

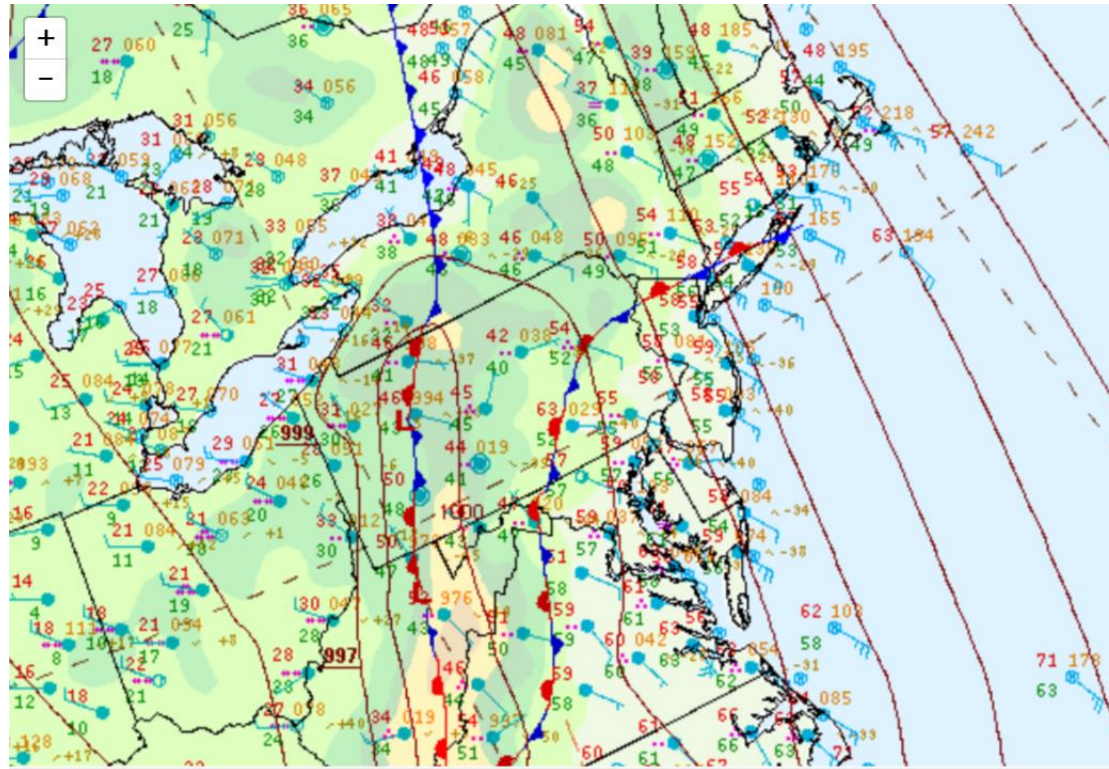


Christmas 2020 Snowmelt Flood

Britt E. Westergard
Senior Service Hydrologist
& Mike Evans
Science & Operations Officer

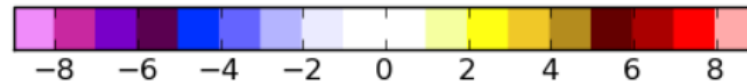
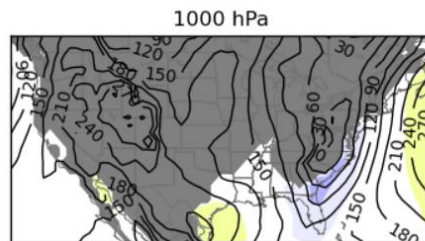
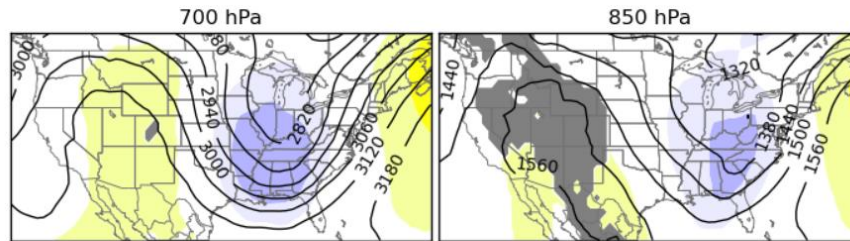
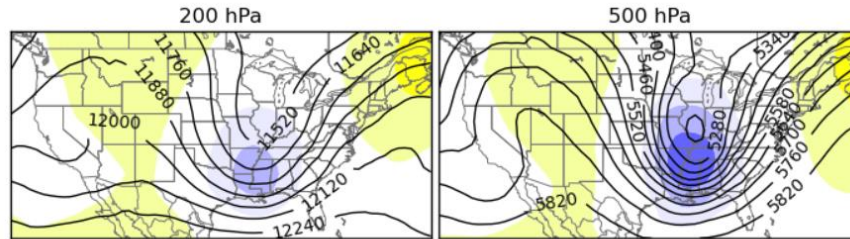
"Christmas Ornament" by Creativity+ Timothy K Hamilton is licensed with CC BY-NC-ND 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/2.0/>

Surface map - 00 UTC December 25th



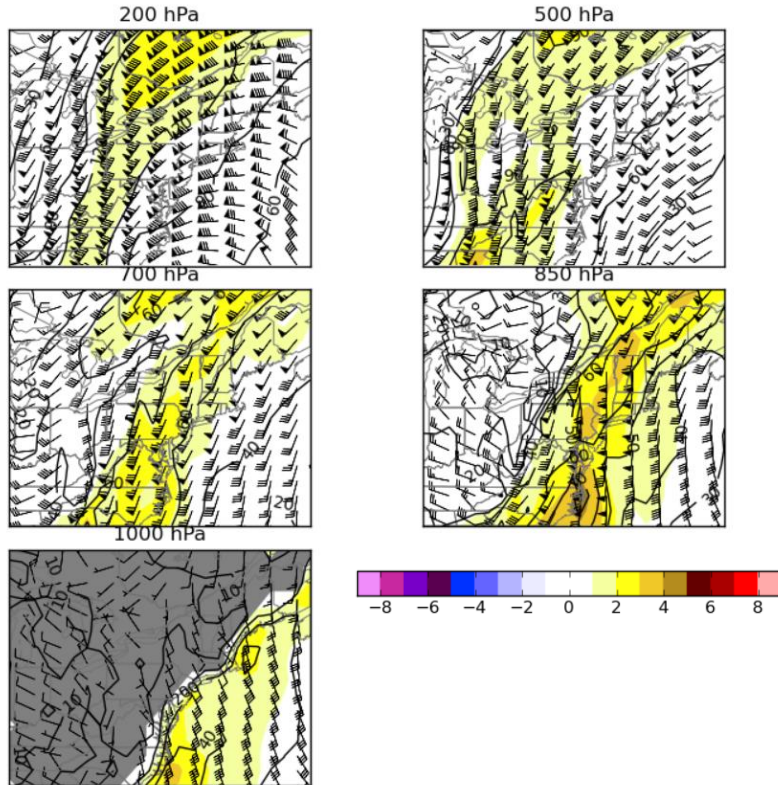


Geopotential heights - 00 UTC December 25th

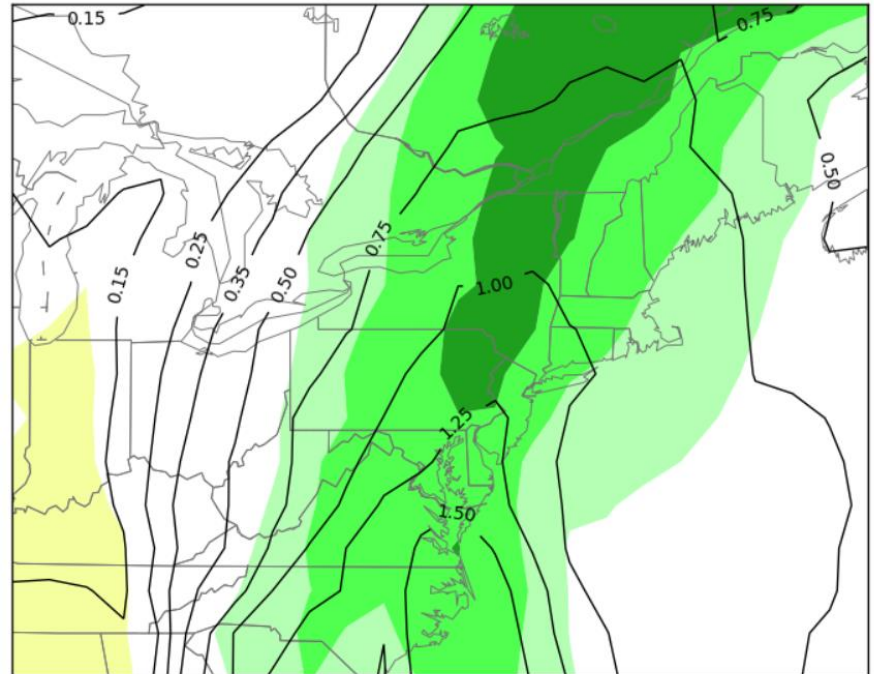




Wind and precipitable water - 00 UTC December 25

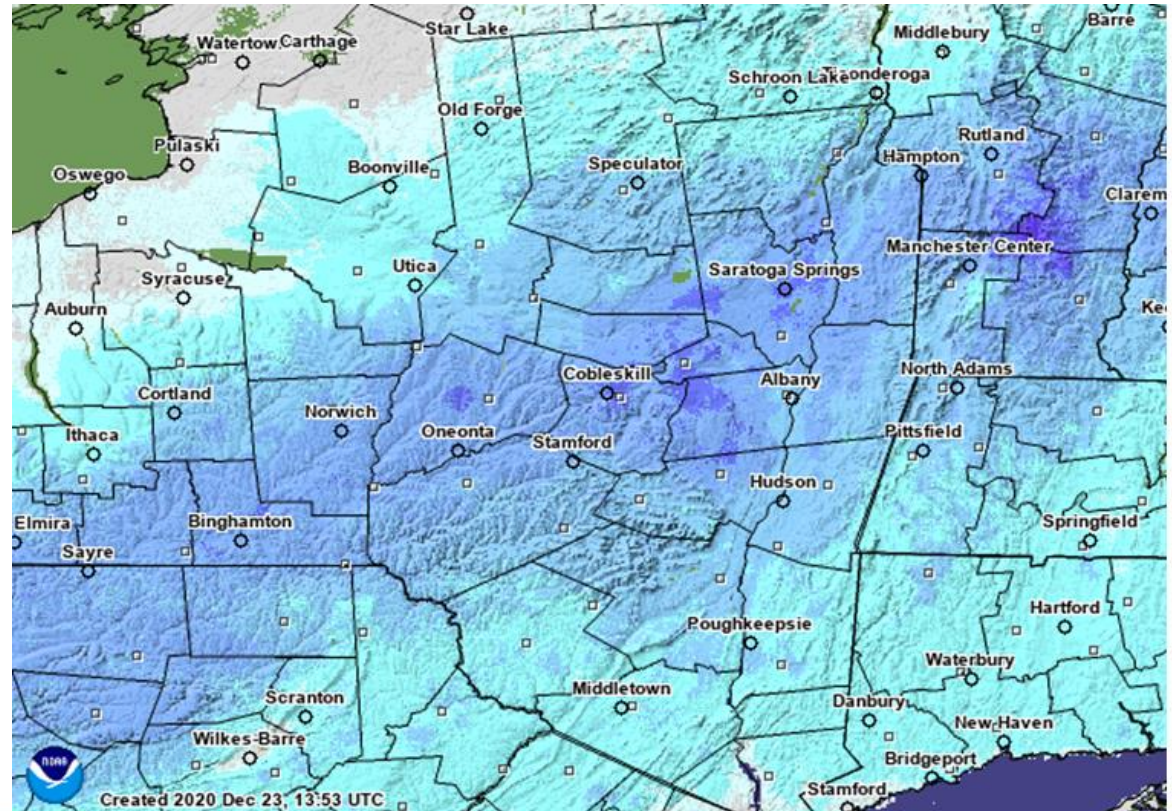


NAEFS Mean Precipitable Water (in) and Standardized Anomaly
HOUR 000 - VALID 00:00 UTC Fri Dec 25 2020

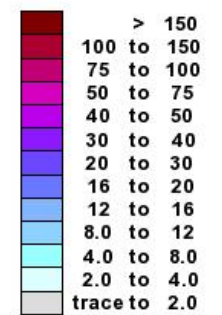




Snow depth before the flood event



Inches of depth



Not Estimated

Elevation in feet



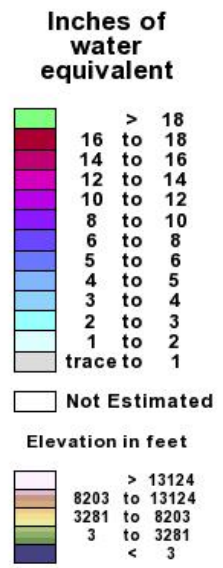


Snow liquid equivalent before the flood event



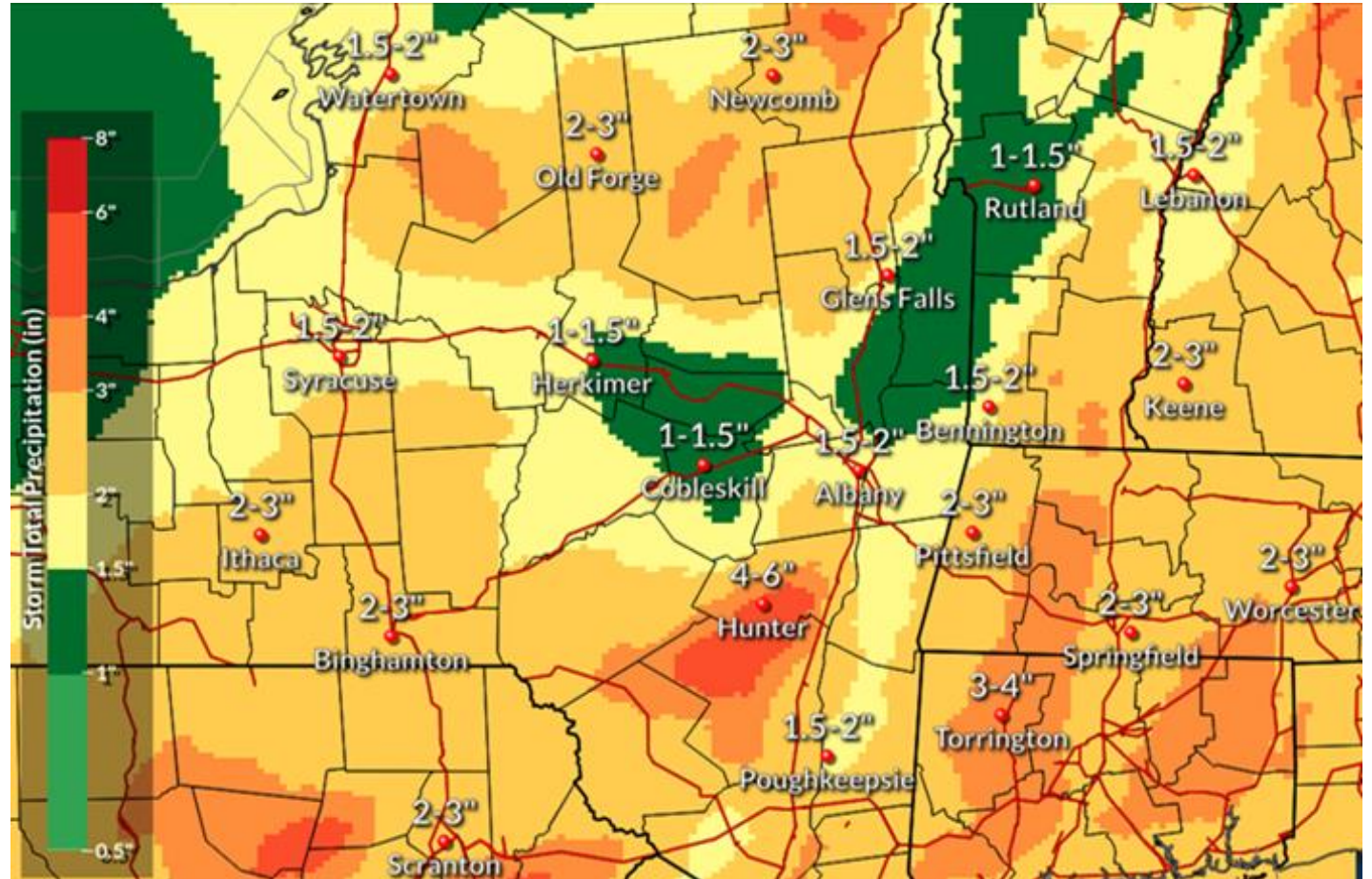
1.5-2.5" SWE generally, locally over 3

Challenge: regular snow surveys hadn't started for the season





Forecasted rainfall Dec 24-25 (forecast from Dec 24)



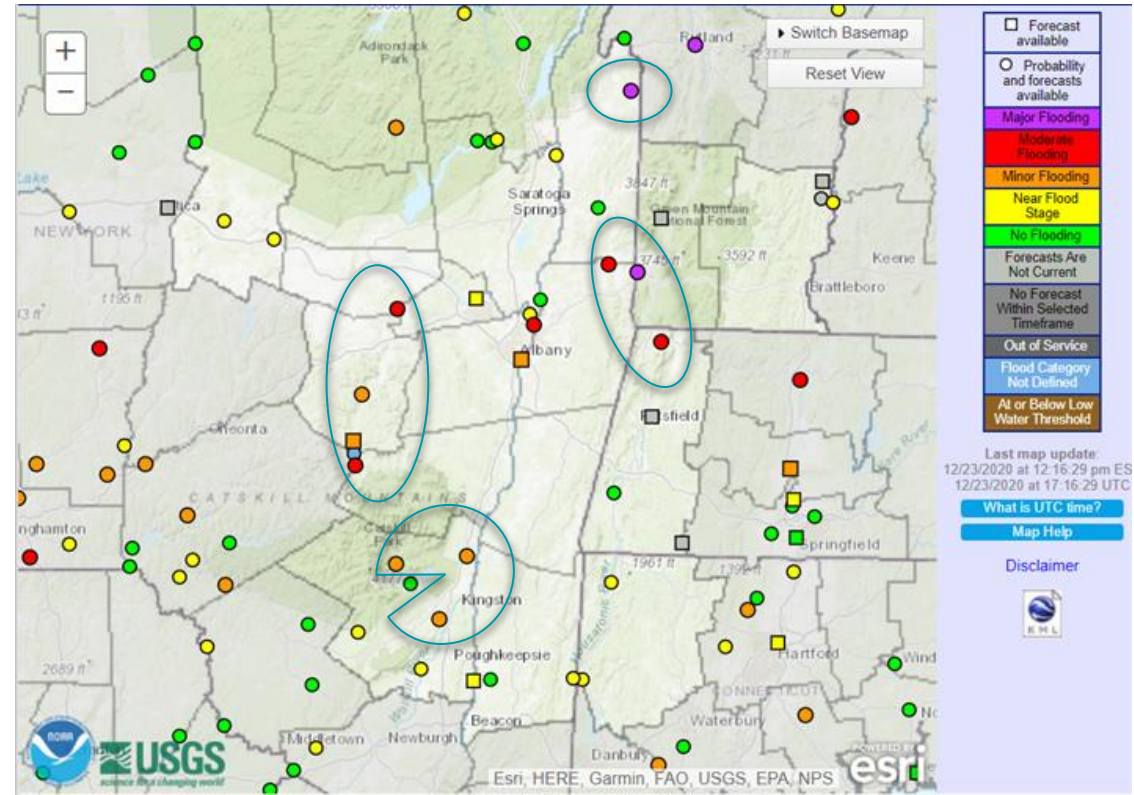


Forecasts from morning of Dec 24

Unusually early flood warnings issued ~1pm Dec 24 in area of highest confidence in significant rainfall and snowmelt

From our briefing:

- What Has Changed?**
- ✓ Rainfall forecast has **increased**
 - ✓ Snowmelt forecast has **increased**
 - ✓ **Flood threat has INCREASED**



Last map update:
12/23/2020 at 12:16:29 pm ES
12/23/2020 at 17:16:29 UTC

[What is UTC time?](#)

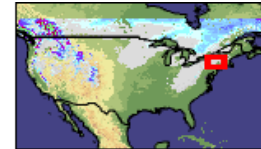
[Map Help](#)

[Disclaimer](#)

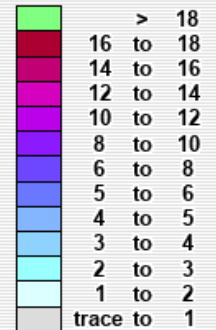


How much snow melted? Snow depth after event:

Modeled Snow Water Equivalent (Shallow-snow Legend) for 2020 December 26, 12:00 UTC

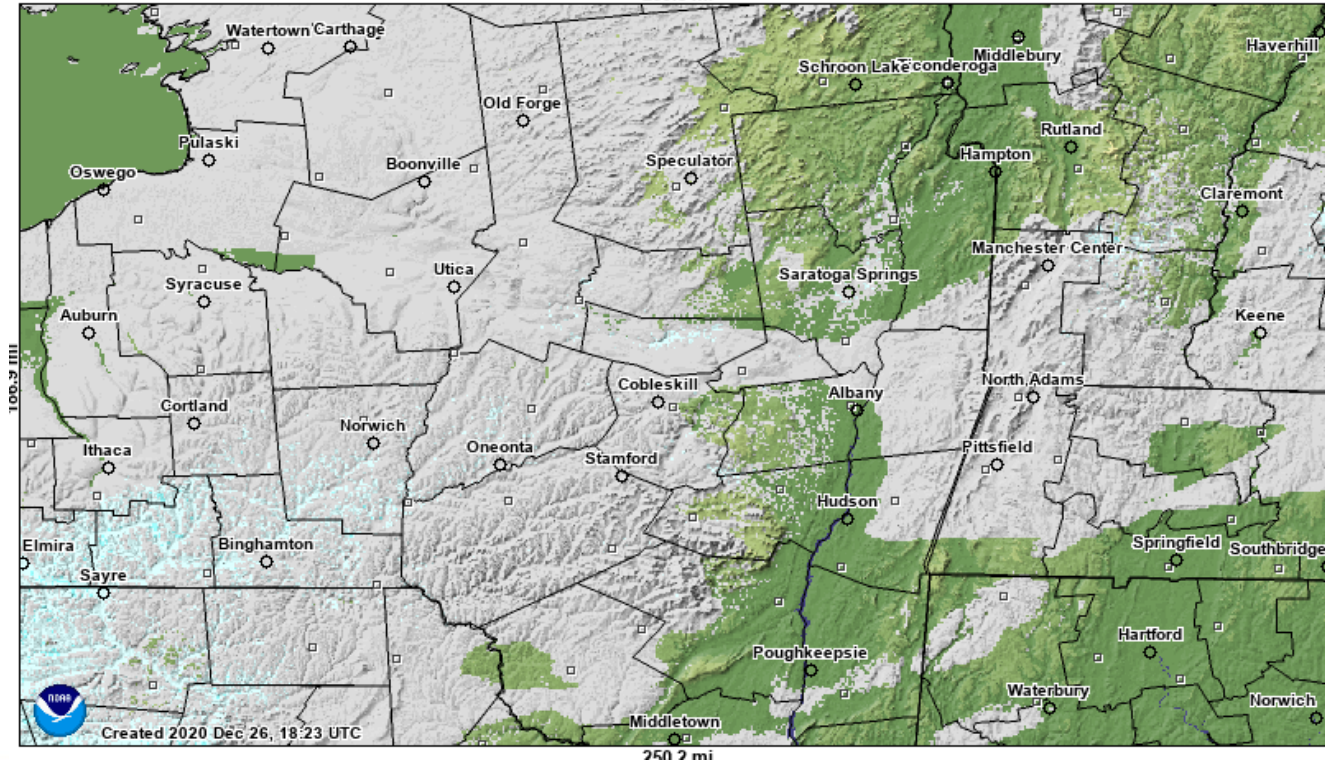
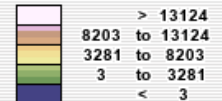


Inches of water equivalent



Not Estimated

Elevation in feet

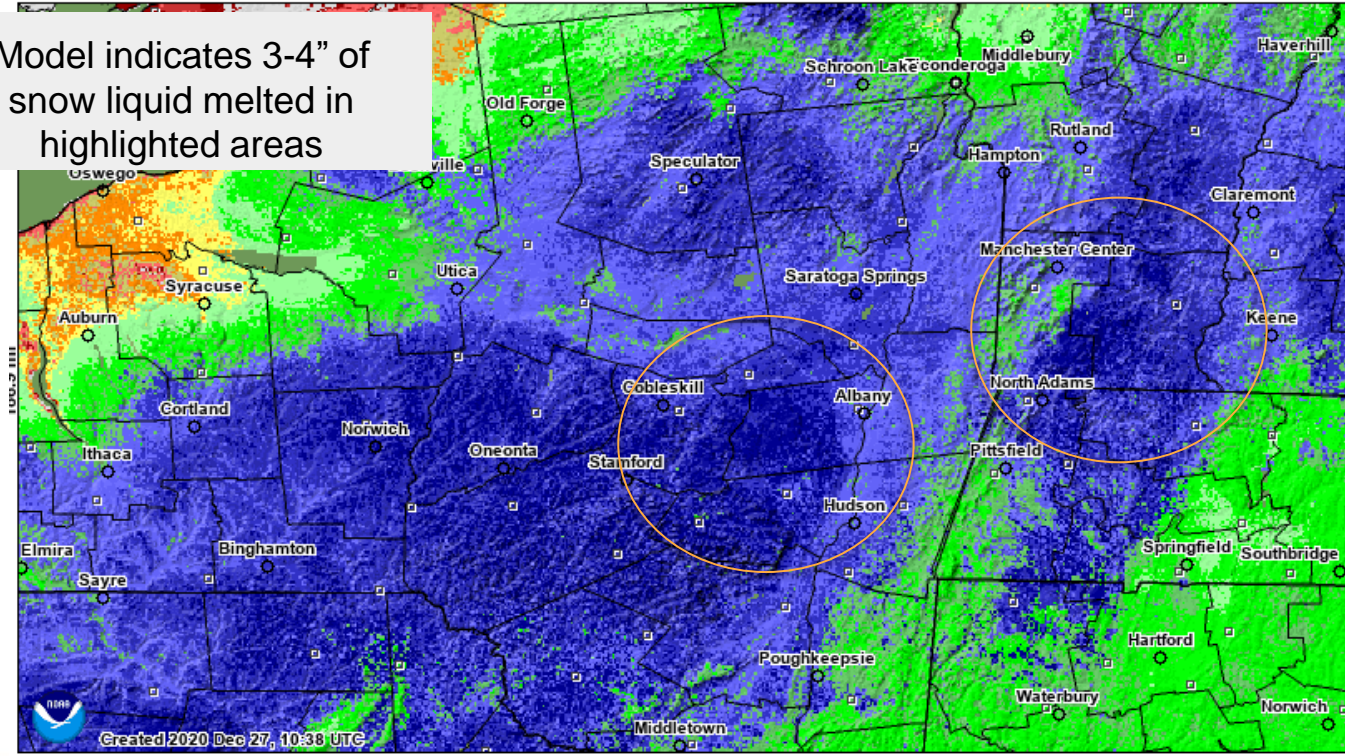
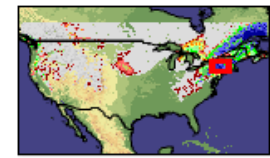




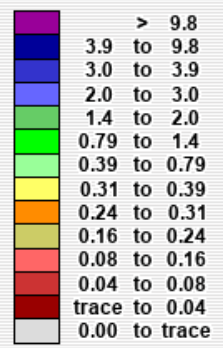
Estimated snowmelt (liquid equivalent)

Total Modeled Snow Melt during 72h preceding 2020 December 27, 5:00 UTC
239.5 mi

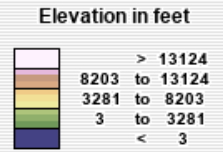
Model indicates 3-4" of snow liquid melted in highlighted areas



Inches of water equivalent



Not Estimated



Created 2020 Dec 27, 10:38 UTC

National Weather Service

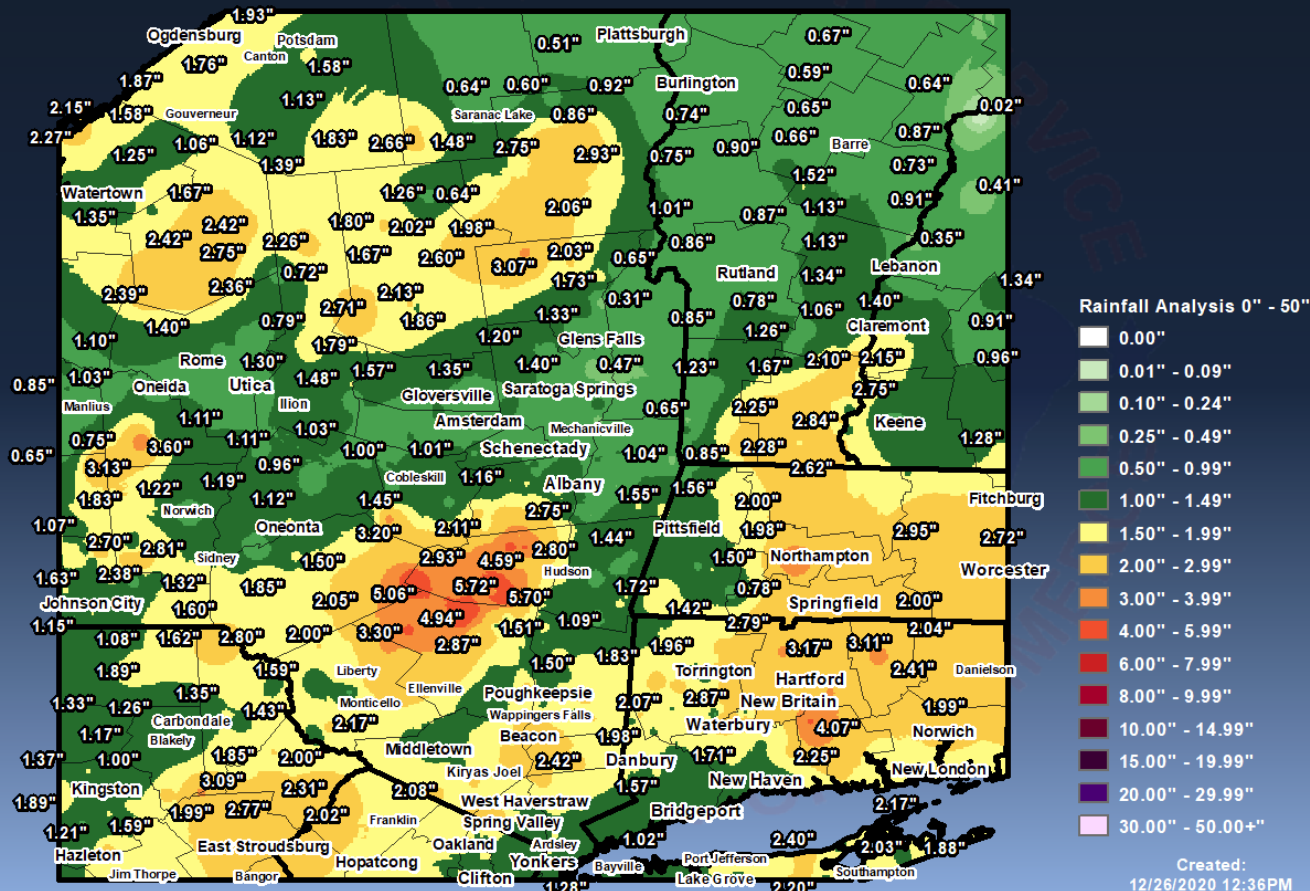
Storm Total Rainfall - December 24-25, 2020

Analysis Data Source: Regional Observations

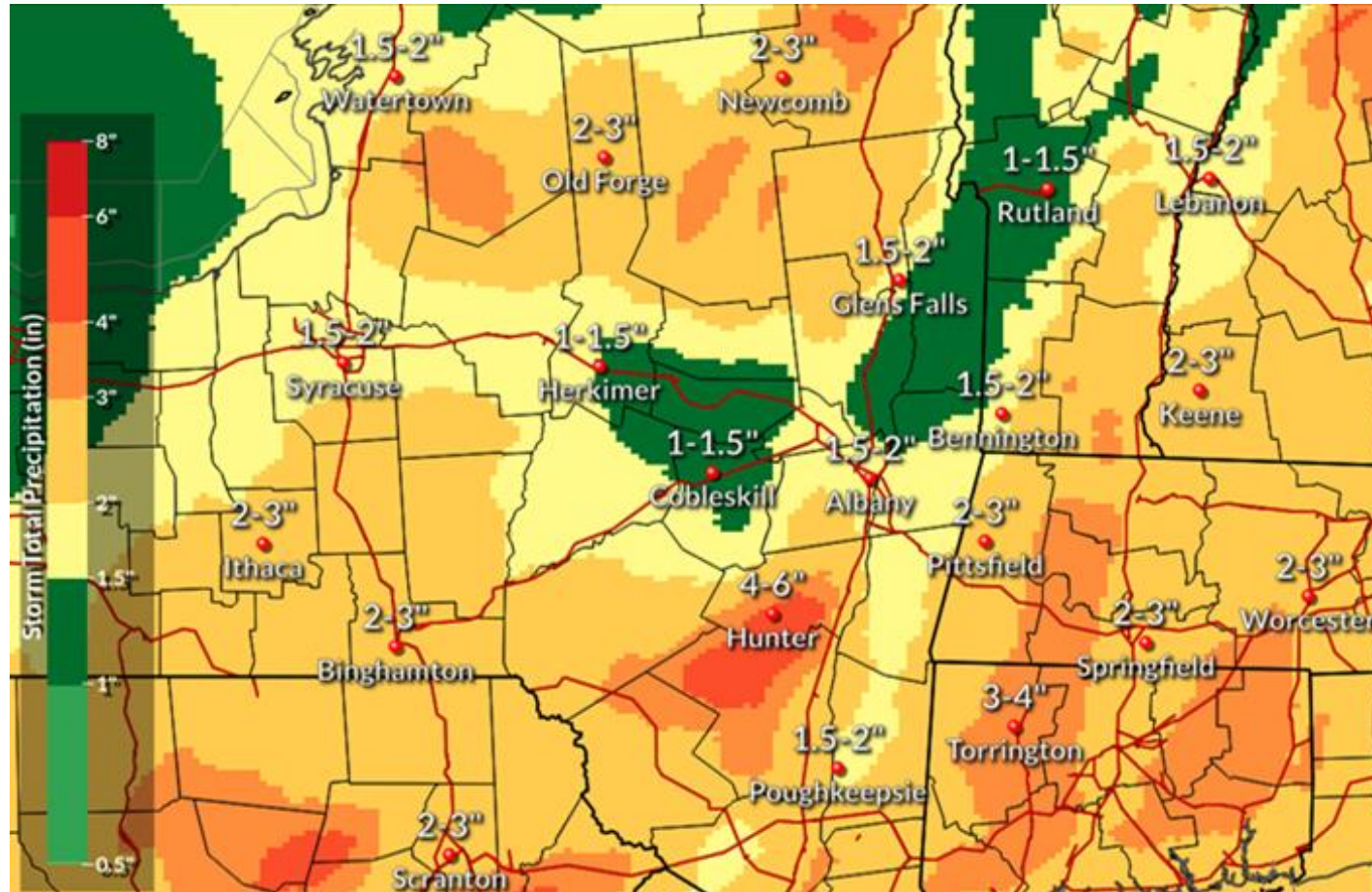


Albany, NY
WEATHER FORECAST OFFICE

Measured rainfall Dec 24-25



This is an experimental product. Care should be taken in using the data. Unofficial observations are plotted. Values at interpolated locations may not represent actual reports at that location.



Forecasted
rainfall
Dec 24-25
(forecast from
Dec 24)



Preliminary river forecast point crests

Major Flood Stage:

3 points: Esopus (MTRN6) & Schoharie (PTVN6 & GBRN6)

Moderate Flood Stage:

2 points: Schoharie (BKBN6 & BRTN6)

Flood Stage:

10 points

NWS Flood Category Definitions:

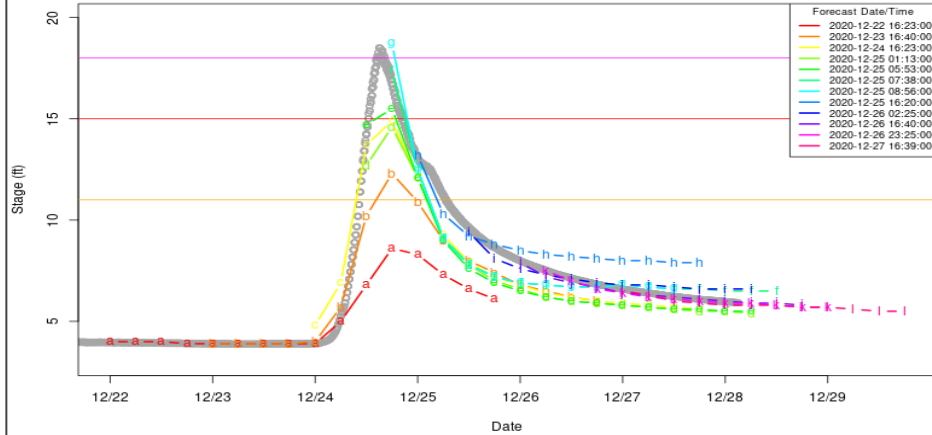
Minor Flooding - minimal or no property damage, but possibly some public threat (e.g., inundation of roads).

Moderate Flooding - some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.

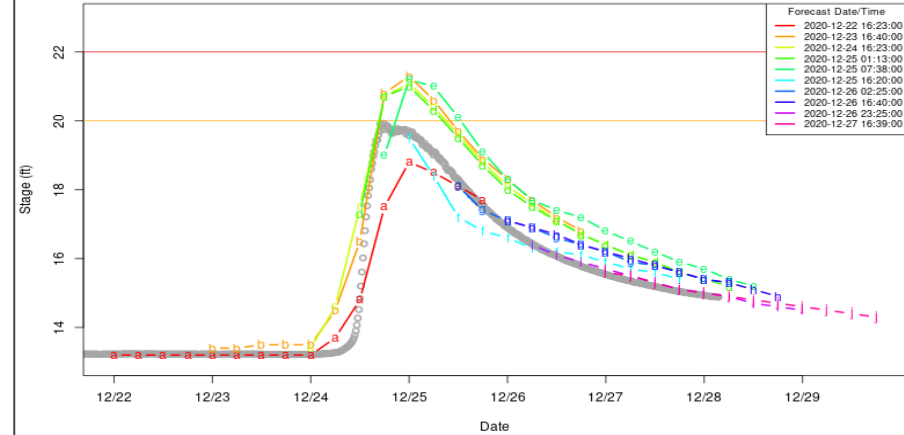
Major Flooding - extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.



Esopus Creek at Cold Brook (MTRN6)



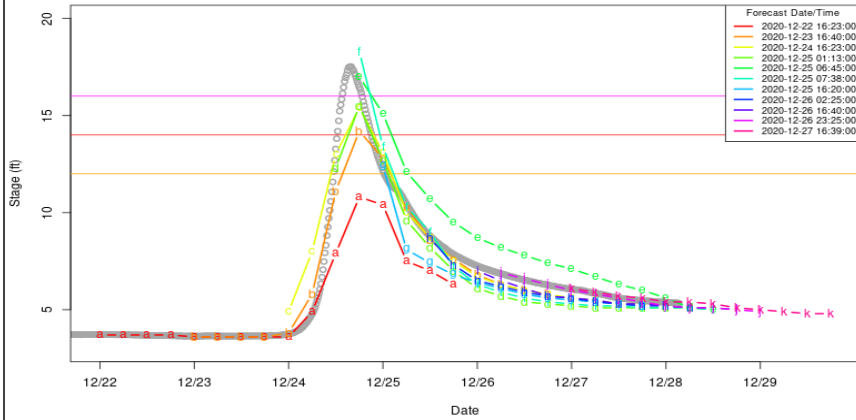
Esopus Cr - Mt Marion (MRNN6)



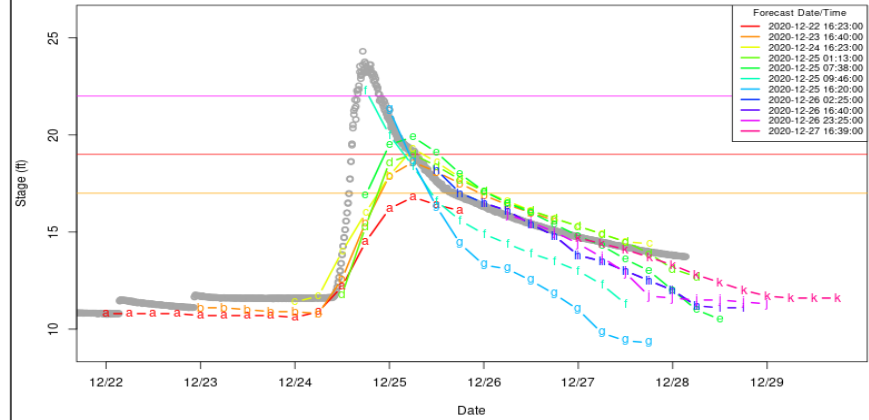
Graphics courtesy Northeast River Forecast Center



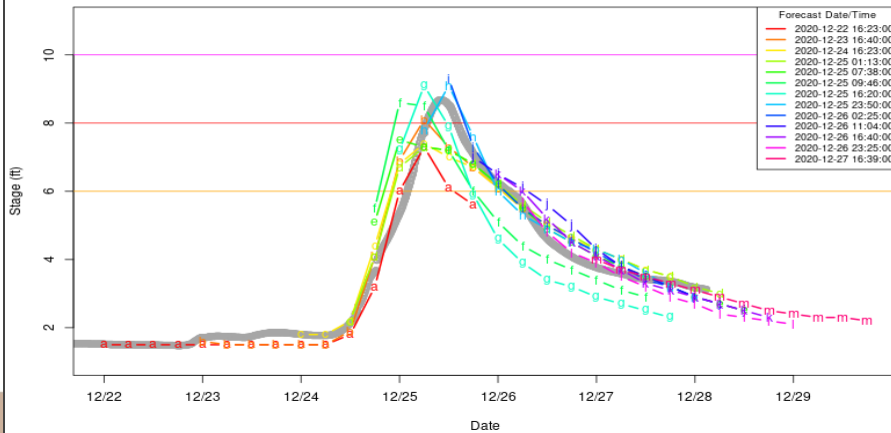
Schoharie Creek at Prattsville (PTVN6)



Schoharie Creek at Gilboa (GBRN6)



Schoharie Cr at Burtonsville (BRTN6)

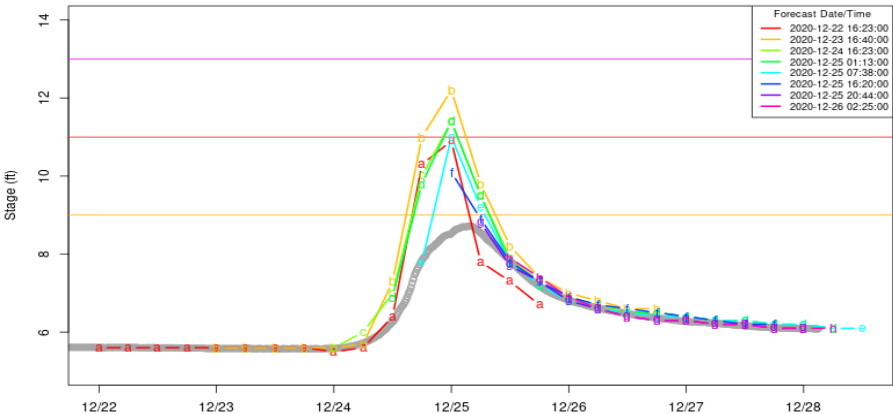


Graphics courtesy Northeast River Forecast Center

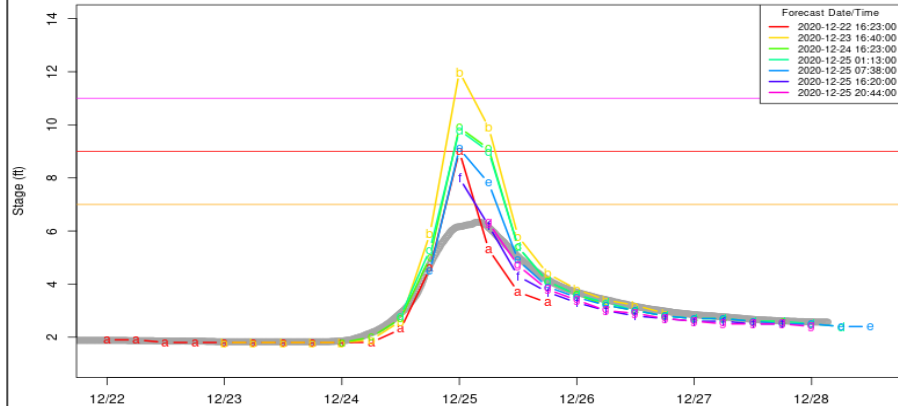
Graphics courtesy Northeast River Forecast Center



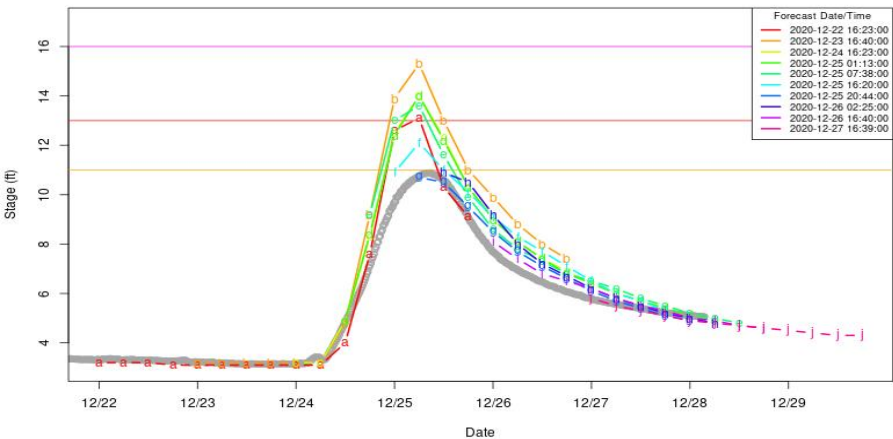
Hoosic River at Williamstown (WILM3)



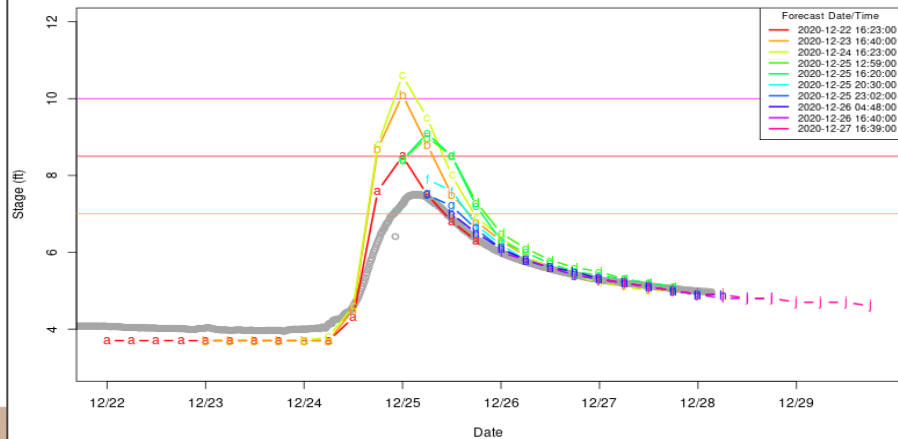
Walloomsac R - N Bennington (BNTV1)



Eagle Bridge 2 SE (EAGN6)



Mettawee R nr Middl Granville (GVVN6)





Public products

Flood watch issued Tuesday Dec 22

Half dozen flood advisories from the 24th through the 25th

Numerous flood warnings for river forecast points beginning on the 24th and continuing through the 26th for the slower responding Housatonic R.

Flood warning for Greene & northern Ulster Counties issued Thursday evening, continued through the next morning, then expanded during the day Friday to include south-central Schoharie Co. and eventually south-central Albany Co.

Flood warning for eastern Bennington & Windham Counties issued Friday afternoon through the evening



Flood Products

	Threat to life and property?	Warning forecaster selects the area based on impacts?	Tiers of impacts can be designated in the product?
Flood Advisory	no	yes	no
Flood Warning	yes	yes	no
Flood Warning for a River Forecast Point	yes	no	yes
Flash Flood Warning <i>(activates WEA)</i>	YES!	yes	yes



New software for issuing warnings

NYC039-095-251900-

/O.EXT.KALY.FL.W.0012.000000T0000Z-201226T0625Z/
/PTVN6.3.RS.201225T0526Z.201225T1200Z.201226T0025Z.NO/
149 AM EST Fri Dec 25 2020

...Forecast flooding increased from Moderate to Major severity and increased in duration until just after midnight tonight...

The Flood Warning continues for
the Schoharie Creek At Prattsville.

- * Until late tonight.
- * At 1:15 AM EST Friday the stage was 13.8 feet.
- * Flood stage is 12.0 feet.
- * Minor flooding is occurring and major flooding is forecast.
- * Recent Activity...The maximum river stage in the 24 hours ending at 1:15 AM EST Friday was 13.8 feet.
- * Forecast...The river is expected to rise to a crest of 17.0 feet this morning. It will then fall below flood stage this evening.
- * Impact...At 16.0 feet, Major flood stage. Water overflows onto County Route 7 north of Route 23.
- * Flood History...This crest compares to a previous crest of 16.7 feet on 03/21/1980.

&&

Schoharie Creek
Prattsville
Flood Stage: 12.0
Observed Stage at Fri 1 am: 13.8
Forecast:
Fri 1 am MSG
Fri 7 am 17.0
Fri 1 pm 15.1
Fri 7 pm 12.1
Sat 1 am 10.7
Sat 7 am 9.5
Sat 1 pm 8.7
Sat 7 pm 8.2
Sun 1 am 7.8
Sun 7 am 7.4
Sun 1 pm 7.1
Sun 7 pm 6.7

&&

LAT...LON 4239 7438 4231 7433 4225 7445 4236 7451

\$\$

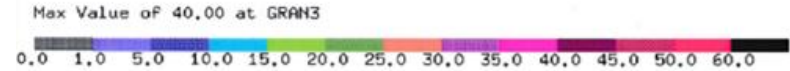
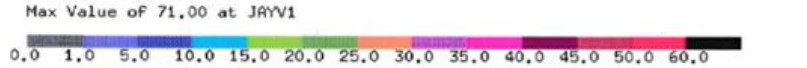
bew



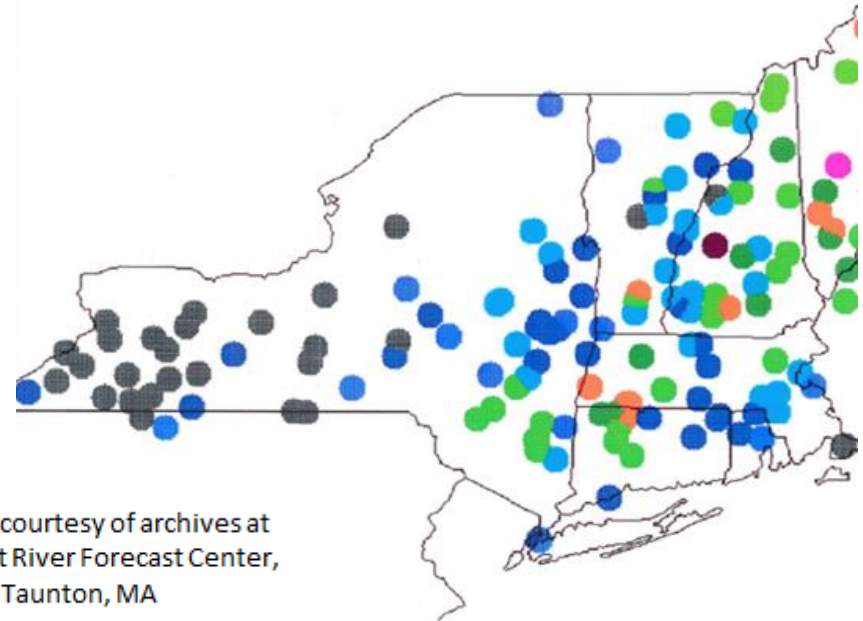
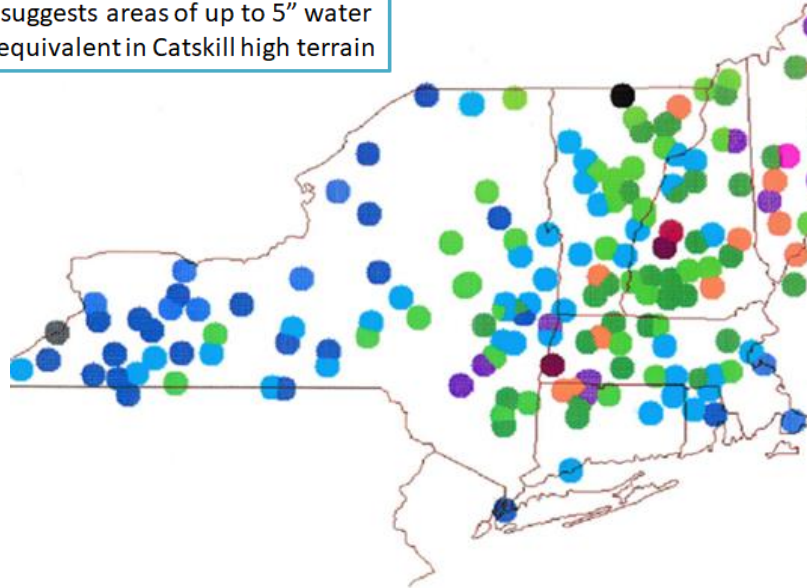
Comparison to January 1996



7am observed snow depths: Jan 18 (left) & Jan 19 (right)



Mid-Atlantic RFC analysis suggests areas of up to 5" water equivalent in Catskill high terrain

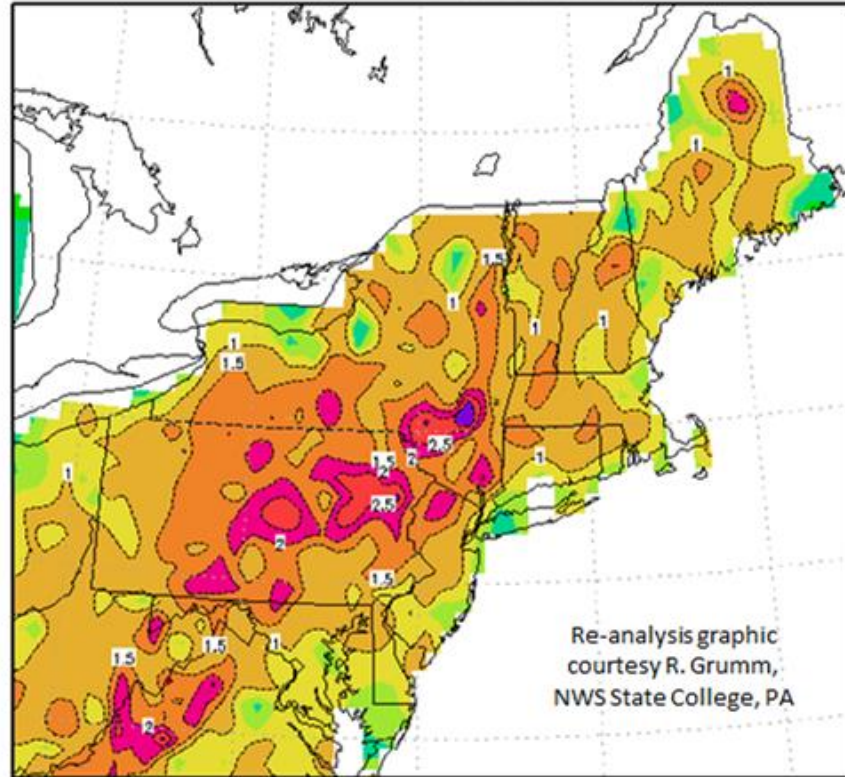


Graphics courtesy of archives at
Northeast River Forecast Center,
Taunton, MA



Storm total rainfall

a. Accumulated liquid equivalent precipitation (mm)
from 12Z18JAN1996 to 12Z20JAN1996





From a 1996 internal NWS memo:

SUBJECT: January 19-21 Eastern New York and Western
New England Flooding and Severe Weather Event.

Two days of temperatures in the fifties and sixties, strong winds, and unseasonably high dew points, produced antecedent conditions that resulted in a rapid meltdown of the one to three foot snow pack across the region. One to three inches of rain fell into the ripe snow pack in six (6) hours Friday, releasing most of the snowpack, with four to eight inches of runoff in six hours. Temperatures fell 30 degrees late Friday after the passage of the cold front and precipitation rapidly changed to heavy freezing rain, sleet and then snow, which continued for several hours before ending Friday evening.



More from the memo...

Record flooding occurred in the Schoharie River Basin, with major flooding in the Mohawk, Hudson and Esopus basins. Significant flooding occurred on the Hoosic, Roundout, and Moose rivers. Small stream, drainage, urban and lowland flooding were widespread throughout the County Warning Area (CWA), exacerbated by snow clogging or blocking drainage routes. Flooding was minimal in the Upper Hudson basin and Adirondacks as the snow pack held and absorbed much of the rainfall.

During Friday afternoon the extent of the ongoing snowmelt was not well known, and the effects of the combination of snowmelt, ice jamming and runoff contributed to a much greater response by the rivers than the precipitation data from the WSR88D or gages suggested. In addition for several model runs prior to the event most numerical models were generally forecasting an inch or less precipitation over the CWA.



Questions?

Please stay in touch...
britt.westergard@noaa.gov

