

Hydrologic Probabilistic Forecasting Overview

The Forecast Uncertainties:

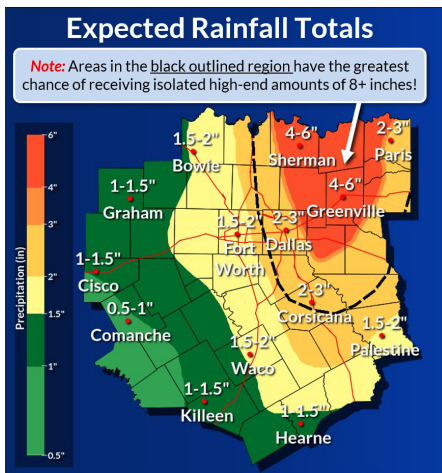
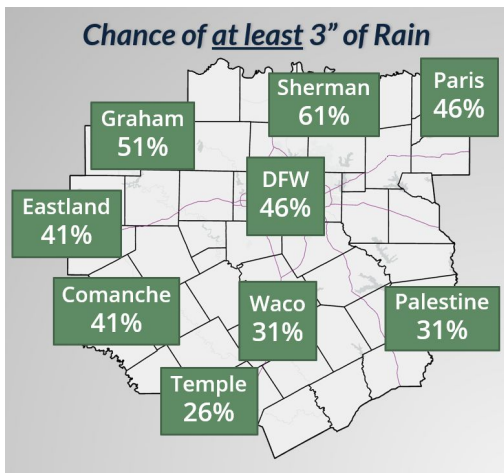
- 1) Rainfall: How Much? When? Where?
- 2) How will water runoff flow once in creeks and rivers?

The answer to both of these uncertainties:

- Run computer models with slightly different settings over a hundred times to produce probabilities of rainfall at each point. Then those rainfall probabilities are used to create different riverine scenarios.

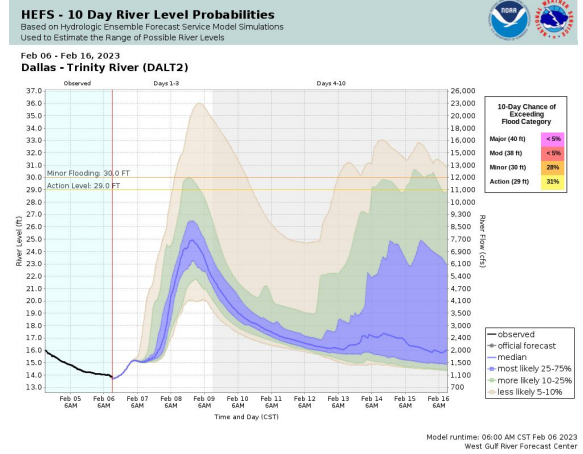
With probability forecasts one can appropriately prepare for a range of outcomes and determine forecast confidence.

WFO Fort Worth may communicate probabilities of rainfall amounts in a couple ways. Both of these can be used to prepare for flash flooding related impacts.



See slide 3 on interpreting probabilistic graphicast handouts for more information.

The West Gulf River Forecast Center is creating flood probabilities at river forecast points.



See next slide for information on these graphics!

Probabilistic River Forecasts

How to View Probabilistic River Data:

From the standard AHPS river heights page...

1. Mouse over the *Probability/Information* tab at the top right
2. Click *Short-term Probabilistic Guidance (Experimental)*

National Weather Service
Advanced Hydrologic Prediction Service

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National Observations WFO Observations Hydrograph

Visit <https://www.weather.gov/owp/operations> for access to new EXPERIMENTAL products and services from the National Water Center: 1 Area Hydrologic Discussion, Flood Hazard Outlook and the National Water Center Visualization Services, a suite of geospatial products from the National Water Model simulation.

View the Enhanced Operating Capability Products and Services StoryMap here

Weather Forecast Office Fort Worth, TX West Gulf River Forecast

Hydrograph River at a Glance Download Inundation Mapping Probability Information

Auto Refresh: OFF

Weekly Chance of Exceeding Levels
Chance of Exceeding Levels During Entire Period
Short-term Probabilistic Guidance (Experimental)

TRINITY RIVER AT DAL
Universal Time (UTC)

192 192 192 192 192
Jan 28 Jan 30 Feb 1 Feb 3 Feb 5

Latest observed value: 32.54 ft at 12:00 PM CST 7 Feb 2023. Flood Stage is 30 ft

Stage (ft)

Flow (cfs)

Site Time (CST)

Graph Created (15:09P Feb 7, 2023)

Observations courtesy of US Geological Survey

Printable Image
About this graph
Tabular Data (UTC)
Tabular Data (CST)

EWAS
RSS
Data: NGVD83
Metadata

NOTE: River forecasts for this location take into account past precipitation and the precipitation amounts expected approximately 24 hours into the future from the forecast issuance time.

NOTE: Forecasts for the Trinity River at Dallas are issued as needed during times of high water, but are not routinely available.

Default Hydrograph

Return to Area Map

How to read probabilistic river forecasts

Observed height in solid black

Median (or middle of all forecasts not the average) is the solid blue line

Probability of river heights are given by color shading. In this case, there is a >10% of minor flood stage being reached Feb 8th.

Forecast certainty (or confidence) can be inferred by the spread of the shaded colors. A shorter and narrow range like on Feb 12th means higher confidence, but the tall and fat ranges on Feb 14th are lower confidence forecast.

HEFS - 10 Day River Level Probabilities

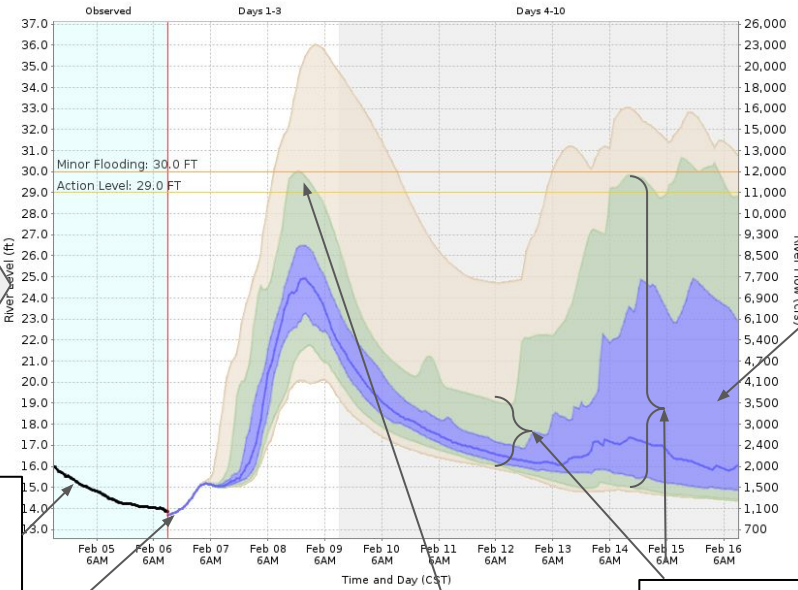
Based on Hydrologic Ensemble Forecast Service Model Simulations
Used to Estimate the Range of Possible River Levels

Feb 06 - Feb 16, 2023
Dallas - Trinity River (DAL2)

Forecasts always go out **10 days!**



Table quickly shows chance of flood category exceedance in the next 10 days



10-Day Chance of Exceeding Flood Category

Major (40 ft)	< 5%
Mod (38 ft)	< 5%
Minor (30 ft)	28%
Action (29 ft)	31%

Blue shading represents the middle 50% of probability spectrum. In other words the river will be inside this range 50% of the time with it being lower 25% of the time or higher 25% of the time.

Legend

- observed
- official forecast
- median
- most likely 25-75%
- more likely 10-25%
- less likely 5-10%



What's Changing?

The National Weather Service is incorporating a probabilistic approach to forecasting, especially when high impact weather is possible, in order to better prepare users for potential forecast outcomes.

What is a Probabilistic Forecast?

This is a forecast that communicates a **range** of a certain parameter, such as temperatures, rain amounts, snow amounts, etc. OR a probability of reaching a **certain threshold** for a parameter, such as a percent chance of dropping below freezing (32°F).

We will also message probabilities when messaging the timing of certain weather events (i.e. earliest possible onset vs. expected onset), as well as the **likelihood of different scenarios** occurring.

Different Scenarios

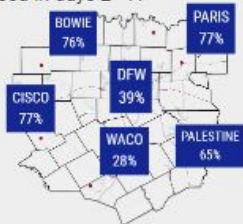
- A *Most Likely Scenario* will be displayed alongside a *Less Likely Scenario*.
- Numbers will include the percent chance of the "Less Likely Scenario" occurring.
- Used 5 to 7 days out, when uncertainty is **HIGH**.
- The potential impacts will be explained in both scenarios.

Most Likely Amounts

- Instead of displaying a single point value, the "most likely" amounts will display a range of the potential amounts, i.e. "1-3 inches of snow".
- Unless stated otherwise, ranges are calibrated so that 50% of the time the actual values will fall within the forecast range.

Probability of a Certain Value

- A percentage will be shown, typically on a map, that depicts the chance of reaching a certain threshold of a parameter.
- The thresholds will be chosen based on what the forecaster believes will be beneficial to decision making.
- Primarily used 3 to 4 days out, but will be used in days 2 - 7.



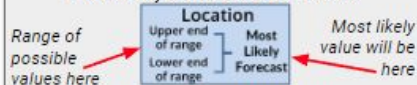
High-End Amounts

"Reasonable Worst Case"

- Used primarily 2 to 4 days out. Very little use in 0 - 2 days, unless we see a rapidly changing forecast that we need to highlight/message.
- High-end amounts will be shown
 - To the public: in a worded format to avoid confusion.
 - To core partners: in a map format with explicit wording that it isn't the official forecast.
- An emphasis will still always be placed on the most likely forecast!
- These values have a **VERY low (10%) chance of occurring**, but we will message these to provide context to what you should be prepared for!

Range Forecast

- Primarily used 3 to 7 days out, when uncertainty is **MEDIUM to HIGH**.



- This will be **CORRECT** only 50% or 80% of the time, which will be mentioned on the graphic.
- Ex: We know it will be cold, but we aren't sure *how* cold. The forecast low one night could be 7° or it could be 29°, but it will most likely be 21°. The impacts would differ widely, so we want to **highlight this!**

