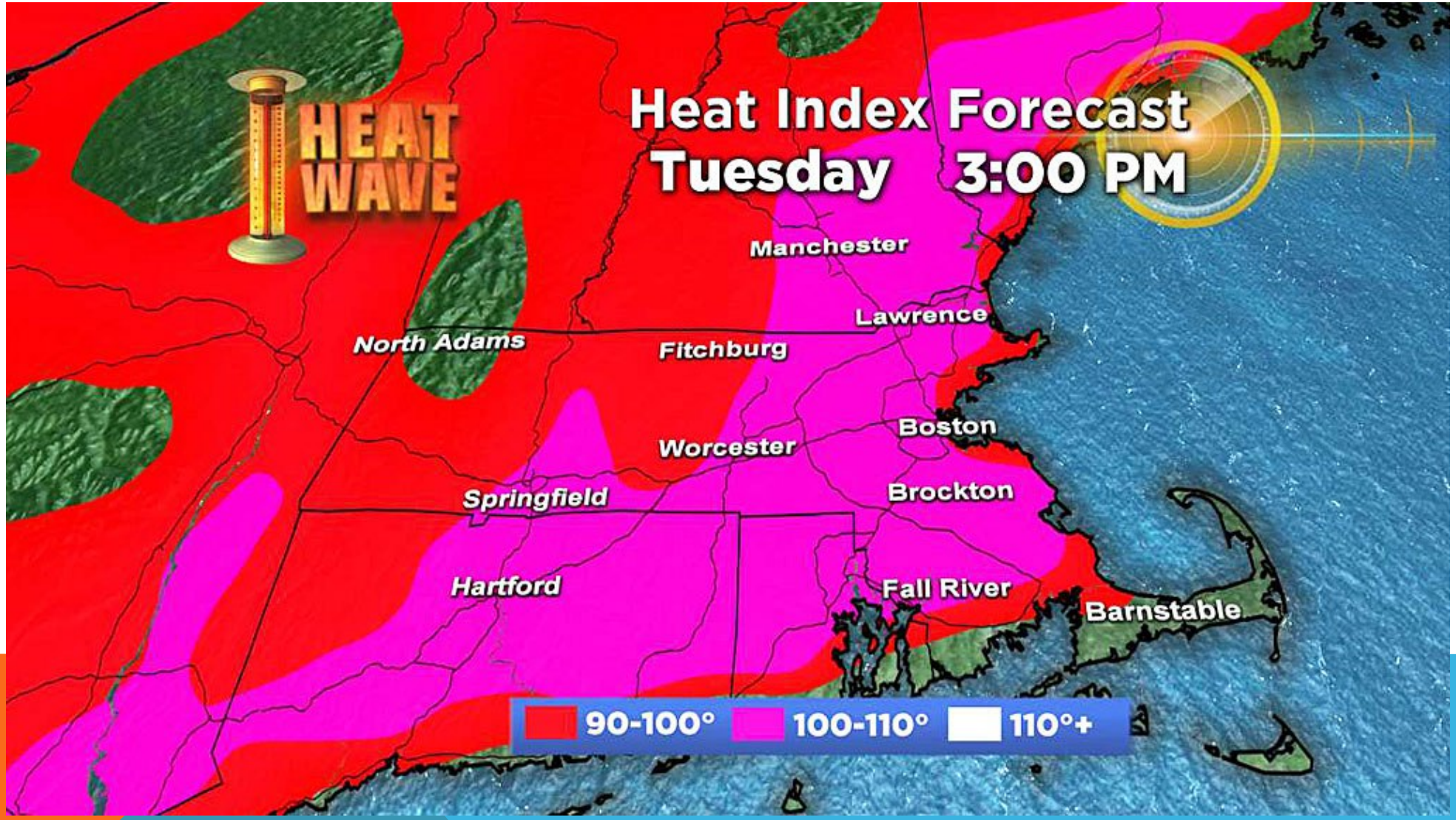
WORKSHOP ON HEAT HEALTH DECISIONS IN THE NORTHEAST

UNDERSTANDING THE HEAT-HEALTH INFORMATION REQUIREMENTS OF MANY DIFFERENT DECISION MAKERS

An initiative of the National Integrated Heat Health Information System (NIHHIS)

SUMMERS IN NEW ENGLAND



CBS Boston
Late August heat wave in 2018

Heat Waves will Worsen in a Warming World

▲ Intensity

- The recent prolonged (multi-month) extreme heat has been **unprecedented** since the start of reliable instrumental records in 1895. (NCA 2014)
- The **intensity of extreme heat events will likely increase**. (NCA 2014)

▲ Duration

- Model results for areas of Europe and North America show that **future heat waves in these areas will be longer lasting** in the second half of the 21st century. (Meehl and Tebaldi, 2004)
- Over the period 1880 to 2005 the **length of summer heat waves** over W. Europe has **doubled** & the **frequency** of hot days has almost **tripled**. (Della-Marta, 2007)

▲ Frequency

- Model results for areas of Europe and North America... show that **future heat waves will become more frequent**. (Meehl and Tebaldi, 2004)

▲ Character

- Most models project somewhat lower relative humidity on the hottest days, but the combined effect of temperature and humidity changes is **substantial increases in heat stress**. (Wuebbles et al., 2014)

▲ Attribution

- "today about **75% of the moderate daily hot extremes over land are attributable to warming**. It is the most rare and extreme events for which the largest fraction is anthropogenic, and that contribution increases nonlinearly with future warming." (Fischer and Knutti, 2015)

Extreme Conditions: Heat (NIHHIS)

- NOAA and CDC launched the National Integrated Heat Health Information System (NIHHIS) in June of 2015 to address heat across timescales
- NIHHIS quickly grew to include representation from several agencies (right) in an interagency working group. The group launched the NIHHIS portal and harmonized heat season outreach.
- NIHHIS has also launched regional, trans-boundary pilots to understand local decision-making contexts and needs, and to improve the information.

Ongoing activities include:

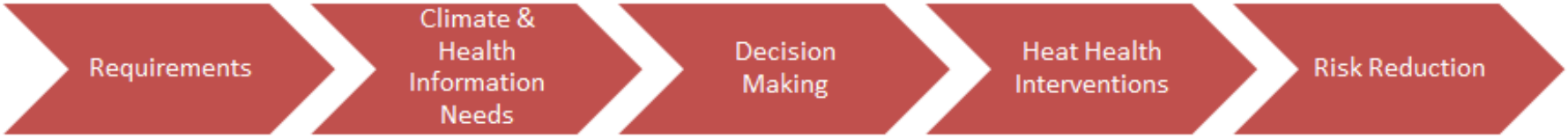
- Expanding border health network in the south,
- 'Decision calendar' exercises to understand multi-disciplinary needs in the Northeast,
- National projects to improve the utility of information.

The National Integrated Heat Health Information System weaves together existing pieces, identifies information needs and helps to develop needed climate services.

NIHHIS will facilitate an integrated approach to providing a suite of decision support services to reduce heat related illness and death

Workshop Goals

- Build and strengthen the **network** between a multidisciplinary set of heat-health decision-makers through relationship and awareness building.
- Identify and document locally-contextualized **interventions** at the planning and preparedness timescales, with important considerations noted.
- Discipline-specific decision makers will use **planning scenarios** to explore decision contexts behind the identified interventions, and specific **information needs** will be documented to support decisions in the form of **decision calendars**.

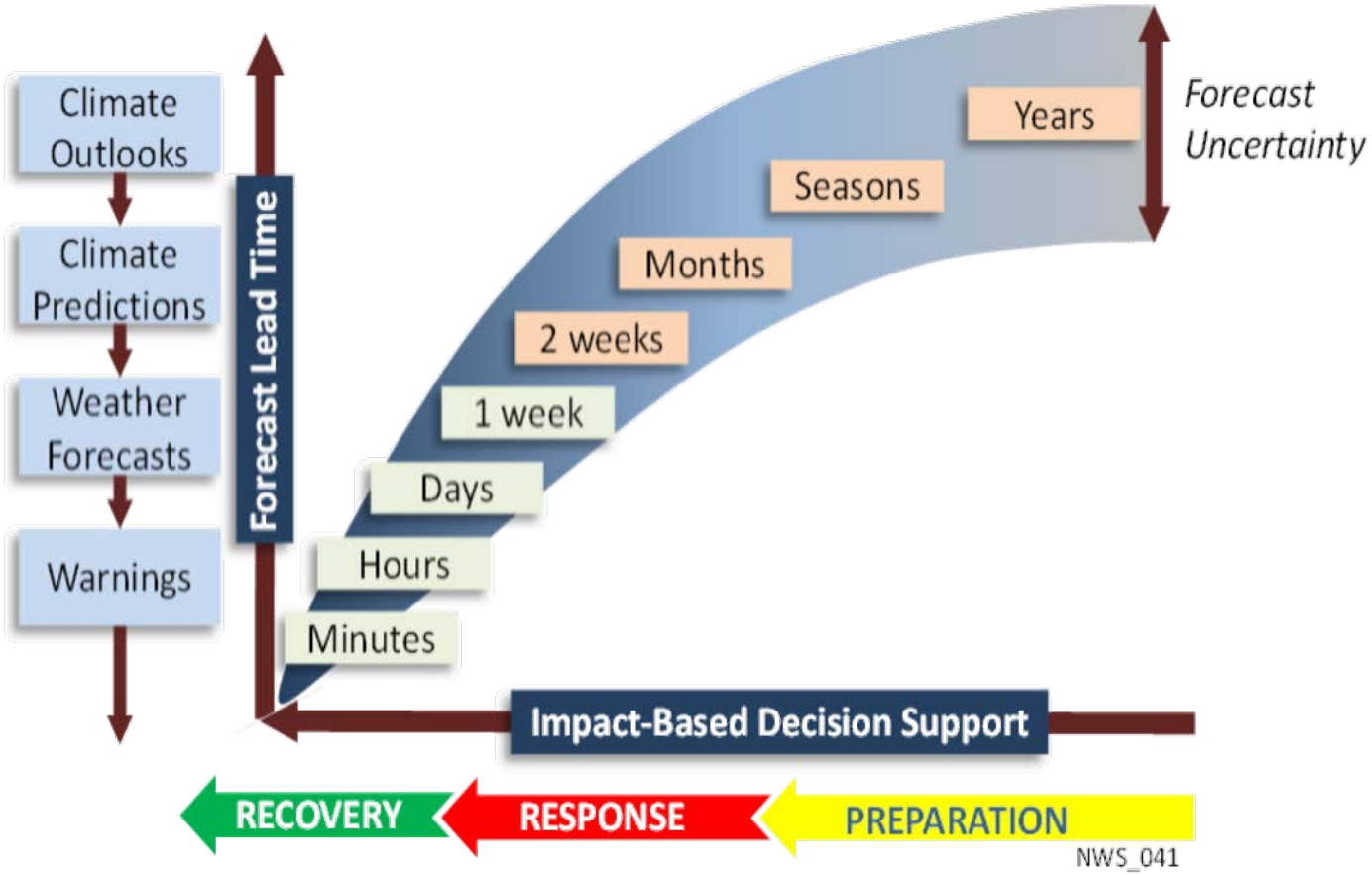


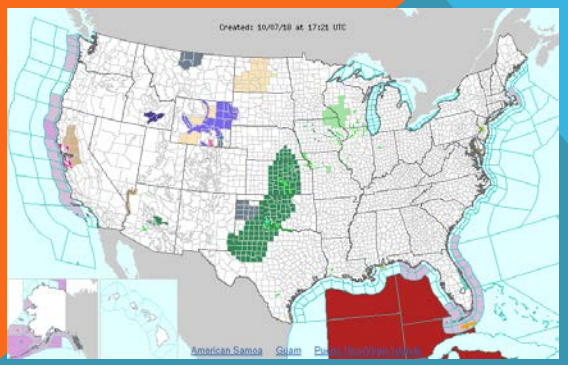
Decision Calendars support **Decision Making** about **Heat Health Interventions** by documenting essential **Climate and Health Information Needs** in a temporally and spatially explicit way that facilitates the elicitation and elaboration of **Requirements**

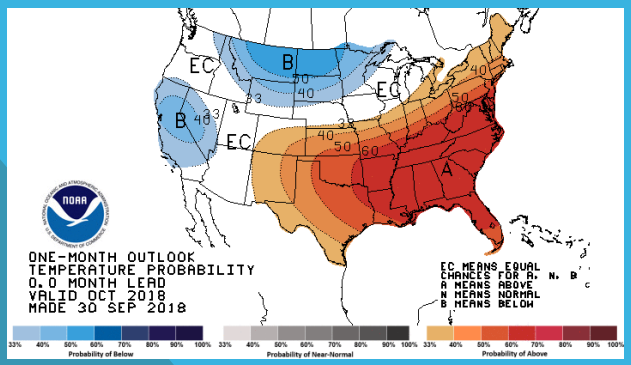
EXTREME HEAT'S HEALTH IMPACTS

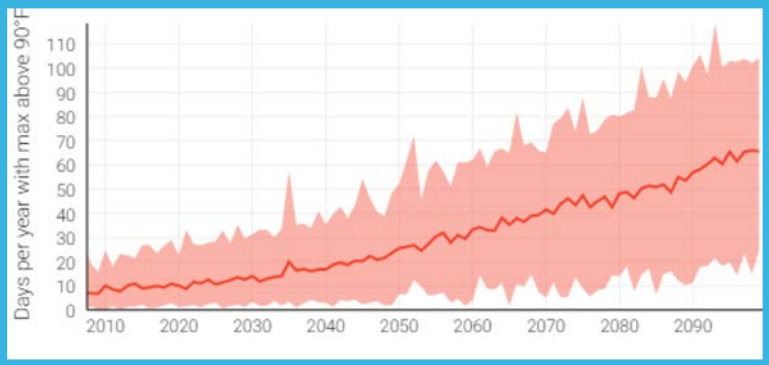
- Discomfort
- Reduced labor productivity
- Psychological distress
- Exacerbation of preexisting chronic conditions
- Heat exhaustion
- Heat cramps
- Heat stroke
- Death

UNDERSTANDING DECISION TIMESCALES









HEAT HEALTH RISK MANAGEMENT ANNUAL CYCLE

Analysis of historical impacts & climate observations

Previous Years

What can we learn from past experiences to improve heat health planning and preparedness?

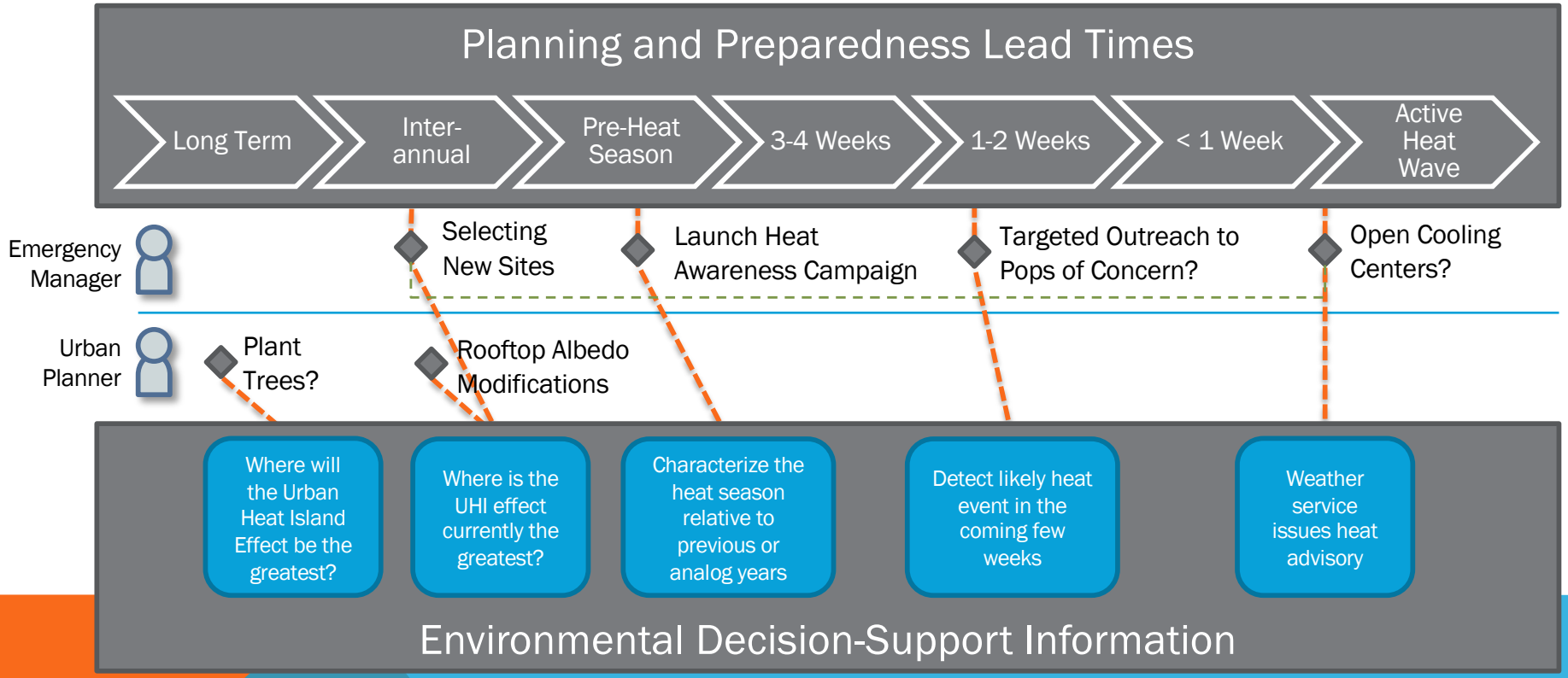
Scenario-based planning & climate predictions

Future Years

How might our current approach fail under future climate stressors, and how can we prevent such failure?

DECISION CALENDARS

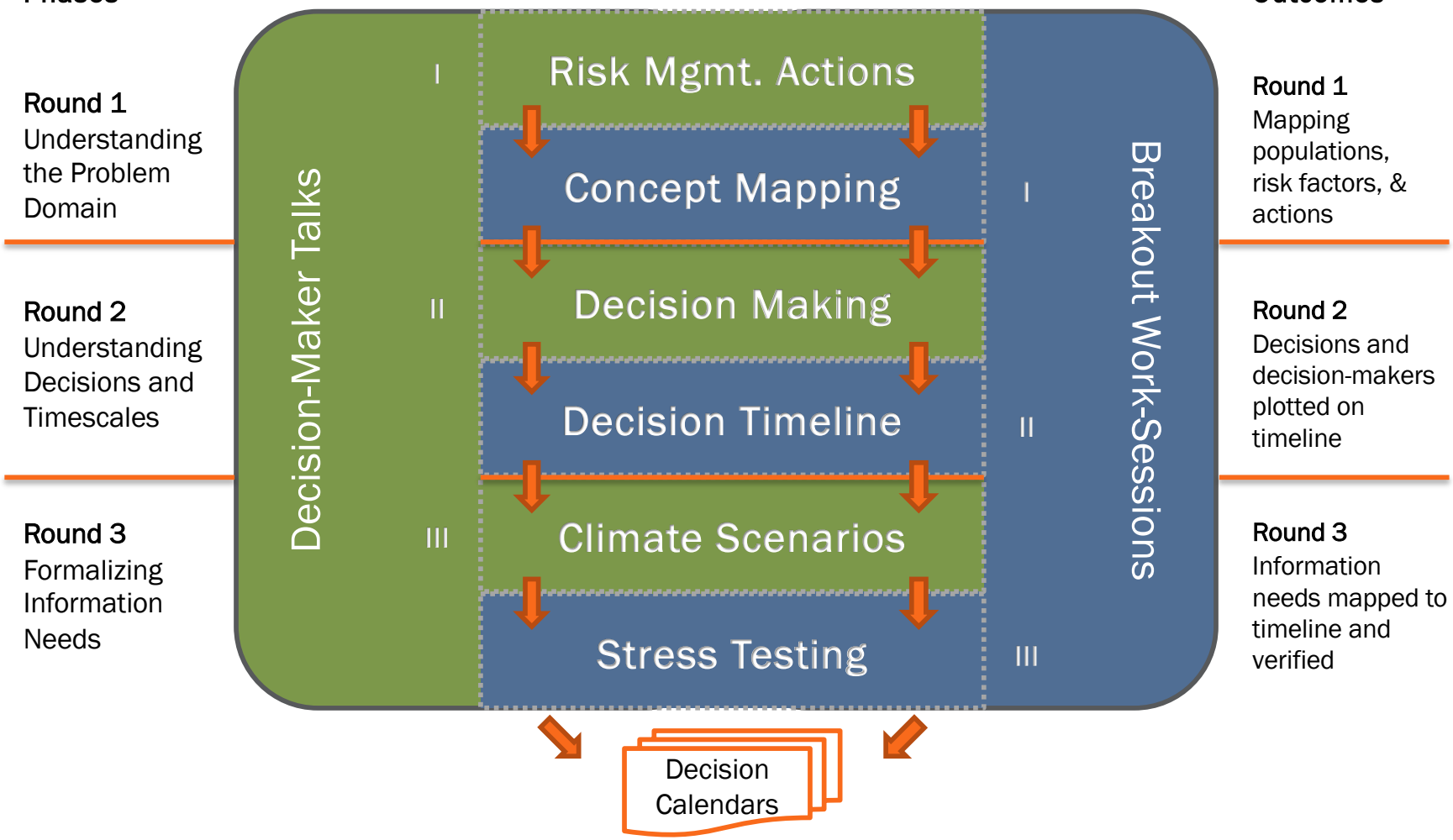
Decision calendars are a framework to organize information about user context in decision-making. They document what needs to be known when, by whom, and with what certainty in order to take actions to reduce heat health risk.



For more information see:

Ray, A. J., & Webb, R. S. (2016). Understanding the user context: decision calendars as frameworks for linking climate to policy, planning, and decision-making. Climate in Context, 27–50. doi:10.1002/9781118474785.ch2

Workshop Process



The workshop opens with a primer on the process for developing decision calendars that will be followed throughout the day, as well as a brief overview of the heat health climate context. The meeting then proceeds through three cycles of lightning talks and breakout groups which will successively build decision calendars, first through concept mapping, and then using a timeline.

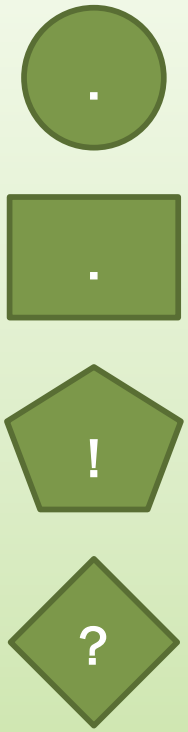
BREAKOUT GROUPS (RISK CATEGORIES)

Exposure	**Group A** *Outdoor Active Exposure* This group will focus on decisions which must be made to protect people who must be exposed for work or play, such as emergency responders, athletes, and military personnel. [Sean Birkel]	**Group B** *Outdoor Incidental Exposure* This group will focus on decisions which must be made to protect people while they are exposed incidentally – in transit to other places, or engaged in leisure or neighborhood activities. [Bill Solecki]	**Group C** *Indoor Exposure* This group will focus on decisions which must be made to protect people while they are in homes and other buildings, including elderly care facilities or schools. [Ellen Mecray]
Vulnerability	**Group D** *Physiological Vulnerability* This group will focus on decisions which must be made to protect people who experience heightened vulnerability due to physiological constraints due to age, medication / drug use, or temporary concerns such as a lack of acclimatization. [Pat Kinney]	**Group E** *Behavioral Vulnerability* This group will focus on decisions which must be made to protect people who are at greater risk because of their behaviors, which with proper education and awareness, can be modified to reduce risk. [Tonna-Marie]	**Group F** *Disability & Limited Agency* This group will focus on decisions which must be made to protect people with disabilities or limited agency (those who depend on others) as well as those who may have fewer means (lower income) or less access to services. [Hunter Jones]

During breakouts, individuals will be assigned to groups based on risk factors which must be managed to protect people from extreme temperatures. Each risk categories may contain multiple risk factors, and may be linked to multiple vulnerable groups. A set of interventions may be employed to manage these risk factors.

COMPONENTS FOR MODELING

Breakout Round 1



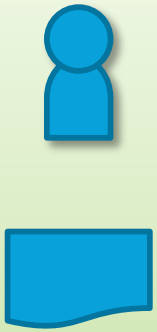
Population of Concern
Any group of people with shared characteristics who are at heightened risk of heat health impacts.

Risk Factor
A characteristic of a person or group that increases their vulnerability or exposure to the hazard of excessive heat.

Risk Management Action
Any health intervention or other action which can be taken to address risk factors and reduce risk in a population.

Decision Point
A question which must be answered in order to implement a risk management action.

Breakout 2



Decision Maker
Any person who is charged with making decisions and taking actions to manage risk in a population of concern.

Information Need
Climate, weather, or health information needed to inform a decision regarding a risk management action.

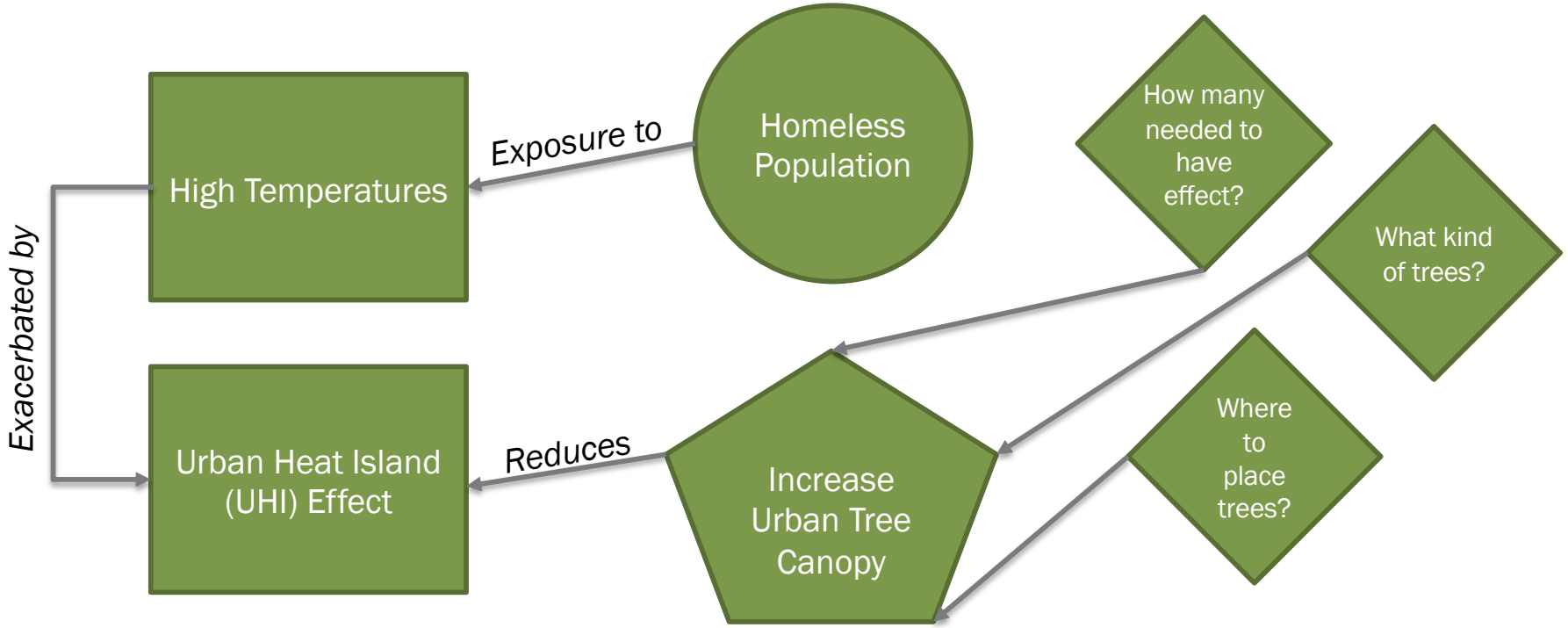
Breakout 3

Assumption
A thing held constant and believed to be stable for the duration of an action (e.g. the power will be stable and adequate to run A/C units.

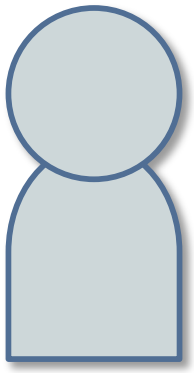
INSTRUCTIONS
BREAKOUT 1 - CONCEPT MAPS

Concept maps are used to represent relationships between things.

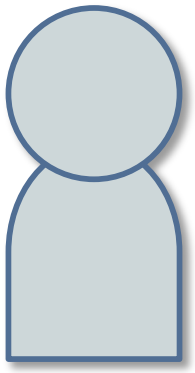
They are composed of very basic elements: shapes and connectors.



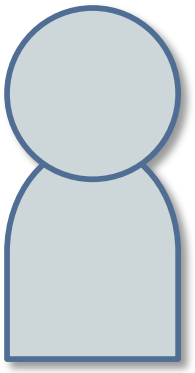
For round 1, do not worry about who takes the action or what information is needed to inform decisions about the action.



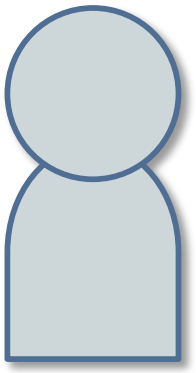
Older Adults



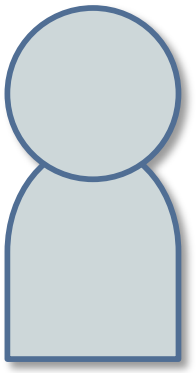
Athletes



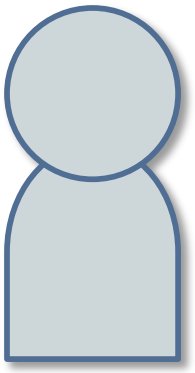
Outdoor Workers



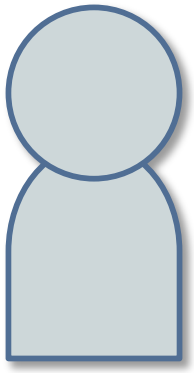
Homeless



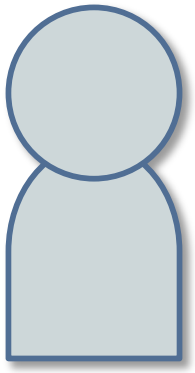
Emergency Responders



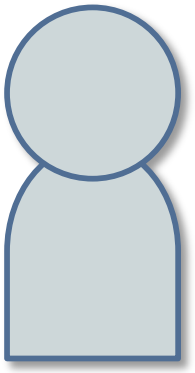
Children



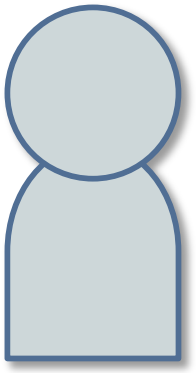
Military Service Members



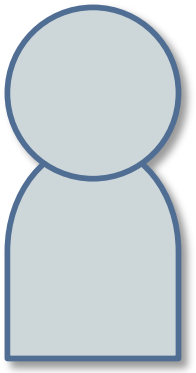
Disabled



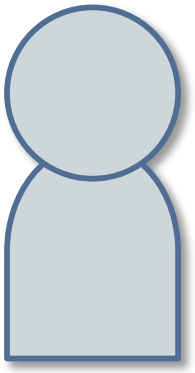
Pets



Institution-alized

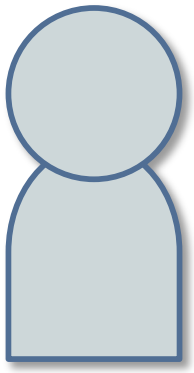


Communities of Color

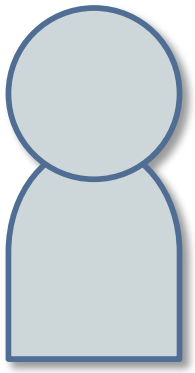


Individuals with Chronic Conditions

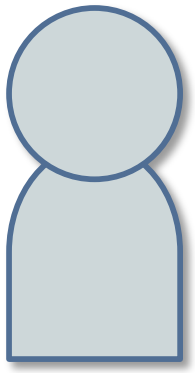
INDEX OF POPULATIONS OF CONCERN



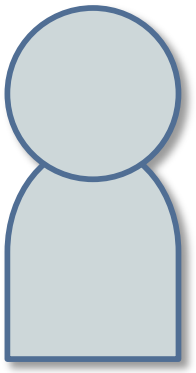
Transportation Official



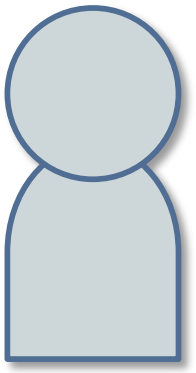
Energy Risk Manager



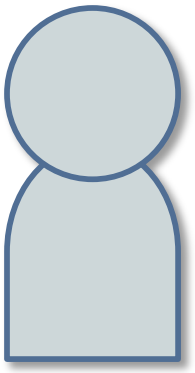
Health Commissioner



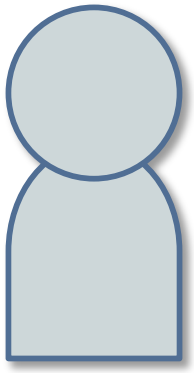
Emergency Manager



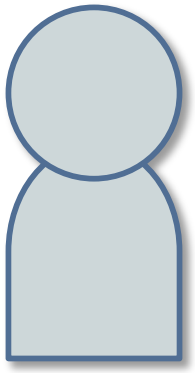
Mayor



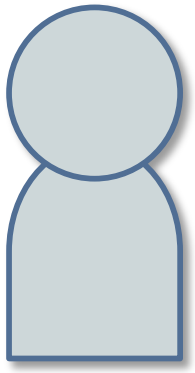
Chief Resilience Officer



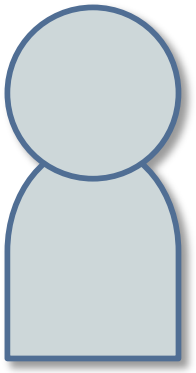
Hospital Administrator



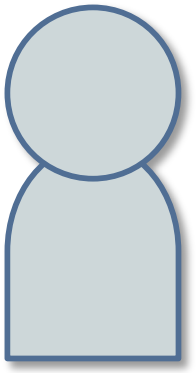
Coach or Trainer



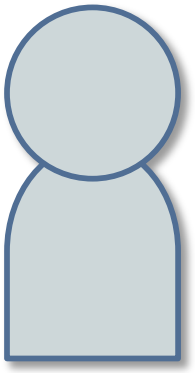
Caregivers for older adults



Construction Managers



City Planners and Architects



Medical Professionals

INDEX OF DECISION MAKERS

RISK FACTORS

HAZARD, EXPOSURE, VULNERABILITY

- Physiology / Thermoregulation
- Medication or Drug Use
- Dependence
- Social Pressure to Work/Perform
- Over-Exertion
- Personal Protective Equipment (PPE)
- Social Isolation
- Low/Fixed Income
- Poor Fitness or Acclimatization
- Limited Access to Care
- Lack of Awareness of Symptoms
- Obesity
- Dehydration
- Sleep Deprivation
- Underlying Illness
- Alcohol Use
- Insolation
- Low Air Circulation or Wind
- High Humidity
- High Temperatures

INTERVENTIONS

- Green Infrastructure
- White Roofs
- Passive Cooling
- Social Cohesion Development
- Neighborhood Watches
- Cooling Centers
- Schedule Changes to Avoid Exposure
- Plan for Utility Outages
- Increase Health Care Staff
- Regulation Changes and Zoning
- Mobile Apps
- Personal Temperature Monitors
- Smart Thermostats
- Home Energy Efficiency Assessments (EmPower-NYC and MassSave)
- Social Media Campaigns
- Caretaker Training
- Community Outreach Meetings

ASSUMPTIONS

- Electricity Available
- Ability to Understand English
- Transportation Infrastructure
- Individual Mobility
- Ability to Afford Energy Costs
- Stable Climate Regime
- Telephone Service
- Internet Access

INFORMATION NEEDS

High Resolution Urban Heat Island Map

Social Vulnerability Indices

Hospitalization Outcomes by County

Heat Season Outlook (number of heat waves, +/- avg, relative to last year)

Heat Wav Predictions at Lead time 2,3,4 weeks – planning

Heat load forecast (cooling degree days per week)

Wet Bulb Globe Temperature predictions over athletic fields and work sites

..

WORKSHOP OBSERVATIONS & OUTCOMES

- There are many disciplines involved in managing heat health risk, but they don't necessarily work closely together or understand each other.
  - An important outcome is strengthening this network of practitioners and researchers so that they work more closely together.
- Removing barriers to networking and learning is important. The workshop was held in a neutral space, with enough distance from day jobs and other distractions to allow participants to focus.
- The S2S timescale is still a challenge for participants in terms of understanding the utility of climate information. Though the workshop successfully encouraged participants to think long-term, it was still hard to get them to think about weeks 3-4 or even seasonal information.
- The presentations which were most commented on were those coming from an unfamiliar specialty (athletics or energy) and those which offered a logical construct for analyzing decisions.

WHAT'S NEXT?

- The prototype decision calendars developed today will be combined with context from the talks and from other background information to create a synthesized complete decision calendar for heat health risk management.
- This interim product will be shared back with meeting attendees for comments and corrections.
- A final version of the decision calendar will be prepared and linked to climate and health information requirements and products (existing and potential).
- From this documentation of information requirements, existing products can be improved, and new products can be piloted.
- Over the next several months, new products will be prepared for piloting during heat season.
- A NIHHIS webinar series will be developed to build on outcomes of the workshop.

NOAA NWS EXPERIMENTAL “HEATRISK”

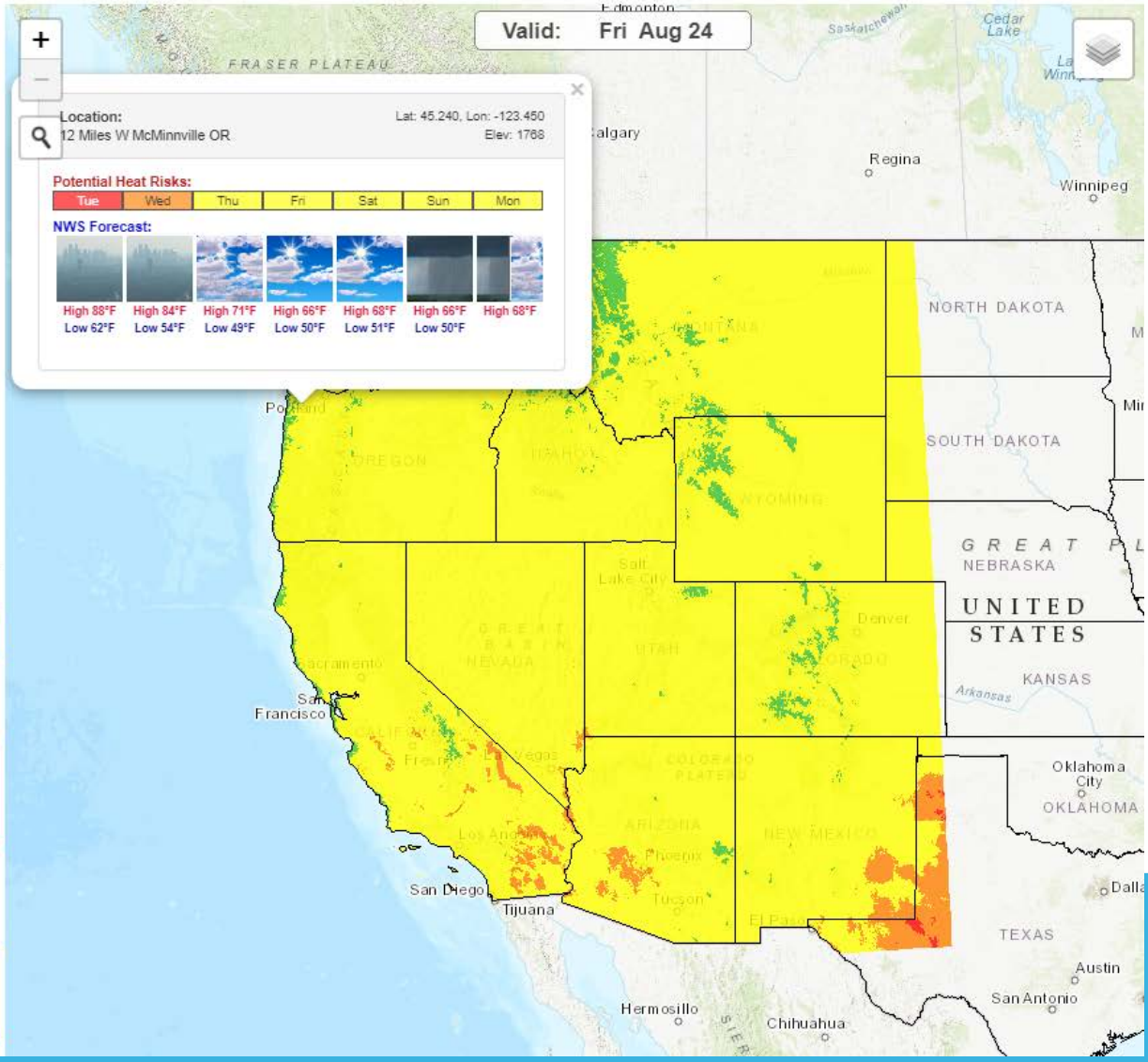
Tue 8/21	Wed 8/22	Thu 8/23	Fri 8/24	Sat 8/25	Sun 8/26	Mon 8/27

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

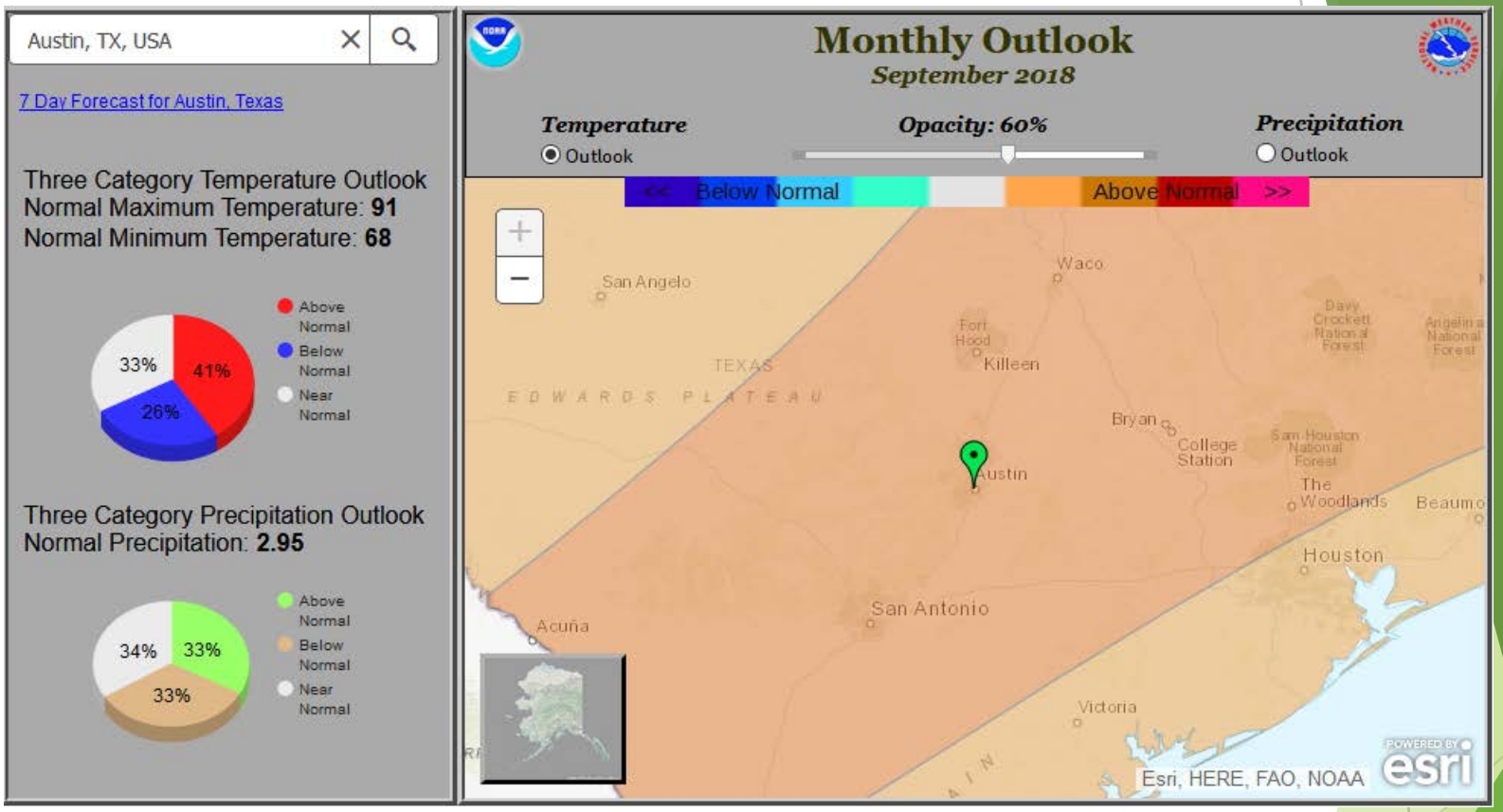
HeatRisk More Information

Heat affects everyone differently. In order to better address heat risk and allow you to prepare for upcoming heat events, the NWS has developed the experimental HeatRisk forecast. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. In a similar way, it provides one value each day that indicates the approximate level of heat risk concern for any location, along with identifying the groups who are most at risk. This product is supplementary to the official NWS heat watch/warning/advisory program and is meant to provide continuously available heat 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	Level	Meaning
Green	0	No Elevated Risk
Yellow	1	Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration
Orange	2	Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration
Red	3	High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration
Magenta	4	Very High Risk for entire population due to long duration heat, with little to no relief overnight



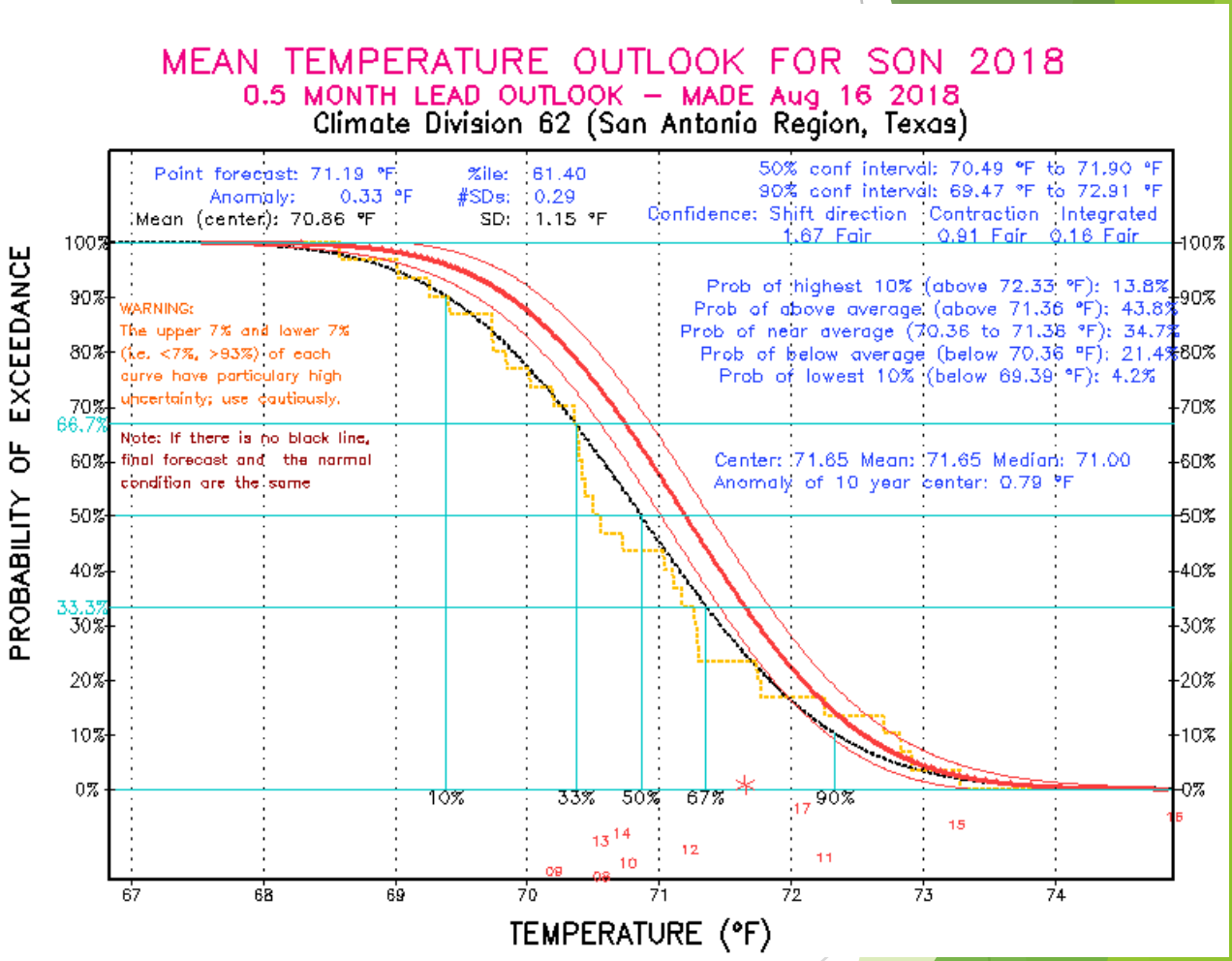
https://www.wrh.noaa.gov/wrh/heatrisk/



This is an example of the information that is provided now. You can get the probability that the temperatures will fall in the upper, lower, or middle tercile of climatological norms. So in this case, a slight chance that temperatures will be above normal in Austin in September, but not a strong signal.
[http://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead14/interactive/index.php]

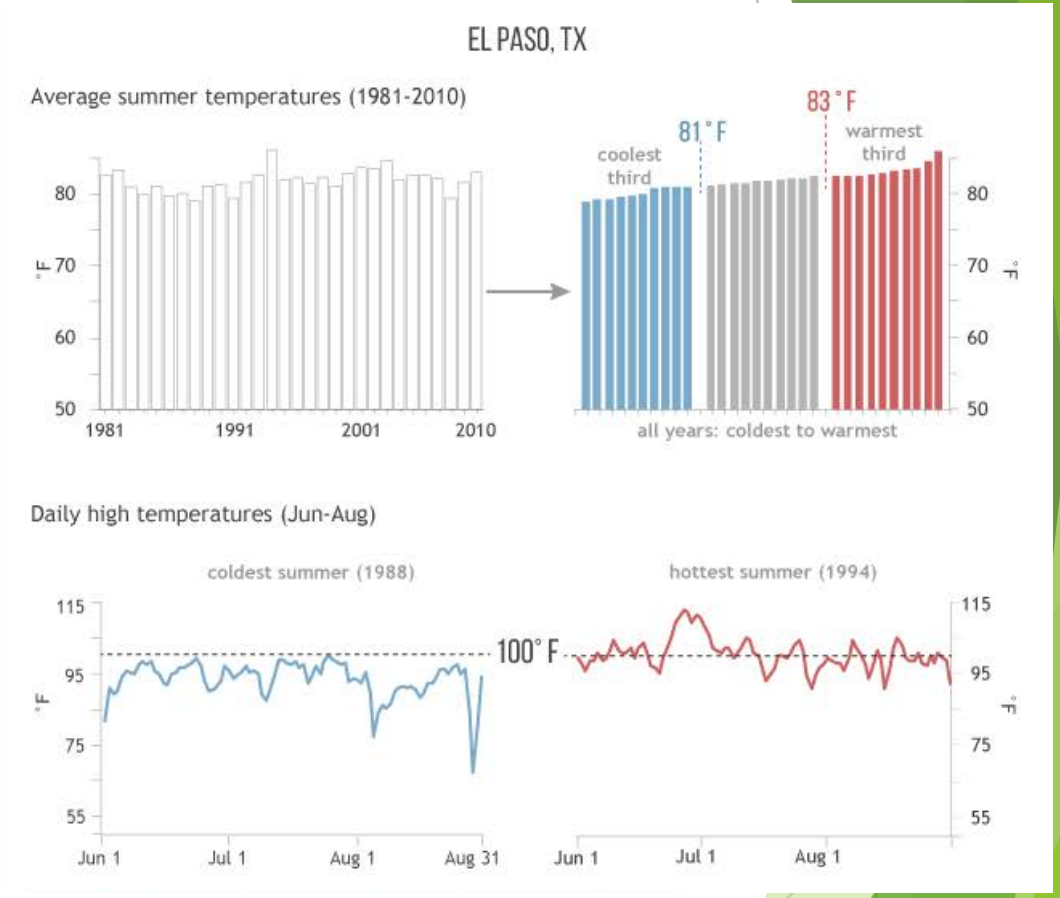
Here's another view of similar information, but by season, if you think that might be more useful. It shows the information as a curve, so you can see the probability distribution. So it looks like we could go with a best guess of the temperatures being .79F above average this fall (SON).

I wonder if I could get NOAA's Climate Prediction Center to produce a POE curve like this for their monthly predictions. I think this would be most useful.

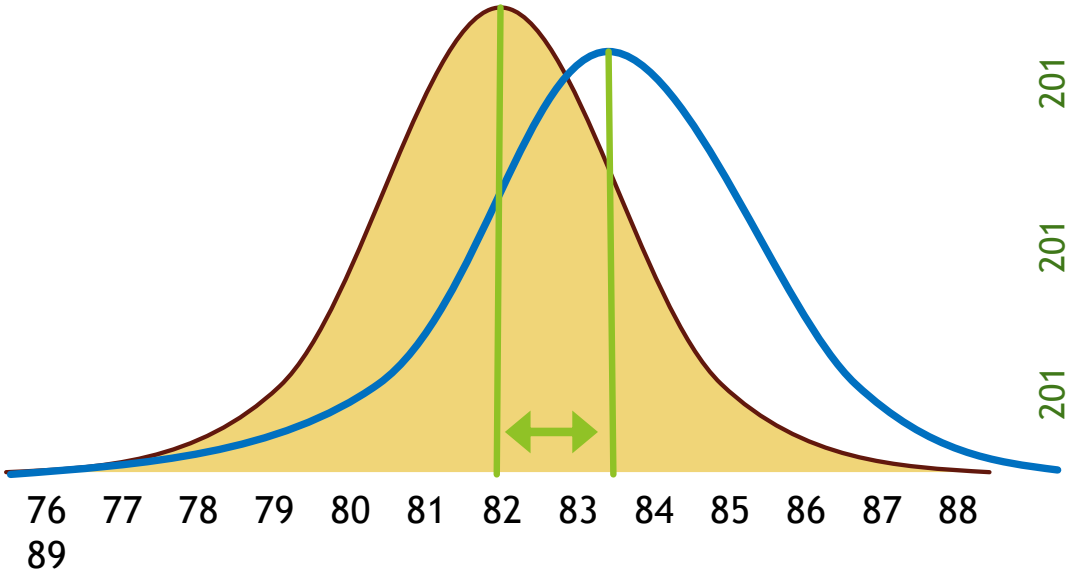


This explainer piece will help you understand how to interpret this information

https://www.climate.gov/news-features/understanding-climate/where-are-highest-chances-hot-summer-2017



Here's a crude example of what we could show in an energy bill:



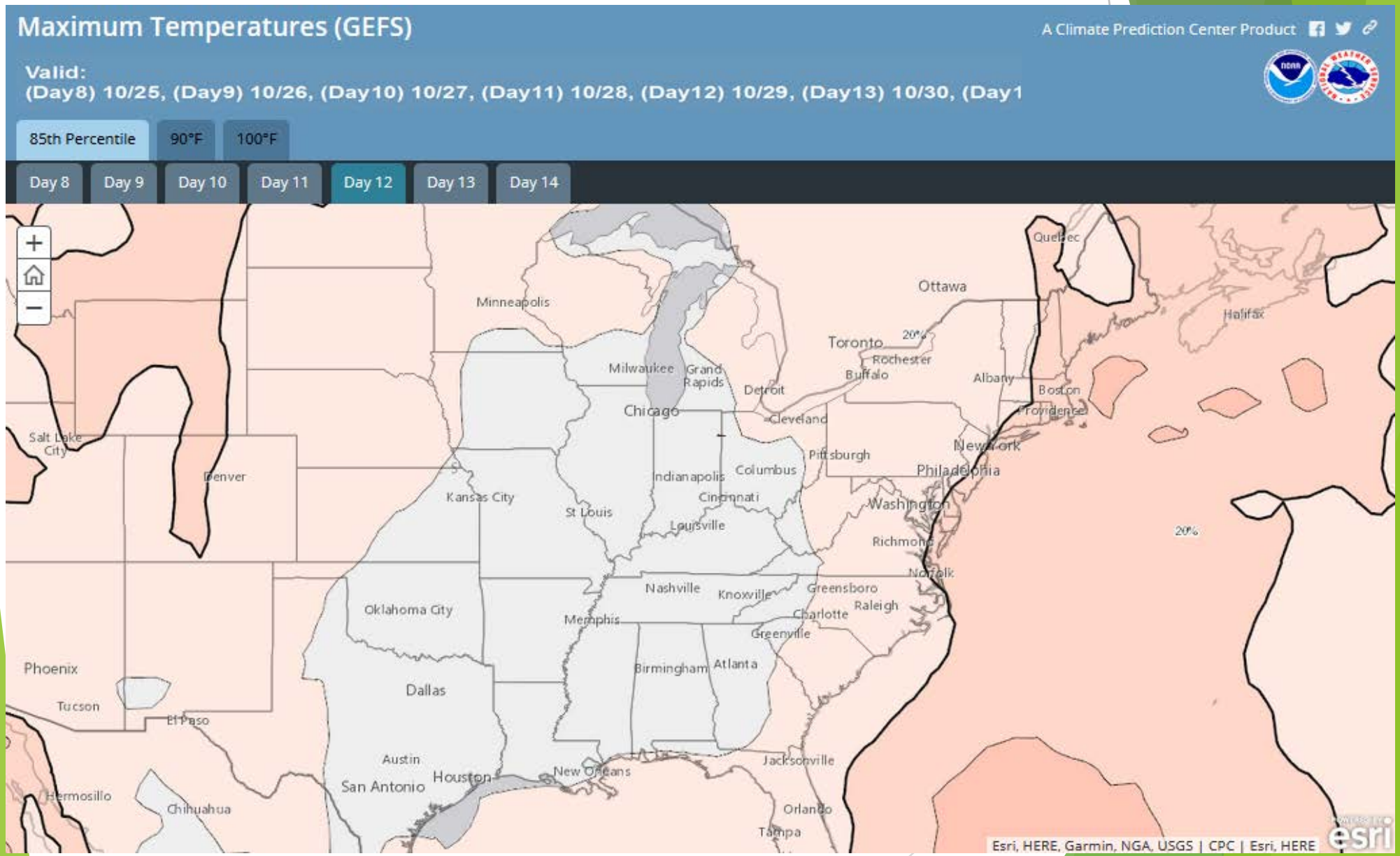
2017 81.1 F — Current Month (August) Average Temperature

2018 82.0 F — Average September Temperature

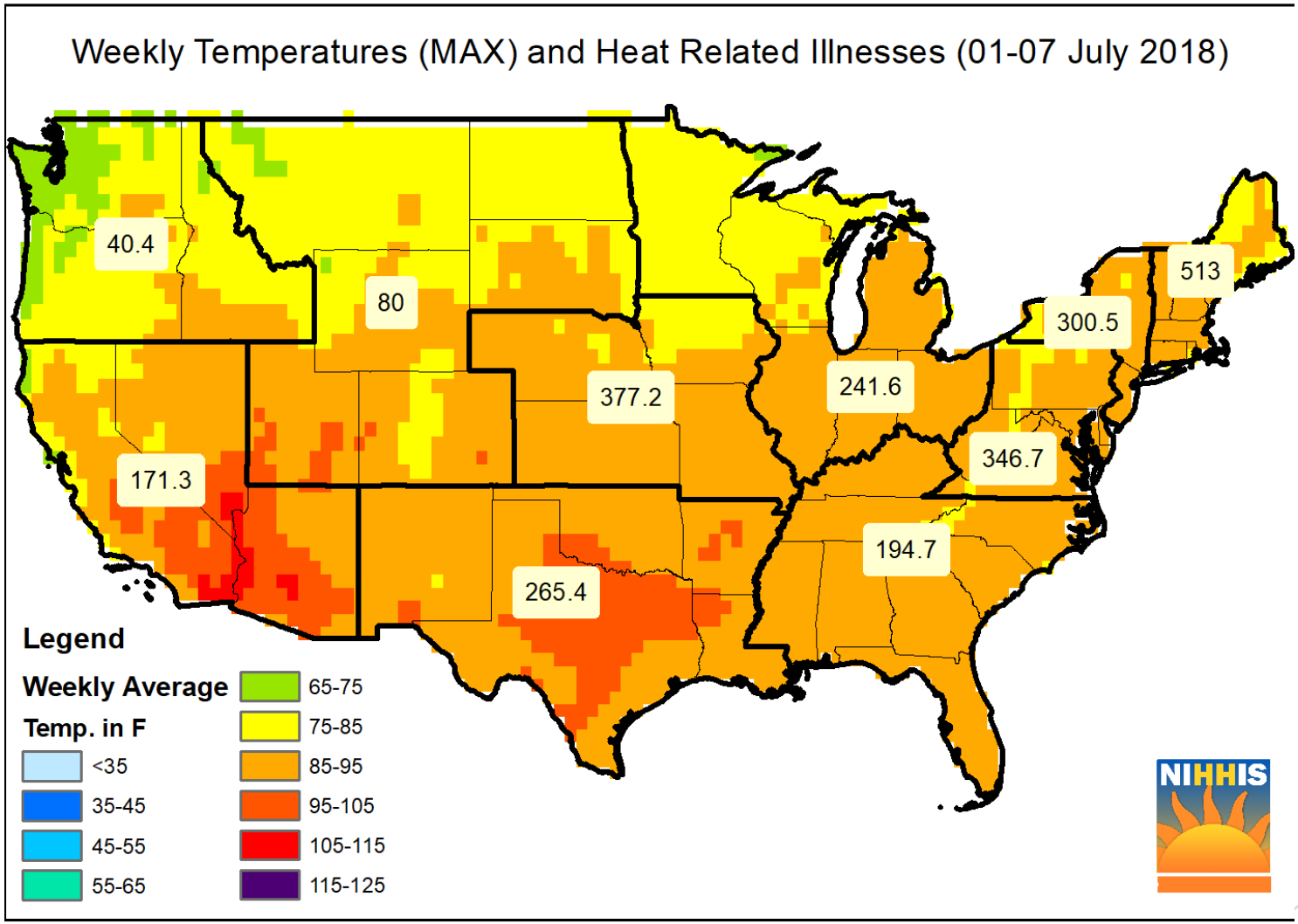
2018 83.5 F — Predicted Average Temperature Next Month

Mean temperature for the month of September in Austin, TX is expected to be 1.5F warmer than the average September, and this translates to a potential increase of $23 in your energy bill compared to last September, based on your energy use history.

New as of October 2018: Week-2 Global Probabilistic Extremes Forecast Tool



NIHHIS Climate and Health Monitor



Number of heat-related illness (HRI) cases observed per 100,000 emergency room visits by HHS region for 01-07 July 2018 and ambient average maximum air temperatures for the same period.