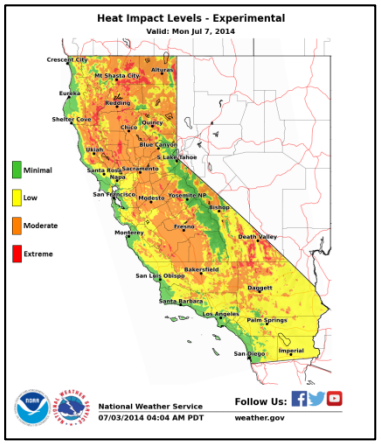
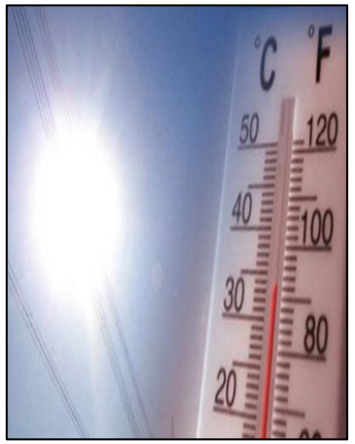




National Weather Service
Western Region
Heat Impact Level (HIL) Project

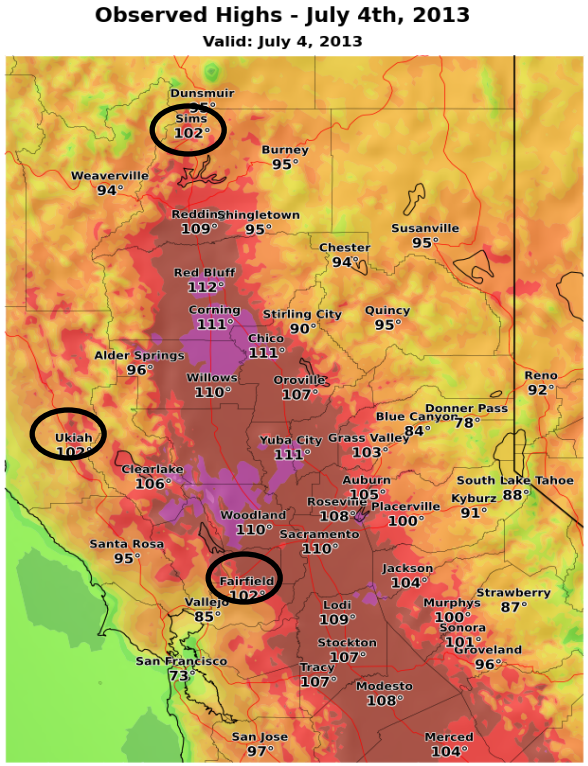
Michael Staudenmaier and Andrea Bair

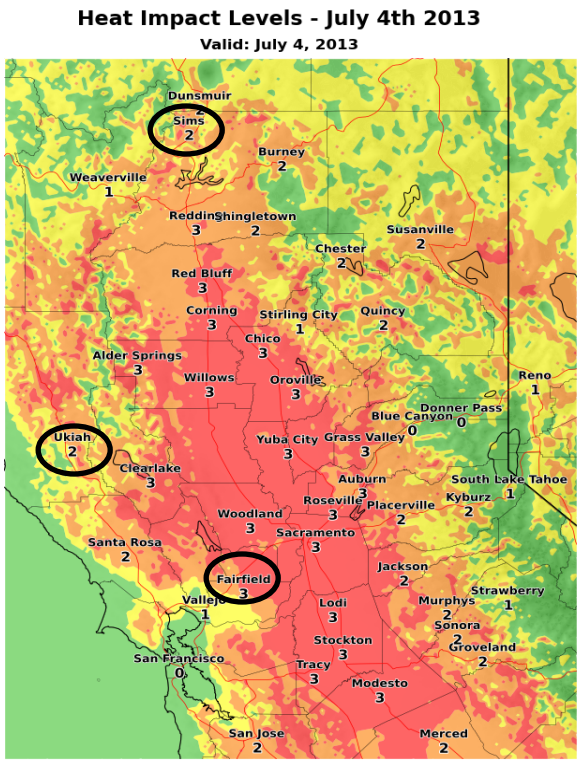
Introduction

- Partners want advanced notice to make decisions
- Heat impacts more than just human health
  - Infrastructure
  - Power
  - Agriculture
  - Livestock
- To move toward a Weather Ready Nation with respect to heat, our current system should be improved.

Heat Impact Level (HIL)

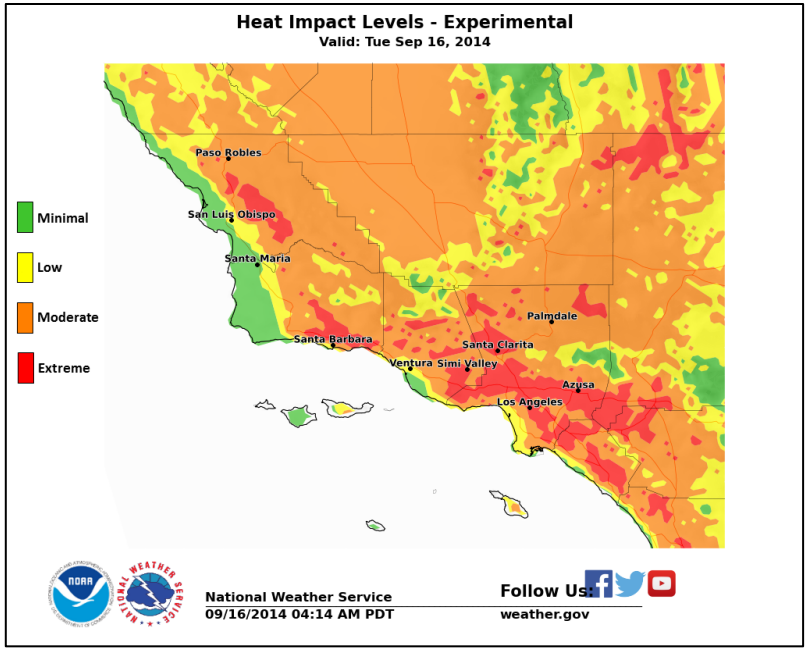
- **Goal: To develop a heat impacts forecast that:**
  - Puts expected heat into climatological context
  - Is available through the entire length of the forecast
  - Allows users and partners to take actions needed at their time scale using a simple color scale of potential impact levels

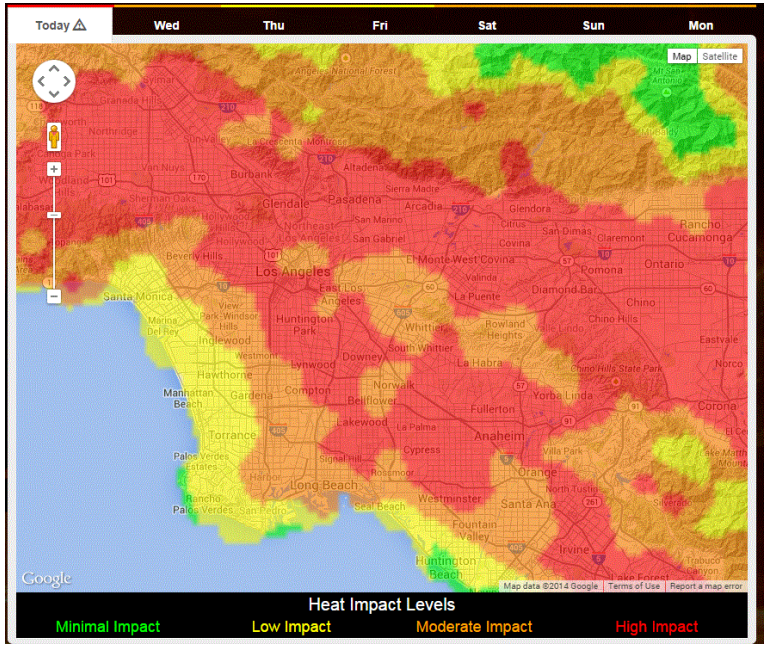




Heat Impact Level (HIL)

- **Goal: To develop a heat impacts forecast that:**
  - Is at high resolution to adequately account for varied terrain
  - Takes advantage of high resolution climate data and gridded forecasts
  - Serves as a framework to build consistency and science into our legacy products and emerging social media messaging capabilities





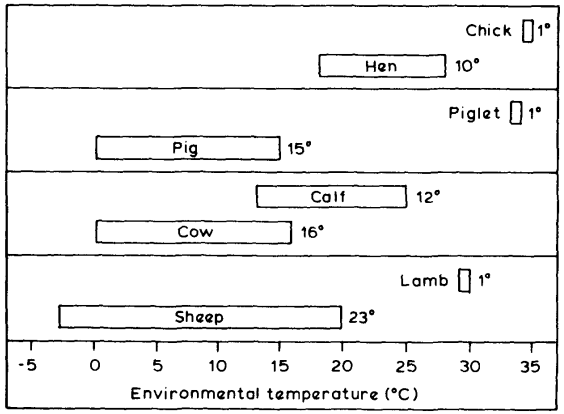
Recent CA Research

- *The Impact of Recent Heat Waves on Human Health in California (2013) – Guirguis et. al.*
  - Criteria should consider **local thresholds** for acclimation to local climatology as well as seasonal timing
  - **Results using high temperature alone worked best** in describing the heat-health relationship in CA.
  - The majority of events do fall in the **top 5% above the 95th percentile**.
  - California could benefit from a **multi-tiered system** that accounts for the vulnerabilities of different populations.

Other Heat Items

- **Early season heat** (first heat wave) can have greater impact due to "mortality displacement"
- Those **without a/c** (or choose not to use), those with chronic physical/mental **health conditions**, **elderly**, **young**, **athletes**, and **outdoor workers** are particularly vulnerable
- Heat impacts can start at **relatively low temperatures**
- Gathering heat morbidity and mortality statistics is **very challenging**.
- Tying one criteria or index to the myriad of heat impacts is **very challenging**.

Figure 4.5 Temperature zones in which farm animals perform effectively. Numbers alongside boxes indicate temperature range. (adapted from: Bianca, 1976).[21]



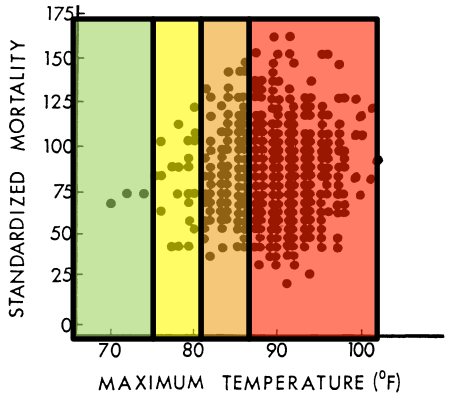
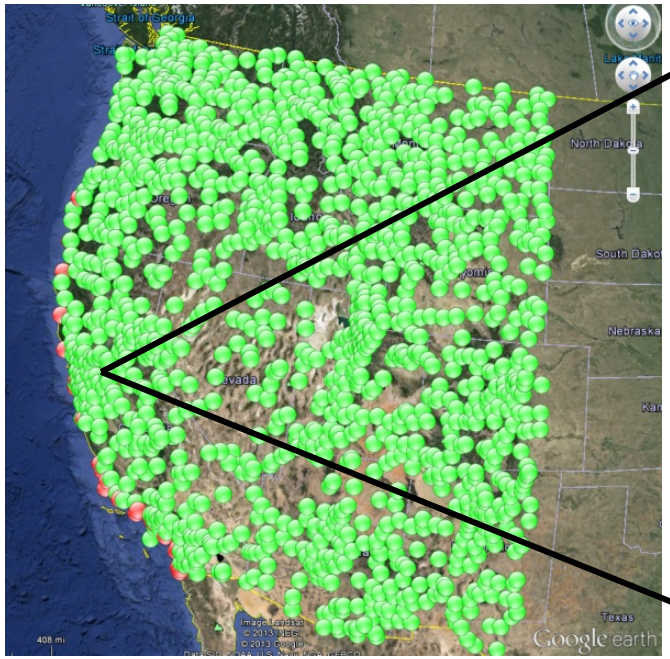


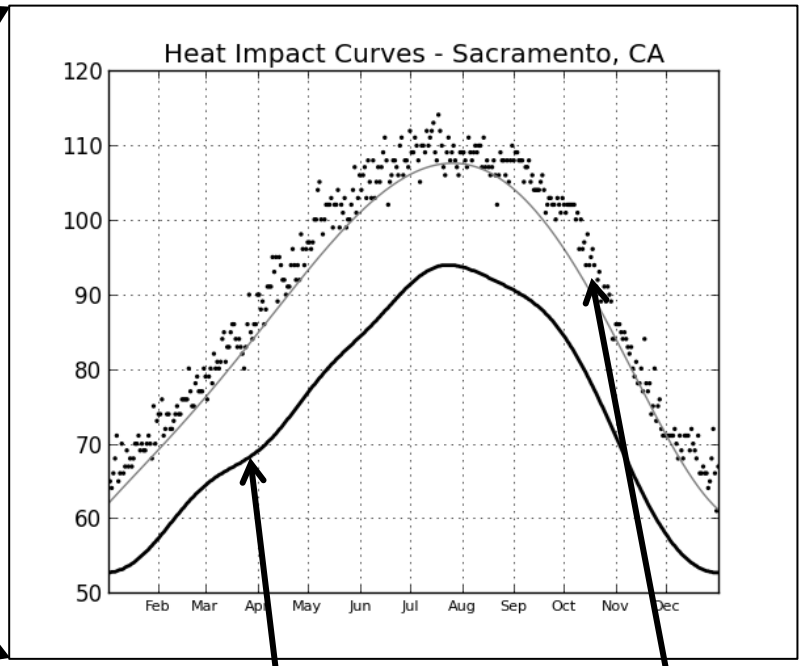
Figure 5. Daily summer-season standardized mortality vs. maximum temperature: Jacksonville.

How Can We Do This?

For each robust observation point: Develop **local relationships** which use near record high and low temperatures as the foundation.



Over 1400 point observations in Western U.S.



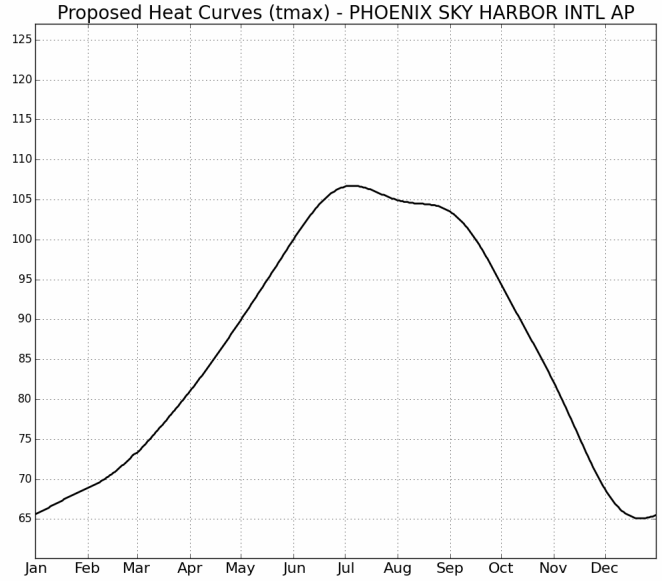
Normal highs

Record highs

How Can We Do This?

Define **unique thresholds** at each location indicating the *level of impacts* possible:

- **Green** – Little to no potential
- **Yellow** – heat related impacts unlikely
- **Orange** – heat related impacts possible
- **Red** – heat related impacts likely



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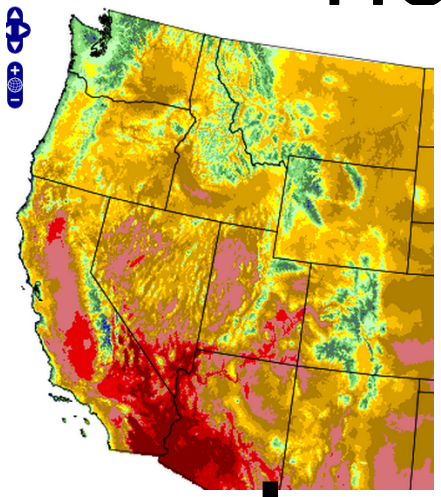
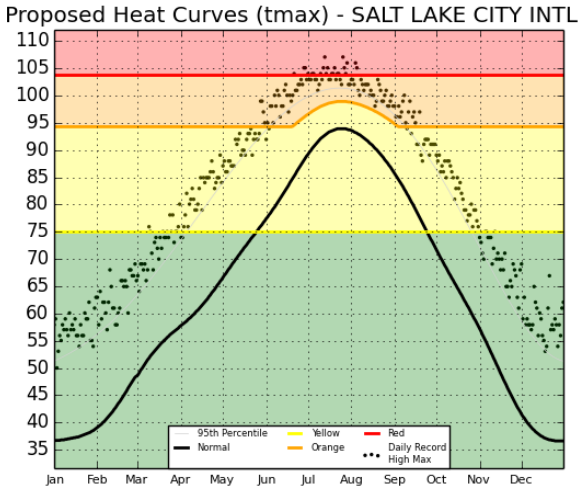
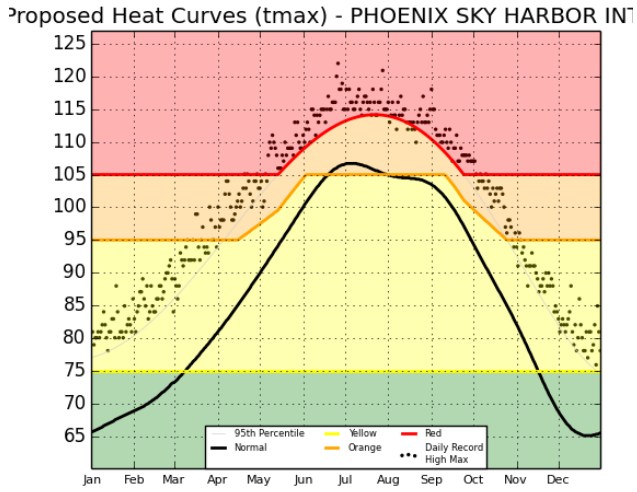
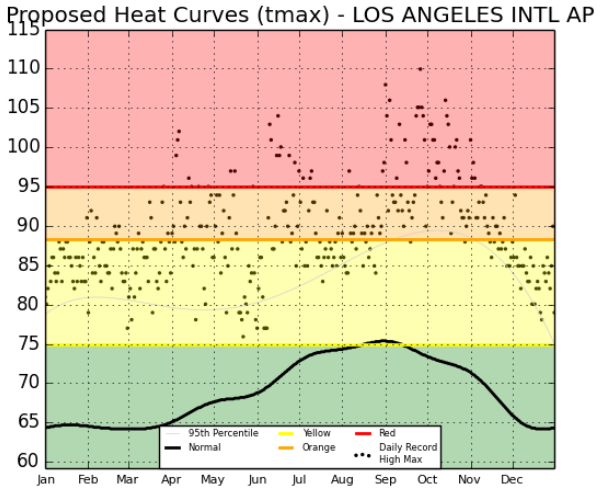


Utilize a **high resolution climatology** (PRISM) database to create unique thresholds at all other points over a 2.5 X 2.5 km grid in the Western U.S.

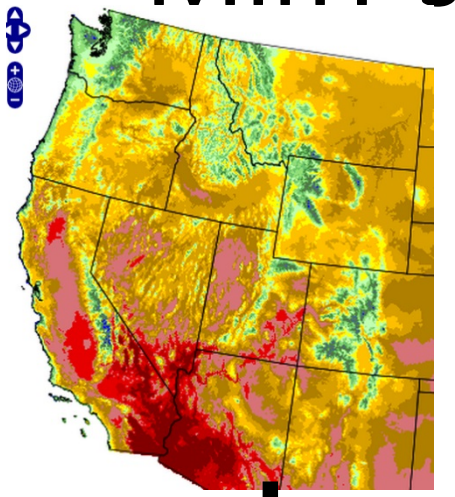






Max Temperature Curves

MinT similar to MaxT Process



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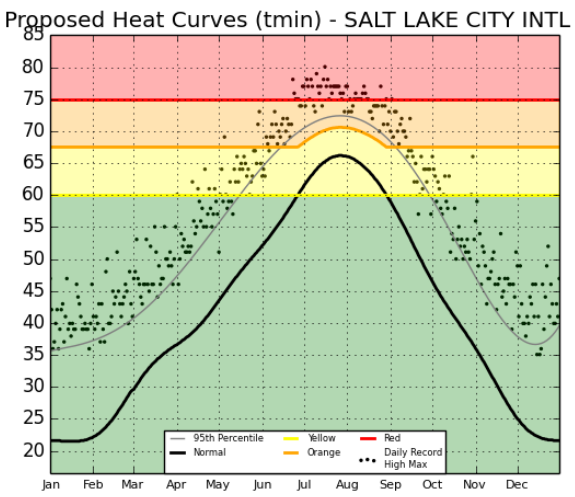
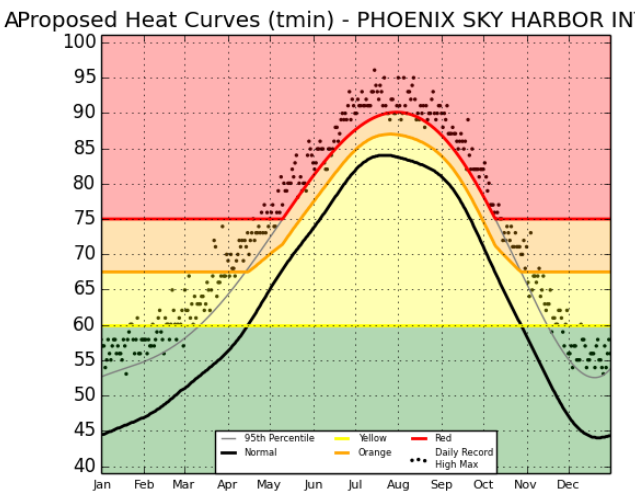
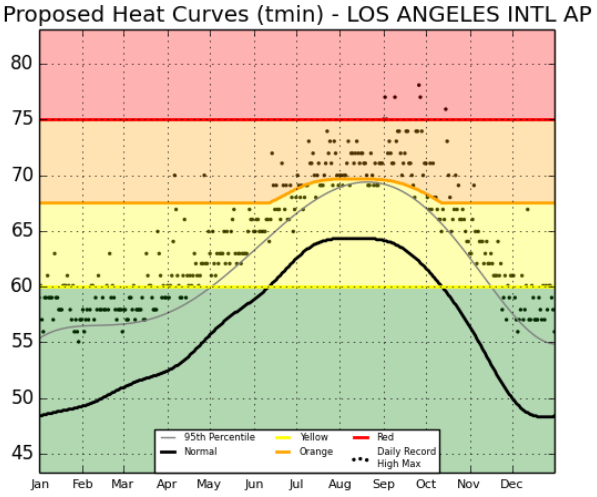
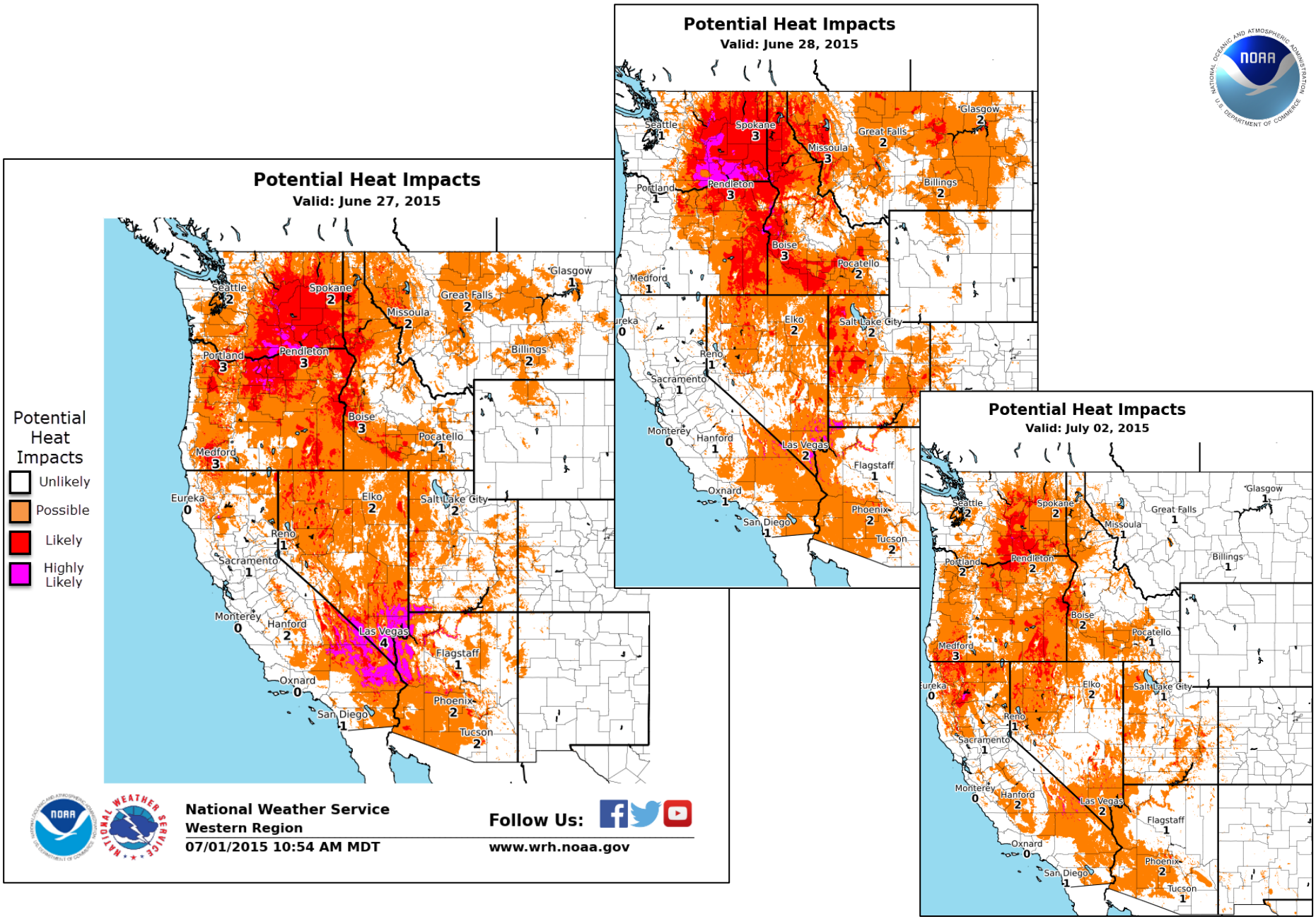
Daily threshold grids generated







Min Temperature Curves


Potential Heat Impacts
Valid: June 27, 2015
Potential Heat Impacts
Unlikely
Possible
Likely
Highly Likely
Seattle 2
Spokane 2
Great Falls 2
Glasgow 1
Missoula 2
Billings 2
Portland 3
Pendleton 3
Boise 3
Pocatello 1
Medford 3
Eureka 0
Elko 2
Salt Lake City 2
Reno 1
Sacramento 1
Monterey 0
Hanford 2
Las Vegas 4
Flagstaff 1
Oxnard 0
Phoenix 2
San Diego 1
Tucson 2
National Weather Service
Western Region
07/01/2015 10:54 AM MDT
Follow Us:
www.wrh.noaa.gov
Potential Heat Impacts
Valid: June 28, 2015
Seattle 1
Spokane 3
Great Falls 2
Glasgow 2
Missoula 3
Billings 2
Portland 1
Pendleton 3
Boise 3
Pocatello 2
Medford 1
Eureka 0
Elko 2
Salt Lake City 2
Reno 1
Sacramento 1
Monterey 0
Hanford 1
Las Vegas 2
Flagstaff 1
Oxnard 1
Phoenix 2
San Diego 1
Tucson 2
Potential Heat Impacts
Valid: July 02, 2015
Seattle 2
Spokane 2
Great Falls 1
Glasgow 1
Missoula 1
Billings 1
Portland 2
Pendleton 2
Boise 2
Pocatello 1
Medford 3
Eureka 0
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Salt Lake City 1
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Sacramento 1
Monterey 0
Hanford 2
Las Vegas 2
Flagstaff 1
Oxnard 0
Phoenix 2
San Diego 1
Tucson 1

It's a Framework, Not a Criteria

- Last year HIL 1.0 which focused on the high temperature relationship
  - Worked pretty good but overnight recovery/duration important
- This year, the **min temperatures** and **duration** (HIL 2.0) are incorporated
- This shows the HIL framework supports **adding complexity** as heat health science and heat impact research allow:

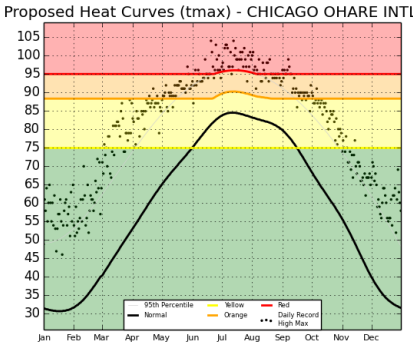
✓ Account for overnight min temps

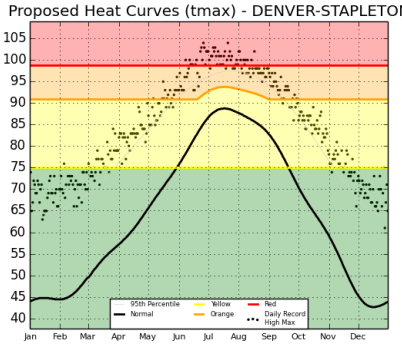
✓ Consecutive day occurrences

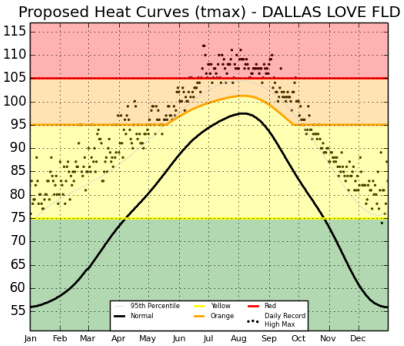
✓ Humidity/apparent temperature

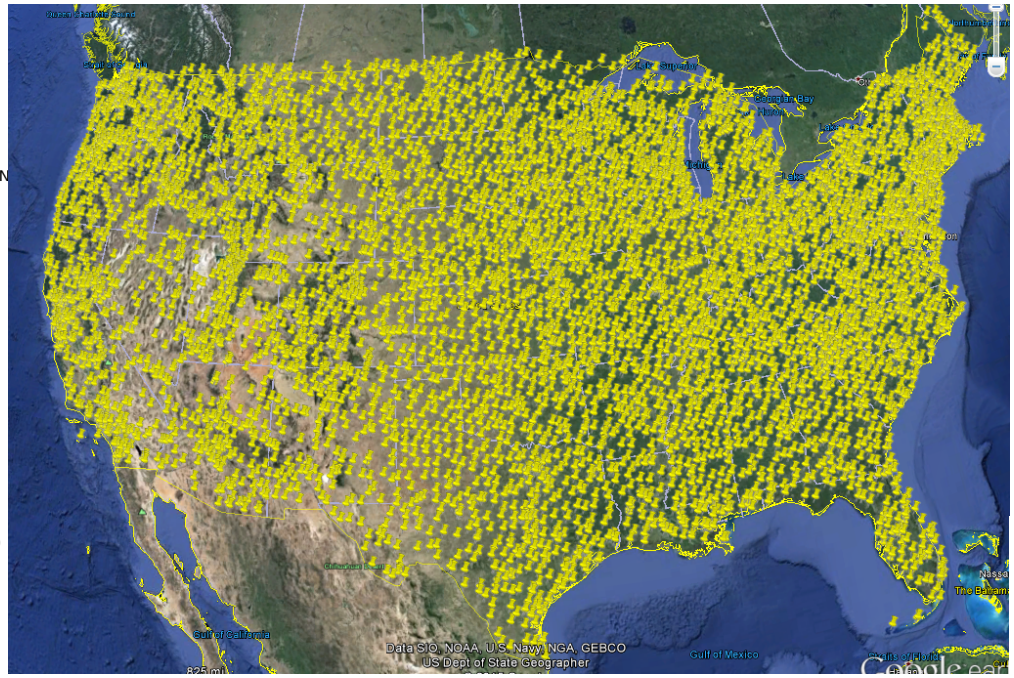
  ✓ minT proxy for humidity

National Value

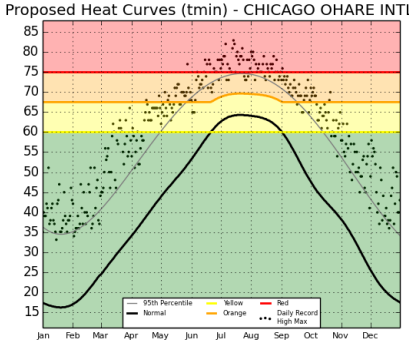


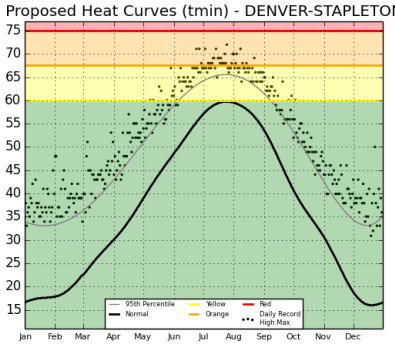


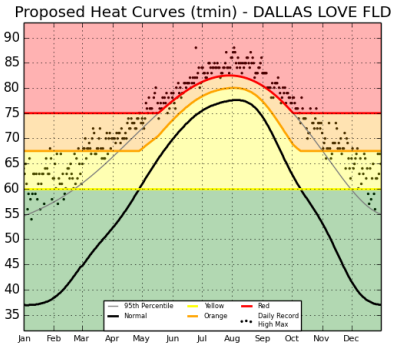


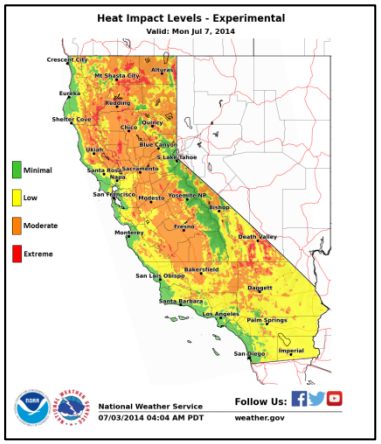


Over 7000 stations

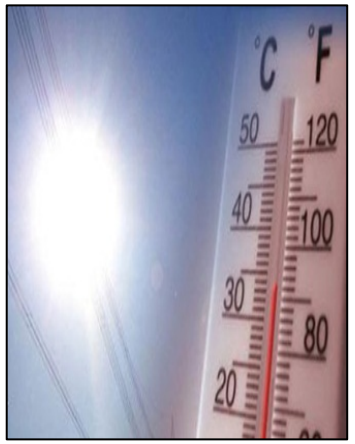








NOAA/NWS
Western Region
Heat Impact Level Project



- **A color-coded index that**:
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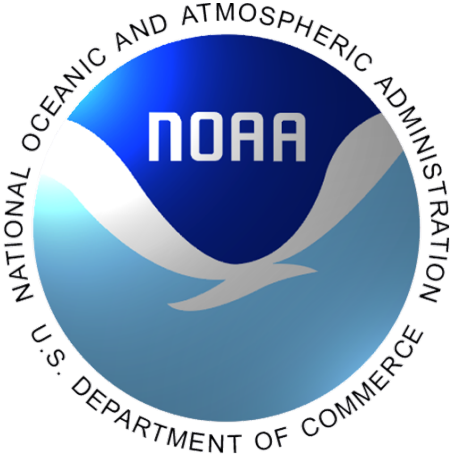

Questions?

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