



Results of 2013-2014 Probabilistic Snowfall Forecast Graphics

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*National Weather Service
Baltimore MD/Washington DC*

Agenda

- **2013-2014 Winter Project Background**
- **Communicating a range of possibilities**
- **Case Studies: January 28-29th, 2014**
February 12-13th, 2014
- **Project conclusions and future work**



4 Main Pilot Project Goals

1. Improve the flow of information

2. Better explain a range of possibilities

3. Develop a societal impacts catalog

4. Build a Weather Ready Nation



Background

- **Weather Forecasts are Inherently Uncertain**
 - **Chaotic Nature of the Atmosphere**
 - Conditions Can Change Rapidly
 - **Deficiencies In Observations**
 - Not Everything is Observed
 - Errors
 - **Uncertainties in Computer Simulations of Atmosphere**
 - Models



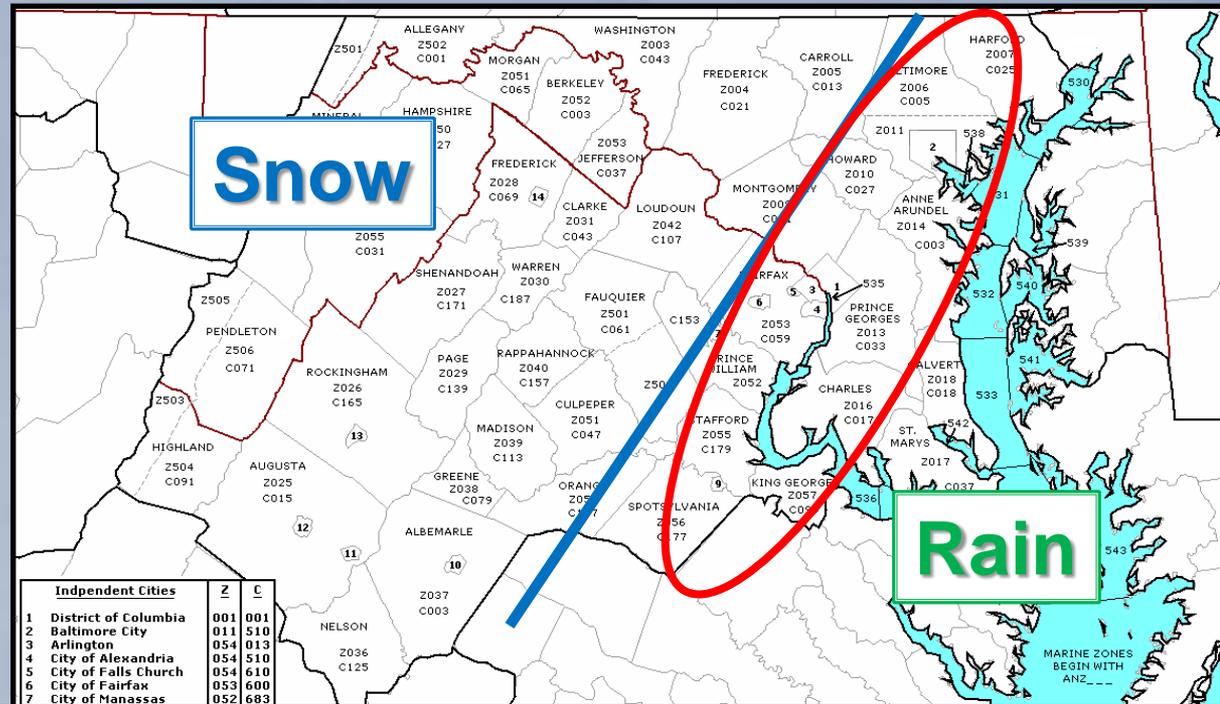
Background

- **Forecasting Snow Here Is Challenging:**
(Contains Uncertainty)
 - **Blue Ridge & Appalachian Mountains**
 - **Atlantic Ocean & Chesapeake Bay**
 - Warmer Water Moderates Land Temperatures



Background

- **Forecasting Snow Here Is Challenging:**
(Contains Uncertainty)
 - **Rain/Snow Line**
 - **Typically Close**

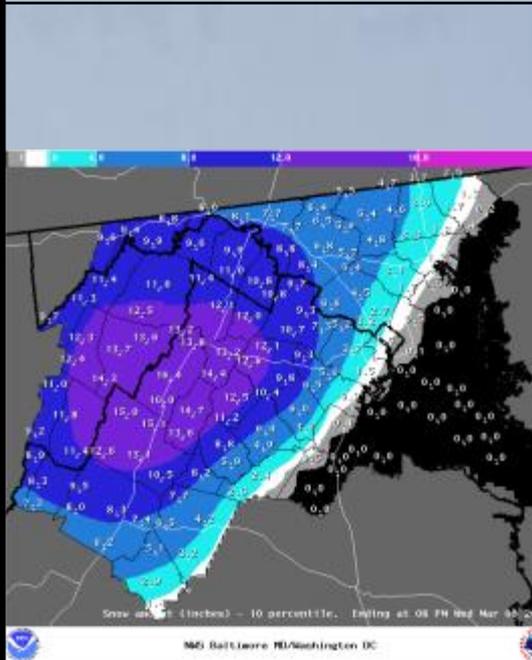


40 mile difference impacts 6,800,000 people!



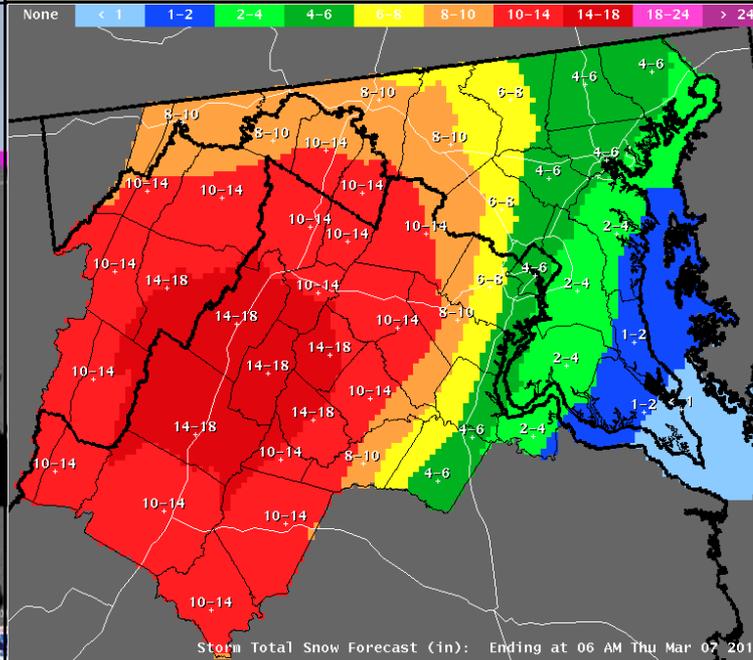
Minimum/Most Likely/Maximum

Minimum



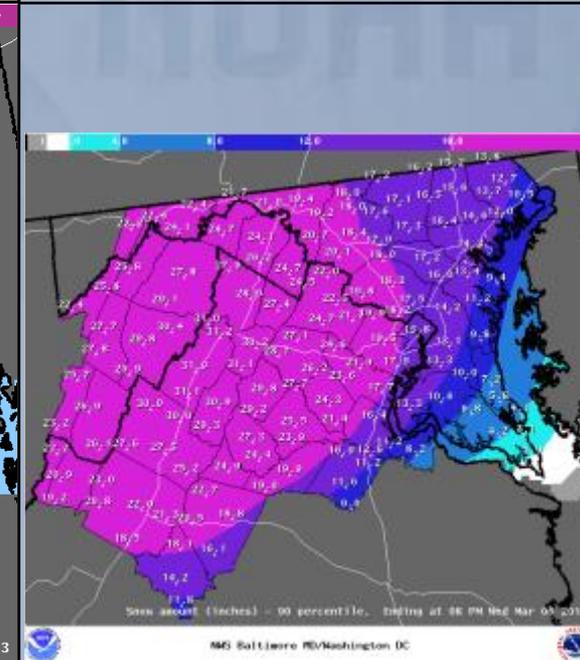
Expect at least this much

Most Likely



Official NWS Forecast

Maximum



Potential for this much

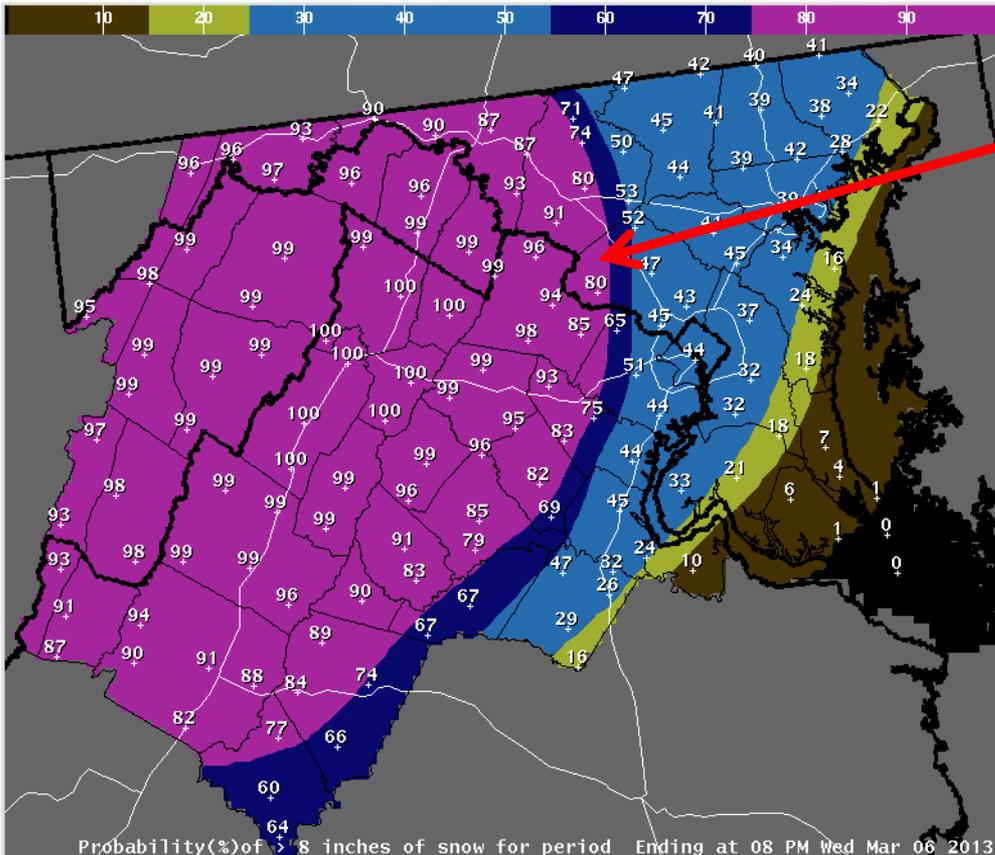
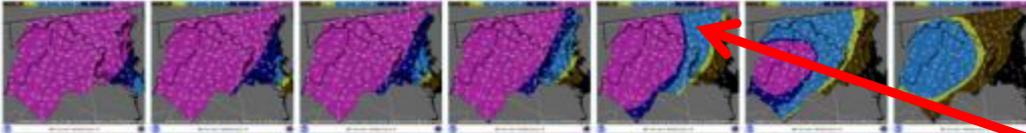
Probability of Exceedance

Chance That Snow Accumulation Will Be Greater Than...

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

Whats this?

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



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

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

National Weather Service
Baltimore MD/Washington DC



Probabilistic Snowfall Range Table

Can Select
County/City
for Local Towns

Defaults to
regional table

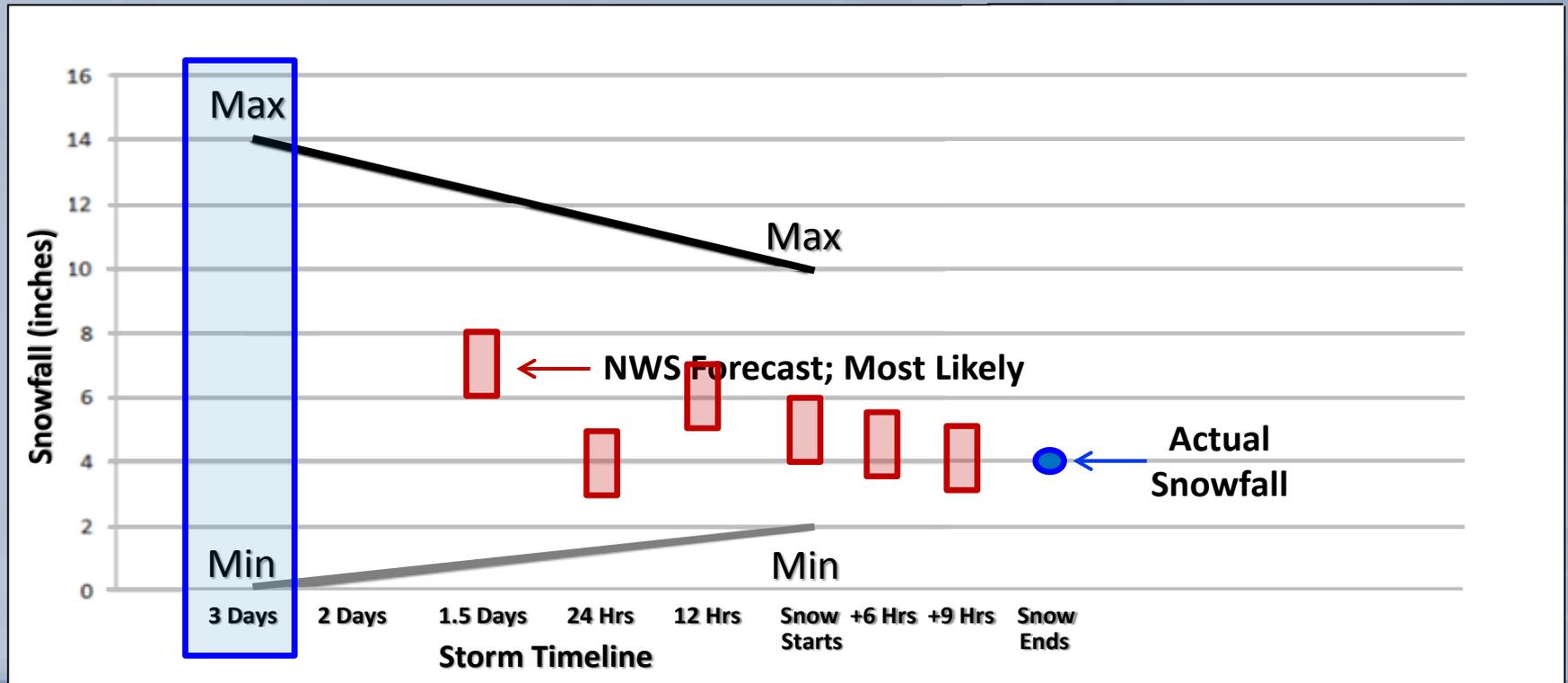
Chance of Snow Accumulation Ranges												
03/05/2013 1900 to 03/06/2013 2000 EST												
												County: <input type="text" value="Selected"/>
Location	Min	Likely	Max	0"	T-1"	1-2"	2-4"	4-8"	8-12"	12-18"	>18"	
Baltimore, MD	1	4-8	15	0%	9%	6%	17%	28%	21%	15%	4%	
Bayard, WV	9	8-12	22	0%	0%	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%



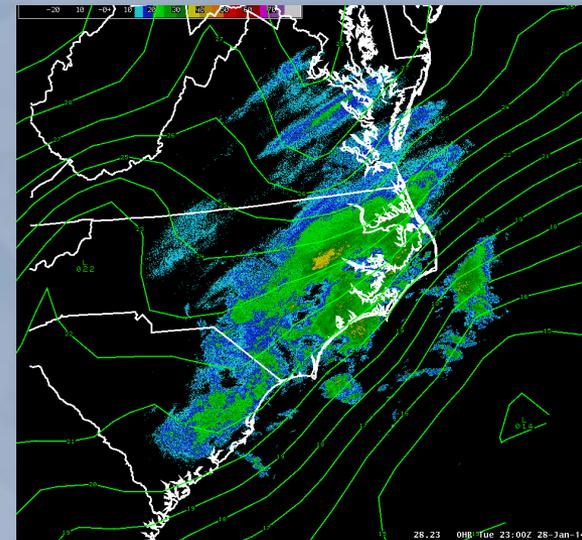
Idealized Situation

- As Storm Nears...
 - Range of Possibilities Shrinks
 - Confidence Increases
- NWS Forecast Between Max/Min



January 28-29, 2014

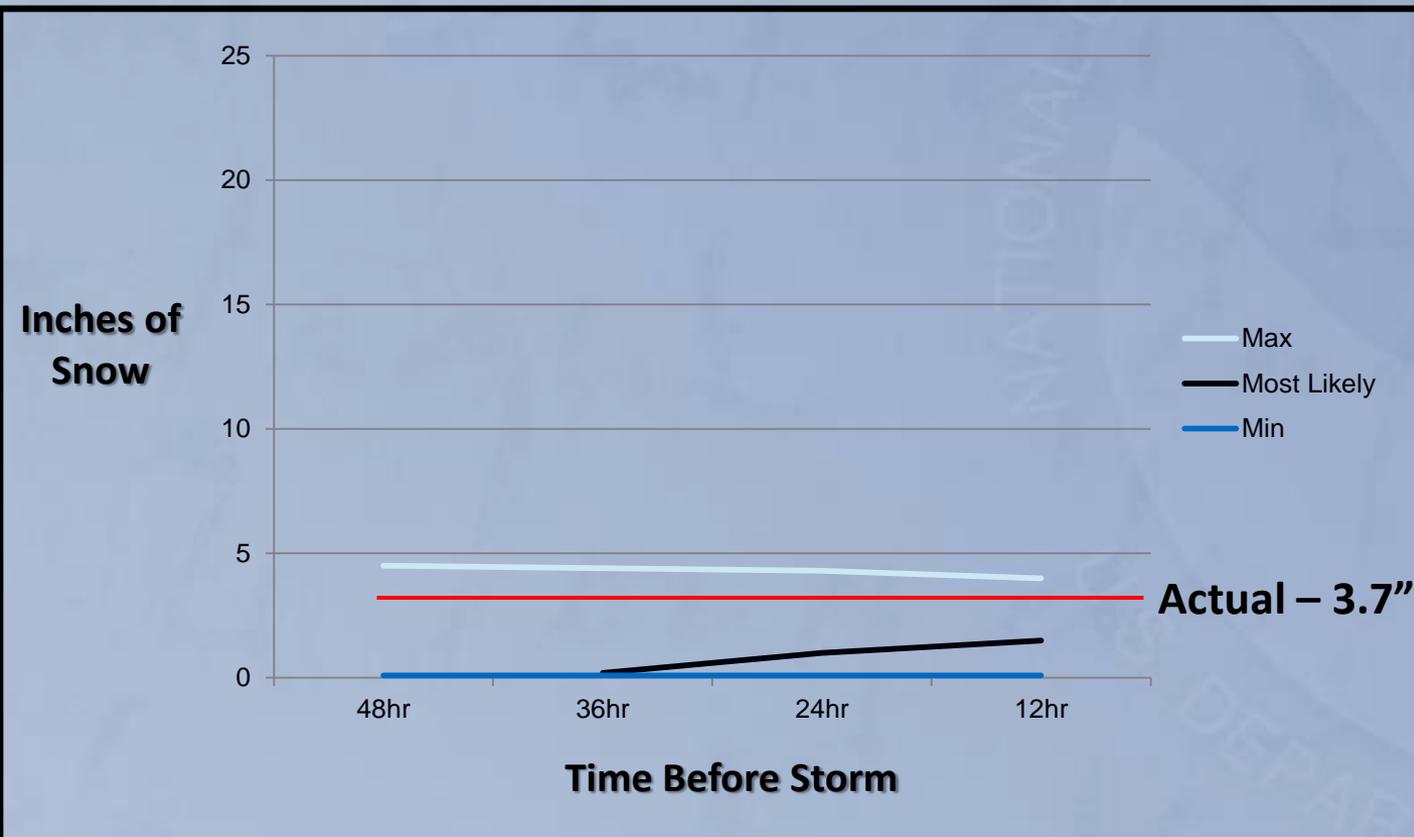
- Coastal Low
- NE & E Virginia
 - Several Inches
 - Transportation Impacts
- Coating to None N & NW



Jan 28th 6pm
Weather Map/Radar

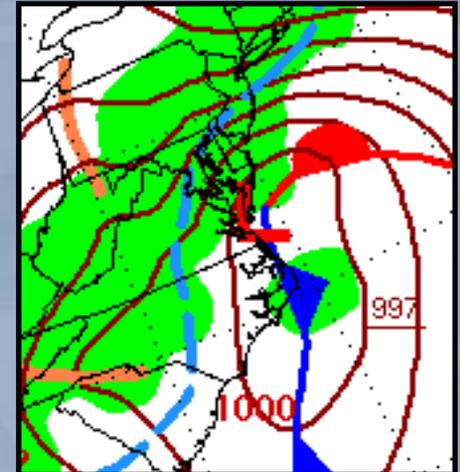
January 28-29, 2014

King George, VA



February 12-13, 2014

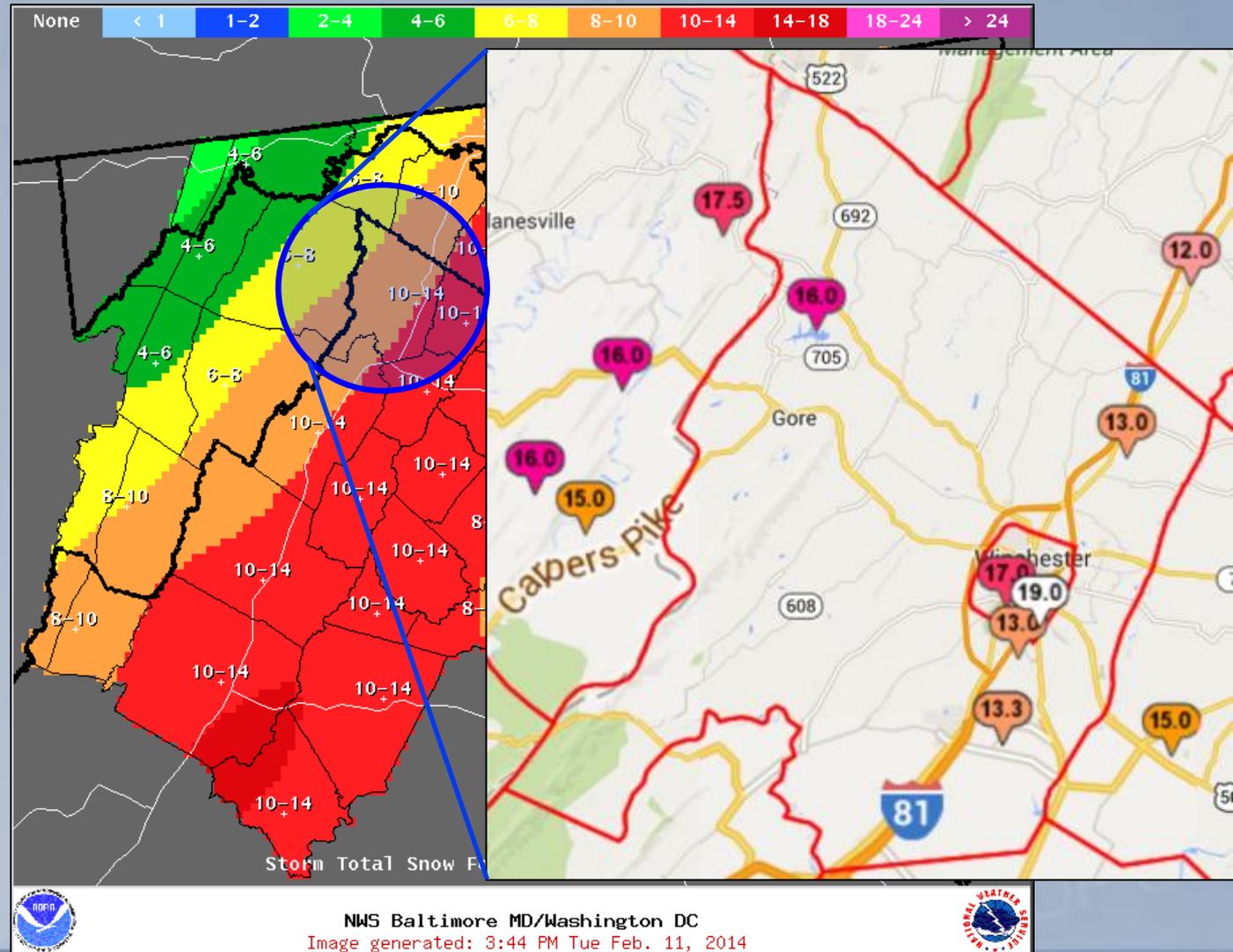
- **Coastal Low**
- **Pre-Valentine's Day**
 - **High Commercial/Shipping Impact**
- **Widespread heavy snow**
- **Some rates 2-3"/hour overnight**
- **Transportation catastrophe in Charlotte, NC due to public malaise**
- **Washington area gov't/schools closed**



Feb 13th 8am
Weather Map

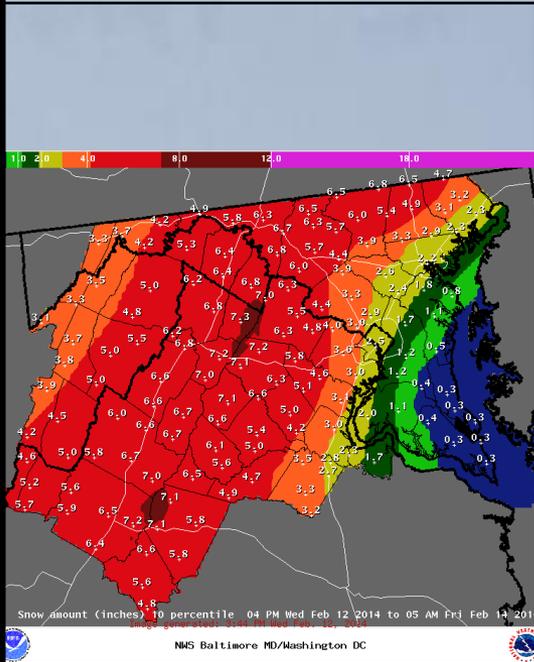
February 12-13, 2014

- Generally well forecast storm
- Frederick Co. under-forecast 1-2 days before
- How could new info helped decision-making?



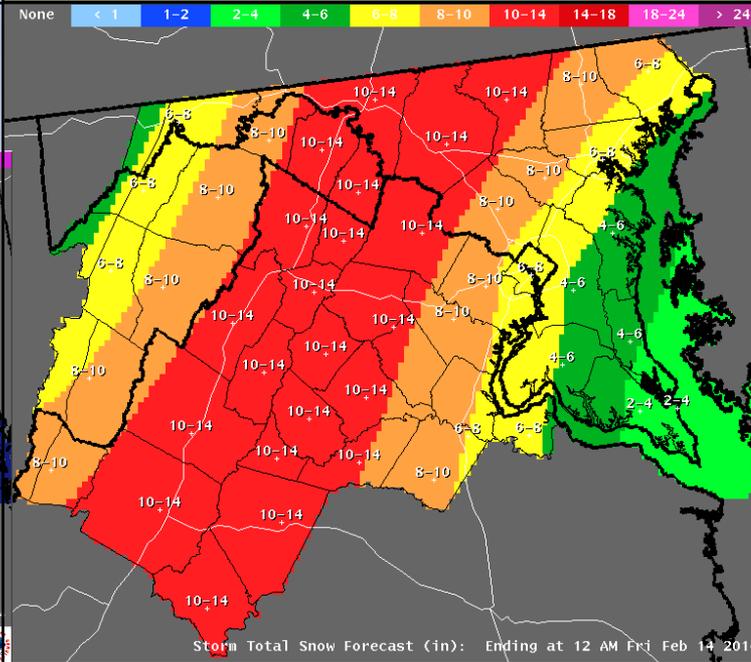
February 12-13, 2014

Minimum



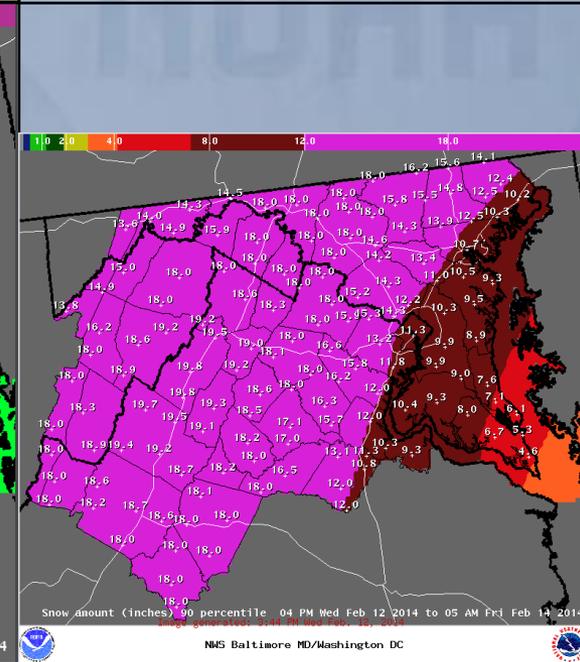
Expect at least this much

Most Likely



Official NWS Forecast

Maximum

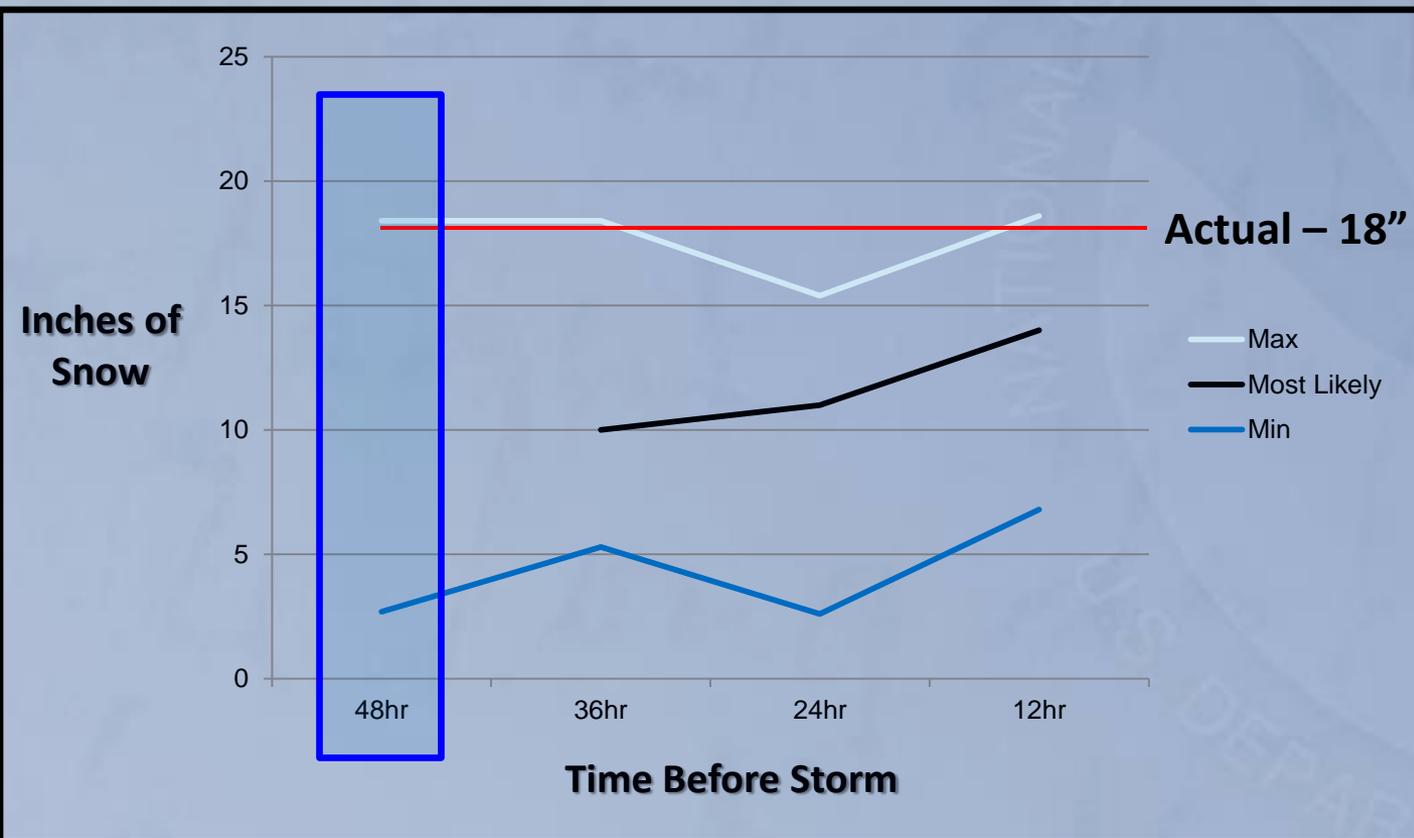


Potential for this much



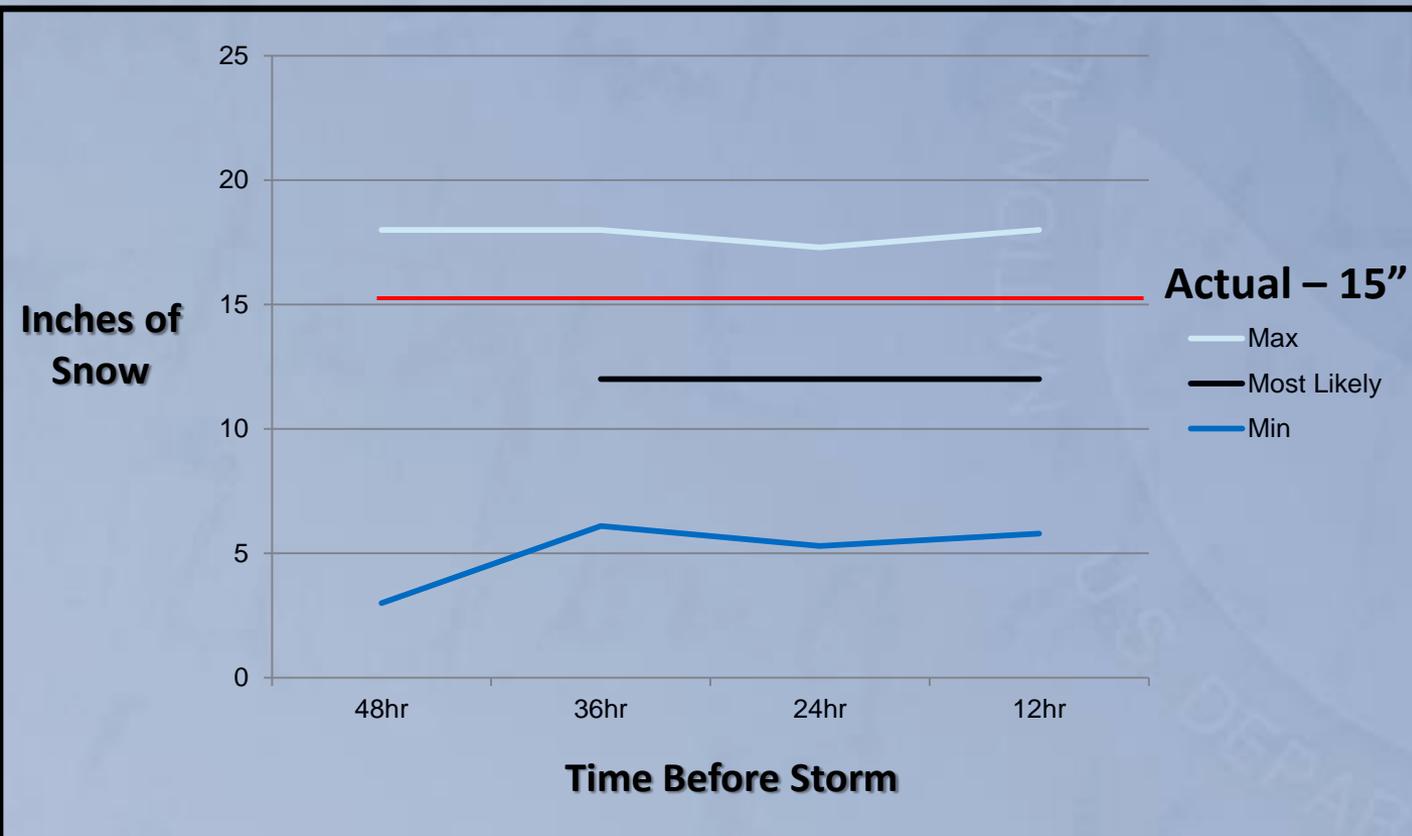
February 12-13, 2014

Winchester, VA



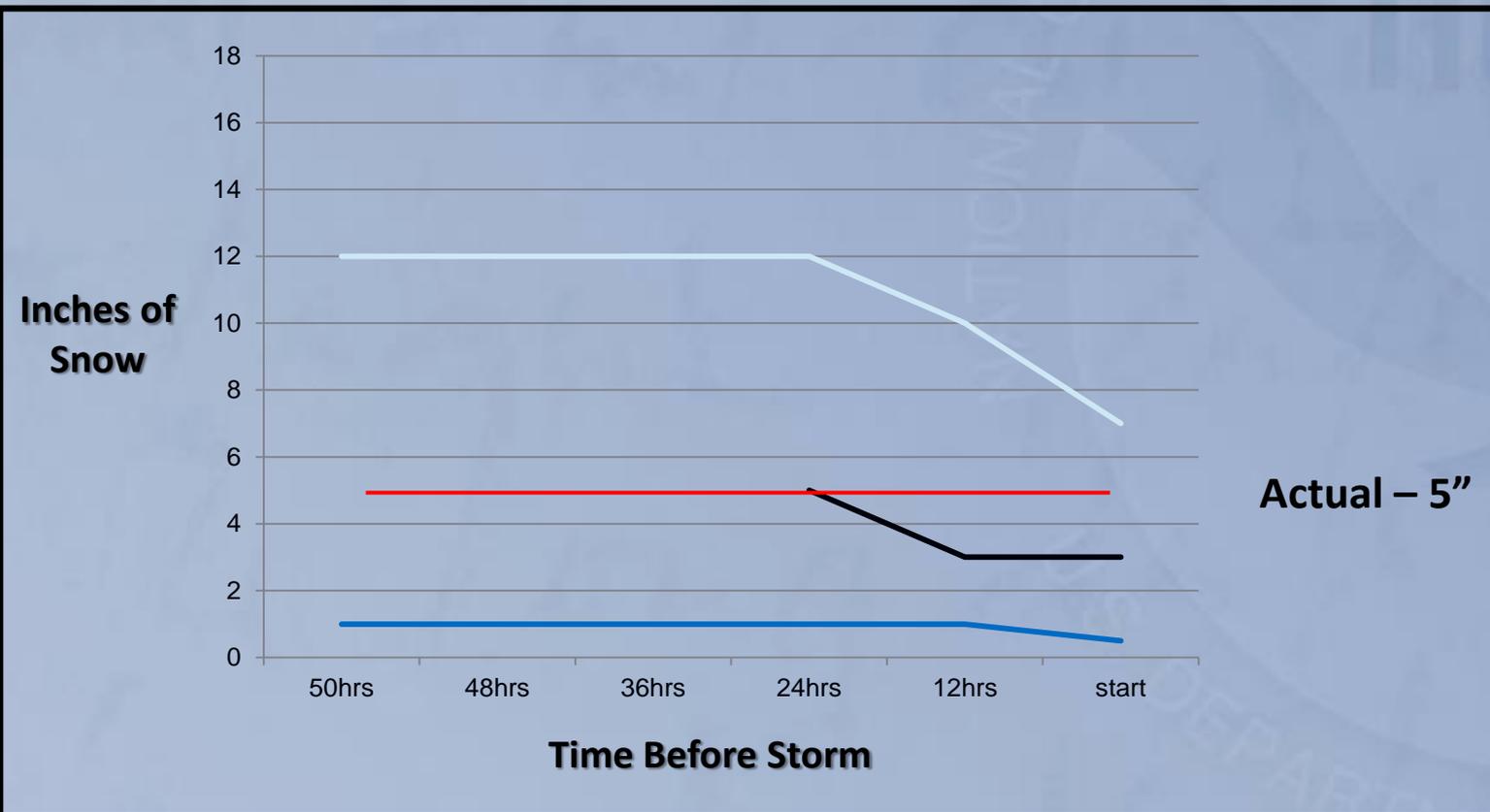
February 12-13, 2014

Charlottesville, VA



February 12-13, 2014

Leonardtwn, MD



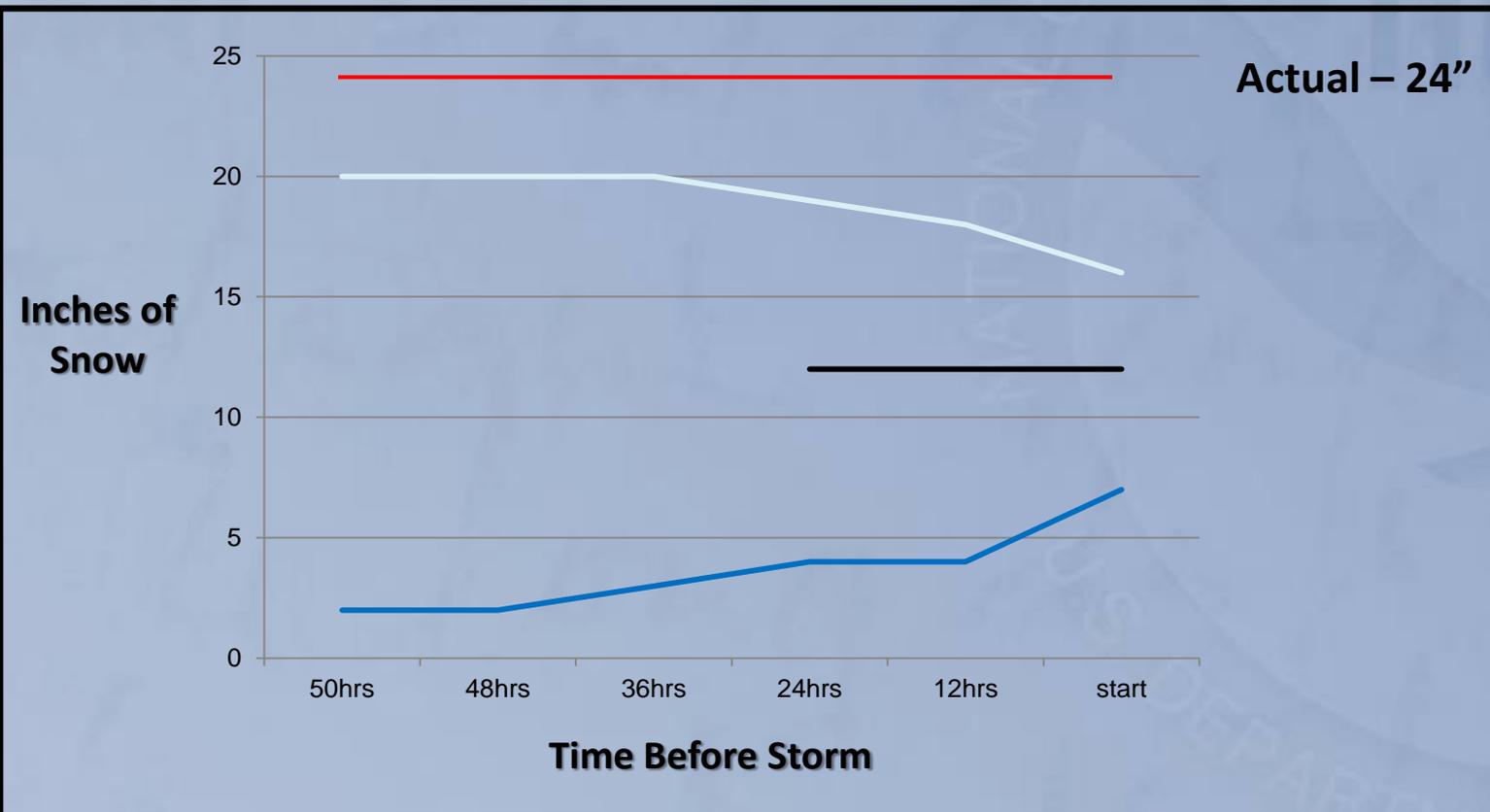
February 12-13, 2014

- **This approach will not be iron-clad**
- **Times when actual will fall outside ‘goalposts’**
 - Small scale hi-intensity snows
 - Thunder-snow
 - Banding
 - **Unforeseen conditions**
- **At least 80% of time should be accurate**



February 12-13, 2014

Millers, MD



Results of Summer Project

- **Case studies of BWI, IAD and Charlottesville.**
- **Analyzed Watch/Warning/Advisory events per site for winter 2013-2014.**
- **Analyzed observed snowfall and forecast snowfall and compared to goal posts (Min and Max).**
- **Accurate forecast = observed and forecasted snowfall falls within the goal posts.**



Number of instances the observed snowfall fell outside the goal posts

Forecast Period (hour)	IAD	BWI	Charlottesville
12	2 times (20%)	2 times (22%)	2 times (40%)
24	1 time (10%)	2 times (22%)	2 times (40%)
36	2 times (20%)	3 times (33%)	0
48	2 times (20%)	2 times (22%)	0



Project Conclusions

- **The Minimum/Most Likely/Maximum is an accurate product in the majority of cases.**
- **In most cases, the Min and Max narrowed as time drew near to the snow onset while The Most Likely (Official Forecast) stayed within the Min and Max goal post.**
- **Feedback from customers has been very positive. Effective planning tool for decision makers.**



Future Work

- **Probabilistic Winter products expanding to PHI, NYC and BOS this upcoming winter.**
- **Potential for future expansion to other offices within Eastern Region next year.**
- **Will consider expanding LWX project to include probabilistic ice graphics in FY15.**



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