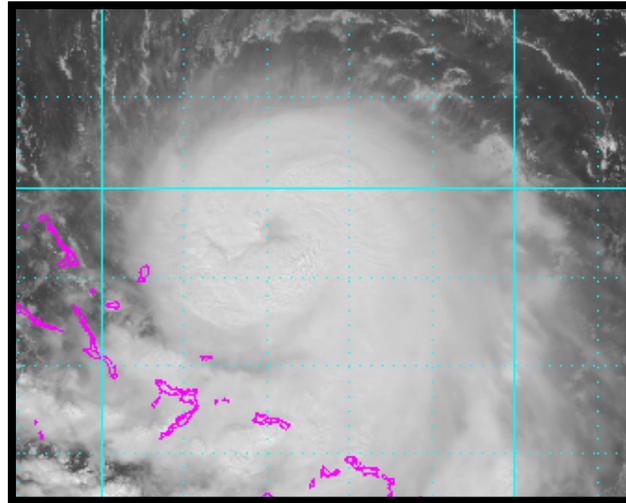


Hurricane Threat Messaging

Local Perspective

New England? – Just a Matter of Time



June 21, 2016

Bob Thompson
Weather Forecast Office – Taunton, MA

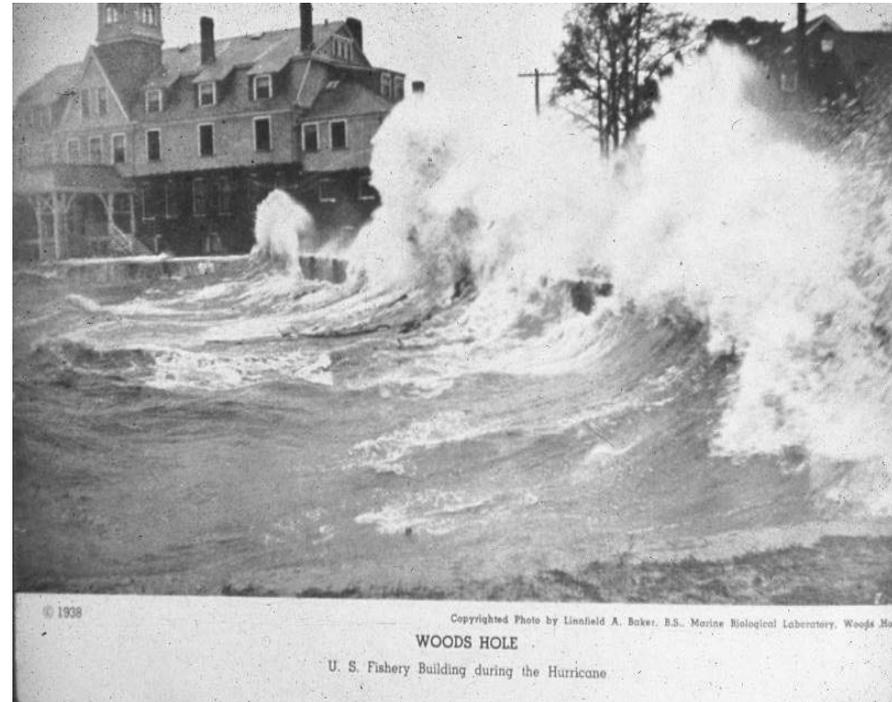
New England Hurricane Threat

- Preparedness challenge
- Our history illustrates the hurricane impacts
 - Wind
 - Coastal flooding from storm surge
 - Flooding rains
- Local Information
 - A few products
 - Communication with media partners
- Take Aways

NEW ENGLAND HURRICANES

Low Frequency, High Impact!

- **Category 3 hurricanes**
 - Great Colonial Hurricane of 1635
 - Hurricane of 1815
 - Hurricane of 1869
 - Great New England hurricane of 1938
 - Carol in 1954
- **Strong Category 2 hurricanes (20th Century)**
 - Great Atlantic Hurricane of 1944
 - Edna in 1954
- **Last land-falling hurricane**
 - Bob in August 1991

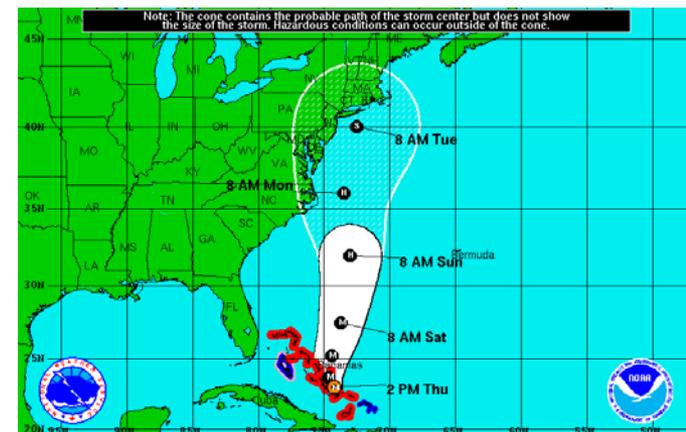


A Preparedness Challenge for All with a Public Safety Mission

- **No Category 3 hurricanes have made landfall in southern New England since 1954**
 - **And no hurricane at all since 1991!**
- **Buildup in coastal population and infrastructure presents a high risk for life and property**
- **Most New Englanders have not experienced a worst case scenario and many no hurricane at all!**
 - **Inexperienced population!**

What About Us?

- Lack of experience by most New England meteorologists, emergency managers, and media folks
- Most significant weather hazard we potentially face
 - Large regional impact
 - Potential large threat to lives and livelihoods
 - Next Category 3 hurricane will probably exceed anything we've experienced
 - And for some beyond anything imagined



What History Tells Us for Impacts

- Wind
- Coastal Flooding/Damage from Storm Surge
- Flooding Rains

Wind Damage in Keene, NH



Keene, NH after 1938 Hurricane



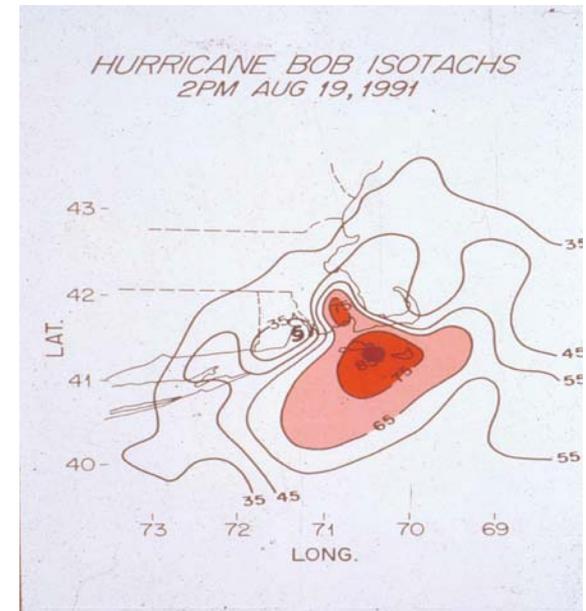
Edgewater Yacht Club during Carol



Quinebaug R. in Putnam, CT - Dianne

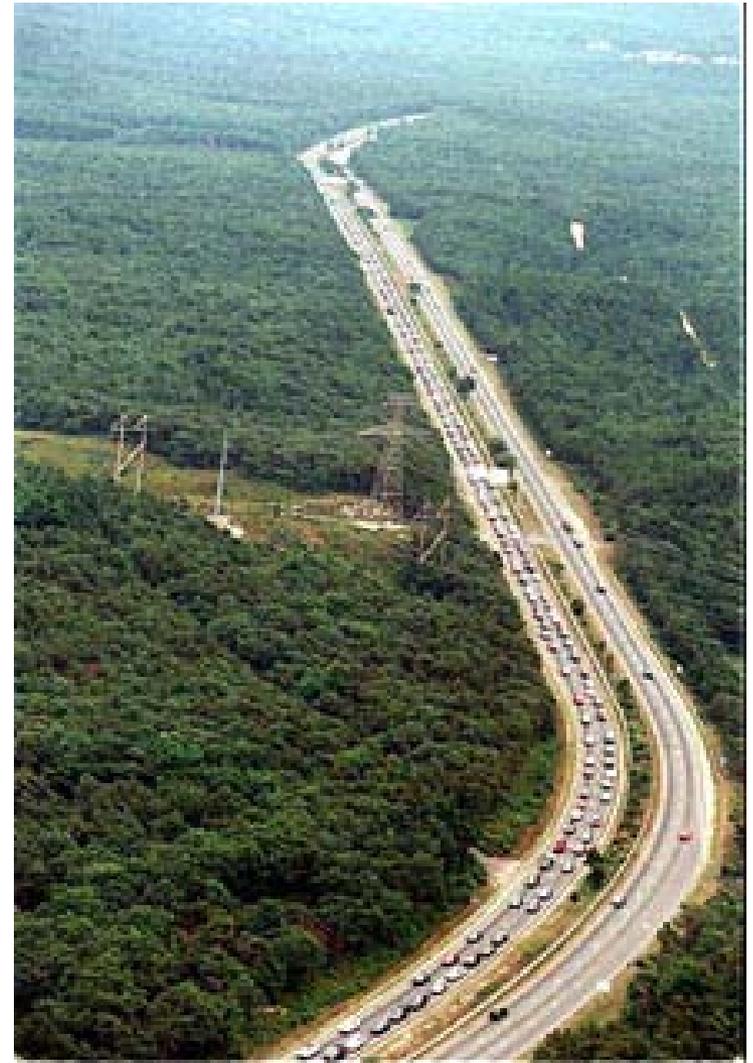
WIND

- **Fast moving hurricane produces wind damage far inland**
- **Strongest to right of track**
- **Damage begins with arrival of tropical storm force winds**
 - When preparations need to be complete
 - Also build in some time for faster than expected arrival
- Highest reported in southern New England: 186 mph on top of Blue Hill during 1938 Hurricane



TRAFFIC!

- **Getting to destination in time**
 - Evacuees
 - Commuters
 - Vacationers



End Game

When Tropical Storm Force Winds Arrive

Tree taken down on weaker side of Hurricane Bob

- Sustained wind = 40 mph
- Gusts = 60 mph



TREES DOWNED BY COUNTY
Hurricane, Sep 1938

Tolland County	29 million
Windham County	91 million
New London County	97 million
Middlesex County	14 million
Hartford County	7 million
Total	238 million

Source: Connecticut Forest and Park Association Report,
November 1938

Hurricane Debris



Providence Journal



Falmouth tree damage from Hurricane Bob

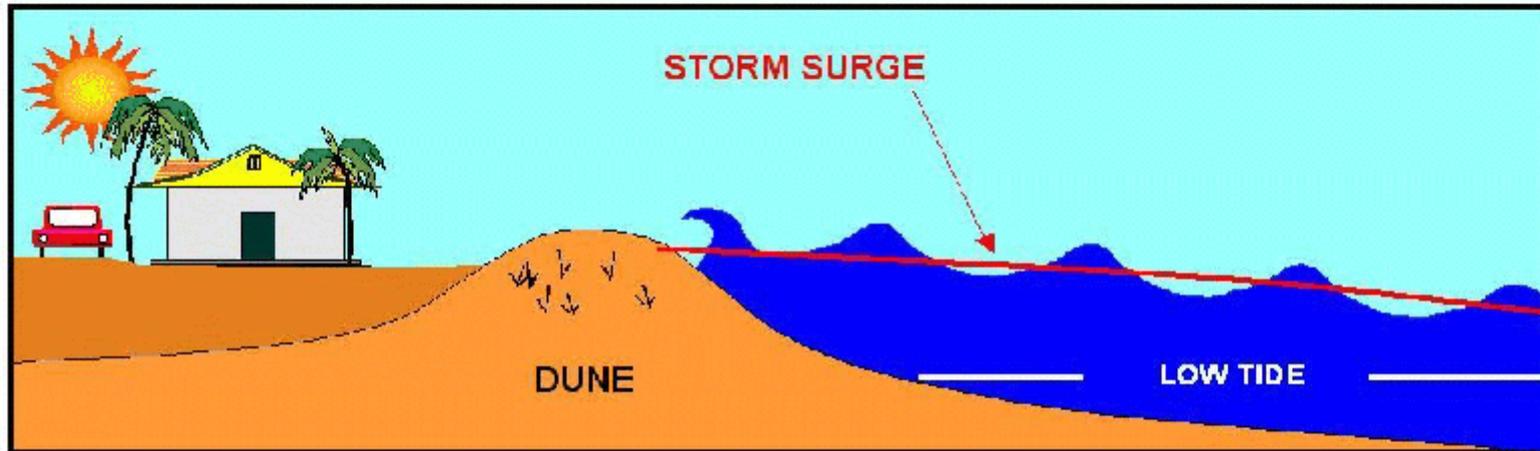


STORM SURGE/COASTAL FLOODING

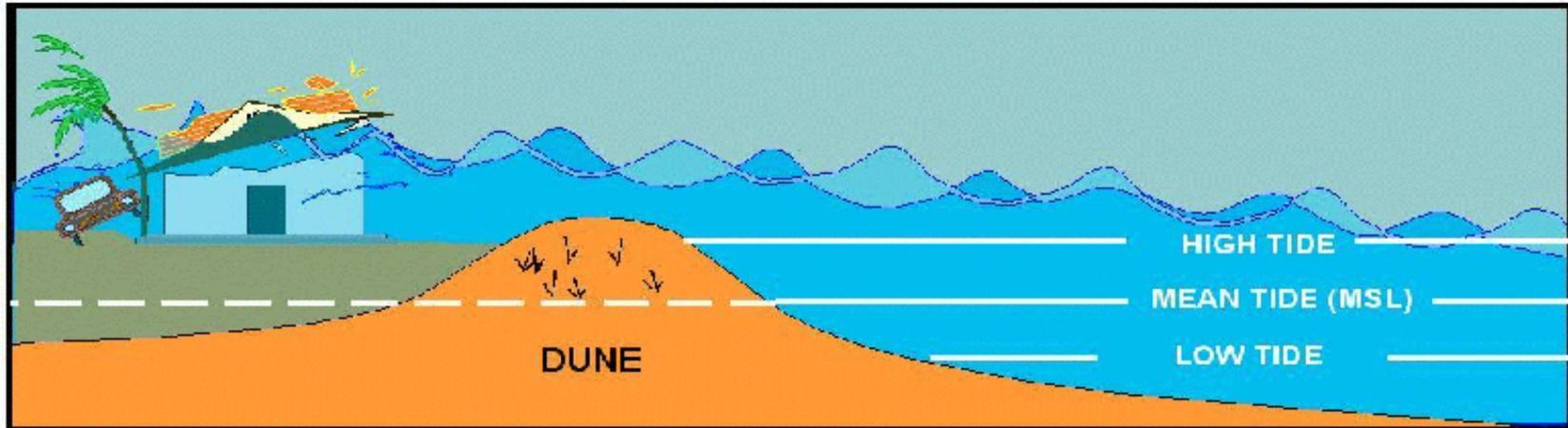
- *Historically cause for most fatalities (e.g. 1938 Hurricane)*
- Highest to right of track along land falling coastline
 - More often New England south coast
- Extreme values can occur
Buzzards and Narragansett Bays
- Storm surge along MA east coast can be comparable to severe nor'easter (consider Sandy a wake-up call for our east coast)



Timing Matters - LOW TIDE

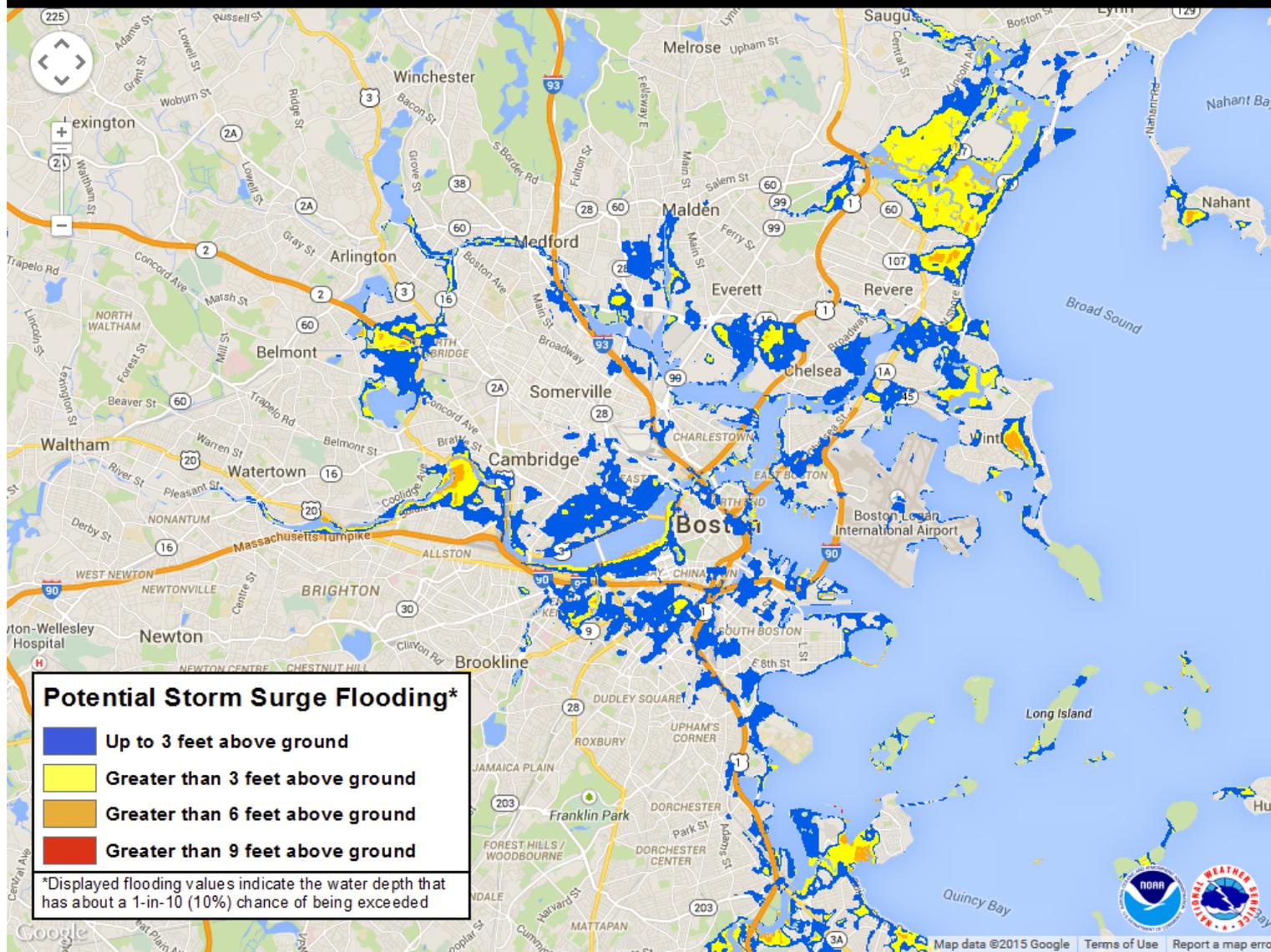


Timing Matters - HIGH TIDE



A Storm like Sandy Can Wreak Havoc along the Massachusetts east coast including Boston

Hurricane TRAVIS - Advisory 18 - EXPERIMENTAL MAP



History Suggests South Coast Especially Vulnerable to Storm Surge Flooding!



1938 Hurricane – 13 foot surge



Hurricane Bob (1991) – 6 foot surge



Near worst case storm surges for Narragansett and Buzzards Bays

Don't Forget the Power of Waves



Andrea Hotel and Resort after Sandy

Including Erosion from Waves



Misquamicut Beach – Westerly, RI (2 days after Sandy)

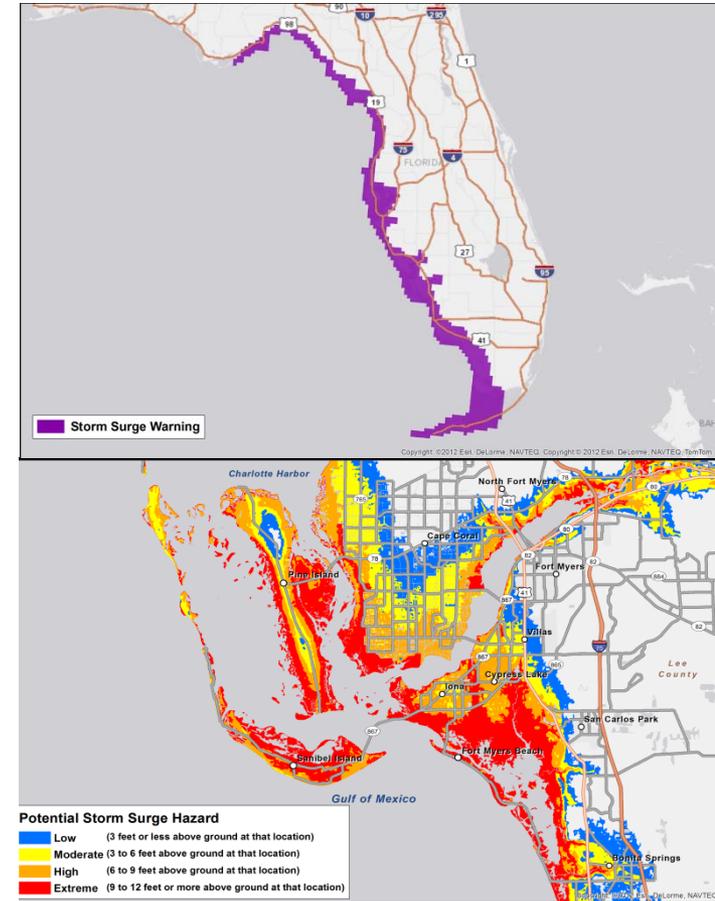


New Developments from National Hurricane Center

- Storm Surge Warnings
 - Explicit Storm Surge Warning
 - versus implicit by a Hurricane Warning
 - Recommended by social scientists

- **Inundation mapping**

- Visualization of inundation **possible** from a specific storm
- *Represents plausible worst case scenario for a specific location*
 - For any given location on map, 90% chance that flooding will be less than shown
- **Depicts where risk too high *not* to take action**
 - **Not** what we expect or think most likely to happen!
- Need to provide careful, consistent messaging to public



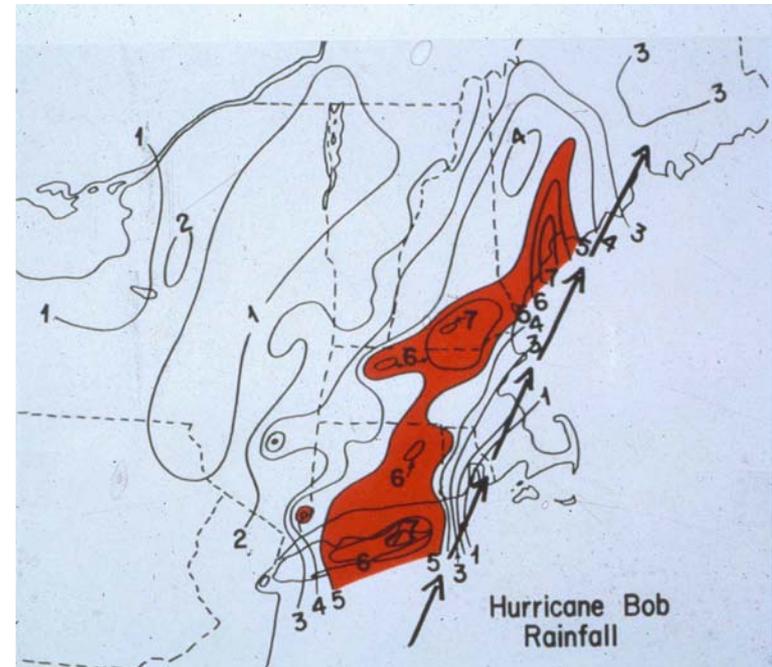
Flooding Rains

- Can be underappreciated risk
- Heaviest rain usually to left of track and leading part of storm
- Even weak tropical cyclones can bring devastating rains



B. SCENE ON MILLERS RIVER AT WINCHENDON, MASS.

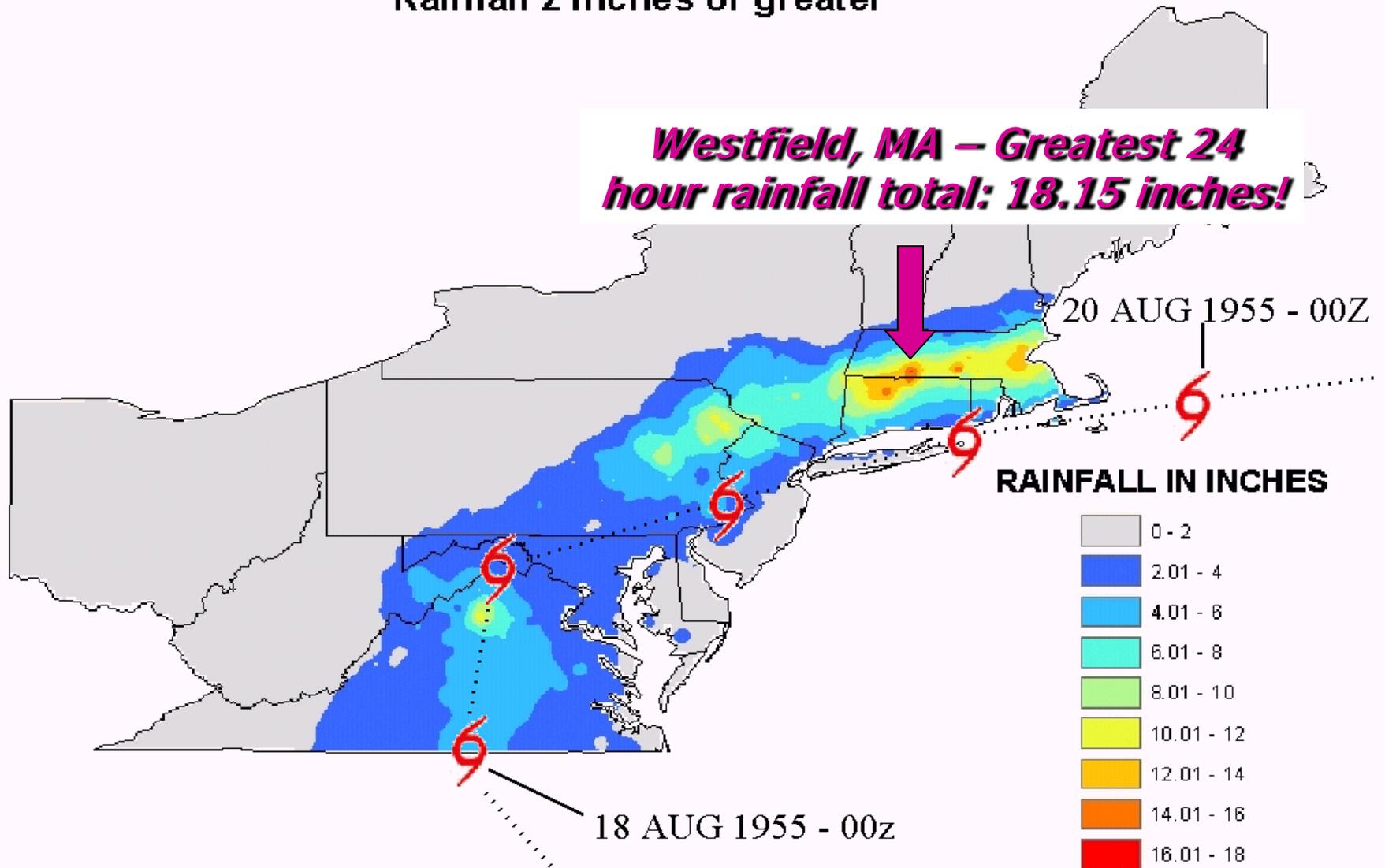
Courtesy of International News Photo.



Hurricane Diane - 1955

Rainfall 2 inches or greater

***Westfield, MA – Greatest 24
hour rainfall total: 18.15 inches!***



Diane's Impact on Quinebaug River Route 44 Bridge in Putnam

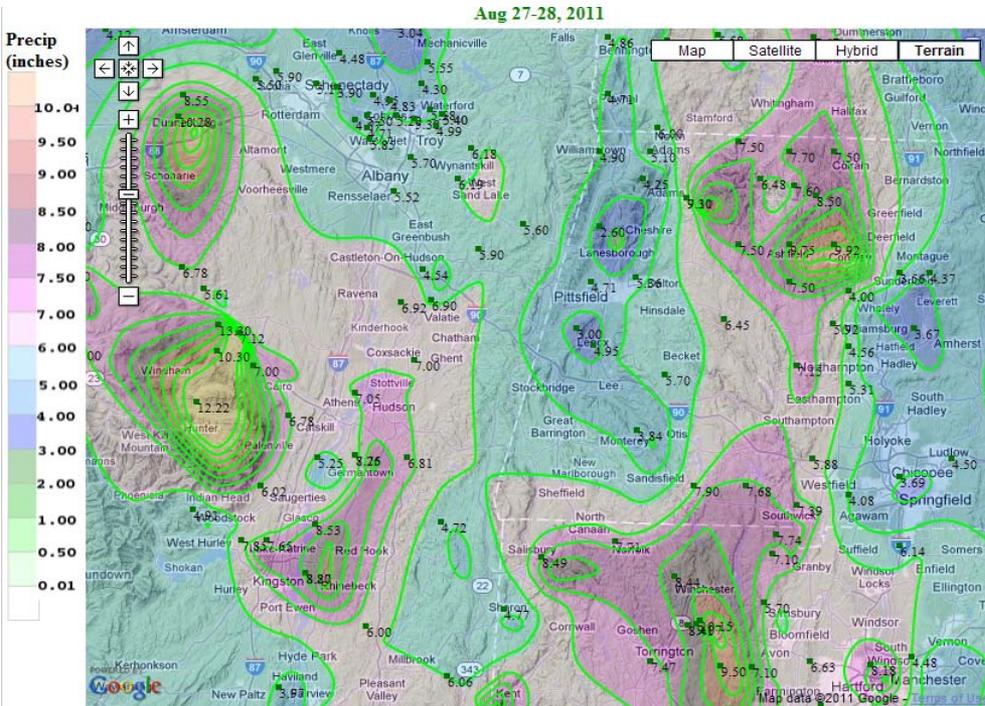


Before Diane



**After 12-18 inches of
rain from Diane**

IRENE – August 2011



Irene Rainfall

Deerfield River in Buckland



Flooding on Conway St., Buckland, MA
Photo: J. Brown

Local Products

- **Hazardous Weather Outlook**
 - Early signal of trouble
 - Look ahead next 7 days
- **Area Forecast Discussion**
 - Early signal of trouble
 - Confidence/alt. scenarios
- **Hurricane Local Statement**
 - Overview of expected impact
 - What's most important
- **Flood/Flash Flood Products**
 - Watches/Warnings
 - River Forecasts

The screenshot shows the National Weather Service website for the Boston, MA office. At the top, there is a navigation bar with links for HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. Below this is a search bar for location forecasts. The main content area features a 'Customize Your Weather.gov' sidebar on the left, a 'News Headlines' section with links to a webinar and training schedule, and a 'NWS Weather Forecast Office - Boston / Taunton, MA' header. A central map shows the New England region with various cities labeled. To the right of the map are links for 'Watches, Warnings & Advisories', 'Frost Advisory', and 'Hazardous Weather Outlook'. At the bottom, there is a grid of icons for different weather products: Radar, Current Weather, Rivers & Lakes, Satellite, Weather Information Display, Forecast Maps, Hour by Hour Forecast, Beach & Surf, Forecaster's Discussion, Submit Storm Report, Text Bulletins, and Winter Weather. A red arrow points from the 'Hazardous Weather Outlook' bullet point to the 'Hazardous Weather Outlook' link on the website. A blue arrow points from the 'Area Forecast Discussion' bullet point to the 'Forecaster's Discussion' icon. A green arrow points from the 'River Forecasts' bullet point to the 'Rivers & Lakes' icon.

weather.gov/boston

Social Media

Facebook

Twitter

NATIONAL WEATHER SERVICE

US National Weather Service Boston MA

1,552 likes · 475 talking about this

Government Organization
This page is an experimental service provided by NWS to explore the use of Facebook to extend the reach of NWS information. Facebook posts do not always reflect the most

About Photos Local Radar Become an Observer! Training / Seminars

Highlights

Status Photo / Video Event, Milestone +

Write something...

US National Weather Service Boston MA shared US National Weather Service Alaska's photo.
about an hour ago

While most of the country has been above average, our friends up in Alaska have been quite below average for the month of July. Check out their post for more information.

Does it seem like a cold July to you? Well you're right! As of the 22nd of July this is the 2nd coldest July on record for Anchorage, Alaska with an average temperature of 54.6 °F.

Check out your latest forecast at: <http://pafc.arh.noaa.gov/>

Recent Posts by Others

- NWRGeek Productions**
Torrential rainfall in Dracut. No flooding that we know of yet.
1 · 3 hours ago
- Miguel Young-Loso Fuentes**
Are the Storms that are in Toronto/NY predicted to come to ...
Yesterday at 1:13pm
- Chris Jablon**
so out of all of this severe weather what is cape cod ma. go...
July 25 at 10:58pm
- NWRGeek Productions**
A tree branch got knocked down (a large one) in front of ...
3 · 1 · July 24 at 8:02pm
- Dan Butler**
Here is a quick time lapse I did as the severe warned stor...
1 · July 24 at 4:21pm

Home Connect Discover

NWS Boston
@NWSBoston

This is an experimental service to explore Twitter use to extend the reach of NWS information. Visit <http://goo.gl/C9g6i> for details and to provide comments.
Taunton, MA <http://www.weather.gov/bos>

Following 23 TWEETS 0 FOLLOWING 302 FOLLOWER

Tweet to NWS Boston @NWSBoston

Tweets

- NWS Boston** @NWSBoston
Severe weather ops in full swing. Will be monitoring threads for reports. ow.ly/WQVJY
Expand
- NWS Boston** @NWSBoston
RT @nbc10_mark Quonset Point water spout from earlier this morning. Rick LaSalle Jr. twitpic.com/ajq433
View photo
- NWS Boston** @NWSBoston
1st band moving E, 17hr hvy rain w/ flood impacts; into aftr, tstorms develop, SVR wx w/ hvy rain threat [#MAXX #CTwx](http://ow.ly/rZ6tJ)
Expand
- NWS Boston** @NWSBoston
@nbc10_mark ... apologies, got the info ... 8:15 - 8:30 am off Quonsett. Thanks for the collab
View conversation
- NWS Boston** @NWSBoston
@nbc10_mark ... do you know where that water spout is located and at what time
View conversation
- NWS Boston** @NWSBoston

Similar to NWS Boston

- NWS Hastings** @NWSHastings Follow
- Barry Burbank** @BarryWBZ Follow
- Steve** @alerberwengland Follow

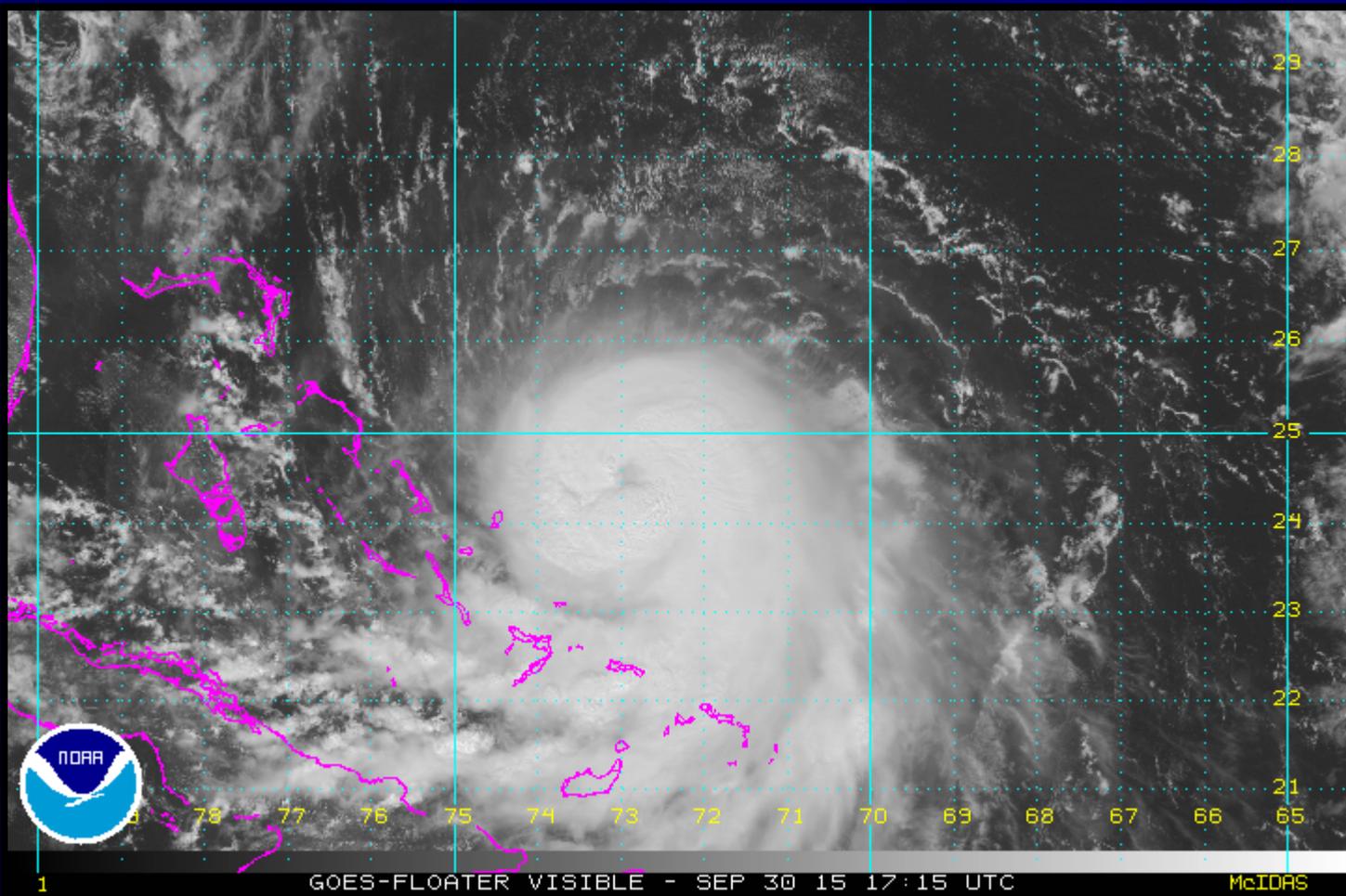
Upcoming Hazardous Weather
Storm/Event Reviews
Fun Weather Facts
Storm Reports





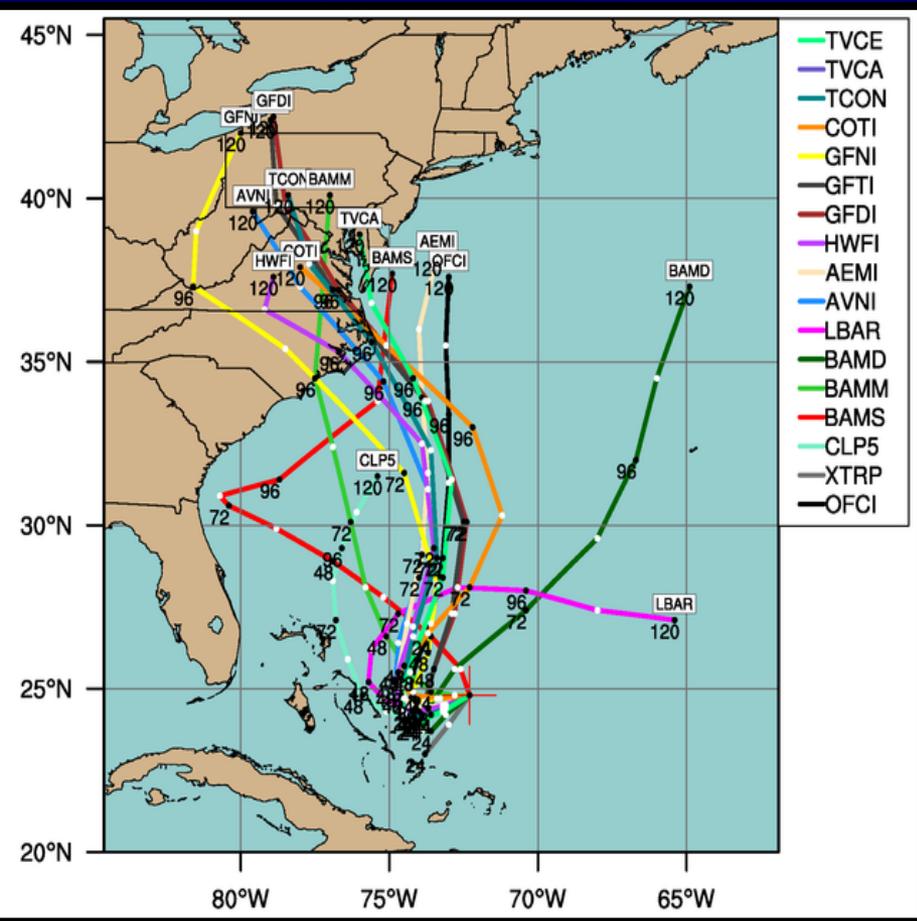
Hurricane Joaquin

A Poster Child for Uncertainty



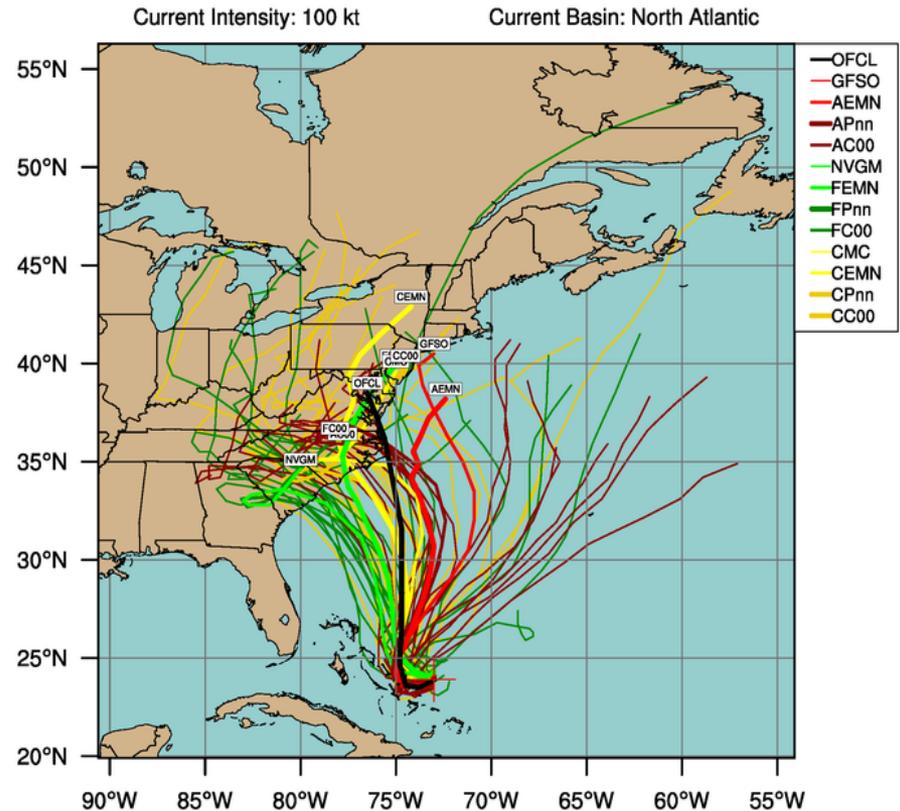
115 PM EDT Wednesday September 30, 2015

Hurricane Joaquin

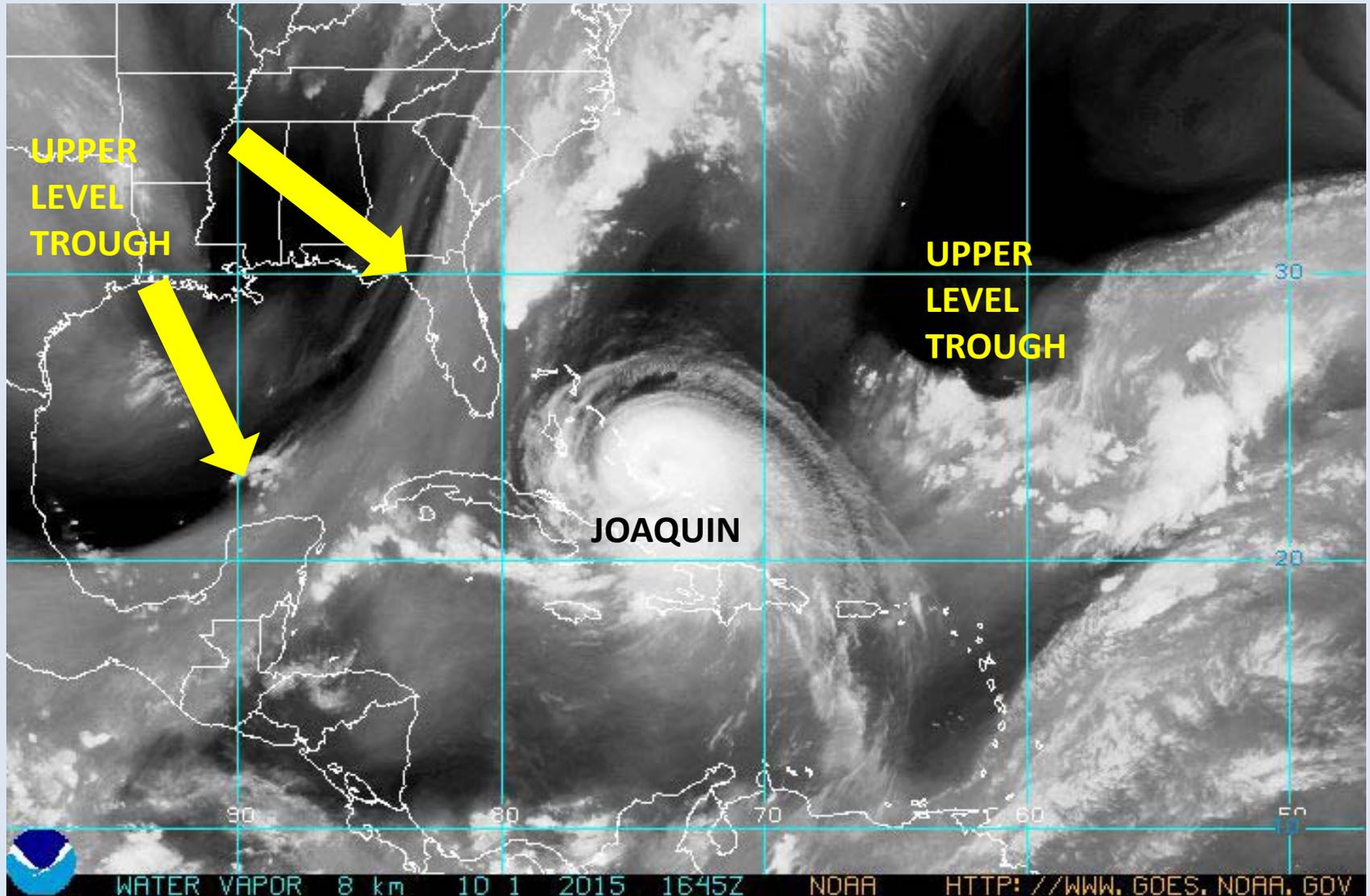


Wed Sept. 30 AM models

EPS track guidance initialized at 0000 UTC, 01 October 2015



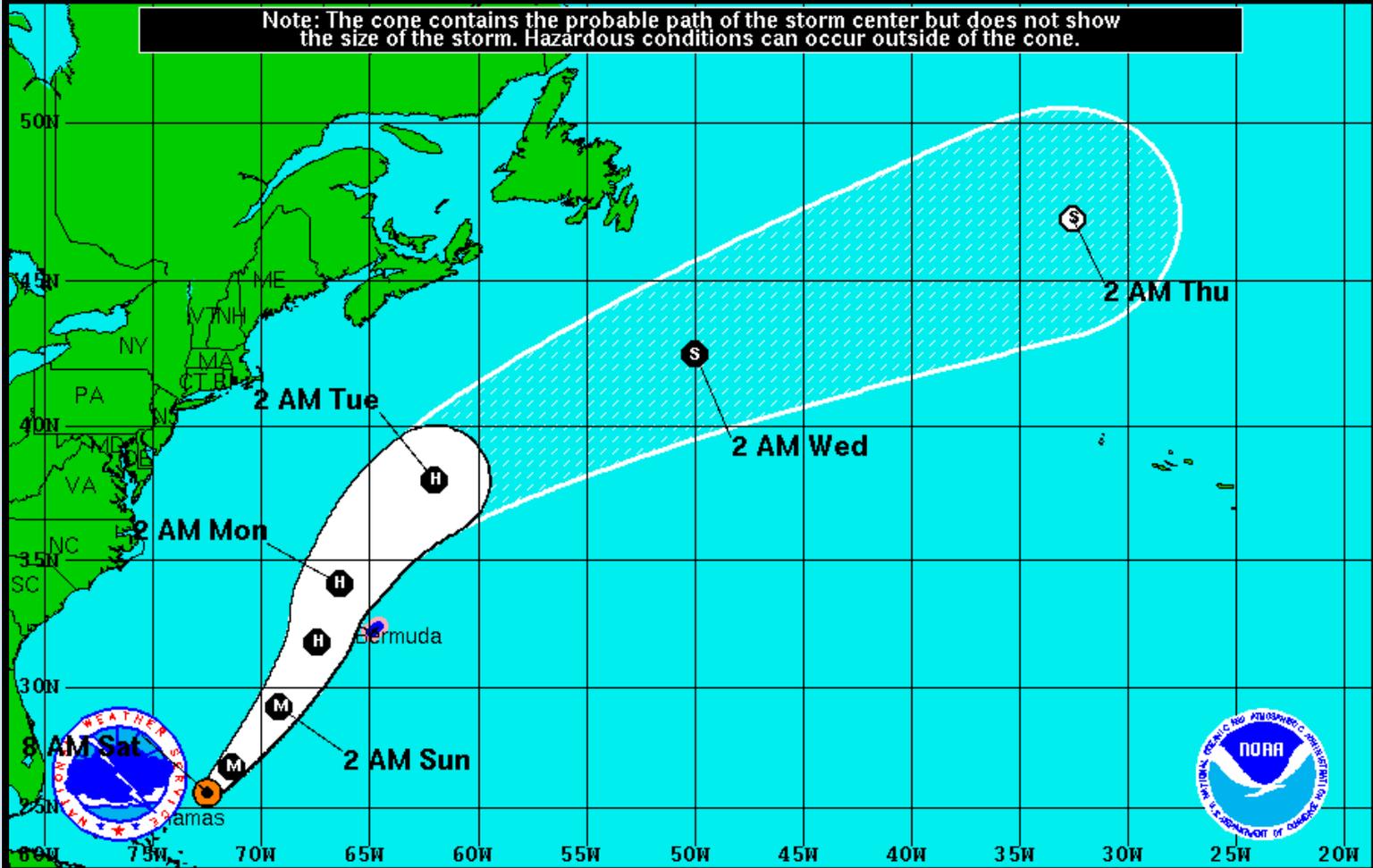
Wed Sept. 30 PM models





Powerful Hurricane Joaquin: Category 3 (125 mph sustained)

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.



Hurricane Joaquin

Saturday, October 3, 2015

8 AM EDT Intermediate Advisory 22A

NWS National Hurricane Center

Current Information:
 ● Center Location 25.6 N 72.5 W
 Max Sustained Wind 125 mph
 Movement NE at 13 mph

Forecast Positions:
 ● Tropical Cyclone ○ Post-Tropical
 Sustained Winds: D < 39 mph
 S 39-73 mph H 74-110 mph M > 110mph

Potential Track Area:

▭ Day 1-3 ▭ Day 4-5

Watches:

▭ Hurricane ▭ Trop. Storm

Warnings:

▭ Hurricane ▭ Trop. Storm

UNCERTAINTY



- **Every storm has some degree of uncertainty**
 - Track, speed, intensity, etc.
- **Some storms more than others**
- **Need to convey appropriate level of uncertainty to public**
- **For potentially high impact storms like hurricanes, important to communicate risk**

PREPAREDNESS!

A collaborative effort among the emergency management,
meteorologist, and media community

New England snowstorm indicators...



DAVE GRANLUND © METROWEST DAILY NEWS
www.davegranlund.com

TAKE AWAYS

- **Request help in getting preparedness message to public**
 - Reach more through media than another means
- **People turn to media when threatened**
 - Consistent message commensurate with threat important
- **NHC and local Weather Forecast Office (WFO) work as team**
 - NHC: Latest info on storm itself
 - WFO: Focus on potential local impacts
- **Need to put specific threat in right context**
 - Too much hype reduces credibility
 - Underplaying of threat could put people at risk
- **Messaging uncertainty**
 - Need to have people **respond to the risk** (not expected outcome)
 - Inundation maps depict where people cannot ignore risk



NOAA-15 HRPT RGB-CH1,CH2,CH4 09/18/2003 11:53 UTC (7:53 AM EDT)

Nature's Awesome Power!

Thank You

Questions?

Atlantic Ocean

HURRICANE ISABEL

Hurricane Isabel - September 2003

New England? - It's just a matter of time