



*The Marriage of
Emergency
Managers
&
Meteorologists*



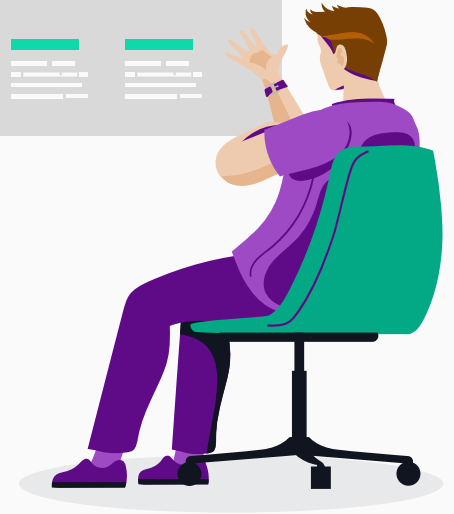
Probabilistic Forecasts & Messaging: What to Know

Madi Gordon - NWS Fort Worth



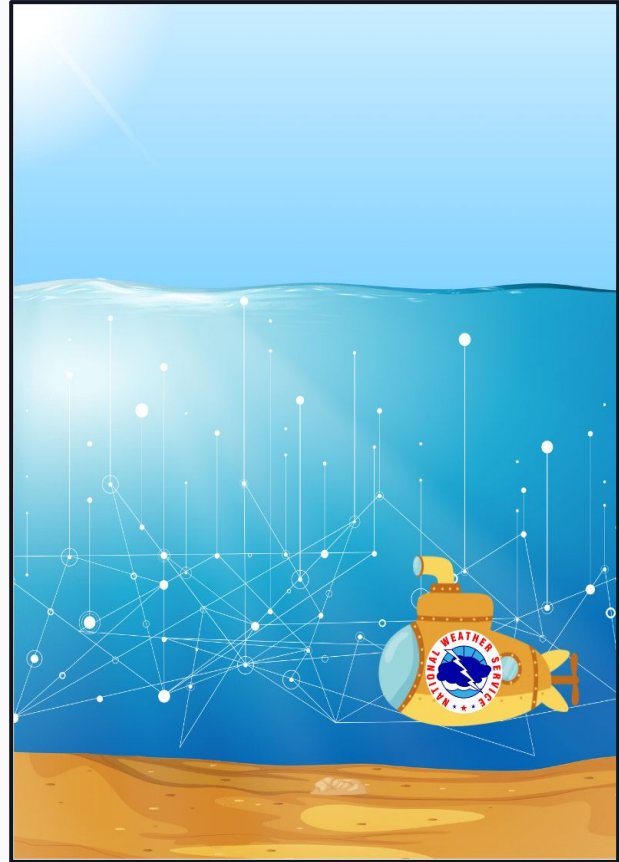
01

Probabilistic Overview

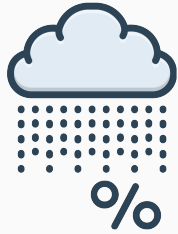


An “Ocean” of Data

More computing power has allowed the NWS to improve weather modeling and improve the state of weather forecasting.



Probabilistic Forecasts: A Rundown



Provides multiple potential outcomes and assigns a likelihood of each occurring.

- Using probabilities to make decisions means that over multiple scenarios, the correct decision will be made more often than not



What to Be Aware Of

Percentages don't always mean a chance for rain!

- If you're scanning a graphic and see a percentage, it's vital you take in all of the context.



Probabilistic forecasts are meant to be decision tools, not a fortune telling machine!

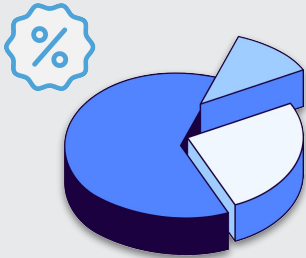


Forecast Confidence

Is There a “Correct” Definition?

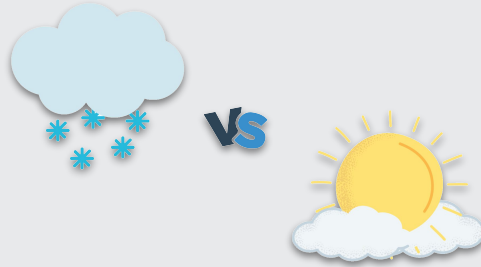
...There’s *multiple!*

Statistical



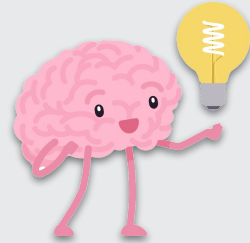
“There is a 90% chance (high confidence) in at least 1 inch of rain”

Hazard Event or Not?



“There is high confidence in receiving snow at your location”

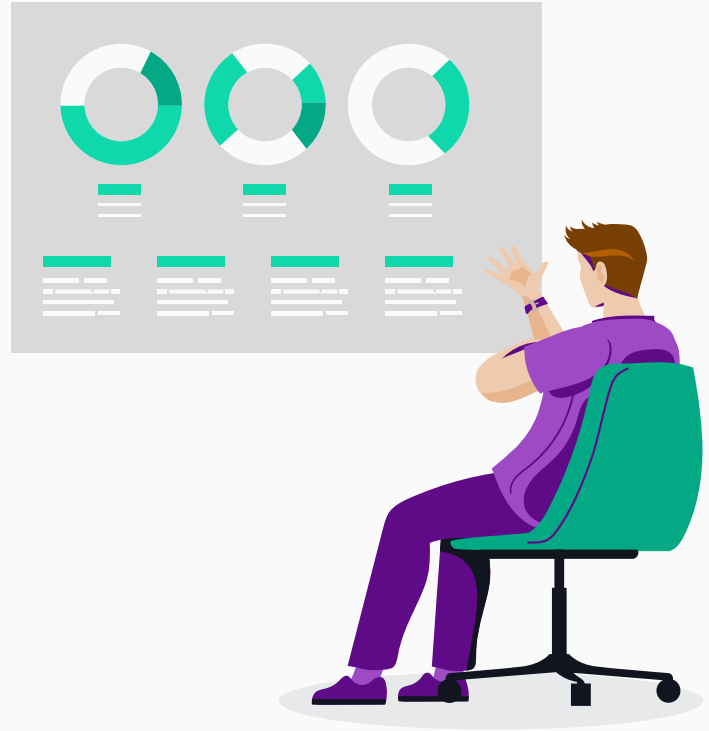
Forecaster’s Experience



“Given this weather pattern, we have high confidence in a flood”

02

Messaging Strategies



Chance of a Certain Threshold

Mid-Week Rainfall Potential

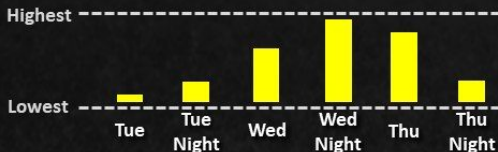
Weather Forecast Office
Fort Worth, TX
Issued October 2, 2023 6:22 AM CT

A cold front will bring multiple rounds of showers and thunderstorms to the region late Tuesday through Thursday.

Heavy rain could result in isolated instances of flash flooding.



When are the highest rain chances?

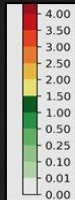


Will there be severe storms?

We cannot rule out a few strong storms capable of gusty winds and hail. But, organized severe weather is unlikely.



Average expected rainfall totals (Tue - Fri)



Most likely area for minor flooding to occur.

30% chance of 3+ inches



- Depicts percent chance of meeting or exceeding a certain value for a weather parameter.

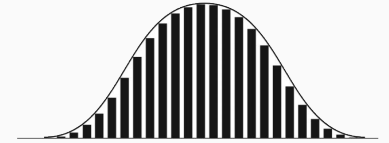
- Often displayed with the **most likely** value.



What to Be Aware Of

Always know the most likely forecast for vital context!

- Try not to anchor yourself in the threshold you see.



When your chance (%) of a certain threshold is high...

- The most likely forecast could be **significantly higher** than the threshold shown!

For instance... let's say you have a 90% chance of at least 1 inch of snow. Your most likely snow accumulations would likely be closer to 2-4 inches!

Alternate Scenarios

- Often displayed as two separate maps. These are “snapshots” of the same time, but different forecast outcomes.
- In some situations, we can message two distinct scenarios that could occur.
- This will often be displayed with the **most likely** value also on the graphic.

Tuesday: Cold Rain Expected

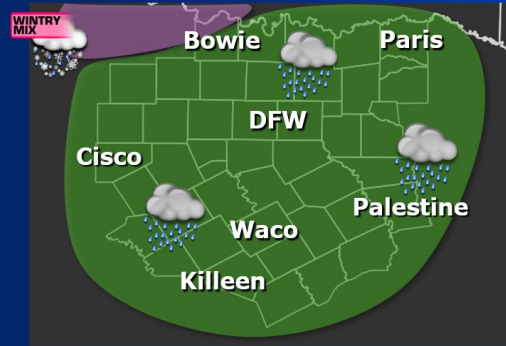
Weather Forecast Office
Fort Worth, TX

Issued November 28, 2023 3:24 PM CT



A Rain/Snow Mix is Possible, But Less Likely

Most likely Scenario

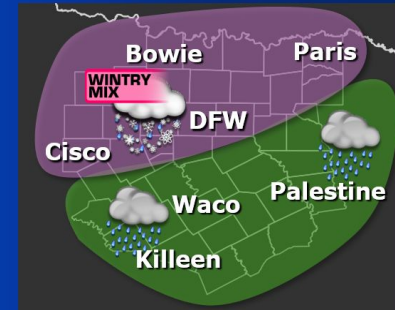


- An approaching system will bring a cold rain across the region.
- Rain/snow mix potential will remain across Oklahoma.

Less likely Scenario

1 in 3 chance of occurring

- Snow begins to mix in with the ongoing rain.
- Surface temperatures above freezing are likely. No impacts are expected.



Alternate Scenarios

- Used in extended forecasts when confidence is low, but model forecasts are grouped into different scenarios.
- Allows communication of lower probability, worse case scenarios.
- Most likely scenario will be visually emphasized.
- Scenario probability can be displayed in percent chance or fractional odds.

Tuesday: Cold Rain Expected

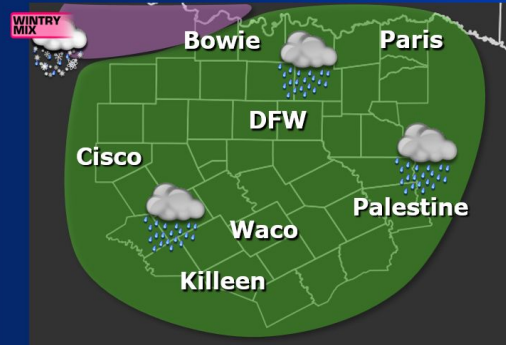
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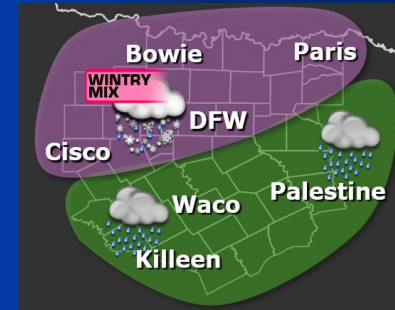


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What to Be Aware Of

- The percentage is actually showing the likelihood of the *scenario* occurring.
- Scenario percentages are not a chance of precipitation!
 - ◆ NWS Fort Worth will use fractional odds to reduce potential confusion
- Messaging will be broad, highlighting the potential for different impacts.



Range Forecasts

- Displayed as brackets that show a range of potential values as well as the most likely value for an upcoming event at a specific location during a set time frame.
- **Values can still fall outside of the range.**
- The size of the range can give you an indication of how **statistically confident** the forecast is.

Potential Winter Event

Weather Forecast Office
Fort Worth, TX
Issued November 29, 2023 1:04 PM CT

What to Expect

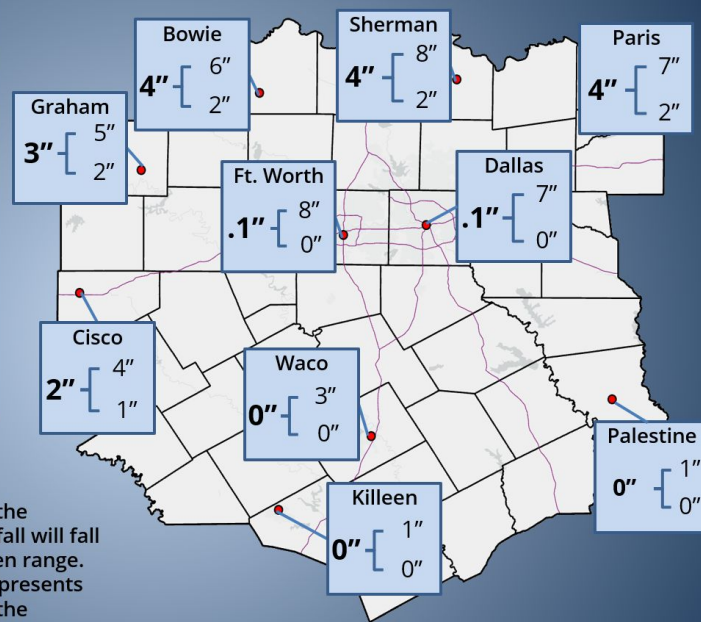
A strong winter system will bring snow, upwards of 4", to North Texas.

Timing

Beginning	Monday afternoon
Peak	Monday Night
Ending	Tuesday afternoon

Location	Most Likely Forecast	Range Forecast
Graham	3"	2" - 5"
Bowie	4"	2" - 6"
Sherman	4"	2" - 8"
Paris	4"	2" - 7"
Ft. Worth	.1"	0" - 8"
Dallas	.1"	0" - 7"
Cisco	2"	1" - 4"
Waco	0"	0" - 3"
Killeen	0"	0" - 1"
Palestine	0"	0" - 1"

80% of the time the amount of snowfall will fall between the given range. A wider range represents less certainty in the forecast.



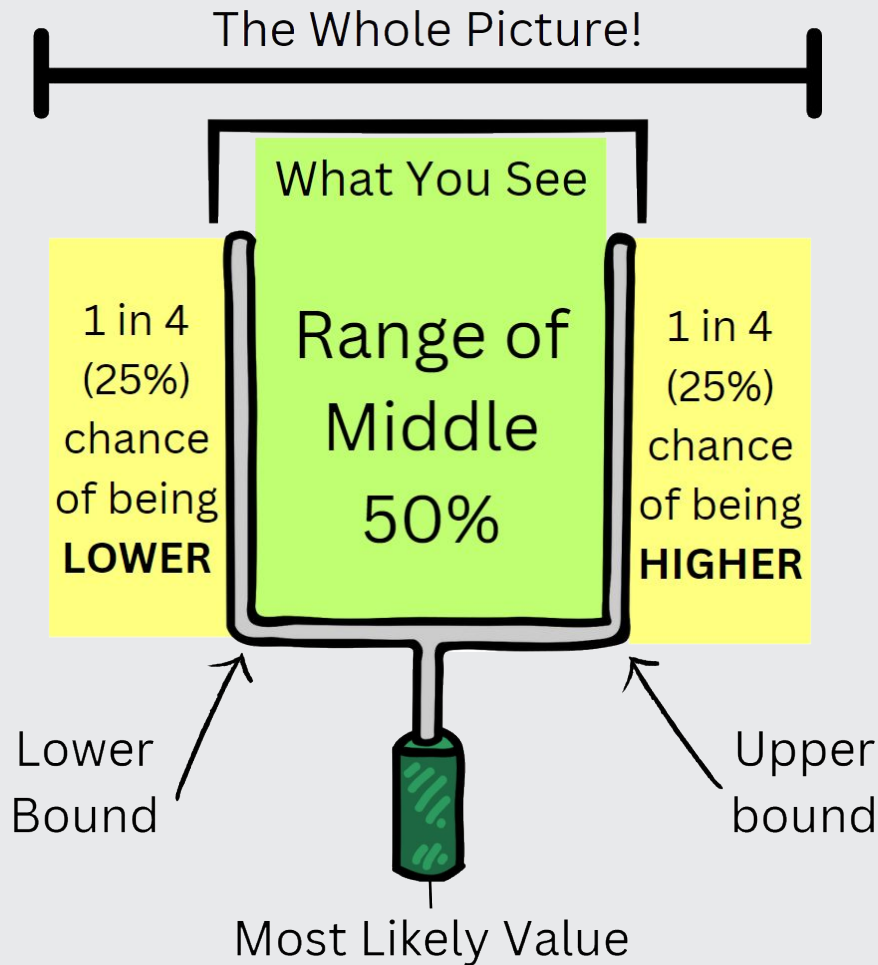
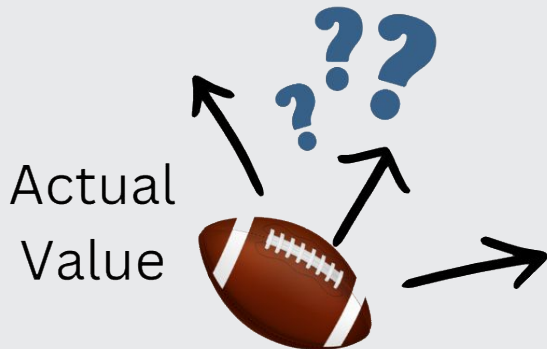
Range Forecasts

Ft. Worth

2" { 5"
1"

The legend states "50% of the time the value will fall between the given range..."

So, what does this mean?





What to Be Aware Of

Range forecasts are only for one time and at one location!

- Does not directly show you uncertainty *across an area* nor *across time*.
- Range forecasts for temperatures look like high and low temperatures at first glance to many people.
 - ◆ NWS Fort Worth is no longer displaying temperature ranges in this fashion due to confusion

Forecast “Extremes”

- **High end amounts:** Shows a reasonable worst case to prepare for
- **Low end amounts:** Shows the *at least* amount to expect.
- Displayed in various ways, but most often as written text. When possible, we'll outline an area of the CWA with the greater threat for these values occurring.

Much Colder Temperatures Thursday

Weather Forecast Office
Fort Worth, TX

Issued November 29, 2023 1:04 PM CT



FRIGID



A strong cold front will arrive on Thursday. Temperatures will fall into the teens and 20s, but we aren't quite sure just how cold it will get.

Wind chills will be in the single digits & teens with strong north winds!



Low Temperature Scenarios

Metroplex Area

Most Likely **21°**
Low Temperature

7° It could be colder than forecast. We have a **10% chance of being this cold**

Central TX Counties

Most Likely **24°**
Low Temperature

11° It could be colder than forecast. We have a **10% chance of being this cold**

Rural Northwest Areas

Most Likely **17°**
Low Temperature

4° It could be colder than forecast. We have a **10% chance of being this cold**

High End Amounts

- Messaged primarily for EMs as a way to enhance decision making.
- These values only have a 10% chance of occurring.
- If we have high confidence in these values occurring, we just aren't sure where exactly, an area on a map will be outlined with an "isolated (10%) coverage of XX" annotation.

Heavy Rain & Flooding Potential Late Wed into Thursday

Weather Forecast Office
Fort Worth, TX
Issued October 3, 2023 3:59 PM CT

Widespread showers and storms expected Wednesday afternoon through Thursday morning.
Heavy rain will result in **isolated flash flooding**.

What you should do?



Prepare to take an alternate route if in a flood prone area.



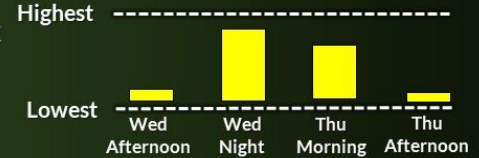
Do not drive through flooded roads!
You don't know how deep it is, especially at night! The road could be washed out!



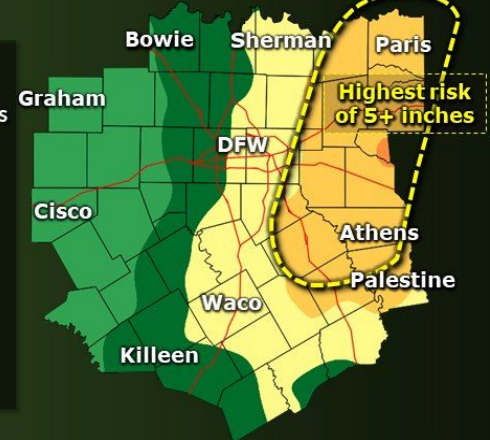
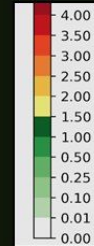
Plan for interruptions to outdoor activities.

NWSFortWorth

Flood Risk Timing



Average expected rainfall totals



weather.gov/fortworth



What to Be Aware Of

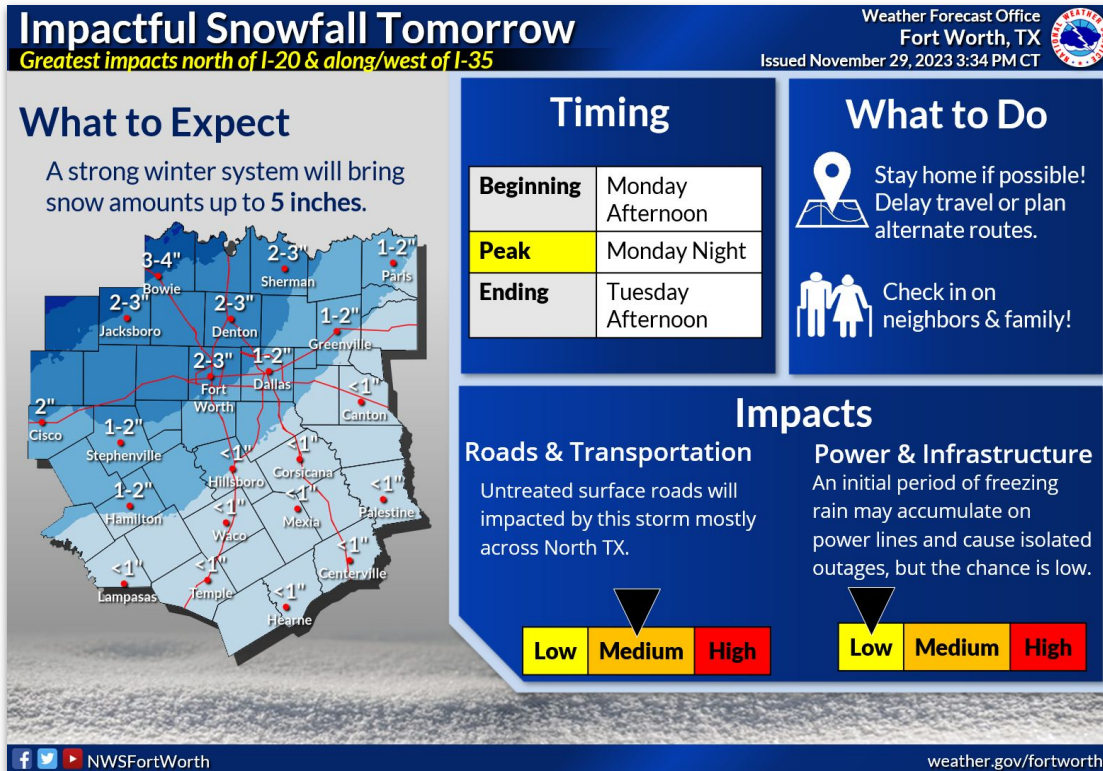
Forecasters may message this in certain ways depending on their confidence:

“isolated (10% coverage) of XX amounts” when forecast confidence in the event is **higher**

“a few areas may receive XX amount” when forecast confidence in the event is **lower**

Most Likely Amounts

- Using ranges allow easy communication of the most likely range.
- Often used for snowfall maps.
- The range of potential amounts typically gets smaller the closer to the event (and statistical confidence increases).

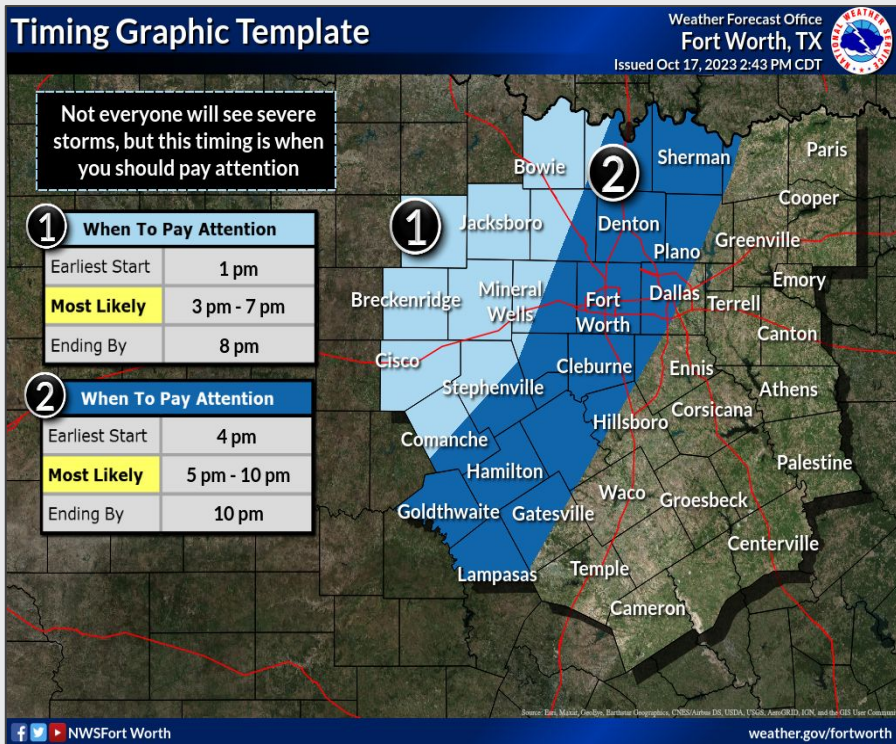


Graphics Update

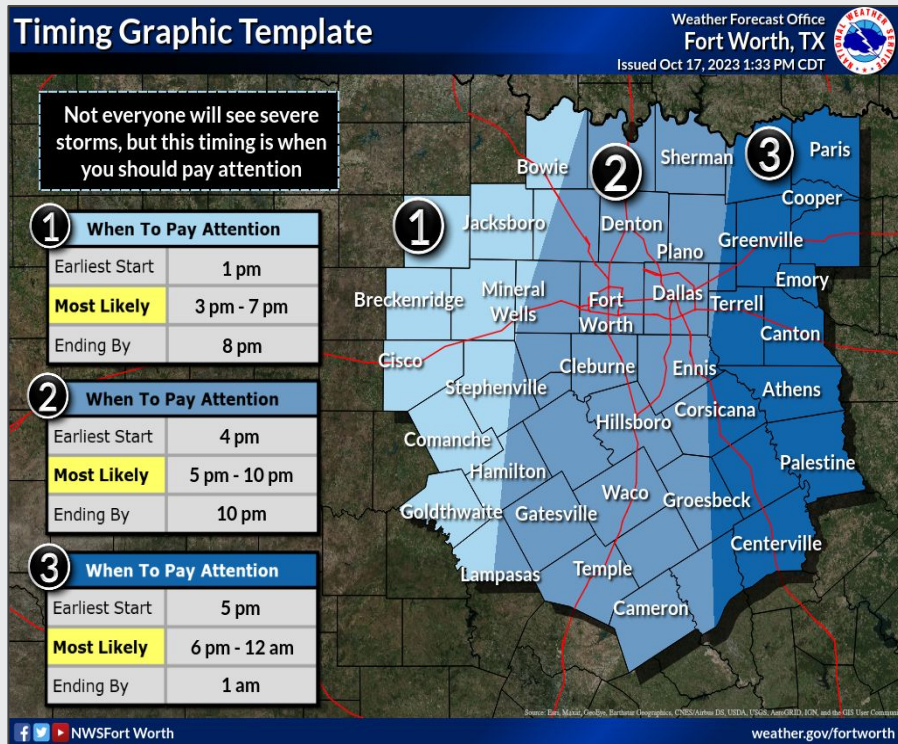


New Graphics - Timing

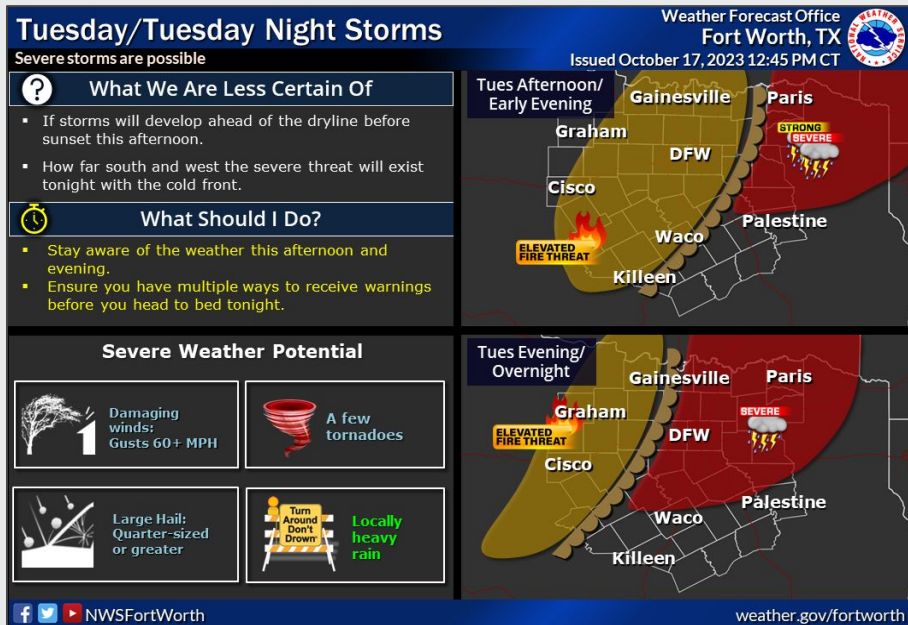
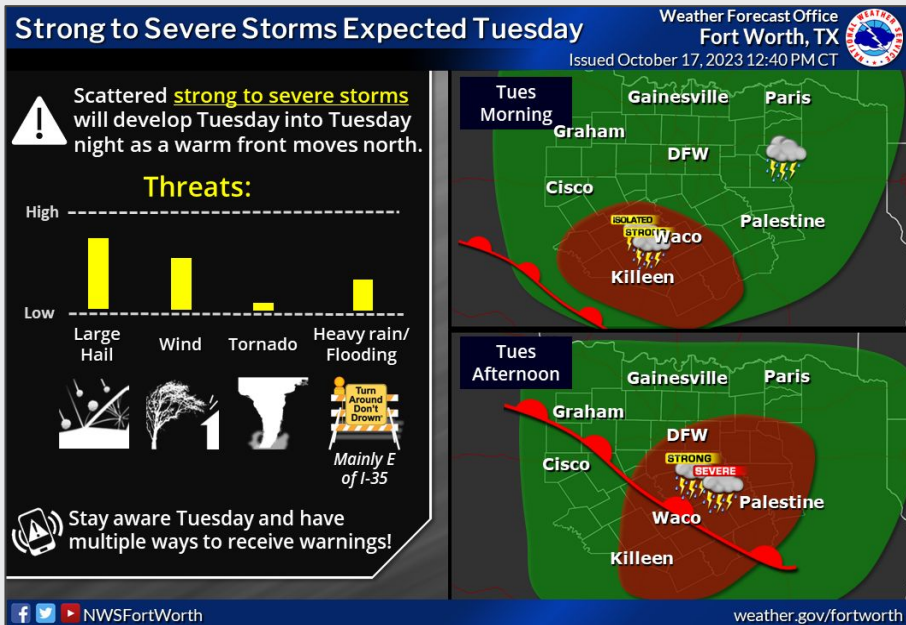
Timing Graphic Template



Timing Graphic Template



New Graphics - Timing



Reminder: NWS Fort Worth typically doesn't put the SPC category, category names or use the same SPC color scale on our graphics. The areas should match, but we focus our graphics more on the **entire threat area** rather than the category. Areas outside the threat area may also see rain or storms, but the main focus will be the severe storm/hazardous threat area.

New Graphics - Timing

Thursday's Severe Timing

- Storms will develop ahead of and along a fast-moving cold front. Some of the storms will be severe.
- The greatest potential for severe weather is in East Texas during the evening hours.

Threats:



Damaging Wind Gusts



Tornadoes



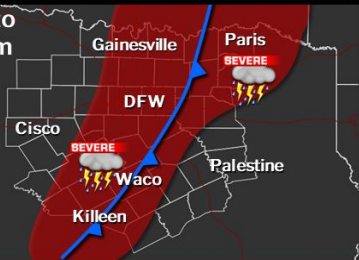
Large Hail

12 pm to 4 pm

Weather Forecast Office
Fort Worth, TX
Issued October 17, 2023 12:18 PM CT



4 pm to 10 pm



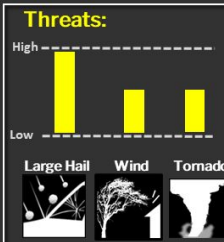
NWSFortWorth

weather.gov/fortworth

Sunday Storms: Timing And Hazards

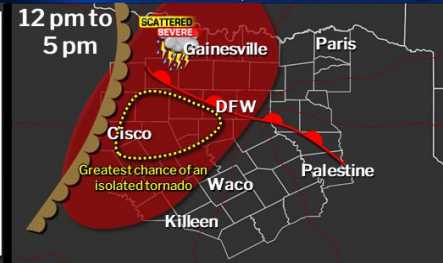
Numerous showers and scattered storms increase this afternoon into the evening hours east of a surface dryline.

Strong to severe storms are expected, some with heavy rainfall. All hazards possible, including flooding.

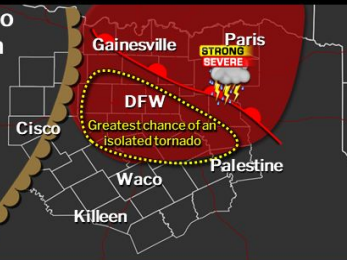


12 pm to 5 pm

Weather Forecast Office
Fort Worth, TX
Issued October 17, 2023 12:18 PM CT



3 pm to 7 pm



NWSFortWorth

weather.gov/fortworth

6 pm to 10 pm



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New Graphic Styles

Severe Weather Potential Thursday

Weather Forecast Office
Fort Worth, TX
Issued November 29, 2023 4:02 AM CT

A few strong to severe thunderstorms will be possible late Thursday morning through Thursday afternoon across eastern Central Texas and the Brazos Valley.

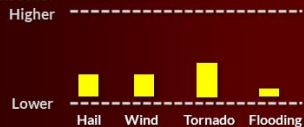
Isolated tornadoes, damaging wind gusts and small hail will be possible.

What has changed?

- The potential for tornadoes across the Brazos Valley has increased.

Timing: 11AM – 6PM Thursday

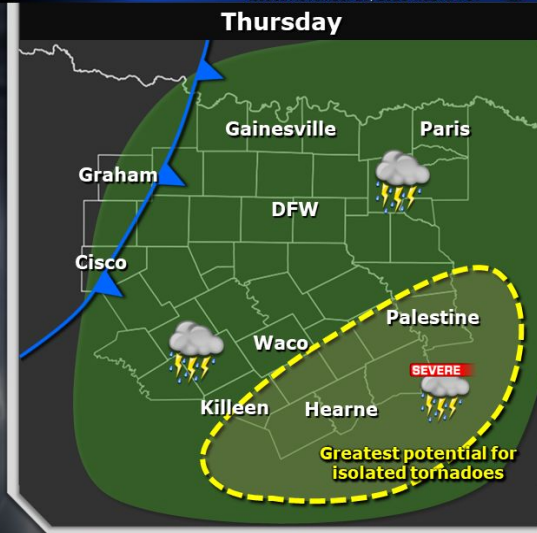
Threats:



Have multiple ways to receive weather alerts!

NWSFortWorth

weather.gov/fortworth



Monday Night: Bundle Up!

Another Cold Night

Weather Forecast Office
Fort Worth, TX
Issued November 26, 2023 3:28 AM CT

Temperature drop to or below freezing for much of the region



- Timing: Monday night in to Tuesday morning
- Bring pets indoors
- Shut off sprinklers
- Keep flammables at least 3 feet from space heaters
- Remember to protect the 4 Ps: People, pets, pipes and plants

NWSFortWorth

weather.gov/fortworth

