

# The Health Effects of Climate Change: Extreme Heat



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# DECLARATIONS

I Have No Commercial Interests  
to Declare Related to this Presentation

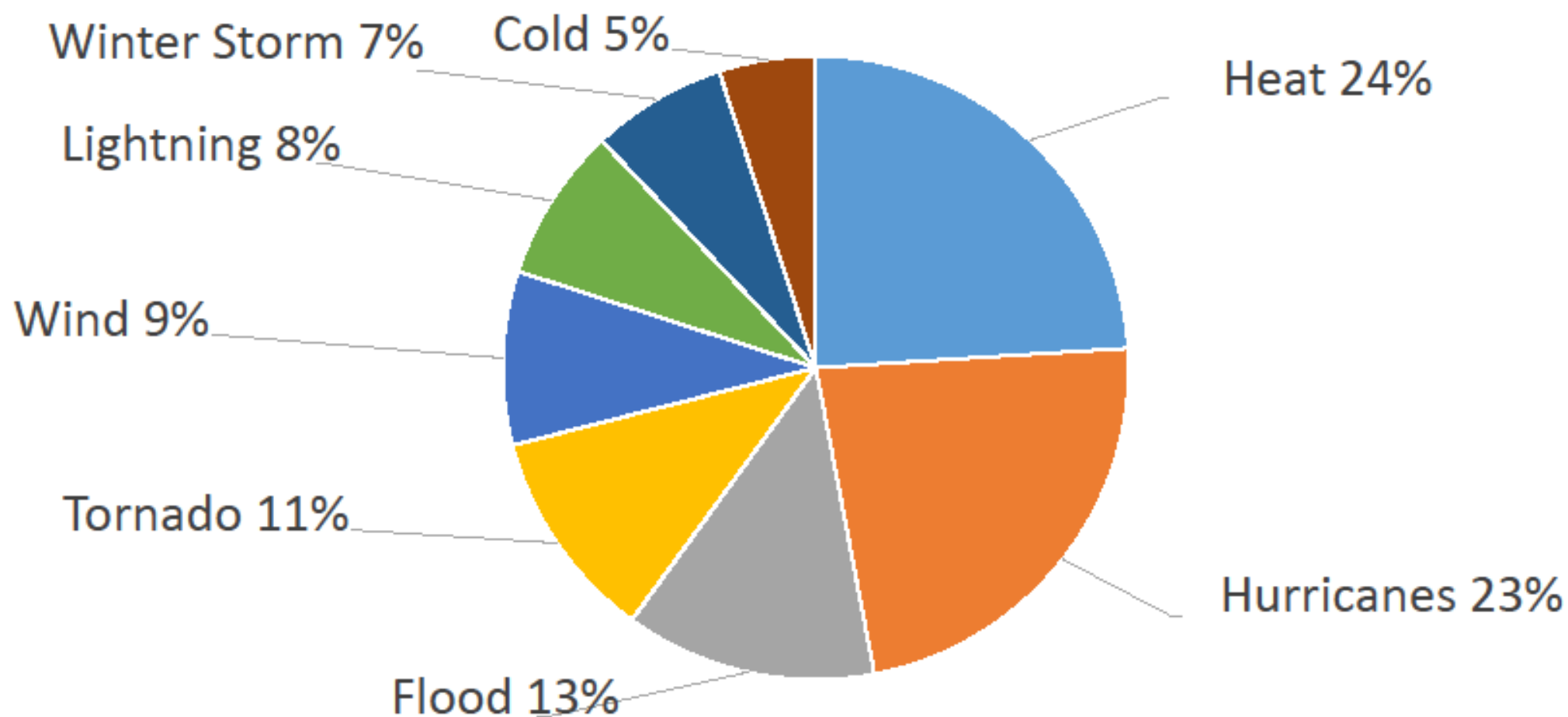
Presentation is partially supported by the  
George Mason University Foundation

# Significance of Heat



**The Leading Cause of Mortality from Extreme Weather**

## U.S. Deaths Attributed to Weather Conditions 2000-2009\*

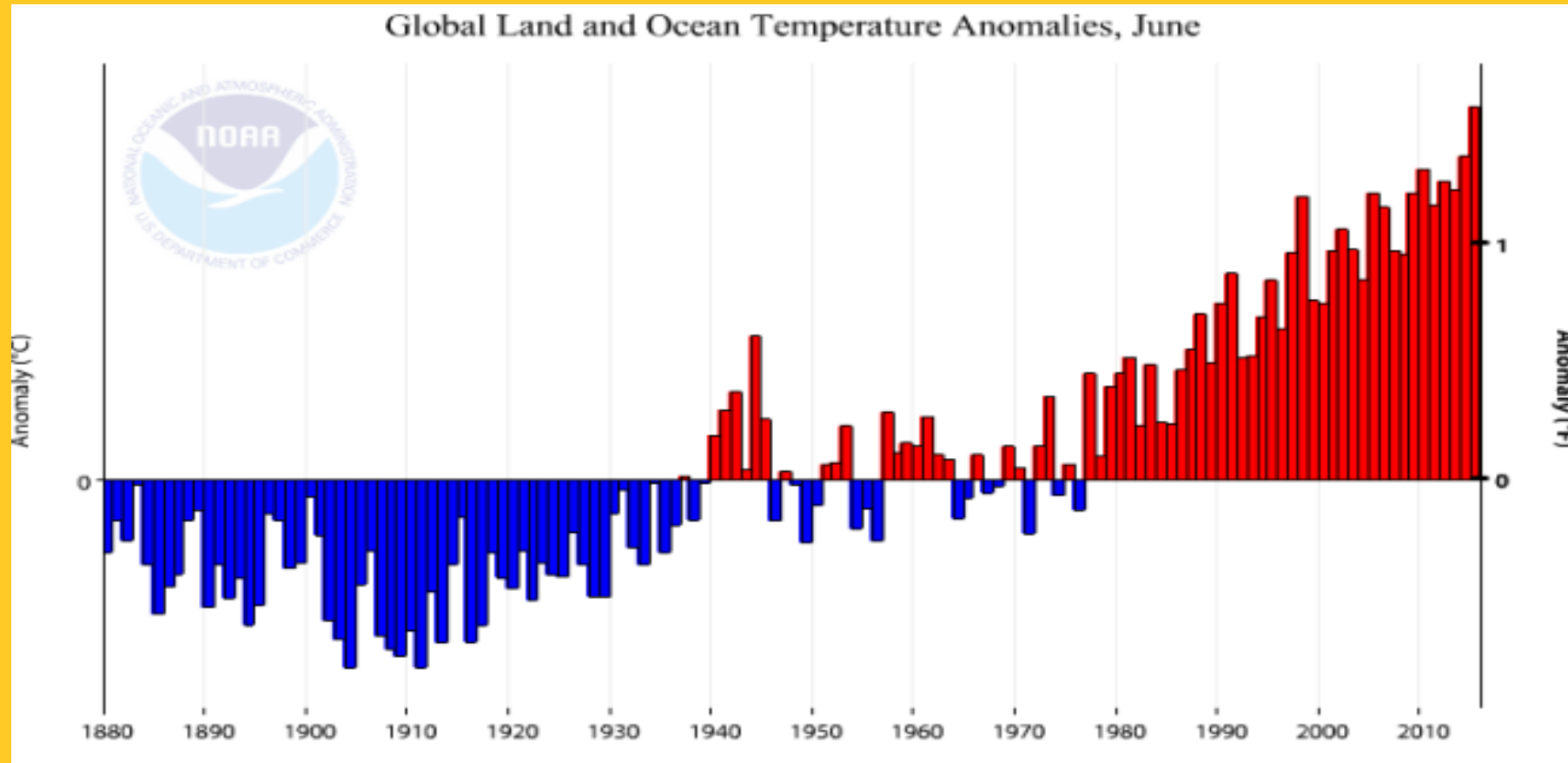


\*NOAA 2010 in <http://www.cdc.gov/climateandhealth/pubs/ClimateChangeandExtremeHeatEvents.pdf>

# Outline

- How is the temperature changing in the U.S.?
- What is an extreme heat event?
- Who is vulnerable to heat events?
- What kinds of problems do heat events cause?
- What can we do about them?

# Global Heat Anomalies



The NOAA global climate record for land and ocean temperatures over the last 136 years in which June of 2015 is now the all-time hottest. Image source: [NOAA](http://noaa.gov)

# Heat in the U.S.?

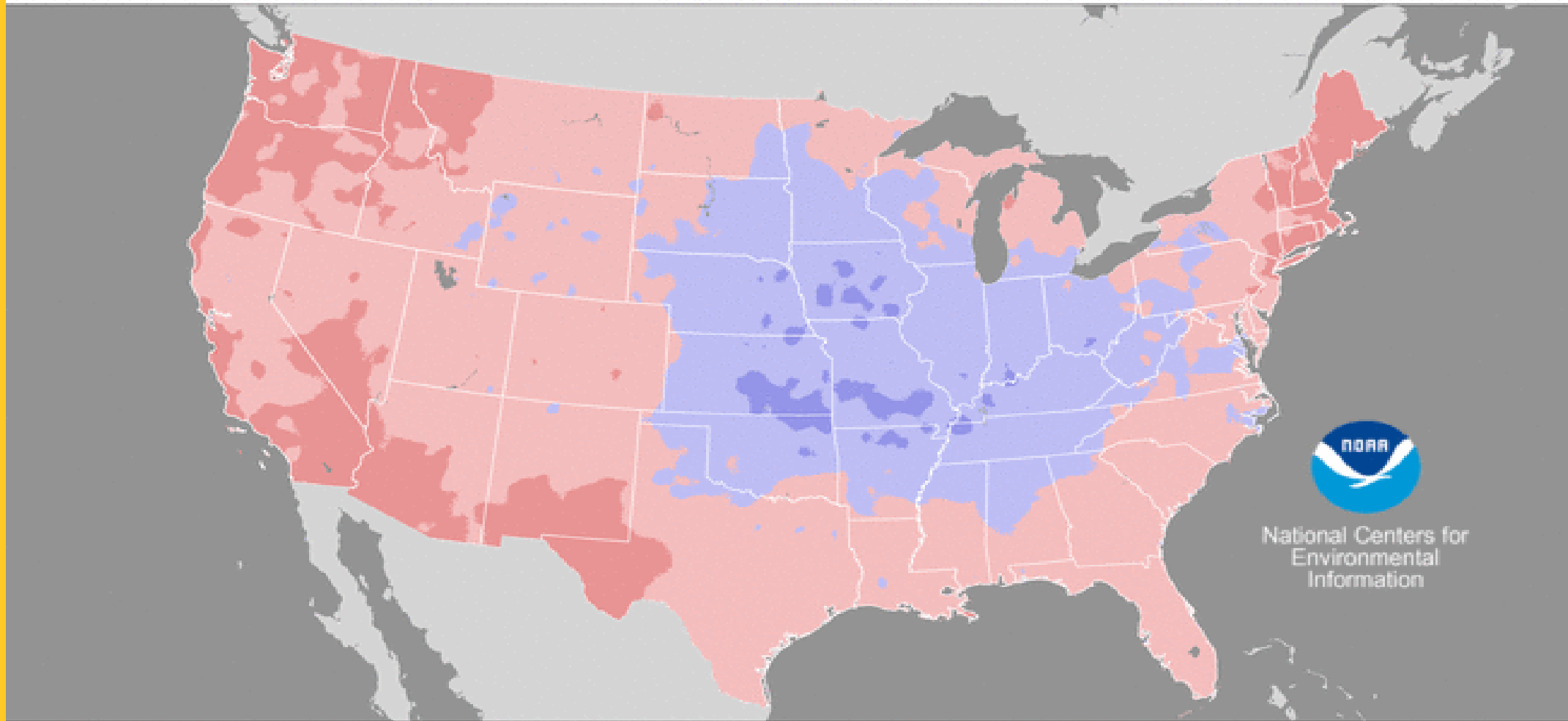
- The August **average** temperature for contiguous U.S. was above average....
- The August **maximum** temperature for contiguous U.S was above average....
- The August **minimum** (nighttime) temperature for contiguous U.S was above average....
- But what about people's individual experience where they live? (next slide)

\*<http://www.ncdc.noaa.gov/sotc/national/201508>

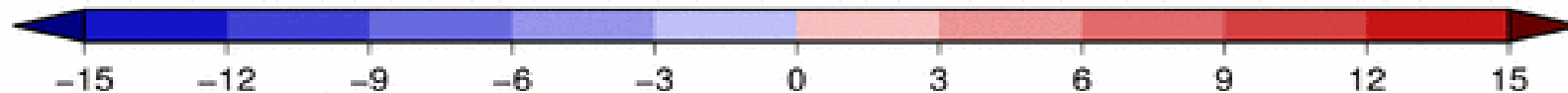
# Mean Temperature Departures from Average

August 2015

Average Period: 20<sup>th</sup> Century



National Centers for  
Environmental  
Information



Created: Fri Sep 04 2015

Degrees Fahrenheit

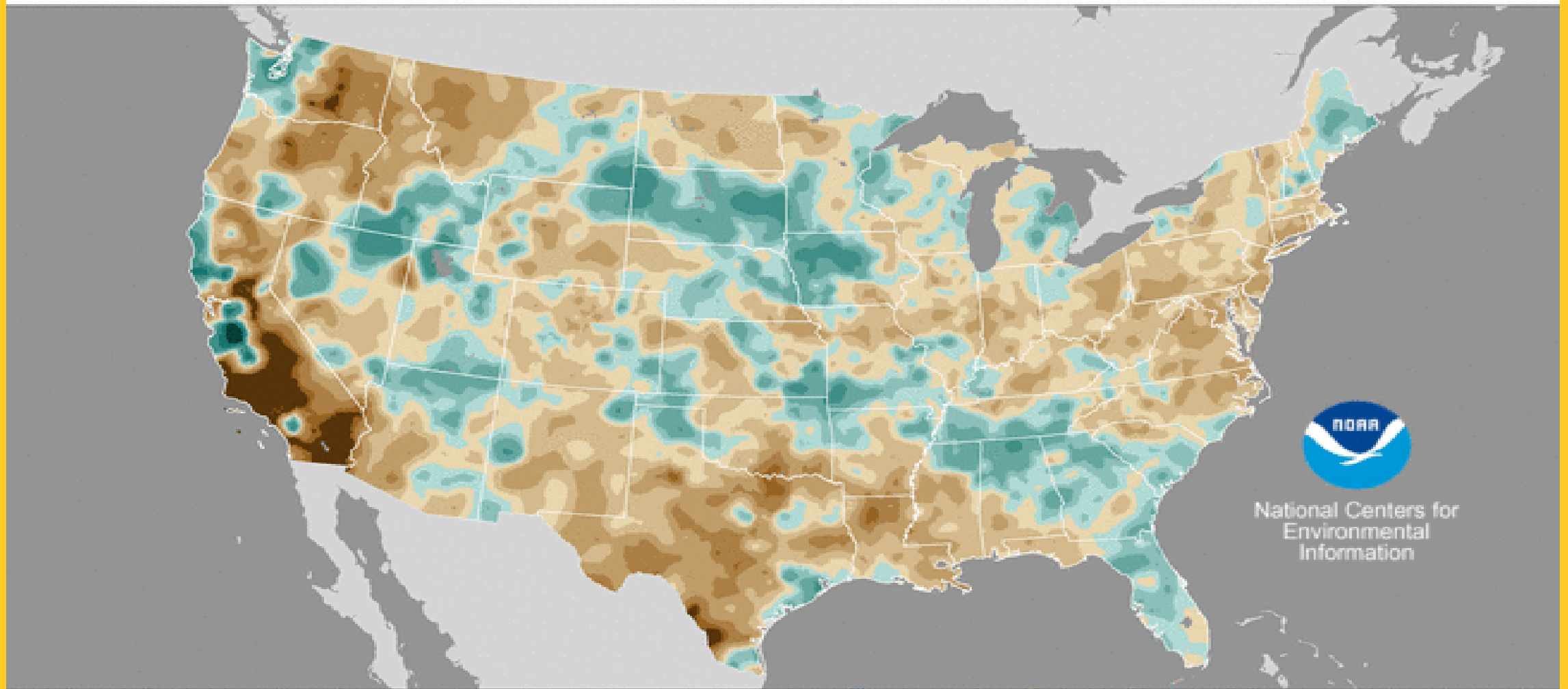
Data Source: 5km Gridded Dataset (nClimGrid)



# Precipitation Percent of Average

August 2015

Average Period: 20<sup>th</sup> Century



Created: Fri Sep 04 2015

Percent

Data Source: 5km Gridded Dataset (nClimGrid)

## What are Extreme Heat Events:

- Extreme heat events are characterized by weather that is substantially hotter and/or more humid for a particular location at a particular time.
- Why hotter AND/OR more humid
- Occur in all terrains (rural, suburban, urban).\*

\*Hayhoe K, et al., PNAS 2004.

# Who is Vulnerable to Heat Injury

- Risk group
  - Age: very old and very young
  - Chronic diseases (heart, pulmonary, renal, mental health)
  - Impaired mobility
  - Lack of air conditioning
  - People on certain medications
  - Homeless
  - People engaged in outdoor activities

# CDC Mortality and Morbidity Reports (MMWR)

- Nationwide review of heat deaths\*
  - '99-2009 total 7,233
  - 94% occurred during the warmer months of the year
- Summary of deaths during heat wave 4 States 2012 \*\*
  - 72% male; 75% living alone\*
  - Underlying cardiac/respiratory disease
  - 69% at home; 91% no air conditioning

\*Office of Climate, Water, and Weather Services. Weather fatalities, 2012. Silver Spring, MD: US Dept of Commerce, National Weather Service; 2013. <http://www.nws.noaa.gov/om/hazstats.shtml>

\*\*MMWR June 7, 2013; 62(22):433-436. (W.Va, Va, Ohio, MD 2012)

## New York City, 2000-2011\* (MMWR)

- Analysis of data hospitals, death certificates, medical examiner records
  - 447 patients each year were treated for heat illness..... and released from EDs
  - 152 per year were hospitalized; 13 died from heat stroke
  - Comorbidities were chronic diseases, mental health disorders, obesity

\*Wheeler K, Lane K, Walters S, Matte T. Heat Illness and Deaths New York City 2000-2011. MMWR. August 9, 2013; 62(31):617-621.

# Health Professionals Understand Why Risk Increases

- Groups at increased risk:
  - Elderly
    - sweat less, less thirst drive
  - Non-ambulatory
    - May not seek cooler locations or hydrate
  - Cardiopulmonary and renal conditions
    - Circulatory burden and dehydration
  - Mental health medications
    - Thermoregulation
  - Children (0-4) and older kids – thermoregulatory issues and activities
  - Sports Enthusiasts – may overdo
  - Laborers – may be placed at greater risk
  - Homeless – may not recognize the danger or have resources to cope

# What does extreme heat mean for personal health?

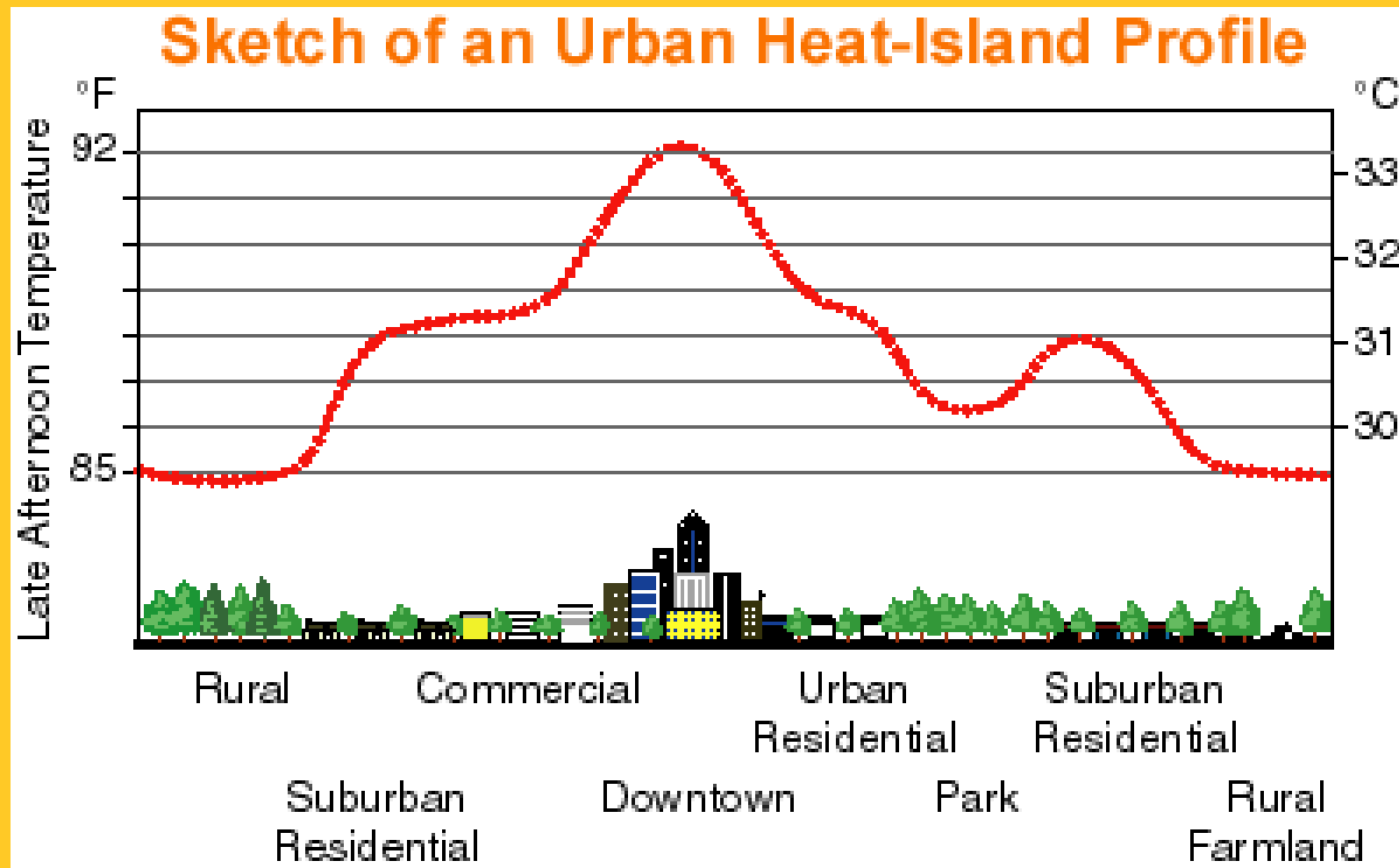
- Mild Symptoms (rash, heat fatigue)
- Heat Exhaustion
  - Thirst, rapid heart beat
  - Weak/Dizzy
  - Cramps/Headache
  - Nausea/Vomiting
  - Profuse Sweating
- Heat Stroke:
  - Confusion, Fainting, Coma
  - Skin dry or moist
  - Core (rectal) temp > 104°
- Risk of Mortality



# What You Should Do about Heat Illness

- If mild, hydrate and get out from heat
- If more severe (heat exhaustion), hydrate, cool, move to a cooler location
- If heat stroke, seek emergency care





Less cooling green spaces, less air flow due to large buildings, more heat absorbing surfaces.

# Preventing Heat Injury and Mortality

- Adequately protecting people requires both clinical AND public health efforts
- Communication is key
- Clinical teams can reach their vulnerable patients
  - Call elders who live alone, caretakers of the non-ambulatory
  - Post relevant information or provide handouts during warm months
- Public Health teams can reach the vulnerable
- Government has a role also- coordination/communication

# Preventing Mortality, continued

- Risk Communication (at the right time)
  - Clinical Sites: identify and warn those at risk; call elders who live alone or caretakers. Post, send, hand out relevant information
  - Mass media (radio, television)
    - Heat Alerts
- Public Health/Local Government Resources
  - Cooling centers
  - Outreach teams
  - Neighborhood: buddy systems, block captains



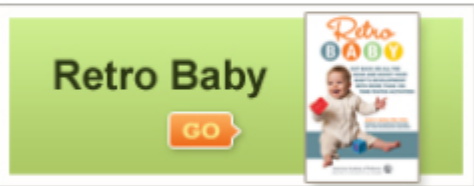
## All Around

### At Home

Medication Safety

### At Play

### On The Go



# Protecting Children from Extreme Heat: Information for Parents

Extreme heat can cause children to become sick in several ways. Make sure to protect your child from the heat as much as possible, watch for symptoms, and call your doctor if you see any develop.



## Preventing Effects of Extreme Heat:

**There are several steps you can take to protect your child from heat-related illness:**

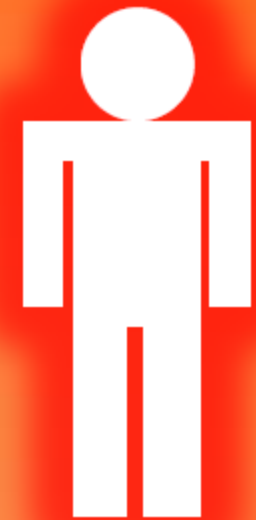
- Plan to have a cool, air-conditioned space for your child. If your home does not have air-conditioning, find a nearby building that does. Libraries can be a great place for a cool retreat from the heat.
- Make sure your child stays hydrated. Encourage her to drink water regularly, even before she asks for it.
- Plan for more time to rest than usual; heat can often make children feel tired.
- When your child is feeling hot, give him a cool bath or water mist to cool down.
- Don't forget about the **effects of sun exposure**.
- Never leave children in a car or other closed motor vehicle. The temperature inside the car can become much higher than the outside temperature, and can rise to temperatures that

# Climate Change, Heat and You



WHAT DOES **HEAT** HAVE TO DO WITH MY HEALTH?

**EXTREME HEAT** MEANS SEVERAL DAYS OR MORE WITH **UNUSUALLY HOT WEATHER**..AND THAT CAN BE **DANGEROUS TO YOUR HEALTH!**



Climate change will lead to more **EXTREME HEAT EVENTS**

CARBON POLLUTION MAKES THE WORLD WARMER AND CHANGES OUR CLIMATE!

THE "**URBAN HEAT ISLAND**" EFFECT  
If you live in a city, it can get a lot **hotter** than if you lived

Planting **trees** can help to

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As the earth continues to warm, public health officials will need to develop and implement extreme heat programs that are flexible enough to manage under extraordinary conditions that will become increasingly common.

Examples of materials that are available already for interested parties to incorporate in an extreme heat program are provided below.

### SPECIFIC GUIDANCE FOR RESPONDING TO EXTREME HEAT EVENTS IS COMMON IN MANY EXTREME HEAT PROGRAMS



#### FACT SHEET FOR CARETAKERS

*Extreme heat events are the most dangerous natural hazard in the United States, contributing to an average of 675 deaths per year.*

*Heat-related death and illness are preventable.*

*Be aware of the weather. If it seems unseasonably warm outside reduce your exposure to heat and sun, take precautions to stay cool, and help people under your care do the same.*

#### Most at-risk during an extreme heat event include people who are:

living alone; mentally impaired; unable to travel; poor; homeless; elderly; infants; participating in outdoor exercise or work; under the influence of alcohol or drugs; or taking medications for high blood pressure, depression, or failure to sleep.

#### STAY COOL

Encourage your patients to follow the steps below to reduce the risk of heat-related illness.

- Spend time in air-conditioned buildings and avoid direct exposure to the sun.
- Drink more fluids; don't wait until you're thirsty to drink water.
- Avoid alcohol or liquids containing large amounts of sugar because these cause a loss in body fluid.
- Refrain from physical activity.
- Avoid direct exposure to sun by wearing brimmed hats and applying sunscreen.
- Dress in lightweight, loose-fitting clothing to keep cool.
- When the temperature is above 95°F, electric fans may not prevent heat-related illness.

#### HELP OTHERS

- During an extreme heat event, reach out and help at-risk people deal with the heat.
- Call 311 to notify 311 Baltimore of people at-risk who may need extra help.

Know the signs of heat-related illness and the right first aid response.

# Adaptation is Saving Lives





# Community strategies to reduce heat risks

## Cooler areas have vegetation and/or water







<http://www.cdc.gov/climateandhealth/pubs/ClimateChangeandExtremeHeatEvents.pdf>

# End of Heat Section



Thank You!  
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