

# National Weather Service

The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national weather, water and climate database, which can be used by other governmental agencies, the private sector, the public, and the global community. The NWS is part of the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce.

# NWS River Forecast Centers

The NWS operates 13 regional hydrologic centers across the U.S. known as River Forecast Centers (RFCs). NWS RFCs prepare river and flood forecasts and other hydrologic information. Most of this information is distributed to the public and other users directly through the internet and/or through the national network of 122 NWS Weather Forecast Offices (WFOs).

A critical function of all RFCs is to prepare hydrologic forecasts during floods. These "flood forecasts" provide the expected crests (maximum height) rivers will reach at specific forecast points and the expected time of occurrence. Flood forecasts also indicate the approximate times when flooding will begin and end at each forecast point based on a predetermined "flood stage" unique to each forecast point. The NWS considers flood stage to be the level at which property damage begins or access roads become inundated.

Other RFC activities include the issuance of daily river stage and streamflow forecasts, longer-range probabilistic river forecasts, and rainfall and drought data and information. This information aids in the optimum management of water resources used for home and industry, power generation, recreation, agriculture, flood control, transportation/navigation, fisheries management, and others. RFCs also produce "flash flood guidance," which estimates how much rain must fall in certain time periods for small stream flooding to begin.

# MARFC

NWS Middle Atlantic River Forecast Center

## OUR MISSION

The NWS Middle Atlantic River Forecast Center (MARFC) supports the overall NWS mission of protecting life and property and aiding in the economic and environmental well-being of the Nation. The MARFC provides timely and accurate hydrologic forecasts and information to support NWS customers and partners, using the best scientific principles to integrate and model water, weather and climate information.

## OUR SERVICE AREA

The MARFC has hydrologic responsibility for one of the most flood-prone and populous regions in the Nation. Our area of responsibility encompasses some 87,000 square miles and includes all or portions of the seven states of New York, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware and Virginia, as well as Washington, D.C.



Major river basins located within the MARFC service area include the Susquehanna, Delaware, Passaic, Raritan, Potomac, Shenandoah, Rappahannock, James and Appomattox, along with numerous other smaller river systems. Seven NWS WFOs receive hydrologic forecasts and guidance from the MARFC for distribution to the public and other users. Each NWS WFO has its own



hydrologic area of responsibility called Hydrologic Service Areas (HSAs).

WFOs/HSAs in and near the MARFC Area of Responsibility

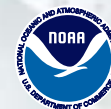
## Flood Facts

- On average, floods cause more **deaths** than any other weather-related event...
- Most flood-related deaths occur in **motor vehicles** and many also occur at **night**...
- Just **two feet** of water will carry away most vehicles...
- Only the National Weather Service issues official flood and severe weather **watches and warnings**...
- NOAA Weather Radio All Hazards is the **fastest** way to receive NWS watches and warnings...
- Most homeowner's insurance policies **DO NOT** cover losses caused by flooding...
- Federal flood insurance is available to most homeowners. Your insurance agent can help you with questions concerning **flood insurance**...

# MARFC

## NWS Middle Atlantic River Forecast Center

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Flooding in Spring Mills, PA, January 1996.



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U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Weather Service

Flooding in Walton, NY, June 2006.



# Middle Atlantic River Forecast Center

## OUR STAFF

MARFC's most important resource—our staff—is comprised of 16 people with varied backgrounds in hydrology, meteorology, engineering, information technology, and other disciplines. We are open 365 days a year from 6 a.m. to 11 p.m., except during flood events when we implement 24-hour operations.

## OUR LOCATION

The MARFC is collocated with the Central Pennsylvania NWS Weather Forecast Office at Penn State University's (PSU) Innovation Park complex in State College, PA. Data, information and resources are shared between the two NWS offices, while the proximity of the NWS facility to PSU creates educational and collaborative research opportunities.



Office location of both the NWS Middle Atlantic River Forecast Center and the State College Weather Forecast Office.

## OUR HISTORY

MARFC's origin goes back nearly 70 years when the Federal-State River Forecast Center was formed largely as a result of the record-setting flood of March 1936. The early center focused on Pennsylvania and was a cooperative effort between the U.S. Weather Bureau (now the NWS) and the State of Pennsylvania. In 1948 the Harrisburg River Forecast Center was established, at which time the service area was expanded to include the Delaware River Basin. Then in 1970 the Potomac, James and Rappahannock River Basins were added. In 1972, record flooding from the remnants of Hurricane Agnes impacted much of the Harrisburg RFC service area. This flood event increased national awareness of the devastation caused by major river floods, and prompted major enhancements to the flood forecasting services provided by the Harrisburg RFC. In the 1980s, the center was renamed the Middle Atlantic RFC, and in 1993 relocated to downtown State College, PA. Then in December 2005, MARFC moved to its current location at PSU.



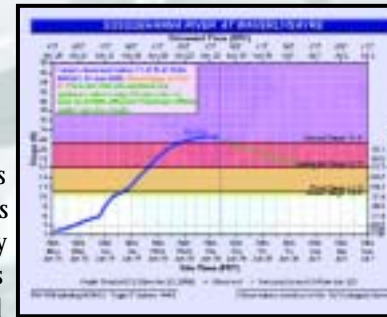
Icy floodwaters destroy the old Walnut Street Bridge in Harrisburg, PA, in January 1996.

## OUR KEY FUNCTIONS and SERVICES

River flood forecasting is essential to the NWS mission of saving lives and reducing property damage. Heavy rainfall can result in river flooding during any month of the year in our service area. To predict floods, the MARFC utilizes the NWS River Forecast System (NWSRFS), a complex hydrologic model comprised of a series of computer-based hydrologic applications and mathematical calculations. Observed, estimated and predicted hydrometeorological data are used as input to the model, while the output are hydrographs, which estimate future river stages for more than 155 locations throughout our service area. These hydrographs help our Hydrologists to predict how high a river will get at specific locations and when water levels will begin to recede again. Our flood forecasts are sent to seven NWS WFOs, which fine tune the forecasts, if necessary, before disseminating the information to the public and other users through NOAA Weather Radio All Hazards, the internet, television, commercial radio and local emergency management agencies.

The Advanced Hydrologic Prediction Services (AHPS) are a relatively new and essential component of the NWS Hydrology Program. AHPS provide users with web-based graphical forecast products that take advantage of recent advances in science and technology. The AHPS products assist Water Resources Managers, Emergency Managers, and others involved in flood and drought mitigation programs in making better decisions, including when to evacuate people and move property. The NWS continues to actively develop, test and implement new AHPS products in cooperation with our customers and partners.

The Hydrometeorological Analysis and Support (HAS) function capitalizes on the newest technology and science, along with today's much higher-resolution data, to bring cohesiveness to the unique fields of hydrology and meteorology. Our HAS forecasters are Meteorologists that prepare critical



An example of a graphic available through the Advanced Hydrologic Prediction Services web pages.

forecasts of the amount, type, distribution and duration of precipitation for input into our hydrologic forecast model. They ensure the quality of observed temperature and precipitation data and monitor real-time hydro-meteorological conditions, providing updates to our Hydrologists as necessary. Our HAS forecasters also coordinate with other local, regional and national NWS offices to ensure consistency in daily operations.

## OUR ADDITIONAL ACTIVITIES

Other functions of our center include issuing routine river forecasts, flash flood and headwater guidance, winter/spring flood potential outlooks, drought guidance, five-day significant flood outlooks, multi-sensor precipitation estimates and precipitation departure information. We also develop and maintain hydrologic computer systems, calibrate hydrologic models, provide Geographical Information System (GIS) mapping support, maintain and update internet pages, perform and publish hydro-meteorological research and participate in educational outreach. Our information also helps support ecosystem management programs such as the State of Maryland's Shellfish Harvesting Program, the State of New Jersey's Marine Monitoring Program, and the State of Pennsylvania's Black Fly Suppression Program. We cooperate with numerous federal, state, and local government agencies and private organizations, including other NOAA agencies, the USGS, the U.S. Army Corps of Engineers, both the Susquehanna and Delaware River Basin Commissions, the Interstate Commission on the Potomac River Basin, and academic organizations.

## OUR FUTURE

MARFC is always working to improve and expand its services to our customers. Additional AHPS enhancements include expanding short-term probabilistic forecasts and flood inundation maps. Other future activities include enhancing flash flood guidance, increasing data and information exchange with partners, implementing probabilistic river forecasts, improving flood forecasting services, expanding GIS mapping capabilities, and exploring and implementing new and improved hydrologic modeling techniques.

## SUSQUEHANNA FLOOD FORECASTING INITIATIVE

Recognizing the need for the protection and management of water resources, the Susquehanna River Basin Commission (SRBC) was established in 1971. Shortly thereafter, flooding from Agnes in 1972 made it evident that flood forecasting services could be enhanced in the Susquehanna basin. To this end, the SRBC helped establish the Susquehanna Flood Forecasting Initiative, which allowed for the expansion of the hydrologic gaging network in the 1980s. This enhanced network is maintained primarily by the U.S. Geological Survey (USGS). Today, the SRBC coordinates a committee comprised of numerous federal and state organizations. The committee operates and maintains what is now considered to be one of the nation's best flood forecast and warning systems.