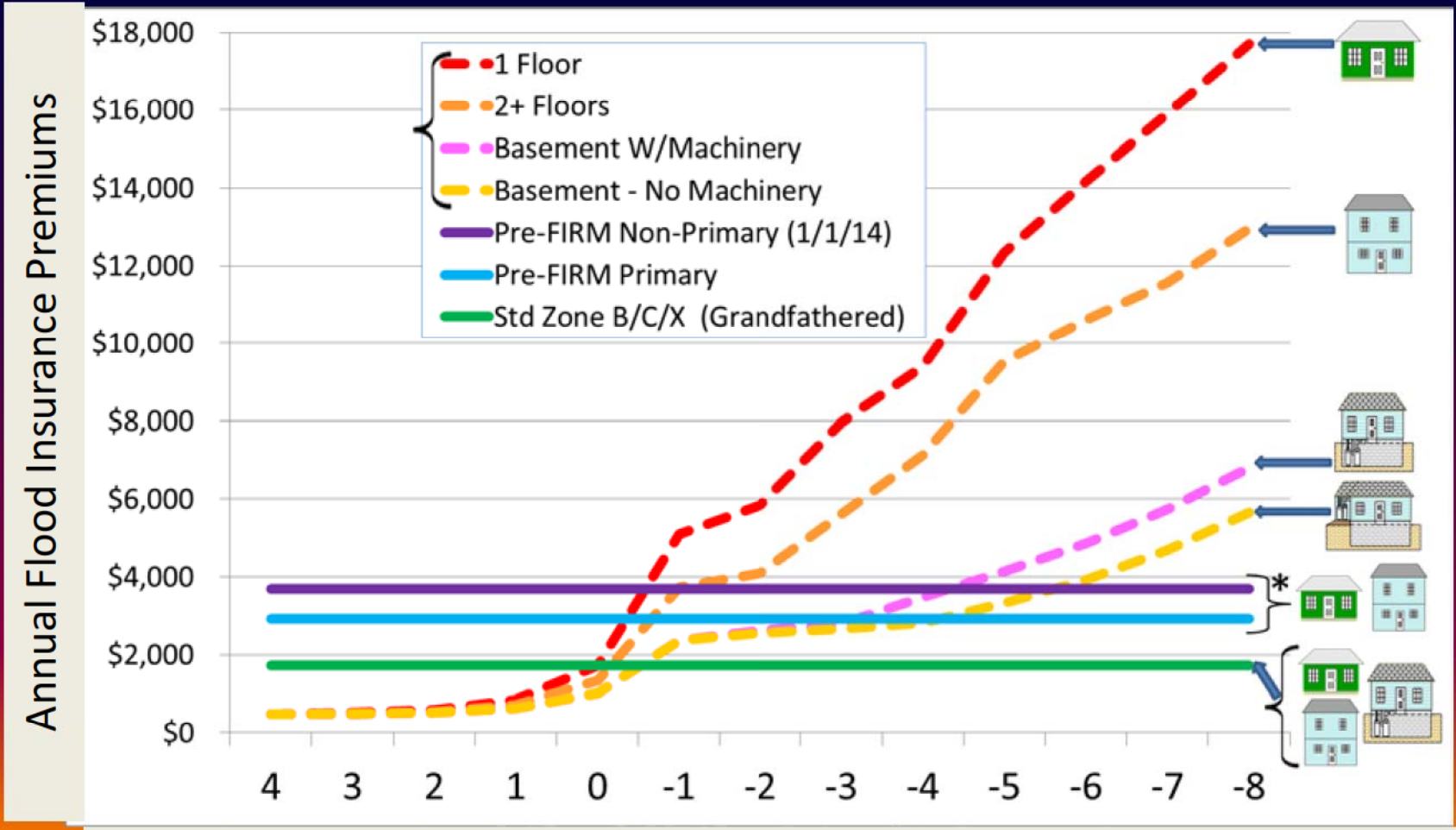
Retrofitting Structures

Encourage retrofitting compliant-when-built structures to protect against current risk and maximize insurance savings

- Install vents and ensure proper venting in lower enclosures
- Elevate equipment
- Backfill basements and lower enclosures
- Elevate structure above BFE
- (anticipate future higher BFEs)
- Relocate structure out of SFHA
- Flood proof non-residential structures

Remind people to get a permit!

Elevation and Insurance Premiums



Rates for 200K Building/80K Contents coverage on 10/1/2013 (except as noted).
*Pre-FIRM Basement Rates are a bit higher

BW-12 and Insurance Affordability

- Like future impacts of BW-12
  - **Insurance affordability, especially for those that cannot afford it #1 issue**!
    - Provision to charge actuarial rates on sale of home particularly impactful
    - BW-12 barely dealt with issue
    - Lots of good ideas out there on how to do this
  - Probably be some sort of "mini" reform of the NFIP in the next few years as actuarial rates kick in
    - **Will effort lead to bad or good outcome from a resiliency and sustainability perspective?**

ASFPMs Approach to Flood Insurance Affordability

- Principles
  1. Entire nation must be treated the same.
  2. Flood insurance premiums must move toward full-risk rates.
  3. Address affordability for those who need it. Consider means tested voucher system.
  4. Refine flood insurance rating to better reflect both risk and effective partial mitigation.

ASFPMs Approach to Flood Insurance Affordability

- Principles
  5. Develop innovative and new flood insurance approaches, such as community-based insurance and long-term policies that stay with a structure and can assist in financing mitigation.
  6. **Fully utilize and refine existing hazard mitigation programs to address flood insurance affordability**.
  7. Evaluate and implement changes in the tax code to incent mitigation.

For Consideration

- FEMA is required by Congress to establish actuarial rates.
- Current rating only looks at lowest floor and BFE.
- Other Ideas:
  - Consider depth and frequency of flooding
  - Consider partial mitigation such as elevating utilities and emptying and wet floodproofing basements
  - Consider flood-proofing of large, multi-family residential structures
  - Consider long term flood insurance financing tied to funding of mitigation
  - Consider community based flood insurance

Conclusions

- The Risks are Real!
- The Costs are High!
- Government is Less and Less Willing to Subsidize Risk.
- New Buildings need to meet Standards … And then some
- Consider Building Higher Adjacent to Flood zones … Maps can change!
- Costs of Building Higher far exceeded by Reduced Risk and Lower Flood Insurance
- BUT: This will have serious impacts in flood prone communities.