

*Speakers: NWS Buffalo Dan Kelly and Sarah
Jamison, NERFC Jeane Wallace*



NWS Flood Services for the Black River Basin



National Weather Service

Who We Are

The National Oceanic and Atmospheric Administration (NOAA) conducts research and gathers data about the global oceans, atmosphere, space and sun, and applies this knowledge to science and services that touch the lives of all Americans.



The National Weather Service is the primary source of weather data, forecasts and warnings for the United States. The NWS is the sole United States official voice for issuing warnings during life-threatening weather situations.

13 River Forecast Centers

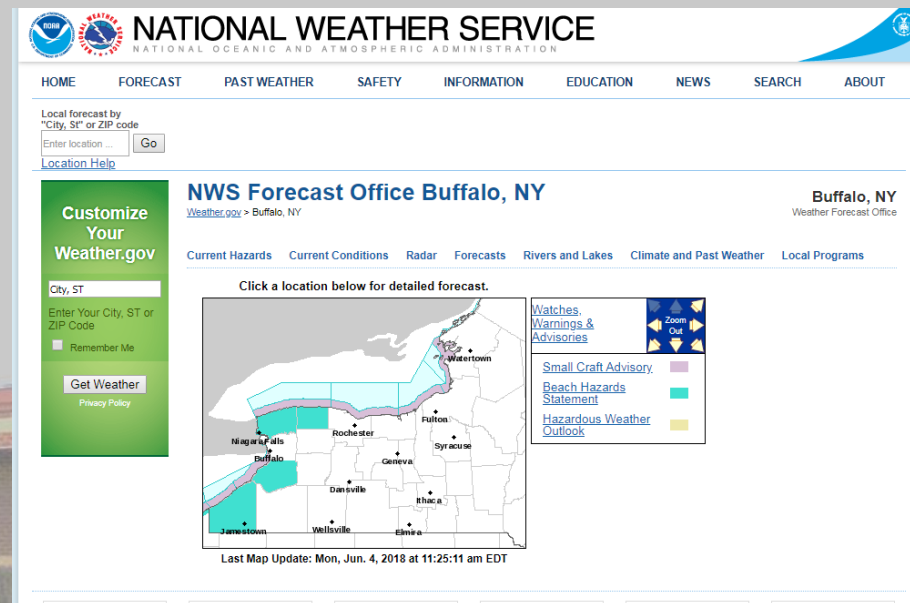


Our Mission:

To provide our nation with river, flood and water resource forecasts for the protection of life and property and the enhancement of the national economy.

National Weather Service Weather Forecast Office Buffalo NY

- Located on the east side of the Buffalo Niagara International Airport
- Staffed 24/7/365 by 22 Meteorologists, Electronic Technicians and Support Staff
- One of 92 stations in the United States and ~500 sites around the world that launch a weather balloon twice per day.
- We are responsible for forecasts (including marine and airport) and warnings for 16 counties in western, central and northern NY.
- Take the official snow readings for Buffalo



The screenshot displays the National Weather Service website for the Buffalo, NY office. At the top, the NWS logo and the text "NATIONAL WEATHER SERVICE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION" are visible. Below this is a navigation menu with links for HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. A search bar prompts users to enter a location or ZIP code. The main content area is titled "NWS Forecast Office Buffalo, NY" and includes a "Customize Your Weather.gov" sidebar with a "Get Weather" button. A map of the Buffalo region is shown, with various weather advisories highlighted in different colors: Small Craft Advisory (pink), Beach Hazards Statement (teal), and Hazardous Weather Outlook (yellow). The map includes labels for cities like Buffalo, Rochester, and Syracuse. A legend on the right side of the map explains the color coding for these advisories. The page also features a "Watches, Warnings & Advisories" section and a "Local Programs" link.

www.weather.gov/buf

NWS Services

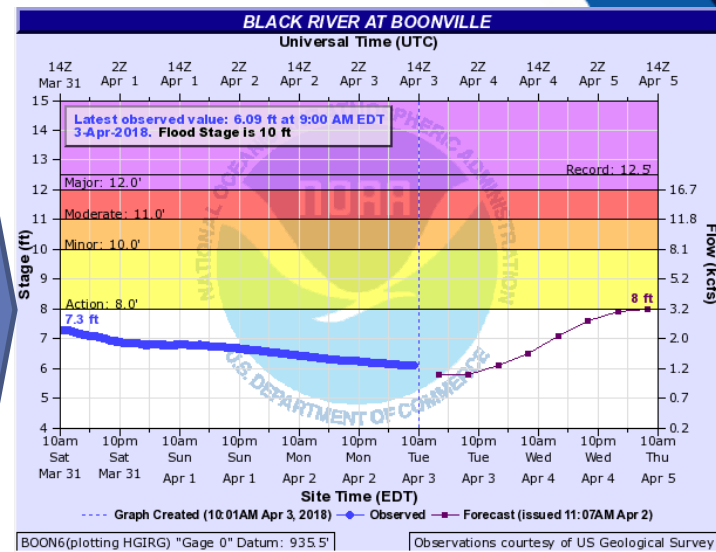
River Forecasting



NWS

RFC

NWS & RFC



Data Collection

**River Forecasting
CHPS Model**

Final Forecast AHPS

NWS Services

Roles and Responsibilities

- **NWS BUF**

- Daily Forecasts
- Watch/Warnings/Advisories
- Maintain observing climate stations
- Work with partners to expand observing networks
- Collect snow information
- Issuance of RFC river forecasts and warnings
- Maintain River and Lakes [AHPS](#) webpage
- Decision Support Services to core users

- **RFC**

- Calibrate and implement variety of hydrologic and hydraulic models and produce temperature and precipitation forecasts to provide:
- River flow and stage forecasts at 2 locations
- Guidance on the rainfall needed to produce Flash Flooding
- Ensemble streamflow predictions
- Ice Jam and Dam Break support
- Water Supply forecasts
- Reservoir Inflow Forecasts

NWS Services

Flood Products and Definitions

- **Hazardous Weather Outlook (HWO)**
 - Discuss the potential for flooding (Timeframe: 3 to 5 day)
- **Flood Watch**
 - 50% confidence that flooding will occur. (Timeframe: A Day or Two)
- **Flood Warning**
 - Flooding is imminent, 80% or greater confidence. (Timeframe: hours)
- **Flood Warning (river)**
 - Issued for a specific river and forecast point.
- **Flood Warning (areal)**
 - Issued for an area for expected flooding not at a forecast point (non-gauged waterways, severe ponding, closed roads)
- **Flash Flood Warning**
 - Issued for rapidly rising waters which pose an immediate risk to life or property (washouts, floating cars, rescues, etc).

NWS Services

River Forecasting

WGUS41 KBUF 130522
 FLWBUF
 BULLETIN - IMMEDIATE BROADCAST REQUESTED
 FLOOD WARNING
 NATIONAL WEATHER SERVICE BUFFALO NY
 1222 AM EST Sat Jan 13 2018

...The National Weather Service in Buffalo has issued a Flood Warning for The following rivers in New York...

Black River At Boonville

PRECAUTIONARY/PREPAREDNESS ACTIONS...

SAFETY MESSAGE...Never drive your car through flooded roadways. The water may be deeper than it appears. Turn around...don't drown!

Stay tuned to NOAA Weather Radio and other local media for further details and updates.

&&

NYC045-049-065-131122-
 /O.NEW.KBUF.FL.W.0009.180113T0522Z-180114T0000Z/
 /BOON6.1.ER.180113T0517Z.180113T1200Z.180113T1800Z.NO/
 1222 AM EST Sat Jan 13 2018

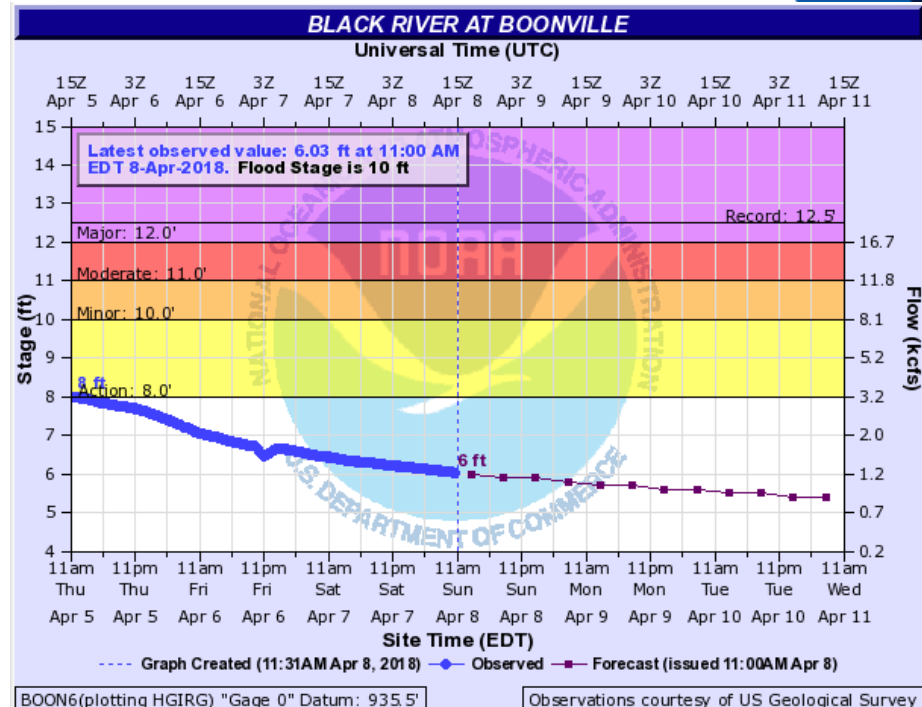
The National Weather Service in Buffalo has issued a

- * Flood warning for the Black River At Boonville
- * until this evening.
- * At 12 AM Saturday the stage was 10.0 feet and rising.
- * Flood stage is 10.0 feet.
- * Minor Flooding is forecast.
- * Forecast...the river is expected to rise above flood stage early this morning and crest near 10.2 feet this morning.
- * IMPACT...At 10.0 feet...Flood stage, widespread farmland flooding in the Flats area. Several roads may be closed in Glenfield, Martinsburg, and Lowville.

&&

LAT...LON 4392 7550 4394 7536 4378 7537 4348 7524
 4346 7534 4386 7559

\$\$





Forecasting River Rises and Discharges

River Forecast Information

Buffalo, NY - Internet Explorer
https://www.weather.gov/buf

File Edit View Favorites Tools Help

  **NATIONAL WEATHER SERVICE**
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by "City, St" or ZIP code
Enter location ...
[Location Help](#)

News Headlines
• [Skywarn Training Schedule Spring 2018](#)

NWS Forecast Office Buffalo, NY
[Weather.gov](#) > Buffalo, NY

Buffalo, NY
Weather Forecast Office

Current Hazards Current Conditions Radar Forecasts Rivers and Lakes Climate and Past Weather Local Programs

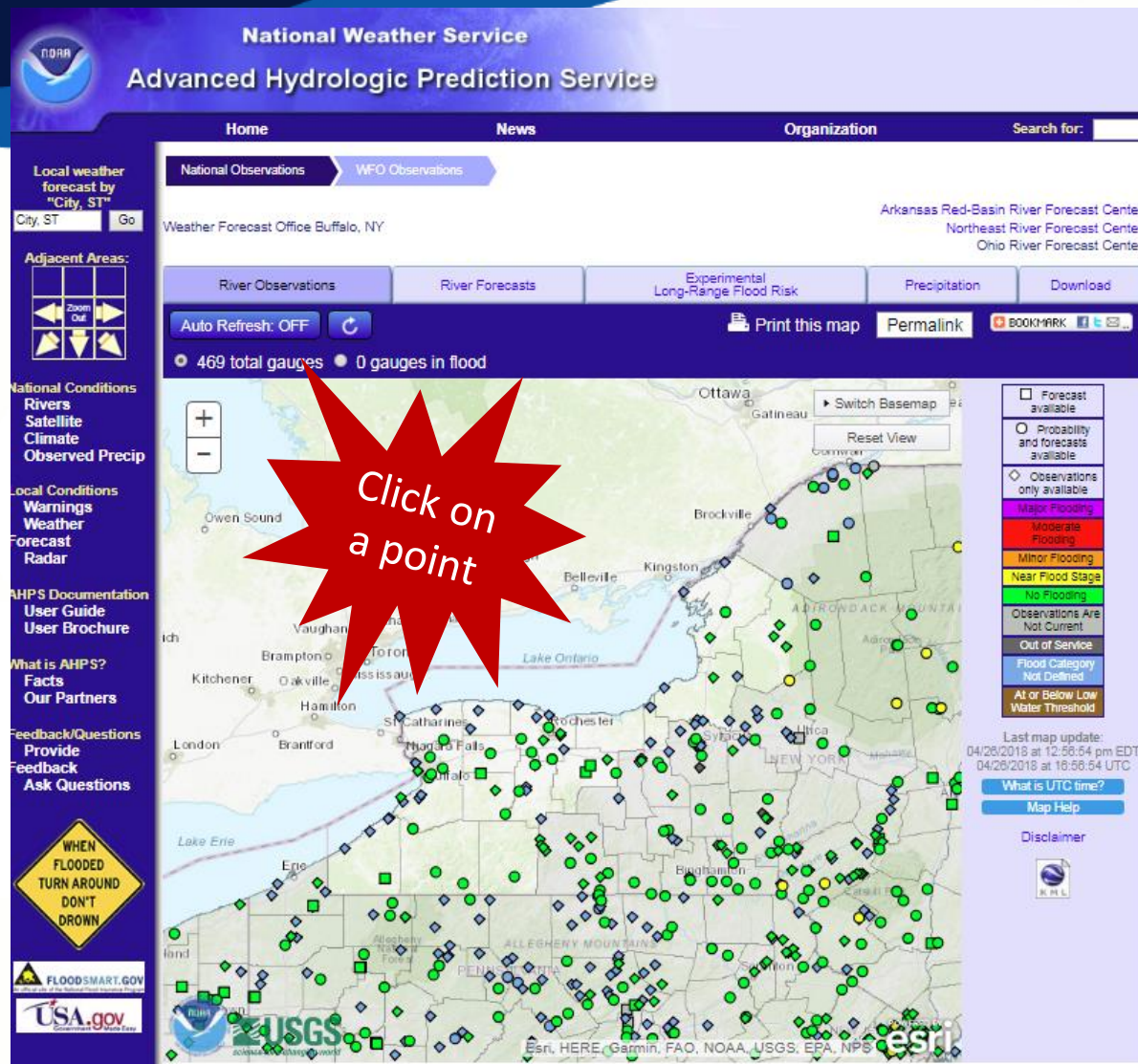
Click a location below for detailed forecast.

Last Map Update: Mon, Apr. 9, 2018 at 8:52:11 am EDT

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

Forecasting River Rises and Discharges

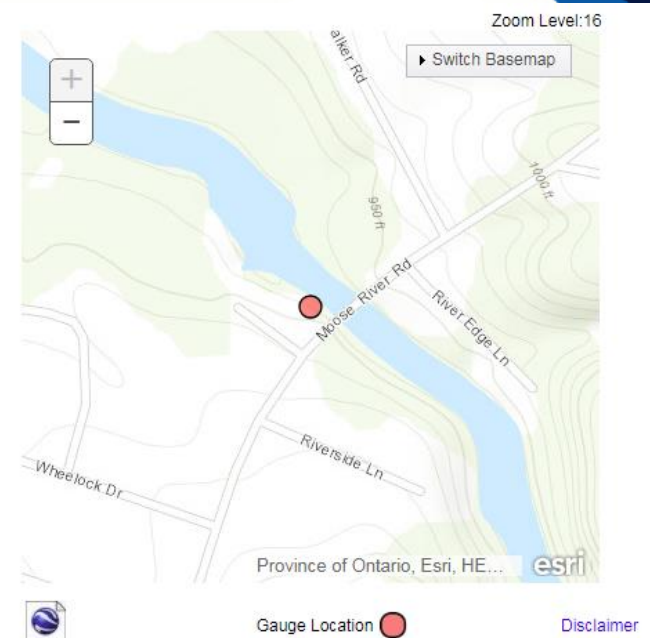
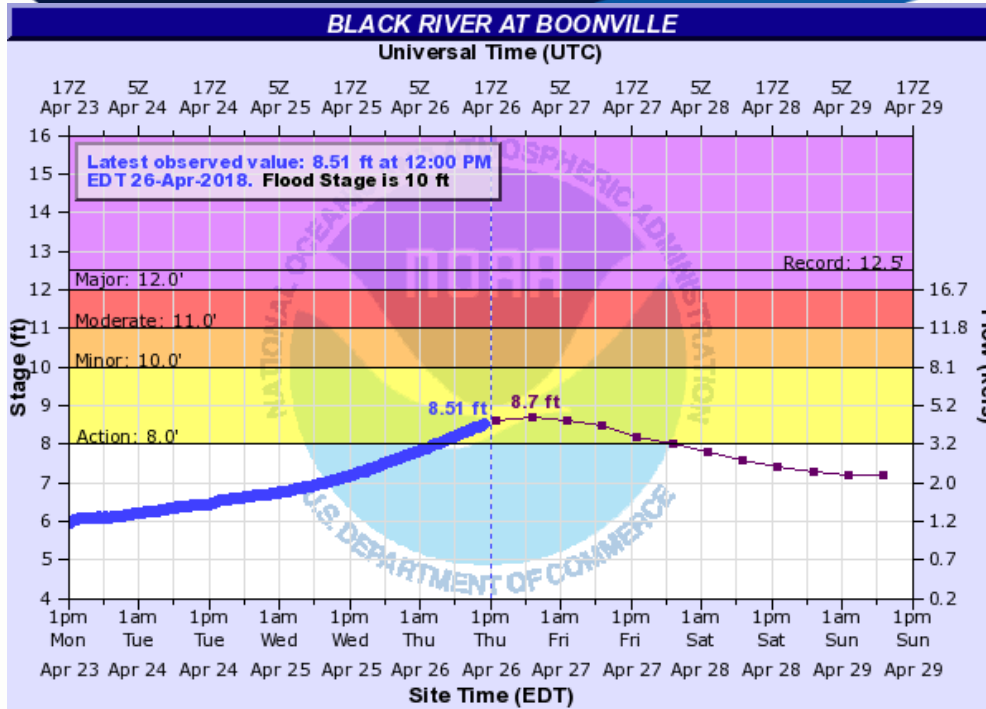
River Forecast Information



<https://water.weather.gov/ahps2/index.php?wfo=buf>

Forecasting River Rises and Discharges

River Forecast Information



Flood Impacts & Photos

Collapse

If you notice any errors in the below information, please contact our Webmaster

- Major flood, widespread flooding of commercial, industrial, and residential areas throughout the Black River Valley.
- Moderate flood, widespread farmland flooding and road closures all along the river. Some residential flooding in portions of Carthage and Castorland.
- Flood stage, widespread farmland flooding in the Flats area. Several roads may be closed in Glenfield, Martinsburg, and Lowville.
- Action stage, minor agricultural lowland flooding begins downstream in the Flats area. East Martinsburg Road may be closed.

Historic Crests

- 12.50 ft on 03/28/1913
- 11.41 ft on 12/30/1984
- 11.31 ft on 04/18/1982
- 11.29 ft on 01/23/1957
- 11.27 ft on 05/20/1969

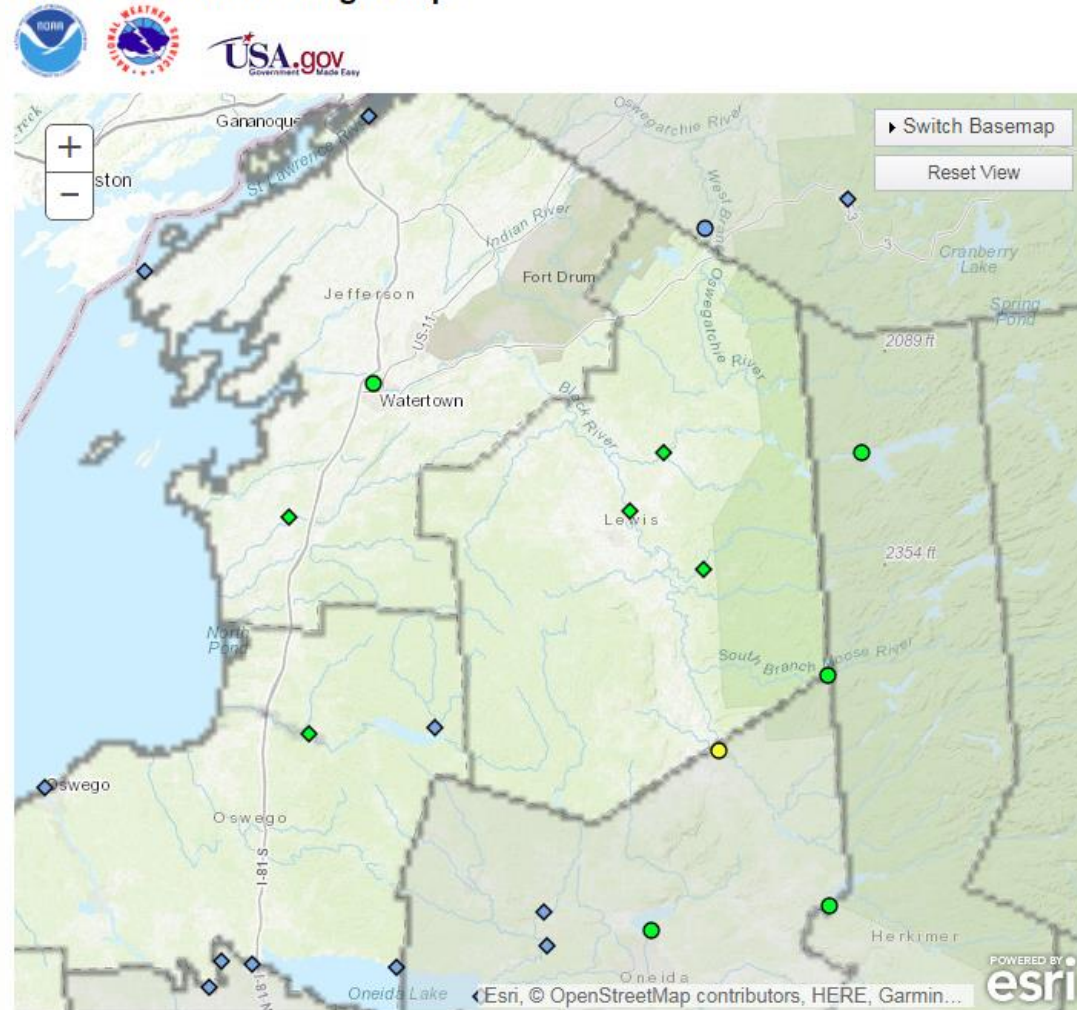
Forecasting River Rises and Discharges

River Gauges

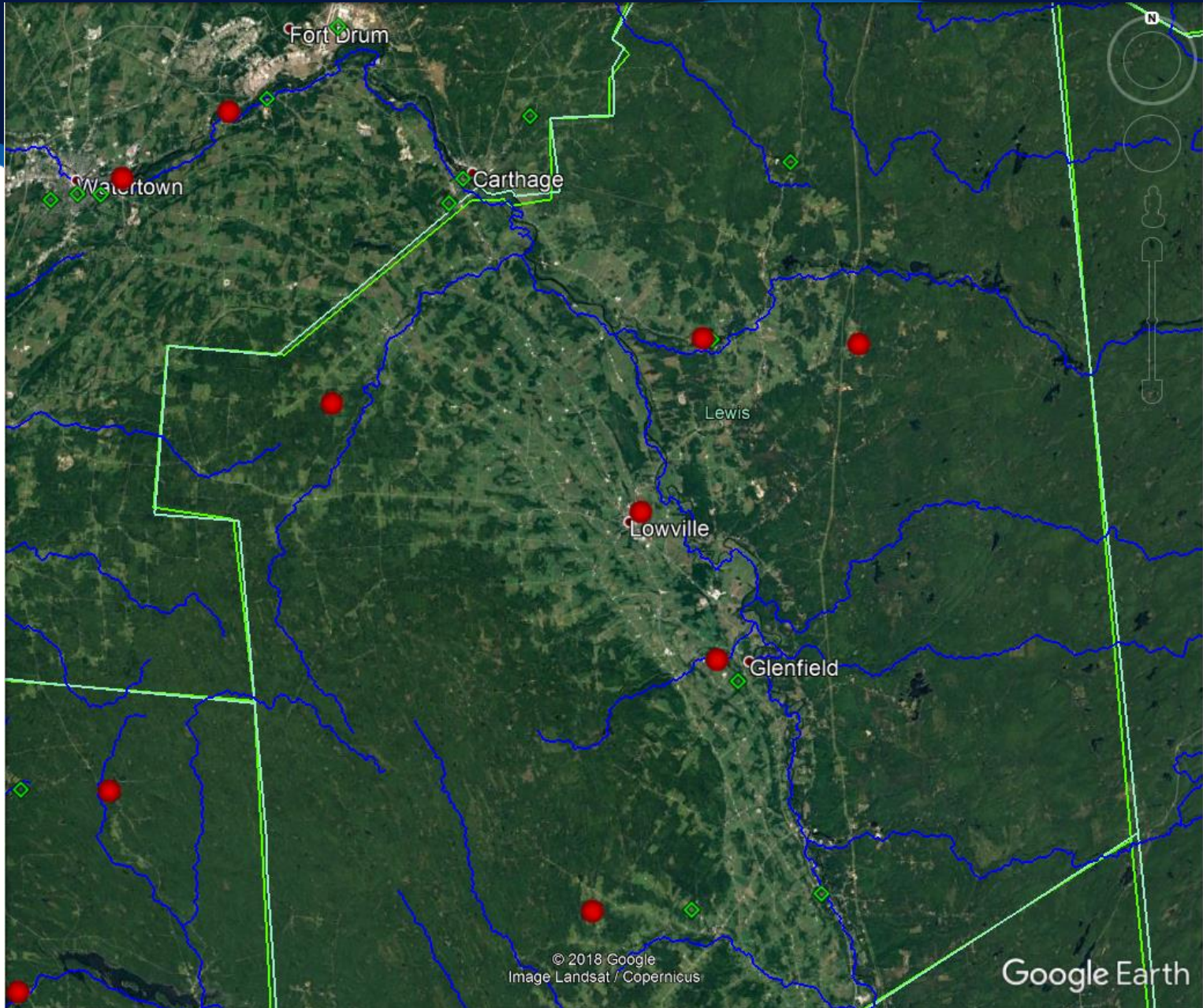
The NWS does not operate river gauges in the Black River Basin.

NWS works with local, county, and federal partners to develop river gauge observation and forecast points

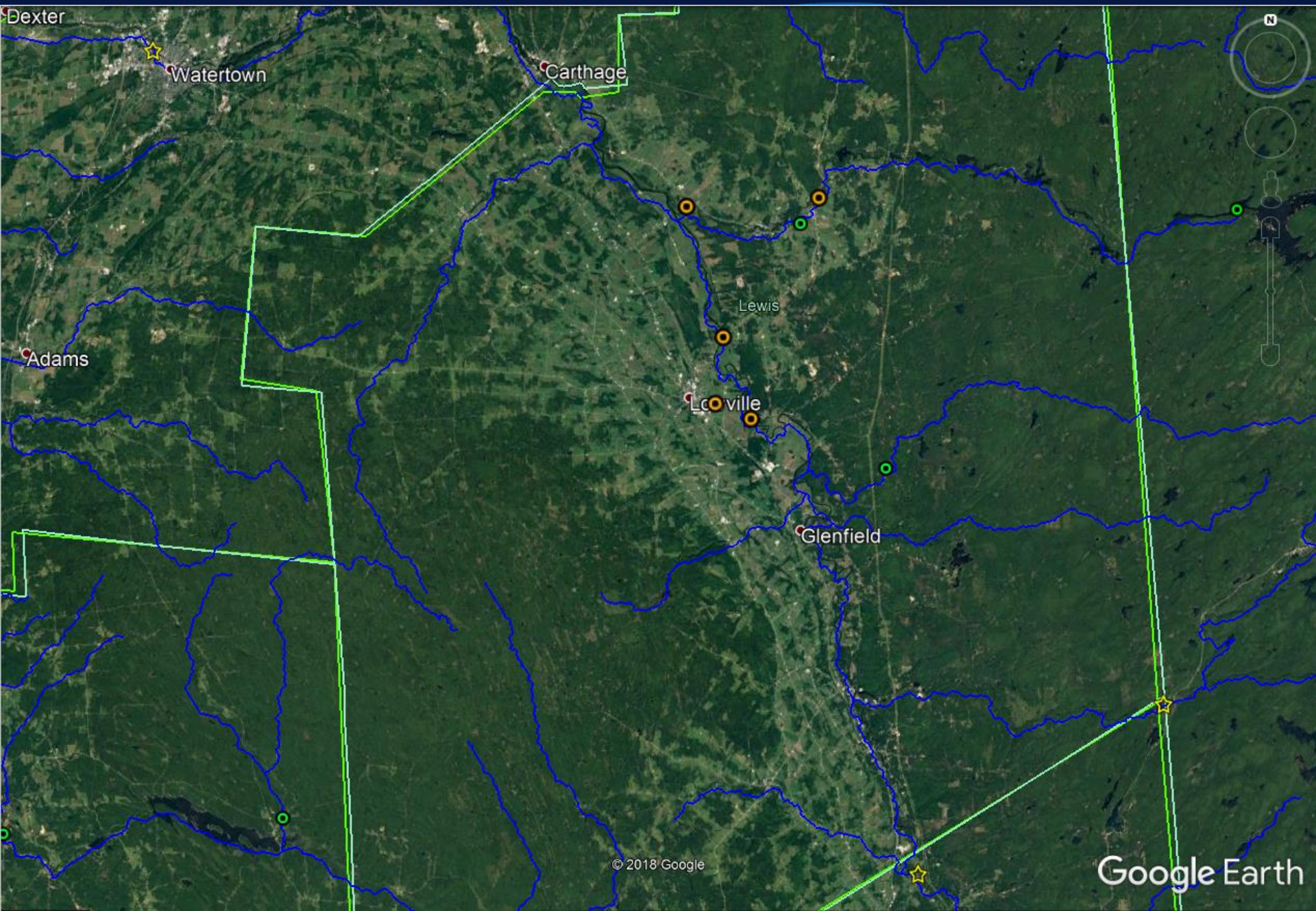
AHPS Observed Gauge Map



Observing sites in Lewis and Jefferson Counties



Lewis County Gauging Locations



Forecasting River Rises and Discharges

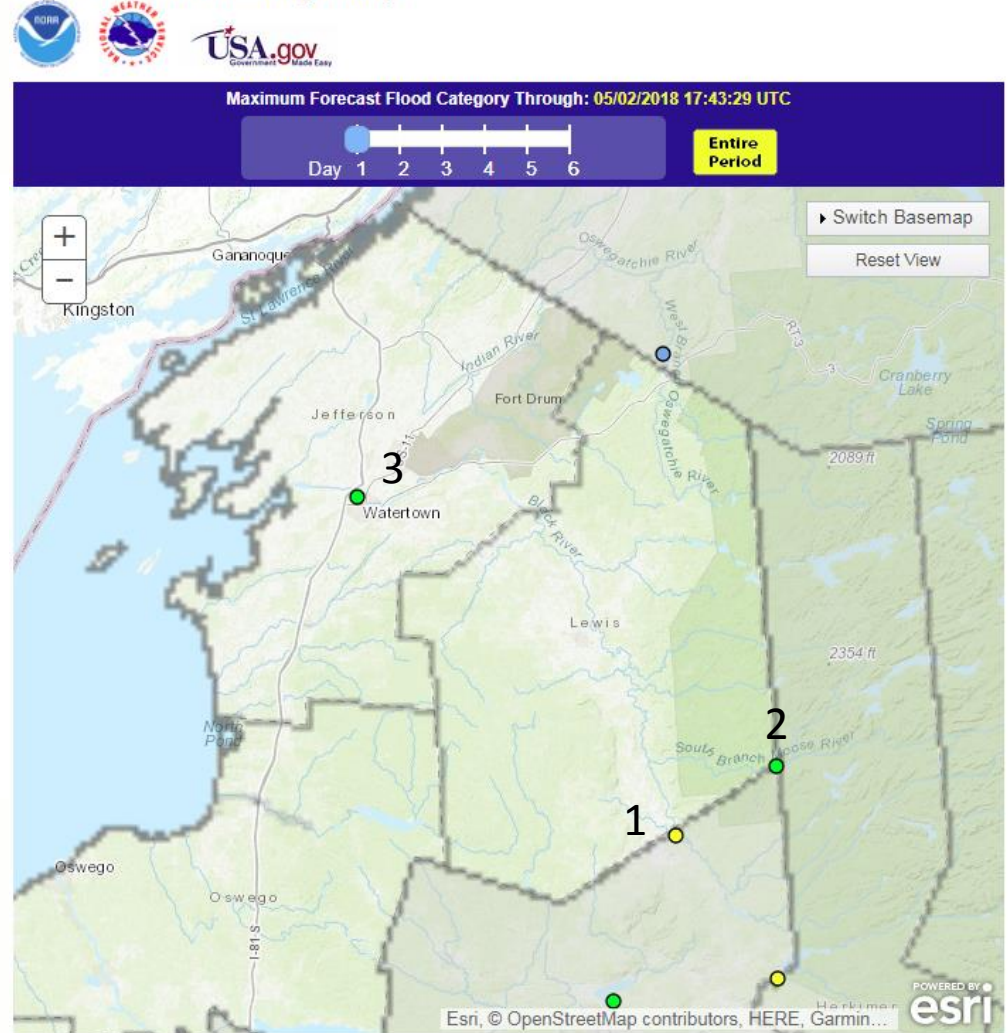
River Forecast Points in the Black River Basin

There are three official forecast points for the Black River Basin-

1. Black River at Boonville
2. Moose River at McKeever
3. Black River at Watertown

Forecasts are updated 3 times a day.

AHPS Forecast Gauge Map



Current River Flood Warning Polygons

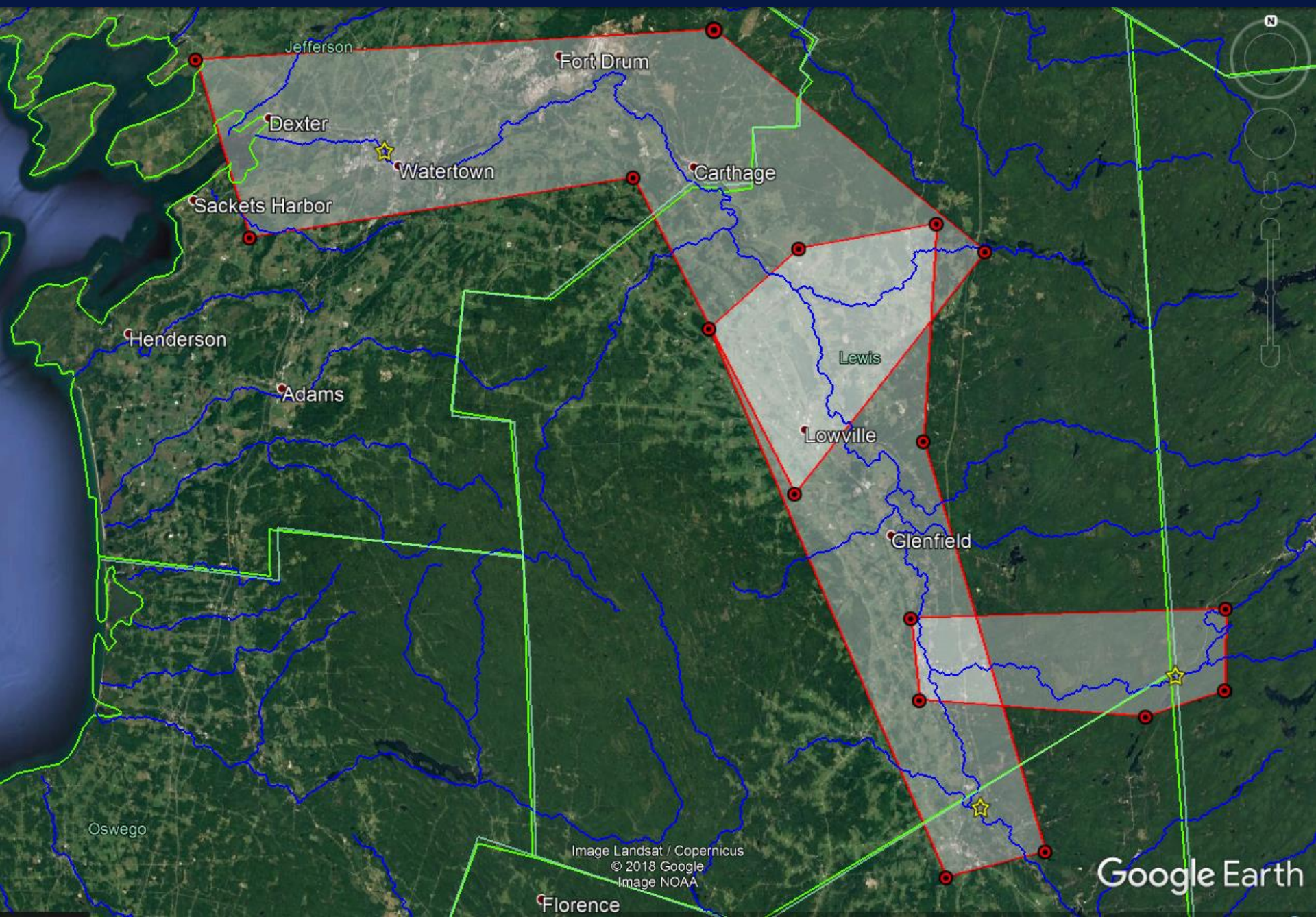


Image Landsat / Copernicus
© 2018 Google
Image NOAA

Google Earth

Proposed FLW Polygons

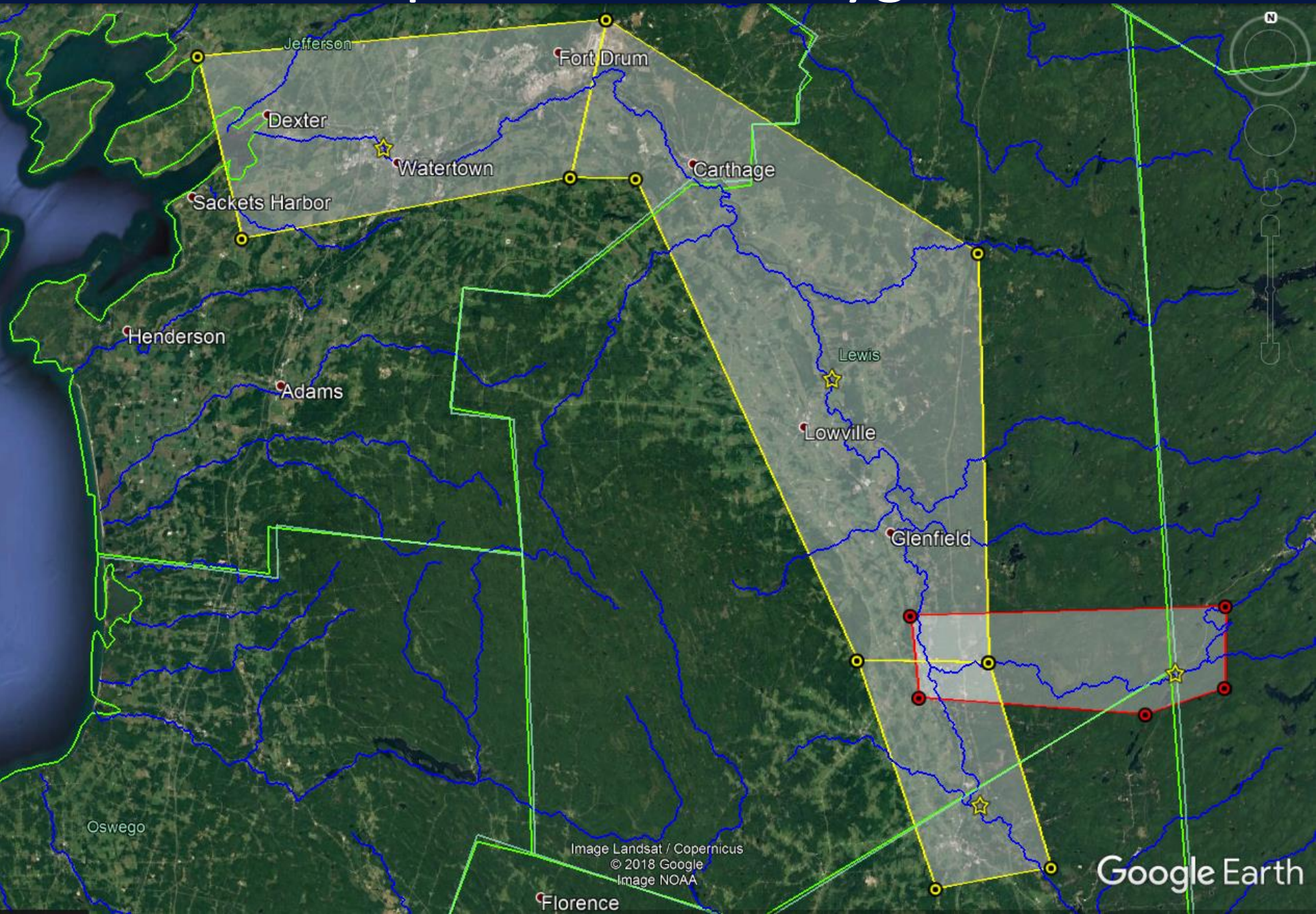


Image Landsat / Copernicus
© 2018 Google
Image NOAA

Google Earth

Forecasting River Rises and Discharges

Establishing a River Forecast Point

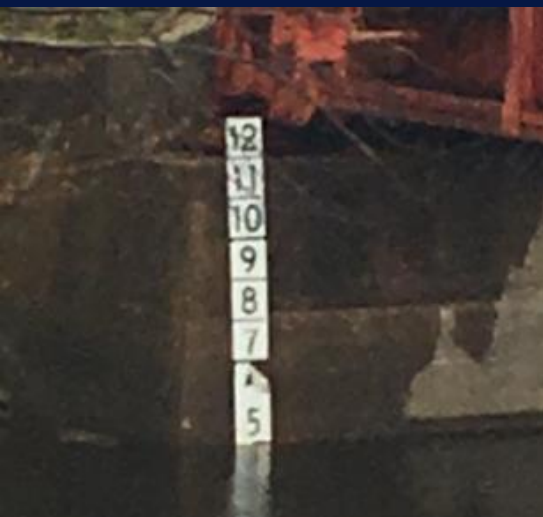
In order to establish a forecast point:

1. There needs to be a user request and real-time data
2. Then the NWS Buffalo coordinates with the River Forecast Center (RFC) to add the point and to ingest the data.
3. The RFC has adds the point and begins the testing phase .
 1. This takes time because in order to properly test it, they need to see how forecasts work out with high flows.
 2. Testing typically takes 6-12 months.
 3. While this is being done, we prepare our operations for the forecast point, including developing warning areas and standard impact statements.
4. Once the testing is done, we send out a formal notice and after 30 days we begin issuing the forecast daily.

Dadville is presently in the testing phase. What we need now is feedback on the impact statements...what floods at what river stages. These levels and impacts can be adjusted in the future if need be.

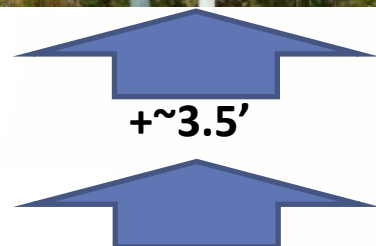
Forecasting River Rises and Discharges

Dadville River Gauges



*My involvement with the Floods on
Black River 4/15/08*

*In January of 1985 we had a bad
Flood. On the evening of Dec. 28th we received
heavy rains in the area and temperatures got to
62° - the 29 + 30 we received nearly 2" of Rain
and that warm rain took most of the snow pack
that evening of the Dec. 28th. Nearly another 1" of
Rain fell New Years eve. This caused a flood like
we had not seen before in the Flats of Black River.
The Farmers on the Ridge Road had nearly 2½ feet
of water in their barns and could not have kept
animals on the road had the water been any higher
The day that the water peaked at Dadville I marked
the base of the Flag Pole at the DEC office at the*



Preliminary impact statements for Dadville

Watertown

Action (8) – Action stage, bankfull.

Flood (10) - Flood stage, minor damage to riverfront commercial properties in Dexter.

Moderate (12) - Moderate flood, flooding along the riverfront in Dexter and numerous road closures in Carthage.

Major (14) - Major flood, heavy commercial, industrial, and residential damages in Watertown and Carthage. Flooding on Huntington Street and River Street in Watertown.

Boonville

Action (8) – Action stage, minor agricultural lowland flooding possible downstream in the flats area.

Flood (10) - Flood stage, widespread farmland flooding in the flats area. Several roads may be closed in Glenfield, Martinsburg, and Lowville.

Moderate (11) - Moderate flood, widespread farmland and residential flooding in the flats. Numerous road closures along the river.

Major (12) - Major flood, widespread farmland and residential flooding in the flats. Numerous road closures. Some residential and commercial flooding in Port Leyden and Lyons Falls.

Dadville

Action (12) – Minor agricultural lowland flooding in the flats. East Martinsburg Road may be flooded.

Flood (14) – Flood stage, widespread farmland flooding in the flats. Several roads may be closed in Glenfield, Martinsburg, and Lowville.

Moderate (16) –Moderate flood, Flooding threatens residential, agriculture, and livestock interests in the flats. Numerous road closures all along the river. Some residential flooding in portions of Carthage and Castroland.

Major (17) – Major flood, widespread residential and agricultural flooding in the flats. Numerous road closures. Widespread residential and commercial flooding in Carthage and Castorland.

Forecasting River Rises and Discharges

Snowfall Measurements



HUDSON RIVER-BLACK RIVER REGULATING DISTRICT BLACK RIVER AREA

2018 SNOW SURVEY

April 9-11, 2018

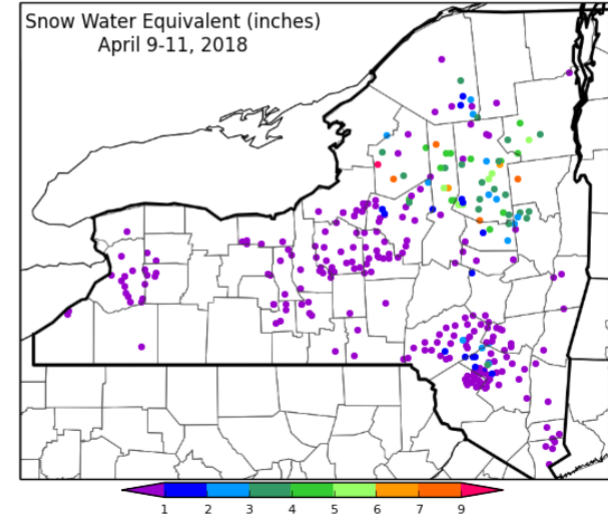
| Stream | Snow Course | Date | 2018 | | Average* | | % of Average | |
|--------------|----------------------------------|---------|------------|-------------|------------|-------------|--------------|-------------|
| | | | Snow Depth | Water Cont. | Snow Depth | Water Cont. | Snow Depth | Water Cont. |
| Black River | Hawkinsville, Elevation 1249 | 4/10/18 | T&P | T&P | 1.9 | 0.66 | 0% | 0% |
| | Boonville, Elevation 1655 | 4/10/18 | 14.3 | 4.40 | 4.9 | 1.86 | 292% | 237% |
| | Highmarket, Elevation 1820 | 4/9/18 | 21.3 | 7.30 | 11.4 | 4.46 | 187% | 164% |
| | Turin, Elevation 1282 | 4/9/18 | 11.6 | 3.40 | 3.3 | 1.17 | 352% | 291% |
| | Lowville, Elevation 739 | 4/10/18 | T&P | T&P | 0.2 | 0.09 | 0% | 0% |
| | North Lake, Elevation 1820 | 4/11/18 | 20.9 | 5.94 | 7.5 | 2.55 | 279% | 233% |
| Beaver River | Stillwater Res. Area, Elev. 1706 | 4/10/18 | 12.3 | 7.50 | 7.3 | 2.60 | 168% | 288% |



Northeast Regional Climate Center

- Home
- Weather Station Data
- State & Regional Analyses
- Monthly Maps
- Daily Maps
- Summary Tables
- Narrative Overview
- US Regional Maps
- Climate Normal Maps
- NY Snow Survey Maps**
- Northeast Drought
- El Niño Comparison Tool
- Analyses for Industry
- Climate Resources
- Publications & Services

- Quick Links
- Webinar



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Get Time Series for Station ID:

Get Time Series for Basin ID:

Get Basin Averages for:

Get Climatology for Station ID:

Navigation Tools:

43.970 N, 74.623 W

Query: Station (2002-present)

Redraw Map

Select Physical Element:

Select Date: 2018 April 11 13:00 UTC

Snap to nearest time

Select Overlays:

- Hydrologic Features
 - RFC Basins Label
 - Other Basins Label
 - HUCs (6-digit) Label
 - RFC Boundaries
 - Rivers and Streams
 - Lakes and Reservoirs
- Political Features
 - County Boundaries
 - CMA Boundaries
 - State Boundaries
 - National Boundaries
- Point Features
 - Stations Label
 - Cities Label
 - Flight Lines Label
 - Climate Stns Label
 - Skiing Label
- Transportation Features
 - Roads and Highways

Modeled Snow Water Equivalent for 2018 April 11, 13:00 UTC

Created 2018 Apr 12 00:35:00 UTC

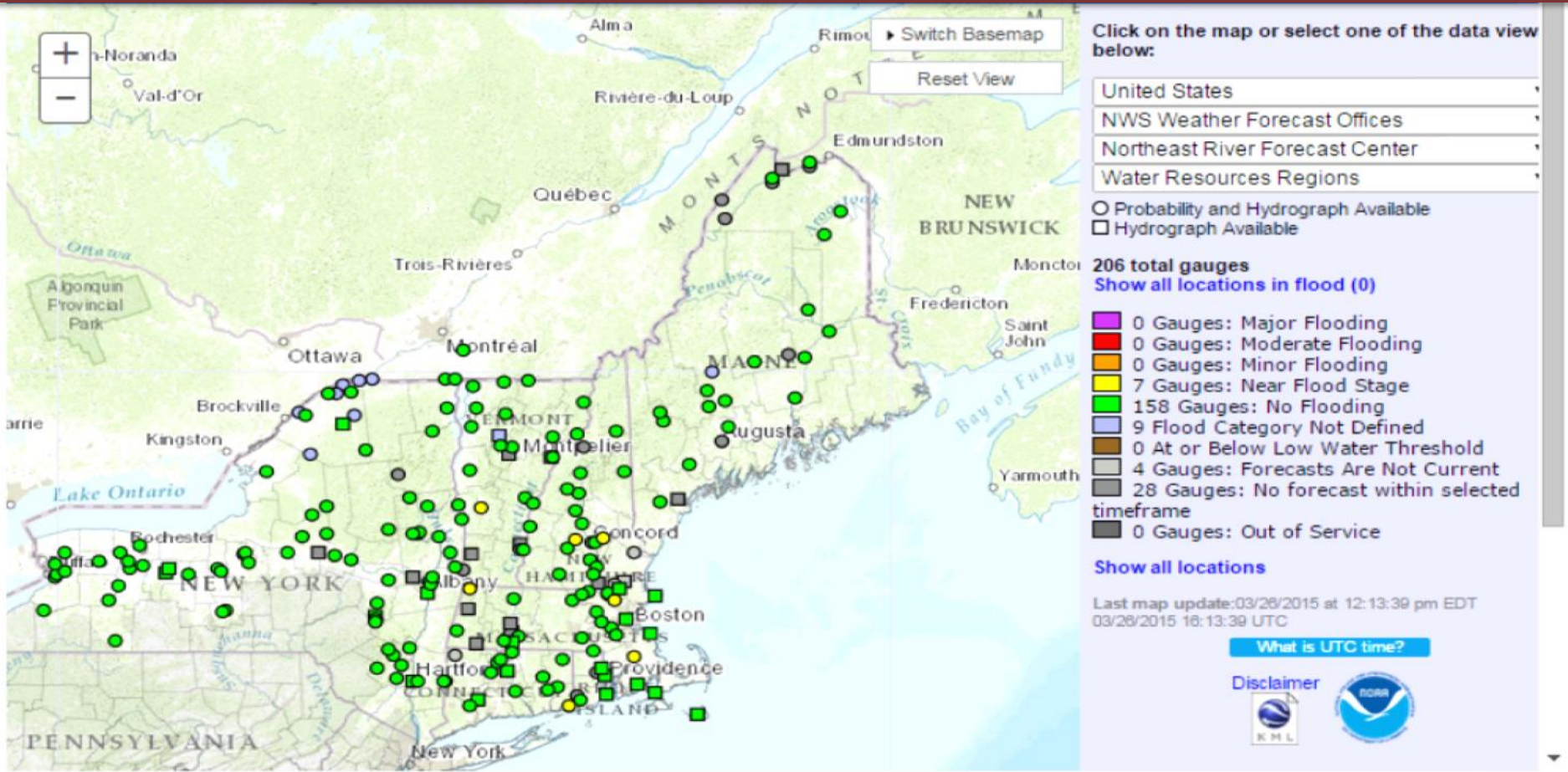
Inches of water equivalent

- > 30
- 18 to 20
- 14 to 16
- 12 to 14
- 10 to 12
- 8 to 10
- 6 to 8
- 4 to 6
- 2 to 4
- trace to 1
- Not Estimated

Elevation in feet

- > 13124
- 8203 to 13124
- 3281 to 8203
- 3 to 3281
- < 3

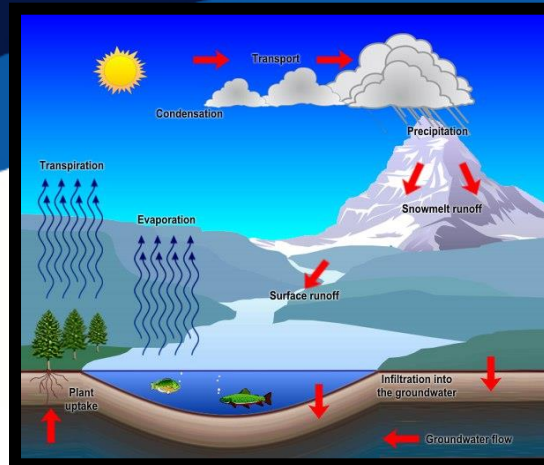
Northeast River Forecast Center *Operations & Services*



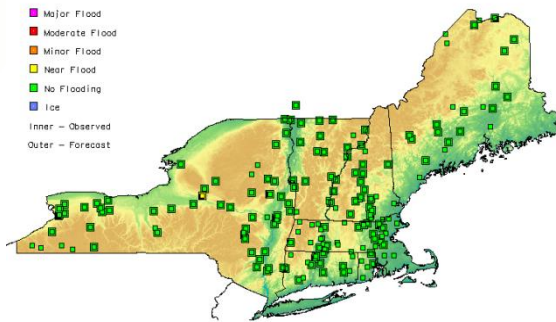
River Forecast Center Responsibilities

Calibrate and implement variety of hydrologic and hydraulic models and produce temperature and precipitation forecasts to provide:

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- Guidance on the rainfall needed to produce Flash Flooding
- Ensemble streamflow predictions
- Ice Jam and Dam Break support
- Water Supply forecasts
- Reservoir Inflow Forecasts

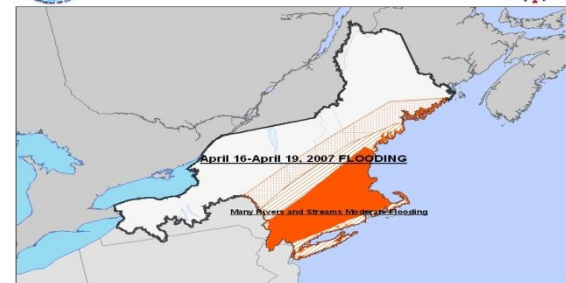


Observed and Forecast River Conditions
August 7, 2009 12:11pm EDT



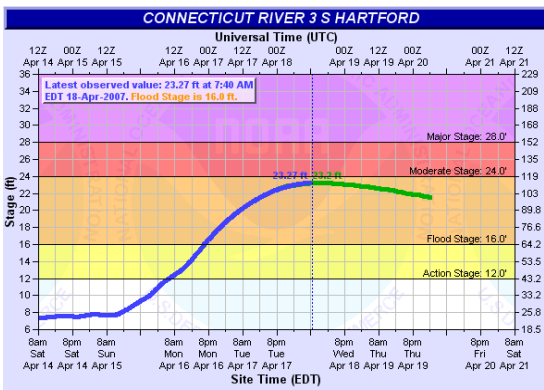
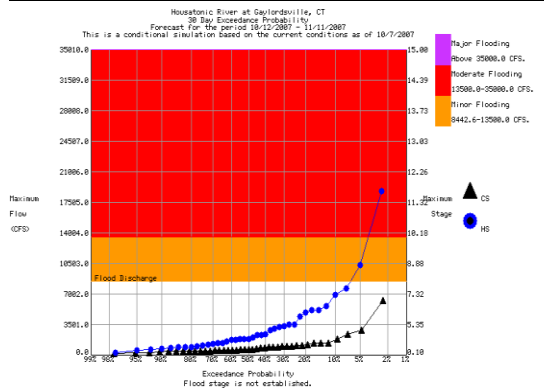
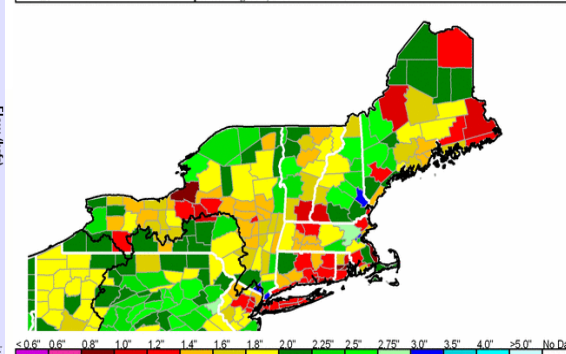
Source: NOAA/NWS/Northeast RFC

NOAA Significant River Flood Outlook
Valid: 4/16/2007 - 4/21/2007
Northeast River Forecast Center 4/16/2007 11:30:38 AM



Significant River Flooding impacts include: Roads adversely affected; Residential, commercial, industrial, and/or agricultural areas affected; May require evacuation of people.

NOAA National Weather Service
Northeast River Forecast Center
1 Hour Flash Flood Guidance
Updated August 7, 2009 10:50 AM CDT



HFDC3 (plotting HCRG) *Stage 0' Datum: n/a Observations courtesy of the US Geological Survey



Moderate flooding - Connecticut River at Portland, CT.

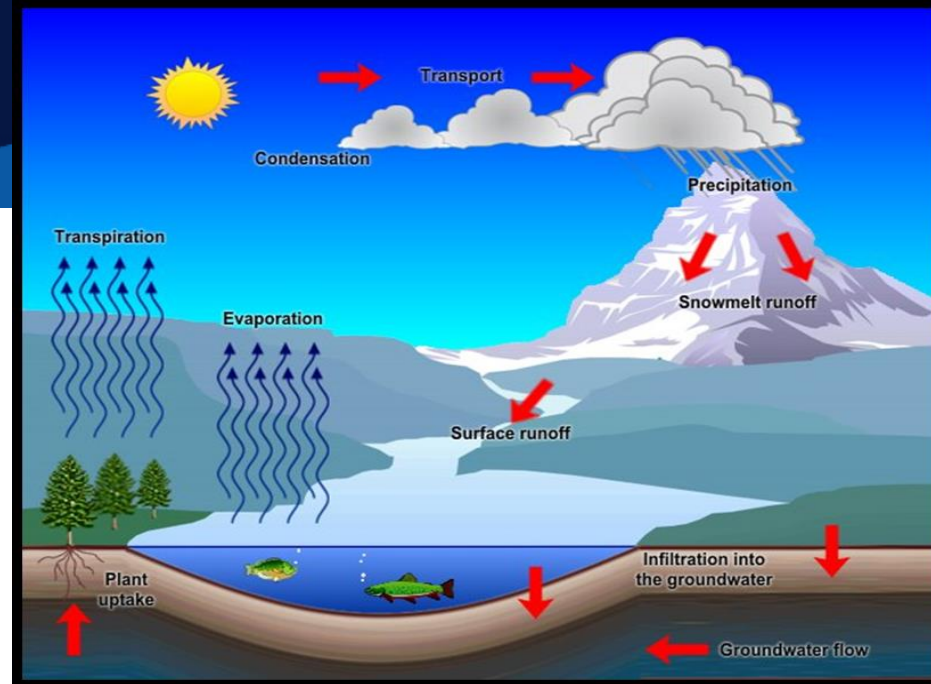
Forecast Services On A Watershed Scale

Requirements:

- Observed precipitation & temperatures
- Observed streamflows (USGS)
- Forecast temperatures and precipitation
- **Drainage area > 100 sq mi**

Our models help us forecast:

- The volume of water in the river & that's converted to stage/elevation
- Time of the peak elevation & duration
- Soil moisture & Snow melt
- Unit hydrograph theory
- Reservoir Operations (RES-J)
- Hydraulics (HEC-RAS) for complex river systems
 - Tidal reaches
 - Lake Champlain, Farmington River
 - Combines tidal/storm surge with fresh water runoff on 5 tidal rivers

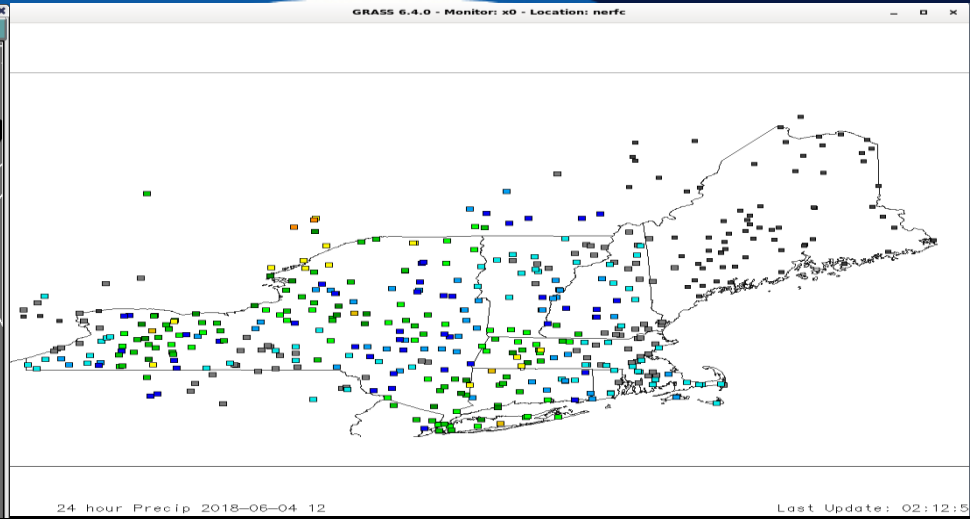
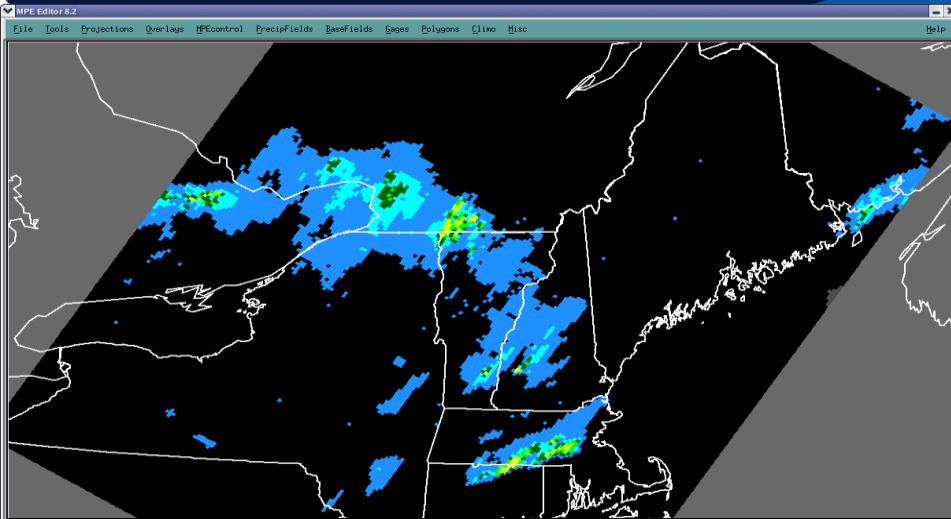


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# //STATION NAME="BLACK RIVER AT DADVILLE NY"
# //LABEL="Discharge ft^3/s"
# //PARAMETER CODE="00060"
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# //RATING REMARKS="At and above 7.30 ft identical w/ rat 39"
# //RATING EXPANSION="logarithmic"
# //RATING BREAKPOINT1=3.660000E+00 BREAKPOINT2=7.300000E+00
# //RATING OFFSET1=2.500000E+00 OFFSET2=3.000000E+00 OFFSET3=3.300000E+00
# //RATING_INDEP ROUNDING="???" PARAMETER="Gage height (ft)"
# //RATING_DEP ROUNDING="???" PARAMETER="Discharge (ft^3/s)"
# //RATING_DATETIME BEGIN=20040328021500 BZONE=-05:00 END=20161001000000
EZONE=-05:00 AGING=None
# //RATING_DATETIME COMMENT=""
# //RATING_DATETIME BEGIN=20161001000000 BZONE=-05:00 END=-----
EZONE=--- AGING=Working
# //RATING_DATETIME COMMENT=""
```

| INDEP | SHIFT | DEP | STOR |
|-------|-------|---------|------|
| 16N | 16N | 16N | 1S |
| 3.00 | 0.00 | 1090.00 | * |
| 3.01 | 0.00 | 1096.00 | |
| 3.02 | 0.00 | 1101.00 | |
| 3.03 | 0.00 | 1107.00 | |
| 3.04 | 0.00 | 1113.00 | |
| 3.05 | 0.00 | 1119.00 | |
| 3.06 | 0.00 | 1124.00 | |
| 3.07 | 0.00 | 1130.00 | |
| 3.08 | 0.00 | 1136.00 | |
| 3.09 | 0.00 | 1142.00 | |
| 3.10 | 0.00 | 1147.00 | |

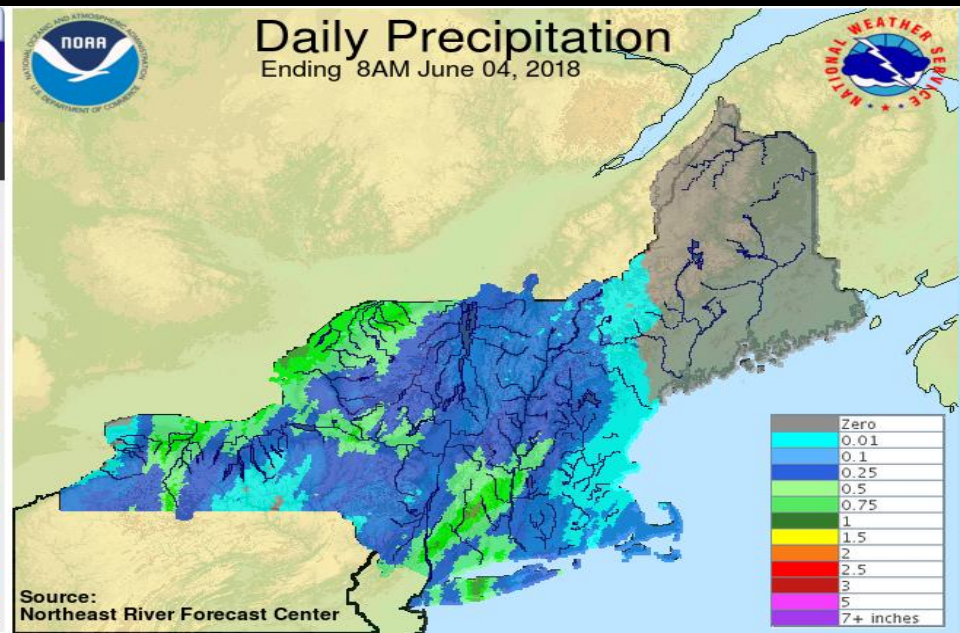
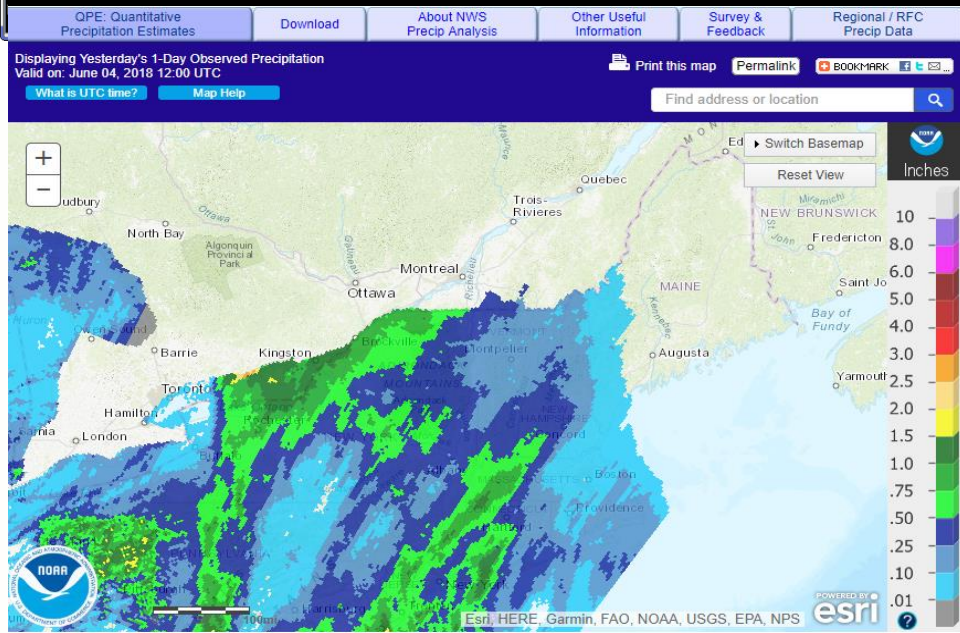
Precipitation Assimilation

Gage-only and Radar/Gage Multi-sensor Estimation



Hourly Multi-sensor Precipitation Estimation
(Radar / Gage Mosaic)

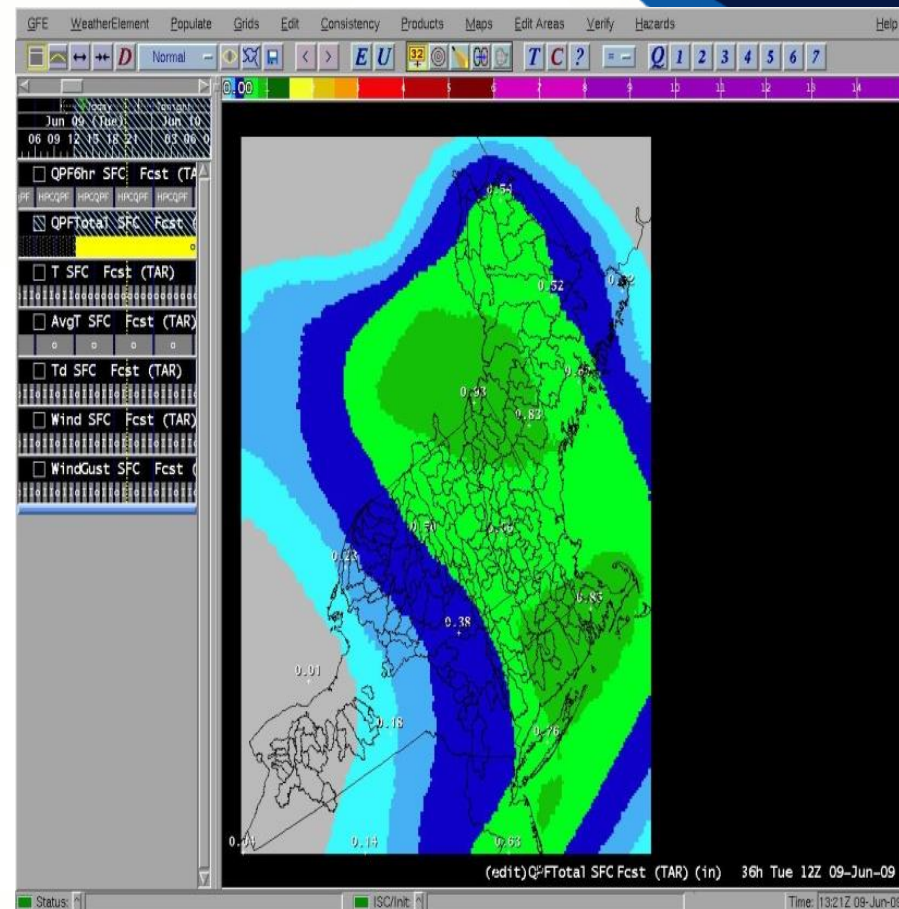
Gage-only Precipitation Estimation



Precipitation/Temperature Forecasting

Hydro-meteorological Analysis & Support Meteorologists

- HAS Forecasters lead the effort
- Rainfall forecasts out 48-72 hours
 - Longer for contingency guidance
- Past & Future Temperatures during the cool-season (Nov-Apr)
 - Lower & Upper zones (>2kft)
 - Initialize with the RTMA temps (past) and the WFO ISC Temperature Grids (future)
 - Also incorporate 925mb temps for the upper zones (NAM, GFS)
- QPF 3x daily & temps 2x daily



Dadville

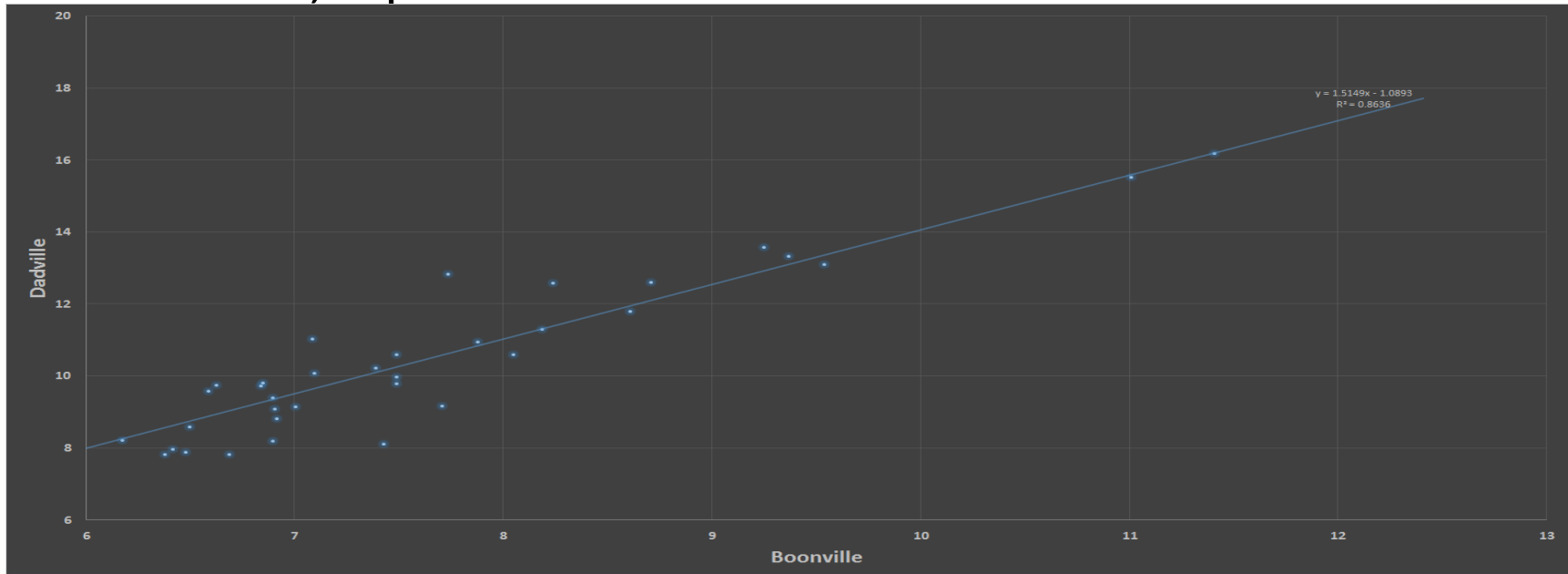
Data:

- With the help of WFO BUF we are ingesting hourly (averaged) stage data
- Historical stage data is available back to September 2015, plus some earlier crests
- The USGS has provided a preliminary rating, up to 12.72'



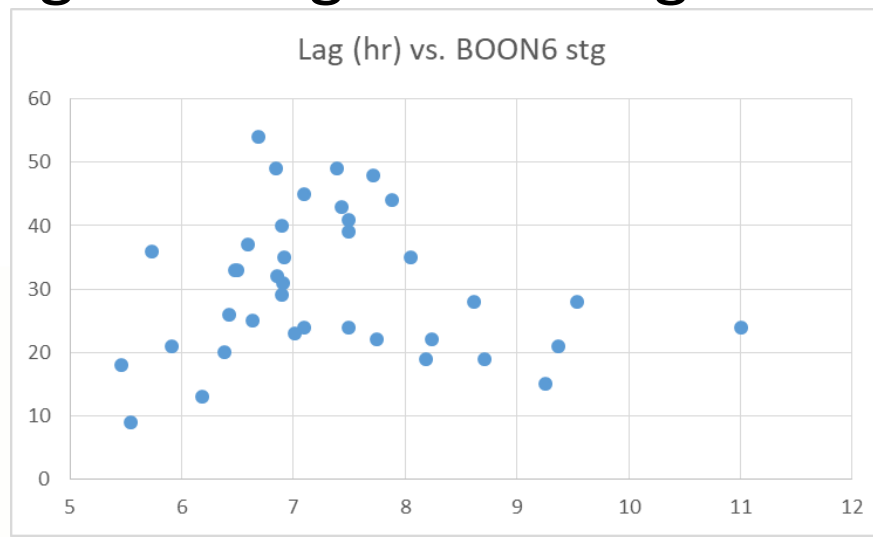
Forecasting for Dadville

- With just 2.5 years of data and no rating at flood levels, we decided to implement a stage-stage relationship between Boonville and Dadville
 - Plot of Boonville crests vs. Dadville crests for each event, equation for line of best fit



Travel time

- The stage-stage relationship gives us an idea of how high the stage will be at Dadville, based on Boonville's observed and forecast stages.
- Then we estimate a lag time between the crest at Boonville and the crest at Dadville by plotting historical lags vs. stage and using LAG-K model:



More NERFC products: Seasonal and 5 Day Flood Outlooks

Spring Outlook issued every 2 weeks from January through late April

Significant Flood Outlook Issued daily – for potential over next 2-5 days



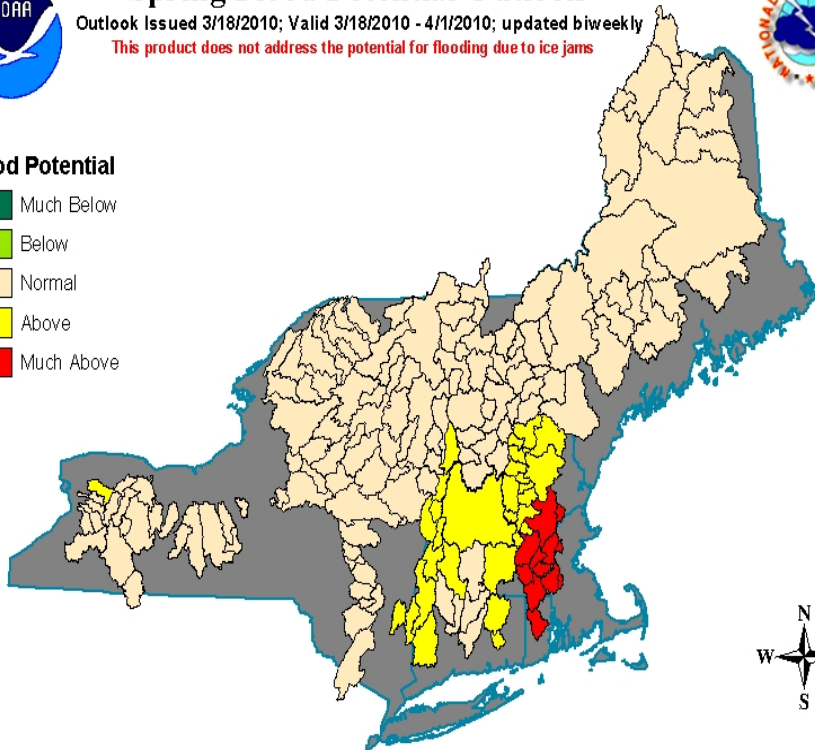
Spring Flood Potential Outlook

Outlook Issued 3/18/2010; Valid 3/18/2010 - 4/1/2010; updated biweekly
This product does not address the potential for flooding due to ice jams



Flood Potential

- Much Below
- Below
- Normal
- Above
- Much Above

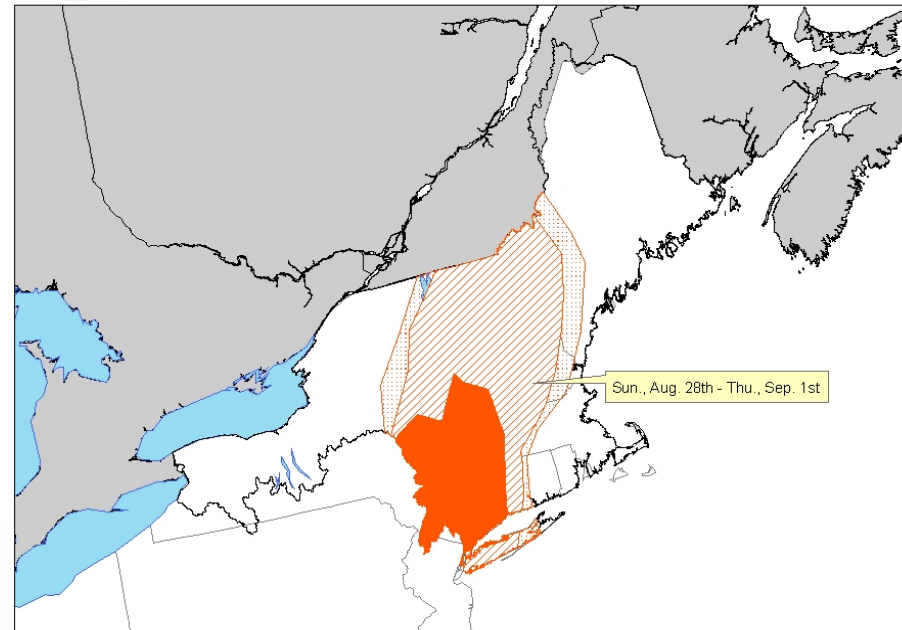


Map produced by the Northeast River Forecast Center



Significant River Flood Outlook

Valid: 8/28/2011 - 9/2/2011
Northeast River Forecast Center 8/28/2011 1:49:33 PM



SIGNIFICANT RIVER FLOODING POSSIBLE.

SIGNIFICANT RIVER FLOODING LIKELY.

SIGNIFICANT RIVER FLOODING OCCURRING OR IS IMMINENT.

Significant River Flooding Impacts include:
Roads adversely affected. Residential, commercial, industrial, and/or agricultural areas affected. May require evacuation of people.

NOTE: Flash Flooding or Minor River Flooding will NOT be included in this outlook.

NERFC Self-Briefing Page

<http://www.weather.gov/nerfc> - "Additional Info" menu

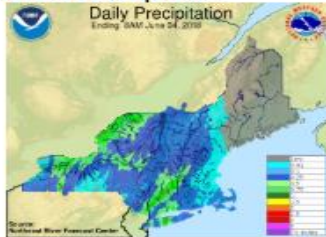
NERFC Self Briefing Page - Warm Season

[Weather.gov](#) > [Northeast RFC](#) > [NERFC Self Briefing Page - Warm Season](#)

Northeast RFC
River Forecast Center

[River Observations and Forecasts](#) [Weather Observations and Forecasts](#) [Water Supply](#) [Climate and History](#) [Seasonal Interest](#) [Additional Info](#)

Observed Precipitation



Forecast Precipitation



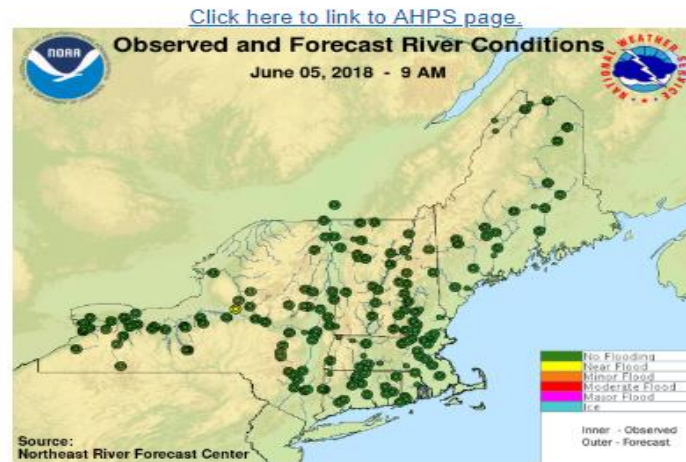
1 Hour Flash flood Guidance



3 Hour Flash flood Guidance



River Conditions



Regional RADAR



Eastern Region Hazards



USGS WaterWatch



Short Range Forecast



Satellite Images



You can help!!!



WANTED!

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TO HELP SCIENTISTS STUDY STORMS**

Measure precipitation in your own backyard with CoCoRaHS!

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CoCoRaHS needs your help!



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Observations
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for Decision
Makers of
Tomorrow"



To learn more or to become a volunteer observer, please visit our web site at:

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