

**NATIONAL WEATHER SERVICE
PRODUCT/SERVICE DESCRIPTION DOCUMENT (PDD)
TYPE: Official Product
DATE:**

Meteorological Model Ensemble River Forecasts

Part I – Mission Connection

1. Product/Service Description – The National Weather Service (NWS) Meteorological Model Ensemble River Forecasts web pages, graphics and text products are being produced by Eastern Region River Forecast Centers (RFCs) and the Southeast RFC to provide useful hydrologic information to users. The objective of this information is to provide short lead-time (<7 days) ensemble river forecasts using forcing fields provided by various meteorological ensemble systems.

These ensemble river forecast are produced at the RFCs using a collection of software entitled Meteorological Model-based Ensemble Forecasting System (MMEFS). The MMEFS uses the temperature and precipitation output from the National Centers for Environmental Prediction (NCEP) Global Ensemble Forecast System (GEFS), the Short Range Ensemble Forecasts (SREF), and the North American Ensemble Forecast System (NAEFS). These ensemble members are processed through the Community Hydrologic Prediction System (CHPS) to generate an ensemble of river forecasts. These individual river forecasts are turned into probabilistic forecasts. The RFCs' CHPS software used to generate a suite of graphics to display this information (see Attachment 1 for some examples).

2. Purpose – The purpose of the ensemble river forecasts is to provide users with a short-term (<7 days) situational awareness by providing the probabilistic exceedence information relative to NWS flood categories and providing the ensemble river forecasts that in turn show a range of outcomes. These web pages complement information contained in the current short-term deterministic hydrologic forecasts and internal NWS WFO-requested *subjective* contingency forecasts. This service will support the NOAA mission goals of serving society's need for weather and water information and supporting the nation's commerce, economy, and planning for the protection of life and property.
3. Audience – The target audience for this service is the general public which needs hydrologic information and flood water response agencies like the US Army Corps of Engineers (USACE), US Geologic Survey (USGS), NWS Weather Forecast Offices (WFOs) and the emergency management community. Additional users include water reservoir managers (e.g. water supply managers for the large cities in the northeast or the power companies of the southeastern states), and recreational interests.

4. Presentation Format – The ensemble river forecasts can be viewed at <http://www.weather.gov/erh/mmefs>. The interface utilizes can be zoomed to individual forecast points and states. The information is selectable by “Ensemble/Model” type and the “Chance of Exceedence” for action, minor, moderate, and major flood stages is depicted for that “Ensemble/Model” type on the Google map. Please see sample presentations in Attachment 1.

Part II – Technical Description

1. Format and Science Basis –This service uses forcing parameters provided by various meteorological ensemble systems as input to the hydrologic model hosted by the RFC’s Community Hydrologic Prediction System (CHPS). At this time, these products are generated for river forecast locations in the Northeast, Ohio River Valley, Mid-Atlantic and Southeast U.S using model outputs from the National Centers for Environmental Prediction (NCEP) 21-member [Global Ensemble Forecast System](#) (GEFS), the 21-member [Short Range Ensemble Forecast](#) (SREF) system and the 42-member [the North American Ensemble Forecast System](#) (NAEFS) produced at NCEP. The design of software supporting these products is flexible enough to easily add other meteorological ensemble sources. Even though the system has been automated, the staff of each RFC monitors the output and provides status messages to users as needed.

These ensemble river forecasts were developed for several reasons.

- Hydrologic forecast uncertainty is closely linked to the uncertainties associated with precipitation and temperature forecasts used by hydrologic simulation models.
 - This service explicitly uses short-range meteorological model ensemble temperature and precipitation data, eliminating the need for historical precipitation and temperature data for its results.
 - This service provides a means to further users' understanding of the effects of model inputs used in hydrologic simulations.
 - These ensembles river forecasts are useful surrogates for multiple contingency runs that are typically used by river forecast centers to convey quantitative precipitation forecast (QPF) or quantitative temperature forecast (QTF) uncertainty for *worst case* scenarios.
2. Availability – The ensemble river forecast web pages are available 24-hours per day and 7-days a week and are monitored by Eastern Region RFCs and the Southeast RFC staff.
 3. Additional Information
 - a. An online course, designed to help [understand numerical weather prediction \(NWP\) models](#), which includes a section on ensembles, is available from UCAR's COMET. Another online course from COMET provides an [Introduction to NAEFS](#).

There are some limitations/features of MMEFS that affect how the graphics are interpreted. Including:

- 1) MMEFS uses numerical interpretation between met. model grid points, i.e. terrain, climatology is not considered. Elevation-dependent significant temperature change scenarios are not accounted in MMEFS methods.
 - 2) The met. models have varying native grid resolutions; the user should be aware of these and consider these in the interpretation of the MMEFS graphics. I.e. tropical systems may not be adequately resolved by the coarser grid resolutions of the global model suite.
 - 3) The known biases of the met. model precipitation estimates are unaddressed by MMEFS algorithms.
 - 4) The uncertainty errors of the hydrologic models are not addressed by the MMEFS algorithms. During times of limited precipitation, the ensemble members will show very little spread.
 - 5) The snow melt model in MMEFS is driven only by temperature and does not account for melt variations due to humidity and winds. For scenarios that include high dewpoints/winds (which amplify melt rates), the snow melt values will be underdone.
4. Contact – Comments on this product can be emailed to ahps.webmaster@noaa.gov.

Comments may also be provided to:

NOAA/NWS/Eastern Region Headquarters
Attn: Laurie Hogan
630 Johnson Ave, Suite 202
Bohemia, NY 11716
631-244-0114

Acknowledgements

MMEFS is a joint collaboration of the ER DOHs: Thomas Adams (NWS/OHRFC retired), Joseph Ostrowski (NWS/MARFC retired), and Robert Shedd (NWS/NERFC)

Attachment 1. Examples of various displays from the web pages for the Meteorological Model Ensemble River Forecasts.

Customize
Your
Weather.gov

Enter Your City, ST
or ZIP Code

 Remember Me

Meteorological Model Ensemble River Forecasts

Weather.gov > Eastern Region Headquarters > Meteorological Model Ensemble River Forecasts

Local Forecast Offices A-K Local Forecast Offices L-Z River Forecast Centers Center Weather Service Units Regional HQ

Zoom to a Location
 [GEFS](#)
 [NAEFS](#)
 [SREF](#)
 [Whats This?](#)

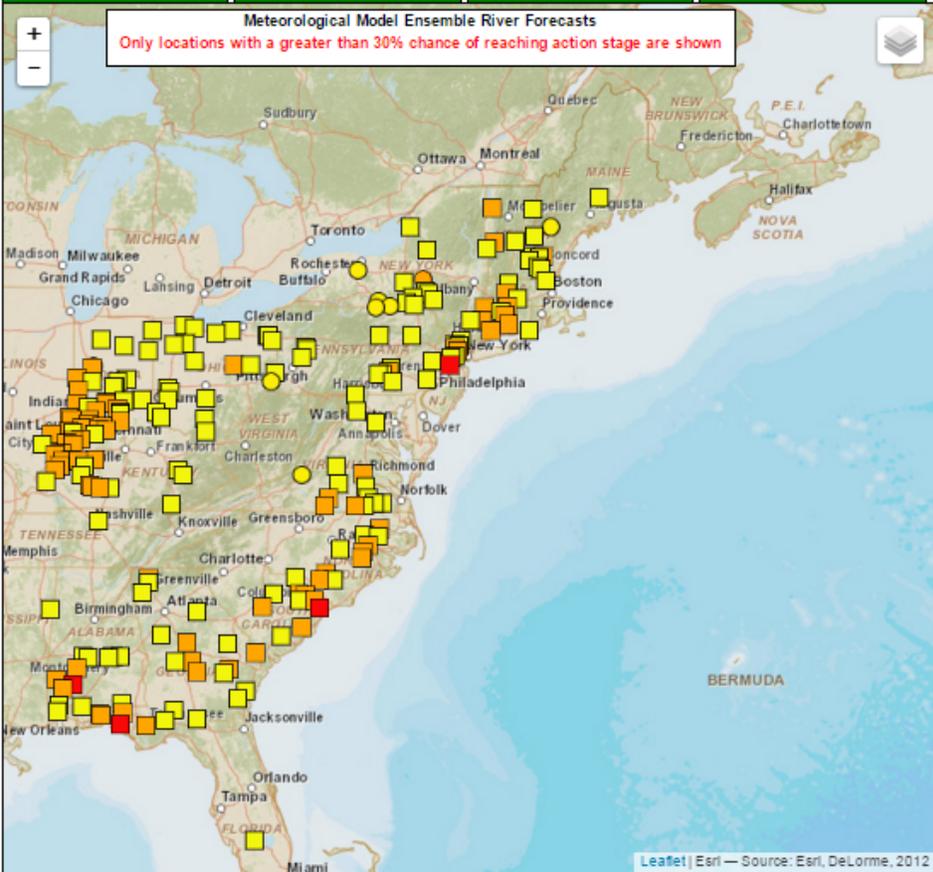
WELCOME TO OUR NEW WEBPAGE. PLEASE BOOKMARK THE URL.

[Product Description Document](#)
 Data In [KML](#) format
 [Recorded Training](#)

MARFC Status & News
NERFC Status & News
OHRFC Status & News
SERFC Status & News

Meteorological Model Ensemble River Forecasts

Only locations with a greater than 30% chance of reaching action stage are shown



Leaflet | Esri — Source: Esri, DeLorme, 2012

Turn Auto Refresh ON Map Last Updated: 2/26/2016 at 9:19:47 AM [Make a link to this map view](#)

Eastern Region Headquarters
Regional Headquarters

News Legend			
News Items less than 24 hours old	News Items 1 to 7 days old	No current News Items	
Map Legend			
Chance of Exceedance		River Forecast Centers	
30%	Level	70%	Middle Atlantic River Forecast Center
Action	Minor Flood	Northeast River Forecast Center	Northeast River Forecast Center
Moderate Flood	Major Flood	Ohio River Forecast Center	Ohio River Forecast Center
Major Flood	Major Flood	Southeast River Forecast Center	Southeast River Forecast Center
● = less than 30% chance of reaching Action level			
○ = no critical levels defined for this point			

Figure 1. This figure is an example of the main overview map page for this service.

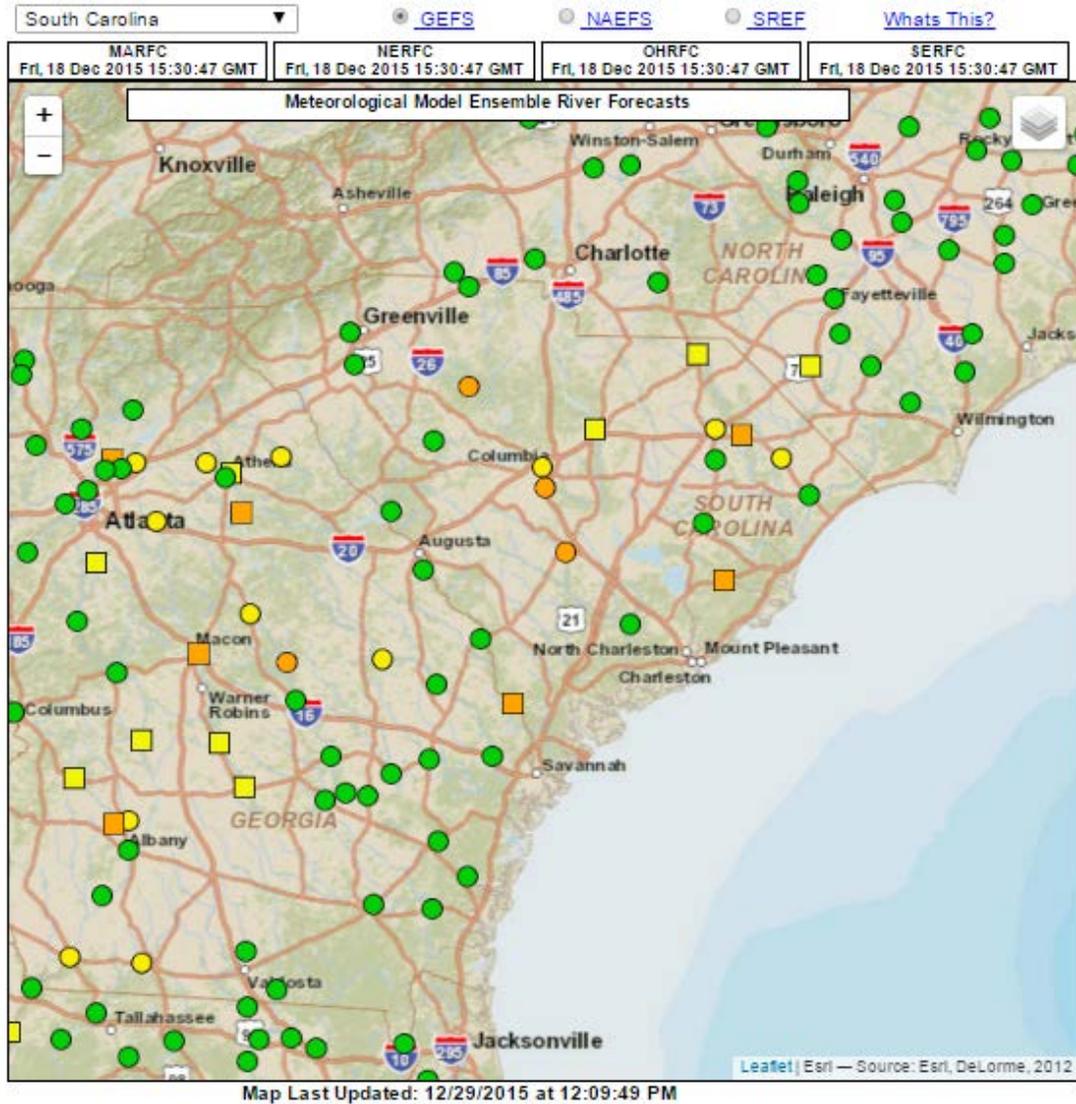


Figure 2. This figure is an example of single state (South Carolina) display capability from this service.

GEFS Based Simulations

Wabash River at West Lafayette, IN (LAFI3)

[Click Here for Current Official NWS Forecast](#)

Estimated Chance River Will Rise Above Minor Flood Level is greater than 90%

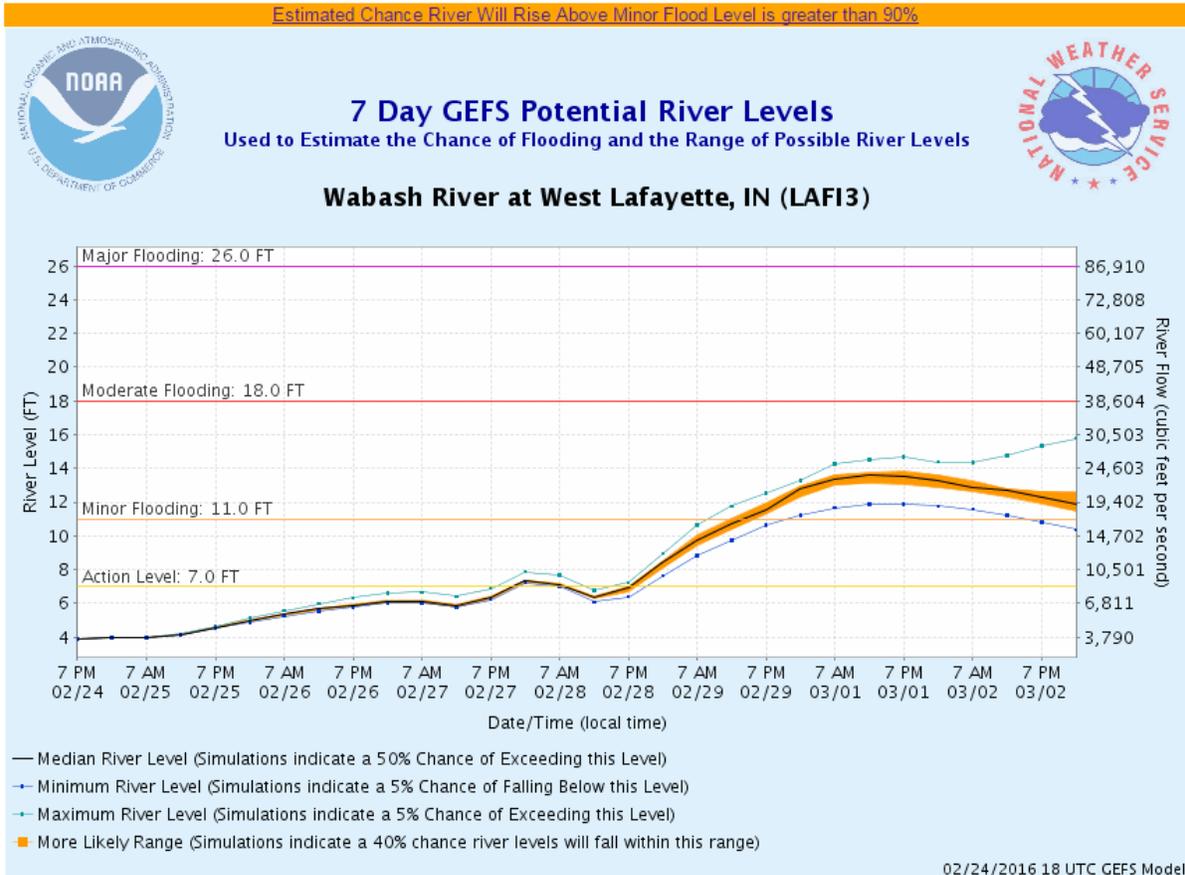


Figure 3. This figure is an example of the CHPS graphic capability from this service.

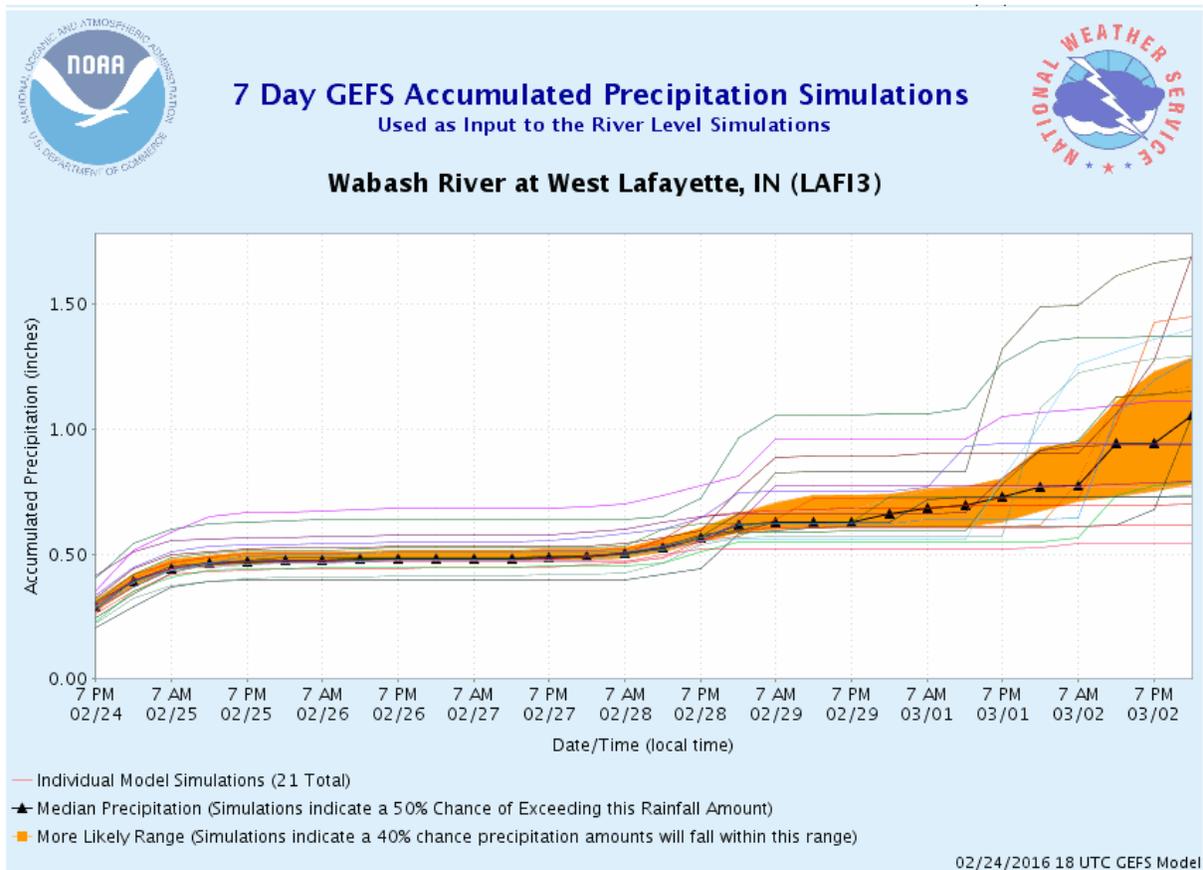


Figure 4. This figure is an example of the CHPS graphic capability from this service.

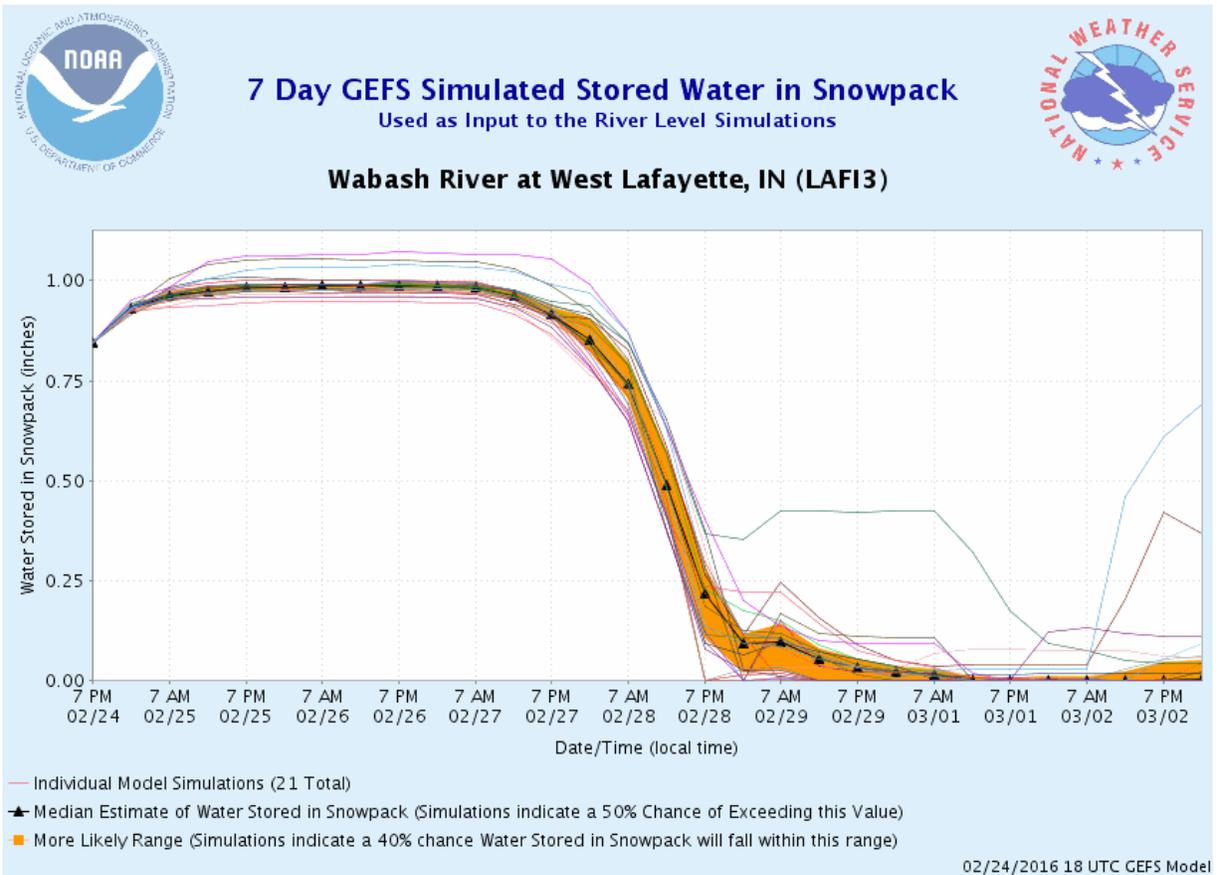


Figure 5. This figure is an example of the CHPS graphic capability from this service.