

# NWS-CDC Joint Webinar on Experimental NWS HeatRisk

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# Webinar Logistics

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- This webinar is being **recorded** and will be publicly posted along with the Presentation PDF after the webinar. *By attending this webinar, you consent to the recording of your likeness including voice and/or webcam images.*
    - <https://www.weather.gov/wrn/calendar>
  - All lines will remain muted throughout the presentation.
  - Please use the **Question Box** to ask questions, which will be answered at the end during the Q&A.

# Opening Remarks



**Michelli Mainelli**

Deputy Director  
NWS, NOAA



**Aaron Bernstein,  
MD, MPH**

Director  
NCEH/ATSDR, CDC

# Today's Presenters



**Mike Staudenmaier**

**Division Chief - WRH Science  
and Technology Infusion  
Division, NWS, NOAA**



**Kim McMahon**

**Public Weather Services  
Program Manager, HQ  
NWS, NOAA**



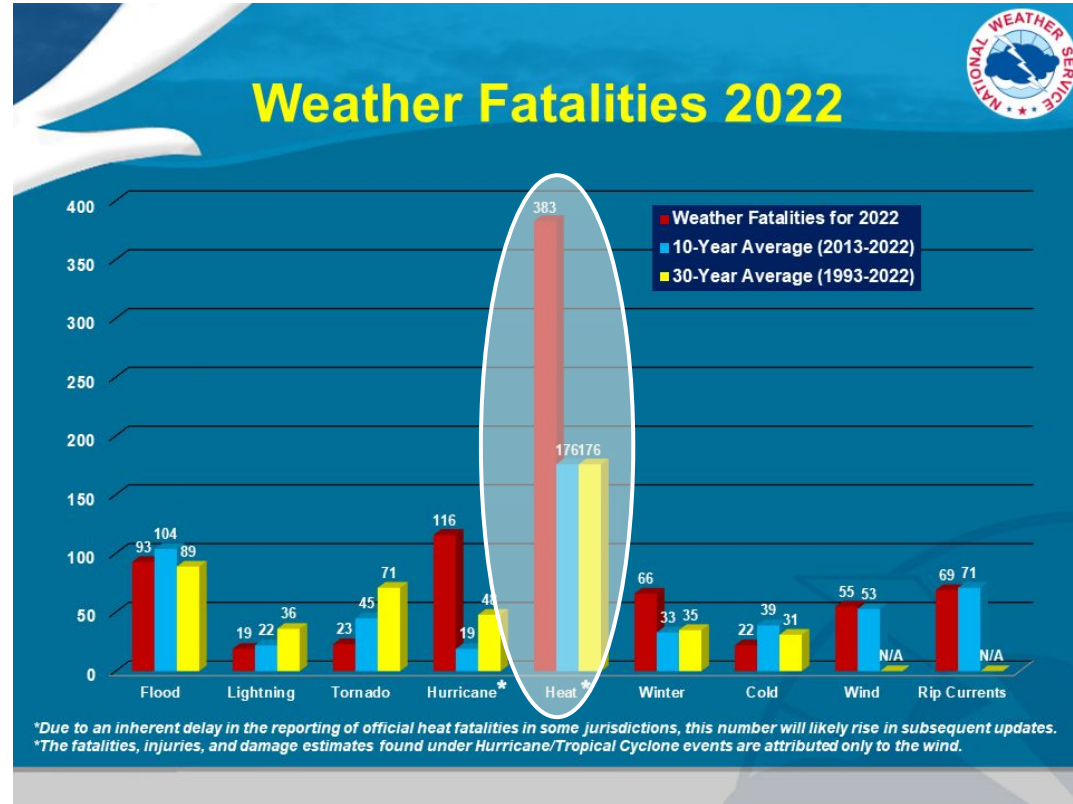
**Ambarish Vaidyanathan, Ph.D**

**Senior Health Scientist - Climate and Health Program,  
National Center for Environmental Health, CDC**



# Why Heat Matters

- Heat is the leading weather-related killer
- 2023 was the warmest year on record, with the top 10 warmest years on record occurring from 2014-2023
- Studies show heatwaves trending hotter, longer, and more frequent with less overnight relief



# Agency Collaboration

CDC and NOAA National Weather Service worked together to develop a service that contextualizes heat forecasts with data relevant public health data.



Climatological  
Temperature Data



Health-based  
temperature thresholds

NWS integrated health-based temperature thresholds that were provided by CDC with local temperature parameters to devise HeatRisk — a numeric and a color-coded system.





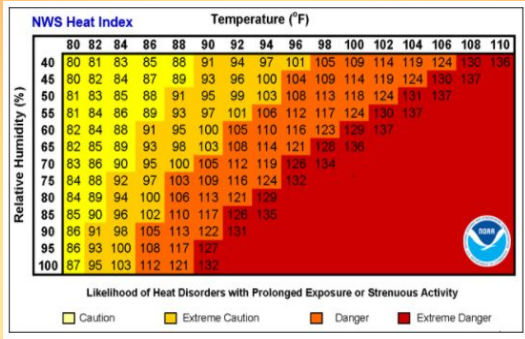
# Who is Most At Risk to Extreme Heat

- Children and Older Adults
- People who are Pregnant
- People with Disabilities
- People with Chronic Health Conditions
- First Responders
- Outdoor Workers
- People exercising or doing strenuous activities outdoors
- People who lack access to cooling
- People who lack housing and/or quality housing
- Pets and Service and Support Animals



# NWS Forecast Tools to Assess Heat

## Heat Index



Heat stress in context for **general public.**

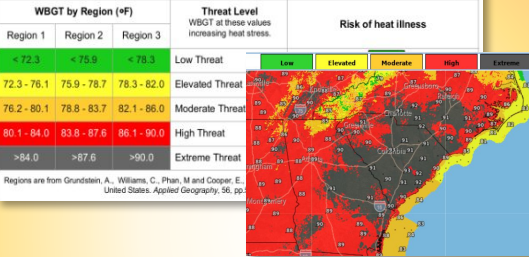
- Relatively simple: T + RH
- Light physical activity in shade



5'7" adult, 147.7 lbs, walking outside at 3.1 mph, wearing trousers and short sleeved shirt

## Wet Bulb Globe Temperature

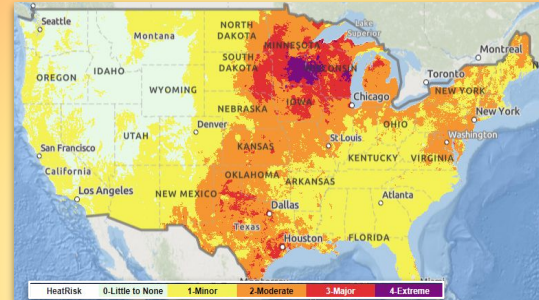
Disclaimer: Always check with local officials for appropriate actions and activity levels. Experienced heat stress will depend upon duration and intensity of activity and personal health and vulnerability.



Heat stress in context for **healthy, active outdoor communities.**

- More Complex: T + RH + wind + solar radiation
- High levels of outdoor physical activity

## HeatRisk (experimental)



Risk of heat related impacts in **climatological context** with CDC heat-health information.

- Impacts-based: MaxT + MinT + CDC heat-health data
- Spectrum of heat-health impacts for *all* populations



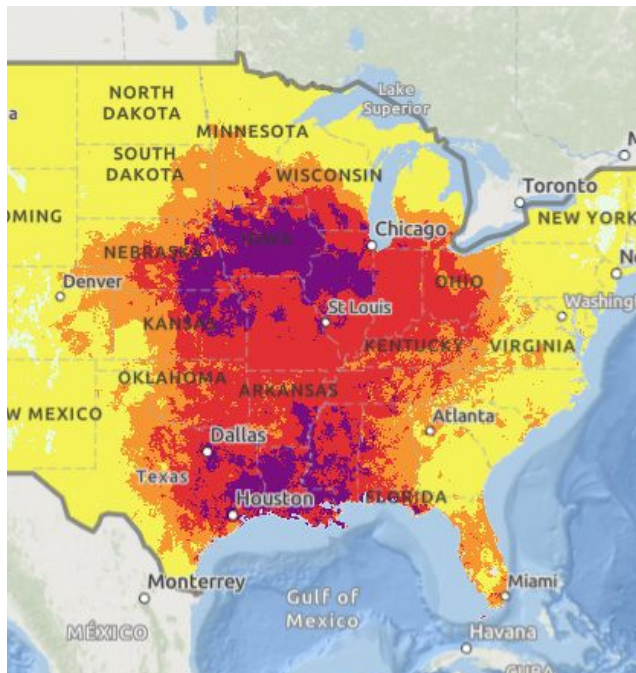


# What is HeatRisk?

A **numeric/color-based heat service** that serves as a **framework** for leveraging peer-reviewed heat-health science and data consistently across the CONUS

| Category     | Risk of Heat-Related Impacts   |
|--------------|--|
| Green<br>0   | Little to no risk from expected heat.  |
| Yellow<br>1  | Minor - This level of heat affects primarily those individuals extremely sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration.  |
| Orange<br>2  | Moderate - This level of heat affects most individuals sensitive to heat, especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and in heat-sensitive industries.                                  |
| Red<br>3     | Major - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat-sensitive industries and infrastructure.  |
| Magenta<br>4 | Extreme - This level of rare and/or long-duration extreme heat with little to no overnight relief affects anyone without effective cooling and/or adequate hydration. Impacts likely in most health systems, heat-sensitive industries and infrastructure. |

Simple Numeric/Color System



Excellent Geographical Coverage

Kind of like AQI...

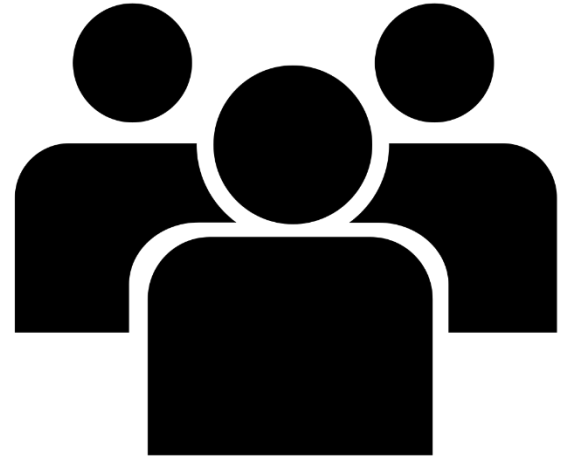


But for Heat!



# HeatRisk Basic Tenets

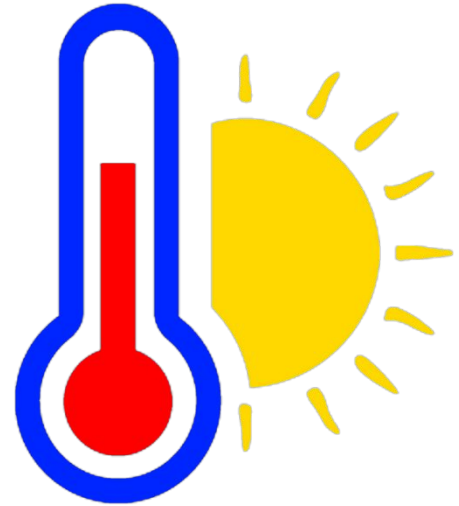
- Communities adapt to their **local climatology**
- **Acclimation** to heat is important
- There is some level where heat is dangerous, **no matter the time of year**
- Everyone has different heat tolerances – **no single threshold works**





# HeatRisk Basic Tenets

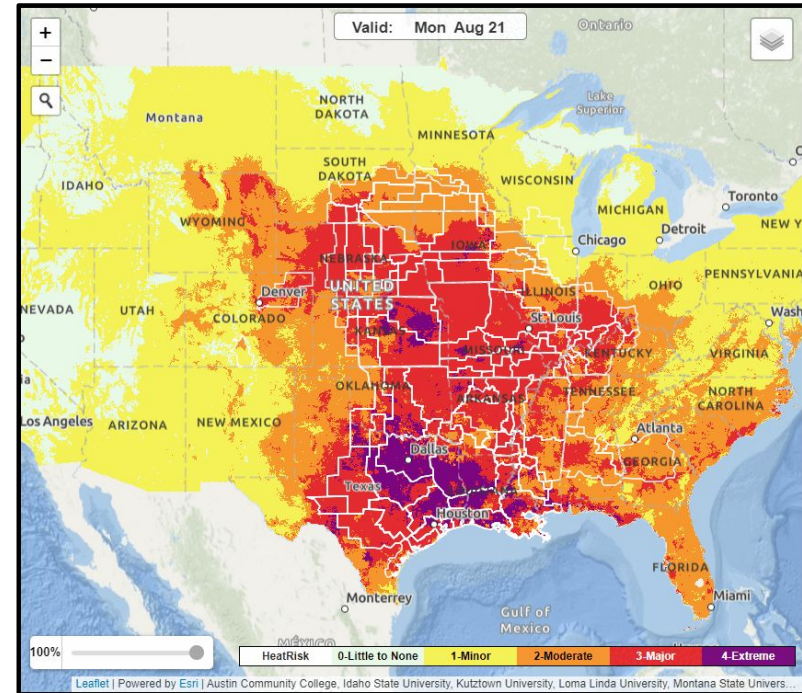
- The **95th percentile** approach is used to identify excessive heat
- Temperature is the **first order driver** for heat impacts
- **Humidity can be roughly estimated** by temperature ranges and min temps
- Framework rules are **applied nationally** to remain consistent



# HeatRisk Considerations

## What does it take into account?

- How significantly above normal high and low temps are for a location (24h period, 7 days out)
- Time of the year
- Duration of unusual heat
- Overnight relief
- If temperatures are at high enough levels to pose an elevated risk for heat complications (based on CDC heat-health thresholds)





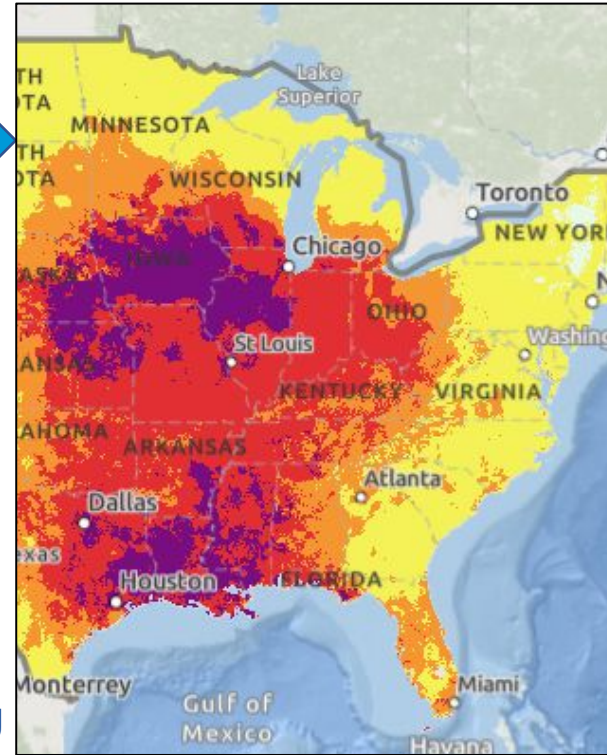
# CDC-NWS Collaboration

| Climate Region | Hospitalization Outcome | Heat-Sensitive Zones with Heat Alert Criteria, by Heat Index Ranges |            |             |              |          |
|----------------|-------------------------|---|------------|-------------|--------------|----------|
|                |                         | <= 80 °F  | 81 - 90 °F | 91 - 100 °F | 101 - 110 °F | > 110 °F |
| Northwest      | All-Causes              |   |            |             |              |          |
|                | All cardiovascular      |   |            |             |              |          |
|                | All respiratory         |   |            |             |              |          |
|                | Diabetes                |   |            |             |              |          |
|                | Fluid and electrolyte   |   |            |             |              |          |
|                | Renal failure           |   |            |             |              |          |

- Heat-sensitive zone
- Heat index ranges at which positively significant peak heat-attributable health risk / burden are observed
- Heat index ranges used for issuing alerts
- Median heat alert criteria

Vaidyanathan, A. et al.. Assessment of extreme heat and hospitalizations to inform early warning systems. *Proceedings of the National Academy of Sciences*, 116(12), 5420-5427.

- HeatRisk v1.0 was based on local/long-term climatology and available at the start of this collaboration.
- CDC-NWS focused on incorporating health evidence and calibrating alert thresholds based on heat-health impact information.







# Data Sources and Analytical Framework



## Code-based (ICD-9 / ICD-10) assessment of heat-related burden

### U.S. Standard Certificate of Death

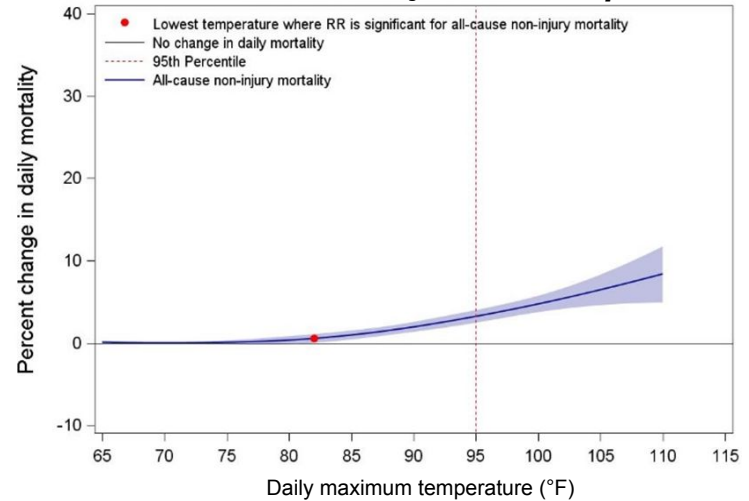
|  |                                  |                                   |                              |   |                                      |
|--|----------------------------------|-----------------------------------|------------------------------|---|--------------------------------------|
| 1. DECEASED'S LEGAL NAME (Include AKA's if any) (First, Middle, Last)  |                                  | 2. SEX                            | 3. SOCIAL SECURITY NUMBER    |   | STATE FILE NO.                       |
| 4a. AGE-Last birthday (Years)  | 4b. UNDER 1 YEAR (Months   Days) | 4c. UNDER 1 DAY (Hours   Minutes) | 5. DATE OF BIRTH (Mo/Day/Yr) | 6. BIRTHPLACE (City and State or Foreign Country) |                                      |
| <b>Part I</b>  |                                  |                                   |                              |   |                                      |
| 32. <b>PART I. Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.</b>   |                                  |                                   |                              |   | Approximate interval: Onset to death |
| <b>CAUSE OF DEATH (See instructions and examples)</b><br>IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____ Due to (or as a consequence of): _____<br>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST<br>b. _____ Due to (or as a consequence of): _____<br>c. _____ Due to (or as a consequence of): _____<br>d. _____ Due to (or as a consequence of): _____ |                                  |                                   |                              |   |                                      |
| <b>Part II</b>   |                                  |                                   |                              |   |                                      |
| PART II. Enter other significant conditions contributing to death, but not resulting in the underlying cause given in PART I.  |                                  |                                   |                              |   |                                      |

Underlying cause information

Contributing cause information

## Statistical Attribution Approach

### Heat-Mortality Relationship



<https://www.cdc.gov/nchs/data/dvs/DEATH11-03final-ACC.pdf>

- The primary or underlying reasons (and contributing factors) for adverse health outcome.
- Generate relationships between temperature and adverse health outcomes using a statistical framework.





# Data Sources and Analytical Framework



## Data Sources

- **Health data:** CDC's National Vital Statistics System for mortality data
- **Meteorological data:** National Weather Service



## Analytical Framework

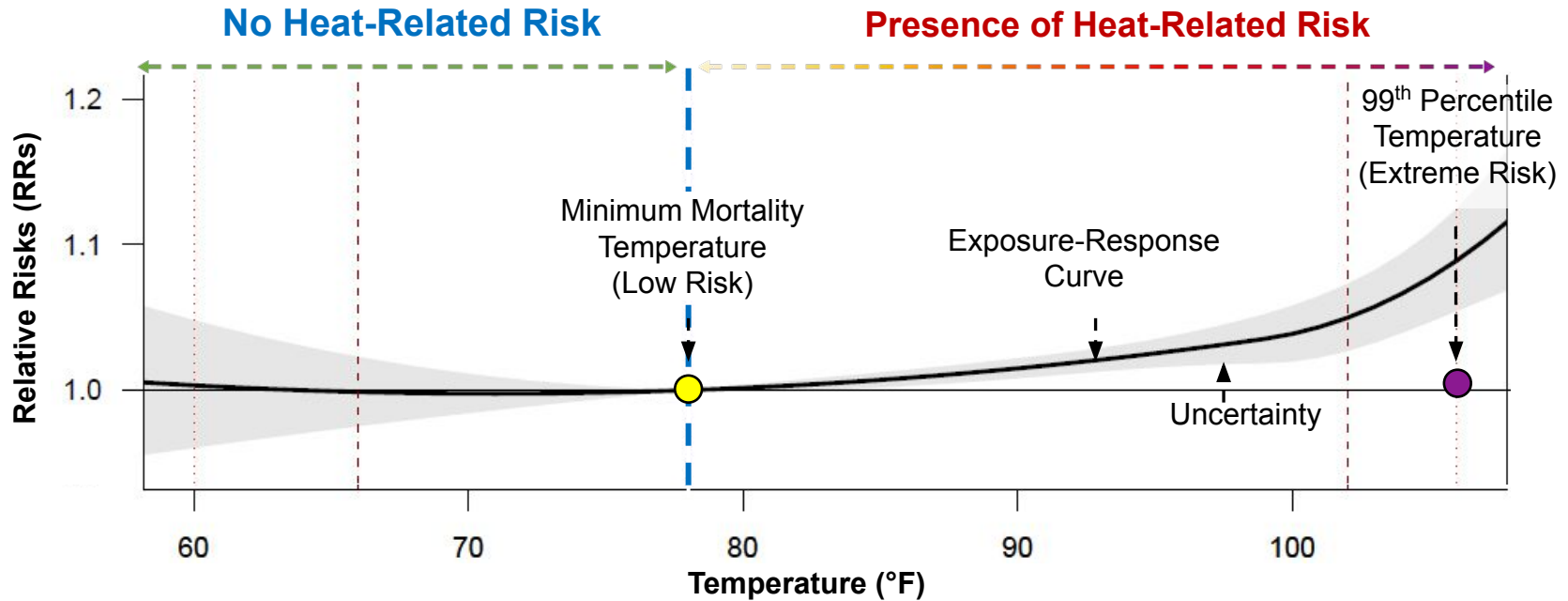
- **Stage One:** county-level time series analysis using a Distributed Lag Non-Linear Model (DLNM) for the warmer months (April 1 through October 31)
  - Heat exposure measures: Daily maximum and minimum temperatures
    - Controls for air pollution, seasonality, long-term trends, day of the week, etc.
    - Health risks estimated for cumulative lag period of 0-3 days
- **Stage Two:** multivariate random-effects meta-analysis to derive overall cumulative heat-mortality relationships and estimate heat-attributable deaths over a range of temperature values.





# Basis for Creating Heat-Related Health Impact Information

## Heat-Mortality Relationship





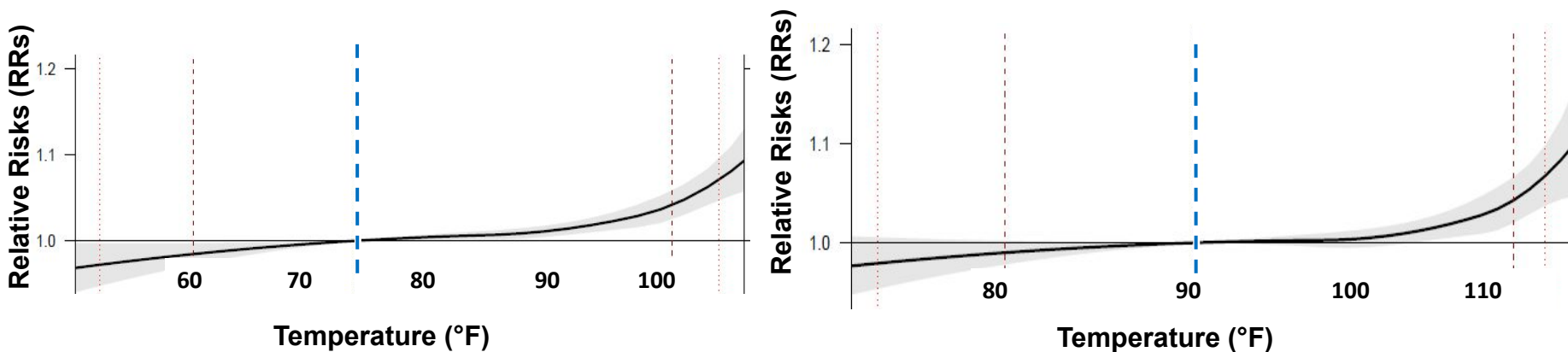
# Understanding Health Impacts over a Range of Temperatures



## Heat-Mortality Relationship

Cooler Climate

Warmer Climate

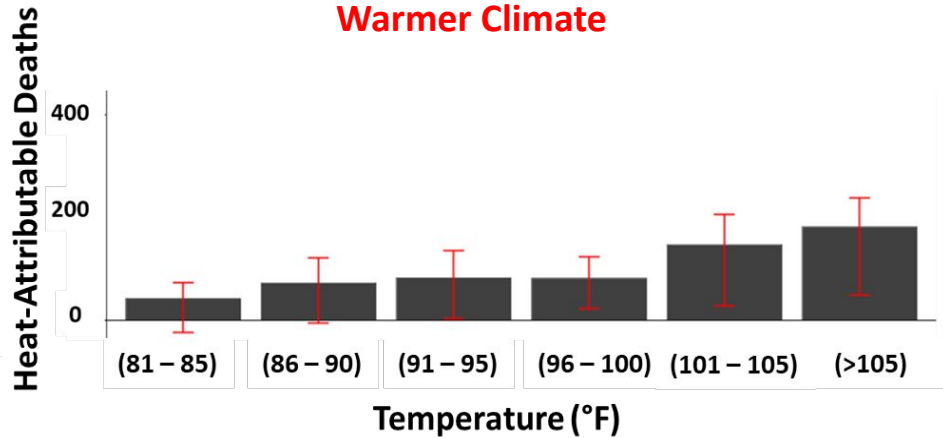
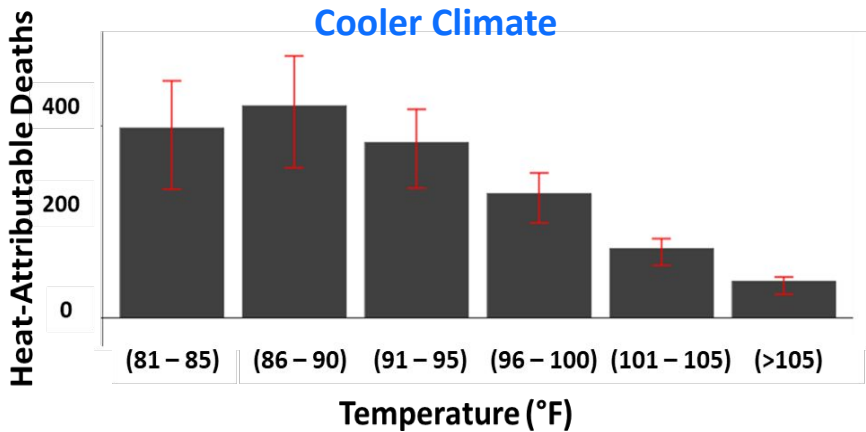




# Understanding Health Impacts over a Range of Temperatures



## Heat-Attributable Deaths (Health Impacts)





# Generating Local Heat-Health Impacts

$$\text{Percent of Heat-Attributable Deaths (PHAD)} = \frac{\text{Heat-Attributable Deaths at a Specific Temperature} * 100}{\text{All Heat-Attributable Deaths}}$$



## Location-Specific Heat-Attributable Health Impacts

| Location            | Percentile Range: 25 to 30 |          | Percentile Range: 30 to 35 |          | ... | ... | ... | ... | Percentile Range: 95 to 99 |          | Percentile Range: > 99 |          |
|---------------------|----------------------------|----------|----------------------------|----------|-----|-----|-----|-----|----------------------------|----------|------------------------|----------|
|                     | Temp. Range                | PHAD (%) | Temp. Range                | PHAD (%) | ... | ... | ... | ... | Temp. Range                | PHAD (%) | Temp. Range            | PHAD (%) |
| Baldwin, (Alabama)  | >83°F to 84°F              | 0        | >84°F to 85°F              | 0        | ... | ... | ... | ... | >95°F to 102°F             | 31       | >102°F                 | 2        |
| Calhoun, (Alabama)  | >79°F to 81°F              | 0        | >81°F to 82°F              | 1        | ... | ... | ... | ... | >95°F to 104°F             | 25       | >104°F                 | 2        |
| Colbert, Alabama    | >78°F to 80°F              | 0        | >80°F to 82°F              | 1        | ... | ... | ... | ... | >97°F to 107°F             | 25       | >107°F                 | 2        |
| ...                 | ...                        | ...      | ...                        | ...      | ... | ... | ... | ... | ...                        | ...      | ...                    | ...      |
| ...                 | ...                        | ...      | ...                        | ...      | ... | ... | ... | ... | ...                        | ...      | ...                    | ...      |
| ...                 | ...                        | ...      | ...                        | ...      | ... | ... | ... | ... | ...                        | ...      | ...                    | ...      |
| ...                 | ...                        | ...      | ...                        | ...      | ... | ... | ... | ... | ...                        | ...      | ...                    | ...      |
| ...                 | ...                        | ...      | ...                        | ...      | ... | ... | ... | ... | ...                        | ...      | ...                    | ...      |
| Natrona, (Wyoming)  | >63°F to 66°F              | 0        | >66°F to 69°F              | 1        | ... | ... | ... | ... | >95°F to 104°F             | 26       | >104°F                 | 0.79     |
| Sheridan, (Wyoming) | >62°F to 65°F              | 0        | >65°F to 67°F              | 0        | ... | ... | ... | ... | >96°F to 107°F             | 27       | >107°F                 | 0.91     |
| Uinta, (Wyoming)    | >58°F to 60°F              | 0        | >60°F to 63°F              | 0        | ... | ... | ... | ... | >87°F to 94°F              | 30       | >94°F                  | 0        |

- Created an algorithm to identify specific and cumulative mortality impacts
- Ascertained heat-health impact information for multiple locations across the United States







# HeatRisk Categories



## Extreme (4)

- *Rare long duration and/or extreme event*
- Extreme risk of widespread heat-related impacts (including illness and mortality) for anyone without effective cooling and/or hydration.
- Temps above 95th percentile for 2+ days and/or near all-time records.



## Major (3)

- Major risk of widespread heat-related impacts (including illness and mortality) for anyone without effective cooling and/or hydration.
- Excessively warm day and nights (generally above 95th percentile).



**Primary difference between Extreme and Major is duration and/or maximum intensity of heat. Both are potentially VERY impactful!**





# HeatRisk Categories



## Moderate (2)

- Moderate risk of heat-related impacts, mostly in “at higher risk” populations without effective cooling and/or hydration
- Primarily heat-related illness. Non-zero, but low, risk of heat-related mortality expected.



## Minor (1)

- Minor risk for “at higher risk” populations. Minor spike in heat illness. Non-zero, but very low, risk of mortality expected.



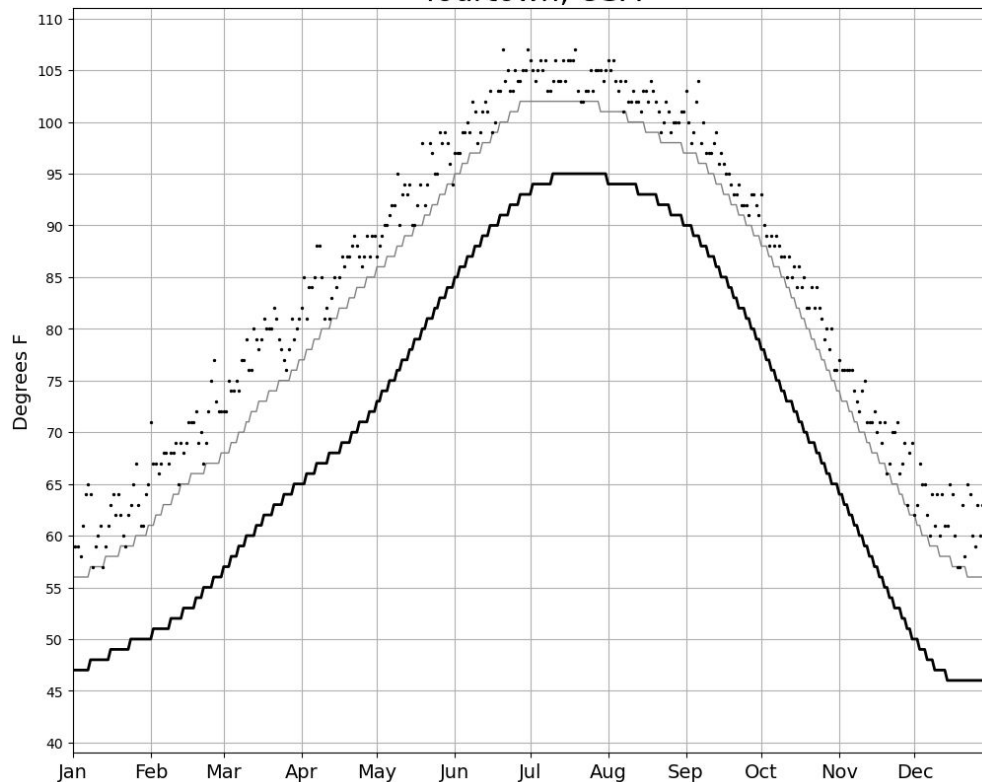
## None (0)

- Little to no risk from expected heat.



# How HeatRisk Works

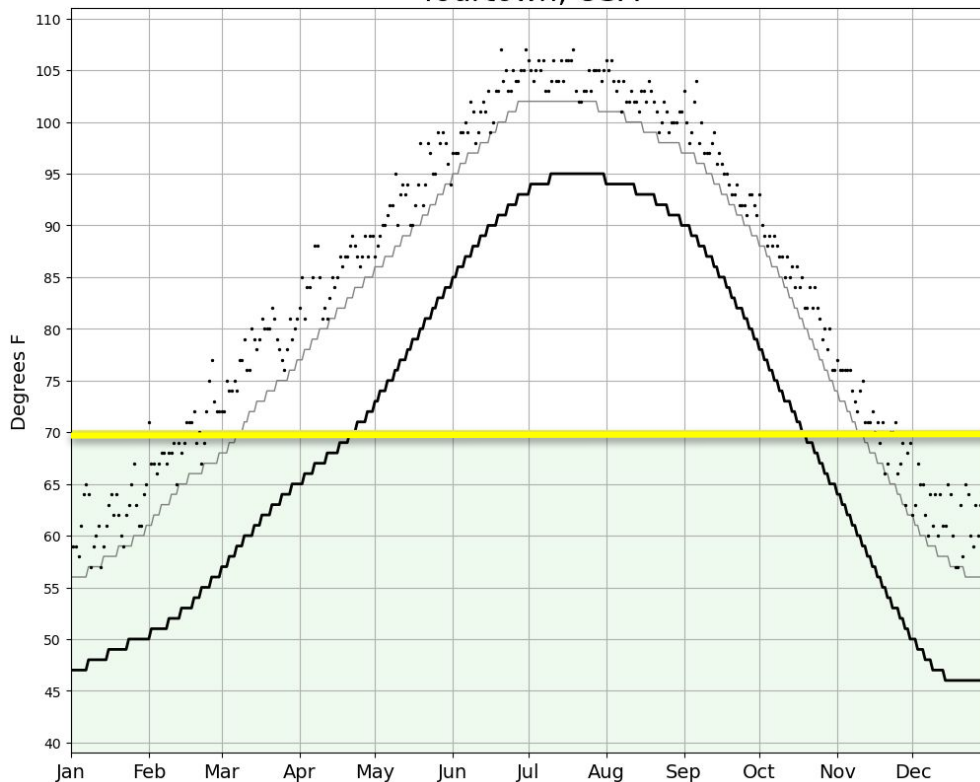
NOAA/NWS HeatRisk - MaxT Heat Impact Levels  
Yourtown, USA



- HeatRisk leverages local climatology normals, including the 95th percentile of temperatures to identify excessive heat for *that* location
- Dark curve = 1991-2020 NCEI Normals
- Light grey curve = 95th percentile curve (30-day smooth applied)
- Dots = daily record highs in the period of record

# How HeatRisk Works

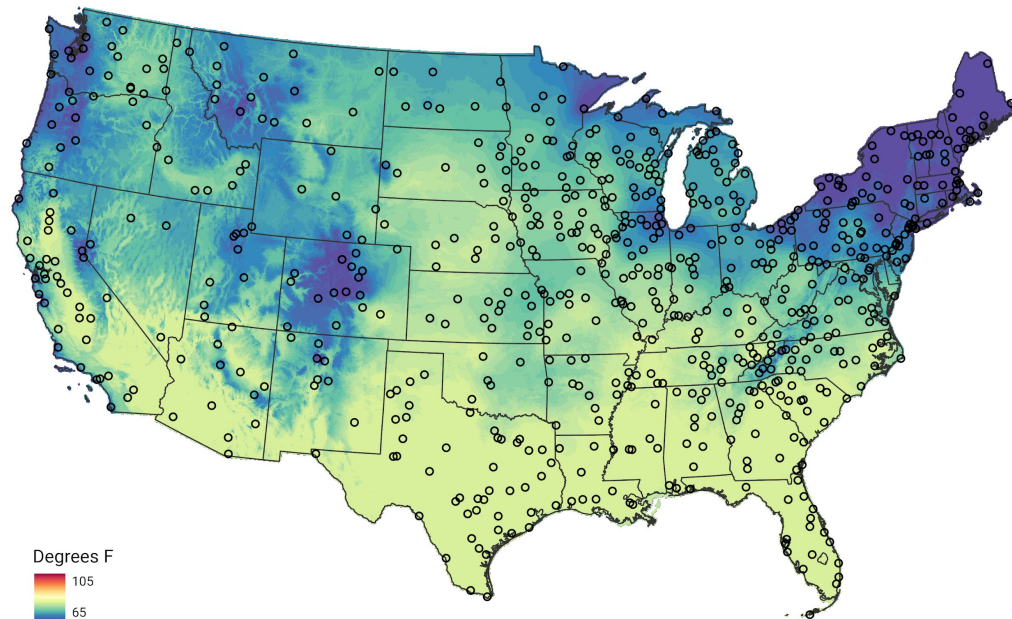
NOAA/NWS HeatRisk - MaxT Heat Impact Levels  
Yourtown, USA



- The first threshold we define is the Yellow threshold
- We leverage the CDC Minimum Mortality Temperature (in urban areas) or 1st percentile (for rural areas)
- This means nearly all heat-attributable deaths were modeled to have occurred above this temperature
- Temperatures below this are in the Green category

# How HeatRisk Works

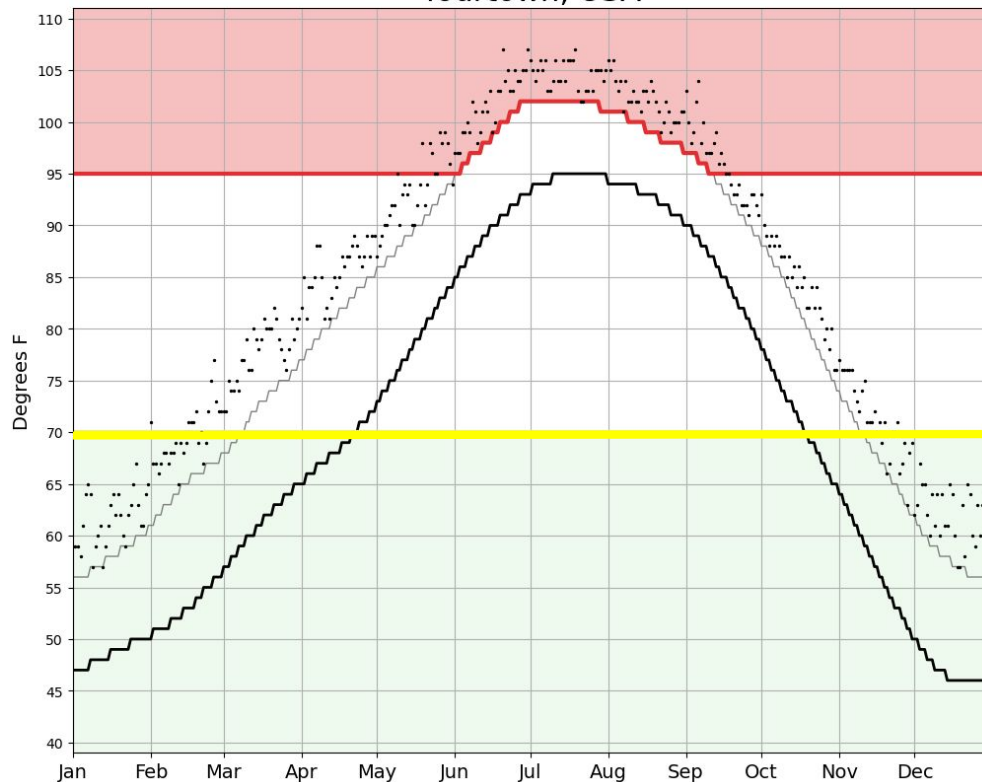
HeatRisk v2.5 - Yellow MaxT Threshold



- Map of the Yellow maximum temperature threshold across the US based on CDC-derived data for ~700 stations.
- Modeled relationships (county/regional heat-health statistics modeled to single station location) were available from small rural locations up to large metropolitan areas.

# How HeatRisk Works

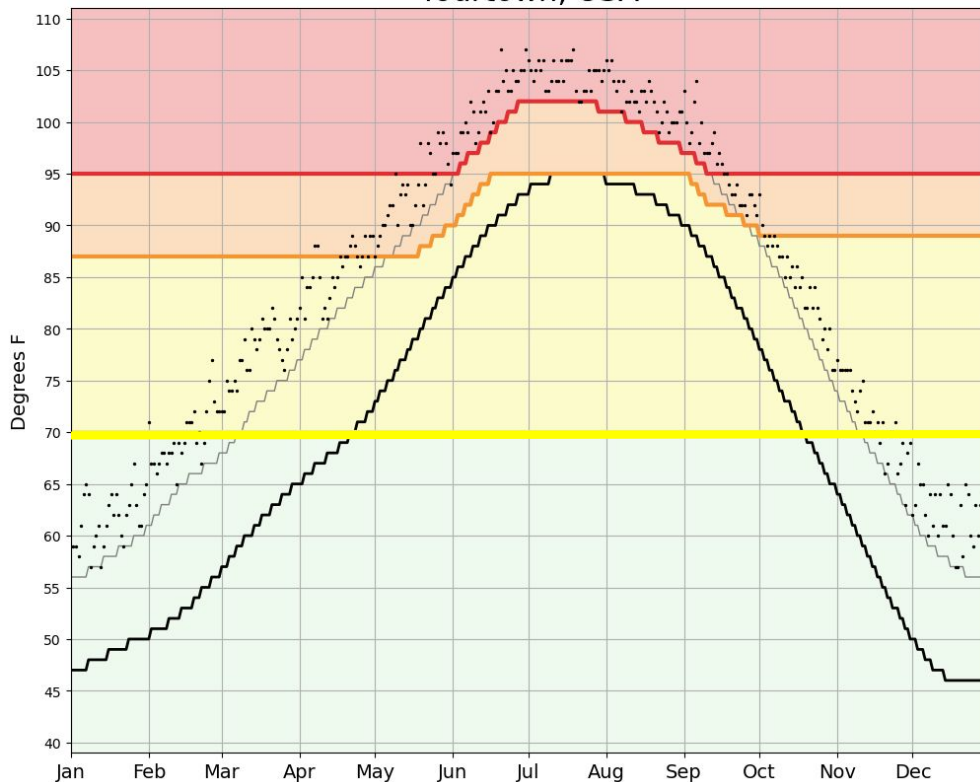
NOAA/NWS HeatRisk - MaxT Heat Impact Levels  
Yourtown, USA



- The “base” Red threshold is based on the 50th percentile of heat- attributable deaths from the CDC data
- This means that half of those deaths were modeled to have occurred above/below this value
- In the warmer months, the Red threshold is then defined as the higher value between the base value or the 95th percentile curve (light gray curve)

# How HeatRisk Works

NOAA/NWS HeatRisk - MaxT Heat Impact Levels  
Yourtown, USA



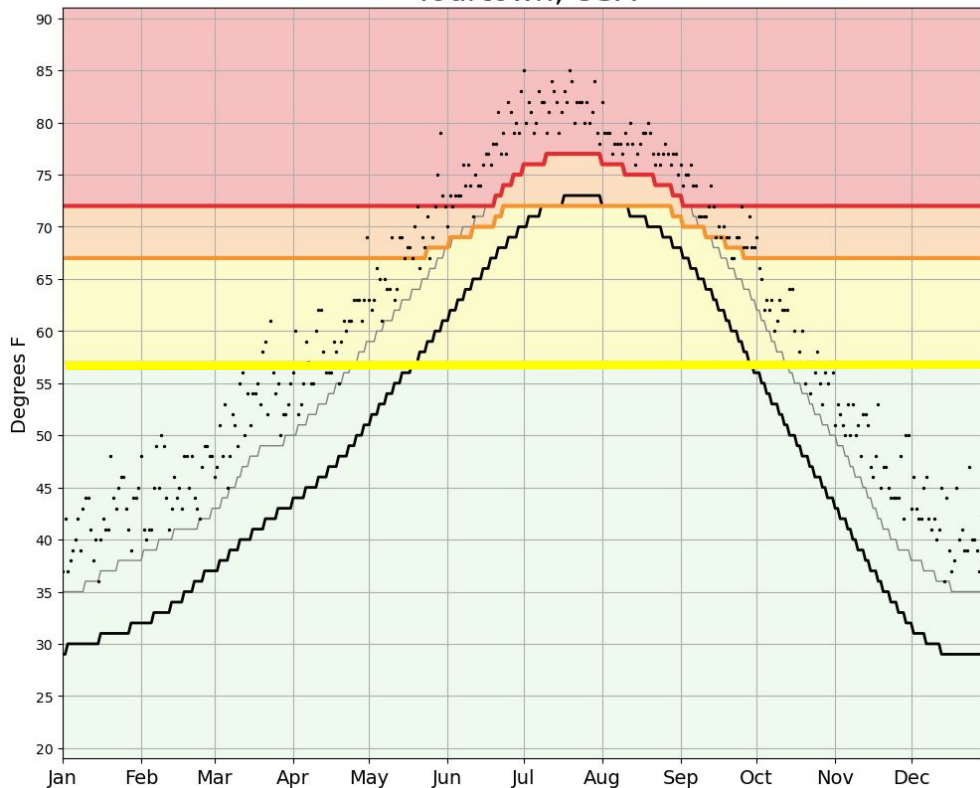
- Finally the **Orange** threshold is generated
- This involves:
  - Mathematically leveraging the Red and Yellow values
  - Taking into account the time of year (Spring vs Fall) and CDC data (25th percentile)
  - Capping at the Red base value (where applicable)
- Note differences in early and late season Orange thresholds, which account for acclimation aspects.





# How HeatRisk Works

NOAA/NWS HeatRisk - MinT Heat Impact Levels  
Yourtown, USA



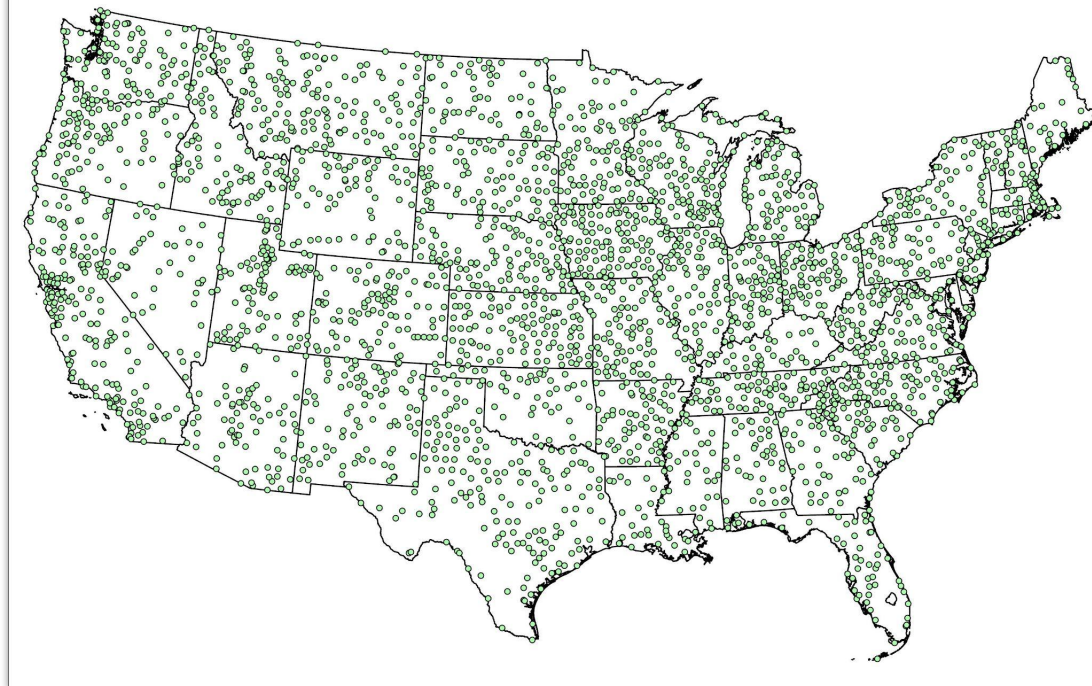
- For minimum temperature, Orange and Red thresholds are based primarily on climatology. Yellow levels are based on CDC thresholds and climatology.
- Minimum temperatures are used in the 24-hour HeatRisk approach to better account for:
  - Overnight relief potential
  - Humidity





# How HeatRisk Works

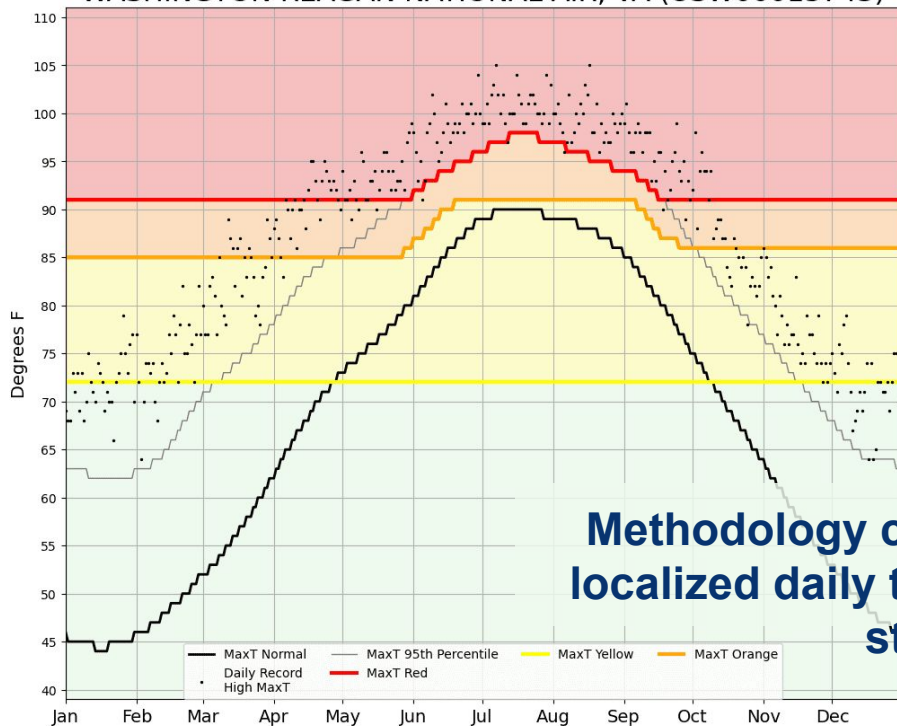
HeatRisk v2.5 - Climate Stations



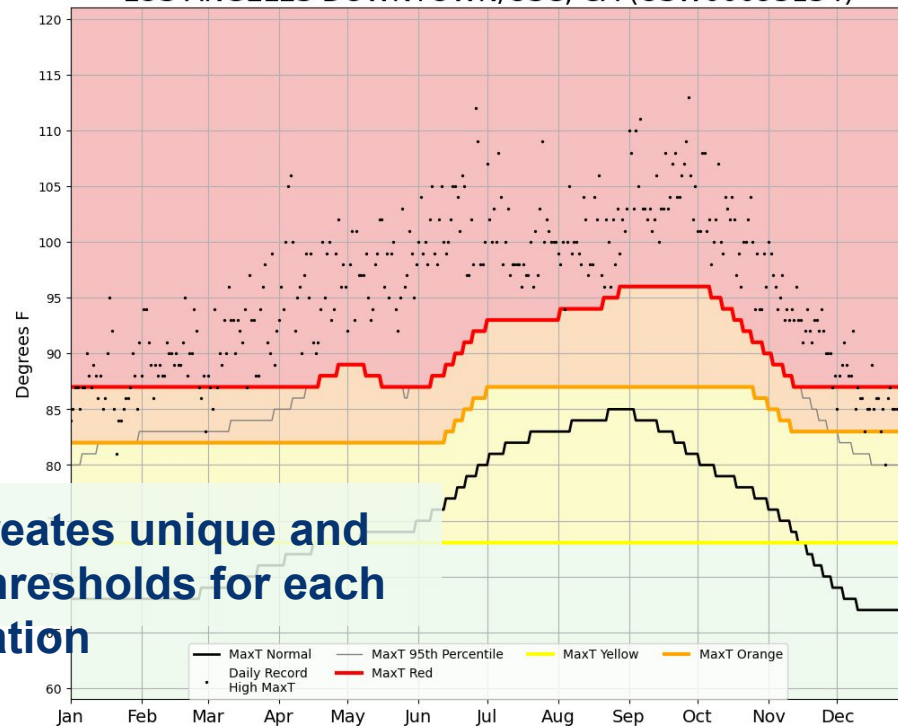
This process is applied to ~3100 stations across the Contiguous US

# How HeatRisk Works

NOAA/NWS HeatRisk v2.5 - MaxT Heat Impact Levels  
WASHINGTON REAGAN NATIONAL AIR, VA (USW00013743)



NOAA/NWS HeatRisk v2.5 - MaxT Heat Impact Levels  
LOS ANGELES DOWNTOWN/USC, CA (USW00093134)

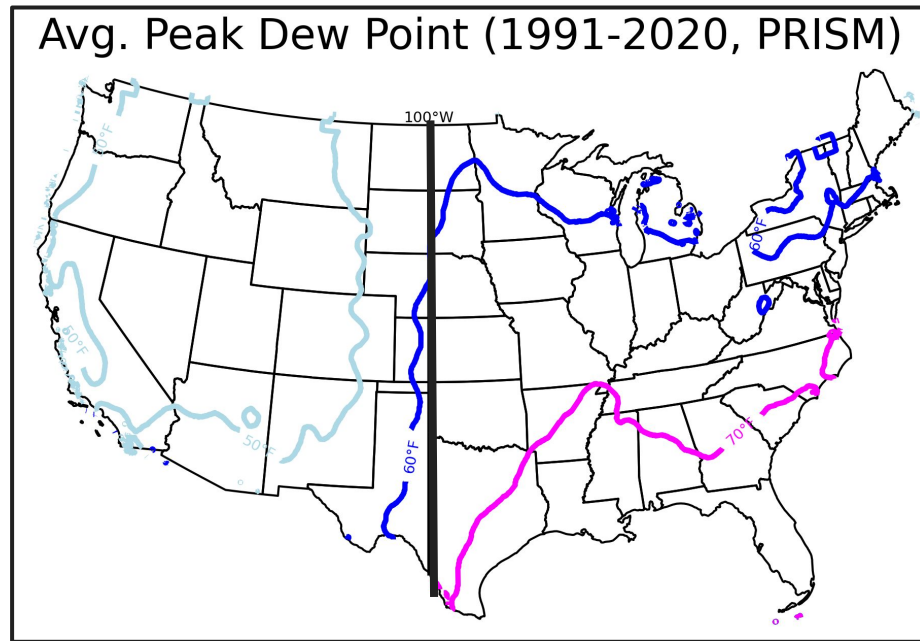


# How HeatRisk Works

## How is humidity accounted for?

- Natural dividing line along 100°W, with higher average dew points (measure of moisture) to the east and lower to the west

“Along the hundredth meridian from Manitoba to Mexico there is a zone of semiarid land. ... Passing from east to west across this belt a wonderful transformation is observed. On the east a luxuriant growth of grass is seen... Passing westward, species after species of luxuriant grass and brilliant flowering plants disappear; the ground gradually becomes naked, with “bunch” grasses here and there; now and then a thorny cactus is seen, and the yucca thrusts out its sharp bayonets. At the western margin of the zone the arid lands proper are reached.” (Powell 1890, Seager et al 2018)



# HeatRisk Algorithm - Combining to 24 hour value

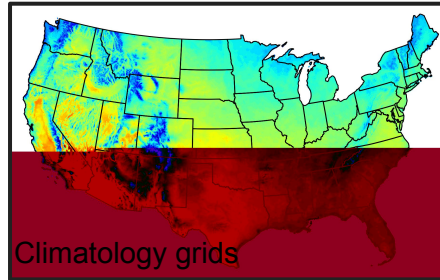
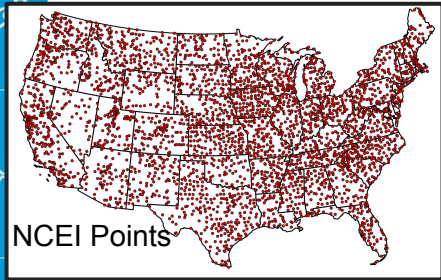
|              | <b>MaxT (0,1,2,3)</b> | <b>MinT (0,1,2,3)</b>            |
|--------------|-----------------------|----------------------------------|
| <b>Humid</b> | 45%                   | 55%<br>27.5% Day 1   27.5% Day 2 |
| <b>Dry</b>   | 67%                   | 33%<br>11.5% Day 1   21.5% Day 2 |

MaxT/MinTs are each assigned a 0, 1, 2, 3 based on where they fit within the daily threshold values.

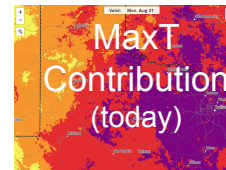
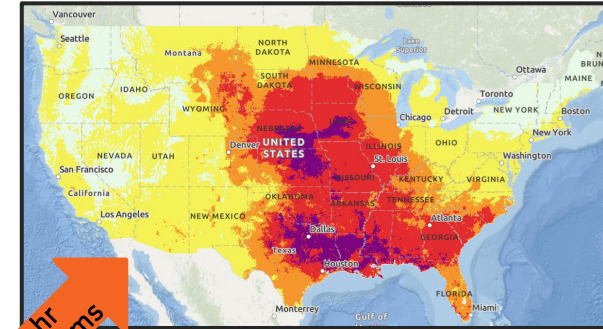
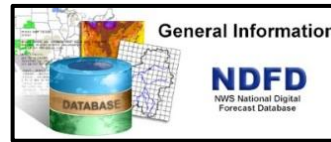
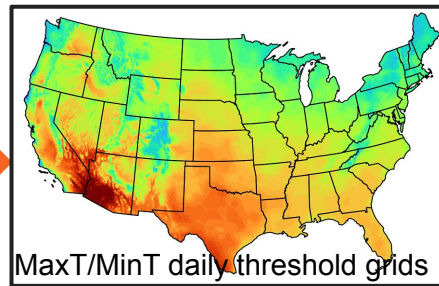
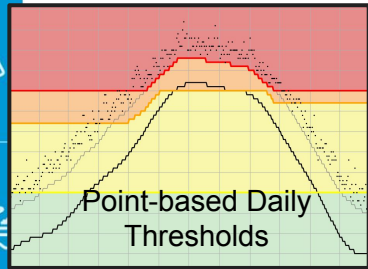
Different weighting schemes are used for the “humid” and “dry” climates.

Final HeatRisk values consider the morning low, the afternoon high, and the following morning low to describe the 24 hour risk

# HeatRisk Process Review - Points to Grids to Forecast



Magenta - Two or three consecutive 24-hr periods are  $\geq$  95th percentile, and/or highs are near or above all time records



24-hr Algorithms

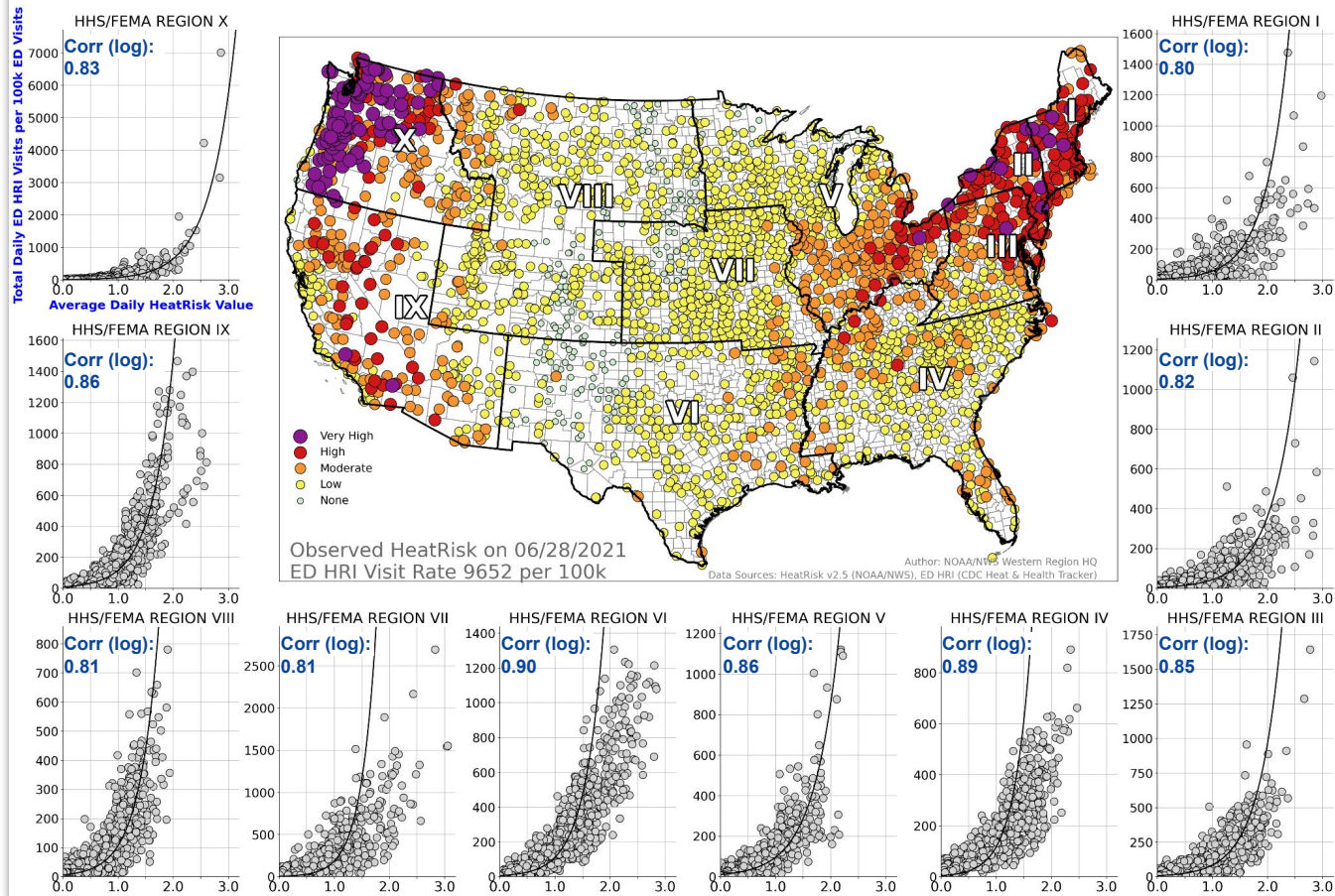




# Impact-Based Verification

Comparing regional observed HeatRisk values (FEMA/HHS regions) against emergency dept. (ED) heat-related illness (HRI) for the combined 2019-2023 heat seasons found a **strong correlation** (0.80-0.90).

## Analysis of Daily HeatRisk Values and Emergency Department Heat-Related Injury Visits for Apr 1st through Oct 31st from 2019 to 2023



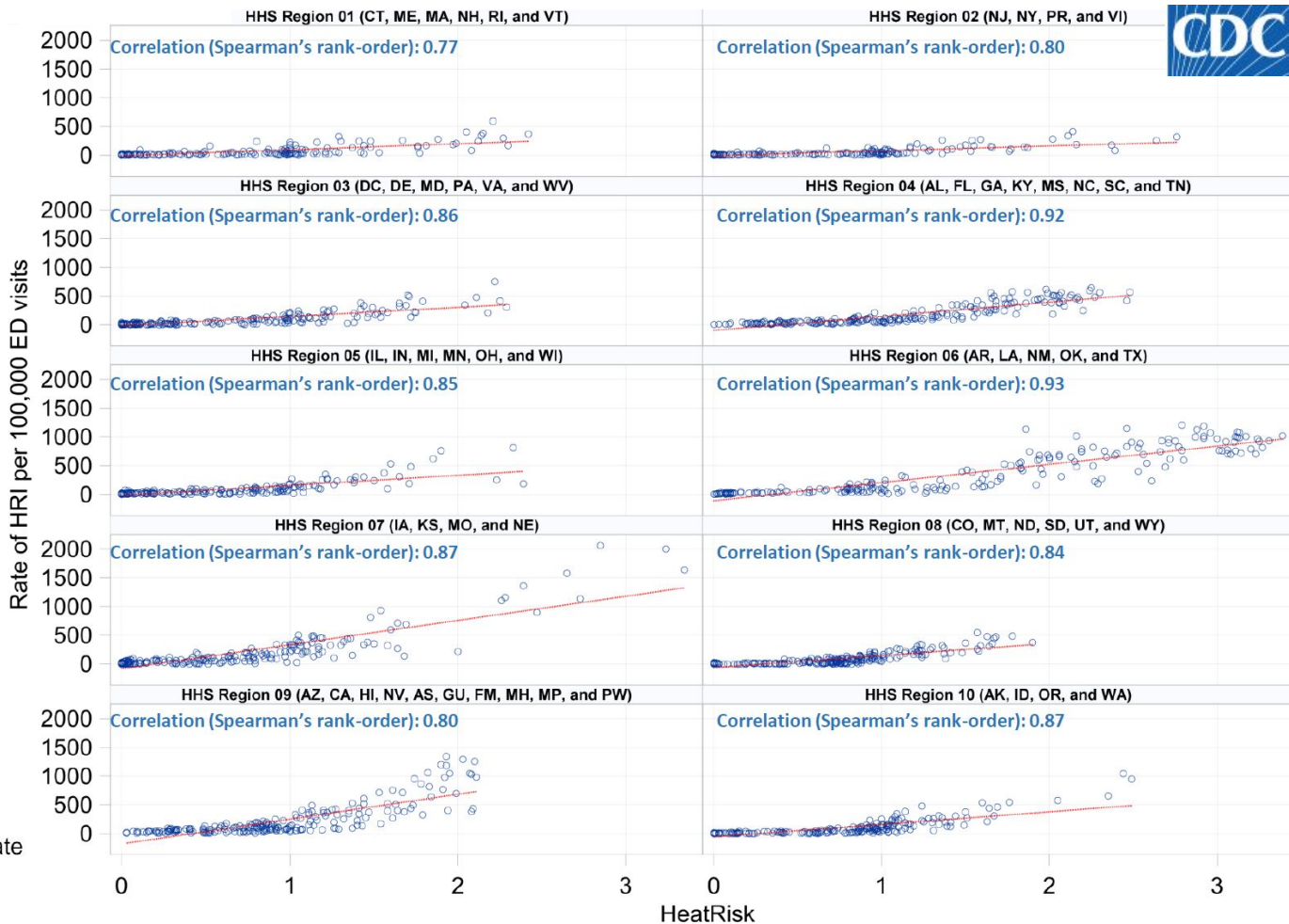
# Impact-Based Verification

HeatRisk vs. HRI  
ED Visit Rate  
Correlation for  
Warm Season  
Months (Apr - Oct)  
of 2023

*Population Weighted*

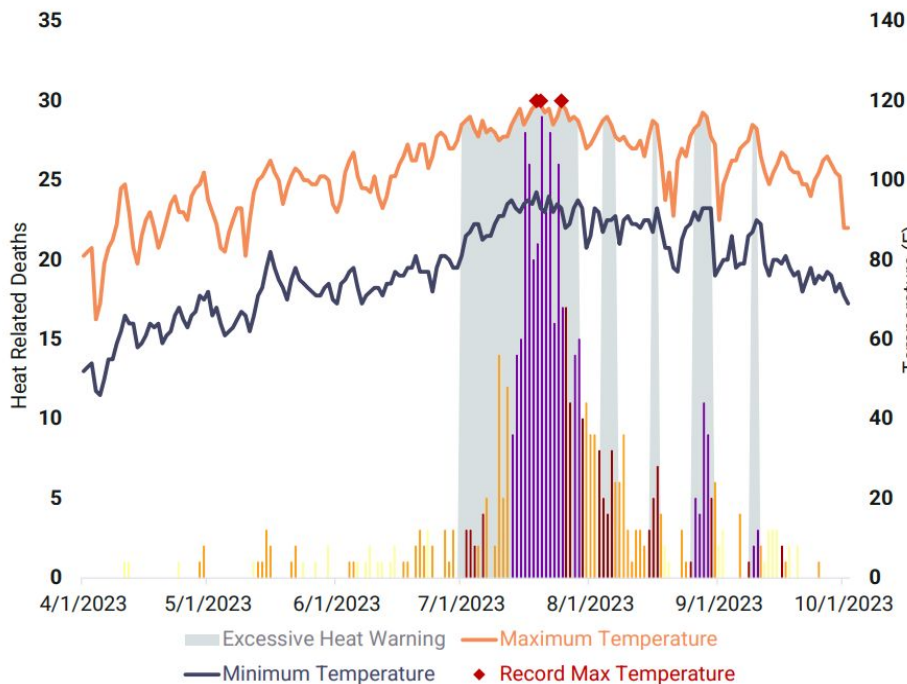
— Trend line: Daily HeatRisk vs. HRI rate

○ Daily HeatRisk vs. HRI rate



# Impact Based Verification

Daily temperatures were not below 91 degrees from July 10th – July 25th. **During these two weeks, 303 deaths occurred.** A new top 5 record-breaking hottest temperatures of 119 occurred on July 19<sup>th</sup>, 20<sup>th</sup>, and 25<sup>th</sup> in Maricopa County.



**Over half of all heat related deaths in 2023 occurred on days where heat risk was calculated as extreme.** There were 21 days in 2023 where the NWS calculated an extreme heat risk.

**Over half of all heat related deaths in 2023 occurred on days where heat risk was calculated as extreme.** There were 21 days in 2023 where the NWS calculated an extreme heat risk.

For more information: National Weather Service <https://www.weather.gov/psr/heat>

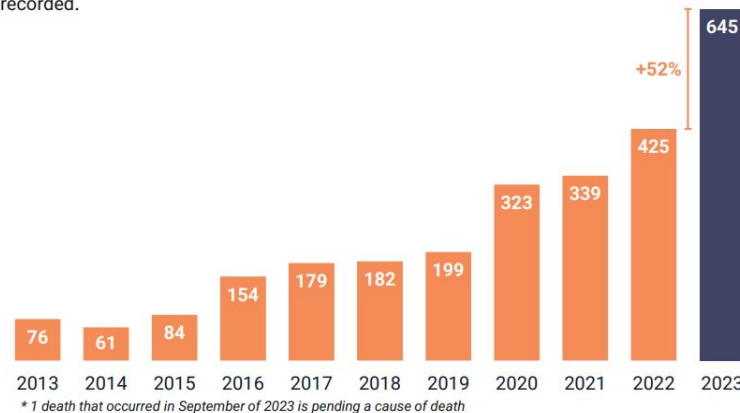
| None     | Minor                                      | Moderate                         | Major                | Extreme           |
|----------|--|----------------------------------|----------------------|-------------------|
| No risk. | Risk to those extremely sensitive to heat. | Risk to those sensitive to heat. | Risk to most people. | Risk to everyone. |
| 7%       | 24%  | 15%                              | 52%                  |                   |

## Heat Related Deaths Over Time

Deaths by Year

**Maricopa County identified a total of 645 heat related deaths occurring in 2023.**

This represents a 52 percent increase from last year and the most heat related deaths ever recorded.





# WPC HeatRisk CONUS Viewer

<https://www.wpc.ncep.noaa.gov/heatrisk>

**NWS HeatRisk**  
Identifying Potential Heat Risks in the Seven Day Forecast

Mon 8/21 Tue 8/22 Wed 8/23 Thu 8/24 Fri 8/25 Sat 8/26 Sun 8/27

Click map for potential heat risks and NWS forecast for a location.

The NWS HeatRisk is an experimental color-numeric-based index that provides a forecast risk of heat-related impacts to occur over a 24-hour period. HeatRisk takes into consideration:

- How unusual the heat is for the time of the year
- The duration of the heat including both daytime and nighttime temperatures
- If those temperatures pose an elevated risk of heat-related impacts based on data from the CDC

This index is supplementary to official NWS heat products and is meant to provide risk guidance for those decision makers and heat-sensitive populations who need to take actions at levels that may be below current NWS heat product levels.

| Category     | Risk of Heat-Related Impacts   |
|--------------|--|
| Green<br>0   | Little to no risk from expected heat.  |
| Yellow<br>1  | Minor - This level of heat affects primarily those individuals extremely sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration.  |
| Orange<br>2  | Moderate - This level of heat affects most individuals sensitive to heat, especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and in heat-sensitive industries.                                  |
| Red<br>3     | Major - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat-sensitive industries and infrastructure.  |
| Magenta<br>4 | Extreme - This level of rare and/or long-duration extreme heat with little to no overnight relief affects anyone without effective cooling and/or adequate hydration. Impacts likely in most health systems, heat-sensitive industries and infrastructure. |

[Comments? Questions? Please Contact Us.](#)

Leaflet | Powered by Esri | NWS, Austin Community College, Idaho State University, Kutztown University, MIT, Montana State University, NASA Wallops Flight Facility, North Carolina State Uni...

- Access daily interactive maps with point-based forecasts
- Overview of HeatRisk, including a definition of each level
- Data Formats: static images, KML and GeoTIFF files



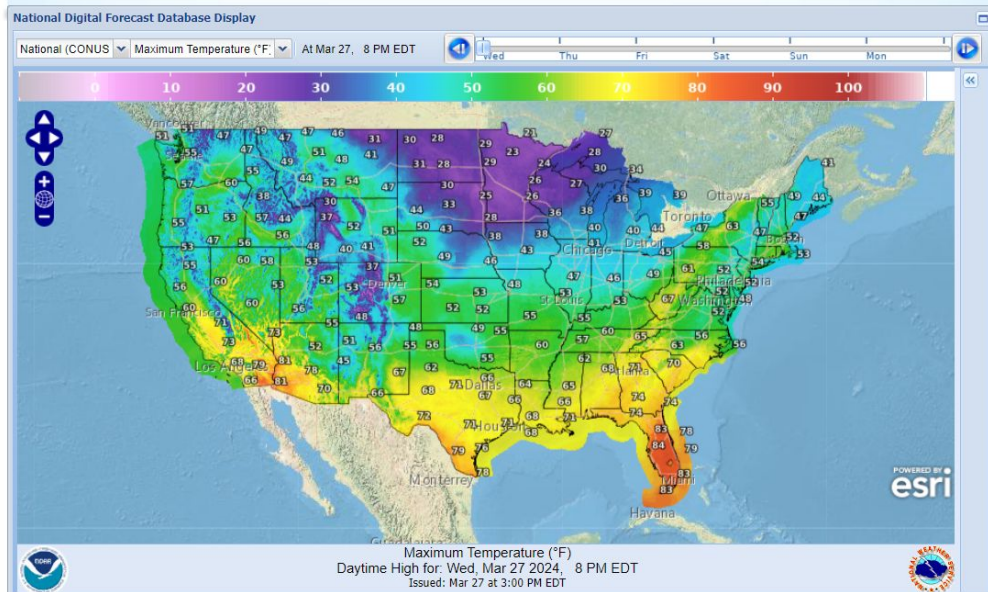
# National Digital Forecast Database (NDFD)

<https://digital.weather.gov>

## Graphical Forecasts

Weather.gov - National Digital Forecast Database Graphical Forecasts

NOTE: Digital display of new NWS forecasts can be delayed by several minutes or more from local issuance.



- HeatRisk will be available on NDFD for all CONUS locations by the end of May
- Data formats: GRIB2, XML, and WMS



# Partner Usage

## Marin County Risk of Heat-Related Impacts

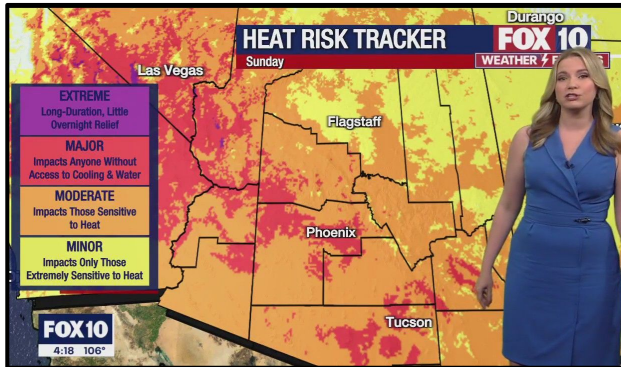
HeatRisk differs based on individual impact. Heat sensitive groups include, older adults, those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. Protect your health with the guidance below or refer to [wrh.noaa.gov/wrh/heat/](http://wrh.noaa.gov/wrh/heat/)

| HeatRisk Level             | Risk of Heat-Related Impacts  | Recommendation  |
|----------------------------|---|---|
| <b>0 Green (Little)</b>    | Little to no risk.  | Great weather for outdoor activities!   |
| <b>1 Yellow (Minor)</b>    | This level of heat primarily affects those individuals extremely sensitive to heat, especially when outdoors without effective cooling and adequate hydration.              | <ul style="list-style-type: none"> <li>Increase hydration.</li> <li>Reduce time spent outdoors or stay in when the sun is strongest.</li> <li>Open windows at night and use fans or air inside buildings.</li> </ul>  |
| <b>2 Orange (Moderate)</b> | Moderate risk for heat sensitive groups, especially those without effective cooling and hydration. Some risk for sun-exposed, active individuals in the general population. | <ul style="list-style-type: none"> <li>Reduce time in the sun between 10 a.m. and 4 p.m.</li> <li>Stay hydrated.</li> <li>Stay in a cool place during the heat of the day.</li> <li>Move outdoor activities to cooler times.</li> <li>Open windows at night and use fans or cooler air.</li> </ul>  |
| <b>3 Red (Major)</b>       | This level of heat affects anyone without effective cooling and adequate hydration. Major risk for sun-exposed individuals, outdoor enthusiasts, and heat-sensitive groups. | <ul style="list-style-type: none"> <li>Try to avoid being outdoors in the sun between 10 a.m. and 4 p.m.</li> <li>Stay hydrated.</li> <li>Stay in a cool place especially during the day.</li> <li>If you have access to air conditioning, thermostats to 78 or higher. Fans may be adequate.</li> <li>Cancel outdoor activities during the heat of the day.</li> </ul> |
| <b>4 Magenta (Extreme)</b> | Entire population is at risk. Heat risk can be deadly for heat sensitive groups, without effective cooling. Poor air quality and power outages are also likely.             | <ul style="list-style-type: none"> <li>Avoid being outdoors in the sun between 10 a.m. and 4 p.m.</li> <li>Stay hydrated.</li> <li>Stay in a cool place, including overnight if you have access to air conditioning, thermostats to 78 or higher. Fans will not be adequate.</li> <li>Cancel outdoor activities.</li> </ul>   |

**Heat Exhaustion**      **Heat Stroke**

**ACT FAST**      Dizziness      Confusion

• Move to a cooler area      Thirst



## Maricopa County Multi-Jurisdictional Hazard Mitigation Plan



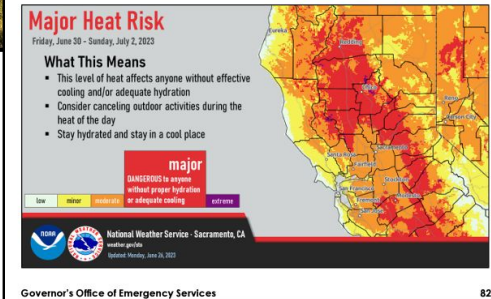
### Extreme Temperature Response Plan

NWS Experimental HeatRisk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale, very similar to the Air Quality Index (AQI). This daily value indicates the level of heat risk concern for any location, along with identifying the groups who are most at risk. Essentially, the higher the value, the greater the potential heat risk. During this experimental phase, the NWS in California, Nevada, Utah, and Arizona are linking the heat product issuance to the HeatRisk output, rather than to the many varied single threshold approaches previously used. In simple terms, magenta and red HeatRisk would generally lead to excessive heat warnings and orange would lead to advisories, depending on location.

See Figure 1 below for an example of the NWS HeatRisk product distributed by NWS in the partner emails. See **Table 1** on the next page for the HeatRisk table used to identify the risk used in the HeatRisk product.

For more information visit the [NWS Experimental HeatRisk: Identifying Potential Heat Risks in the Seven Day Forecast](http://NWS Experimental HeatRisk: Identifying Potential Heat Risks in the Seven Day Forecast) website.

Figure 1: NWS HeatRisk Product Example



## Public Health Seattle & King County

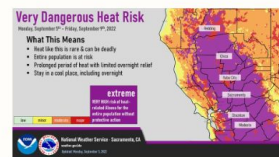
Overview of NWS HeatRisk Values:

| HeatRisk Level | HEAT  | WHY YOU'RE AT RISK  | WHO'S MOST AT RISK  |
|----------------|---|---|---|
| 0              | Little to no risk.  | Little to no risk.  | Everyone  |
| 1              | This level of heat primarily affects those individuals extremely sensitive to heat, especially when outdoors without effective cooling and adequate hydration.              | Those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. | Older adults, those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. |
| 2              | Moderate risk for heat sensitive groups, especially those without effective cooling and hydration. Some risk for sun-exposed, active individuals in the general population. | Those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. | Older adults, those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. |
| 3              | This level of heat affects anyone without effective cooling and adequate hydration. Major risk for sun-exposed individuals, outdoor enthusiasts, and heat-sensitive groups. | Those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. | Older adults, those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. |
| 4              | Entire population is at risk. Heat risk can be deadly for heat sensitive groups, without effective cooling. Poor air quality and power outages are also likely.             | Those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. | Older adults, those who work or exercise outdoors, infants and children, individuals experiencing homelessness, and individuals with a medical condition. |

## Outdoor School Activities Adjusted Due To Excessive Heat Warning

### Health and Safety Update

SEPTEMBER 5, 2022



Due to the extreme heat continuing this week in the Sacramento Region, Jesuit High School is adjusting all outdoor activities. The schedule changes follow Sacramento County Public Health and Department of Emergency Services' recommendation to postpone or cancel outdoor events.

### ADJUSTMENTS:

- Spirit Week outdoor lunch and community period events will be held the week of September 19 ahead of the Homecoming Dance Saturday, September 24. A new schedule will be posted later today.
- Athletic team practices will now be held in the morning or evening. Coach communications were sent via email and posted to Google Classroom. The Water Polo match vs. Rocklin has been rescheduled.

Graphic from National Weather Service Sacramento, CA as of Monday, September 5, 2022 7 p.m.

- Large indoor spaces will be open at lunch, during the Community Period, and after school as cooling centers. This includes the Harris Center and Welcome Center.





# CDC HeatRisk Dashboard

[www.cdc.gov/heatrisk](http://www.cdc.gov/heatrisk)



## HeatRisk

### Home

Hot days can affect anyone. If you are pregnant, are a child or teen with asthma, or have a heart condition or other chronic health conditions, heat can make your health worse.

Enter your zip code below to get the *HeatRisk* for this week and actions you can take to keep you and your family safe.



### Get Your Local *HeatRisk*



**HeatRisk Map**  
This map shows HeatRisk across the United States for Friday, April 19, 2024.

You can view more local HeatRisk data on the Environmental Public Health Tracking Program's [Data Explorer](#).

HeatRisk is an experimental product and is not supported 24/7. Changes may occur without advance notice.

Source: [NOAA/NWS](#)

### Health Info

Heat and health guidelines, recommendations, and resources

Healthcare Professionals

Heat and Your Health


This resource made possible through partnerships across the U.S. government.

POWERED BY TRACKING



# CDC HeatRisk Dashboard

[www.cdc.gov/heatrisk](http://www.cdc.gov/heatrisk)



## HeatRisk

Home

Get Your Local HeatRisk


**Home**

Heat and Your Health

Healthcare Professionals

About the Data

**Today's HeatRisk**  
Fulton County, GA




Moderate

Source: [NOAA/NWS](#)

Today's HeatRisk is **Moderate**.

Today is an okay day to be outside for most people. If you are [sensitive to heat](#) consider ways to stay cool.

Heat can make air quality worse. Check the [air quality](#) in your area before heading out.

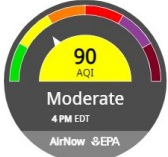


**HeatRisk Forecast**  
Fulton County, GA

| Friday   | Saturday | Sunday   | Monday  | Tuesday        | Wednesday      |
|----------|----------|----------|---------|----------------|----------------|
| April 5  | April 6  | April 7  | April 8 | April 9        | April 10       |
| Moderate | Major    | Moderate | Minor   | Little to None | Little to None |

**Heat and Air Quality**

**Today's Air Quality**



Moderate

4 PM EDT  
AirNow ©EPA

**Moderate**

Today's air quality is **Moderate (51-100)**. Most people will be okay spending time outside, but the air quality may affect people who are very sensitive to air pollution.



# CDC HeatRisk Dashboard

[www.cdc.gov/heatrisk](http://www.cdc.gov/heatrisk)

Today's *HeatRisk* is **Moderate**.

Today is an okay day to be outside for most people. If you are [sensitive to heat](#) consider ways to stay cool.

Heat can make [air quality](#) worse. Check the air quality in your area before heading out.



## Actions you can take to protect your health

Stay hydrated, stay cool. People who are outside for a long time or who are sensitive to heat could have health impacts. Even a few hours in a cool location can lower your risk for health problems from heat.

If you are **outside**, especially for a long time, you can:

- Stay in the shade as much as possible.
- Take breaks when you can.
- Do outdoor activities during the coolest parts of the day or evening, if possible.

If you are **indoors**, you can:

- Use air conditioning or find a location that has one.
- Use a fan to cool your body off, only when indoor temperatures are less than 90°F.

Check on your family, friends, and neighbors, especially if they have chronic medical problems or live alone. Check on pets.

Work with your doctor to see if you need to take additional health actions.

Go to [Heat and Your Health](#) to learn more.

Today's *HeatRisk* is **Extreme**.

This level of heat affects everyone, as the heat is very intense and can last for a long time. Everyone can take steps to protect themselves from impacts of heat on your health.

Heat can make [air quality](#) worse. Check the [air quality](#) in your area before heading out.



## Actions you can take to protect your health

Stay hydrated, stay cool. **Everyone** can have health impacts at this level of heat.

**Staying cool on these days likely requires staying inside with air conditioning if possible.** If you don't have air conditioning, consider [finding a location](#) that does. Fans may not cool you off when it is this hot outside. Even a few hours in a cool location can lower your risk for health impacts from heat.

If you are **outside**, you can:

- Do outdoor activities during the coolest parts of the day or evening, or move to a cooler day, if possible,
- Stay in the shade as much as possible,
- Take breaks when you can.

Check on your family, friends, and neighbors, especially if they have chronic medical problems or live alone. Check on pets.

Work with your doctor to see if you need to take additional health actions.

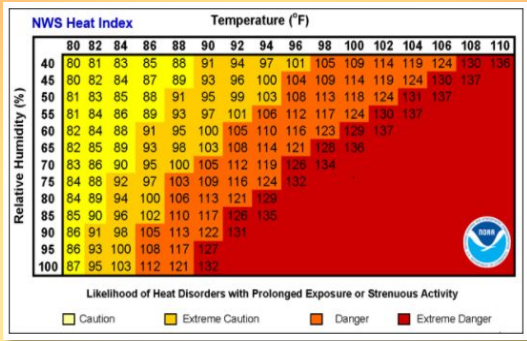
Go to [Heat and Your Health](#) to learn more.





# NWS Forecast Tools to Assess Heat

## Heat Index



Heat stress in context for **general public.**

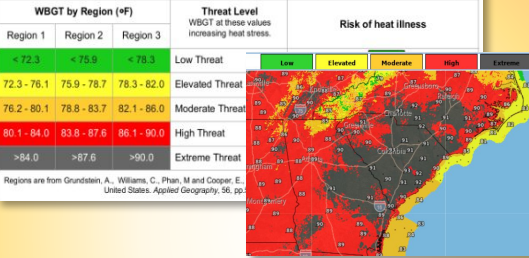
- Relatively simple: T + RH
- Light physical activity in shade



5'7" adult, 147.7 lbs, walking outside at 3.1 mph, wearing trousers and short sleeved shirt

## Wet Bulb Globe Temperature

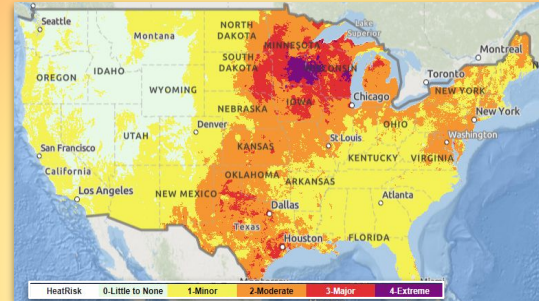
Disclaimer: Always check with local officials for appropriate actions and activity levels. Experienced heat stress will depend upon duration and intensity of activity and personal health and vulnerability.



Heat stress in context for **healthy, active outdoor communities.**

- More Complex: T + RH + wind + solar radiation
- High levels of outdoor physical activity

## HeatRisk (experimental)



Risk of heat related impacts in **climatological context** with CDC heat-health information.

- Impacts-based: MaxT + MinT + CDC heat-health data
- Spectrum of heat-health impacts for *all* populations



# Resources

<https://www.weather.gov/safety/heat-index>

- Overview of each of the three NWS heat tools
- Downloadable reference sheet
- Additional resources and outreach materials

## Heat Forecast Tools

[Weather.gov](#) > [Safety](#) > Heat Forecast Tools

Heat Safety | Heat Watch vs. Warning | **Heat Forecast Tools** | During a Heat Wave | Heat Related Illnesses

### NWS HeatRisk

- ✓ Combines weather, climate and CDC data to identify **potentially dangerous heat** that may lead to increased risk from health impacts.
- ✓ Designed to help you understand **what forecasted heat means to you** and what actions you may need to take.

**HeatRisk**

0 Green - Little to no risk from expected heat.

1 Yellow - Minor - This level of heat affects primarily those individuals who are sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration.

2 Orange - Moderate - This level of heat affects most individuals and is likely to have especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and on heat sensitive industries.

3 Red - Major - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat sensitive industries and infrastructure.

4 Magenta - Extreme - This level of rare and/or long-duration extreme heat will likely cause a significant number of deaths unless effective cooling and/or adequate hydration. Impacts likely in most health systems, heat sensitive industries and infrastructure.

weather.gov

NWS has multiple tools to assess the potential for heat stress due to extreme temperatures. The following tools can inform the issuance of NWS official heat watches, warnings, and advisories. Each of these tools integrate other weather parameters to provide a deeper level of information beyond what the actual air temperature can tell us. View the [NWS Heat Tools reference sheet](#) for more details.

Safety  
National Program



### Heat Safety Resources

Heat Safety

Heat.gov

Children, Pets and Vehicles

Seasonal Safety Campaign

Ultraviolet (UV) Safety

Games and Activities for Kids

Survivor Stories

Education and Outreach

Links and Partners



# Thanks!

## NWS

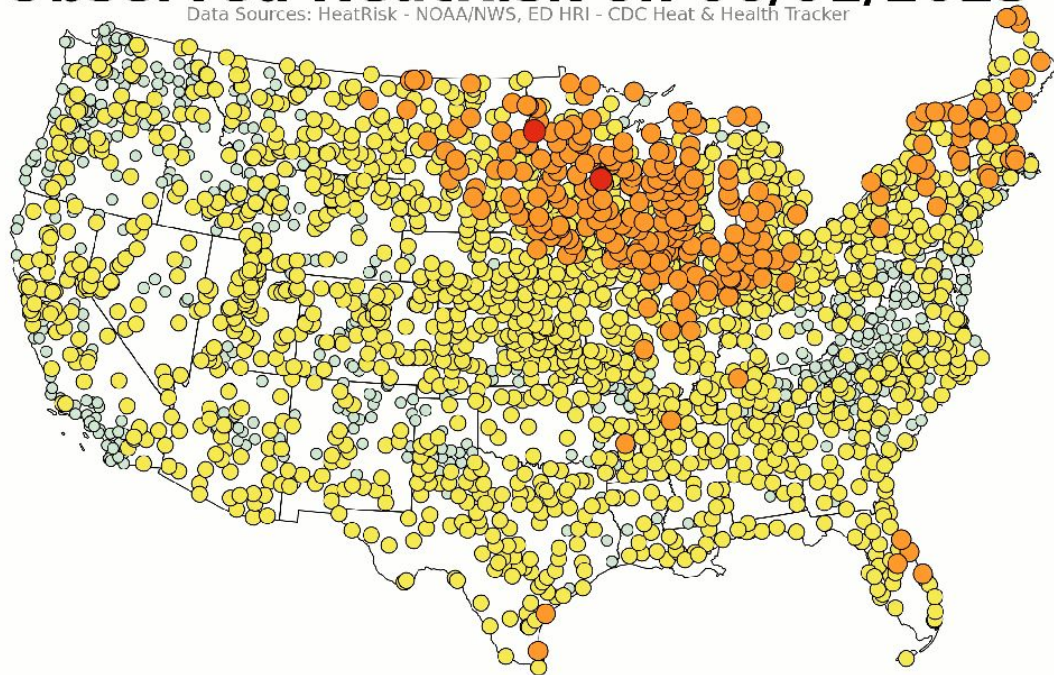
- Mike Staudenmaier, WRH/STID
- Chad Kahler, WRH/STID
- Mark Loeffelbein, WRH/STID
- Kimberly McMahon, Public Program
- Jessica Lee, Public Program
- Paul Iniguez, formerly of WFO Phoenix
- William Rasch, SOO WFO Sacramento
- Andrea Bair, WRH/ISD

## CDC

- Ambarish Vaidyanathan, CDC

## Observed HeatRisk on 06/01/2023

Data Sources: HeatRisk - NOAA/NWS, ED HRI - CDC Heat & Health Tracker



Feedback on HeatRisk can be made here: [https://www.surveymonkey.com/r/ExpNWSHeatRisk\\_2024](https://www.surveymonkey.com/r/ExpNWSHeatRisk_2024)



# Questions

To ask a question, open your toolbar

Go to the Questions header

Type in your question and hit enter.

