The National Integrated Heat Health Information System (NIHHIS)

Understanding Decision-making Information Needs through Partnership

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http://climate.gov/nihhis

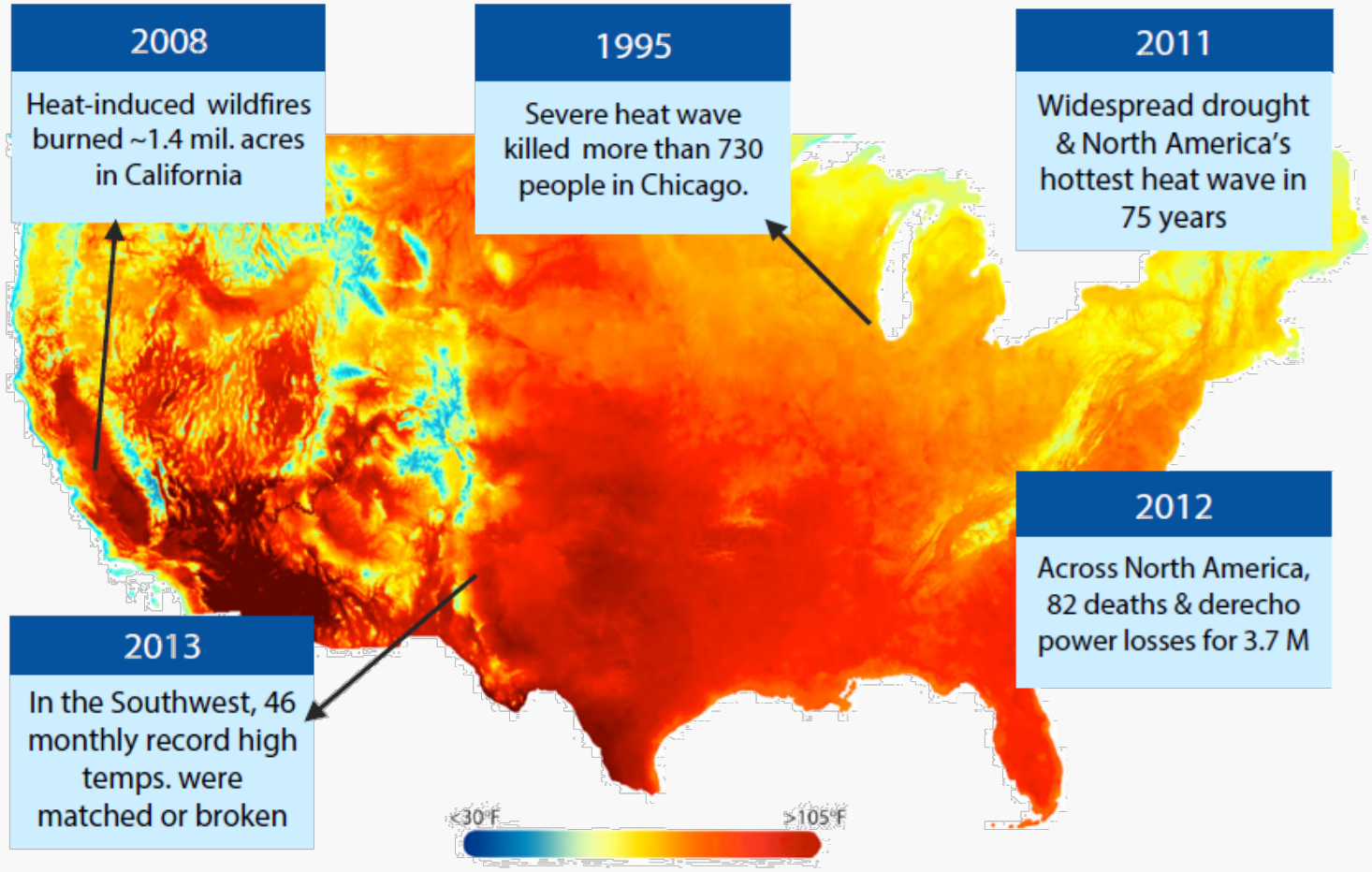
Image source: flickr:d26b73

Extreme Heat is a Multidisciplinary Problem

Decisions must be made in many disciplines to protect humans from extreme heat's health consequences.

- Local health departments
- Utilities / Energy
- Emergency Management
- Chief Resilience Officers
- Weather Forecast Offices
- Hospitals
- School districts

They all need information at different timescales, and have different risk tolerances and capacity to respond.



The base map shows projected average maximum temperatures for July 2030 in degrees Fahrenheit under a low emissions scenario (best case scenario). Call out boxes detail devastating effects of past heat waves across the country.

NIHHIS: Improving Climate Services for Risk Reduction

- NOAA and CDC launched the National Integrated Heat Health Information System (NIHHIS) in June of 2015 to integrate efforts, followed by an international, interdisciplinary workshop in July to understand the current state of affairs in reducing the risk of negative health outcomes from extreme heat and to plan for future risk reduction.
- NIHHIS quickly grew to include representation from several agencies (right) in an interagency working group, and the group launched a NIHHIS portal and harmonized outreach activities.
- NIHHIS has also launched regional, trans-boundary pilots to understand local decision-making contexts and needs, and to improve heat-health information provided.

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

NIHHIS Core Research Questions

Institutional Capacity & Partnerships

- What institutional partners have you engaged to help define the needs (esp. bridging disciplines: health, env. science, emergency management); is that sustainable and if so, how and why?

Heat Parameters & Health Outcomes

- What heat parameters (tmax, tmin, heat index, etc) are most important for which specific population and in what geographic conditions?

Data and Forecast Products

- What data and forecast products, indicators, surveillance, and monitoring is needed (at what spatial and temporal resolution & lead time) and what is currently being used by practitioners to make decisions?

Engagement and Communication Strategies

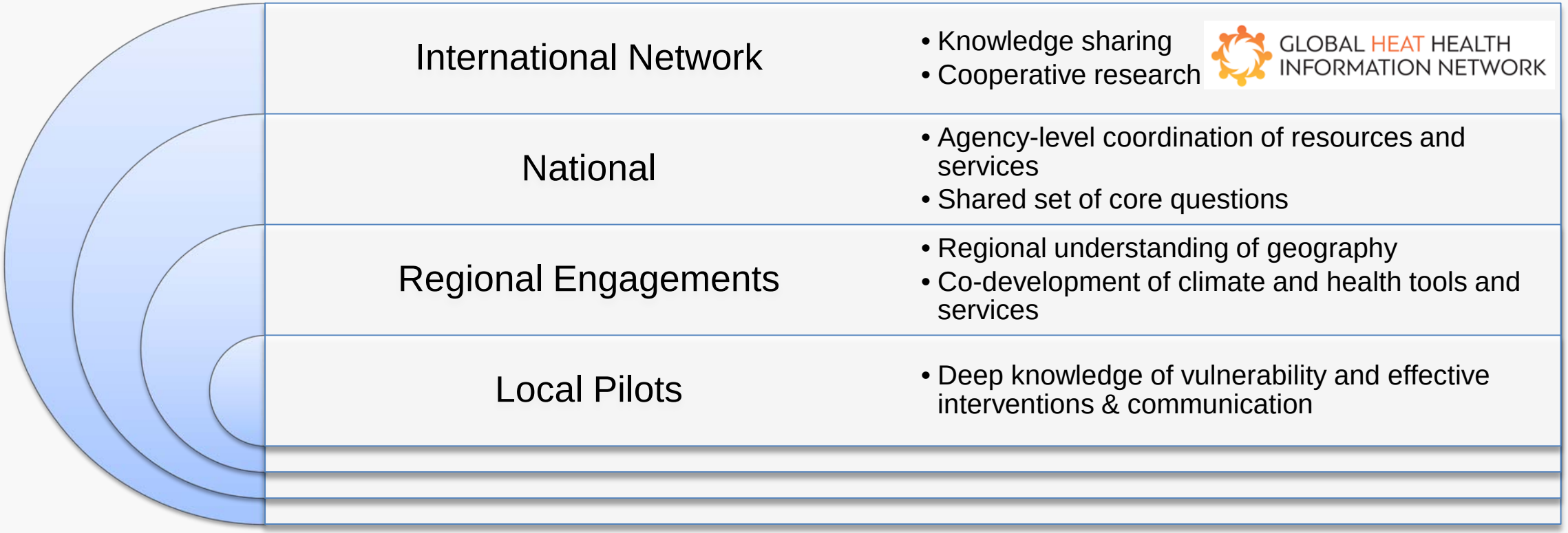
- What communication strategies are most effective both during an event and for long lead time planning (seasonal outlooks)?

Interventions and Effectiveness

- What health interventions are currently being employed in managing heat risk and at what timescales?
- Are these interventions successful, and to what extent to they depend on local context & capacity?

NIHHIS Framework: Network and Domestic Pilots

NIHHIS is a global network that integrates partners' knowledge, experience, and activities to effect a coordinated response to heat-health at many levels.



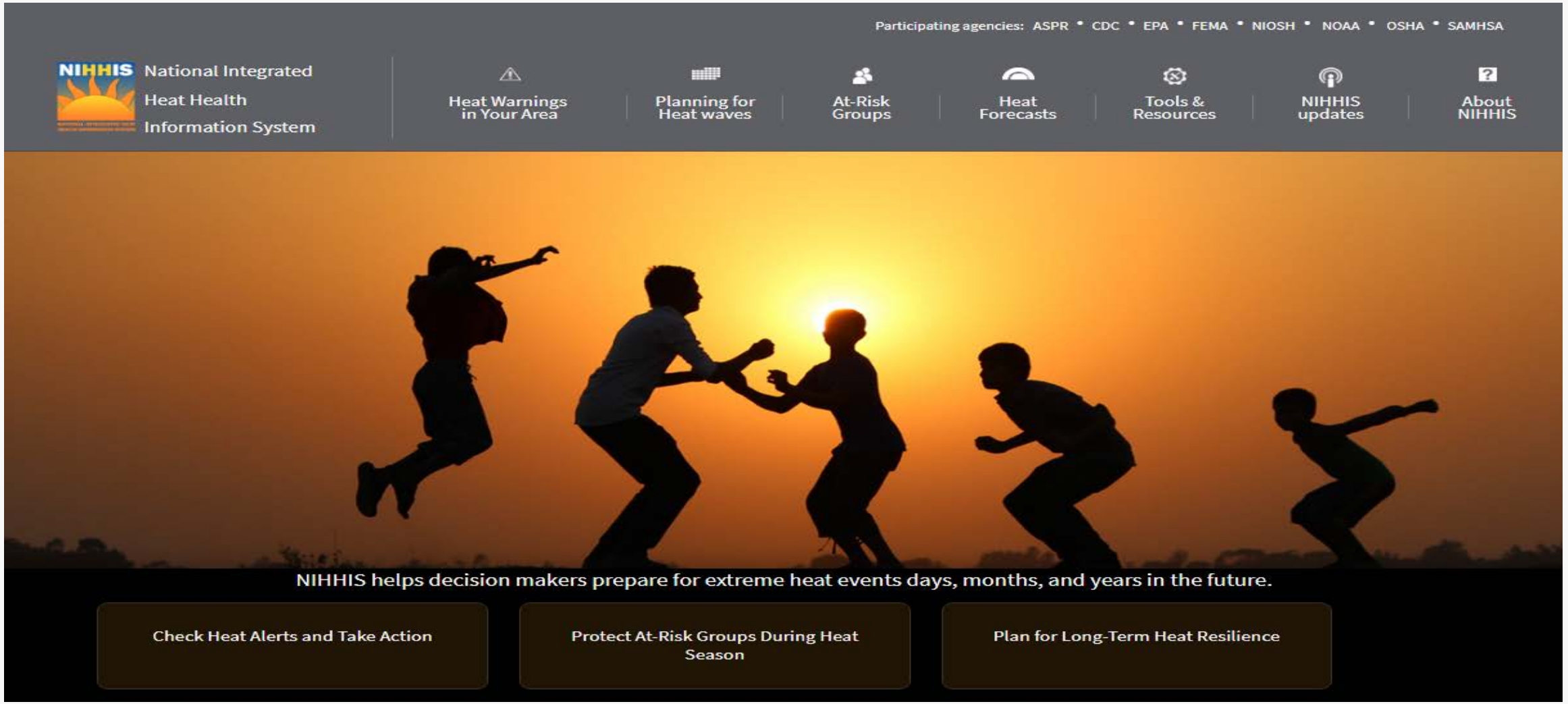
NIHHIS Interagency Working Group

The NIHHIS Interagency Working Group was initially formed as an Extreme Heat and Critical Infrastructure Task Force under the National Security Council. The group includes representation from many agencies:

Recent accomplishments and ongoing projects:

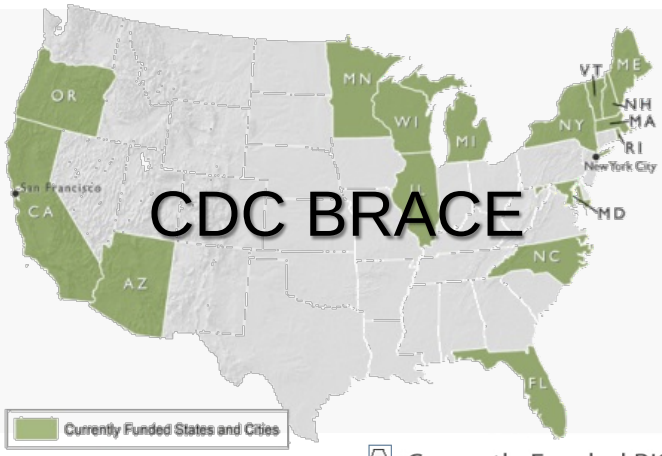
- A major social media campaign to expand awareness of the issue in 2017 heat season.
- Activity modification thresholds and WBGT
- Development of version 2 of the NIHHIS Portal with harmonized inter-agency information and resources as well as heat predictions.
- A White House webinar on protecting vulnerable populations from Extreme Heat (2016).

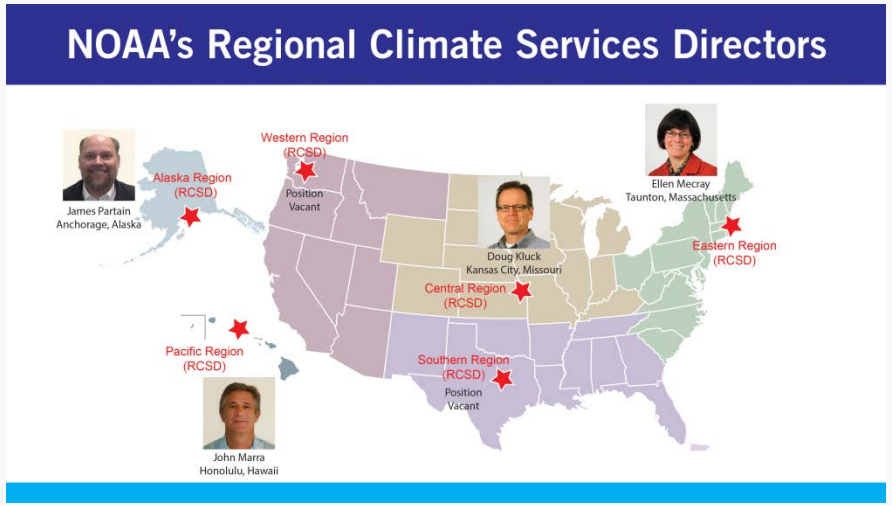
The NIHHIS Portal

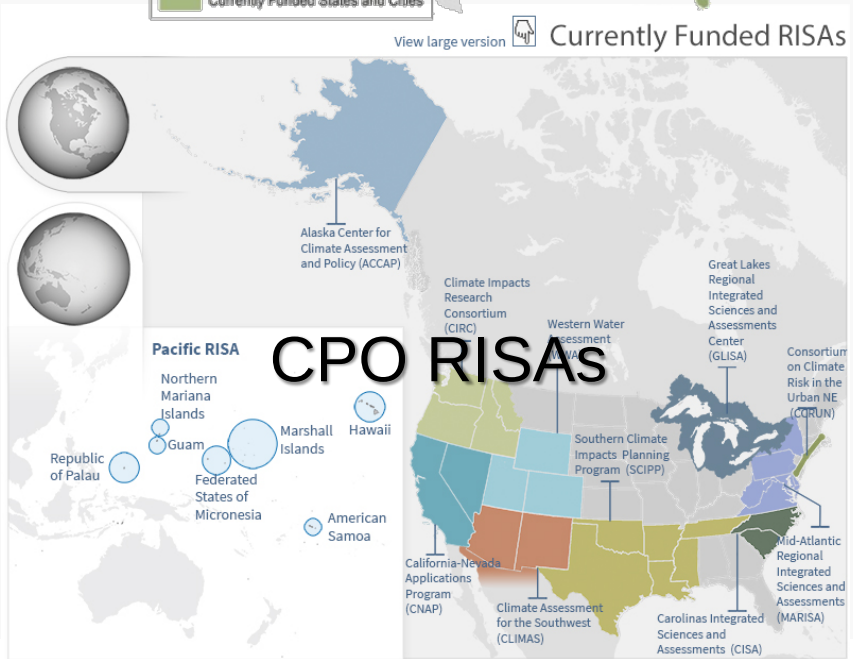


Visit http://climate.gov/NIHHIS to learn more

NIHHIS: user engagement via other networks





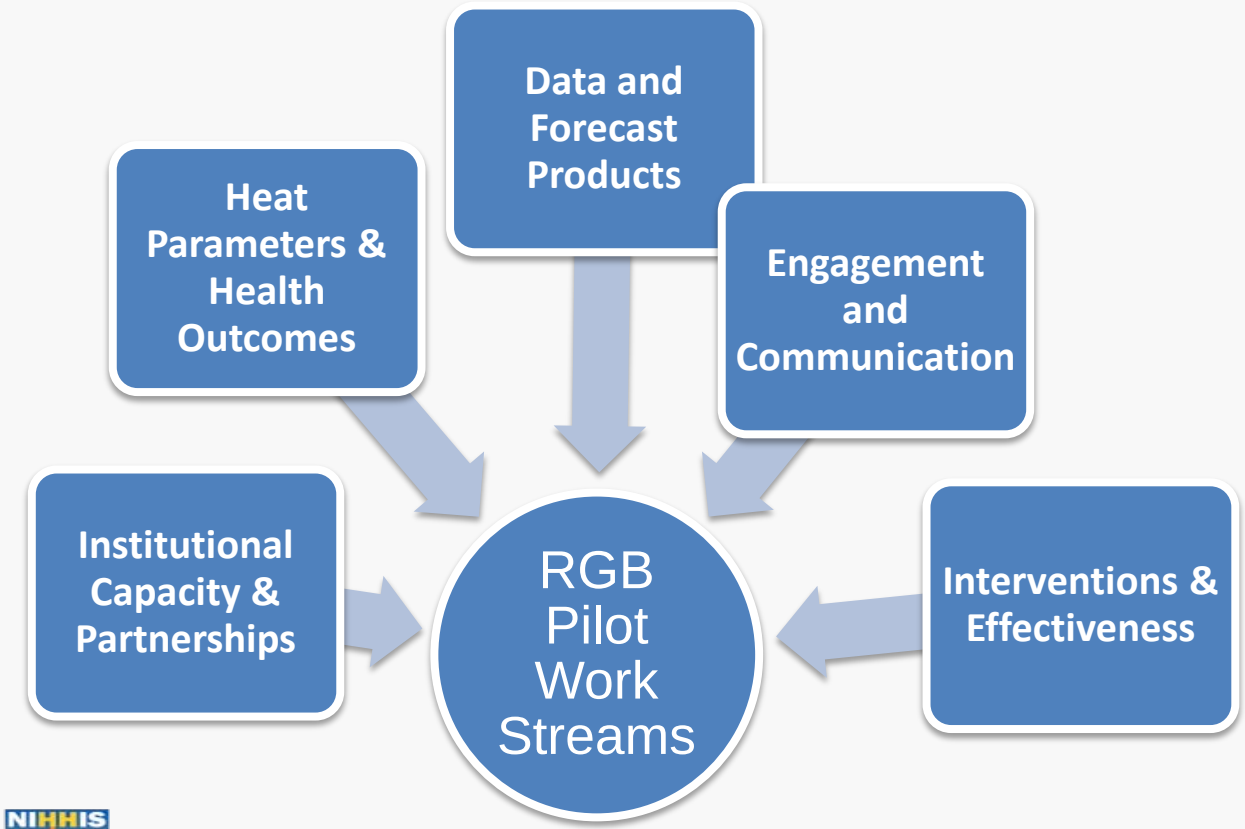


Defining Local Context: NIHHIS Pilots

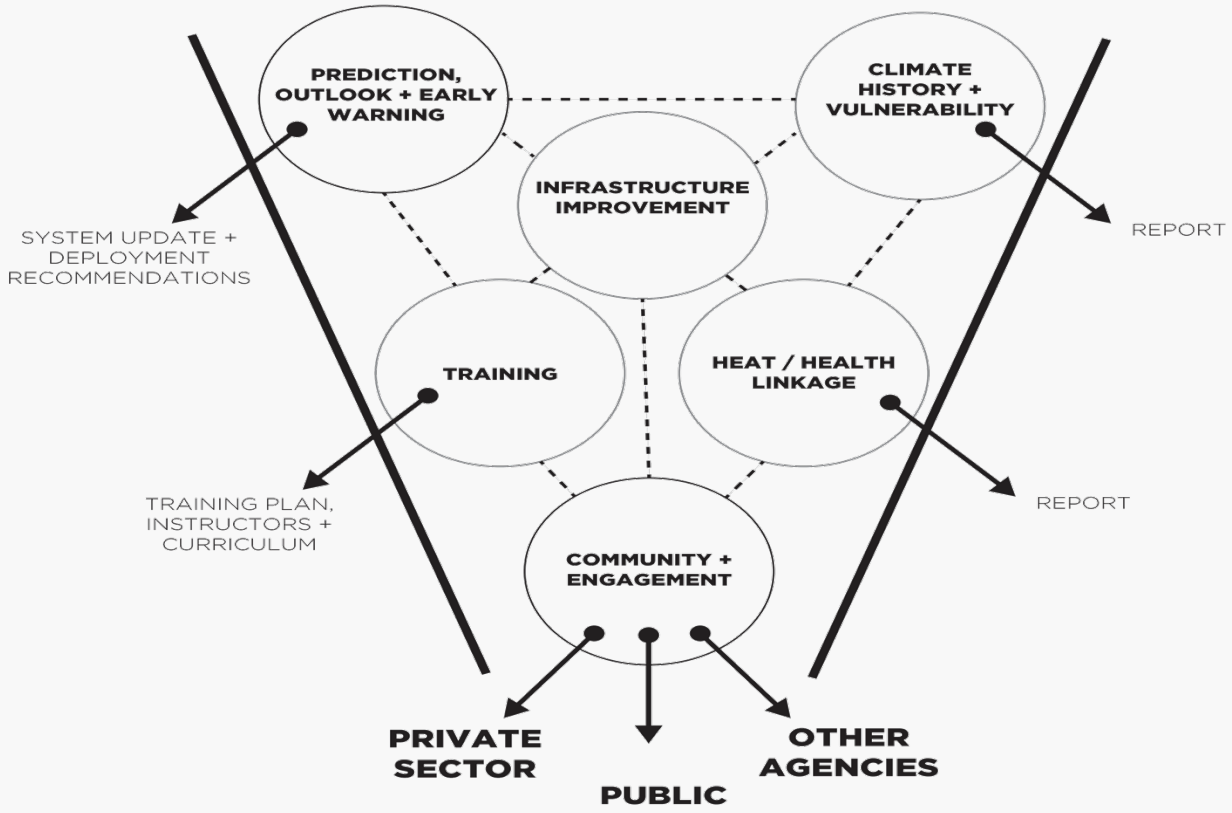
- Decision Calendars
  - Interviews with experts in many disciplines
  - Documentation and refinement
  - Compare across pilots
- Climate Scenarios
  - Tabletop exercises to develop & refine information requirements and identify research & operational gaps
- Case Studies for the Climate Resilience Toolkit

NIHHIS El Paso Workshop Goals

Translate NIHHIS Core Questions into Actionable Work Streams



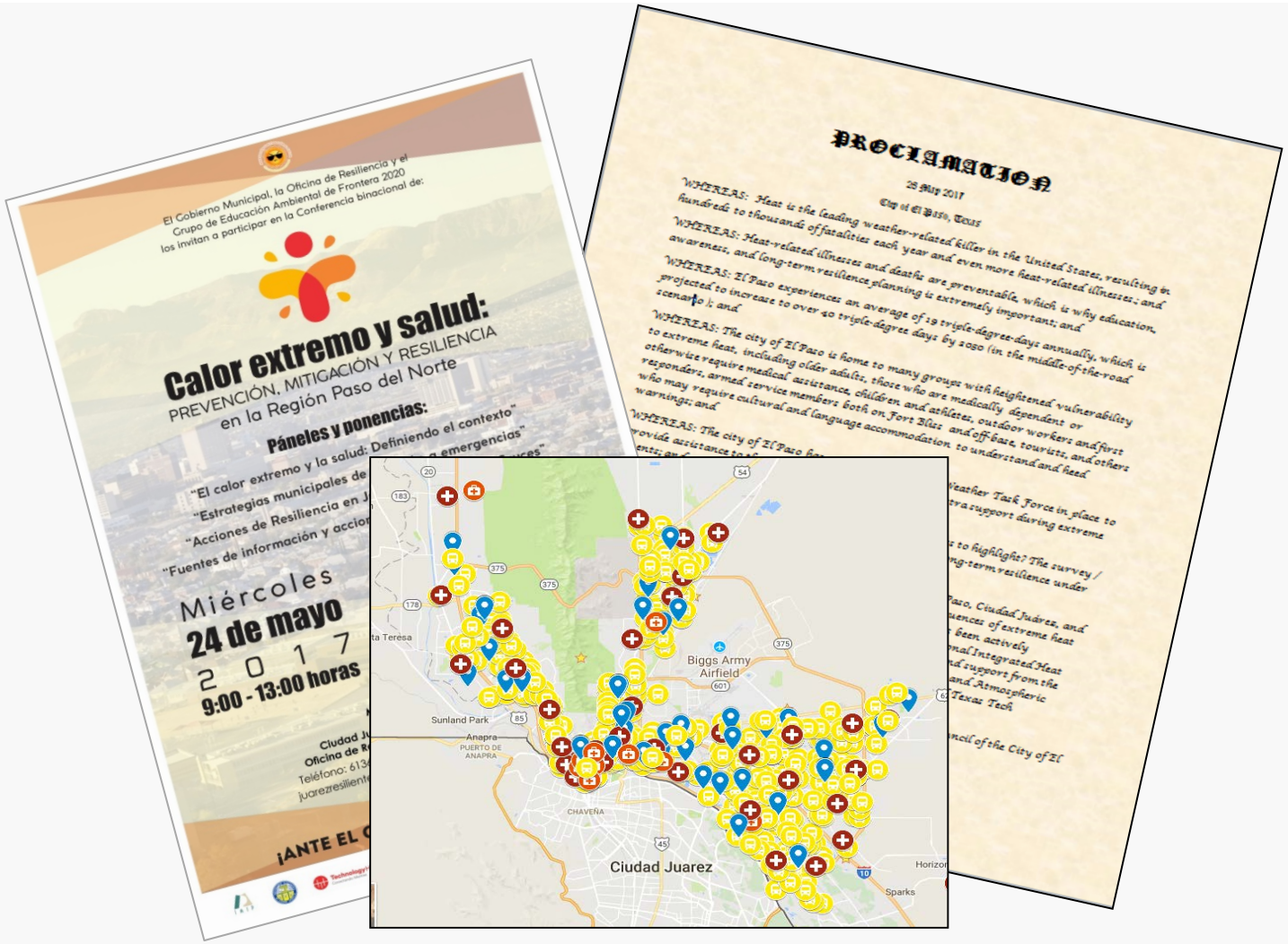
RGB Pilot Work Streams

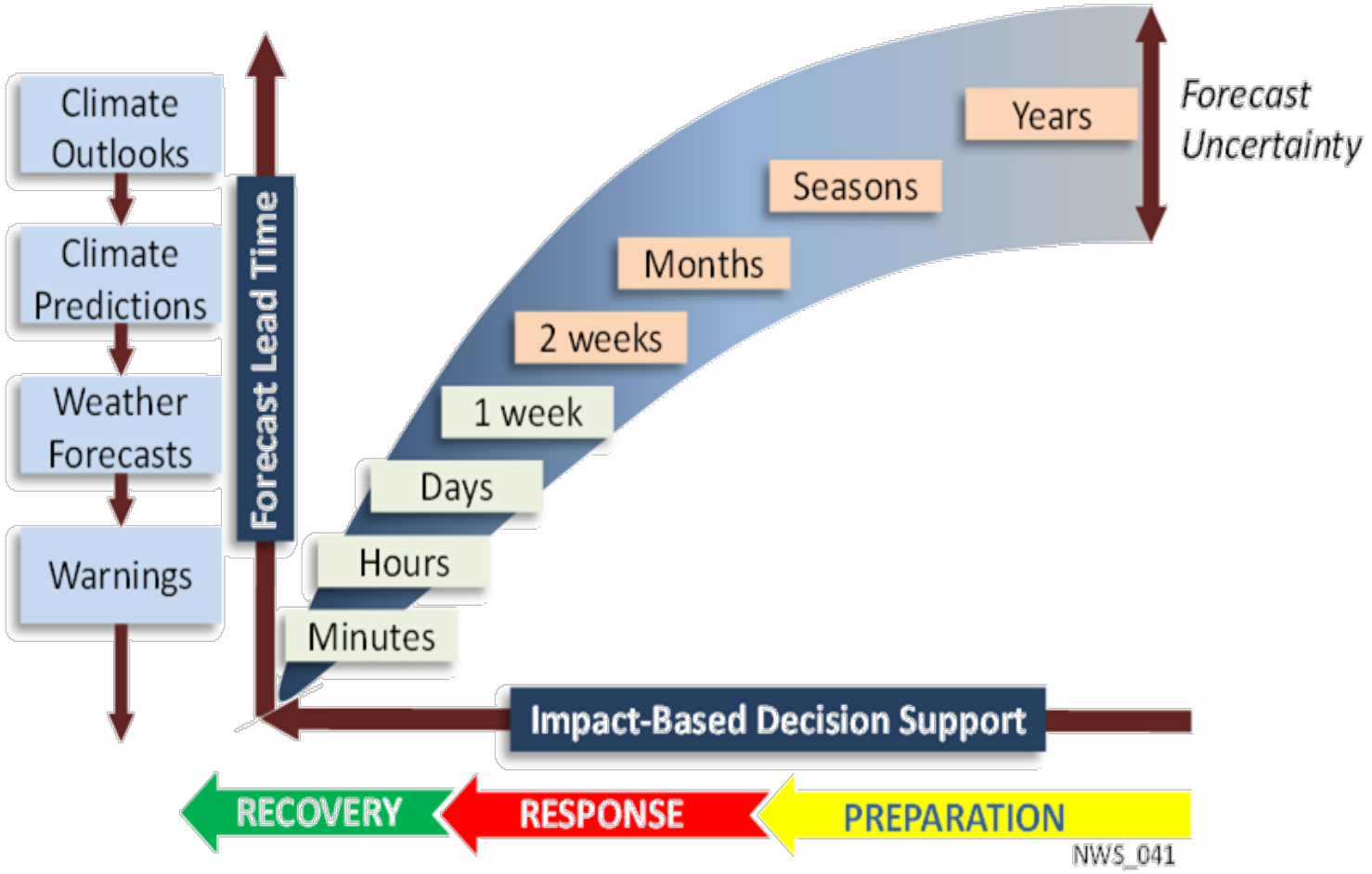


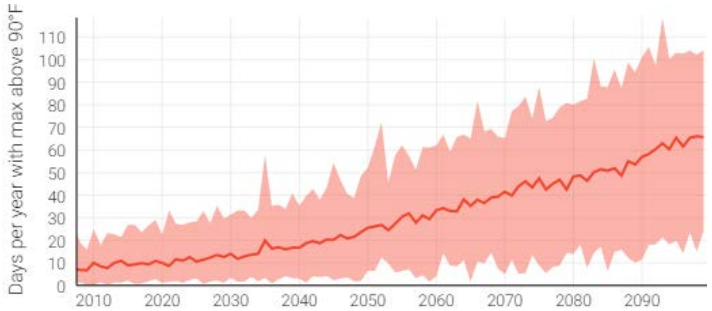
NIHHIS RGB Pilot Engagement for Launch Workshop

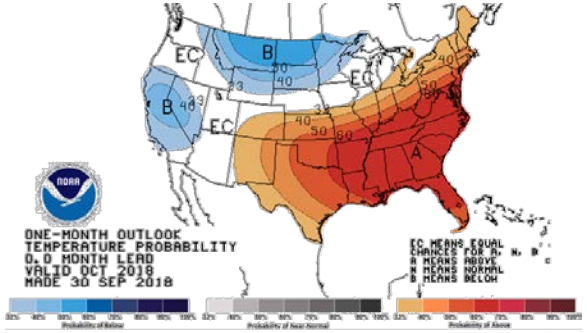
Accomplishments of the RGB Pilot

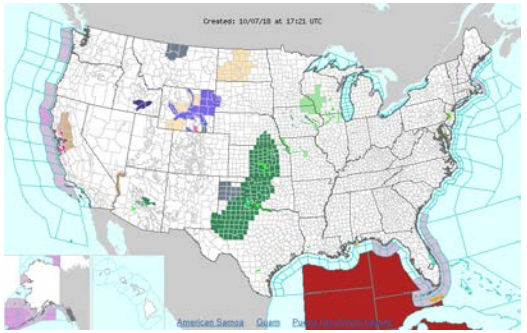
- Inventory of experts, data, and products.
- Heat season awareness activities.
- Promotora heat-health education in colonias.
- Border heat network.
- Syndromic surveillance.







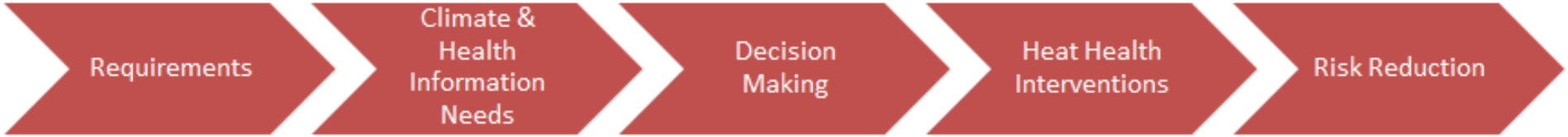




UNDERSTANDING DECISION TIMESCALES

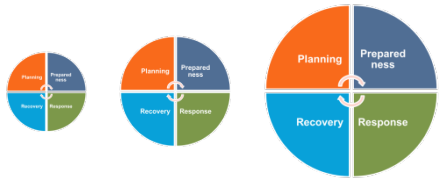
NIHHIS Northeast Decision Calendar Workshop Goals

- 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**

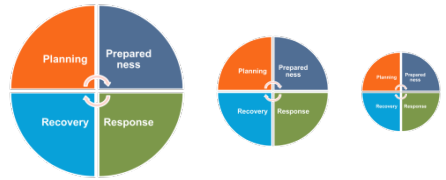
Analysis of historical impacts & climate observations



Previous Years

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

Scenario-based planning & climate predictions

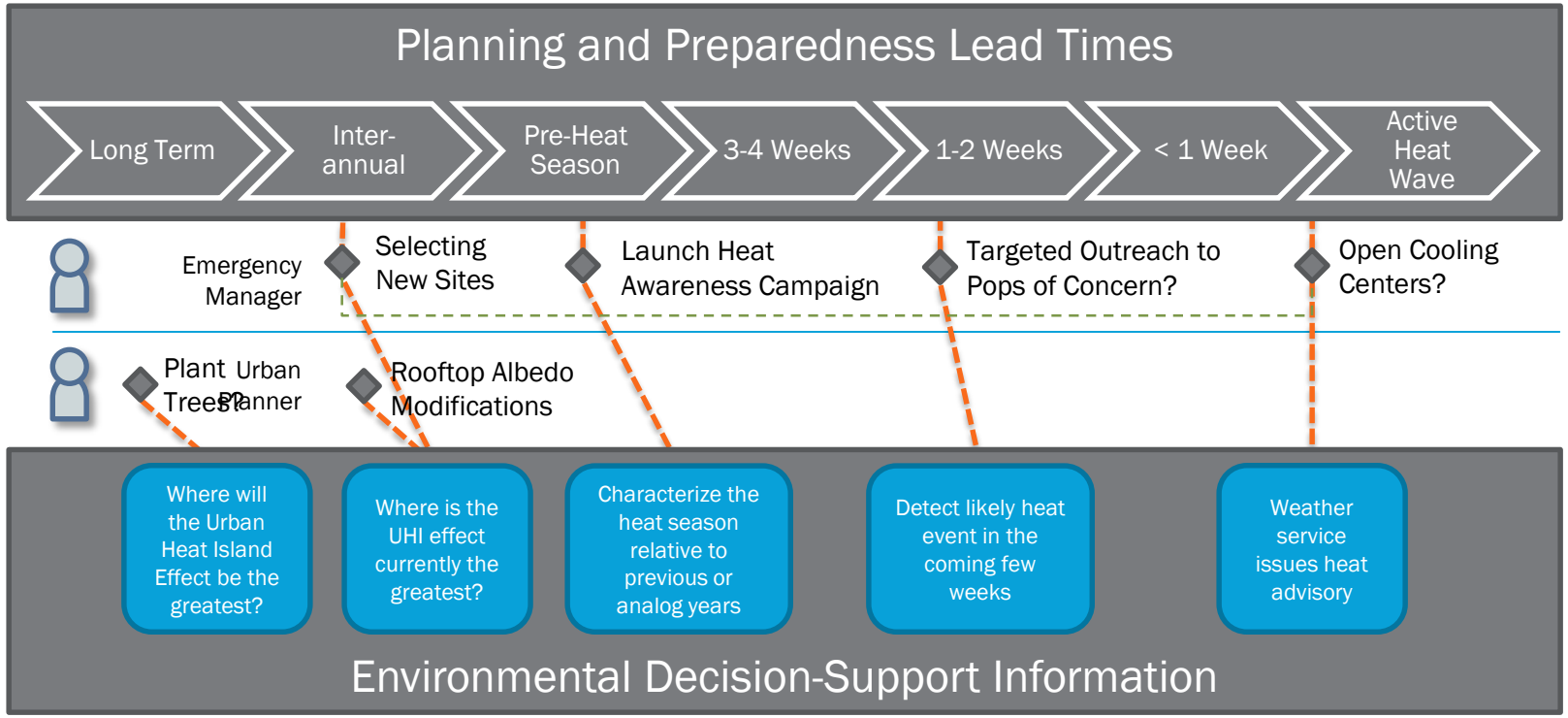


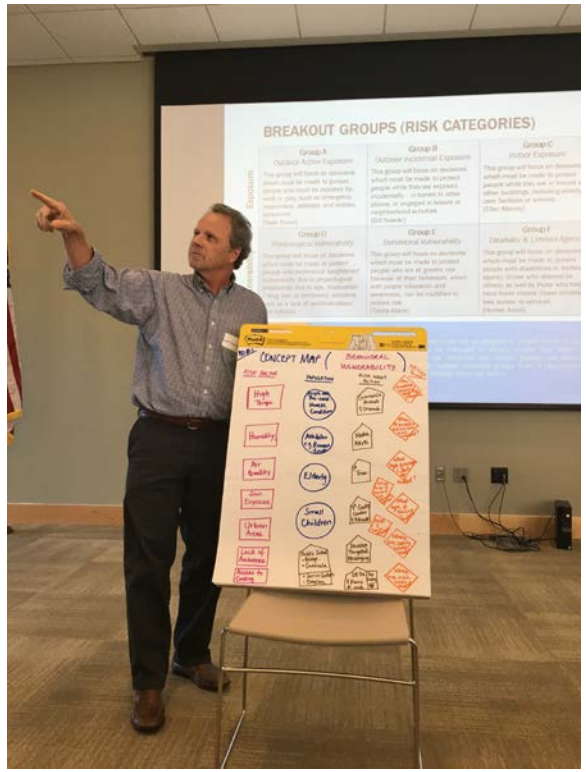
Future Years

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

HEAT HEALTH RISK MANAGEMENT ANNUAL CYCLE

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.





DECISION CALENDARS

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

Information Needs Identified via NIHHIS Workshops

- High Resolution Urban Heat Island Map
- This could be used to statistically downscale predictions to understand local impacts. It would be interesting to also do this dynamically with WRF.
- Heat Health Social Vulnerability Indices (local scale)
- These are coupled with UHI-predictions to understand where RISK is highest
- Hospitalization Outcomes by County for HRI, Air Quality Related Illnesses
- Compare/contrast to NOAA StormData and other impact measurements for full picture
- Heat Season Outlook (number of heat waves, +/- avg, relative to last year, historical analogs, seasonality)
- This could include a health interpretation by our colleagues at CDC linked to Syndromic Surveillance outcomes
- Heat Wave Predictions at Lead time 2,3,4 weeks – this extends HeatRisk to longer time scales, but this should also be able to take user-defined variables that set thresholds – for example hooking this up to CISA's HHVT.
- Heat load forecast (cooling degree days per week)
- Wet Bulb Globe Temperature predictions over athletic fields and work sites out to two weeks for scheduling
- humidity, temperature, solar exposure (can be derived from cloudiness), wind (cools, but also dries)
- Many WFOs are already experimenting with this, such as Tulsa, El Paso, Chanhassen, Caribou, Raleigh, Burlington, etc..
- Heave Wave Annual Exceedance Probability and 100 Year Return Interval

Lessons Learned from NIHHIS Partnerships

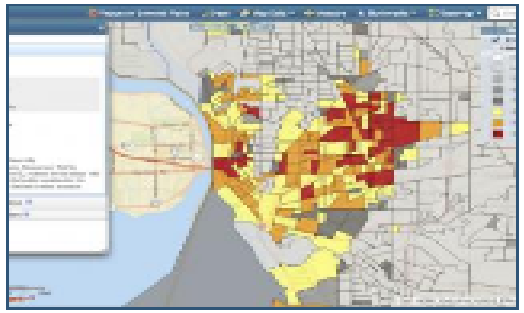
- Properly implementing heat health risk reduction actions is complicated, and you cannot understand the full set of pros and cons without a diverse set of partnerships.
  - For example, increasing urban tree canopy can help reduce the urban heat island effect, but it can also increase the risk that the power grid could fail, as a common cause of power outages in the summer is power lines sagging into trees and getting taken down by branches.
- Many decision-makers cannot tell you exactly what climate/weather/health product they need, they are experts on what decisions they make. Eliciting their needs requires engagement over a long period of time.
- Seasonal to Sub-seasonal information is new, and there's a chicken and egg problem associated with that. It's hard to know how to apply information at this time scale when you've never had it before.
- Showing is better than telling, and it takes time and 1:1 interactions to understand decision contexts.
- Many disciplines take action and make decisions within one particular timescale (emergency managers tend to think short-term – but through conversations they can be encouraged to think on other time scales.

NIHHIS Portal Tools

Tools

Clear Filters | Filter by topic: ▼ | Filter by tool function: ▼

Tools are available to help you manage your climate-related risks and opportunities, and to help guide you in building resilience to extreme events. Browse the list below, or filter by topic and/or tool functionality in the boxes above. To expand your results, click the Clear Filters link.



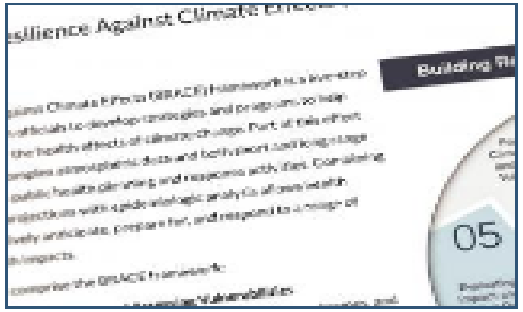
EJSCREEN: Environmental Justice Screening and Mapping Tool

Access environmental and demographic information for user-defined locations in the United States, and compare data for selected locations to the rest of the state, EPA region, or the nation.

Read more ›

emPOWER Map

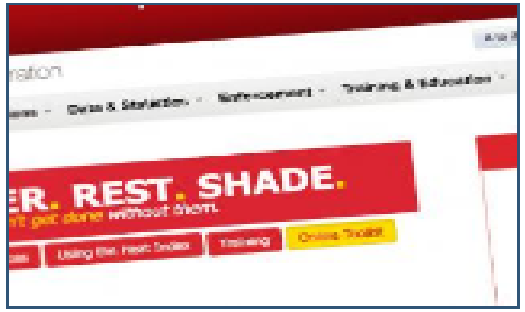
Hospitals, first responders, electric companies, and community members can use this interactive online map to view information about Medicare beneficiaries who rely on electricity-dependent medical and assistive equipment and severe weather events that may put them at risk for power outages.



Building Resilience Against Climate Effects (BRACE) Framework

Communities can use this five-step process from the Centers for Disease Control and Prevention to prepare for the health effects of climate change.

Read more ›



Extreme Heat Media Resources Toolkit

Employers can download free outreach materials from OSHA to help raise awareness about the health risks of extreme heat at work.

Read more ›

Case Studies

Clear Filters | Filter by climate threat/stressor: ▼ | Filter by topic: ▼ | Filter by steps to resilience: ▼ | Filter by region: ▼

Communities, businesses, and individuals are taking action to document their vulnerabilities and build resilience to climate-related impacts. Click dots on the map to preview case studies, or browse stories below the map. Use the drop-down menus above to find stories of interest. To expand your results, click the Clear Filters link.

Developing an Early Warning System to Prevent Heat Illness

Residents of the Carolinas are familiar with hot summers, but in some areas excessive heat events bring a higher risk for

Bracing for Heat

Heat waves bring some level of discomfort to nearly everyone. When excessive heat catches vulnerable populations off guard, though, discomfort can

Protecting People from Sweltering City Summers

Federal, state, and local agencies are working to provide

Where Do We Need Shade? Mapping Urban Heat Islands in Richmond, Virginia

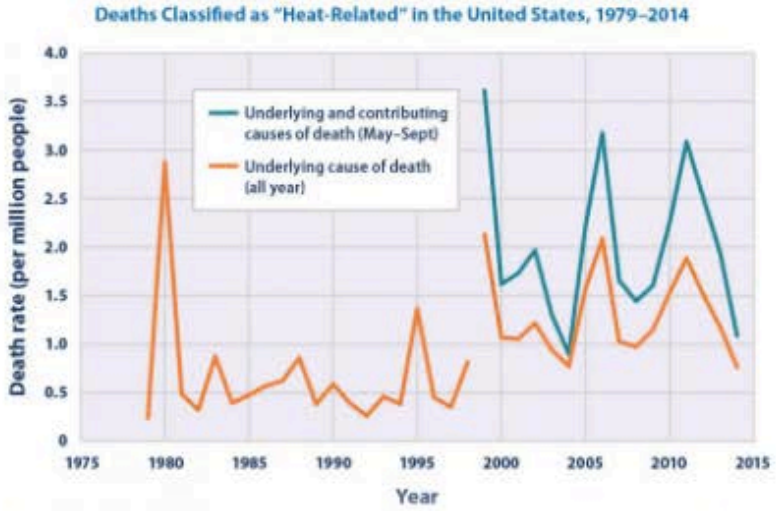
Citizen-scientists took to the

Developing an Early Warning System to Prevent Heat Illness

Residents of the Carolinas are familiar with hot summers, but in some areas excessive heat events bring a higher risk for heat-related illness—and even death. A new tool can help local communities get ahead of heat events so they can reduce risk for their residents.

As summer months come and go in North and South Carolina, many people are noticing more days of intense heat or uncomfortable humidity each year. To some, it's little more than a growing inconvenience—but to others, the increasing heat burden is becoming a matter of life and death.

In fact, weather records show that heat waves in the United States are occurring more frequently, becoming more intense, and lasting longer.[1] In the United States, more deaths have been attributed to heat than from all other natural disasters combined—an average of more than 650 heat-related deaths occurred each year between the years of 1999 and 2009.[2]



The graph shows heat-related illness as a more prominent cause of death in the summer months of May through September. Click for a larger view and additional information.

Steps to Resilience

This content supports the highlighted step.

1. Explore Hazards
2. Assess Vulnerability & Risks
3. Investigate Options
4. Prioritize & Plan
5. Take Action

Tools

Building Resilience Against Climate Effects (BRACE) Framework ›

National Integrated Heat Health Information System (NIHHIS) ›

Topics

Health › Extreme Heat—NIHHIS ›

Heat's Impact on Outdoor Workers

Activity Modification Guidelines exist for outdoor workers, athletes, and the military, but most rely on WBGT.

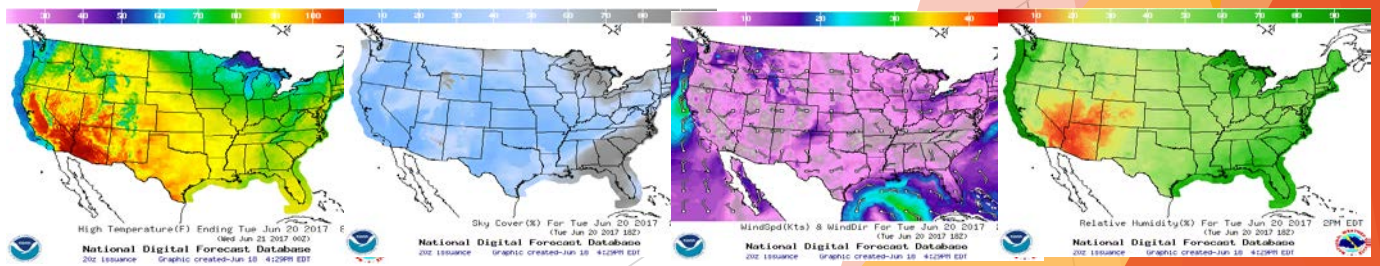
Work/Rest and Water Consumption

Applies to average sized, heat-acclimated soldier wearing BDU, hot weather. (See TB MED 507

Easy Work	Moderate Work	Hard Work
• Weapon Maintenance • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony • Manual of Arms	• Walking Loose Sand at 2.5 mph, No Load • Walking Hard Surface at 3.5 mph, < 40 lb Load • Calisthenics • Patrolling • Individual Movement Techniques, i.e., Low Crawl or High Crawl • Defensive Position Construction	• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load • Field Assaults

Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest (min)	*Water Intake (qt/hr)*	*Work/Rest (min)*	*Water Intake (qt/hr)*	*Work/Rest (min)*	*Water Intake (qt/hr)*
1	78° - 81.9°	NL	½	NL	¾	40/20 min	¾
2 (GREEN)	82° - 84.9°	NL	½	50/10 min	¾	30/30 min	1
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1
4 (RED)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1
5 (BLACK)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1

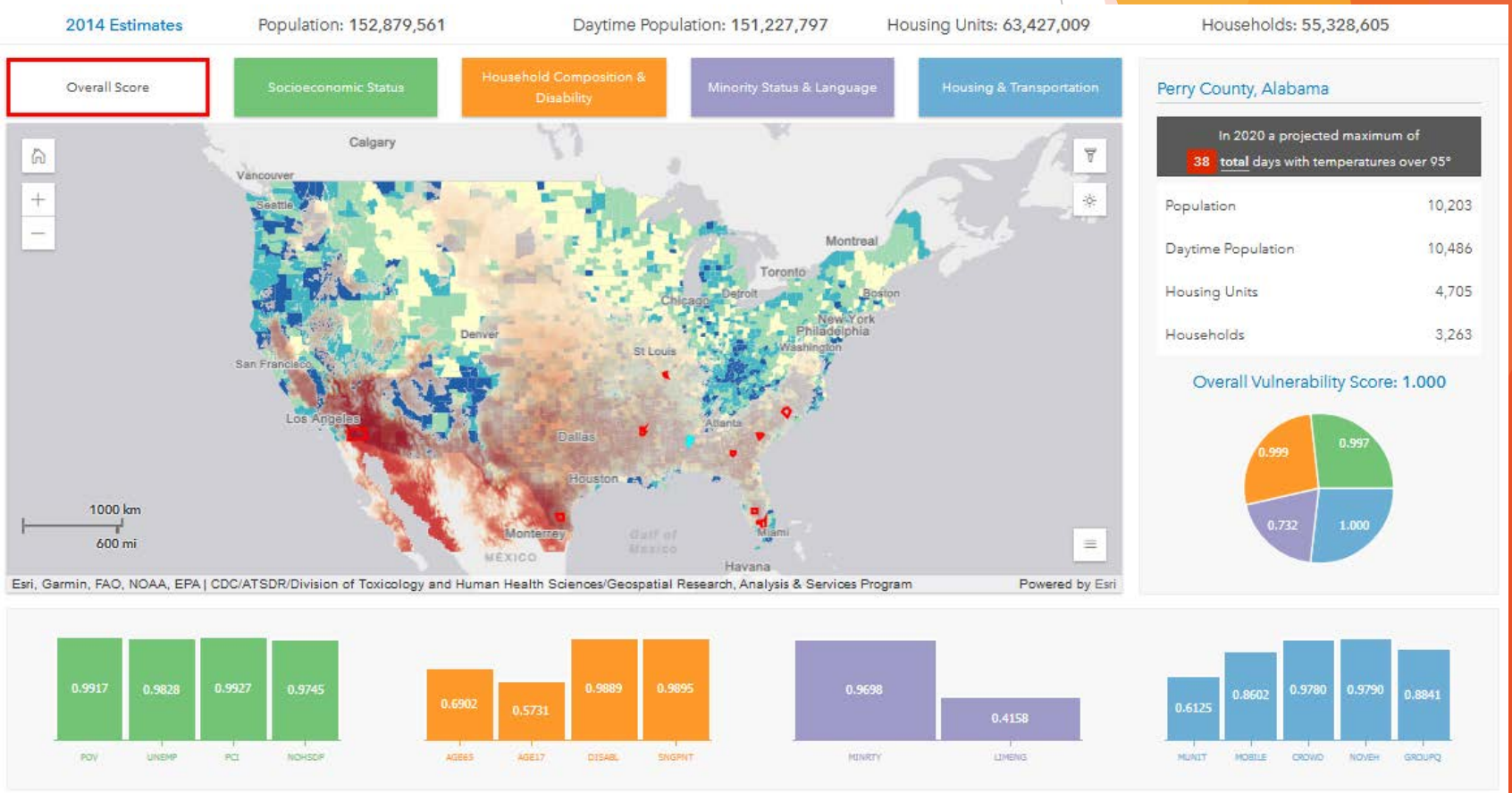
For additional copies, contact: U.S. Army Center for Health Promotion and Preventive Medicine Health Information Operations Division at (800) 222-9698 or CHPPM - Health Information Operations@apg.amedd.army. mil.
For electronic versions, see http://chppm-www.apgea.army.mil/heat. Local reproduction is authorized.
June 2004



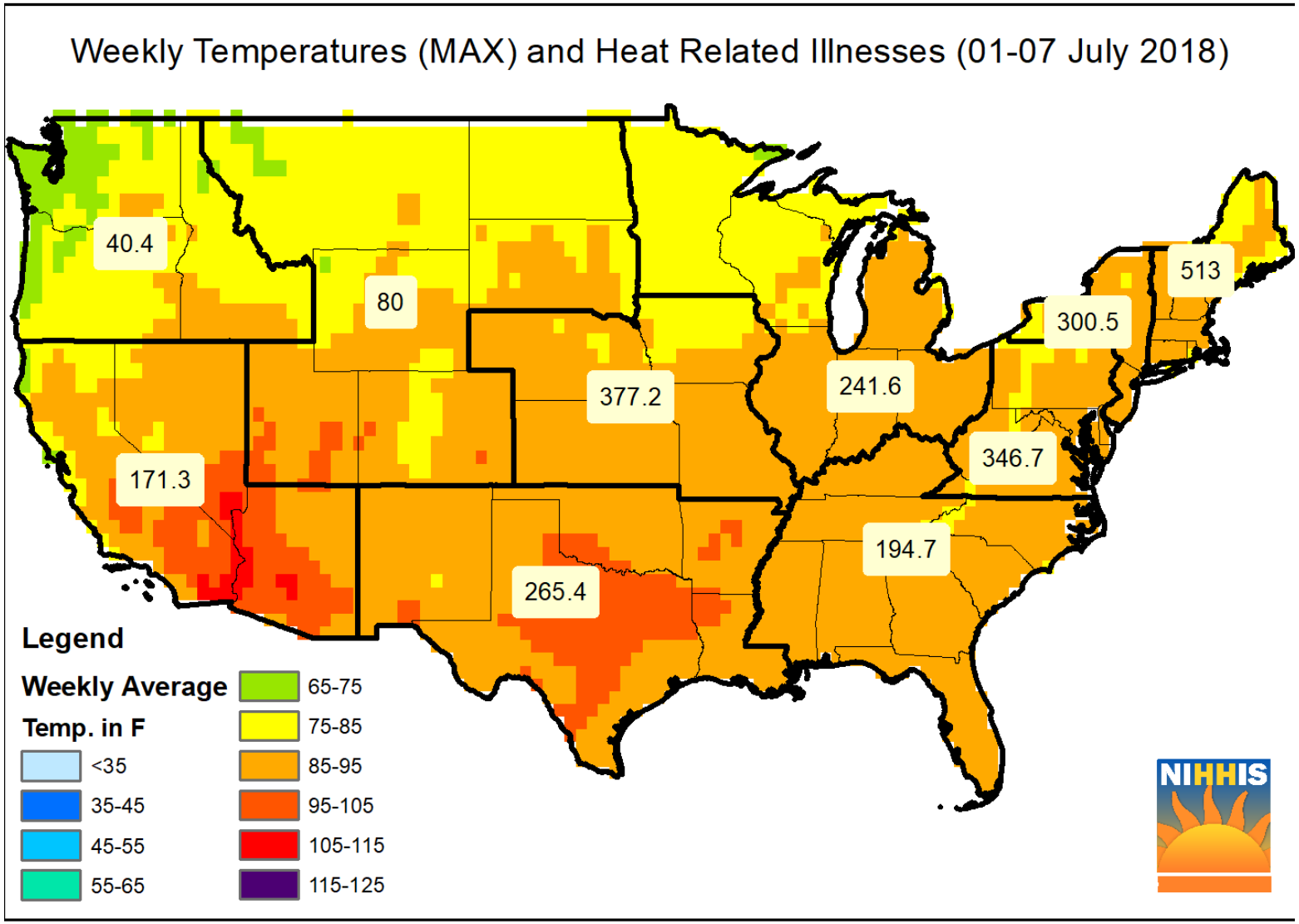
NIHHIS: NOAA & ESRI Collaboration on Heat Risk Maps

NOAA/NIHHIS/ESRI Collaboration on Heat Risk Mapping

http://arcg.is/2AnBC2

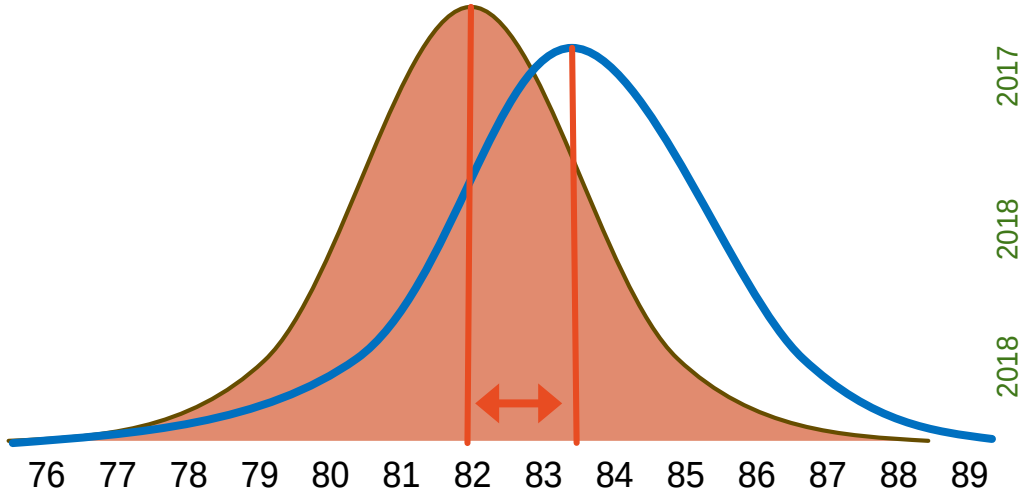


NIHHIS Climate and Health Monitor



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.

Representing Monthly Information 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