



National Weather Service

What's New to Help You



MISSION

Provide weather, water, and climate data, forecasts and warnings

Protect life and property

Enhance national economy

VISION

A Weather-Ready Nation:
Society is Prepared for and
Responds to Weather-
Dependent Events





Our Goal

- To provide more information to Emergency Managers to
 - Facilitate improved decision making
 - Elicit the proper public response during the most life-threatening weather events

So how are we trying to do that?



- Winter Initiatives
 - Snow Forecast Uncertainties and Intensities
- Summer Changes
 - SPC Outlooks
- Tropical / Hurricane – Storm Surge Updates
- New Webpages

Winter Weather “Experiments”



SNOWFALL = BIG IMPACTS

- School / government / business closures
- Airport shutdowns/delays
- Traffic accidents with injuries/fatalities
- Money plowing/treating roads
- Lost resources in traffic congestion
- Power outages/damage in strong storms





Weather Forecasts are Inherently Uncertain

- Chaotic Nature of the Atmosphere
- Deficiencies In Observations
- Uncertainties in Computer Simulations of Atmosphere

Demand for snowfall forecasts has escalated

- Society has become increasingly mobile
- High sensitivity to Winter Hazards
 - Highways Often Run Above Capacity in Fair Weather
 - Packed Schedules Leave Little Time For Delays





Accurate Forecasts Desired Days in Advance

But, as Lead Time *increases*, Certainty *decreases*

- We need to better communicate the range of possibilities
 - Find a balance between Lead Time and Certainty
- NWS constantly striving to provide:
 - The most accurate weather forecast
 - Relay our degree of uncertainty

Winter Weather “Experiments”



- Experimental projects designed to provide enhanced user information
- New York City Forecast Office
 - Snow Accumulation Potential
 - *In conjunction with other offices along I-95 Corridor provides uncertainty information in the form of a Range of Potential Snowfall*
- Buffalo Forecast Office
 - Snow Threat Graphics
 - *Designed to display areas with the greatest threat of heavy snowfall rate*

Winter Weather "Experiment"

New York City Forecast Office



- Forecasting Snow in New York City and Long Island is Challenging
 - Appalachian Mountains
 - Urban Heat Island
 - Atlantic Ocean and Long Island Sound
 - Warmer Water
 - Coastal Fronts
- During a rain/snow event a 40-mile difference could impact almost 17 million people



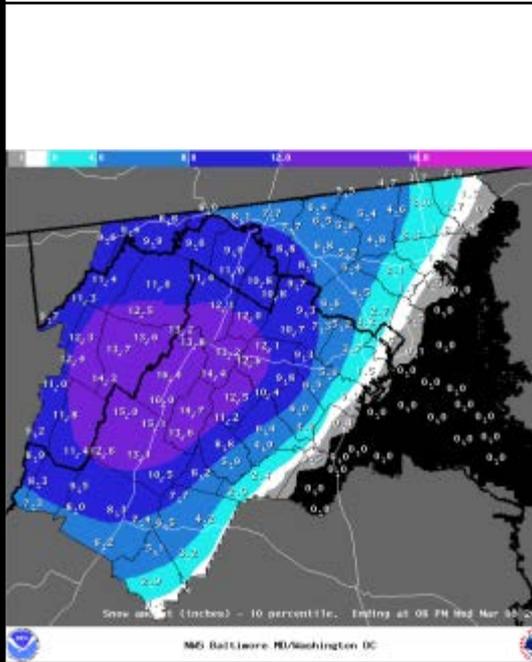
Winter Weather "Experiment" New York City Forecast Office



- Available on the web: <http://www.weather.gov/okx/winter>
- Three New Products - Winter 2014-2015
 - Minimum / Most Likely / Maximum Snow
 - Issued prior to the storm
 - "Goal Posts" of Possibilities
 - "Official" NWS Forecast Is the Most Likely
 - Chance that Snow Will Be Greater Than...
 - 0.1", 1", 2", 4", 6", 8", 12" and 18"
 - Probability of Ranges Table
 - Several Locations for Each County

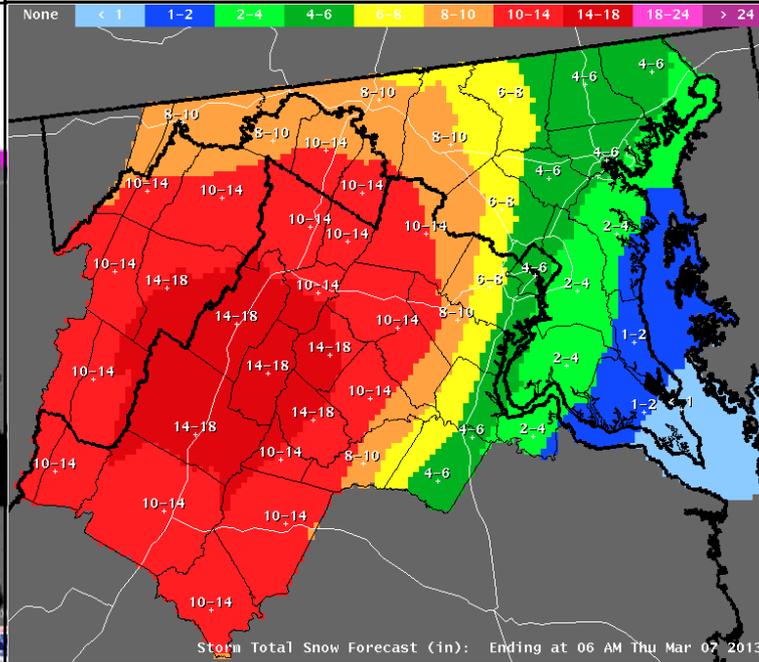


Minimum



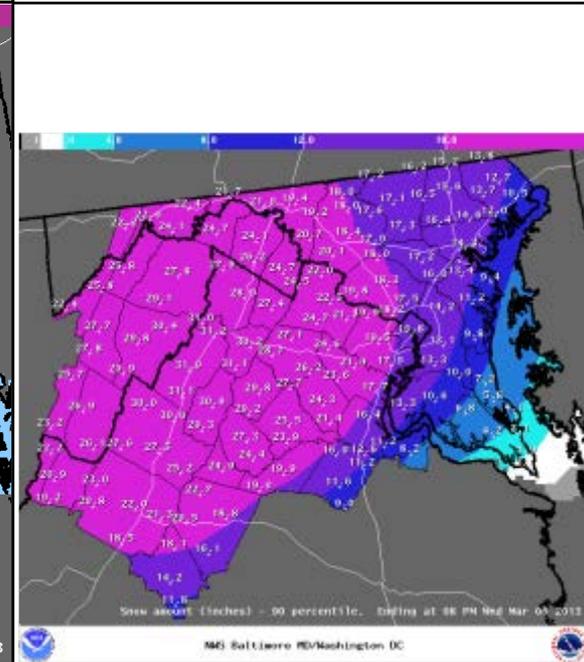
Expect at least this much

Most Likely



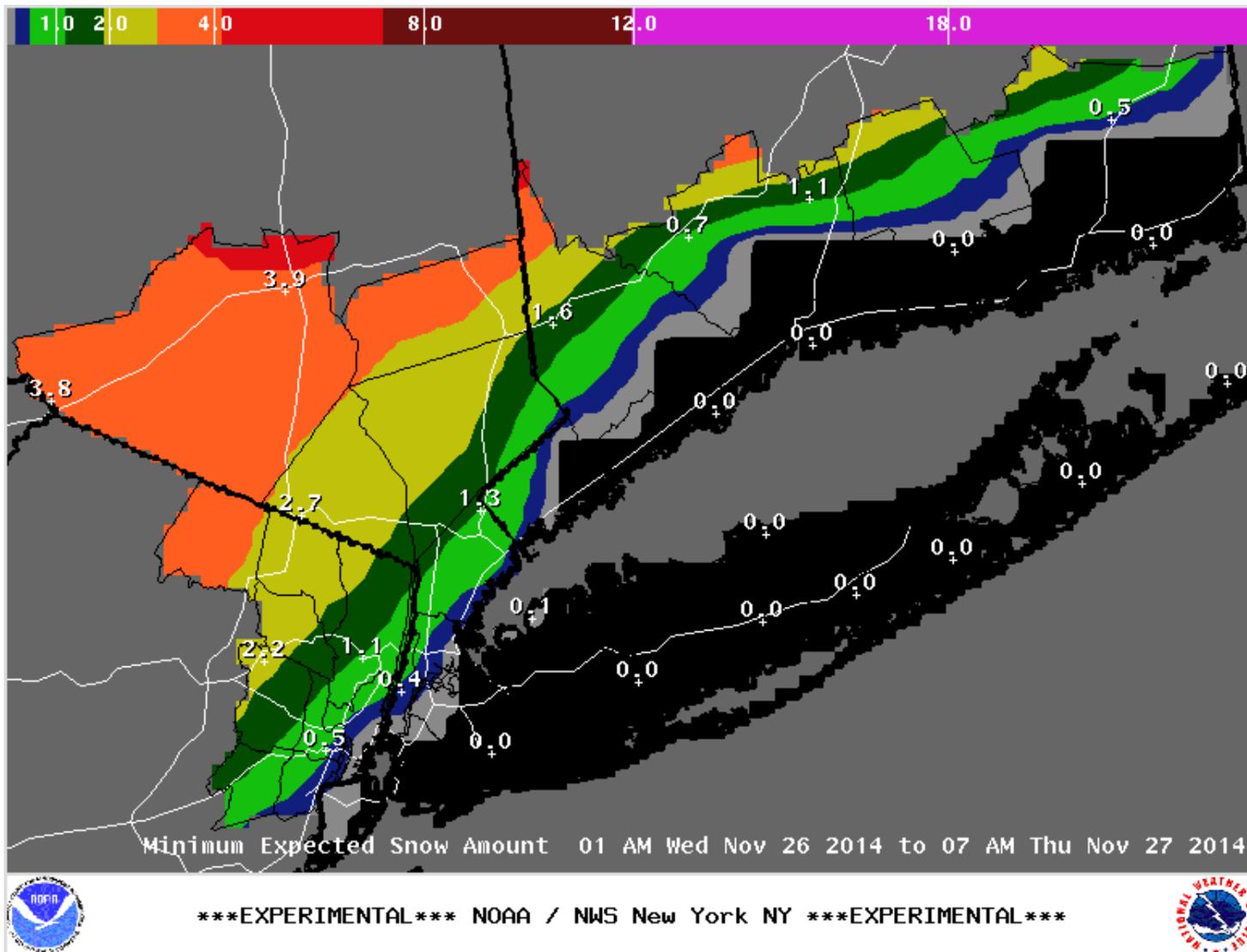
Official NWS Forecast

Maximum

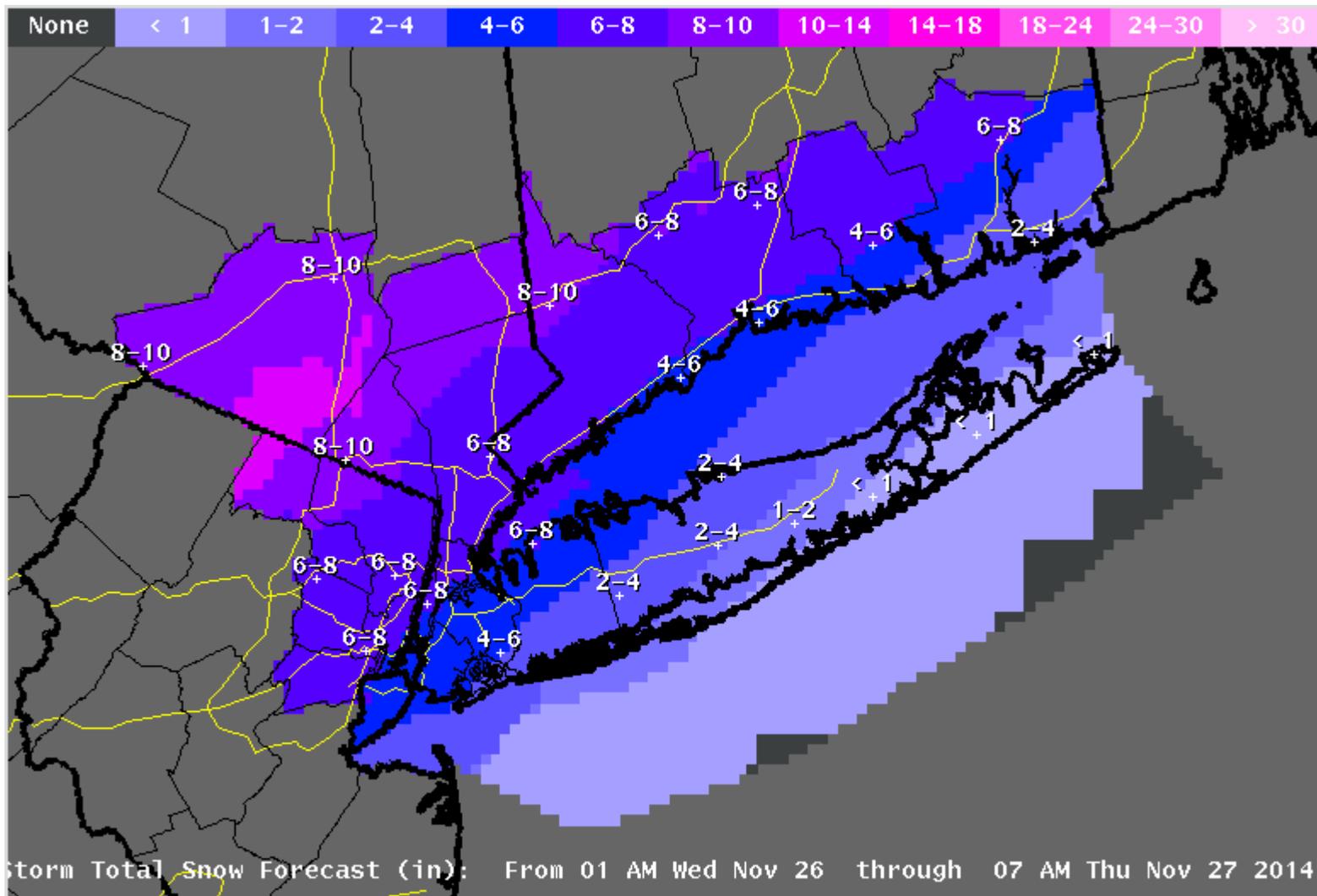


Potential for this much

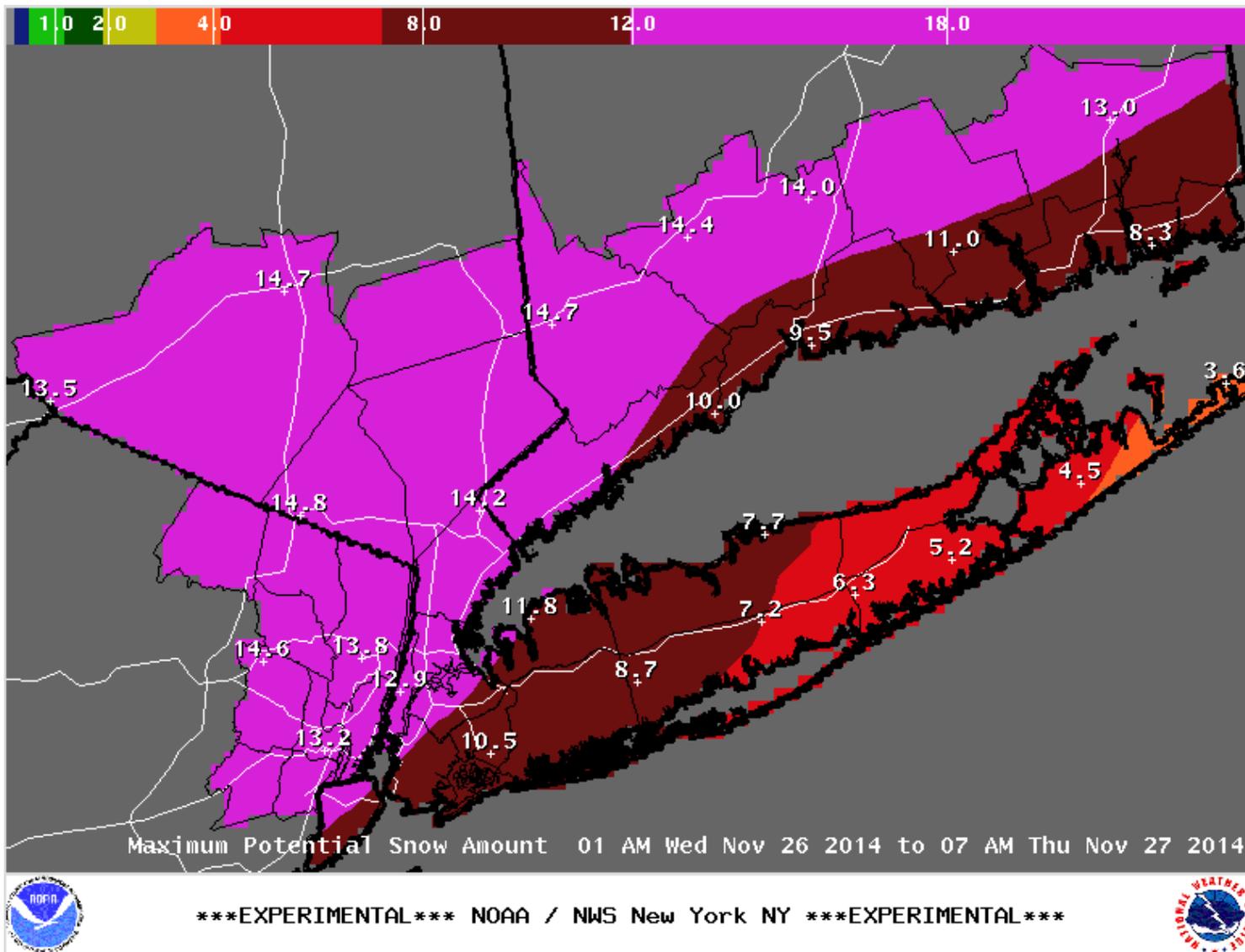
Minimum Expect At Least This Much



Snow – Most Likely Storm Total “Official” Forecast



MAXIMUM Worst Case Scenario



Exceedance Graphics

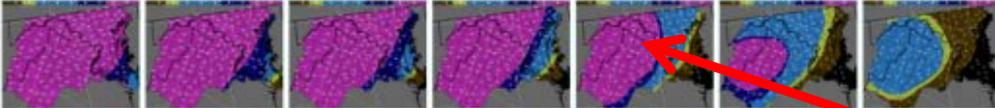


Chance That Snow Accumulation Will Be Greater Than...

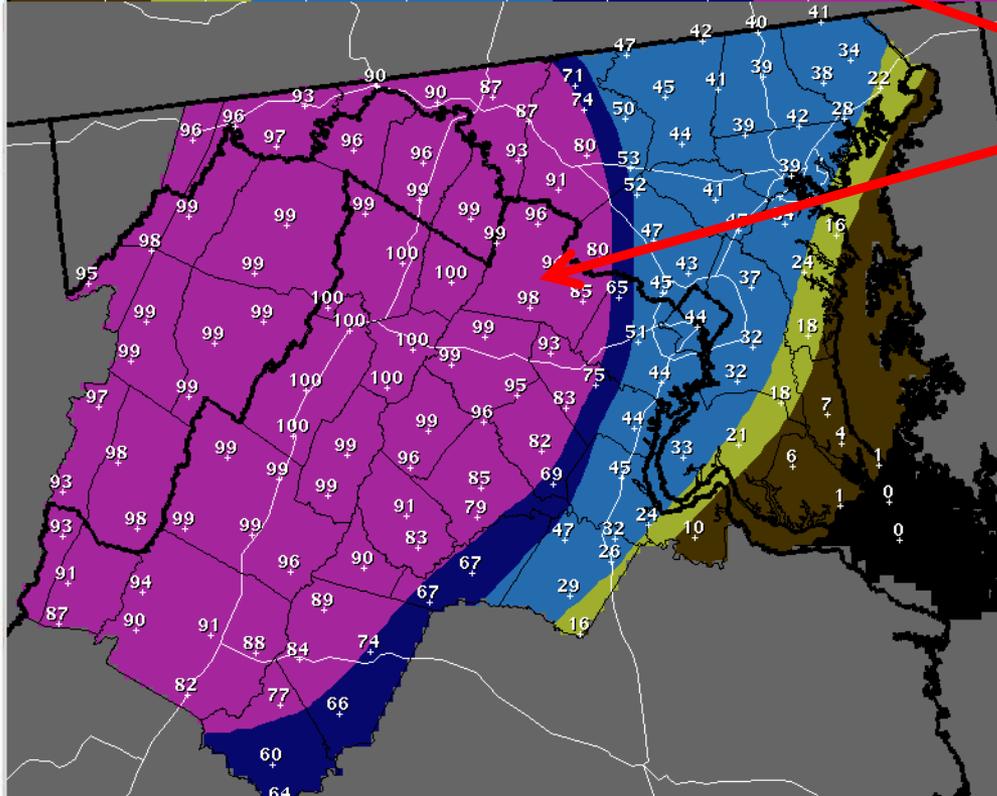
03/05/2013 1900 to 03/06/2013 2000 EST

What's this?

>0.1" >1" >2" >4" >8" >12" >18"



10 20 30 40 50 60 70 80 90



Probability(%) of > 8 inches of snow for period Ending at 08 PM Wed Mar 06 2013



NWS Baltimore MD/Washington DC



Mouse over
desired amount
and image appears
on large screen

Table of Probabilistic Snowfall Accumulations



Can Select County/City for Local Towns

Defaults to regional table

Chance of Snow Accumulation Ranges
03/05/2013 1900 to 03/06/2013 2000 EST

County:

Location	Min	Likely	Max	0"	T-1"	1-2"	2-4"	4-8"	8-12"	12-18"	>18"
Baltimore, MD	1	4-8	15	0%	9%	6%	17%	28%	21%	15%	4%
Bayard, WV	9	8-12	22	0%	0%	0%	1%	4%	47%	21%	27%
Charlottesville, VA	4	12-18	19	0%	6%	0%	4%	16%	25%	37%	12%
Frederick, MD	7	8-12	19	0%	0%	0%	1%	17%	38%	32%	12%
Fredericksburg, VA	0	4-8	14	11%	11%	6%	11%	25%	20%	13%	3%
Hagerstown, MD	8	8-12	19	0%	0%	0%	1%	13%	46%	26%	14%
Harrisonburg, VA	14	12-18	28	0%	0%	0%	0%	1%	6%	49%	44%
Leonardtown, MD	0	1-2	5	39%	3%	24%	20%	13%	1%	0%	0%
Martinsburg, WV	10	8-12	24	0%	0%	0%	0%	4%	50%	13%	33%
National Mall, DC	1	4-8	17	0%	9%	5%	11%	30%	19%	19%	7%
Staunton, VA	9	12-18	22	0%	0%	1%	0%	7%	19%	42%	31%
Winchester, VA	13	12-18	29	0%	0%	0%	0%	0%	6%	56%	38%

Location	Min	Likely	Max	0"	T-1"	1-2"	2-4"	4-8"	8-12"	12-18"	>18"
Baltimore, MD	1	4-8	15	0%	9%	6%	17%	28%	21%	15%	4%

Winter Weather “Experiment”

Buffalo Forecast Office



- NWS routinely produces snowfall amount forecasts
- However, other parameters can be as just a valuable
 - Rate of snowfall
 - Time of day
- “How can we graphically show where we think the threat of heaviest snowfall will occur and the forecast movement of lake effect snow bands?”

Winter Weather "Experiment"

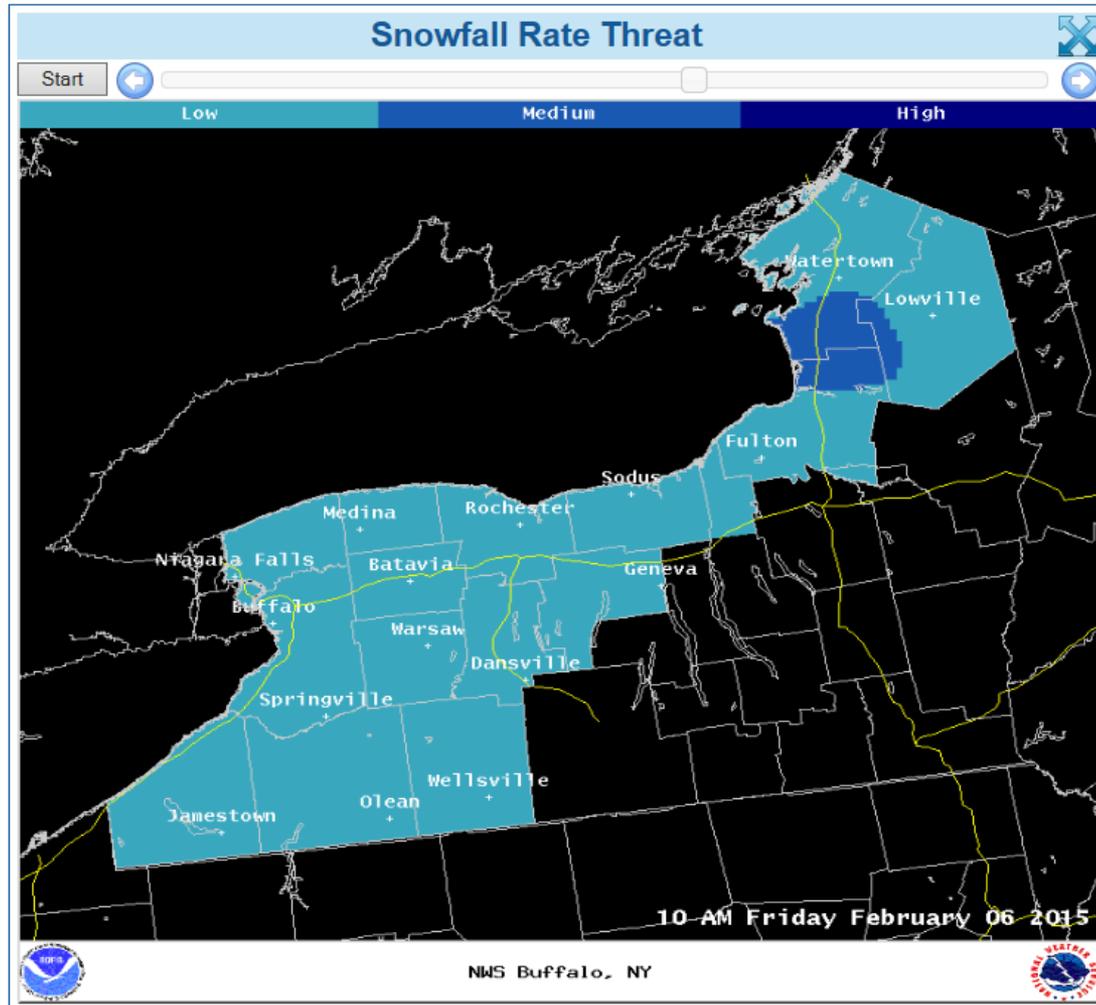
Buffalo Forecast Office

http://www.weather.gov/buf/Snowfall_Rate_Threat_Loop



WFO Buffalo Areas of Greatest Snowfall Rate Threat Graphics

Graphical display of hourly snowfall rate threat for next 50 hours.



Winter Weather "Experiment"

Buffalo Forecast Office

<http://www.weather.gov/buf/SnowfallRateThreatTiles>



Snowfall Rate Tiles Display

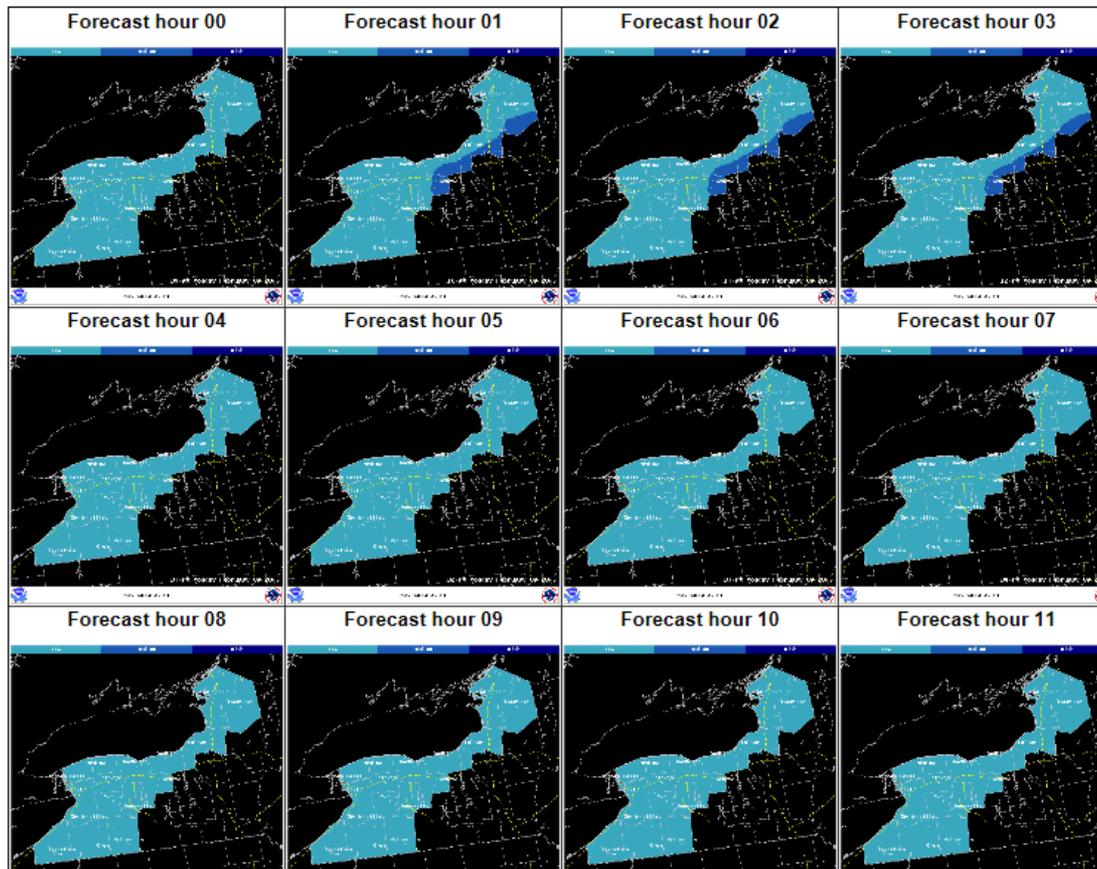
[Weather.gov](#) > [Buffalo, NY](#) > Snowfall Rate Tiles Display

Buffalo, NY
Weather Forecast Office

[Current Hazards](#) [Current Conditions](#) [Radar](#) [Forecasts](#) [Rivers and Lakes](#) [Climate and Past Weather](#) [Local Programs](#)

Click on Image to see full size image of that Forecast hour. Use browser's back button to get back to this page from the full size image.

Images are BELOW the Forecast hour text.



Winter Weather "Experiment"

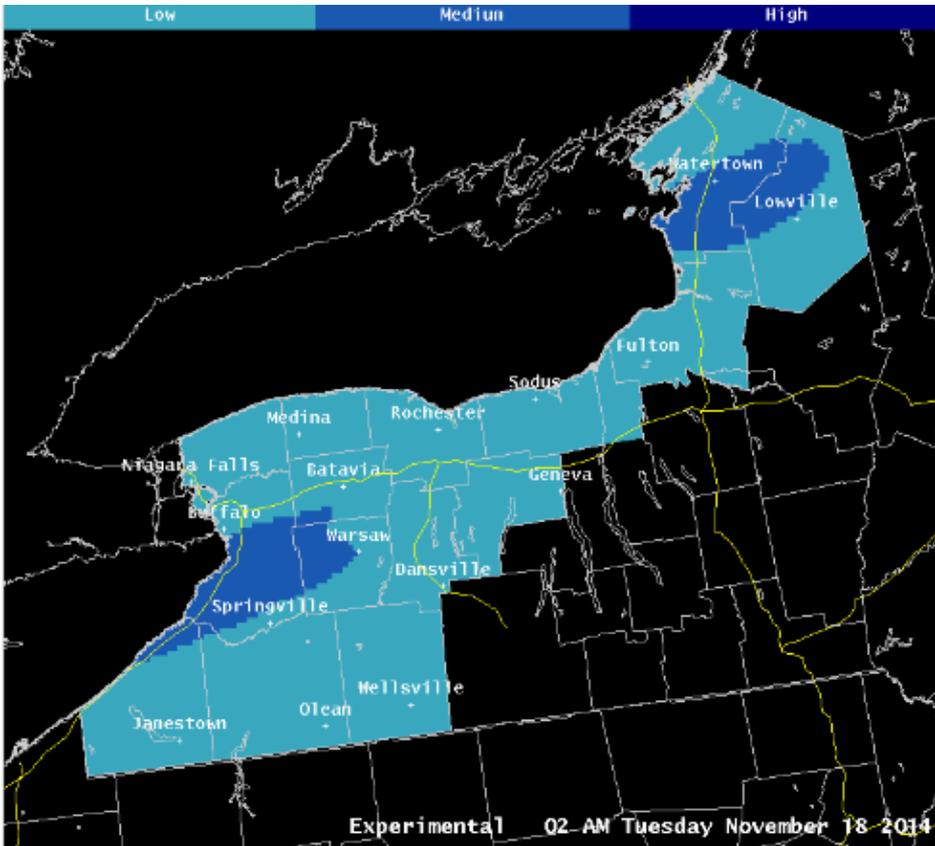
Buffalo Forecast Office

http://www.weather.gov/buf/Snowfall_Rate_Threat_Loop

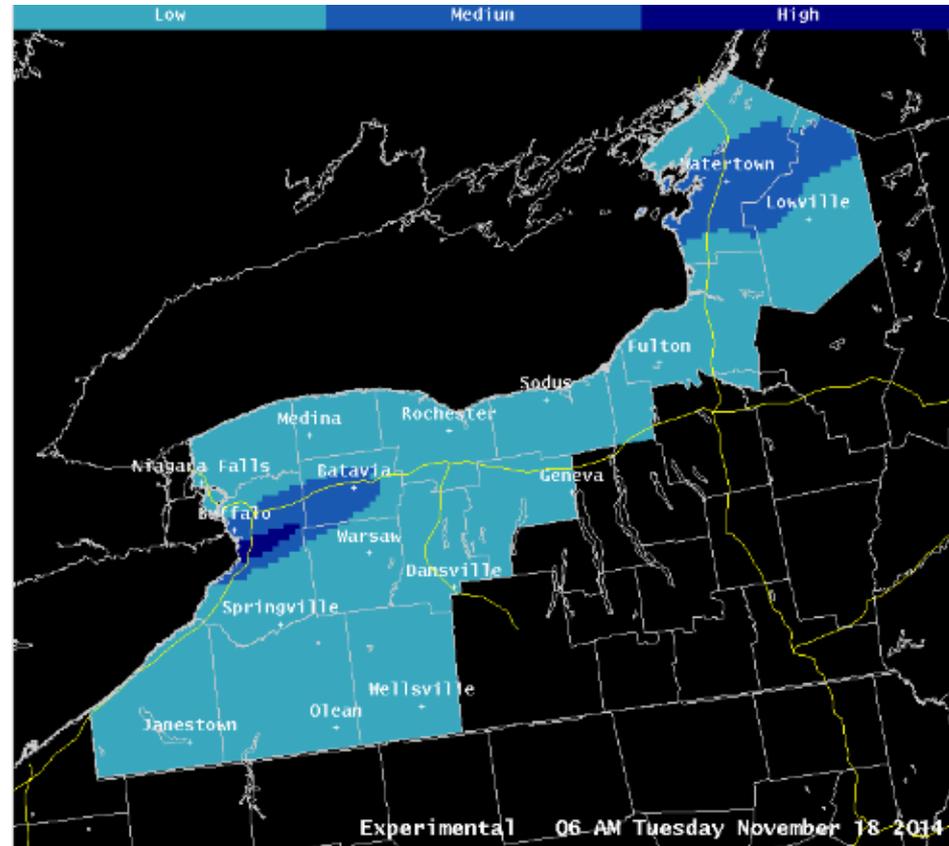


2AM Tuesday 11/18/2014

6AM Tuesday 11/18/2014



NWS Buffalo, NY



NWS Buffalo, NY





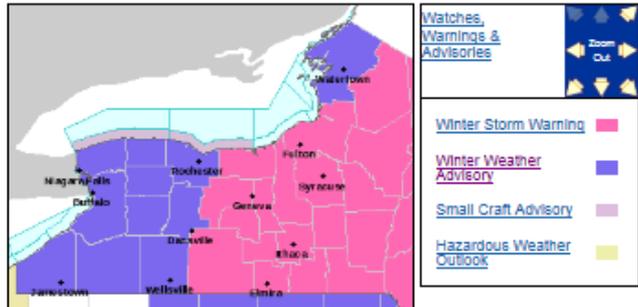
- News Headlines**
- [Latest Lake Erie Ice Cover Image](#)
 - [Storm Total Snowfall Forecast](#)
 - [Snowfall Rate Threat Graphics](#)
 - [Latest Snowfall Reports](#)

NWS Forecast Office Buffalo, NY

Buffalo, NY
Weather Forecast Office

- [Current Hazards](#)
- [Current Conditions](#)
- [Radar](#)
- [Forecasts](#)
- [Rivers and Lakes](#)
- [Climate and Past Weather](#)
- [Local Programs](#)

Click on the map below to zoom in.



Last Map Update: Mon, Feb. 9, 2016 at 10:41:12 am EST

- [Radar](#)
- [Current Weather](#)
- [Rivers & Lakes](#)
- [Satellite](#)
- [Weather Information Display](#)
- [Forecast Maps](#)
- [Hour by Hour Forecast](#)
- [Detailed Forecast](#)
- [Climate Plots](#)
- [Text Bulletins](#)
- [Marine Forecasts](#)
- [Skywarn](#)
- [Montague Radar](#)
- [Buffalo Radar](#)
- [NOAA Weather Radio](#)
- [Forecaster's Discussion](#)
- [Lake Effect Page](#)
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- FORECAST**
 - Hourly Weather Graph
 - Activity Planner
 - Graphical Table
 - Graphical 2D
 - Aviation
 - Marine
 - Great Lakes
 - Fine Weather
 - Tropical Weather
 - Ultra/violet index
- HAZARD**
 - Day 1 Outlook
 - Day 2 Outlook
 - Day 3 Outlook
 - Weather Hazards
 - National Warnings
 - Drought Monitor
 - Weather Dashboard
 - Snowfall Rate Threat Graphics
 - Storm Total Snowfall Forecast
- CLIMATE**
 - Lake Effect Page
 - Rochester Climate Graphs
 - Buffalo Weather History
 - Snow Spotters
 - First Snowfall Facts
 - Buffalo Climate Graphs
- MODEL DATA**
 - Forecast Models
 - MOB Output
 - Mesoscale Models
 - Bufkit
 - Hourly Mesoscale Analysis
- CURRENT CONDITION**
 - Lake Temperatures
 - Observations
 - Sunrise/Sunset
- LOCAL PROGRAMS**
 - Submit a Storm Report
 - Student Opportunities
 - NOAA Weather Radio
 - Upper Air
 - StormReady
 - SKYWARN
 - Office Staff
 - Research
 - Social/Media Dashboard

• Available in "News Headlines" during storms

• Always available

Severe Convective Weather



- Storm Prediction Center (SPC) in Norman OK issues watch and forecast products dealing with severe weather
- Risk communication is fundamentally linked to science-based threat probabilities
 - Drives communication intensity and decision support
- SPC issuing probabilistic forecasts since 1999
 - Day 1: Tornadoes, Hail and Damaging Winds
 - Day 2/3: All severe hazards combined
- Outlook probabilities
 - Chance of a severe event occurring with a 25 mile radius

SPC Days 1-3 Convective Outlook Changes



- SPC has revised **Day 1**, **Day 2**, and **Day 3** categorical severe weather outlooks to *better communicate risk and describe the likelihood of severe weather*
- This included the addition of two new categories for the SPC Convective Outlook
3 outlook categories → 5 outlook categories
- Changes became effective October 22, 2014

Rationale behind Changes



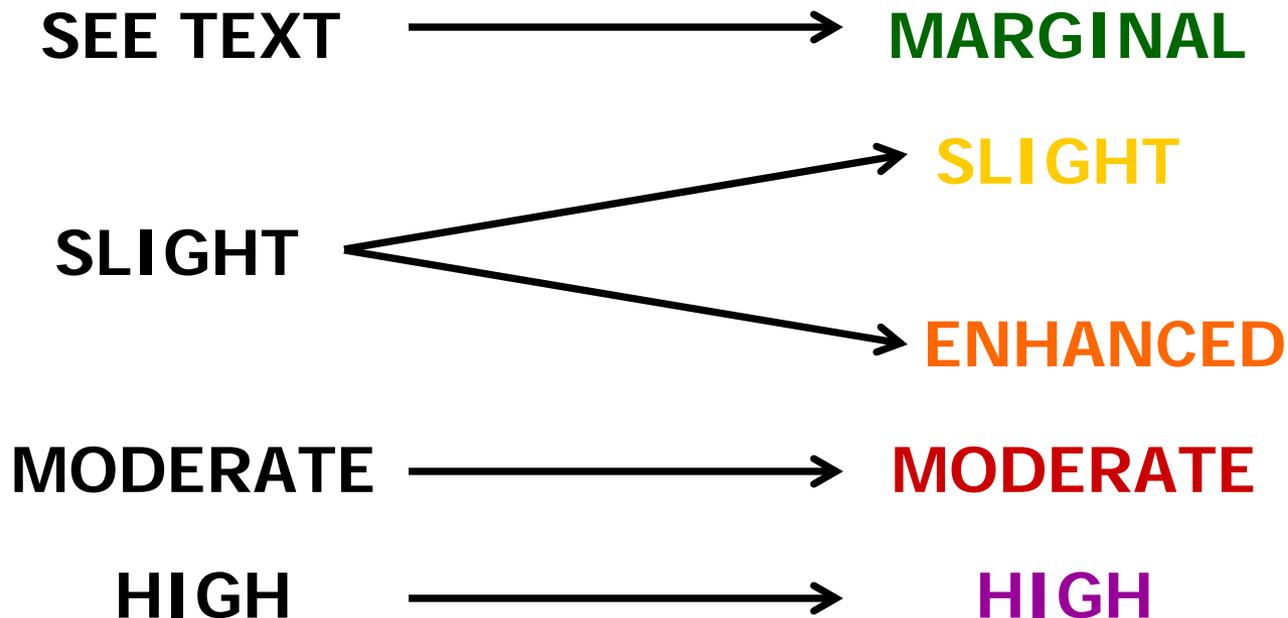
- **SLIGHT, MODERATE, HIGH** terminology has been used for 40 years. They have established understanding and these thresholds will essentially remain unchanged.
- Several years of customer feedback of the limitations of **SEE TEXT** and **SLIGHT** terminology



Day 1, Day 2, Day 3 Categorical Outlook Changes

Increase risk categories to 5 levels for Day 1 And Day 2 Outlooks

Increase risk categories to 4 levels for Day 3 Outlook (High not forecast)





Rationale behind Changes

- Addition of **ENHANCED** addresses the concerns about SLIGHT (both meaning and range)
- Addition of numbers on the graphic legend aids in the interpretation (colors also important)

1 2 3 4 5

- Social science community was heavily engaged in the planning



Day 1, Day 2, Day 3 Outlook Changes

Increase risk categories to 5 levels for Days 1+2; 4 levels for Day 3 Outlook

SPC Severe Weather Outlook Probability-to-Categorical Description Tables (2014)

Day1	0%	2%	5%	10%	10% sig	15%	15% sig	30%	30% sig	45%	45% sig	60%	60% sig
Tor	TSTMS	MARGINAL	SLGT	ENHANCED			MDT		HIGH				
Wind	TSTMS		MARGINAL			SLGT		ENHANCED			MDT	HIGH	
Hail	TSTMS		MARGINAL			SLGT		ENHANCED			MDT		

Day2	0%	5%	15%	15% sig	30%	30% sig	45%	45% sig	60%	60% sig
All Svr	TSTMS	MARGINAL	SLGT		ENHANCED			MDT		HIGH

Day3	0%	5%	15%	15% sig	30%	30% sig	45%	45% sig
All Svr	TSTMS	MARGINAL	SLGT		ENHANCED			MDT

Old

Example #1

SFC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 1629Z 09/15/2013
VALID: 15/1630Z-16/1200Z
FORECASTER: HART/SMITH
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

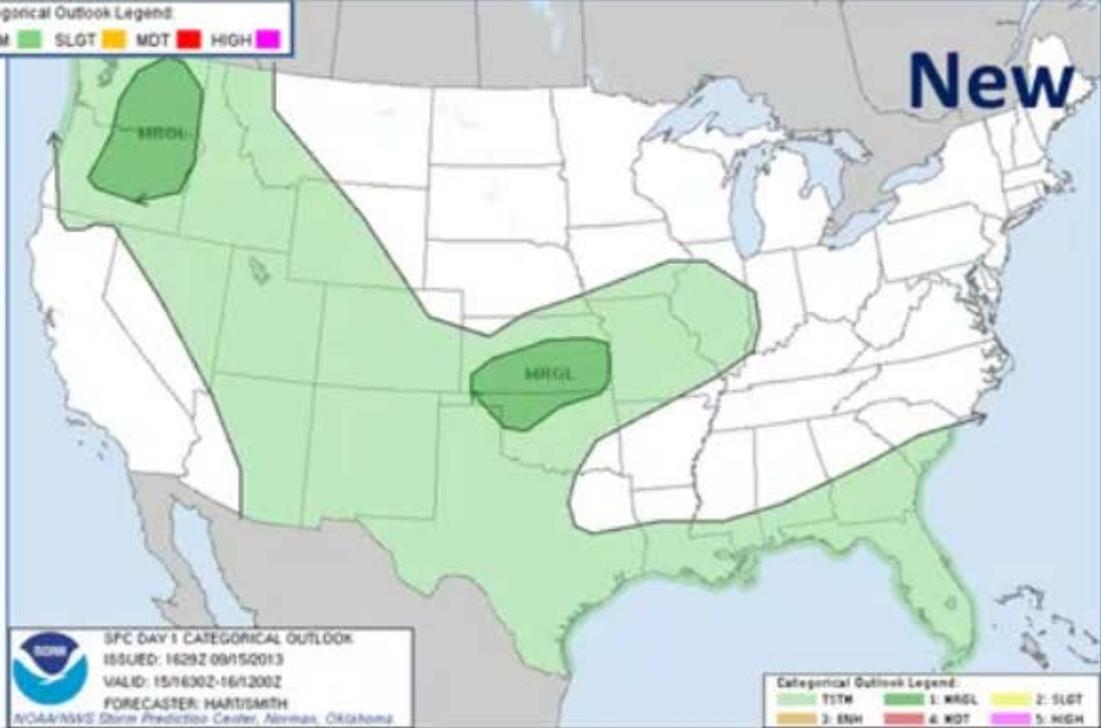
Categorical Outlook Legend
TSTM SLGT MDT HIGH

Marginal
risk added

New

SFC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 1629Z 09/15/2013
VALID: 15/1630Z-16/1200Z
FORECASTER: HART/SMITH
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

Categorical Outlook Legend
TSTM 1: MRGL 2: SLGT
3: BSH 4: WDT 5: HIGH



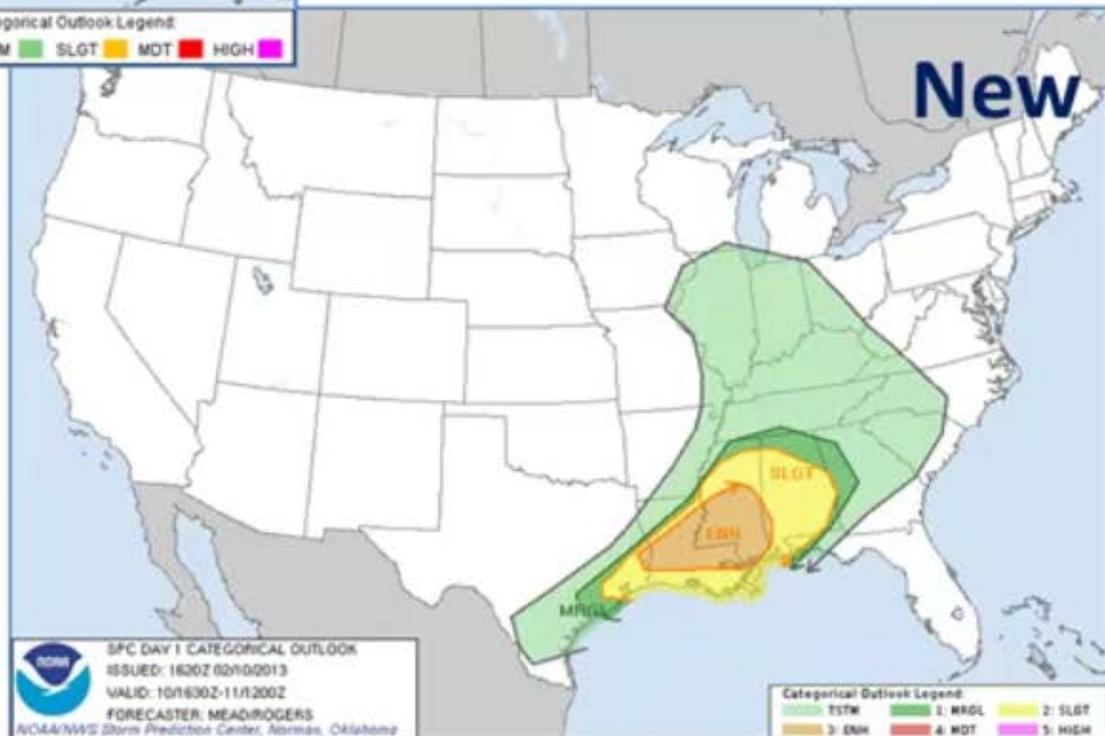
Old

Example #2

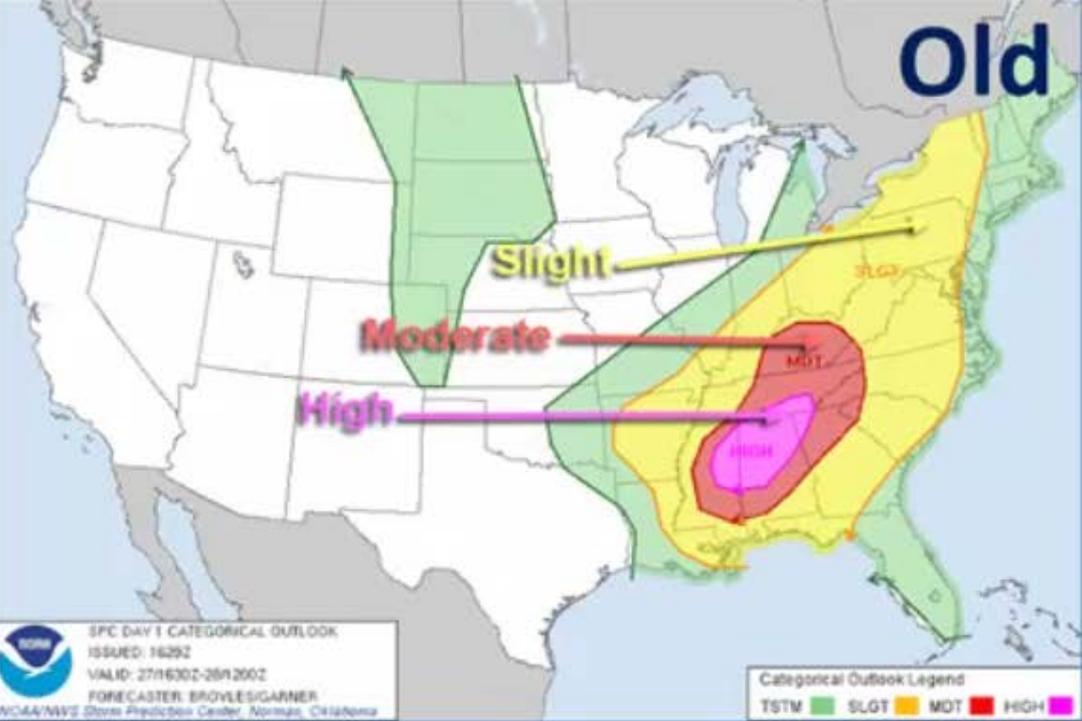


New

Marginal and
Enhanced
risks added



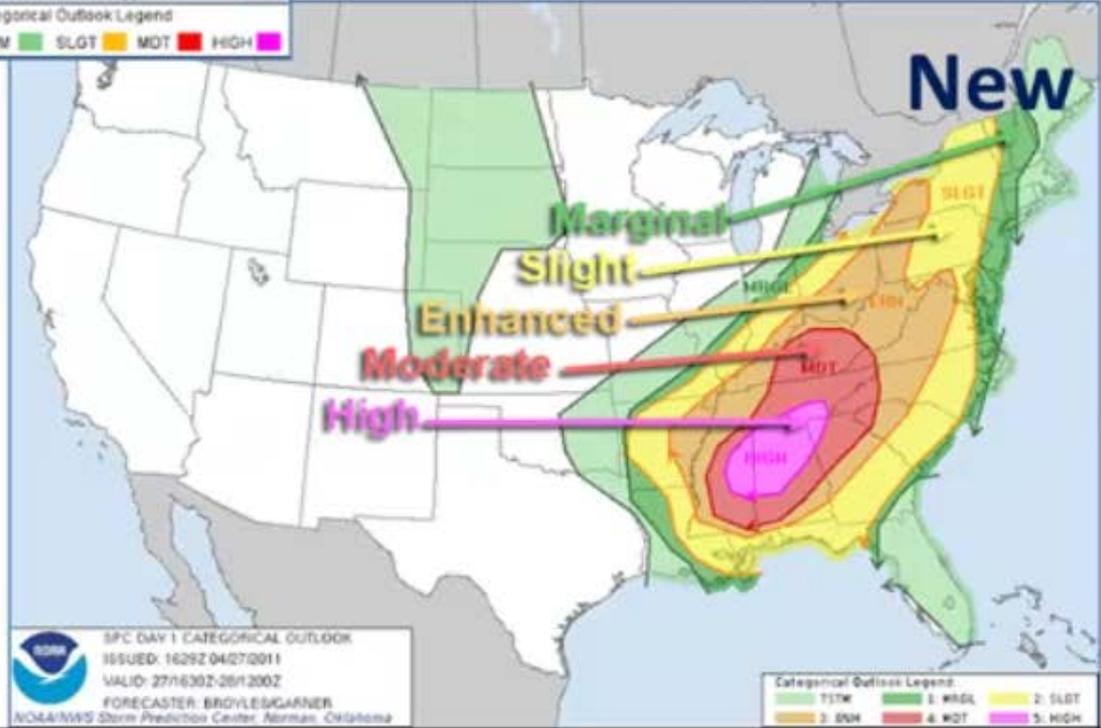
Old



Example #3

High Risk
tornado outbreak
April 27, 2011

New

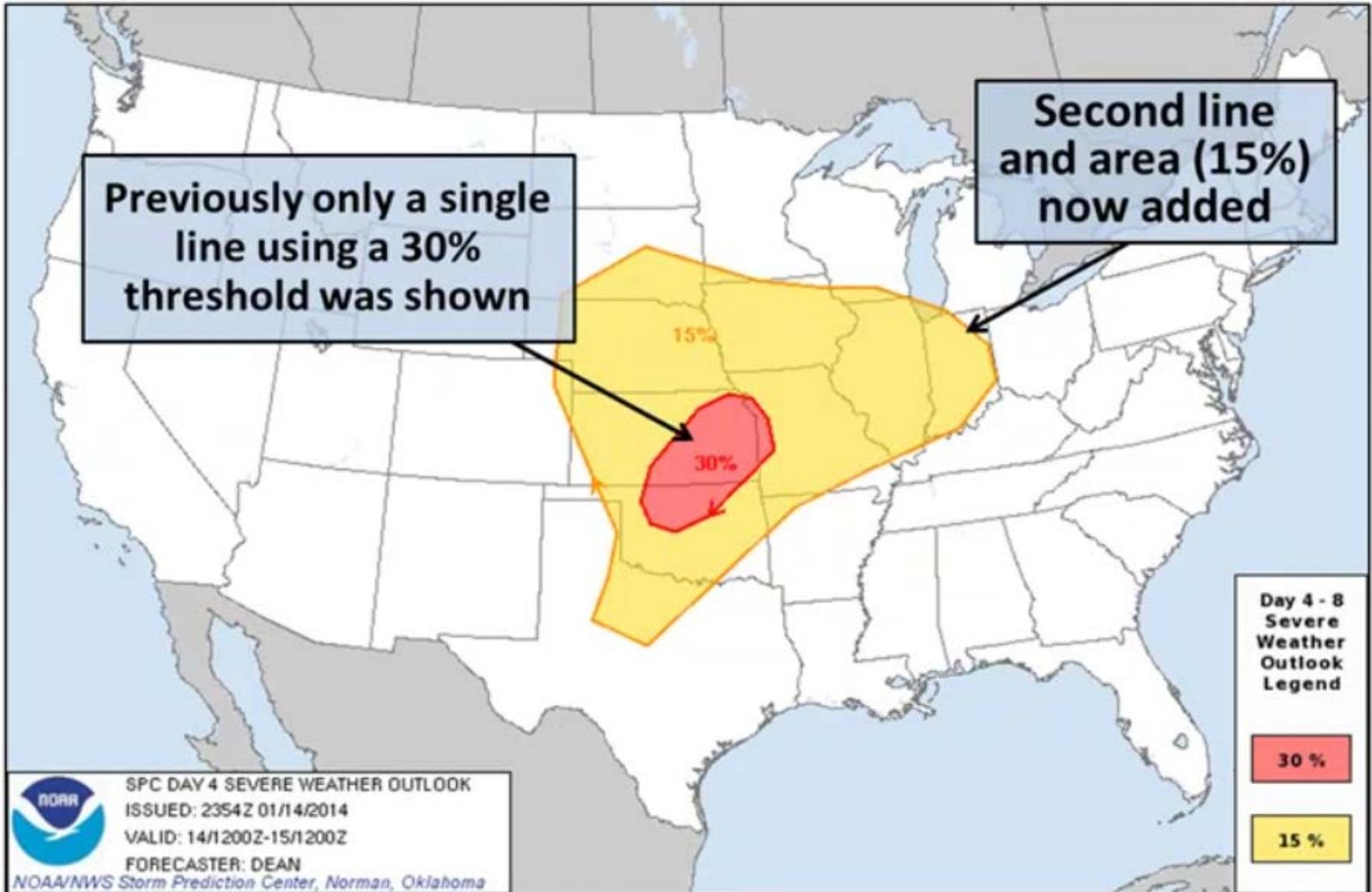


SPC Days 4-8 Convective Outlook Changes



- SPC has revised the **Days 4-8 categorical severe weather outlook** to better describe the likelihood of severe weather
- A **new forecast threshold category (15%)** has been added for Days 4-8
- Changes became effective on December 16, 2014

Day 4-8 Convective Outlook

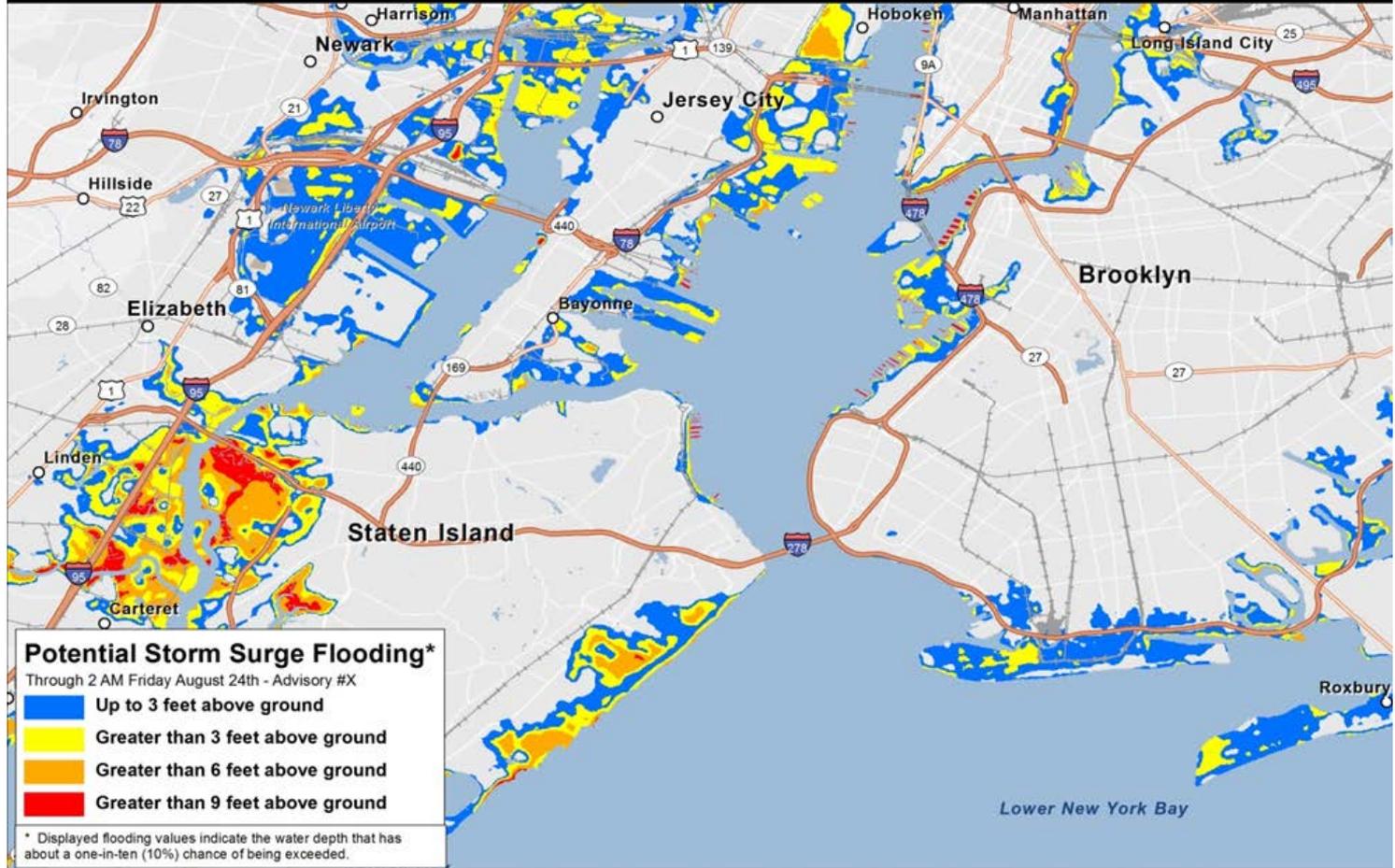




Tropical Weather

- NOAA's National Hurricane Center (NHC) implemented changes in 2014
 - Potential Storm Surge Flooding Map
 - Depicts the reasonable worst-case scenario for any individual location
 - Shows inundation levels that have a 10% chance of being exceeded
 - 5-day Graphical Tropical Weather Outlook
 - No longer uses hatched areas to denote locations of disturbances
- NHC Storm Surge Resources page
<http://www.nhc.noaa.gov/surge/resources.php>

Hurricane X

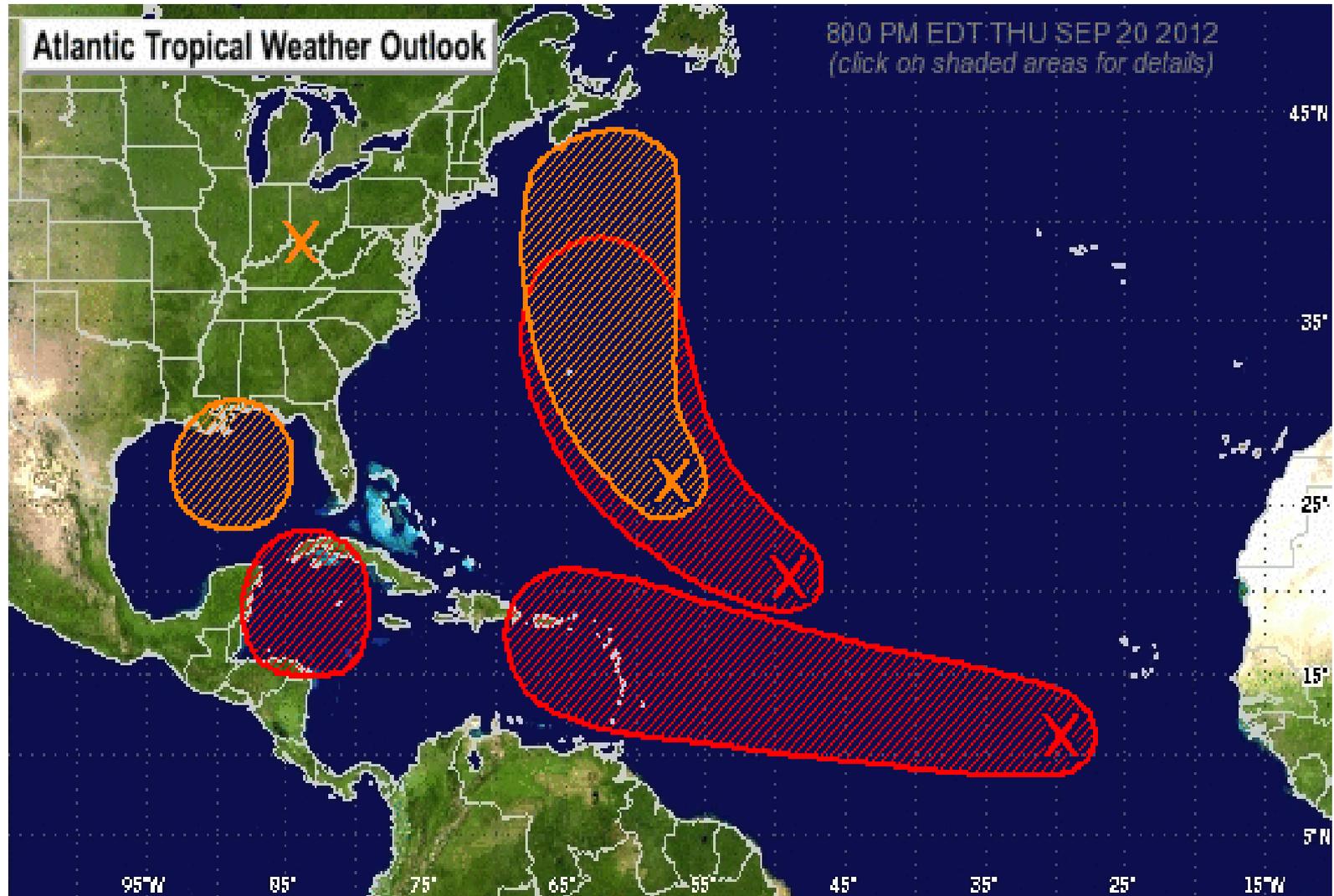


Potential Storm Surge Flooding*

Through 2 AM Friday August 24th - Advisory #X

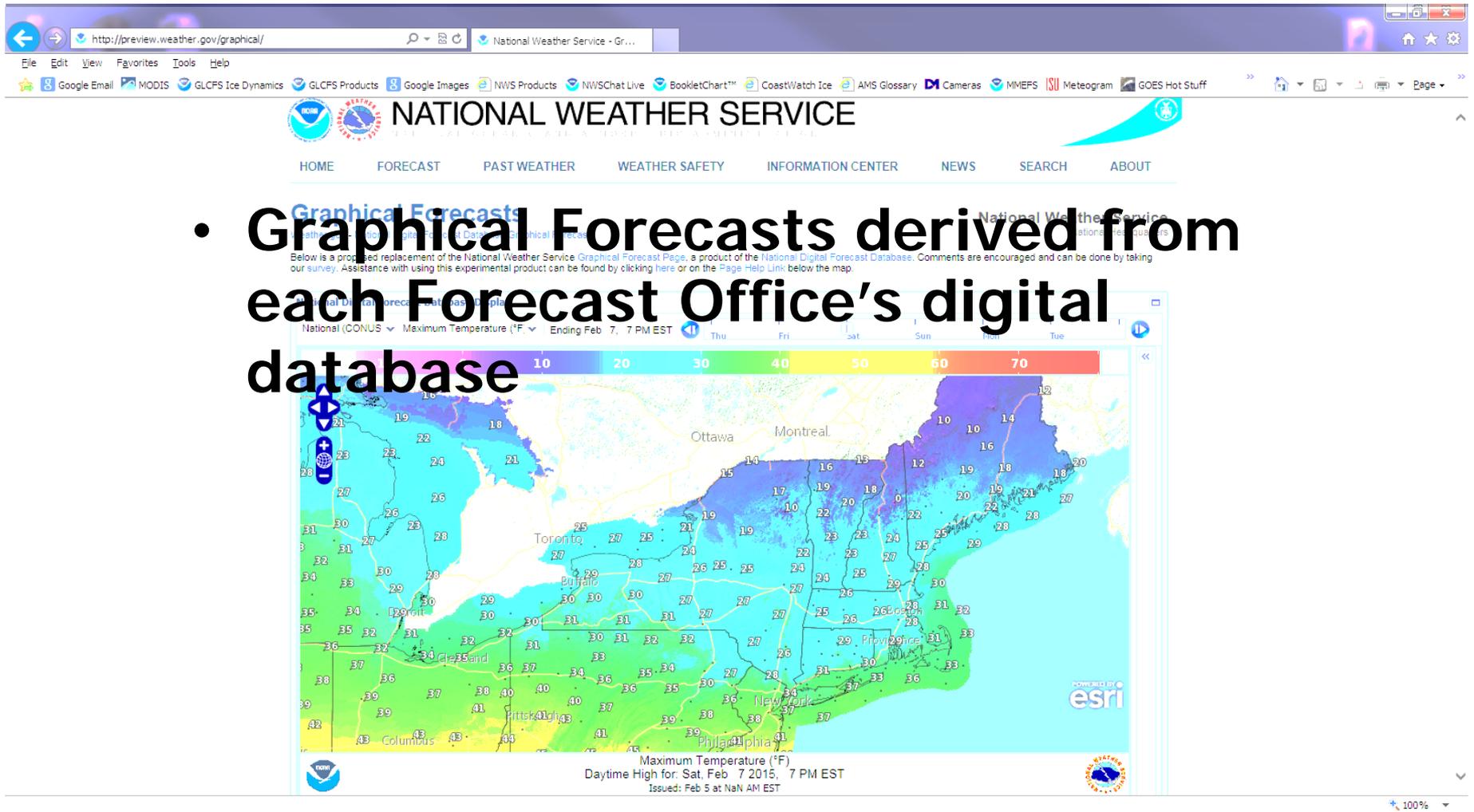
- Up to 3 feet above ground
- Greater than 3 feet above ground
- Greater than 6 feet above ground
- Greater than 9 feet above ground

* Displayed flooding values indicate the water depth that has about a one-in-ten (10%) chance of being exceeded.



5-Day Tropical Cyclone Formation Potential: Low < 30% Medium 30-50% High > 50%

http://preview.weather.gov/graphical



The screenshot shows a web browser window displaying the National Weather Service graphical forecast page. The browser's address bar shows the URL "http://preview.weather.gov/graphical/". The page header includes the National Weather Service logo and navigation links: HOME, FORECAST, PAST WEATHER, WEATHER SAFETY, INFORMATION CENTER, NEWS, SEARCH, and ABOUT. The main content area features a large map of the Eastern United States and parts of Canada, overlaid with a color-coded temperature forecast. A legend at the top of the map shows a color gradient from blue (10°F) to red (70°F). The map displays numerical temperature values for various locations, including Ottawa, Montreal, Toronto, Buffalo, Boston, Philadelphia, and New York. A text box at the bottom of the map reads: "Maximum Temperature (°F) Daytime High for: Sat, Feb 7 2015, 7 PM EST Issued: Feb 5 at NaN AM EST". The page is powered by ESRI.

- Graphical Forecasts derived from each Forecast Office's digital database



-
- Forecasts – Temperature, Wind, Probability of Precipitation, Hazards, Precipitation Amounts – 6-hr and total, Snow amounts – 6-hr and total
 - Marine – Wave Heights
 - Fire Weather – Maximum/Minimum Relative Humidity
 - Severe Weather – Convective Outlook, Severe Probabilities
 - Tropical -- Wind Speed Probabilities

<http://preview.weather.gov/edd>

The image is a screenshot of a web browser displaying the NWS Enhanced Data Display v4.4 interface. The browser's address bar shows the URL "http://preview.weather.gov/edd". The page title is "NWS Enhanced Data Display v4.4" and it includes a search bar showing "26°F". The main content is a map of the Northeast United States and parts of Canada, with various weather data layers overlaid. On the left side, there is a control panel with sections for "Interface" (set to "Advanced"), "Quick Layers" (with options for Radar, Satellite, Hazards, Tropical, Rivers, Forecast, Observations, Upper Air, Model Spread, Webcams, Outlooks, and Background), and "Mouse Click Control" (with options for "Public/Marine Forecast" and "Right-click map for forecast options"). Overlaid on the map in large black text are three bullet points:

- Current Observations:
 - Radar, Satellite, Hazards, Surface Observations
- Forecasts:
 - Forecast Graphics
 - Hydrology
- "Travel Forecasts"

The map shows major cities like Toronto, New York, and Boston, and geographical features like Lake Erie and the Appalachian Mountains. The bottom of the interface includes a status bar with "NWS Chat", "State Overlay", "Map Storm Reports", "Save/Share", and "Like" buttons, along with coordinates and a scale bar.