

HeatRisk - Overview

The experimental National Weather Service (NWS) HeatRisk is a color-numeric-based index that provides a forecast of the potential level of risk for heat-related impacts to occur over a 24-hour period. That level of risk is illustrated by a color/number along with identifying the groups potentially most at risk at that level. Each HeatRisk level is also accompanied by recommendations for heat protection and can serve as a useful tool for planning for upcoming heat and its associated potential risk. Based on the NWS high resolution national gridded forecast database, a daily HeatRisk value is calculated for each location from the current date through seven days in the future.

HeatRisk serves as another NWS tool that can be used to protect lives and property from the potential risks of excessive heat, being especially useful for those who are more easily affected by heat or those who provide support to those communities of heat-vulnerable individuals. We know that weather extremes generally affect historically underserved vulnerable communities the most, and HeatRisk ensures that communities have the right information at the right time to be better prepared for upcoming heat events. HeatRisk has been available in the Western United States since 2014 and was expanded across the contiguous United States in 2024.

Who is most susceptible to heat?

Extreme heat can make everyone uncomfortable, but heat commonly affects certain groups, typically identified as heat-sensitive or heat-vulnerable, at lower thresholds than other populations. These groups face a higher risk of heat-related illness and negative impacts than others. Some of these groups include:

- The elderly and the very young
- People experiencing homelessness
- Those on certain medications and/or those with pre-existing conditions which make them more sensitive to heat (your doctor can let you know if this is you)
- Those working outdoors – especially new workers, temporary workers, or those returning to work after a week or more off, along with workers working indoors in a non-cooled space
- Those exercising or doing strenuous activities outdoors during the heat of the day - especially those not used to the level of heat expected, those who are not drinking enough fluids, or those new to that type of activity
- Those without a reliable source of cooling and/or hydration - this includes otherwise healthy individuals who are attending outdoor activities and are exposed to the heat and may not recognize the early symptoms of heat stress
- Those not acclimated to the level of heat expected - especially those who are new to a much warmer climate
- Those sensitive to poor air quality, which can be exacerbated by heat waves
- Those living in low income communities
- Some economic sectors are also affected by increasing levels of heat, such as energy and transportation

Why is this different from the Heat Index, Wet Bulb Globe Temperature, or official NWS Heat Products?

The NWS has [multiple tools](#) to assess the potential for increased heat stress due to extreme temperatures. Each tool can inform the issuance of NWS official heat watches, warnings, and advisories. Each of these tools integrate various weather parameters to provide a deeper level of information beyond what the actual air temperature can tell you. Because of that, each tool provides a different perspective and should be used appropriately to get the best understanding of the risk from an excessive heat event.

The biggest difference between the HeatRisk approach and other approaches is that the HeatRisk identifies unusual heat (defined as the warmest 5% of temperatures) specifically for a particular date and location, resulting in daily thresholds that are unique for each location and date. This allows the approach to better account for acclimation (many of us become “used to the heat” and so our thresholds change) and the variation in climatology that we know exists across most regions of the United States. HeatRisk uses a high-resolution gridded climatology to put the forecast into context and also incorporates heat-health data from the CDC to influence the local thresholds and inform the approach.

While the [heat index](#) is a valuable component toward understanding heat risk for people, there just are not an adequate number of stations across the country, particularly in the West, that report hourly humidity values for a long enough period of years to develop a high resolution gridded climatology needed for an approach like HeatRisk. Additionally, in most approaches to heat index warning criteria, the impacts of excessively warm nights are not considered, nor are the impacts from heat over the entire 24 hour period. To get around those limitations, HeatRisk utilizes both the high and low temperatures for a location and compares them to historical values at that location to classify those temperatures that are in the top 5% and above levels identified by the CDC heat-health data as excessive for that climate. The approach also leverages well-known relationships between temperature and dew point to approximate the important role of humidity. So, the HeatRisk approach does factor in humidity, but in a more general sense. Because of these important differences in approaches, HeatRisk’s 24-hour based output will differ somewhat from specifically calculated heat index values.

The [Wet Bulb Globe Temperature](#) (WBGT) is another useful index that measures heat stress in direct sunlight, taking many factors into account. If you work or exercise in direct sunlight, this can be a good index to monitor. Like HeatRisk, it also is a multi-color numeric index that provides precautionary actions that can be taken at the various predicted values. While useful for the active person conducting strenuous activities in direct sunlight, WBGT may be less useful as a universal measure for heat risk, especially for the heat-sensitive whose thresholds are much lower, for the homebound without effective cooling methods where the impacts of accumulated heat inside buildings is important, and the output (in degrees of temperature) can be confusing as they are cooler than the Heat Index (also in degrees of temperature). It also can be quite challenging to accurately predict WBGT beyond the next day or two due to the many factors that need to be accounted for on the local scale.

As mentioned earlier, HeatRisk is an experimental product, which means that there is no guarantee of timely availability and changes may occur without advance notice. *The [NWS’s heat watches, advisories, and warnings](#) remain the official heat products from the NWS.* Forecasts of HeatRisk, WBGT, and Heat Index are available to supplement these official NWS heat products and one or more of these may be particularly suited for a person’s particular needs.

As the newest addition to the suite of heat-related tools the NWS provides, HeatRisk provides additional information that can be used to better identify those days of the year when heat may be at levels that pose a risk to certain populations or economic sectors. For groups who are heat-sensitive, their individual levels of action may be below NWS established heat criteria which are established to warn the entire general population to specific action. Additionally, while methodologies for specific heat product criteria can be different from one NWS office to another, a goal of HeatRisk service is to explore applying a scientific and consistent methodology nationally to provide potential risk from upcoming heat in a uniform manner with output available for any level of heat, not just for the most extreme heat events, over the entire seven day forecast period.