

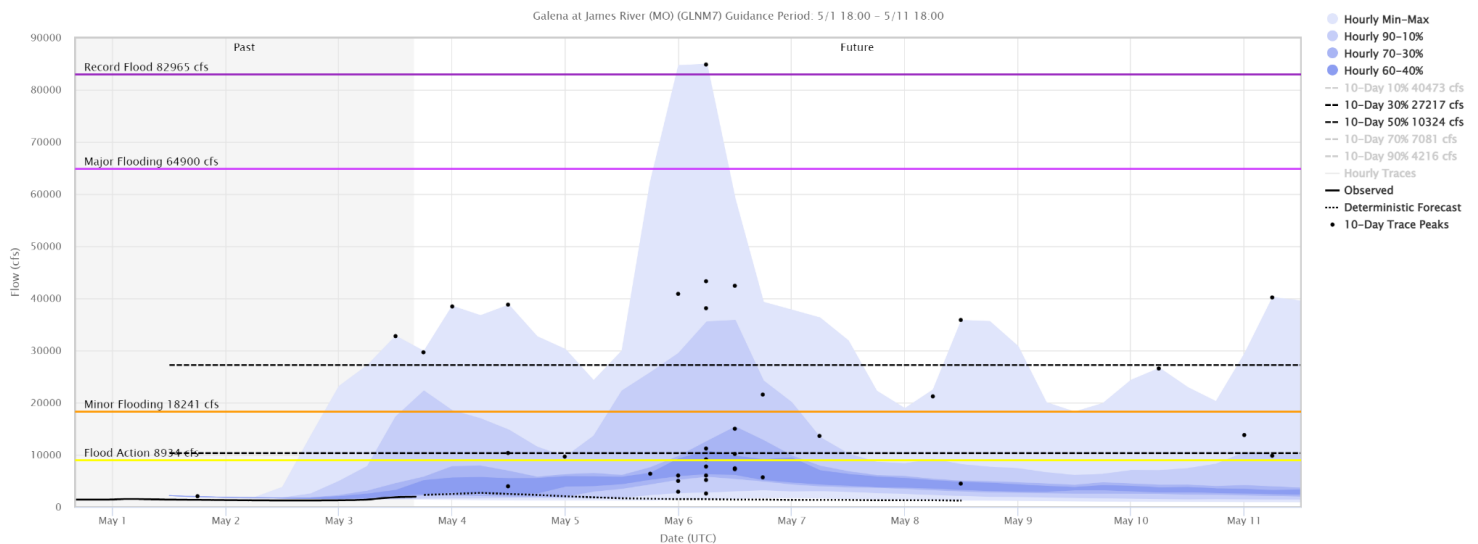
How to Interpret HEFS Forecasts

The Western Regions RFC's have collaborated on a common format to the short-range HEFS forecasts. These forecasts can help increase situational awareness during flood events by presenting a range of possible outcomes and their probabilities.

Many of the elements in the HEFS images shown below were designed based on a nationwide 2-year social science study conducted by OAR and The Nurture Nature Center.

NOTE : The website is still “under-construction.” Interpretive guidance will be updated as work progresses.

After clicking on a forecast location on the map a thumbnail image will appear. To see the full hydrograph click on the three line icon (≡)



Ensemble Hydrographs

Forecast hydrographs (ensemble members or traces) created by HEFS begin at the same point, which is the most recent observation on the river. The hydrologic model is initialized with the latest simulated ground conditions (model states), and is run with an ensemble of meteorological forcings to produce different hydrologic simulations. Individual ensemble members can be toggled on/off by clicking on the legend

The time step of the ensemble above is 6 hours, but the timestep could be shorter depending on the issuing RFC. The probabilities displayed in color on the graph are the chances for exceeding a certain stage or flow **at that hour**.

The 10-day 10%/30%/50%/70%/90% lines can be toggled on/off in the legend. These lines indicate the chance of exceedance for the **entire window**. The black dots are the peak flow values for each individual ensemble member (trace).

This becomes important when considering a question like “What’s the chance of exceeding flood stage in the next 10 days?”

Legends

The readout of hourly probabilities will display when the mouse is hovering over the HEFS forecast display.

Hourly probabilities – The shadings can also be considered as “confidence bands”:

- **min-max** : All of the values fall within the shaded bands. The values in the upper light blue bands comprise the 10% largest values, and those in the lower light band band comprise the 10% smallest values
- 80% of the values fall within the next darker blue bands. They are within the **90-10%** chance range.
- 40% of the values fall within the third shade of blue bands. They are within the **70-30%** chance range.
- 20% of the values fall in the darkest shading. The values are within the inner **60-40%** chance band and are nearest the median values at that hour.

Exceedance Table

Galena at James River (MO)
10-day Chance of
River Flow Exceedance

Guidance Period:
5/1 18:00 - 5/11 18:00

10%	40473 cfs
30%	27217 cfs
50%	10324 cfs
70%	7081 cfs
90%	4216 cfs

MINOR

ACTION

The exceedance table is a quick way to get an estimate of the numeric value of the probability of flooding (or exceedance of another threshold) **over the entire time period** of the displayed window. This probability may be higher than a quick visual estimation based on the hourly ensemble shading.

In the example on the right, the Minor line indicates there is about a 40% chance of reaching a minor flood stage in the next 10 days.

The ensemble display has an adjustable time window. Currently the window can be viewed at 5, 10, 15 or 20 days. The “Forecast Period” dropdown menu is used to change the time window.

Making Sense of Uncertainty

For more information on the social science behind these graphics and the 2-year study conducted in collaboration with NWS WFO’s and RFC’s see:

<https://nurturenaturecenter.org/wp-content/uploads/2021/08/Making-Sense-of-Uncertainty-2020FI-NAL-1.pdf>