NWS Flood Services for the Black River Basin

Speakers: NWS Buffalo Dan Kelly and Sarah Jamison, NERFC Jeane Wallace
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.
The National Weather Service (NWS) is responsible for weather watches, warnings, and advisories as well as forecasts several times daily.
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.
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

www.weather.gov/buf
NWS Services
River Forecasting

Data Collection
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).
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.

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.
Forecasting River Rises and Discharges
River Forecast Information

http://www.weather.gov/buf
Forecasting River Rises and Discharges
River Forecast Information

Click on a point

Forecasting River Rises and Discharges

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

12 Major flood, widespread flooding of commercial, industrial, and residential areas throughout the Black River Valley.

11 Moderate flood, widespread farmland flooding and road closures all along the river. Some residential flooding in portions of Carthage and Castorland.

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

8 Action stage, minor agricultural lowland flooding begins downstream in the Flats area. East Martinsburg Road may be closed.
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.
Observing sites in Lewis and Jefferson Counties
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.
Current River Flood Warning Polygons
Proposed FLW Polygons
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.
In January of 1985 we had a big flood. On the evening of Dec 28th we received heavy rains in the area and temperature got to 62°- the 29th-30th 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 Year's 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 8 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 made the base of the Flag Pole at the DEC office at the 10' mark.
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.

Forecasting River Rises and Discharges

Snowfall Measurements

Hudson River-Black River Regulating District
Black River Area
2018 Snow Survey
April 9-11, 2018

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River Forecast Center Responsibilities

• Calibrate and implement variety of hydrologic and hydraulic models and produce temperature and precipitation forecasts to provide:
  – River flow and stage forecasts at 200 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

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
Precipitation Assimilation

Gage-only and Radar/Gage Multi-sensor Estimation

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

Gage-only Precipitation Estimation

Daily Precipitation
Ending 8AM June 04, 2018
- 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
Inside CHPS (Community Hydrologic Prediction System)

Streamflow simulations

Soil Moisture Modeling

Snow water simulations

Forecast snowmelt
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
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

Significant River Flood Outlook
Northeast River Forecast Center 8/28/2011 1:40:33 PM

Flood Potential
- Much Below
- Below
- Normal
- Above
- Much Above

Map produced by the Northeast River Forecast Center
You can help!!!

WANTED!

VOLUNTEERS OF ALL AGES
TO HELP SCIENTISTS STUDY STORMS

Measure precipitation in your own backyard with CoCoRaHS!

The Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) needs you! Everyone can participate, both young, old, and in-between. The only requirements are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can affect and impact our lives.

CoCoRaHS needs your help!

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

www.cocorahs.org

Cooperative Observer Program

“Quality Observations Lighting the Way for Decision Makers of Tomorrow”

National Weather Service

Funding for CoCoRaHS provided by:

NSF