2014-2015 Winter Energy Outlook Conference

Sponsored by: U.S. Department of Energy Office of Electricity Delivery and Reliability and the U. S. Energy Information Administration

Hosted by: National Association of State Energy Officials

October 7, 2014

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CT Dept. of Energy & Environmental Protection
Executive Committee Member
CT Institute for Resilience & Climate Adaptation

The Resilience Challenge

Superstorm Sandy, August 2012 predeeded by:

Record flooding, March 2010
Tropical Storm Irene, August 24, 2011
October Snowstorm, October 30, 2011

AMERICA'S OLDEST CONTINUOUSLY PUBLISHED NEWSPAPER

Hartford Courant

VOLUME CLXXVI NUMBER 304 COURANT.COM • MOBILE.COURANT.COM TUESDAY, OCTOBER 30, 2012

SANDY FURY UNLEASHED

OUTAGES: More than 600,000 power failures in Connecticut as of Monday night.
EVACUATIONS: National Guard called out, helping in Greenwich and Darien.
FATALITIES: One person killed, two hurt in Mansfield when a tree fell on them.
ECONOMY: $10 billion to $20 billion expected in damage to the U.S. economy.

SANDY STRIKES

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Call to Action

Governor's Two-Storm Panel

PA 12-148: ***AN ACT ENHANCING EMERGENCY PREPAREDNESS AND RESPONSE***

$25 m pilot microgrid grant program

General Assembly Bi-partisan Shoreline Task Force

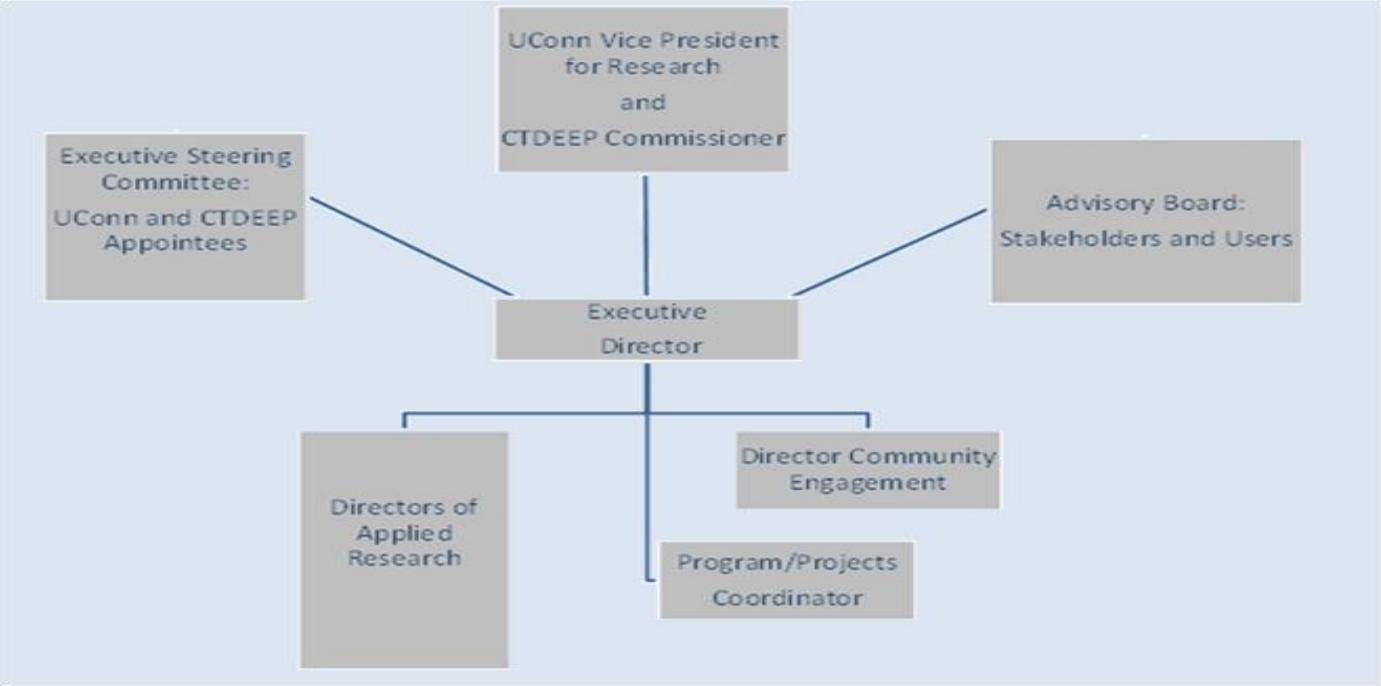
Special Act 13-9: ***AN ACT CONCERNING CLIMATE CHANGE ADAPTATION AND DATA COLLECTION***

Department of Energy and Environmental Protection and The University of Connecticut shall…establish a Connecticut Center for Coasts…that shall include, at a minimum, conducting research, outreach and education projects to guide the development of technologies and regulatory provisions that increase the protection of ecosystems, coastal properties and other lands and attributes of the state that are subject to the effects of rising sea levels

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

January 24, 2014 Governor Malloy launched the CT Institute for Resilience & Climate Adaptation (CIRCA)

Collaborative effort of DEEP and UConn with support from NOAA
DEEP: $2,500,000 UConn: $450,000 NOAA: $450,000



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CIRCA MISSION

CIRCA brings together the multi-discipline world-class research and outreach capabilities of UCONN with the policy and regulatory experience of DEEP to create and disseminate practical and sustainable strategies and policies that increase the protection of ecosystems, coastal properties and other lands and attributes of the state that are subject to the effects of rising sea levels and increased flooding.

CIRCA Focus Areas:

- Energy and Infrastructure
- Environment, Climate & Coasts
- Policy Design and Analysis

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Energy and Infrastructure Resilience

Goal: Connecting science with decision making needs to provide the basis for building more resilient infrastructure systems and helping communities and the State of Connecticut adapt to climate change.

Sample Topics

- Public utility infrastructure hardening (electric systems, natural gas, pipelines, sewage treatment plants, cell towers, etc.)
- Microgrids and energy storage
- Transportation infrastructure hardening (roads, bridges, culverts, train tracks, etc.)
- Resilient building designs
- Sustainable shoreline construction engineering (docks, seawalls, etc.)
- Living shorelines and natural habitat protection
- Green infrastructure

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NOAA Coastal Resilience Networks (CREST) Grant

- CIRCA partner, University of Connecticut awarded nearly $500,000
- 2-year grant: March 2014 – February 2016
- Part of the Sandy Supplemental funds distributed as a result of the FY2013 Disaster Relief Appropriations Act for Coastal Resilience Networks
- Goal – increase coastal resiliency in CT

NOAA CREST: Enhancing Coastal Resilience in Connecticut

- **Objective to increase CT's coastal resiliency by**:
  - Assisting with the creation of the Connecticut Institute for Resilience and Climate Adaptation (CIRCA)
  - Performing focused research
  - Creating a decision support tool for public use
- **Research Areas:**
  - Mapping Shoreline Change
  - Mapping Coastal Protection
  - Mapping Coastal Waves & Sea Level During Storms
  - Living Shorelines
- **Education and Outreach**

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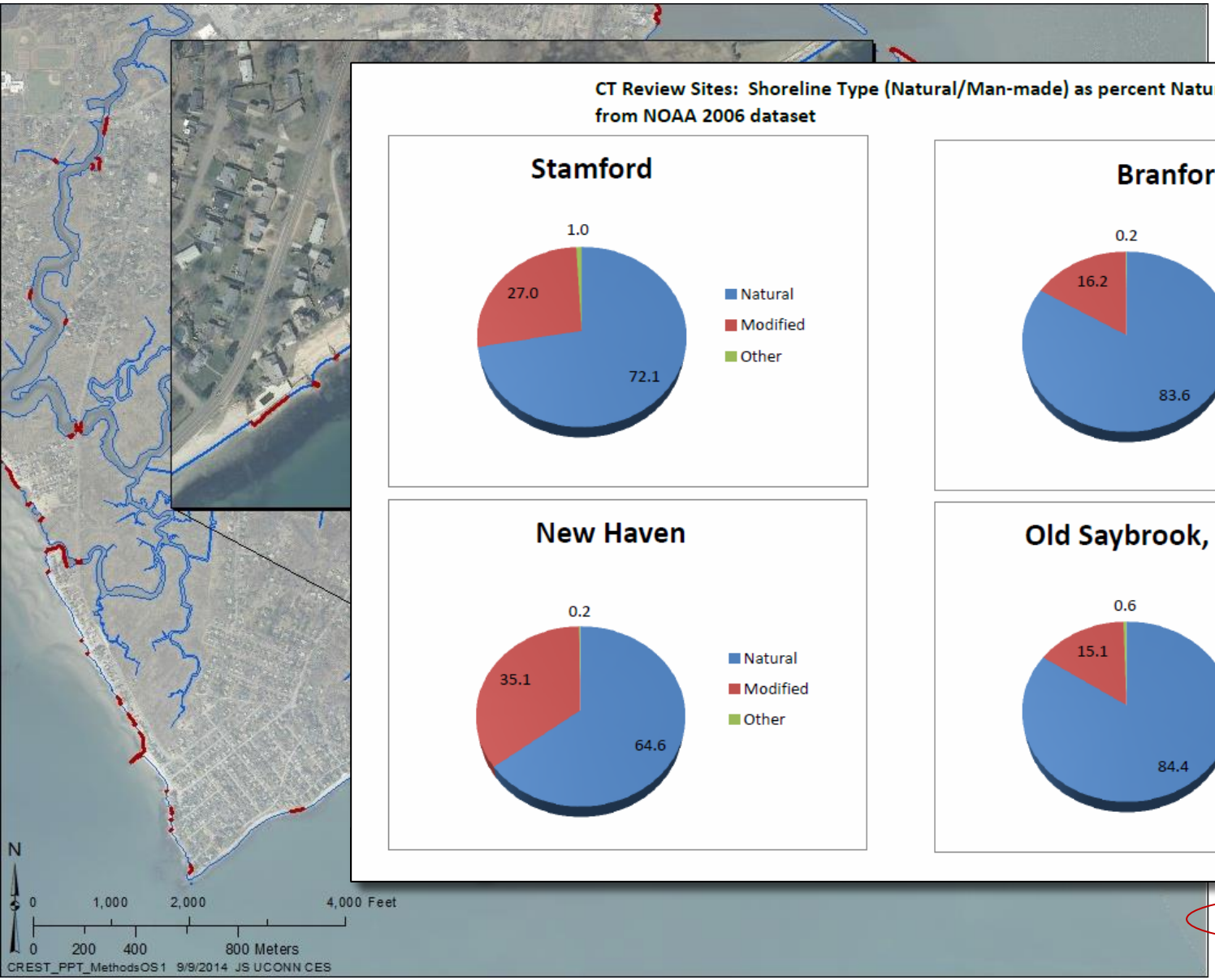
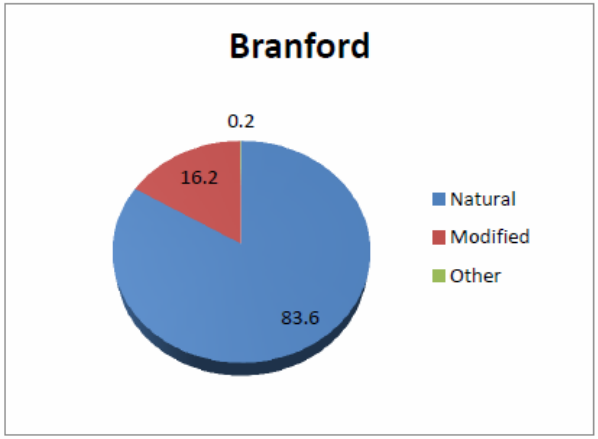
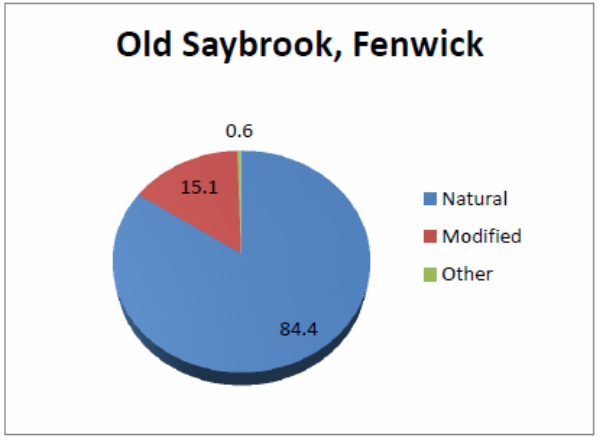
CREST – Shoreline Mapping – Existing Data



CT Review Sites: Shoreline Type (Natural/Man-made) as percent Natural/Modified from NOAA 2006 dataset





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al structure.

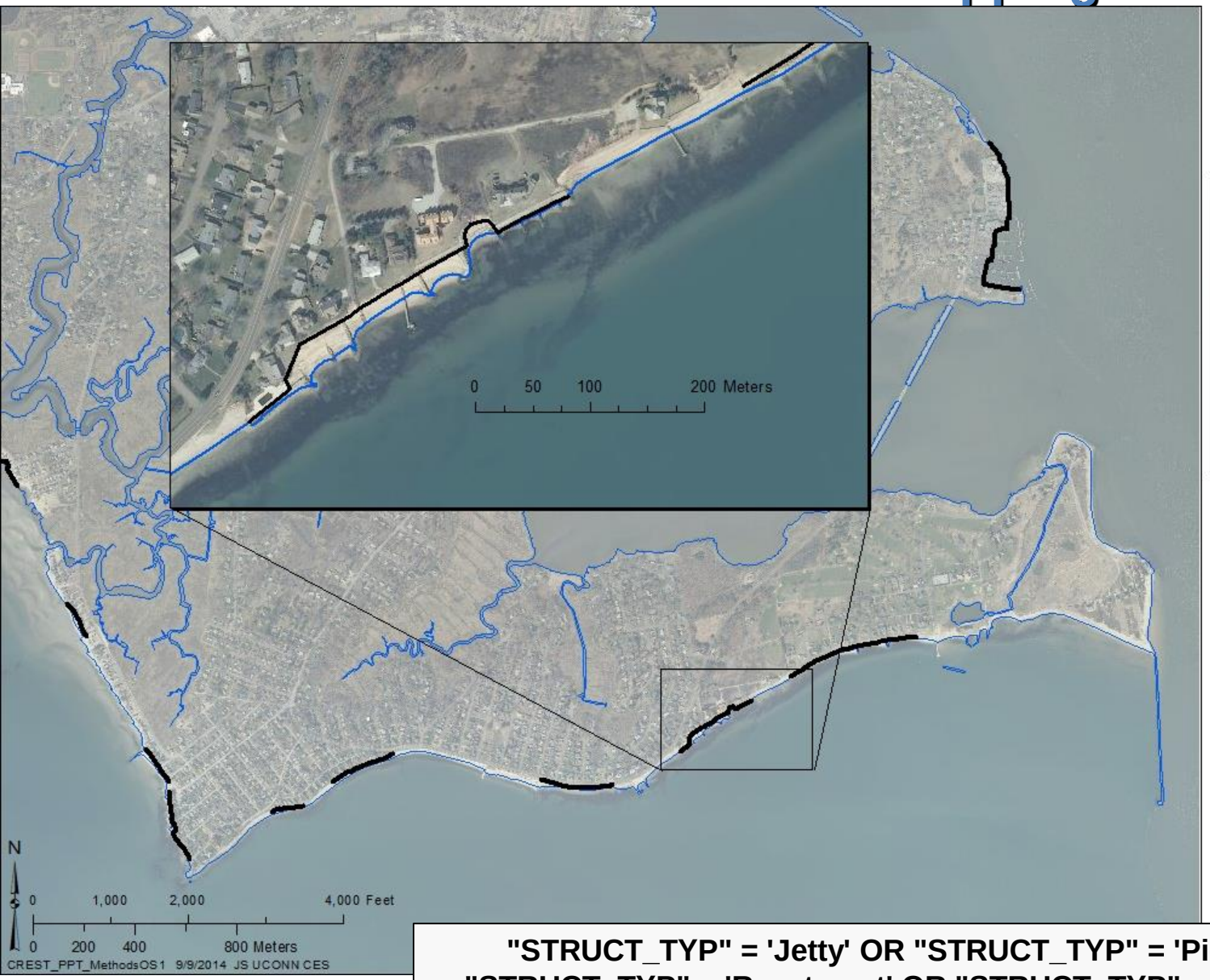
USP, FEMA
g March

NOAA CUSP - Shoreline

NOAA CUSP - Man Made

Base Image - March 2012

CREST – Shoreline Mapping



Coastal Reslience (CREST)
Site: Old Saybrook (4 mile section).

Preliminary evaluation of coastal structure.

Source Data: NOAA 2006 & CUSP, FEMA 2014, and in-house editing using March 2012 imagery as base.

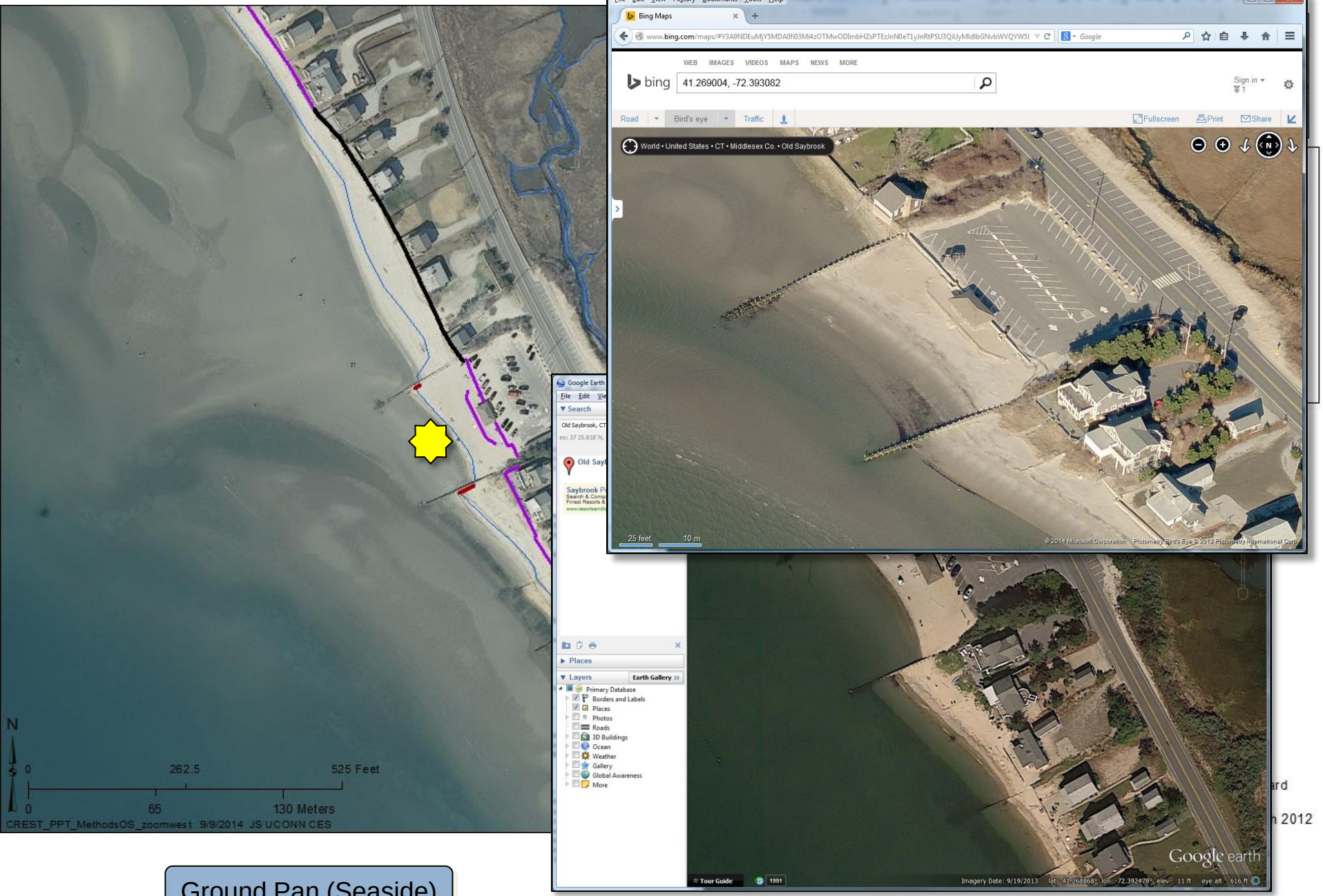
FEMA 2014 GEN_STRUCT

NOAA CUSP - Shoreline

Image - March 2012

"STRUCT_TYP" = 'Jetty' OR "STRUCT_TYP" = 'Pier' OR "STRUCT_TYP" = 'Revetment' OR "STRUCT_TYP" = 'Seawall'

CREST – Shoreline Mapping – Digitizing



Ground Pan (Seaside)

CREST - Shoreline Analysis – All Layers Combined

Coastal Reslience (CREST) draft site location - Old Saybrook (4 mile section).

Preliminary evaluation of coastal structure. Includes NOAA defined shoreline (2006) and nearest visible inland feature such as dune line (soft) or maximum potential landward movement before storm waves or SLR would encounter a hard structure (man-made or bedrock) or soft feature likely to be protected (lawn,landscaped).

Source Data: NOAA 2006, FEMA 2014, and in-house editing using March 2012 imagery as base.

Both WL and Max Reach

- Hard

Inland Features (Max Reach):

- To be categorized/field check

Shore Structure-Natural

- Hard (bedrock)
- Medium (deep rooted)
- Soft (dune)

Shore Structure-Man Made

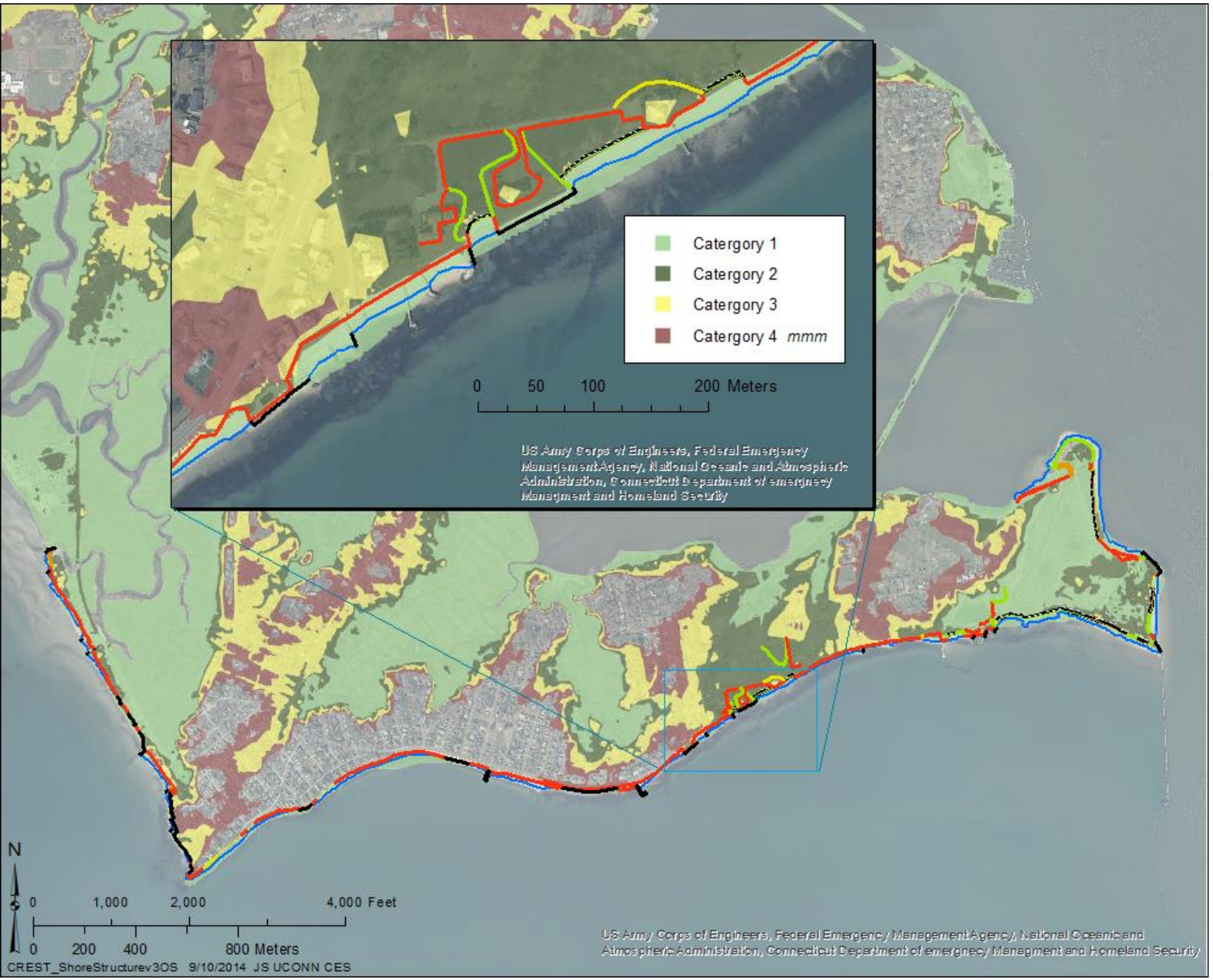
- Hard (Stone or Cement)
- Medium (Wood or Porus)
- Soft (Lawn, mowed)
- TBD

Shoreline

- waterline/beach WL

Base Image - March 2012

CREST - Shoreline Analysis – Coastal Inundation



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Shoreline

- waterline/beach WL

Base Image - March 2012

Environment, Climate and Coasts

Enhancing Coastal Resilience in Connecticut:

- Focus on understanding characteristics of coastline (wave characteristics, nature of shoreline, etc.) to assess science-based options to protect both the built and natural coastal assets.

Assessing coastline change in the last 100 years:

- Focus on understanding nature of changes over time to help determine vulnerabilities and scenarios for resilience.

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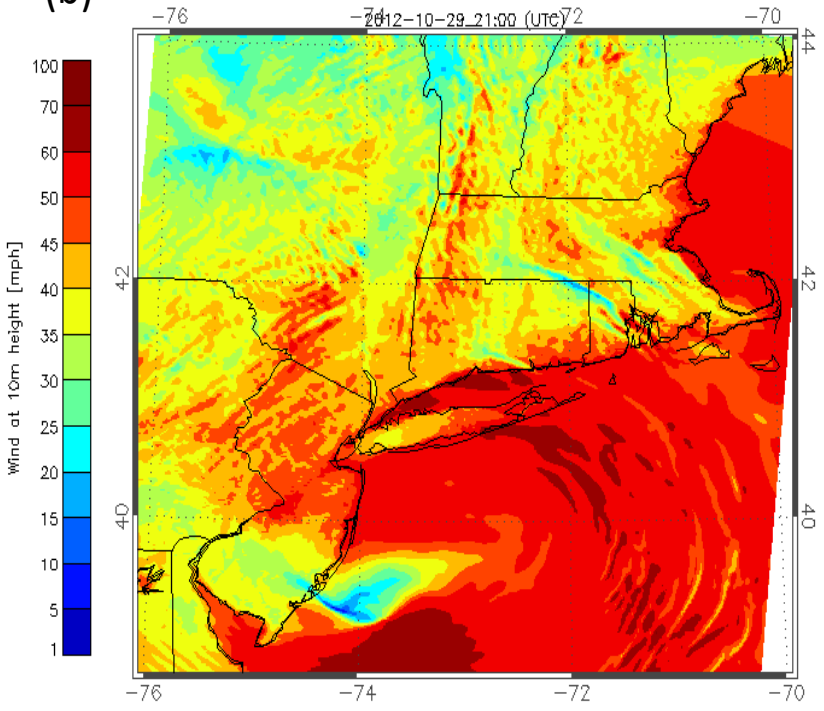
Project: Mapping Coastal Wave Statistics

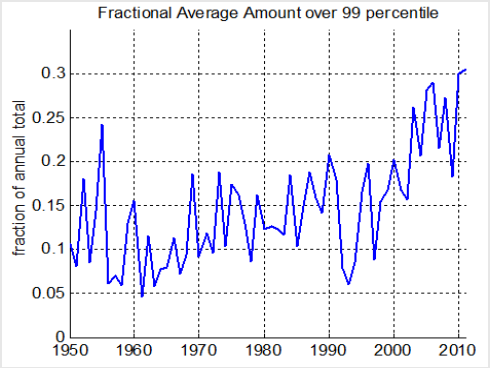
(a)

(b)



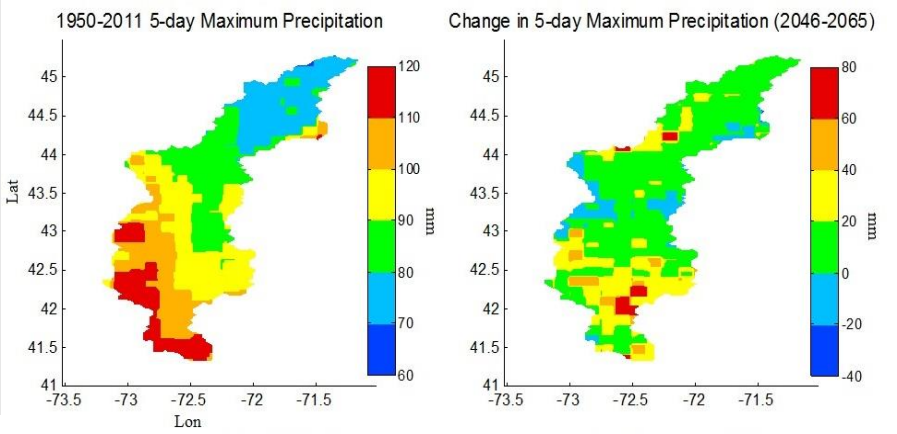
Climate Change Impact on Hydrologic Extremes

- **Trends in past climate:** Extreme precipitation in the CT River Basin increased by ~250% from 1950s to 2010s.



- **Future Projections for the Northeast:** (e.g., 5-day maximum precipitation for CT River Basin shows up to 80% increase in the mid-century period 2046-2065).

- **Combined river & storm surge flood prediction:**



Policy Design and Analysis

Climate Change Plans by Town Type

	Town type			
Plan type	Coastal[1]	Riverine[2]	Inland[3]	All Towns
Climate change action plan	46% (N=24)	13% (N=39)	5% (N=91)	14%[4] (N=154)
Climate change vulnerability assessment	58% (N=24)	10% (N=39)	5% (N=91)	15%[5] (N=154)
Natural Hazard Mitigation Plan	92% (N=24)	63% (N=43)	81% (N=102)	79%[6] (N=169)

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Policy Design and Analysis

Barriers to Municipal Adaptation
(according to planning officials)

	Town type			
Type of Barrier	**Coastal (n=24[1])**	**Riverine (n=44[2])**	**Inland (n=89)**	**All types (n=151[3])**
Lack of funding	66%	75%	71%	71%
Insufficient state/federal coord.	42%	50%	43%	44%
Lack of public information	33%	45%	33%	35%
Other issues take priority	13%	39%	38%	34%
Climate change skepticism	8%	18%	34%	26%
Insufficient private/public coord.	13%	18%	12%	14%
Insufficient staff	13%	16%	21%	19%
Other barriers	8%	2%	2%	3%

Policy Design and Analysis

CIRCA's Policy Design and Analysis program will seek to better understand the climate-generated public policy challenges facing the state and its communities.

The Policy Design and Analysis program will:

- conduct and apply research on policy design and development about climate adaptation, to help Connecticut better plan for climate impacts in the coming years, and
- actively seek input from law, economics, public policy and other relevant fields so that its research and recommendations are integrative.

Connecticut Institute for Resilience and Climate Adaptation

- **Improve scientific understanding of a changing climate and its impacts on coastal and inland floodplain communities and ecosystems;**

- **Develop and deploy natural science, engineering, legal, financial, and policy best practices for climate resilience;**

- **Undertake or oversee pilot projects designed to improve resilience and sustainability in at risk communities**

- **Create a climate-literate public that understands its vulnerabilities & uses that knowledge to make scientifically & environmentally sound decisions;**

- **Enhance the resilience of critical infrastructure systems**

- **Reduce the loss of life and property, ecological damage, and social disruption from storm**

- **Foster resilient and sustainable communities – particularly along the Connecticut coastline and inland waterways – that can adapt to the impacts and hazards of climate change**

Thank you

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