Connecticut Geospatial Information Systems Council

Storm Response and Recovery Assessment Group

Draft Findings Report
January 25, 2012

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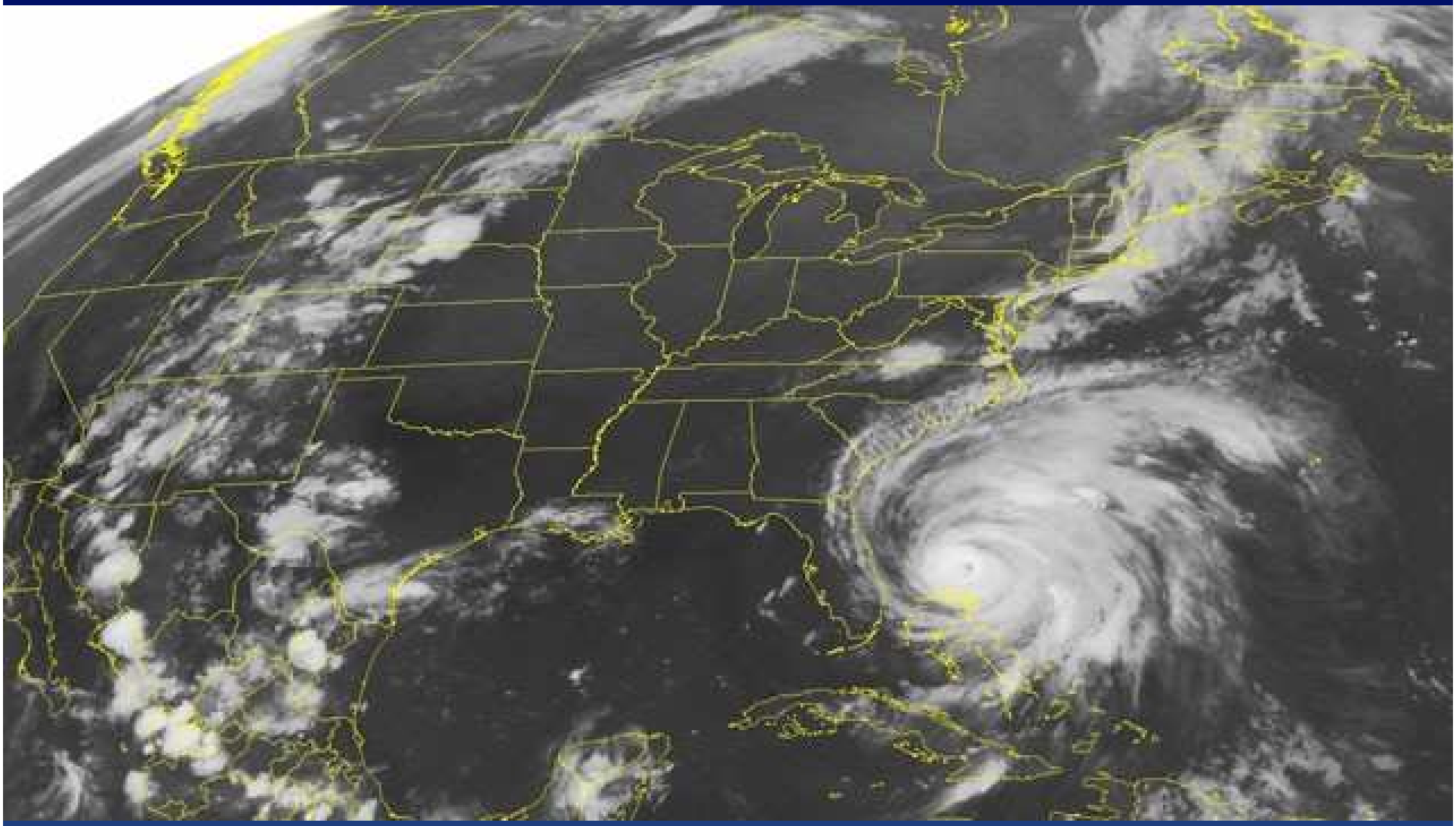
Eric Snowden

Hurricane Irene 2011
International Space Station Astronaut Ron Garan

Background

From the International Space Station, Astronaut Ron Garan tweeted on August 27, 2011 @ 3:32pm EST….

Tropical Storm Irene



NOAA satellite image taken Friday, Aug. 26, 2011, at 1:45 a.m. EDT shows Category 3 Hurricane Irene, now located about 460 miles south-southwest of Cape Hatteras, N.C

Tropical Storm Irene

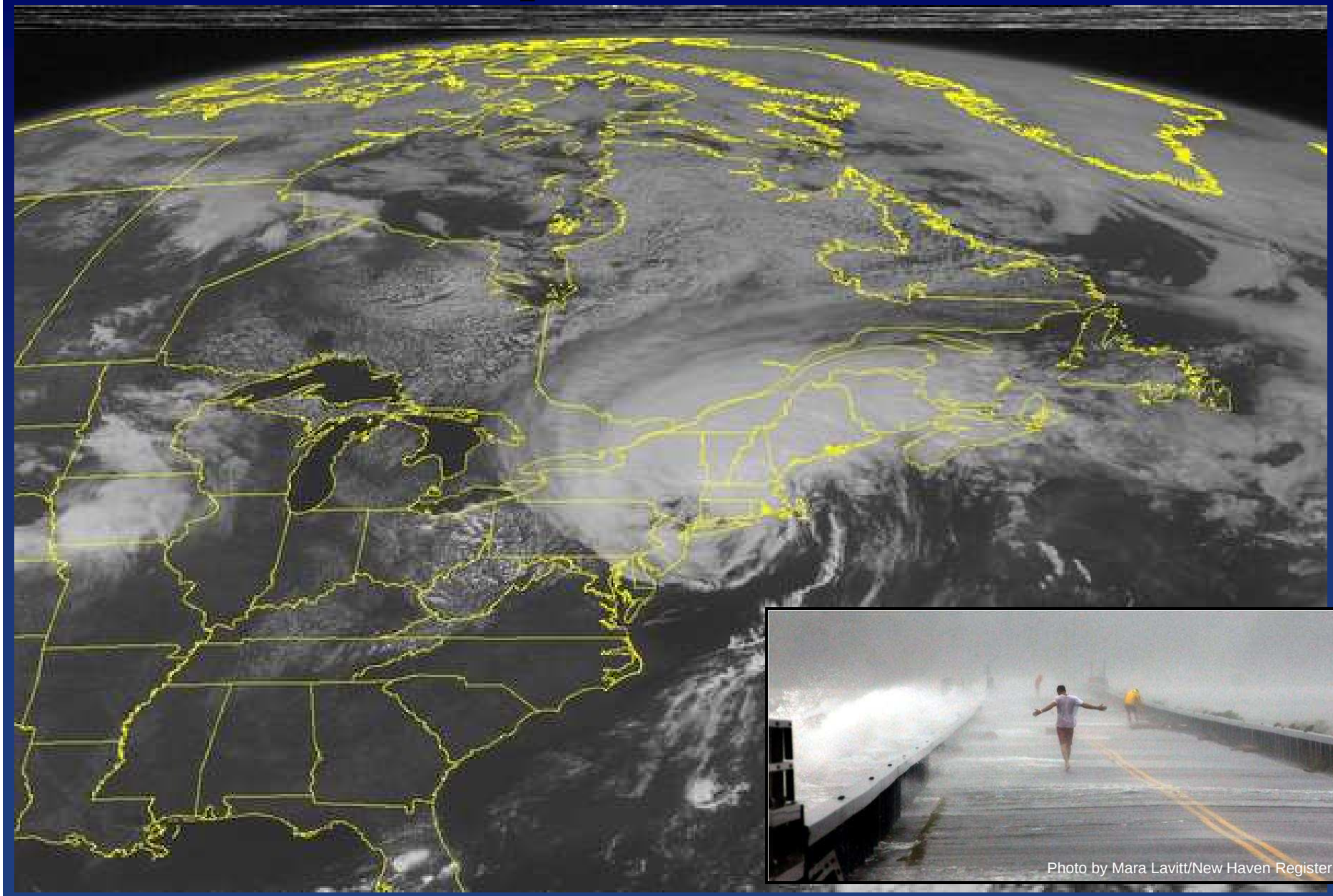
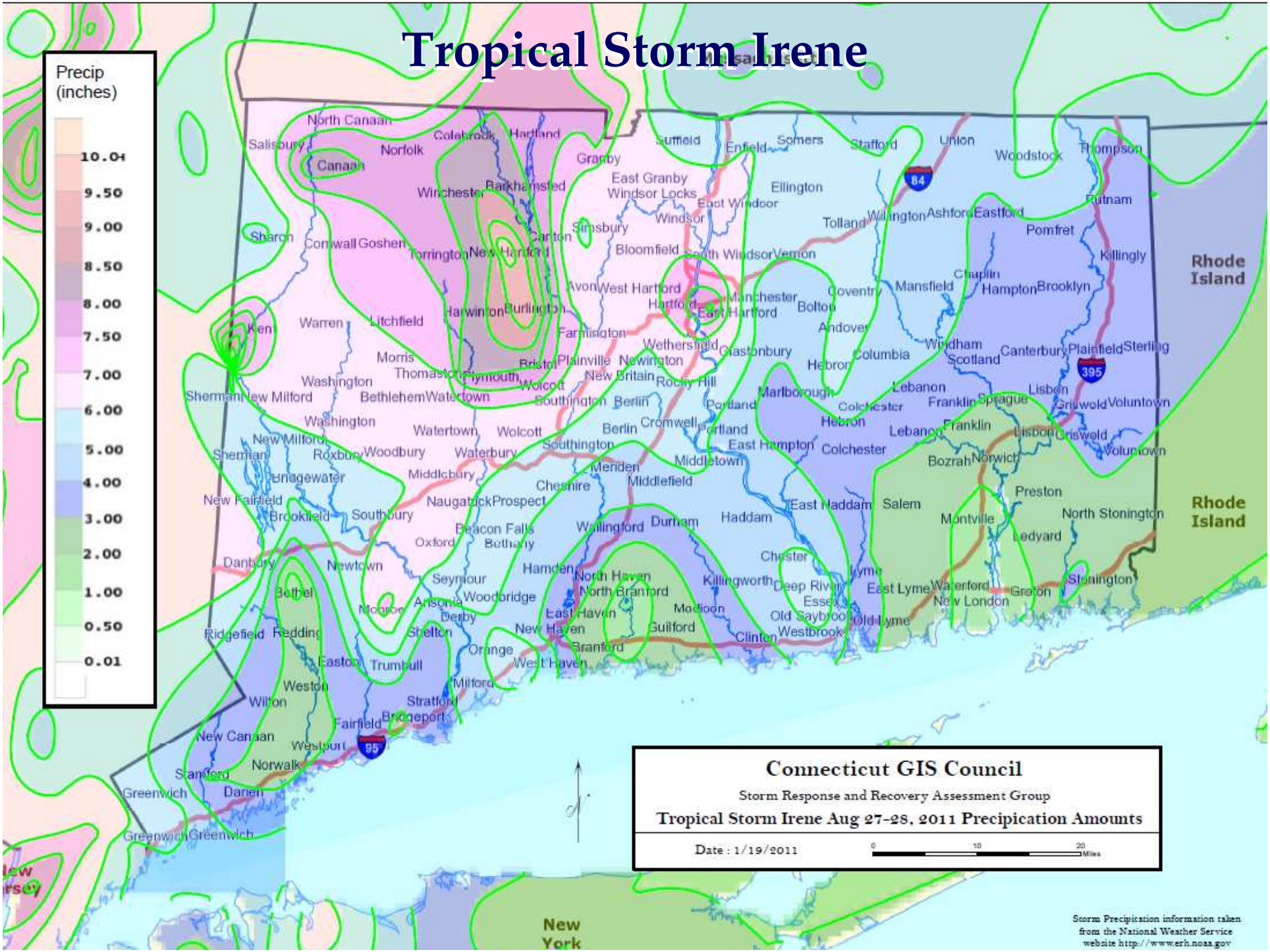


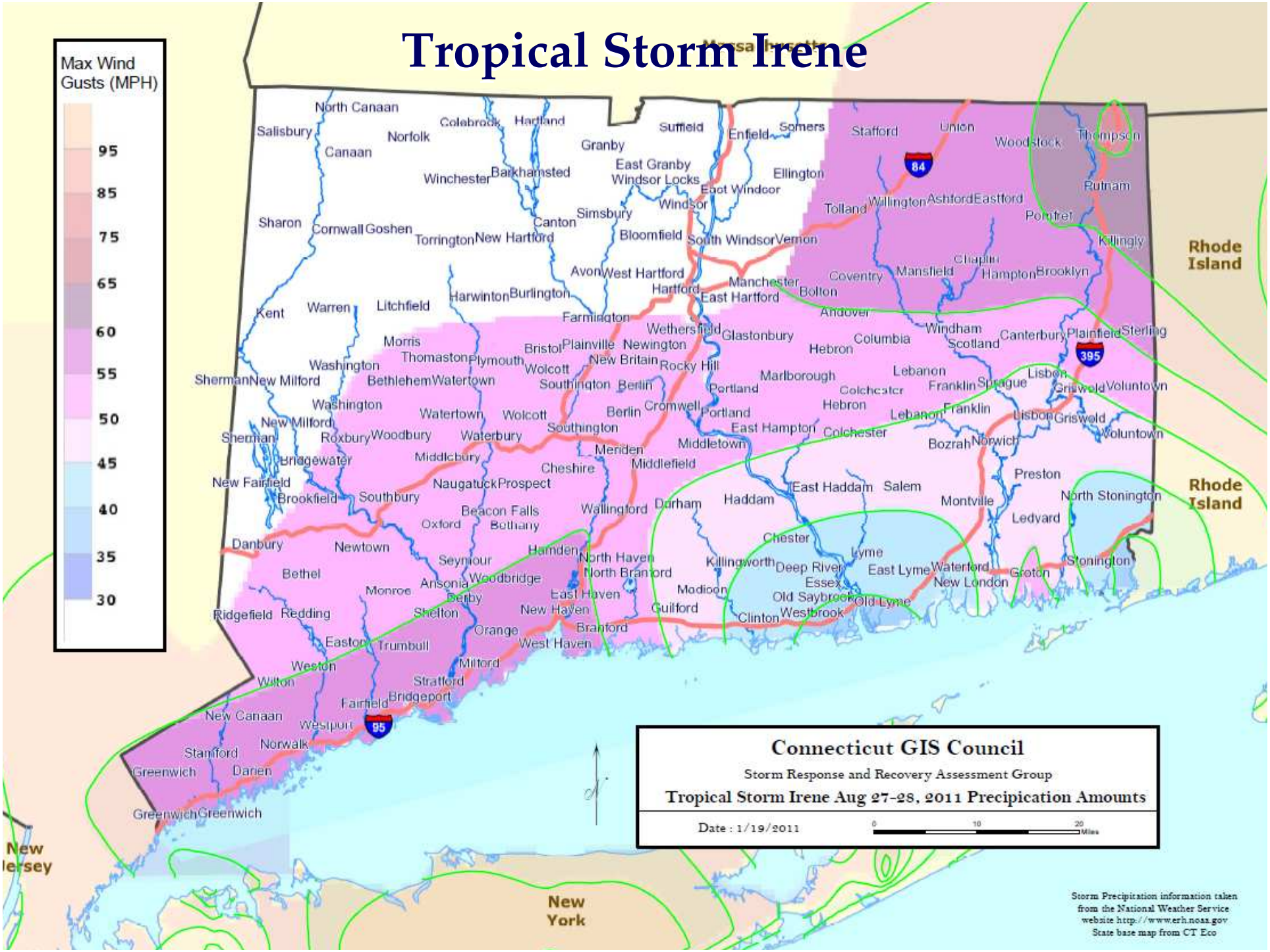
Photo by Mara Lavitt/New Haven Register

NOAA satellite image taken Sunday, August 28, 2011 at 1:45 PM EDT

Tropical Storm Irene



Tropical Storm Irene



Tropical Storm Irene

Photo: Cathy Zuraw / Connecticut Post

LONG ISLAND SOUND

Long Island

Connecticut GIS Council
Storm Response and Recovery Assessment Group
Tropical Storm Irene August 2011 Storm Surge Extent

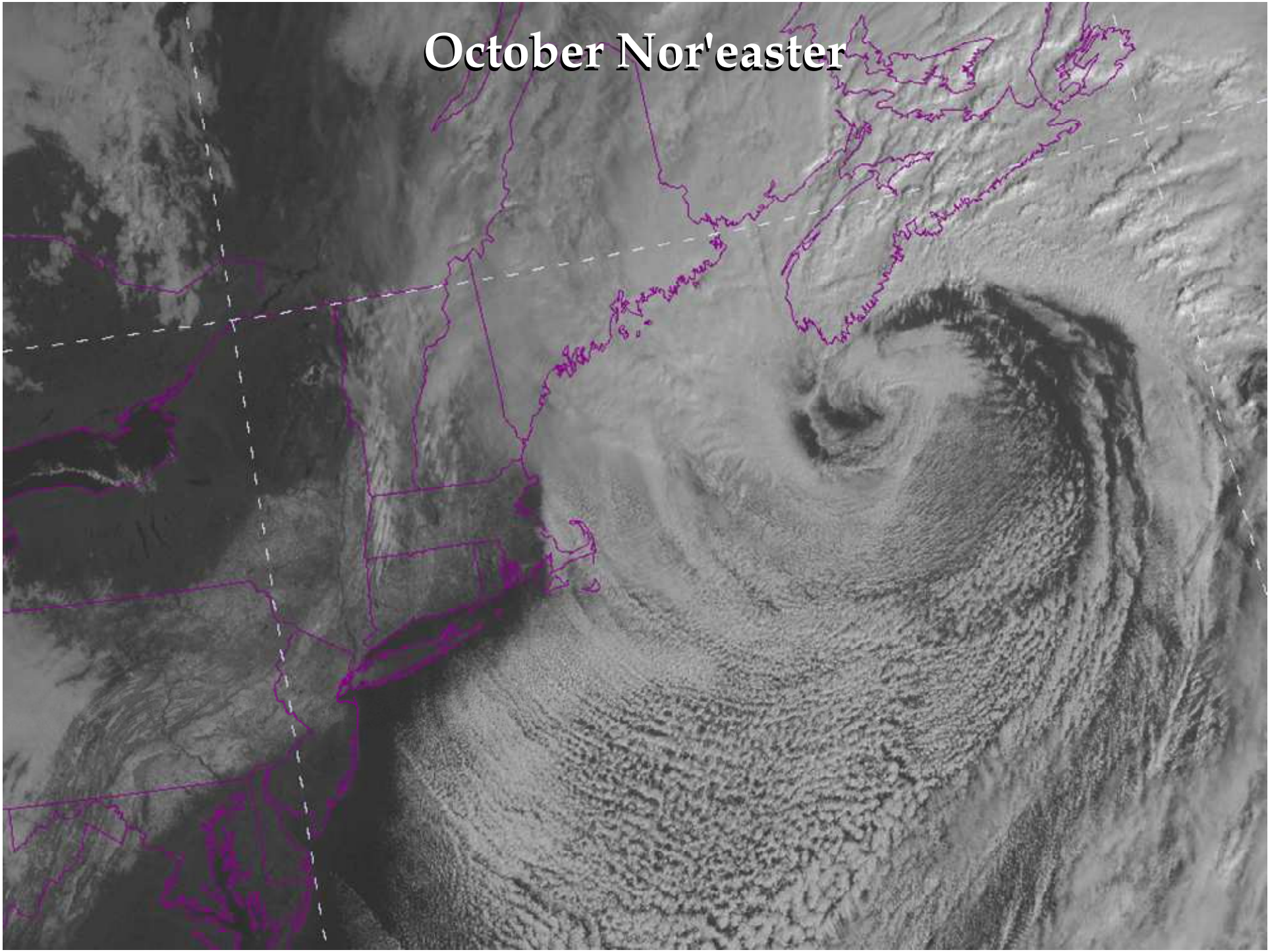
Date: 01/21/2012

0 5 10 20 Miles

Legend

Irene Storm Surge Extent (USGS/NOAA)

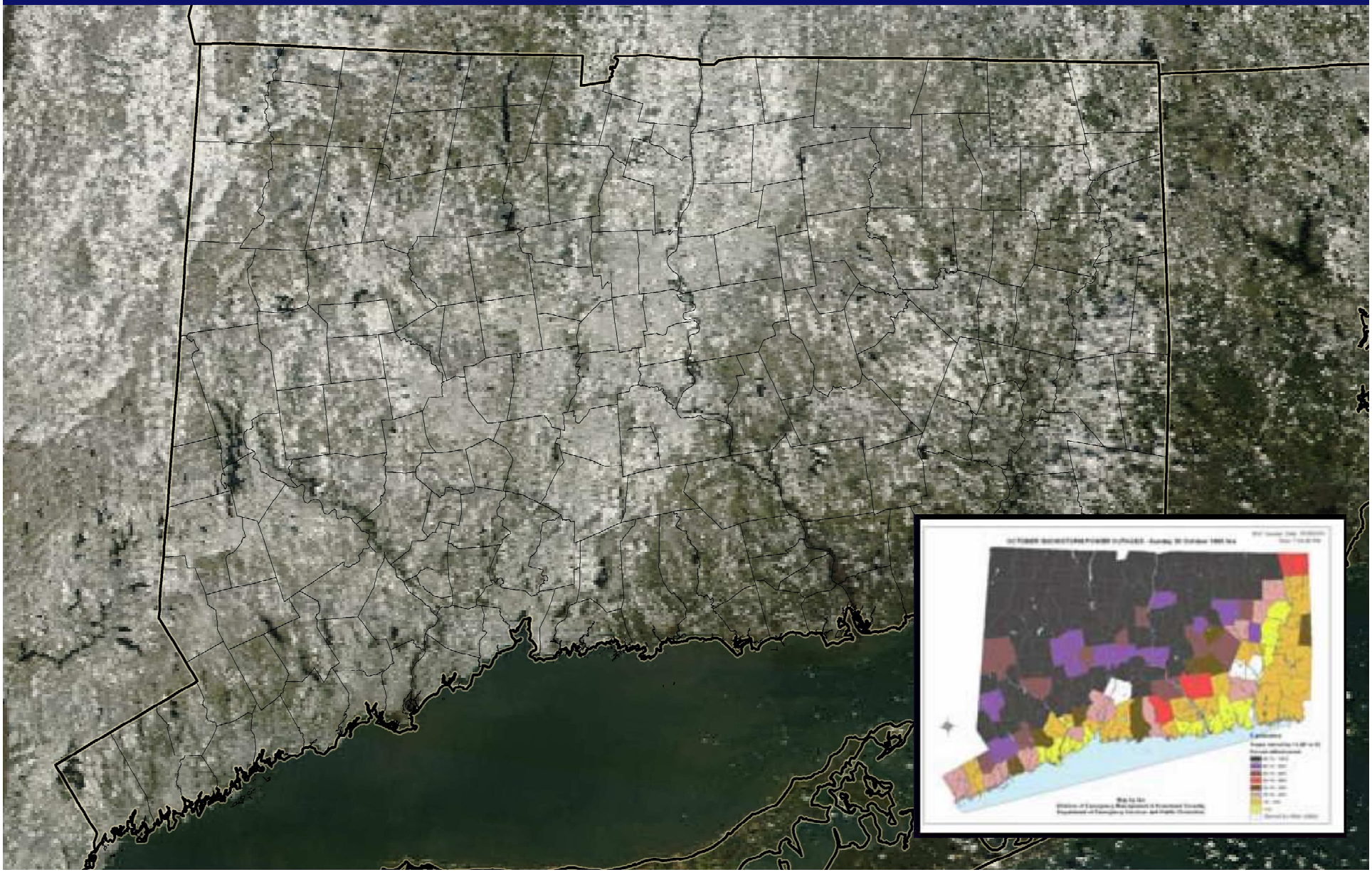
October Nor'easter



October Nor'easter

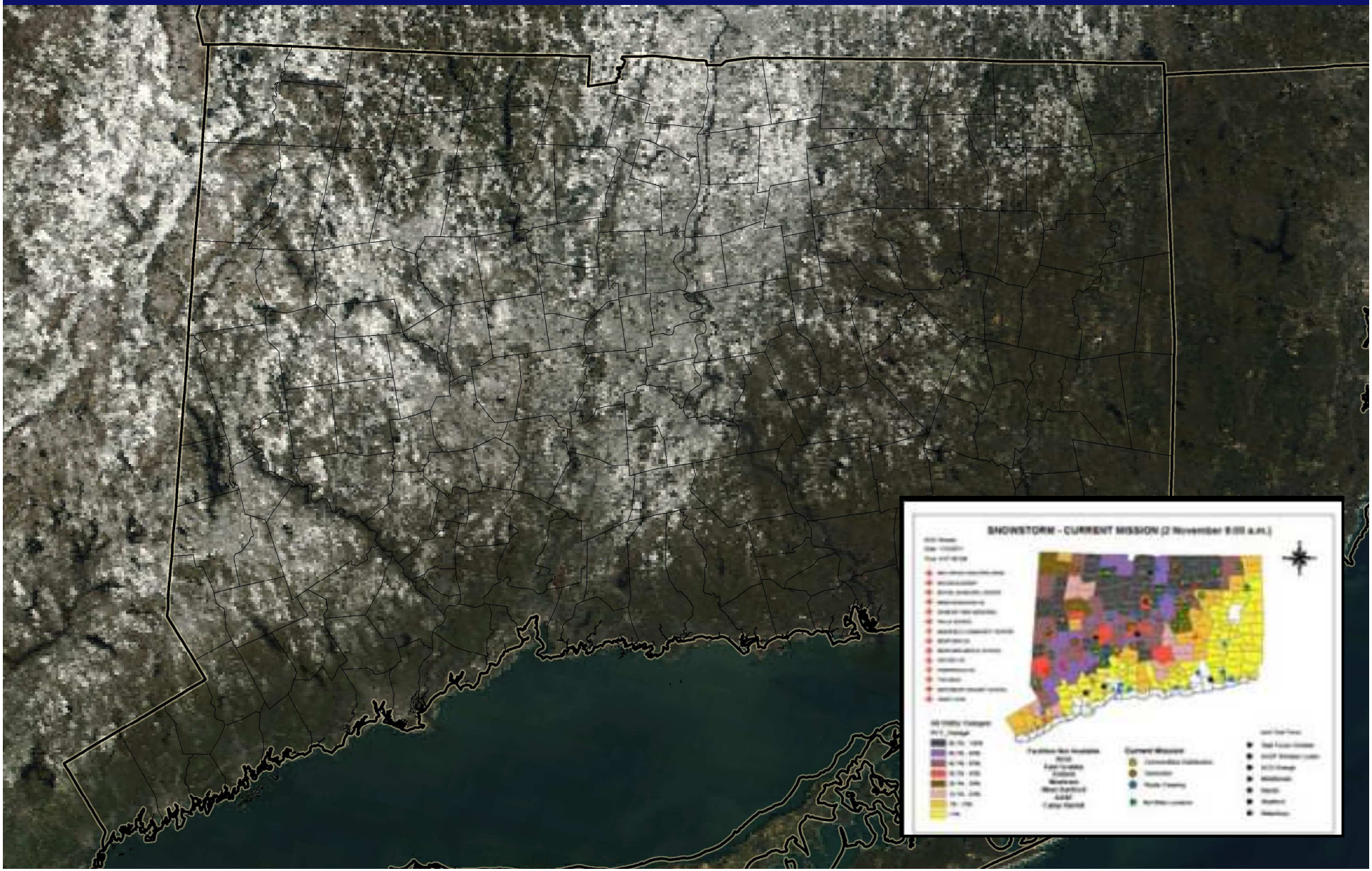
October Nor'easter

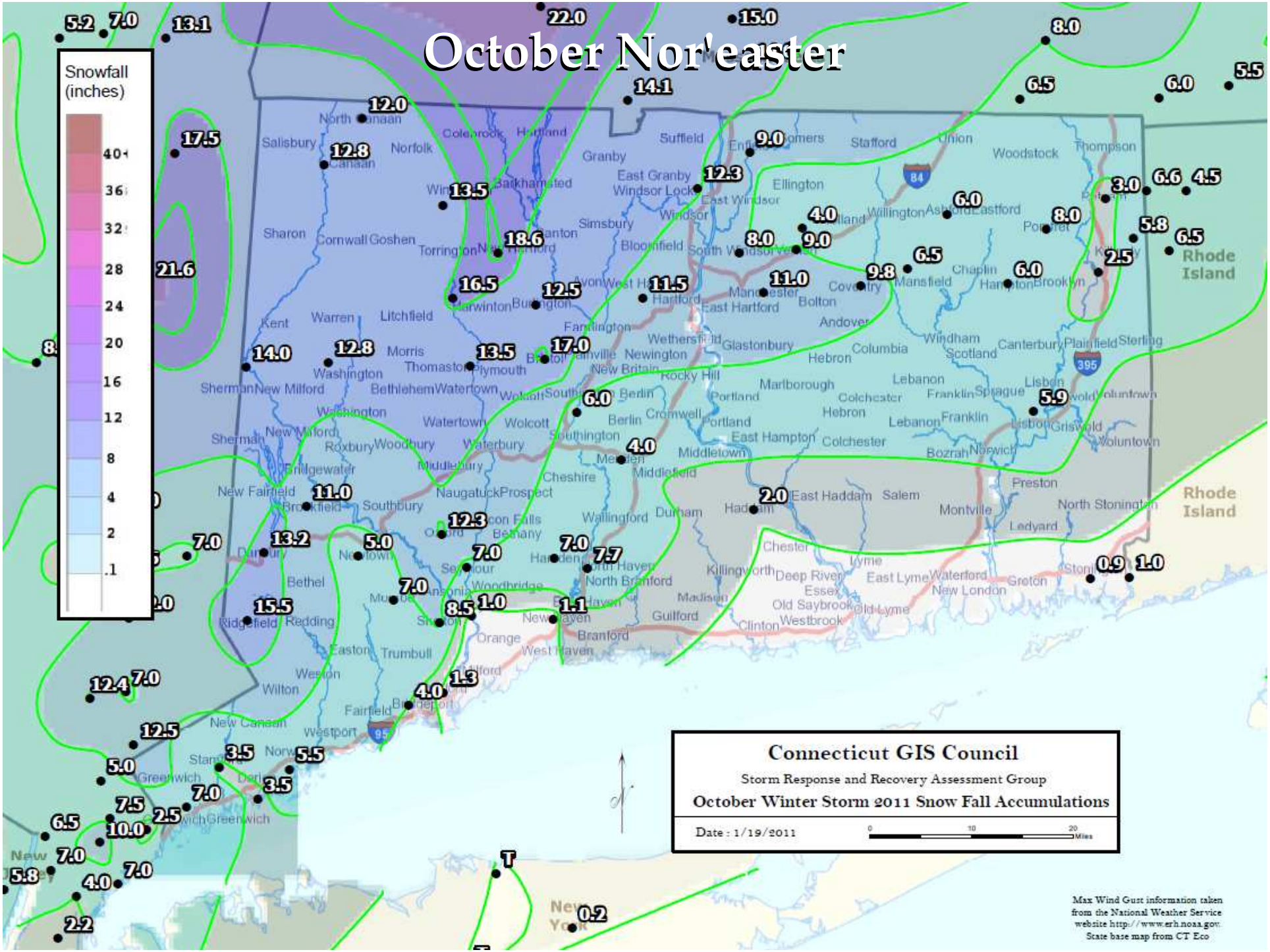
October 30, 2011 – Snow Cover



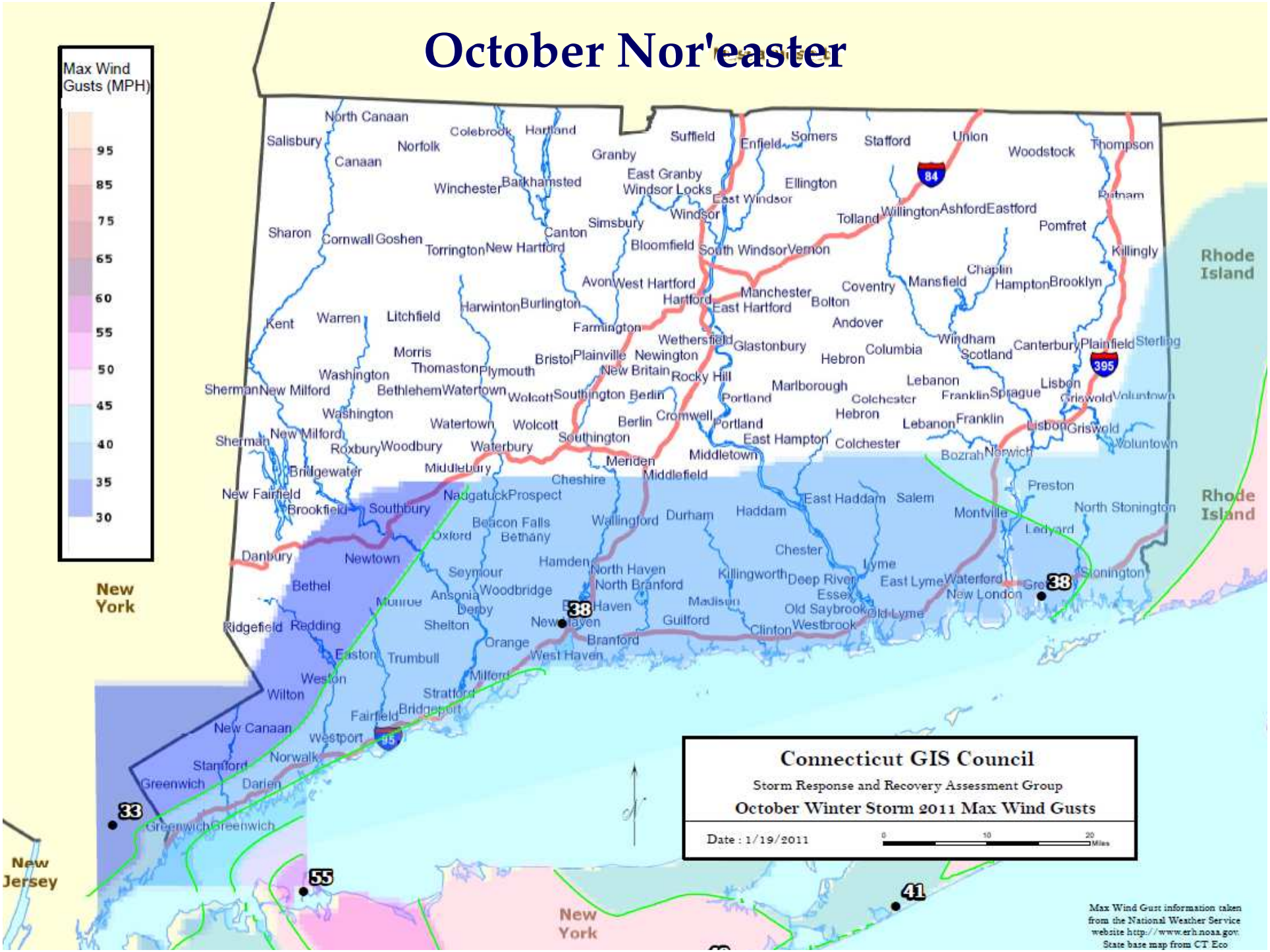
October Nor'easter

November 2, 2011 – Snow Cover




October Nor'easter
Snowfall (inches)
40
36
32
28
24
20
16
12
8
4
2
.1
Connecticut GIS Council
Storm Response and Recovery Assessment Group
October Winter Storm 2011 Snow Fall Accumulations
Date : 1/19/2011
0
10
20
Miles
Max Wind Gust information taken from the National Weather Service website http://www.erh.noaa.gov.
State base map from CT Eco
Rhode Island
Rhode Island

October Nor'easter



Background Information

On August 27, 2011, Connecticut was hit by Tropical Storm Irene, the most severe tropical storm to affect the State since Hurricane Gloria in 1985. Then, on October 29, 2011, an historic October Nor'Easter dumped snow on leaf-covered trees, bringing down limbs and power lines and causing even more severe power outages and damage.

Proposed Process for Enhancement of State Preparedness Planning
William J. Hackett, State Emergency Management Director

Credit: AP Photo

Credit: AP Photo/Jessica Hill

Photo: B.K. Angeletti / Connecticut Post

Background Information

- In response to the two major storms, members of the Connecticut GIS community voiced concerns and opportunities for greater use of GIS and data sharing in response to statewide storm events or other emergency management issues

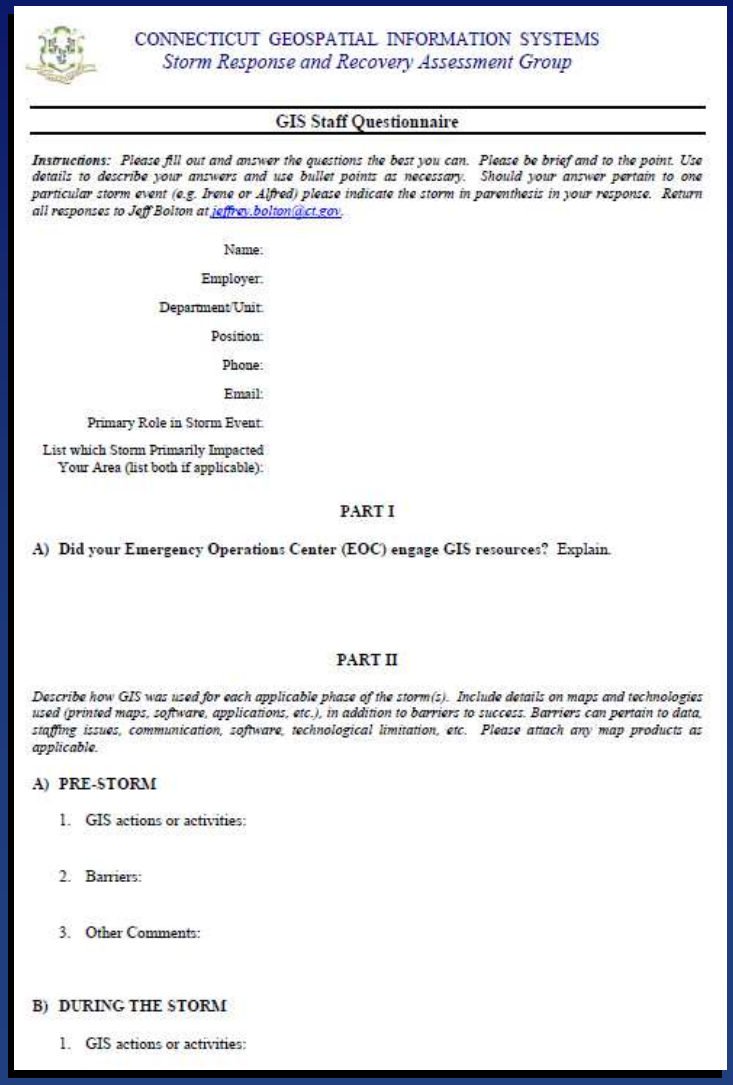
- On November 17, 2011, the Connecticut GIS Council established a "Storm Response and Recovery Assessment Group" to review the use (or lack of use) of GIS Technology during Tropical Storm Irene and the October Nor'easter

- Assessment Group's focus has been on various aspects of how GIS was used for pre-storm, storm, and post-storm response and recovery efforts at the local, regional, utility, state, and federal levels

- The goals of the assessment: identify what GIS strategies were used (or not), barriers encountered, best practices, and recommendations.

Background Information

- Divided workload; utilized the GIS listserv for contacts (Meg); created survey.
- Meg – coastal towns, data collector; Aaron – the rest of the state, map creator; Erik – regional agencies, reviewer; Jeff – state agencies, utilities, and other states



CONNECTICUT GEOSPATIAL INFORMATION SYSTEMS
Storm Response and Recovery Assessment Group

GIS Staff Questionnaire

Instructions: *Please fill out and answer the questions the best you can. Please be brief and to the point. Use details to describe your answers and use bullet points as necessary. Should your answer pertain to one particular storm event (e.g. Irene or Alfred) please indicate the storm in parenthesis in your response. Return all responses to Jeff Bolton at jeffrey.bolton@ct.gov.*

Name:
Employer:
Department/Unit:
Position:
Phone:
Email:
Primary Role in Storm Event:
List which Storm Primarily Impacted Your Area (list both if applicable):

PART I

A) Did your Emergency Operations Center (EOC) engage GIS resources? Explain.

PART II

Describe how GIS was used for each applicable phase of the storm(s). Include details on maps and technologies used (printed maps, software, applications, etc.), in addition to barriers to success. Barriers can pertain to data, staffing issues, communication, software, technological limitation, etc. Please attach any map products as applicable.

A) PRE-STORM

1. GIS actions or activities:
2. Barriers:
3. Other Comments:

B) DURING THE STORM

1. GIS actions or activities:

PART I

Did your Emergency Operations Center (EOC) engage GIS resources? Explain.

PART II

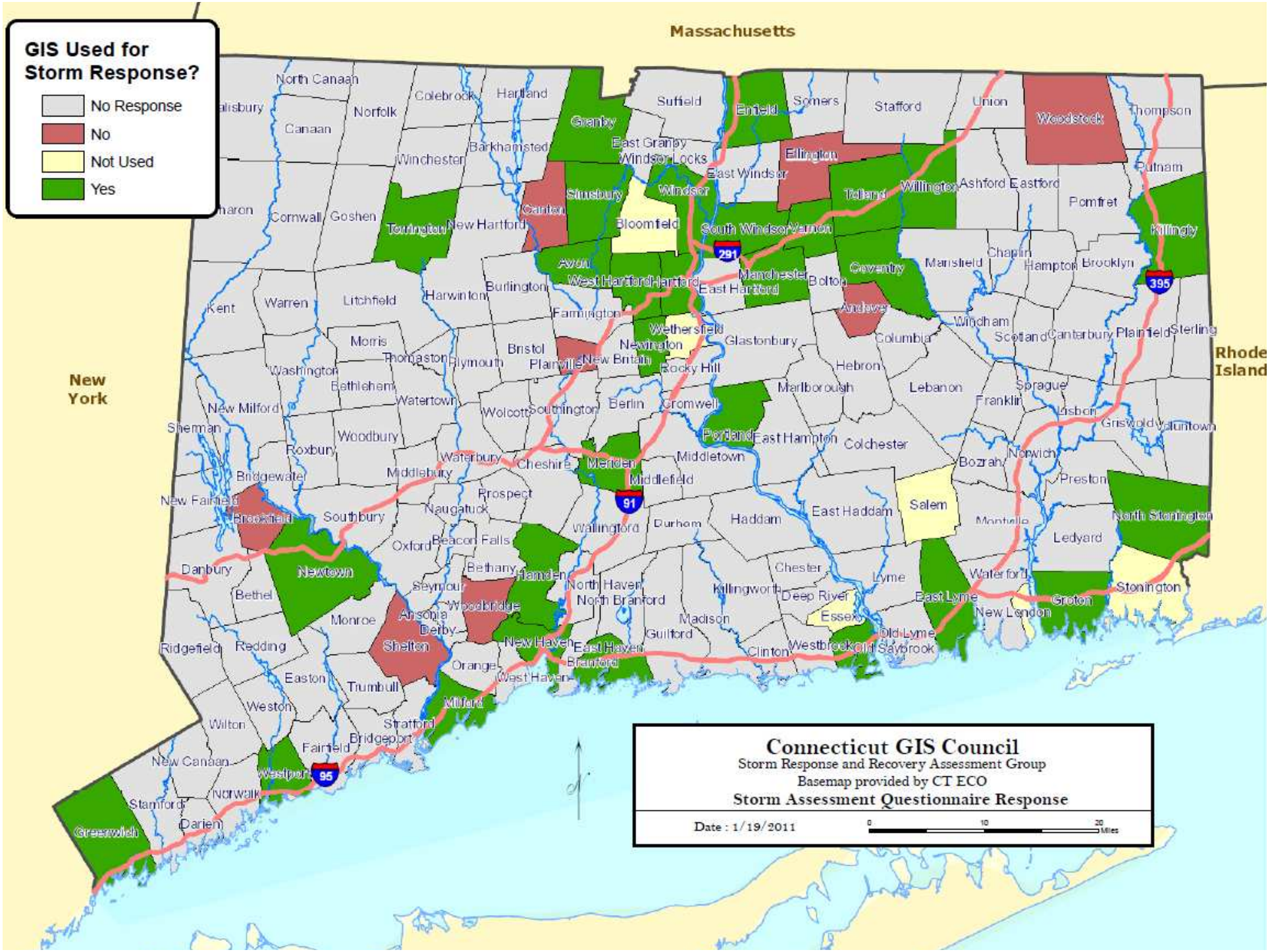
Describe how GIS was used for each applicable phase of the storm(s). Include details on maps and technologies used (printed maps, software, applications, etc.), in addition to barriers to success. ***Barriers can pertain to data, staffing issues, communication, software, technological limitation, etc.*** *Please attach any map products as applicable.*

PART III

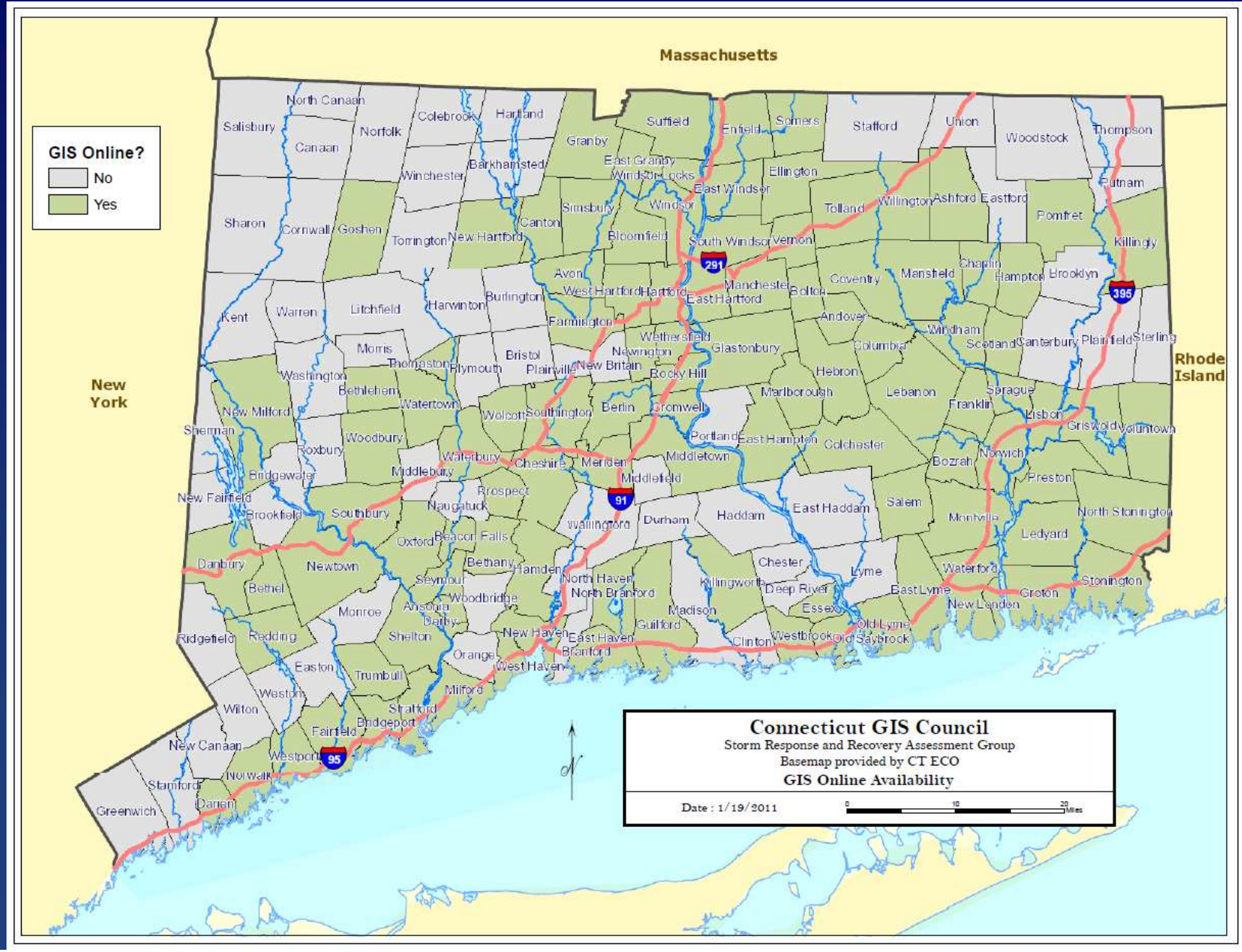
A) List your “Best Practices” that helped in the storm response and/or recovery efforts:

B) List any Recommendations on how GIS can/should be used during a local, regional, or statewide disaster:

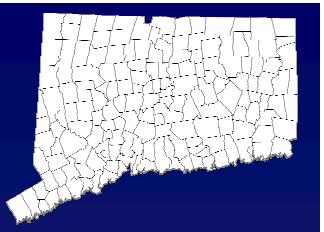
C) Other comments:


GIS Used for Storm Response?
No Response
No
Not Used
Yes
Massachusetts
New York
Rhode Island
Connecticut GIS Council
Storm Response and Recovery Assessment Group
Basemap provided by CT ECO
Storm Assessment Questionnaire Response
Date : 1/19/2011
0
10
20
Miles

Municipal Responses



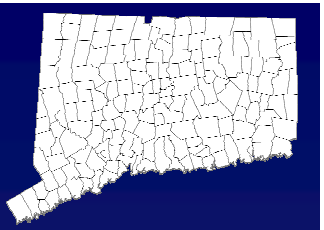
Municipal Responses
Barriers



- Data exports and time-analysis not available.
- Lack of Utility GIS data – Local; CL&P
- Need to upgrade infrastructure to allow for public access to Town managed GIS resources.
- Software - Lack of licensing for ArcMap
- Hardware - old computers; no wide format printers
- Limited personnel trained
- GIS not used to its fullest potential
- Not being able to use GIS remotely
  - Generator failed or no generator
  - No remote access

- Not being allowed to create a GIS web service of closed roads and downed wires to serve data out immediately to private/internal site

Municipal Responses
Barriers



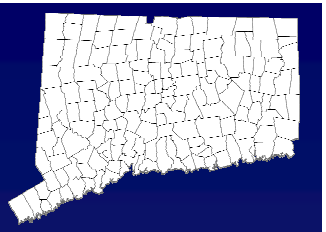
- A lack of resources hindered many small towns. Respondents noted a lack of data, software, staff and licensing. Even within towns that have GIS, responses came back from departments indicating no use of GIS.

- A lack of awareness seemed to be a significant barrier. As the Director of Planning in East Lyme stated “I suspect the limited understanding of the power, usefulness and capabilities GIS could bring to Emergency Operation Management coupled with a lack of resources…resulted in the non-utilization of GIS”.

- Internet access limitations during the storms prevented disseminating information to field crews.

- Not having staff trained in using GIS, it’s not practical to conduct training during an event.

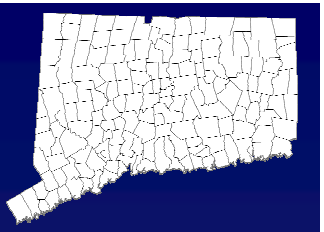
Municipal Responses
Barriers



- Manpower shortages in the field and inconsistency in damage reporting damages prevented accurate data collection for use in GIS.

- Municipal liaison did not have the resources to identify which electric grid serviced streets.

Municipal Responses
Best Practices

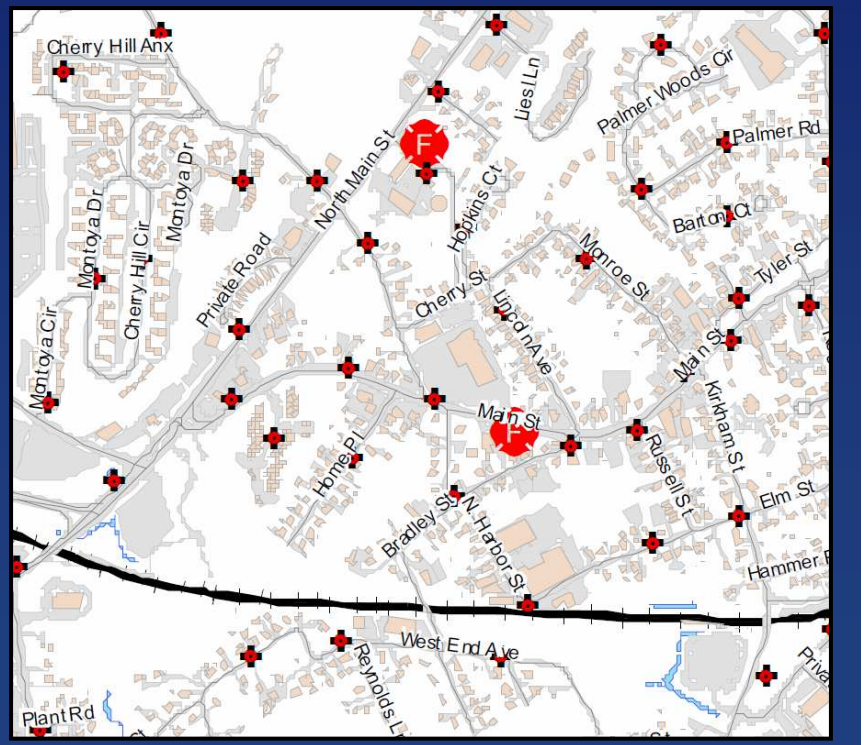


- Rapid delivery of information such as the locations of sheltering operations or travel hazards to emergency personnel for response and the citizens for safety – GIS aids this effort by providing the very user-friendly interface of a familiar map.

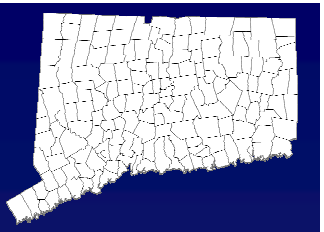
- Having up to date available data

- Having great MetaData

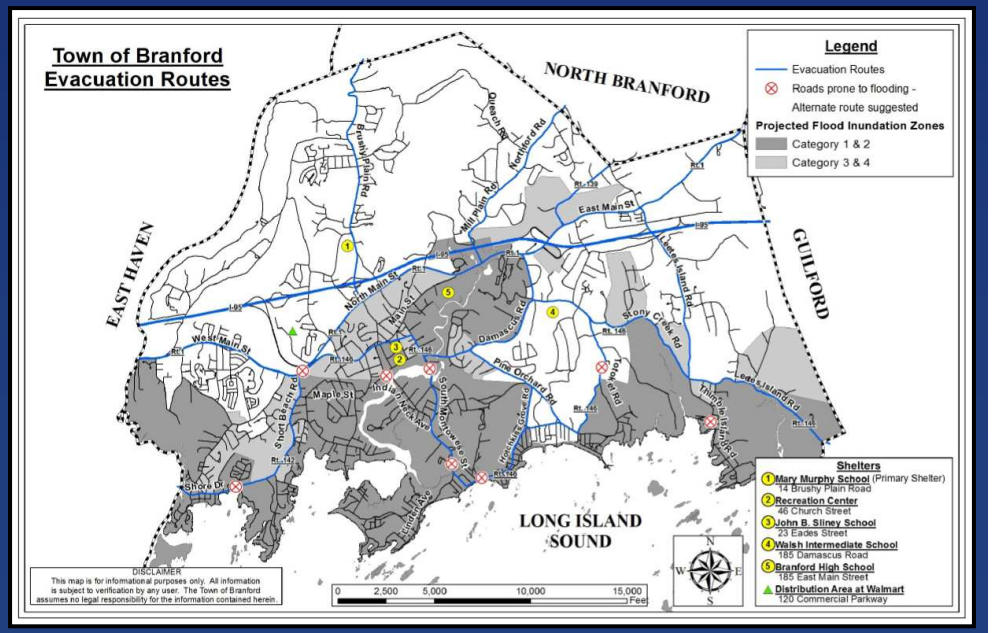
- Using GIS to organize and coordinate recovery efforts having a laptop available to remotely map incident locations



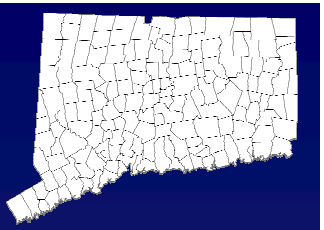
Municipal Responses
Best Practices



- Mapping Road blockages and rerouting vehicles
- Having maps preprinted and ready
- Identifying homes on well water that would need power restored first
- Making map data available online through Google maps
- Having GIS be part of the core staff at the EOC (Greenwich)
- Having GIS accessible on local C drives in case of network loss
- Using SLOSH data for pre-planning

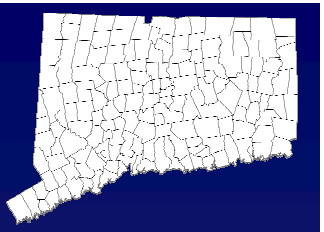


Municipal Responses
Recommendations



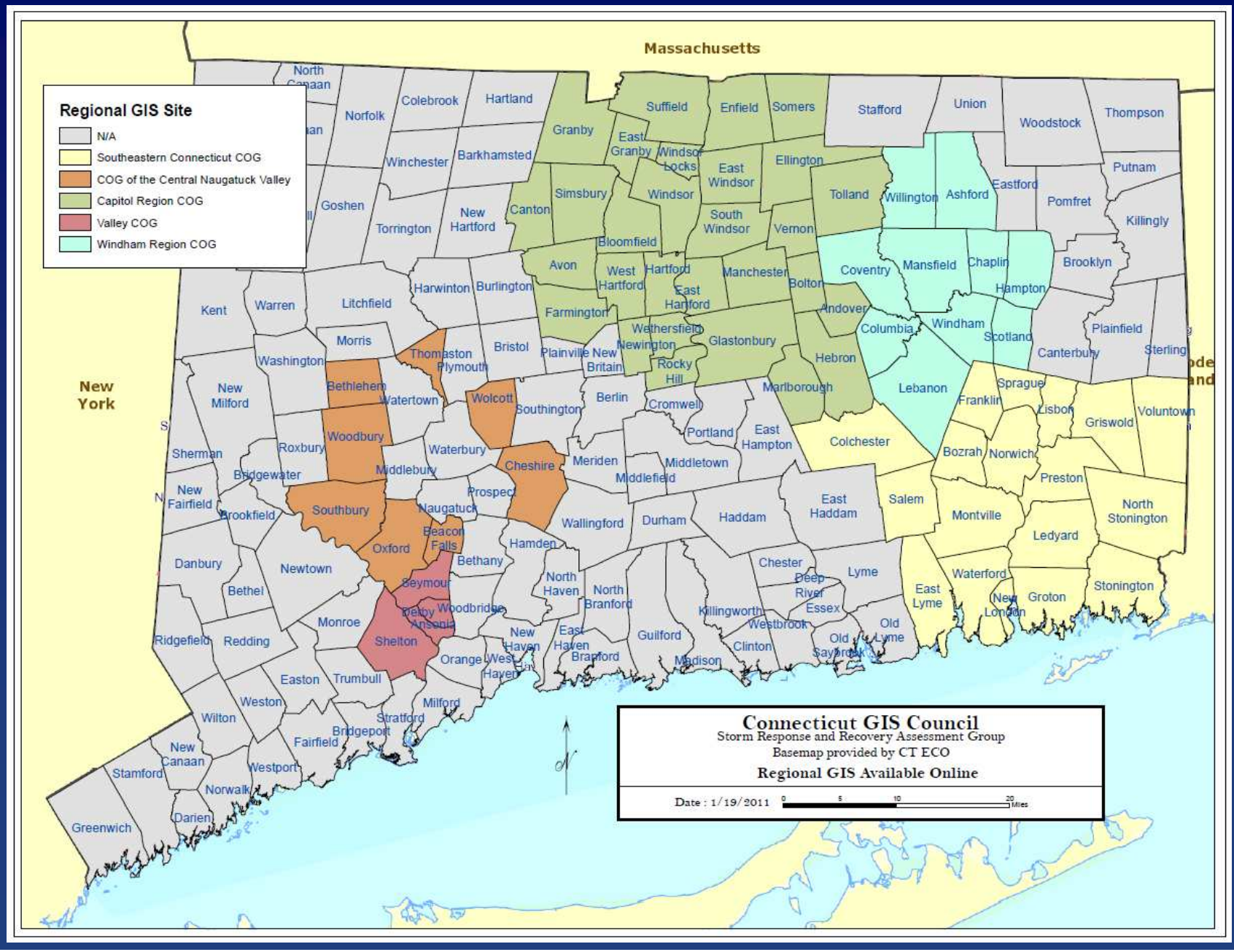
- Tap into citizen contributed information for real-time situation updates.
- Insist on the cooperation of outside agencies (i.e. utilities) to provide GIS datasets when applicable.
- State exposed GIS services for inter-town communications and resource sharing. A data-sharing, state-wide technical working group may facilitate this effort
- Provide towns with no GIS a simplified ArcReader application that can be run on a low end PC with basic data that could help print maps free, easy and standardized flow of GIS data from Towns with GIS capabilities to a centralized location that posts all data for everyone to access over the internet
- Utilize ESRI's emergency response view for a state wide implementation
- One suggestion is to examine the overwhelming response of GIS practitioners to volunteering worldwide through GISCorps (www.giscorps.org).
- Have a state wide GIS Coordinator to organize state wide GIS data and create a disaster plan to work with municipal GIS staff

Municipal Responses
Recommendations

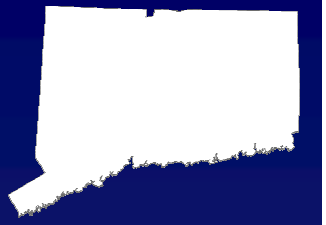


- Regional communication to share resources
- Educating decision makers on the importance of GIS, not just for emergency management
- Better mapping of critical infrastructure
- Communication improvements with utility companies
- Statewide GIS system

Regional Responses



Regional Responses



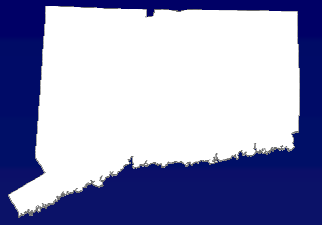
Barriers: n/a

Best Practices: n/a

Recommendations:

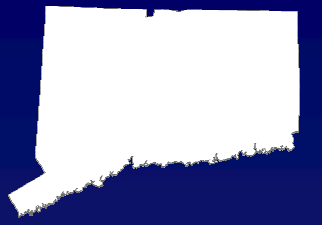
- A state level GIS Emergency Response team (volunteers and/or paid) could be called into action when an event occurs. The important data layers and web sites need to be in place BEFORE an event.

State Responses
Barriers



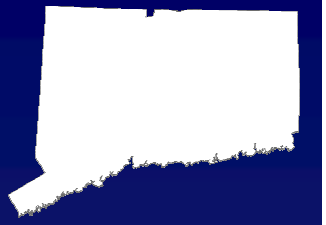
- New disaster planning personnel requesting GIS services without understanding how GIS can be applied as it relates to the department's response and recovery efforts.
- Within the department, uncertainty in knowing what data would be most useful during/after an event. Lack of communication and understanding of data needs between planners and GIS staff.
- Lack of inter-agency GIS coordination and lack of coordination/ understanding between data custodians and State GeoLab and EOC.
- Key employees not being able to get to work due to power outages, road blockages and/or unable to access computers, internet, and phone, or state building closed. This limited the use of GIS/maps soon after the event.
- Agency GIS Manager was not aware of any other available GIS shapefiles or live GIS feeds for CT road closures or utility outages.

State Responses
Barriers



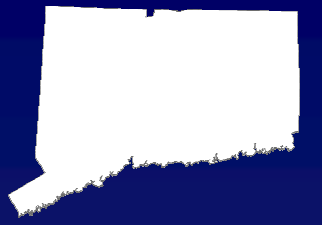
- Inability to gain feedback on the use of prepared maps and data; no feedback from EOC managers on the utility of the GIS resources and maps.
- Achieving complete 24-hour coverage of GIS staff in the state EOC over several days.
- Having to manually update outage information and shelter datasets for maps because GIS and tabular data are not integrated.
- More GIS workstations are needed in the State EOC.
- Software crashing and map export problems
- Technical GIS staff not included in EOC outbrief meetings and not part of the EOC storm response and recovery strategy meetings

State Responses
Barriers



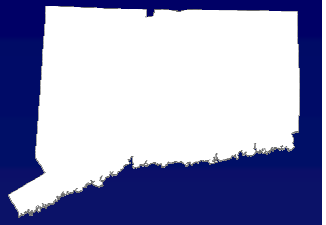
- Divide in coordination, communication, and understanding between EOC managers and planners and those with technical GIS abilities.
- Lack of training or understanding at the management/decision making level of available data and how GIS can be used to streamline traditional information gathering.
- Bureaucratic barriers that inhibit or discourage proactive communication/ coordination between technical GIS staff and utility personnel/technical GIS staff.

State Responses
Best Practices



- Utilizing the most current data layers available.
- Distributing necessary information before the event occurs.
- Presenting necessary information in multiple formats to meet different needs.
- Distribute necessary information using multiple methods so it is available from multiple sources should some not be available during/after an event.
- Utilizing established facility emergency evacuation relocation plans.
- Having at least three technical GIS staff in the Geolab per shift, two plotters, and a laser printer for EOC briefings.
- Coordinating between National Guard and State EOC to prevent repetitious map making.

State Responses
Recommendations

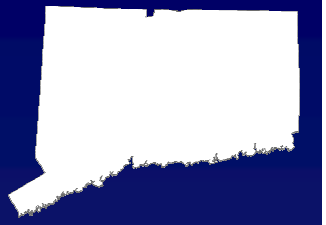


- There should be two statewide GIS web applications (using ArcGIS Server) (one public-facing and one secured with sensitive-critical data layers included) that allows the public to view changing natural disaster data, road obstructions/delays, more detailed power outages based on neighborhoods locations, and status/estimates for repairs in as close to real-time as possible.

- State agencies' GIS representatives should have access to the secured site, MapServices, and be able to develop custom views that show only the layers most relevant to their own business but have others available as needed.

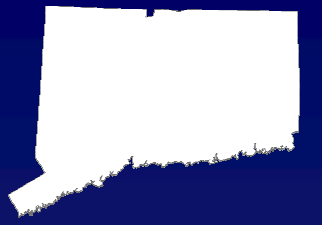
- State agencies and utilities should make their GIS data available to other state agencies and municipalities for planning and disasters.

State Responses
Recommendations



- Flex viewer to show open shelters by towns to make it easier to keep the general EOC staff up to date.
- Need utility companies to release data layers so the state can organize relief efforts more efficiently.
- A fully documented central repository for state-wide GIS data and related map services, available to all agencies, would be beneficial.
- The ability to identify through an automated or semi-automated process, which wireless telecommunications sites are out-of-service at a given time to help prioritize sites to be restored quickly.
- Have the Connecticut Siting Council collect or have the ability to gain access to information regarding wireless telecommunication sites and electric transmission lines that failed during or after each storm and the reason for that failure to map potential problem areas.

State Responses
Recommendations



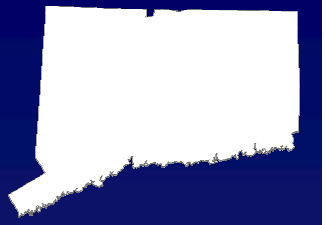
- Collection of the storm data may also help the Connecticut Siting Council in siting of these facilities in such a way as to avoid the occurrence of faults in the system in the future.

- Conduct training sessions for GIS staff (state, regional, local) and EOC managers to expand the understanding of available GIS data, discuss strategies, forecasting-predictability modeling, post-event assessments, and GIS analysis relating to potential natural and human disasters.

- Develop a GIS support network through the GIS Council, GIS User-to-User Group, and listserves prior to events. Designate a person or small group that processes multidiscipline skills and competent in GIS and data knowledge to coordinate GIS needs across the state.

- Fully integrate GIS into the EOC response and recovery efforts by embedding trained-technical GIS staff in all EOC briefings and strategy meetings.

State Responses
Recommendations



- A permanent working group of the GIS Council should be created to provide a forum for utility companies and governments to discussion and promote mutual benefits through GIS and promote the sharing of GIS data across various entities.

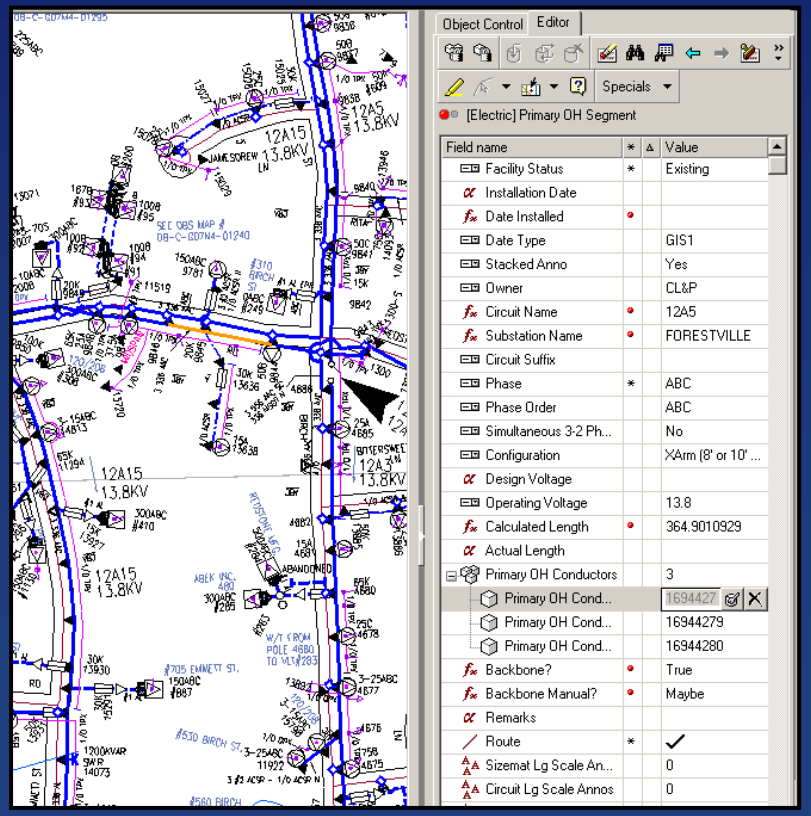
- Utility companies with GIS should be encouraged to attend and participate in GIS Council meetings and work groups/subcommittees.

- Utility companies should be added to the GIS Council.

Utility Responses
Barriers

- Road blocks to sharing digital data with municipalities [and state]: 1) what level of detail to share that would be useful without compromising location of critical faculties and protecting the privacy of customers; and 2) once in the procession of government entities, how would FOIA apply.

- Lack of information from CL&P about the status of the transmission lines feeding our system likely was troubling.



Utility Responses
Best Practices

- Working on streamlining data sharing process, to give more employees access to GIS and up-to-date data without having to manually produce maps and prepare data on the fly in the future for more rapid preparation.

- Having an Outage Management System that reflects current conditions during the event, post storm audit, and corrective activities are tracked to completion using GIS.

- Knowing what facilities are located in flood plains help identify areas that need to be monitored for flooding and utility pressure loss.

- Following an Emergency Plan Document

- GIS is available throughout the company headquarters and on 48 field laptops. GIS is used by people across the organization on a daily basis as part of their duties, in-house and in the field. Everything they need is at their fingertips.

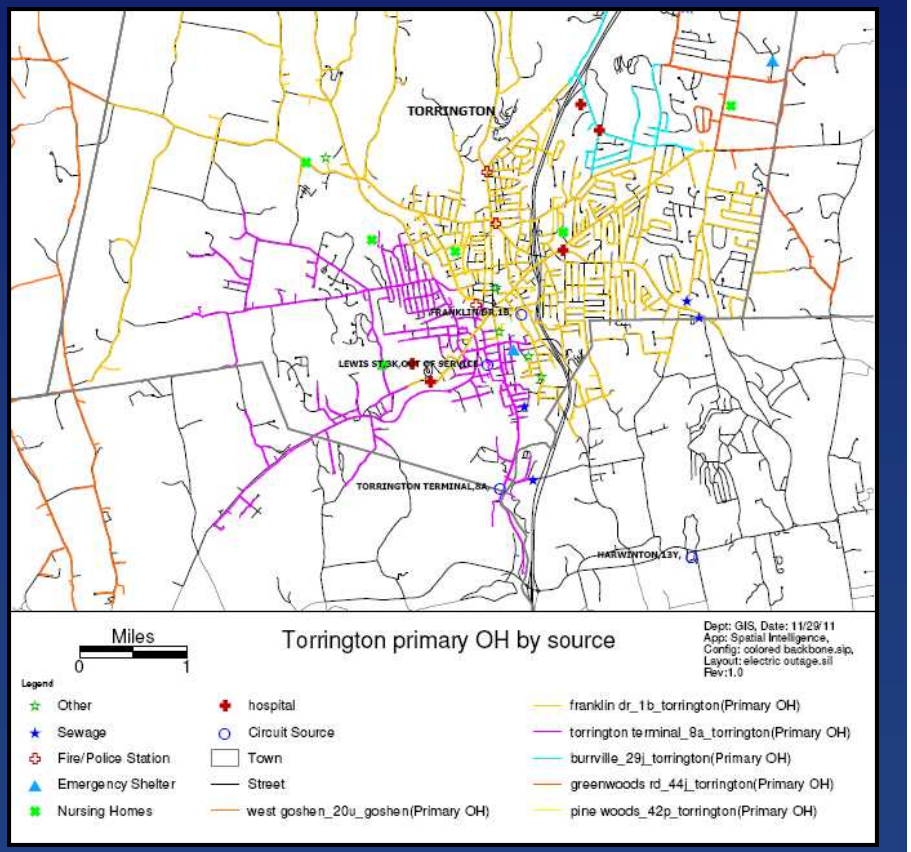
Utility Responses
Recommendations

- Utility participation with the State of Connecticut and municipalities to develop protocols for sharing information, define GIS data requirements, and process to gather damage assessment information.

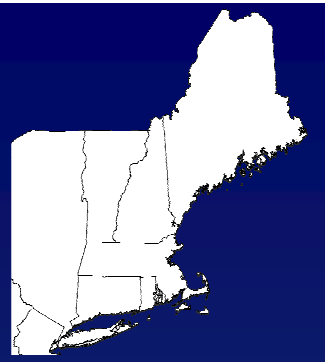
- Identification of critical customers for each town and the State of Connecticut (migrate from paper based systems in the field).

- Improved automation of data gathering and analysis (during storm).

- Matching of electronic data to manual paper process to make repairs and report corrective measures taken (post-storm).



Other States' Responses
Barriers



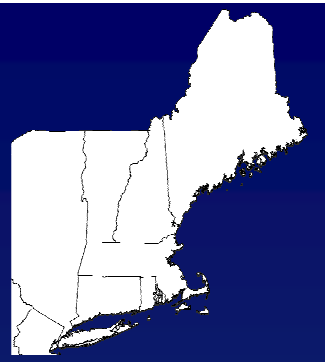
- Some elements of the storm were difficult to prepare for using GIS - high winds were especially hard to narrow in on as far as knowing which areas would be impacted more heavily. (City of Boston)

- Lag time- if not allowed back end SQL access to the CRM feed, GIS is relying on others to provide report updates every so often which is fine as long as they can provide them with coordinates and addresses and incident description. In some cases, reports were just coming in as addresses. Different incident location reporting standards are in use by different agencies across the city which makes it difficult to work with the reports coming in from different sources. (City of Boston)

- MEMA doesn't employ any full-time GIS-dedicated staff, so must be pulled from other pre-land fall planning efforts to focus on mapping preparation.

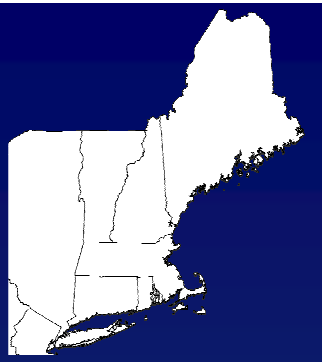
- Experienced inaccuracy issues with ArcMap shp to kml conversion. Conversion wasn't clean, resulting in lost data during from SLOSH kml files. (MEMA)

Other States' Responses
Barriers



- With very few staff to fill the GIS Unit position, staff burn out from multiple long shifts very quickly. MEMA called upon MA State Fusion Center to assist with staffing some shifts.
- GIS Staff were assigned to other post-event duties and were removed from the mapping function. (MEMA)
- Staffing shortage, only one GIS specialist working in the JFHQ. (Mass Military Division)
- Lack of communication with MEMA (Mass Military Division)
- The need for a higher speed plotter is essential. (Mass Military Division)
- We did not have shared information from FEMA that would have been useful for situation awareness (New Hampshire National Guard)
- Had difficulty downloading satellite imagery (bandwidth issue?). (MEMA)

Other States' Responses
Barriers



- Rely on GIS volunteers for EOC during non work hours/weekends; otherwise rely on GIS analysts in the City Planning Department. (City of Providence)

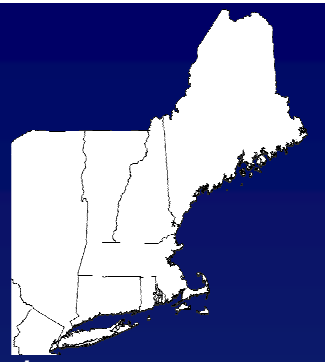
- Lack of GIS staff for emergency management. Staffing the EOC is always difficult. Reductions in staff citywide have essentially cut our city GIS personnel down to 2. We are a city of 175,000 people. (City of Providence)

- Flood inundation information was not available. Could not obtain map services or raw GIS data from electric utility vendor (National Grid) to overlay on top of our other situational maps. FEMA GIS rep was not "in the loop" with all of the GIS emails and other communications during the storm. (State of Rhode Island)

- There is a huge lack of knowledge by decision makers of the capabilities of GIS to support decision making. We have an enormous wealth of data and expertise in how to analyze it, that is for the most part untapped. (State of Rhode Island)

- MEMA GIS personnel were pulled off GIS Unit for other agency assignments, compounding the GIS staff shortage.

Other States' Responses
Best Practices



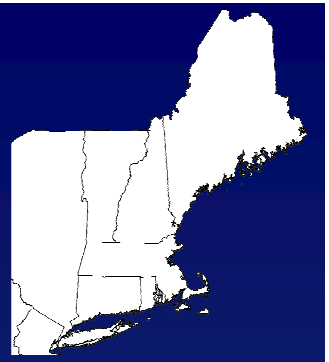
- Use Hurrevac, followed the news and NOAA's satellite imagery / radar / mapservices in order to monitor the storm's approach. Use of KMLs.

- The Mayor's 24 HR Hotline GIS data hub tracked and displayed citizen request calls by category type e.g. downed tree, power lines, traffic light outages, etc. This was plugged in to ArcMap as a dataservice. (City of Boston)

- Tracking storm, USACE SLOSH hurricane inundation model to identify facilities vulnerable to Cat 1- Cat 2 storm surge were we to be impacted by surge from Irene in the case surge were to occur and vulnerable populations would need to be evacuated from these areas. (City of Boston)

- Situational Awareness Reports, tracking citizen request, parks and recreation response to downed trees, public works response to downed trees. Tracking police, fire and EMS response to downed trees and downed wires, obstructed traffic in major arteries, NSTAR reports for power outages. (City of Boston)

Other States' Responses
Best Practices

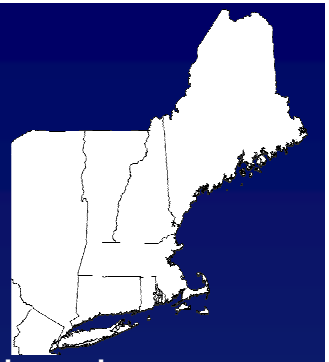


- Evaluating the number of incidents reported in all, how many were public property, private property involving structural or vehicular damage. GIS was used to help categorize these incident types further down to be used in recovery efforts and for the preliminary damage assessment. (City of Boston)

- Best practices are currently being developed based on the flow of processes during this event and in what areas work can be done to make the process more efficient. For example, seeing if the several reporting systems can be standardized in a way where they can be quickly mapped rather than having to map each with a separate process due to different reporting conventions. (City of Boston)

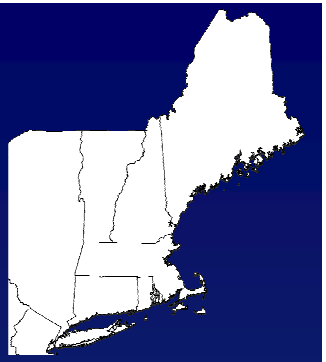
- Time was spent setting up map templates for use during the event. Utilizing ArcMap and Google Earth with HSIP Gold data, set up an Infrastructure Map template, Power Status Map template, and Sheltering Map template. Also created GoogleEarth versions of SLOSH maps for MEMA's Hurricane information page.

Other States' Responses
Best Practices



- Publishing to PDF format and posting to WebEOC file library. Some printed maps were posted in the EOC. (MEMA)
- Time consuming data entry and formatting (utility outage information, roadway status). (MEMA)
- Automating data collection process. (MEMA)
- Formal agreements with other state agencies for operational GIS assistance. (MEMA)

Other States' Responses
Best Practices



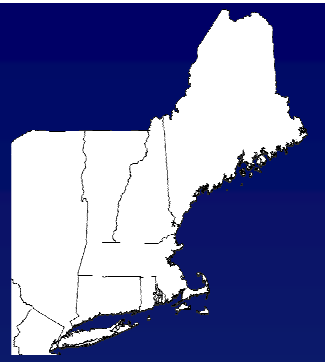
- Need approval of MEMA GIS data release policy.

- Planning, creating forecast maps from NOAA data, layered with MAARNG armories and unit stationing data along with other state specific data, roads, railways, public transit routes in order to have a knowledge base of which units are where for during and post storm clean up. In addition which armories might be in heavily impacted areas and thus require repositioning of assets so that equipment is not trapped in an armory that has been cut off by flooding or other road blockages. Maps were created as .pdf files for handouts to units, as well as for use in briefings as PowerPoint slides. (Mass Military Division)

- Having base maps (templates) with the common used layers (roads, armory locations, hospitals, etc.) already created then only having to create/edit new/existing data specific to the particular operation saves a lot of time. (Mass Military Division)

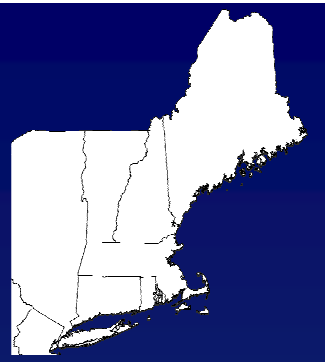
- Our GIS volunteer from RIC took addresses for trees and utility poles down (service calls) and created a map of point data for all calls of service. (City of Providence)

Other States' Responses
Best Practices



- We created static maps that needed to be updated constantly. (City of Providence)
- Further resources were engaged from the University of Rhode Island – Environmental Data Center (URI-EDC). (State of Rhode Island)
- Coordinated personal schedules of GIS call-list. Set up a small local network in the RIEMA EOC with a data server (orthophotography, and complete RIGIS database), two laptops and a desktop PC in case the Internet went down during the storm. URI-EDC created map templates to be used during the storm. (Irene). (State of Rhode Island)
- Created (7) evacuation maps for pre-defined coastal municipal inundation zones based upon many live evacuation status updates. (State of Rhode Island)
- Pre-created map templates; Use of map request forms during the event; Single point of request during the incident; Fully-functional GIS network in case of loss of Internet; Pre-established GIS "call list" to staff the event. (State of Rhode Island)

Other States' Responses
Recommendations



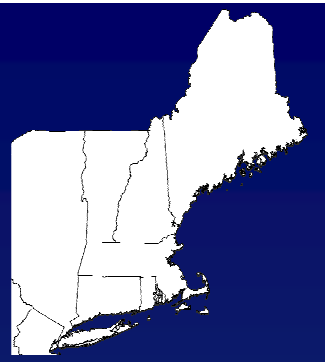
- Access to the live feeds of this information is the most efficient way to report on what is happening right then and there rather than on a situational update report received based on what was going on an hour ago. (City of Boston)

- Streamline data collection process to facilitate and expedite the ability to publish maps (e.g. utility data provided in multiple formats from different companies – needed one person to synthesize and format the data in order to use it for mapping, which is labor/time intensive). (MEMA)

- On a regional level good communications and ways for the various states in the region to share data would be very useful (a server), as sometimes sharing data via email is problematic as the MAARNG email system does strip off certain attachments crucial to GIS, .zip, .shp, etc. (Mass Military Division)

- We need to find a way to post photos for ingestion by SEOC and NG Operations centers. (New Hampshire National Guard)

Other States' Responses
Recommendations



- We need to find a way to identify critical information and determine how it is going to be shared to level that need it. The Central US Earthquake Consortium (CUSEC) has found a way to do this; suggest that we utilize the Northeast States Emergency Consortium (NESEC) to explore how they might be able to enable similar services for the NESEC Region (FEMA Region I and NY and NJ). (New Hampshire National Guard)

- We are now looking at a way to track service calls by plotting point data using an interactive, real time mapping application via ESRI online. (City of Providence)

- Senior GIS staff need to be present in as many planning and decision making meetings as feasible to listen to requests and then volunteer information, mapping and/or analysis to help solve problems or make better decisions. (State of Rhode Island)

Feedback

Comments

Next Steps

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