ADDRESSING HEAT IN DELAWARE

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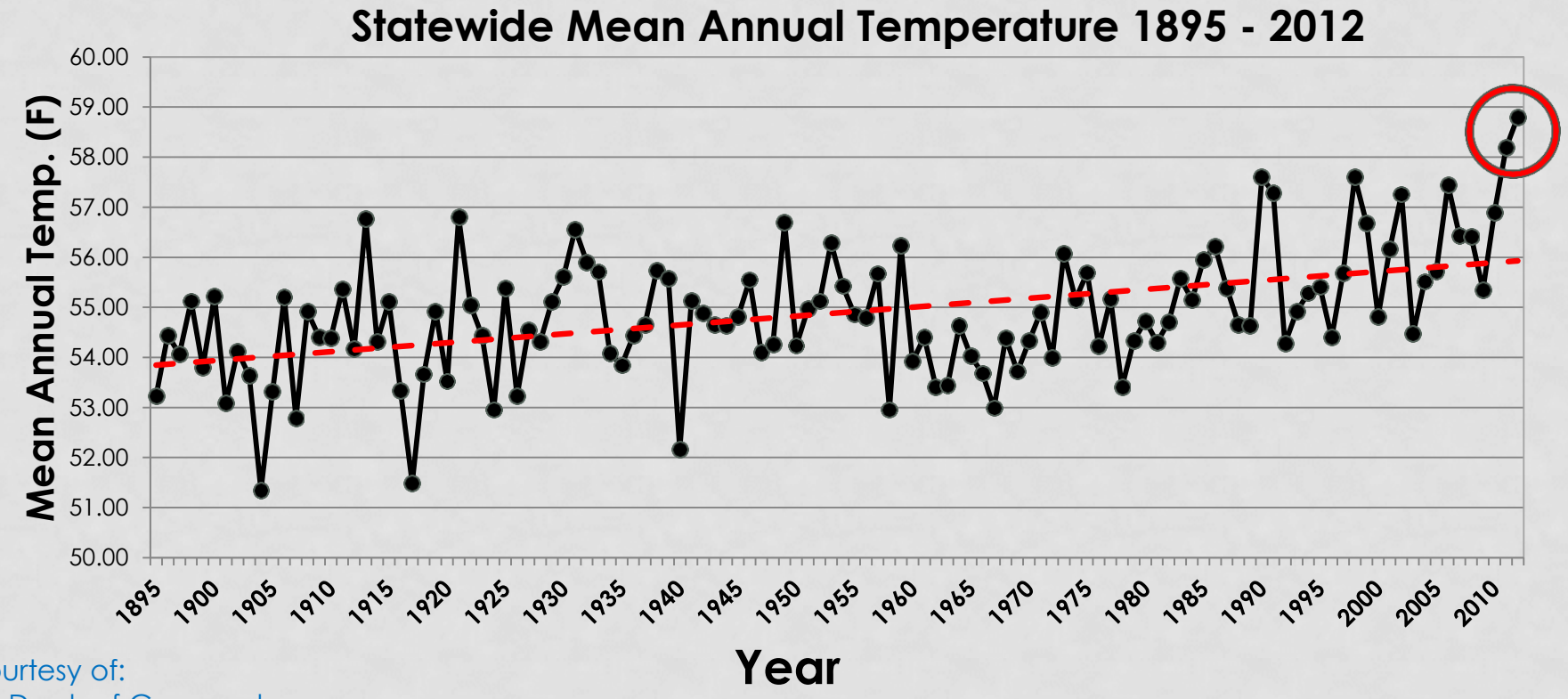
JULY 18, 2013
CITIZEN'S ADVISORY COMMITTEE MEETING
CENTER FOR THE INLAND BAYS

ADDRESSING HEAT

- **Issue:** Historic and Future Temperature Trends in Delaware
  - Courtesy of UD's Dept of Geography and Office of the State Climatologist
  - Courtesy of Dr. Katherine Hayhoe
- **Short-term Adaptation Solution:**
  - Statewide Heat Health Warning System
- **Long-term Mitigation and Adaptation Solutions:**
  - Measures to Cool Communities

HEAT IN DELAWARE: ANNUAL TEMPERATURE PATTERNS FROM 1895 - 2012

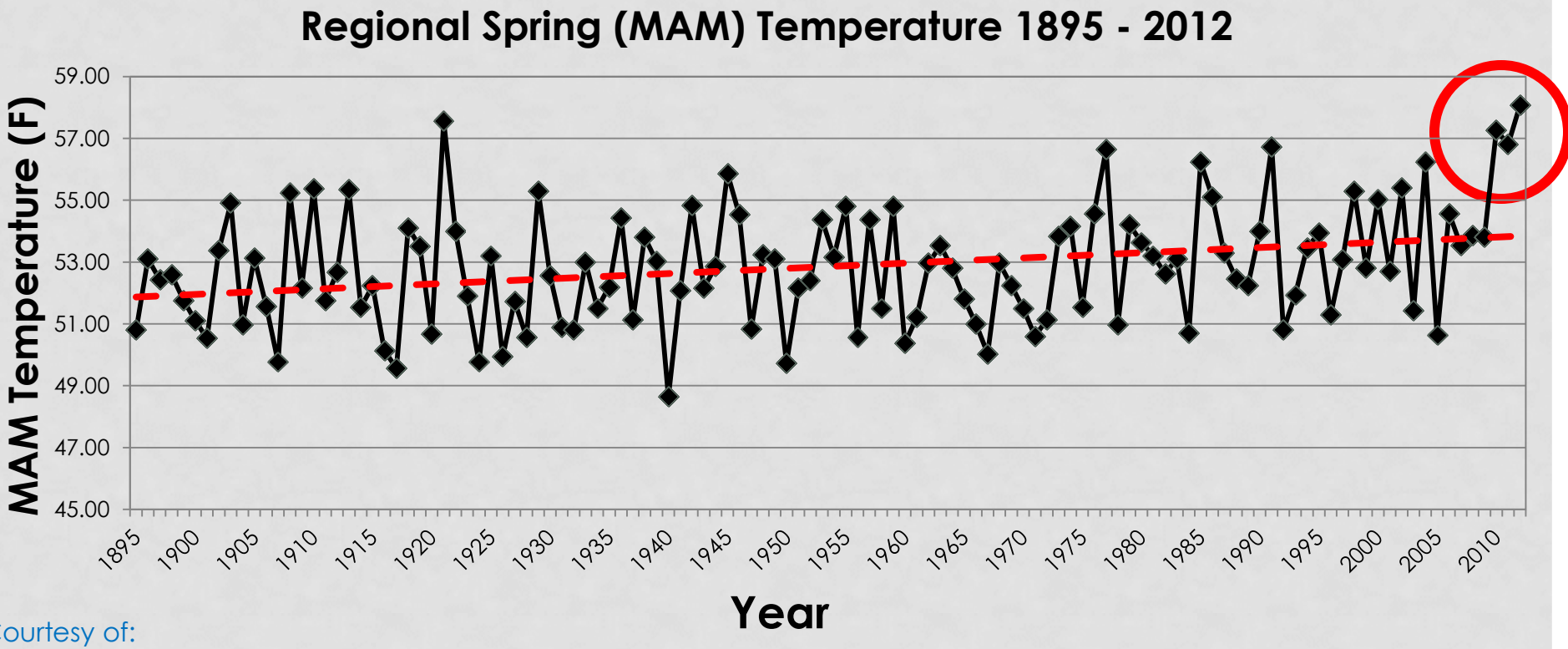
An upward trend in mean annual temperature since 1895.... +0.2°F / decade



Courtesy of:
UD Dept. of Geography
Office of the Delaware State Climatologist

DELAWARE'S HISTORIC SPRING TEMPERATURE PATTERNS: 1895-2012

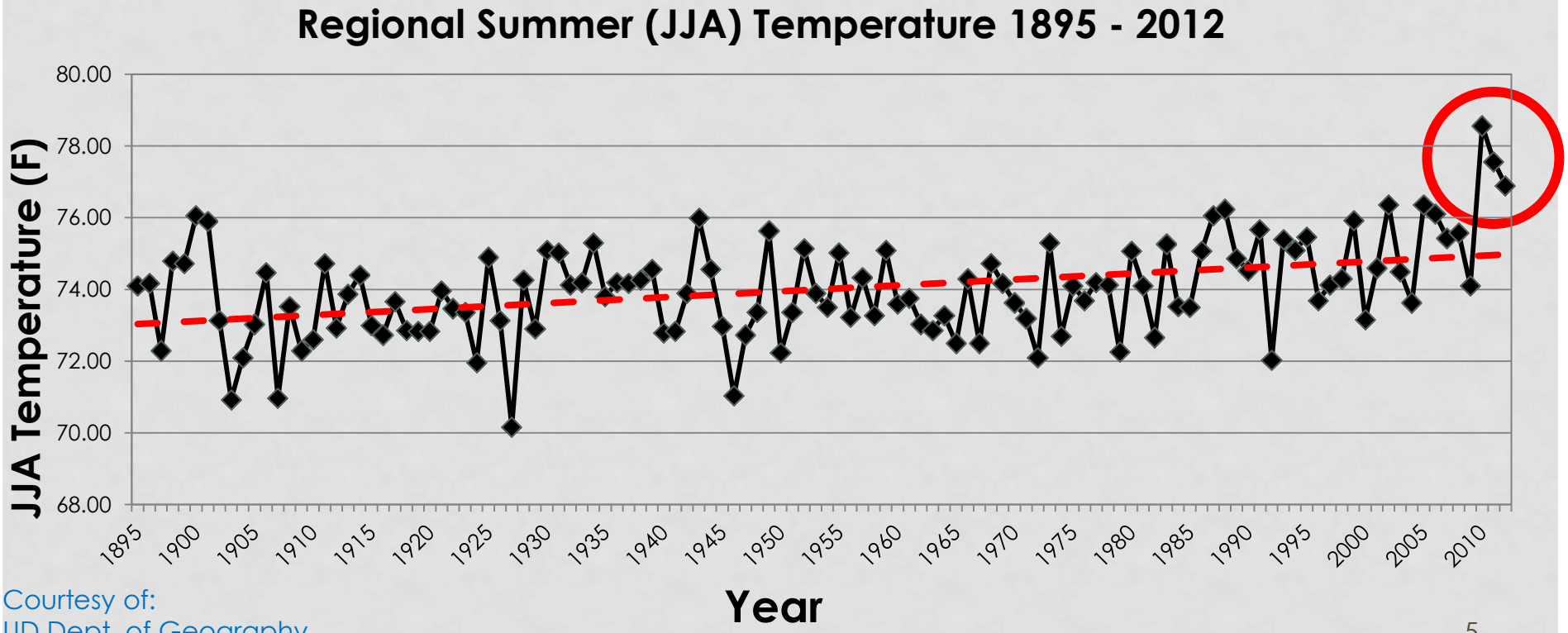
An upward trend in spring temperature since 1895…. +0.2°F / decade



Courtesy of:
UD Dept. of Geography
Office of the Delaware State Climatologist

DELAWARE'S HISTORIC SUMMER TEMPERATURE PATTERNS: 1895-2012

An upward trend in summer temperature since 1895…. +0.2°F / decade



Courtesy of:
UD Dept. of Geography
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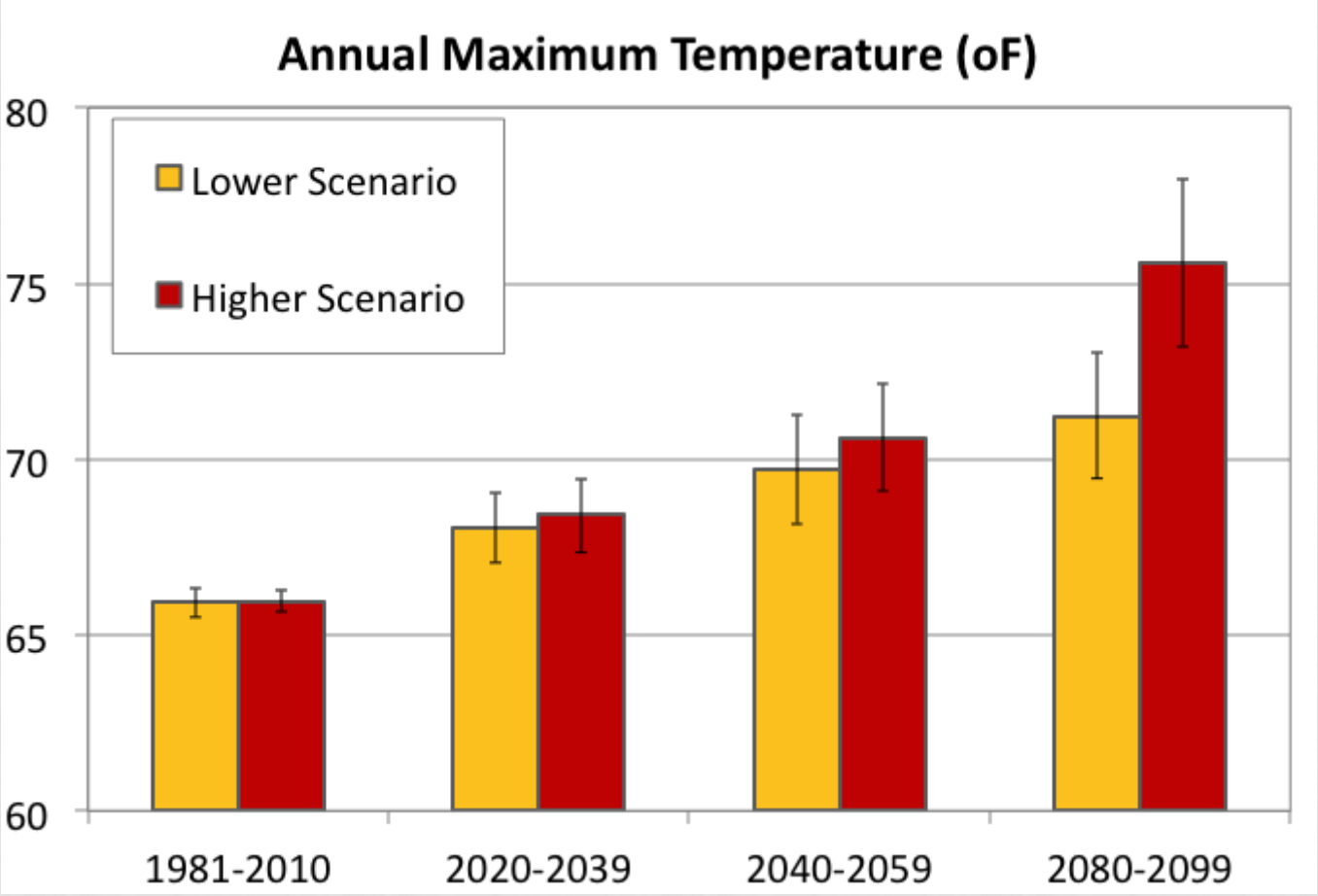
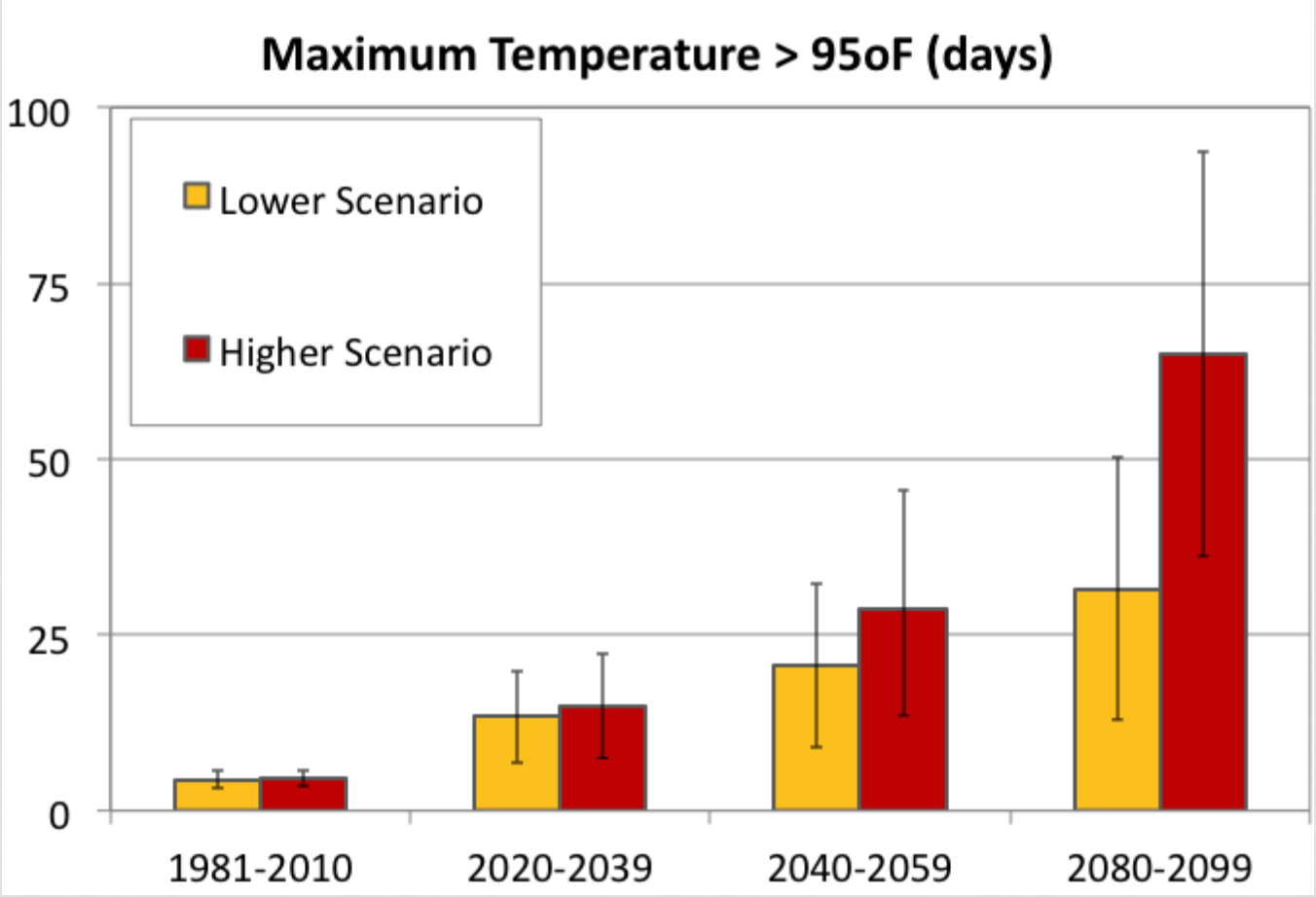
FUTURE PROJECTIONS: ANNUAL MAXIMUM TEMPERATURE THROUGH 2099



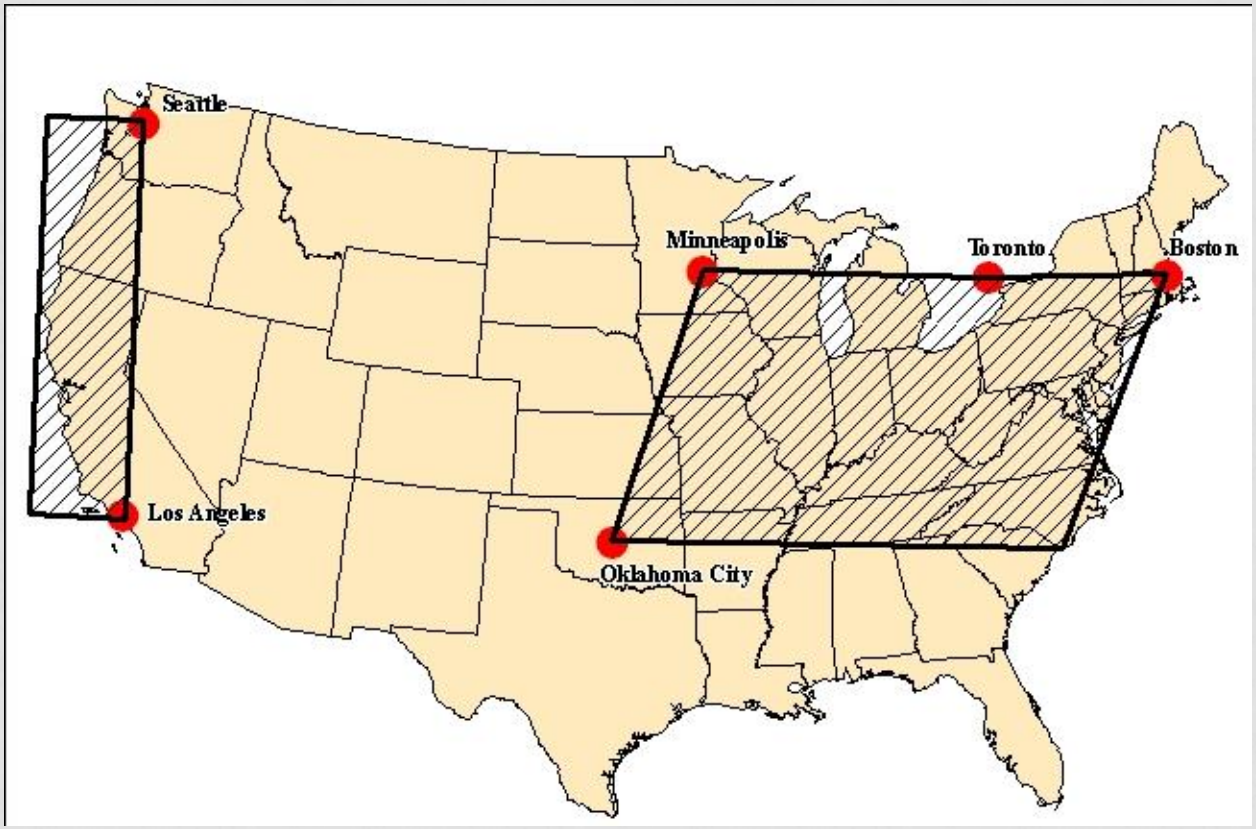
Courtesy of:
Dr. Katherine Hayhoe, 2013

FUTURE PROJECTIONS: MAXIMUM DAYS OVER 95 DEGREES F THROUGH 2099



Courtesy of:
Dr. Katherine Hayhoe, 2013

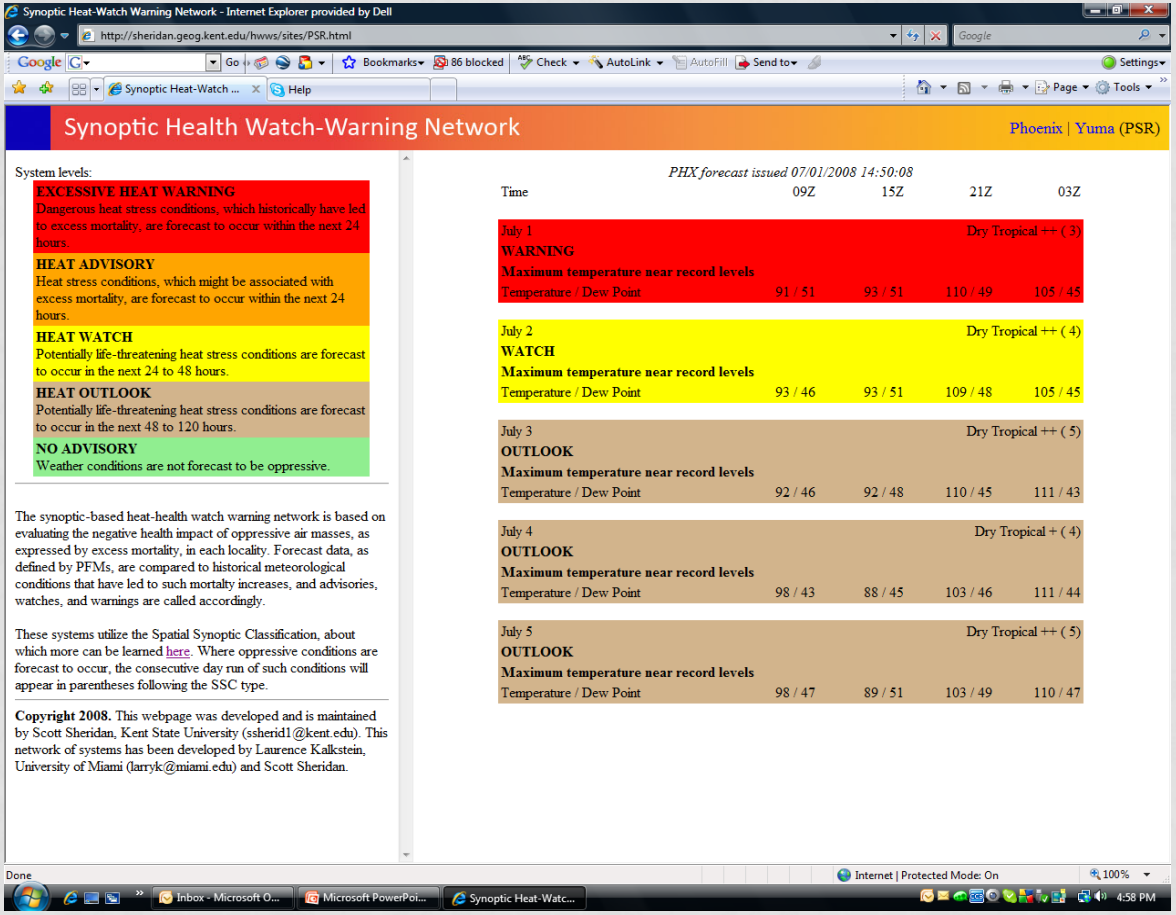
AREAS IN THE U.S MOST VULNERABLE TO HEAT-RELATED MORTALITY



The key: highly variable day-to-day summer weather.

HEAT HEALTH WARNING SYSTEMS

- A custom-made forecasting system based on actual weather-health relationships, as determined by daily variations in human mortality



POSITIVE OUTCOMES RESULTING FROM SYSTEM IMPLEMENTATION

- Lives have been saved [A]
- Effectiveness can be checked
  - forecasting effectiveness (false positives or negatives)
  - accuracy in estimating health impacts of offensive weather [B]
  - noting if we are saving lives
- Increased NWS/Stakeholder cooperation
  - More sophisticated intervention activities developed

[A] Ebi, KL, 2004. Heat watch warning systems save lives. *Bull. Am. Met. Soc.* 85:1067-74
[B] Michelozzi, P. 2004. Impact of heat waves on mortality - Rome. *J. of Am. Med. Assn.* 291:2537-38

NEXT PHASE: DEVELOPING INTERVENTION ACTIVITIES

- Coordinate public broadcasts by the media; coordination between the Weather Service and Health Departments
- Public distribution of tips to the population on how to stay cool
- Opening a "heatline", run by medical personnel for citizen to call in for advice
- Extra personnel in emergency rooms
- Utilization of the "buddy system"
- Suspend utility cutoffs
- Open air conditioned shelters; outreach to the homeless
- Development of a city heat/health task force
- Many more……

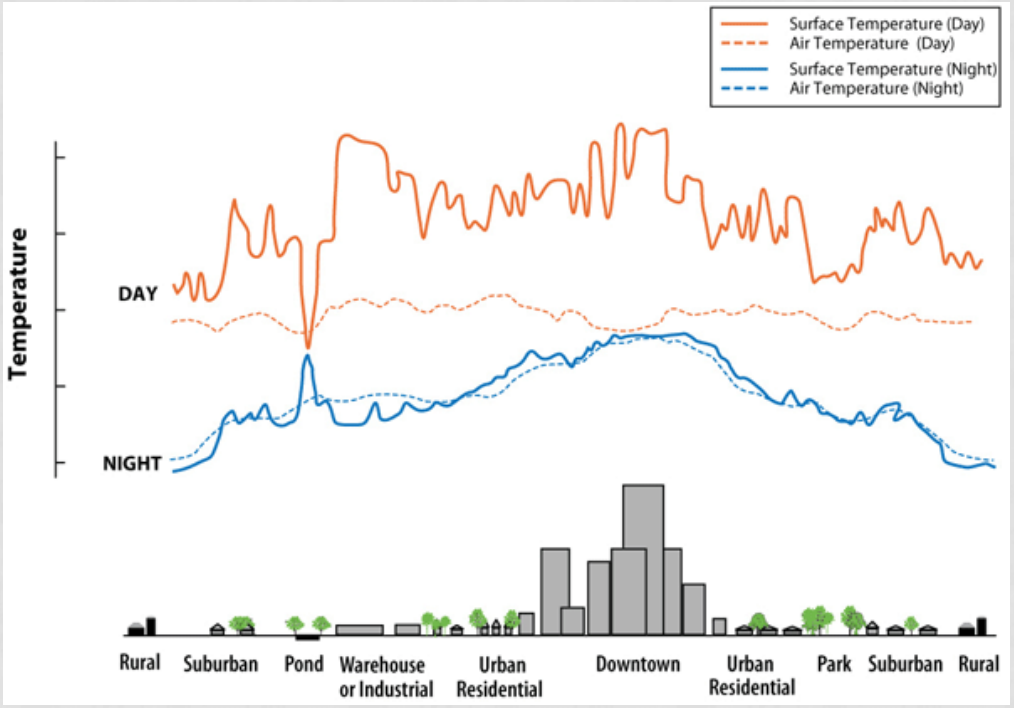
HEAT ISLAND EFFECT

Definition

- Micro-scale temperature differences between urban and rural areas
- Urban areas can be 9 – 27 ° F higher than rural areas

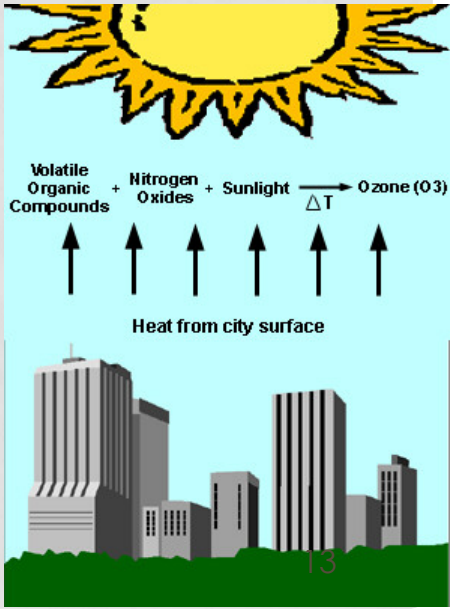
Causes

- Reduced vegetation
- Materials used to build urban infrastructure
- Urban geometry



HEAT ISLAND IMPACTS

- **Increased energy use**
  - 5 – 10 % of summertime electricity demand is used to cool heat islands
  - 1.5 – 2.0% E demand ↑ for every 1 °F ↑ in the summer
  - Longer peak periods; pressure on E grid; brownouts, blackouts
- **Air quality and greenhouse gas (GHG) emissions**
  - Increased GHG emissions
  - Increased air pollution
  - Increased ground-level ozone formation
- **Water quality**
  - Warmer water runoff = ecological shock in waterways
  - Increased water runoff = more pollutants in waterways
- **Human health**
  - Respiratory difficulties
  - Heat cramps, heat exhaustion
  - Non-fatal heat stroke/sun stroke
  - Heat related mortality



LINKAGES = MORE COOLING OPPORTUNITIES

Heat

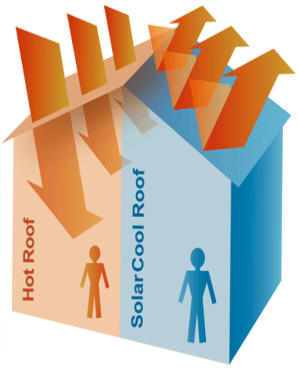
Solutions

Trees Vegetation

Green Roofs

Cool Roofs

Cool Pavements



SCALES FOR IMPLEMENTATION STRATEGIES (HELPFUL FOR MEASURING CO-BENEFITS)

- Individual building
  - Roofs (green and reflective)
  - Vegetation (shade trees and more)
- Community/Neighborhood
  - Street design (e.g., tree lined, vegetation, pavements)
  - Open vegetated land use (e.g., parks, green spaces)
- City/Regional
  - All mitigation strategies (e.g., pavements, trees, vegetation, roofing)
  - Integrate into land use plans, selection of materials

GREEN ROOFS IN DELAWARE

- Girl Scout Lodge, Hockessin
- Baywood Greens Golf Course, Long Neck
- Barclays Headquarters, Wilmington
- Colburn Lab at University of Delaware, Newark
- B'nai B'rith Temple, Newark
- Dover Public Library, Dover
- Bethany Blues Restaurant, Bethany Beach

IMPLEMENTATION MECHANISMS

Policy Mechanisms

- Procurement
- Resolutions
- Tree and Landscape Ordinances
- Comprehensive Plans and Design Guidelines
- Zoning Codes
- Green Building Programs and Standards
- Building Codes
- Air Quality Requirements

Voluntary Mechanisms

- Demonstration Projects
- Incentive Programs
- Urban Forestry and Community Tree Planting Programs
- Weatherization
- Outreach and Education
- Awards

CONTACT INFORMATION

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