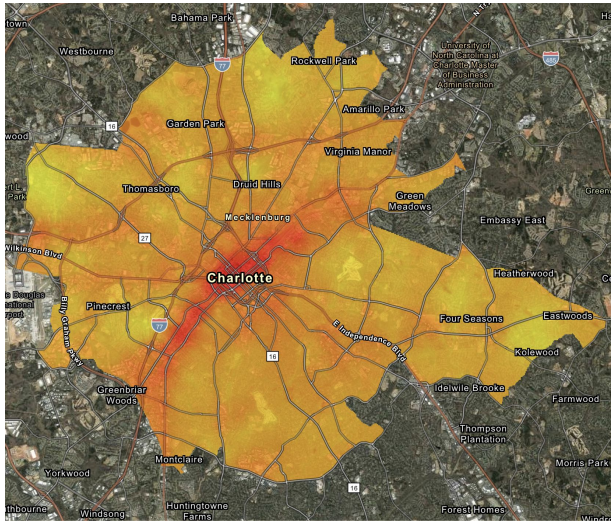


Charlotte's Urban Heat Island

Results from the 2024 NOAA Urban Heat Island Mapping Campaign + Supporting Heat Action in Charlotte & Mecklenburg County

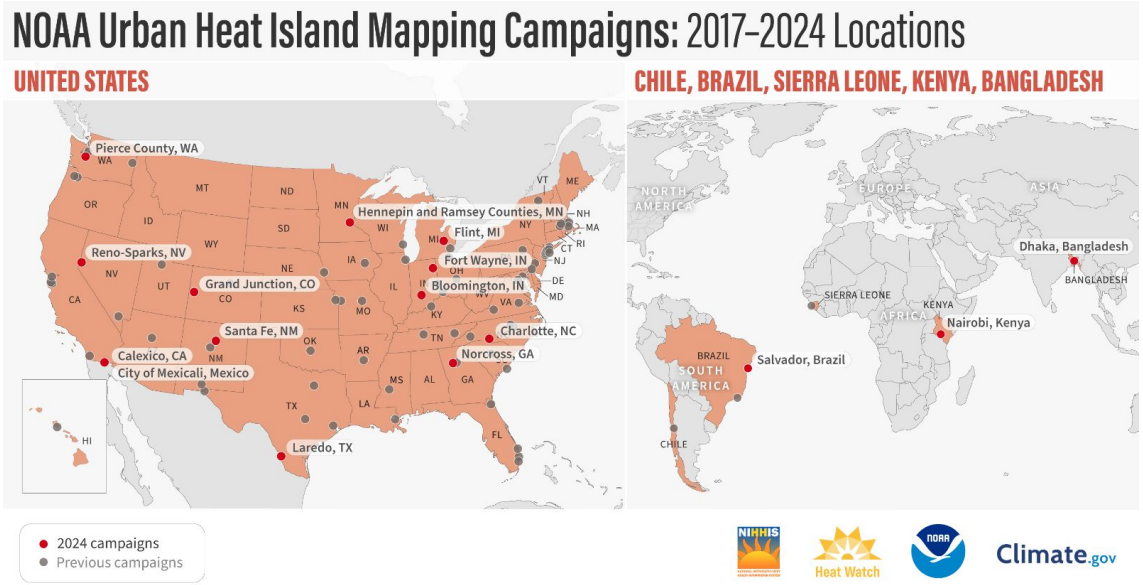
Dr. Katherine Idziorek, AICP
UNC Charlotte Department of Earth, Environmental, and Geographical Sciences

CHARLOTTE HEAT MAPPERS

UNIVERSITY OF NORTH CAROLINA CHARLOTTE | DEPARTMENT OF EARTH, ENVIRONMENTAL, AND GEOGRAPHICAL SCIENCES

Updated May 2026

2024 NOAA Urban heat island mapping campaign



- Part of **Justice40** initiative
- National Oceanic & Atmospheric Association **(NOAA)** partnership with **CAPA Heat Watch**
- **70+** communities mapped since 2017
- Application **January 2024;** notice of award **March 2024**

The Charlotte Heat Mappers

UNC Charlotte Department of Earth, Environmental and Geographical Sciences

- Urban Planning
- Atmospheric Science
- Environmental Justice
- Urban Ecology
- Community Resilience
- Geographic Information Science

Our goal: To better understand the varying effects of extreme heat across our urban area and to work with local partners to mitigate its impacts on community health and wellbeing

Photo: Jenn Conway

Our community partners

- Sustain Charlotte
- Action NC
- Sol Nation
- CharlotteEAST
- Charlotte Urbanists
- CleanAIRE NC
- Charlotte Regional Transportation Coalition
- TreesCharlotte
- Schiele Museum of Natural History
- Mecklenburg County Park and Recreation Department
- Mecklenburg County Air Quality Division
- Charlotte Mecklenburg Emergency Management Office
- Mecklenburg County Housing Innovation & Stabilization Services
- Mecklenburg County Community Support Services
- City of Charlotte's Office of Sustainability and Resilience
- City of Charlotte Landscape Management
- Charlotte Tree Advisory Commission
- UNC Charlotte Department of Earth, Environmental, and Geographical Sciences
- UNC Charlotte Urban Institute
- UNC Charlotte Office of Emergency Management
- UNC Charlotte Department of Public Health Sciences
- Atrium Health/Advocate Health
- State Climate Office of North Carolina
- North Carolina Department of Health and Human Services
- North Carolina Emergency Management
- North Carolina Office of Recovery and Resiliency
- National Weather Service Forecast Office
- Duke Heat Policy Innovation Hub
- U.S. Department of the Interior SE Climate Adaptation Science Center

We welcome additional partners!

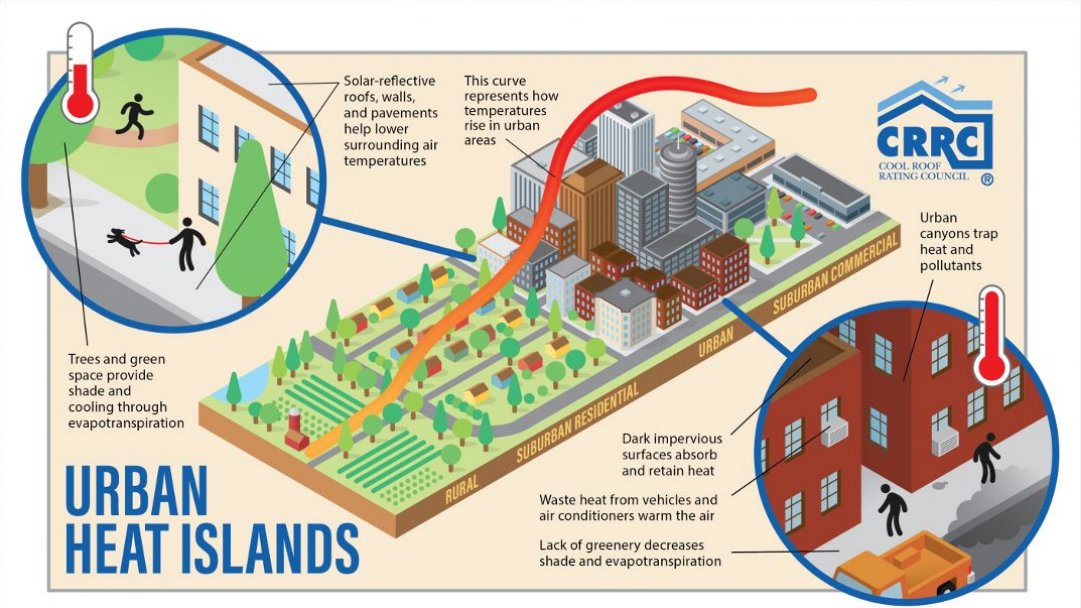
What do we mean by “extreme heat?”

Every individual experiences the impacts of heat differently, which makes setting thresholds for concepts like “extreme heat” and “heat wave challenging!

Some definitions from the National Integrated Heat Health Information System (Heat.gov):

- **Extreme heat**
  - A period of high heat and humidity with temperatures above 90°F for at least 2-3 days.
  - A temperature that is much hotter and/or humid than average. Because some places are hotter than others, this depends on what’s considered average for a particular location that time of year. For example, while summertime temperatures of 100˚F might be normal for Phoenix, Arizona, they would be considered extreme for Seattle, Washington.
- **Heat wave**
  - A heat wave is a period of abnormally hot weather generally lasting more than two days. Heat waves can occur with or without high humidity.

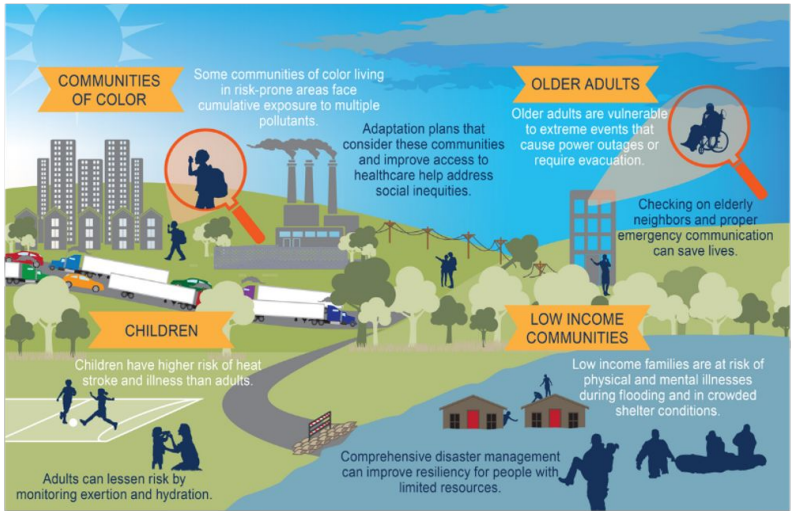
What is the Urban Heat Island (UHI) effect?



Infographic: Cool Roof Rating Council

- **Urban Heat Island (UHI) effect:** the temperature difference between cities and their surrounding rural landscapes
- Highly developed urban areas can experience mid-afternoon temperatures that are **15-20°F warmer** than surrounding, vegetated areas

Why is it important to map urban heat?



https://www.heat.gov/pages/who-is-at-risk-to-extreme-heat

- **Extreme heat is the #1 weather-related killer**…it's deadlier than hurricanes, floods, and tornadoes combined.
- There are variations *within* the urban heat island, meaning that **heat health risk is not distributed equitably.** Already-vulnerable populations are disproportionately impacted.
- Having **high-resolution, "real-feel" heat data** can help understand how people experience heat across Charlotte communities

Why is it important to map urban heat?

Journal of the American Planning Association 443 2020 | Volume 86 Number 4

OPEN ACCESS

Urban Heat Management and the Legacy of Redlining

Bev Wilson

ABSTRACT

Problem, research strategy, and findings: Historical patterns of discrimination and disinvestment have shaped the current landscape of vulnerability to heat in U.S. cities but are not explicitly considered by heat mitigation planning efforts. Drawing upon the equity planning framework and developing a broader conceptualization of what equity means can enhance urban heat management. Here I ask whether areas in Baltimore (MD), Dallas (TX), and Kansas City (MO) targeted for disinvestment in the past through practices like redlining are now more exposed to heat. I compare estimates of land surface temperature (LST) derived from satellite imagery across the four-category rating system used to guide lending practices in cities around the United States, summarize the demographic characteristics of current residents within each of these historical designations using U.S. Census data, and discuss the connection between system-atic disinvestment and exposure to heat. LST and air temperatures are not equivalent, which makes it dif-ficult to reconcile existing research on the human health impacts of heat exposure that rely on a sparse network of air temperature monitoring stations with more granular LST data. Areas of these cities that were targeted for systematic disinvestment in the past have higher mean land surface temperatures than those that received more favorable ratings. Poor and minority residents are also overrepresented in for-merly redlined areas in each of the three study cities.

Takeaway for practice: By examining areas that have experienced sustained disinvestment, cities may be able to more quickly narrow the focus of heat mitigation planning efforts while furthering social equity. Efforts to mitigate the negative impacts of rising temperatures in U.S. cities must be tailored to the local climate, built environment, and sociodemographic history. Finally, geospatial data sets that document his-torical policies are useful for centering and redressing current inequalities when viewed through an equity planning lens.

Keywords: climate change, environmental justice, heat exposure, redlining

Centering Equity in Urban Heat Management

The Fourth National Climate Assessment, released in November 2018, identified extreme heat among the most serious threats to human health in urban areas across the United States (Reidmiller et al., 2018). Similarly, a recent review of the human health impacts of heat concluded that "given projected changes in population, urbanization, and demography, heat will continue to be a substantial public health issue in the decades to come in both the developed and developing worlds" (Sheridan & Allen, 2018, p. 9). In the United States, the Centers for Disease Control (2017) estimates that more than 600 people are killed by extreme heat each year. Though this may not seem a large number, heat accounted for almost as many deaths as flooding and hurricanes combined and was the single largest cause of weather-related fatalities between 1986 and 2017 (National Weather Service, 2018). The most recent climate assessment notes that low-income and marginalized groups with "lower capacity to prepare for and cope with extreme weather and climate-related events" will continue to be most affected, and that "adaptation actions for the most vulnerable populations" should be prioritized (Reidmiller et al., 2018, p. 25). Although there is evidence that equity is receiving more attention in planning discourse, "many U.S. cities continue to ignore equity goals as part of their climate and sustainability plans, or at least treat them as secondary to environmental and economic goals" (Schrock et al., 2015, p. 287). A more recent study also concluded that equity is not prioritized and that "the uneven impacts of hazards on socially vulnerable populations" are often ignored by formal planning efforts (Berke et al., 2018). As cities around the United States begin to more

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Articles

Heat waves and annual mortality among older adults (aged ≥65 years) in the USA

James P Healy, Edgar Castro, Mahdieh Danesh Yazdi, Mary B Rice, Howard Chang, Kyle Steenland, Yaguang Wei, Joel D Schwartz

Summary

Background Heat waves are increasing in frequency and intensity due to climate change. While acute mortality effects are well documented, the impact on annual mortality and the modification of this association by race, poverty level, and amount of green space at a national level are less understood. We aimed to quantify the association of heat waves with annual all-cause and cause-specific mortality among older adults in the contiguous USA.

Methods We conducted a cohort study using an open cohort of 73 769 163 Medicare beneficiaries (aged ≥65 years) residing in 27 926 ZIP codes across the contiguous USA from 2000–18, with 668 448 618 person-years of follow-up. Heat waves were defined at the ZIP-code level as 2 or more consecutive days with a minimum temperature exceeding 2·5 SDs above the local 30-year summer mean. We used quasi-Poisson regression models at the ZIP-code-year level to examine the association between the annual number of heat waves and mortality counts, adjusting for individual and neighbourhood-level characteristics and ozone trends.

Findings An additional heat wave was associated with an increase in the annual mortality rate of 8·83 deaths per 10 000 person-years (95% CI 5·99 to 11·68). Across the contiguous USA from 2000–18, the 8107 observed heat waves were associated with an estimated 17 603 (95% CI 11 942 to 23 287) excess deaths. Were an additional heat wave to occur in every ZIP code each decade, we estimated 36 813 (95% CI 34 031 to 74 979) premature deaths would result. Increased heatwaves were associated with cardiovascular, respiratory, and neurological deaths. In subgroup analyses, the mortality increase was significantly greater for Black individuals (16·50 per 10 000 person-years, 95% CI 8·11 to 25·04) than for White individuals (5·85 per 10 000 person-years, 2·79 to 8·91). The association was stronger in high-poverty neighbourhoods (11·09, 4·00 to 18·29) and was protective in neighbourhoods with abundant green space (−13·51, −24·92 to −1·79).

Interpretation Heat waves are associated with a substantial increase in annual mortality among older US adults, with disproportionate impacts on Black communities and communities on low incomes. Our findings suggest that climate change poses a significant chronic risk to public health, highlighting the need for urgent mitigation and targeted adaptation measures to address these inequities.

Funding None.

Introduction

For decades the deadly impact of heat waves on public health has been documented.[1] One of the most notable heat waves was the Chicago heat wave of 1995, which caused more than 700 excess deaths, and brought widespread attention to heat waves as a major public health threat.[2] Subsequently, numerous population studies have reported associations between heat waves and mortality at the city, national, and multinational levels.[3–6] As climate change is projected to increase the frequency, duration, and intensity of heat waves globally, comprehensive studies of their impacts on vulnerable populations are essential.[7]

The acute health effects of heat waves are well documented, but there is a major gap in our understanding of the chronic impacts over years.[8] Previously, most large nationwide studies have used daily time-series designs.[4–6] These studies are powerful for identifying acute risks but cannot account for mortality displacement longer than a few weeks or for delayed and cumulative effects.[8–9] Thus, resulting mortality months after a heat wave could be unaccounted for.[8] Beyond all-cause mortality, cause-specific mortality has not been investigated beyond cardiorespiratory mortality.[4,7,10] In terms of spatial resolution, existing studies have generally included city, county, or large regional level data, which do not have fine spatial temperature resolution.[11] Using finer resolution data can reduce this exposure measurement error and also include smaller communities that are less often studied.[8] Finally, existing studies have been unable to show consistent effect modification by race or socioeconomic status at the national level, despite some evidence at city and state levels.[3,12]

To address these gaps, we used a large, 19-year nationwide cohort of US Medicare beneficiaries to estimate the association between the annual number of heat wave occurrences and annual all-cause and cause-specific mortality at the ZIP code level, which we use as a proxy for

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npj | urban sustainability

Article

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Current inequality and future potential of US urban tree cover for reducing heat-related health impacts

Check for updates

Robert I. McDonald[1,2,3] ✉, Tanushree Biswas[4], T. C. Chakraborty[5], Timm Kroeger[6], Susan C. Cook-Patton[7] & Joseph E. Fargione[8]

[1]The Nature Conservancy in Europe, Berlin, Germany. [2]CUNY Institute for Demographic Research, New York, NY, USA. [3]Humboldt University, Berlin, Germany. [4]Washington Program, The Nature Conservancy, 74 Wall Street, Seattle, WA 98121, USA. [5]Atmospheric, Climate, & Earth Sciences Division, Pacific Northwest National Laboratory, 902 Battelle Blvd, Richland, WA 99354, USA. [6]Global Science, The Nature Conservancy, 4245 Fairfax Drive, Arlington, VA 22203, USA. [7]Tackle Climate Change Program, The Nature Conservancy, 4245 Fairfax Drive, Arlington, VA 22203, USA. [8]North America Region, The Nature Conservancy, 1101 W River Pkwy # 200, Minneapolis, MN 55415, USA. ✉e-mail: rob_mcdonald@tnc.org

Excessive heat is a major and growing risk for urban residents. Here, we estimate the inequality in summertime heat-related mortality, morbidity, and electricity consumption across 5723 US municipalities and other places, housing 180 million people during the 2020 census. On average, trees in majority non-Hispanic white neighborhoods cool the air by 0.19 ± 0.05 °C more than in POC neighborhoods, leading annually to trees in white neighborhoods helping prevent 190 ± 139 more deaths, 30,131 ± 10,406 more doctors' visits, and 1.4 ± 0.5 terawatt-hours (TWh) more electricity consumption than in POC neighborhoods. We estimate that an ambitious reforestation program would require 1.2 billion trees and reduce population-weighted average summer temperatures by an additional 0.38 ± 0.01 °C. This temperature reduction would reduce annual heat-related mortality by an additional 464 ± 89 people, annual heat-related morbidity by 80,785 ± 6110 cases, and annual electricity consumption by 4.3 ± 0.2 TWhr, while increasing annual carbon sequestration in trees by 23.7 ± 1.2 $MtCO_2e\ yr^{-1}$ and decreasing annual electricity-related GHG emissions by 2.1 ± 0.2 $MtCO_2e\ yr^{-1}$. The total economic value of these benefits, including the value of carbon sequestration and avoided emissions, would be USD 9.6 ± 0.5 billion, although in many neighborhoods the cost of planting and maintaining trees to achieve this increased tree cover would exceed these benefits. The exception is areas that currently have less tree cover, often the majority POC, which tend to have a relatively high return on investment from tree planting.

Climate change is already here, with myriad impacts on human health and society that are projected to increase over time as changes intensify[1,2]. One important impact of climate change is increased risk from excessive heat, as climate change increases in average summer temperature as well as the frequency, intensity, and duration of heat waves. Already, in an average year, heat stress kills roughly 6100 Americans and 356,000 people globally[3], as measured by epidemiological studies of excess deaths due to high temperatures. Note that the statistical estimate of excess deaths is considered more accurate than medical system records that often list another cause of death[3] (e.g., the US Centers for Disease Control estimated an annual average of 1200 deaths from heat stress in the US based on medical records[3]). Higher air temperatures increase mortality and morbidity by causing heat stroke and exhaustion and by exacerbating existing cardiovascular, pulmonary, and renal diseases[4–6]. Summer temperatures in the United States (US), the focus of this paper, are increasing, and heat waves are becoming more frequent as climate change intensifies, with the average number of days with a dangerous heat index (high temperature and humidity) forecast to triple by 2050[7].

Projected impacts on mortality are uncertain, varying among studies. One study projected that by 2090–2099, climate change in warmer regions of the world could increase annual heat-related mortality by 3.0% percentage points to 12.7%, depending on the region and the greenhouse gas

Wilson, B. (2020). Urban heat management and the legacy of redlining. *Journal of the American Planning Association*, *86*(4), 443-457.

Healy, J. P. et al. (2026). Heat waves and annual mortality among older adults (≥ 65) in the USA. *The Lancet Planetary Health*.

McDonald, R. I ,et al.. (2024). Current inequality and future potential of US urban tree cover for reducing heat-related health impacts. *Urban Sustainability*, *4*(1), 18.

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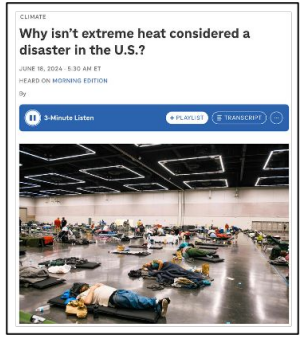
CHARLOTTE HEAT MAPPERS

Challenges to addressing impacts of extreme heat

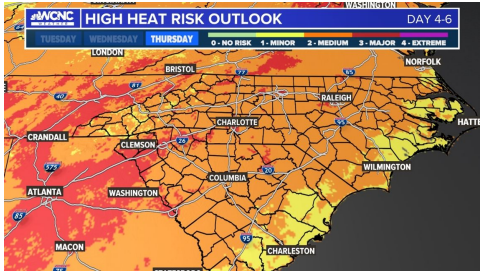
- **Extreme heat is not recognized as a "disaster"** under the Stafford Act, the federal law that establishes how the government (e.g., FEMA) responds to natural disasters
- **There is no nationwide regulation requiring employers t protect workers** against heat-related hazards and health risks
- Heat governance challenges stem from **fragmented and often reactive approaches** to a complex systemic issue.
- The impacts of heat often tend to be **"invisible,"** unlike other types of disasters; it is often called the **"silent killer"**



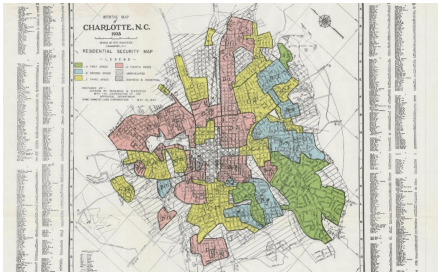
Images (clockwise from top): NPR; Meerow, S., & Keith, L. (2024). Cities at the forefront of emerging US heat governance. *One Earth*, 7(8), 1330-1334; Global Heat Health Information Network.

Why map Charlotte's urban heat island?

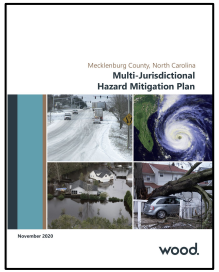
WBTV



WCNC



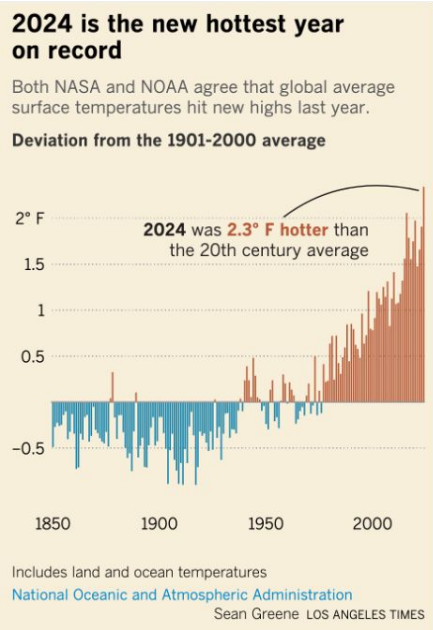
Home Owner's Loan Corporation Risk Map, 1937



CMEMO

- **Environmental injustice(s)** due to racist policies like redlining and historic disinvestment
- **Rapid urban growth** and associated **tree canopy loss**
- **Hazard mitigation data gap** for assessing vulnerability to extreme heat
- **4,000 emergency room visits** for heat-related illnesses each year during North Carolina's heat season - the majority of these in the Piedmont (NCDHHS)

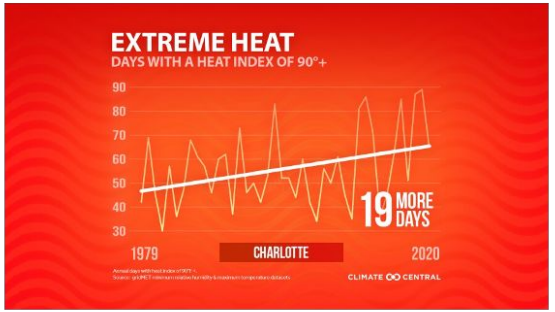
Why map Charlotte's urban heat island?

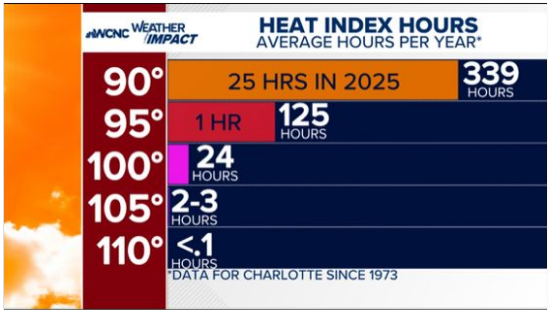


Source: LA Times

- There were **5,748 emergency department visits for heat-related illnesses** in North Carolina between May and September of 2025, **a 34% increase** over the five previous summers (2020 – 2024). (NCDHHS)
- Projections anticipate that **by 2036-2065, Mecklenburg County will be experiencing 24-25 more extreme heat days** – 95 degrees Fahrenheit or hotter – than during the 1976-2005 baseline period. (NCDEQ)

Why map Charlotte's urban heat island?

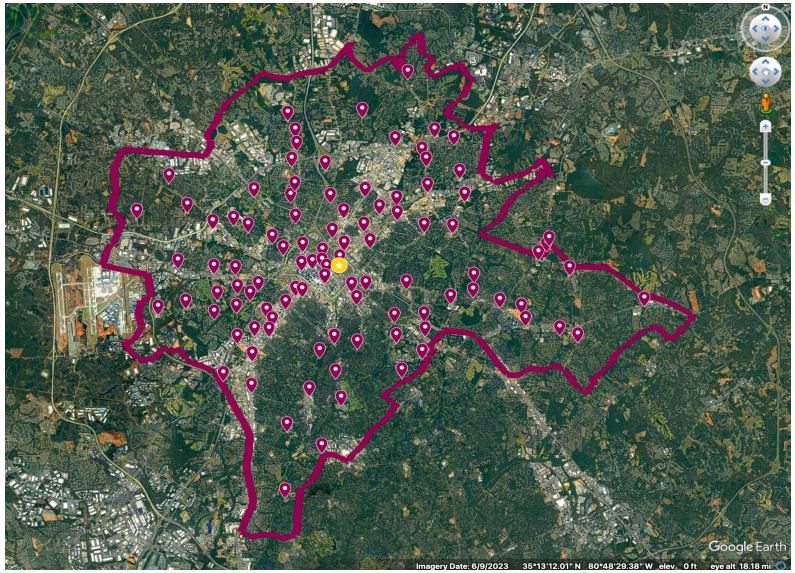




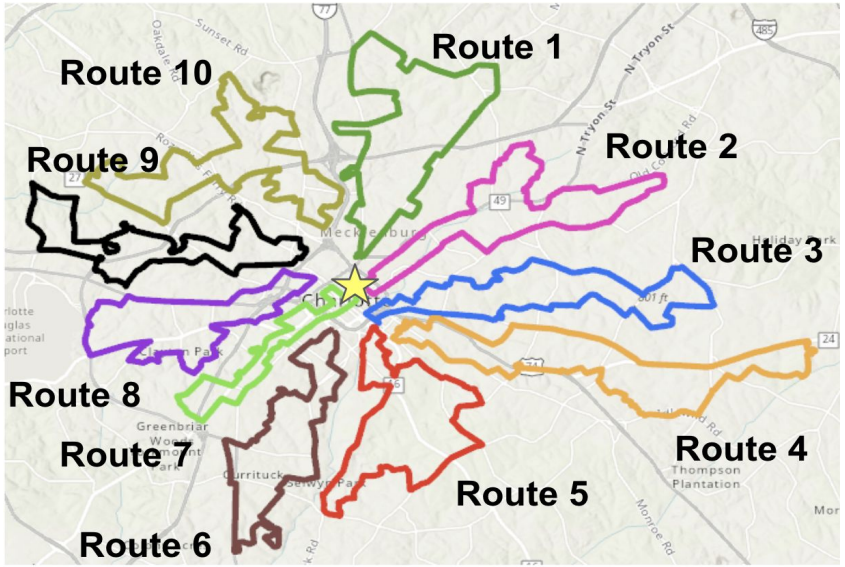
Images: WCNC, WFAE 90.7, WCNC

We know that temperatures will continue to rise. How will we respond to a hotter climate and increasing health impacts?

Mapping area and data collection routes

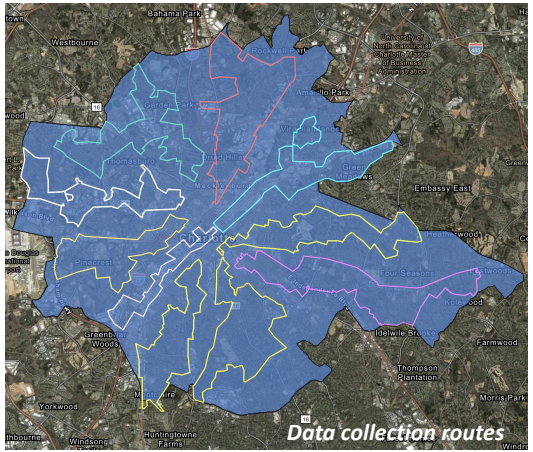


100 sqmi mapping area, POIs provided by partners



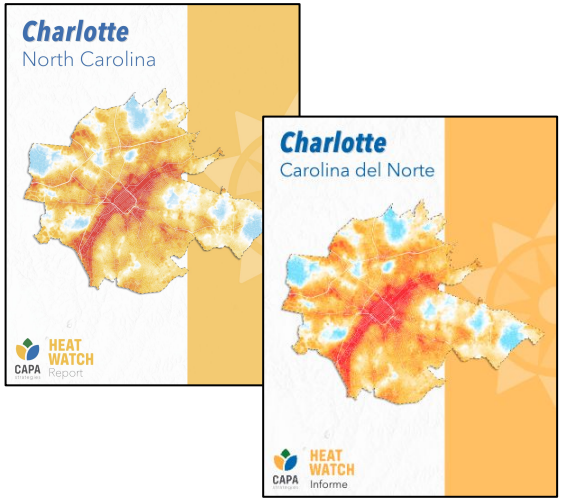
Data collection routes

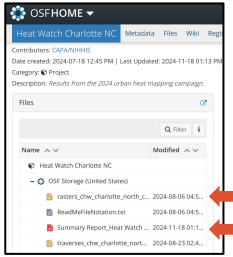
Our community science mapping campaign



- July 14, 2024 (heat index ~105°F)
- 60+ volunteers
- Ten routes, 100 sq mi
- Three shifts:
  6-7am, 3-4pm, 7-8pm
- Mobile sensors gathered temperature and humidity data every 2-3 seconds

Charlotte’s Urban Heat Island



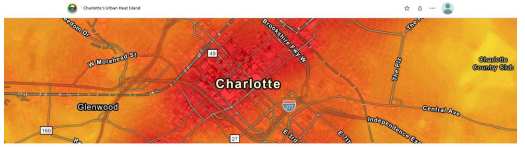


GIS Data

Report PDFs

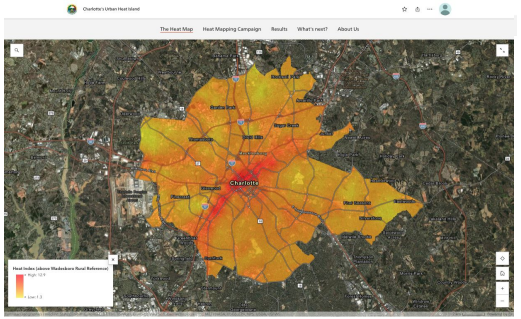
1 CAPA Heat Watch Reports and GIS data at Heat.gov

GIS data short link: https://osf.io/86ume/files/osfstorage



Charlotte's Urban Heat Island

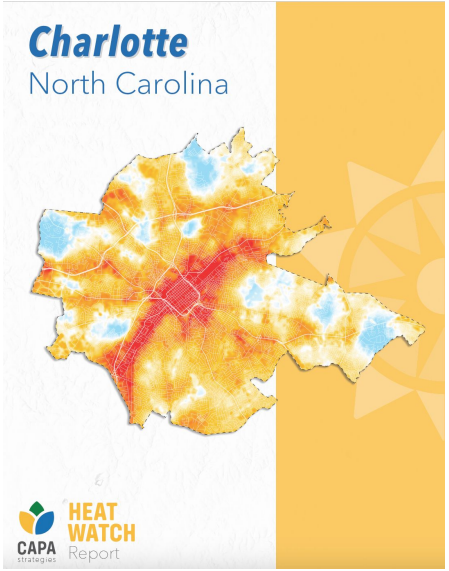
On July 14, 2024, community scientists gathered real-feel temperature and humidity data to learn how heat affects Charlotte communities.

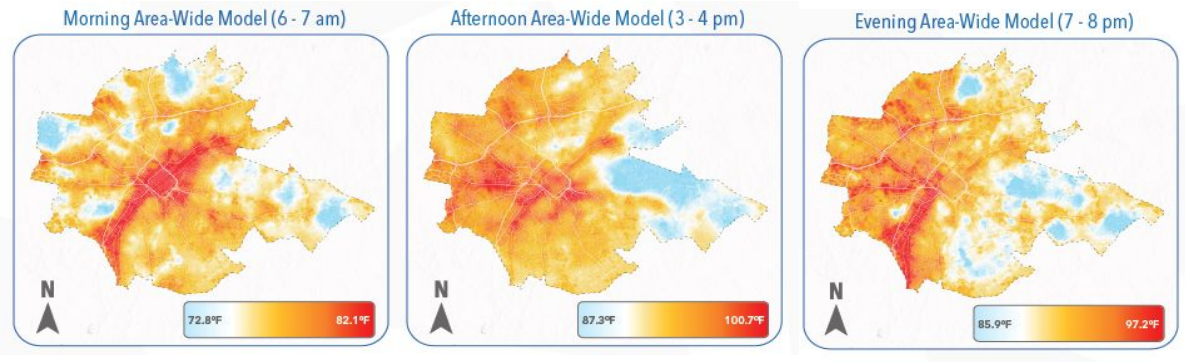


2 Charlotte Heat Mappers interactive StoryMap

Check out the StoryMap here:
https://bit.ly/charlotteheatstorymap

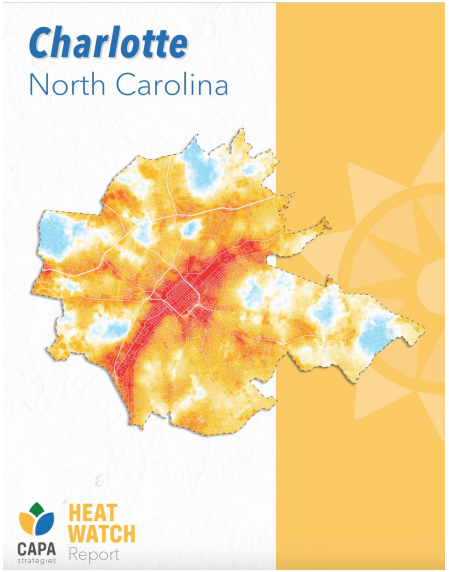
Understanding the CAPA Heat Watch report

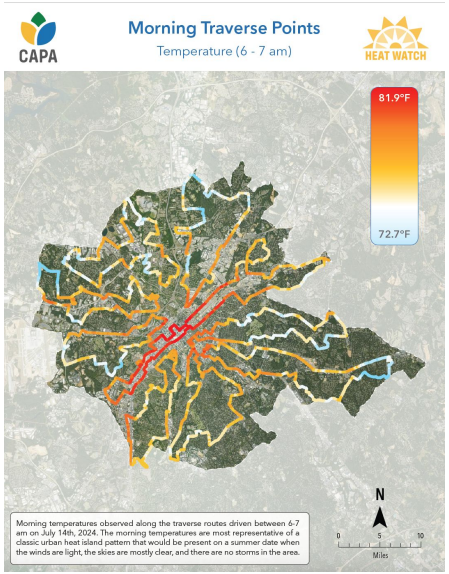




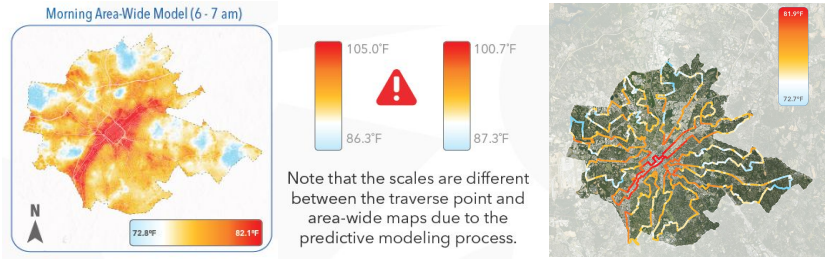
Area-wide maps: high resolution models of temperature based on traverse points and aerial imagery

Understanding the CAPA Heat Watch report





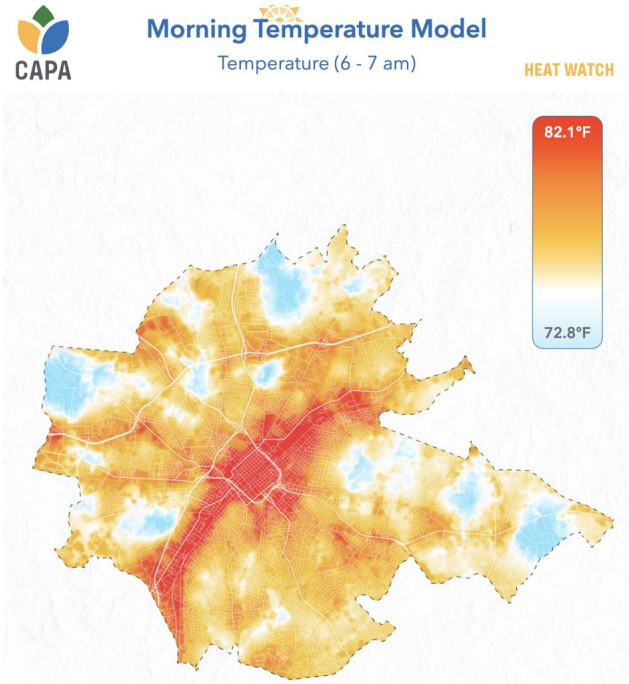
Traverse point maps: the near-surface air temperature measurements gathered on our mapping campaign day



Note: The area-wide maps and traverse point maps have <u>different scales</u>

Morning temperature model

Most Representative



Weather Conditions - Sunrise (6-7 am)

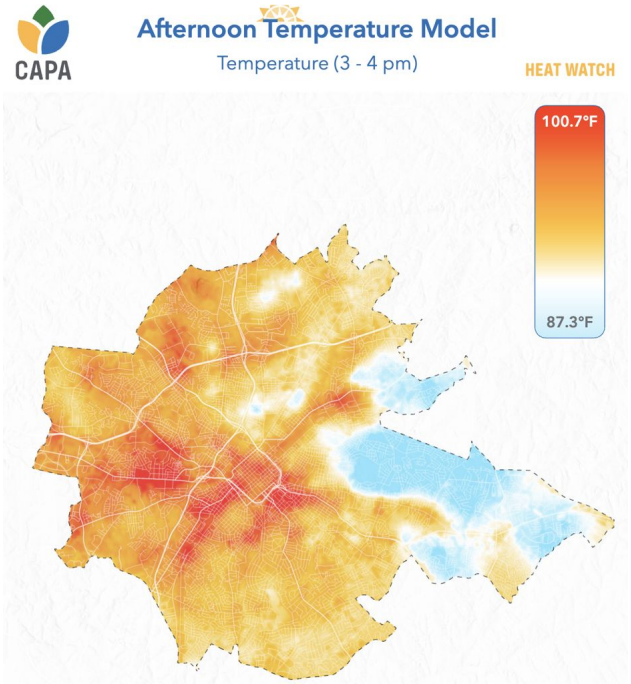
- Temperatures were 72-82ºF
- Mostly clear skies
- No wind
- No storms or rainfall in the area

- Ideal conditions for the development of a nocturnal urban heat Island!

- Most representative of Charlotte's nocturnal urban heat island pattern!

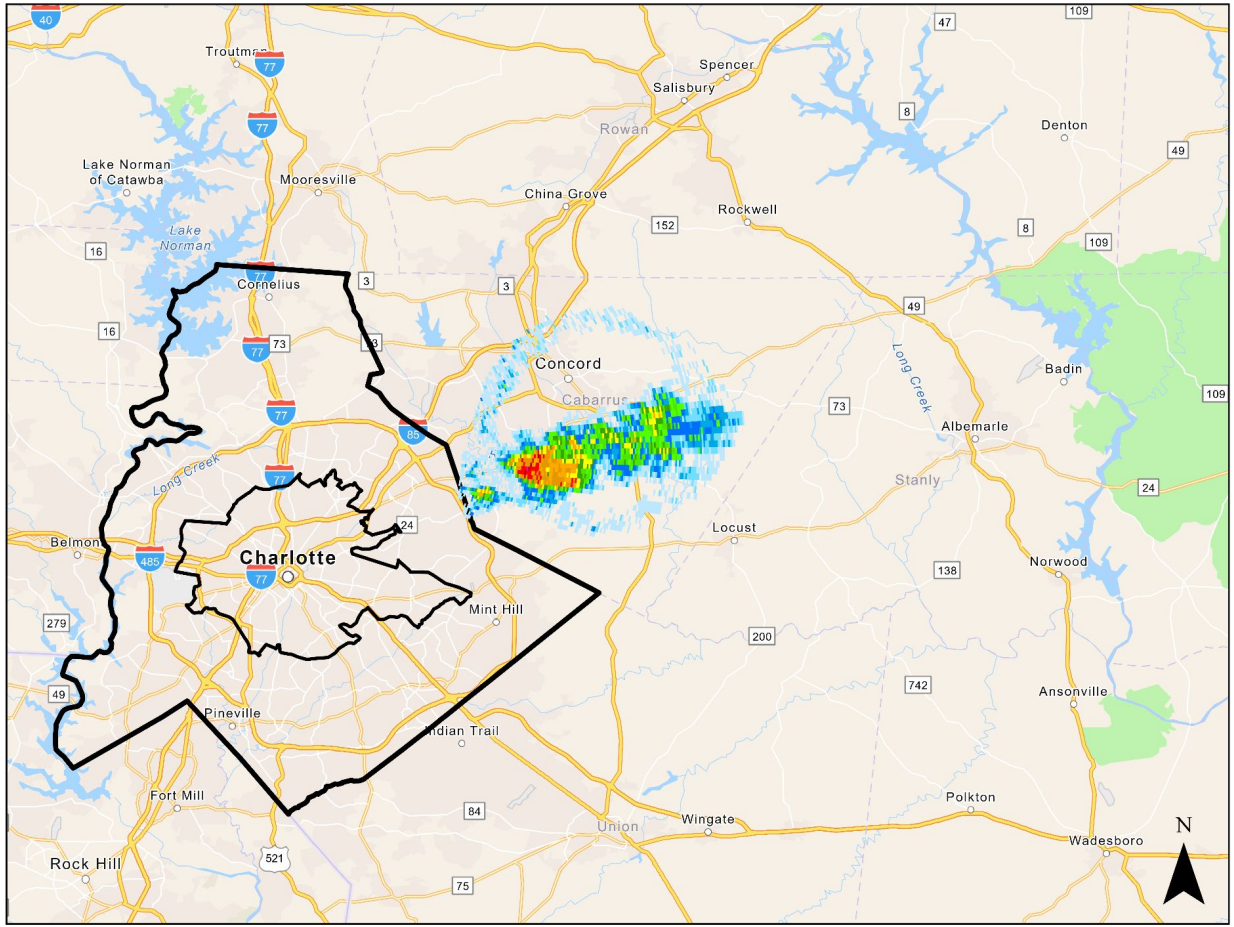
Afternoon temperature model

Less Representative



Weather Conditions - Afternoon (3-4 pm)

- Temperatures were 87-100ºF
- Heat Indices > 90ºF everywhere!
- Partly cloudy (increasing cloudiness)
- Light winds (increasing winds)
- No rainfall over the study area
- Thunderstorms in the metro area!

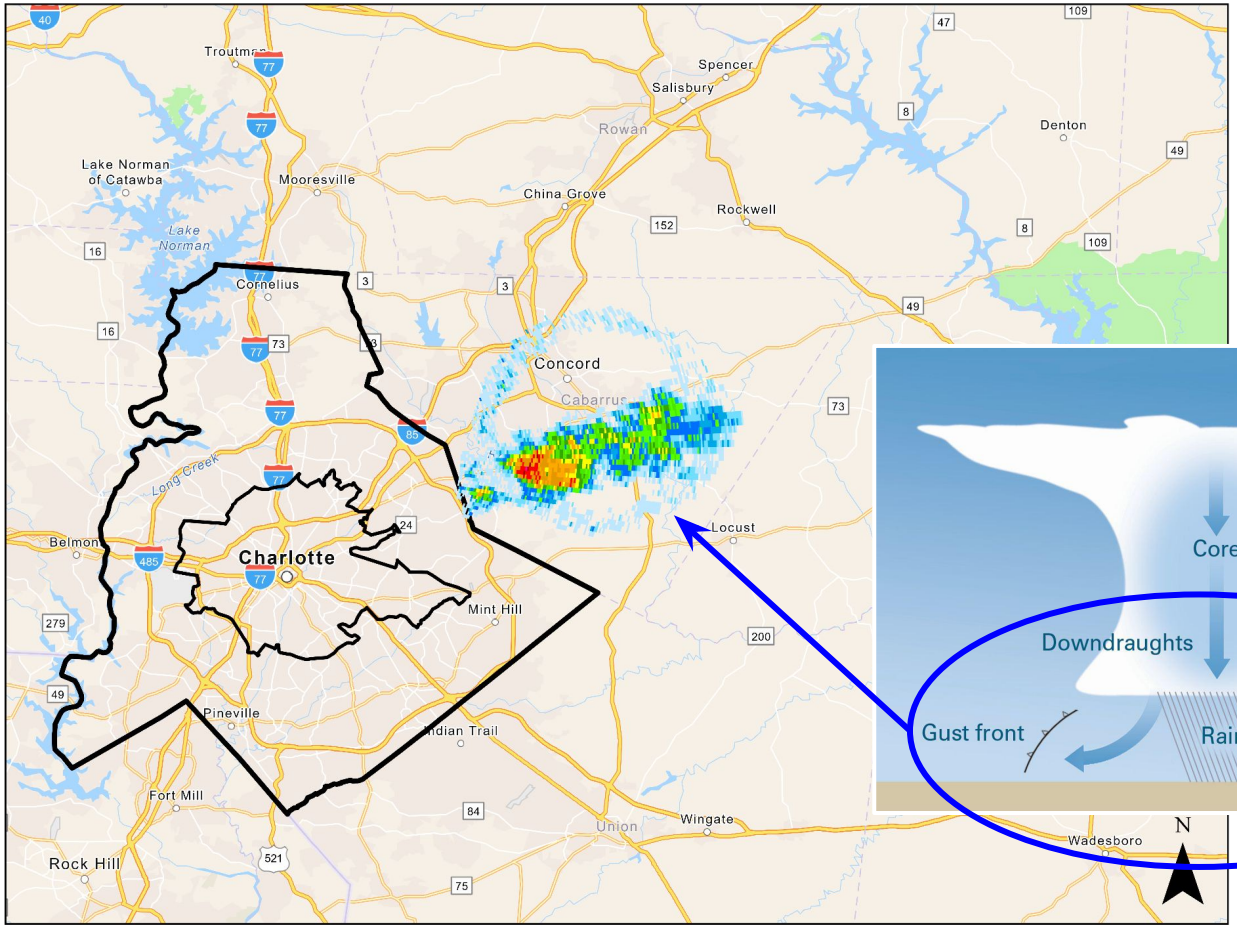


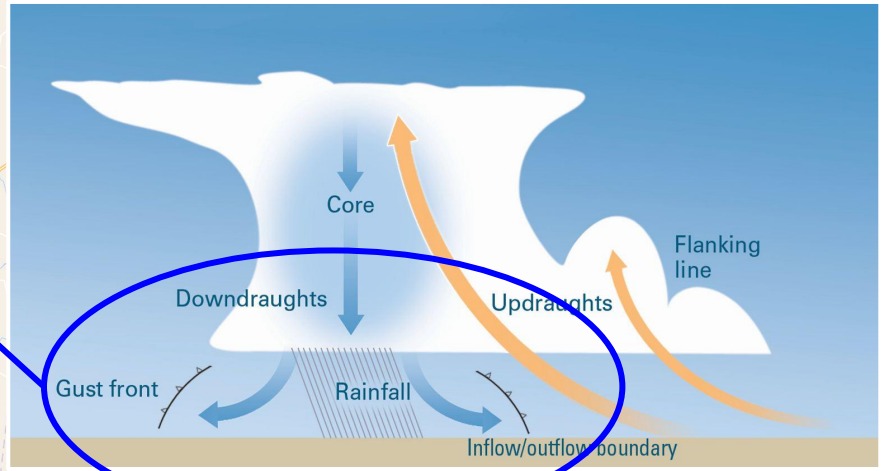
Afternoon

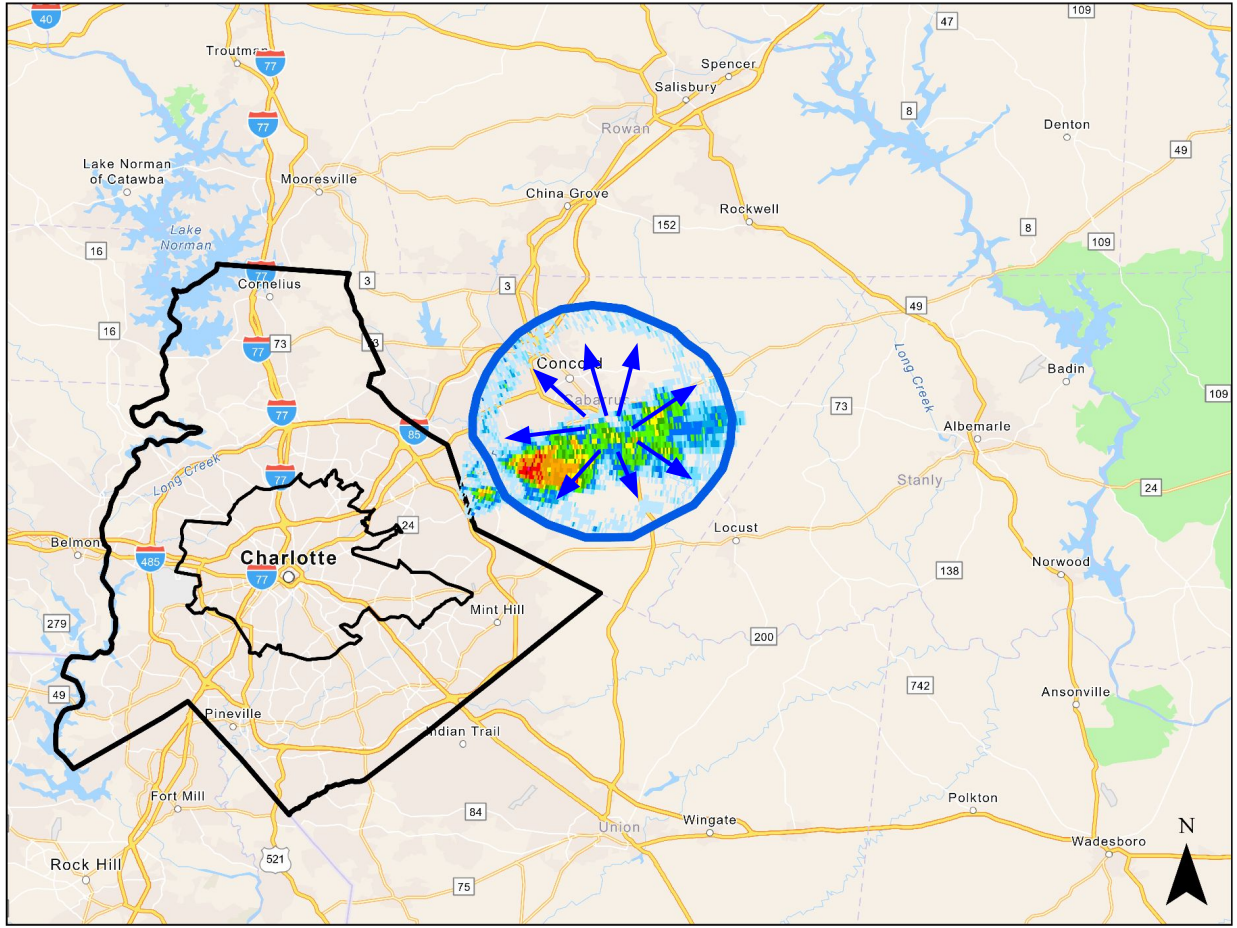
2 pm: One hour before data collection

Afternoon

2 pm: One hour before data collection





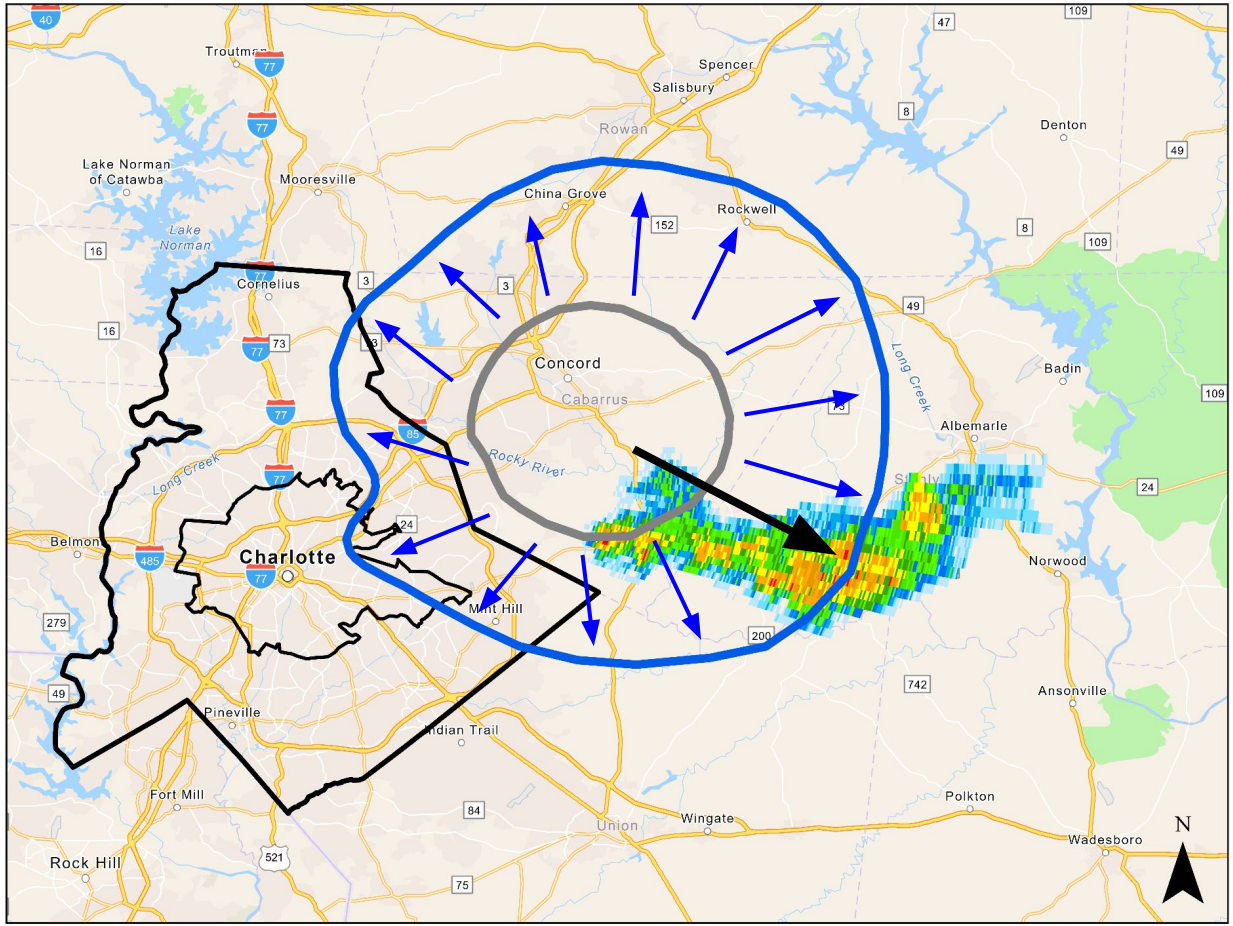


Afternoon

2 pm: One hour before data collection

Afternoon

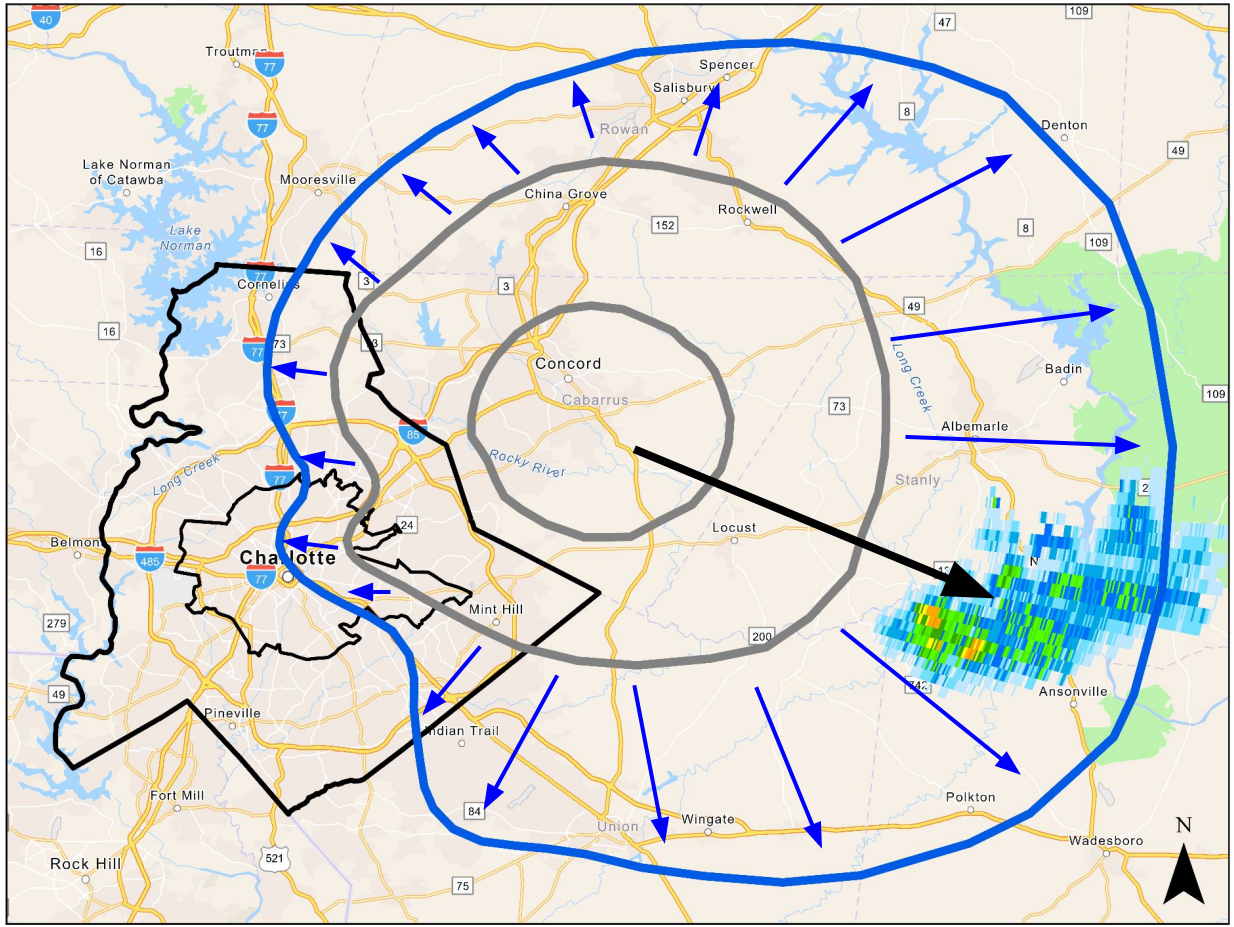
2 pm: One hour before data collection



Afternoon

3 pm: Start of afternoon data collection

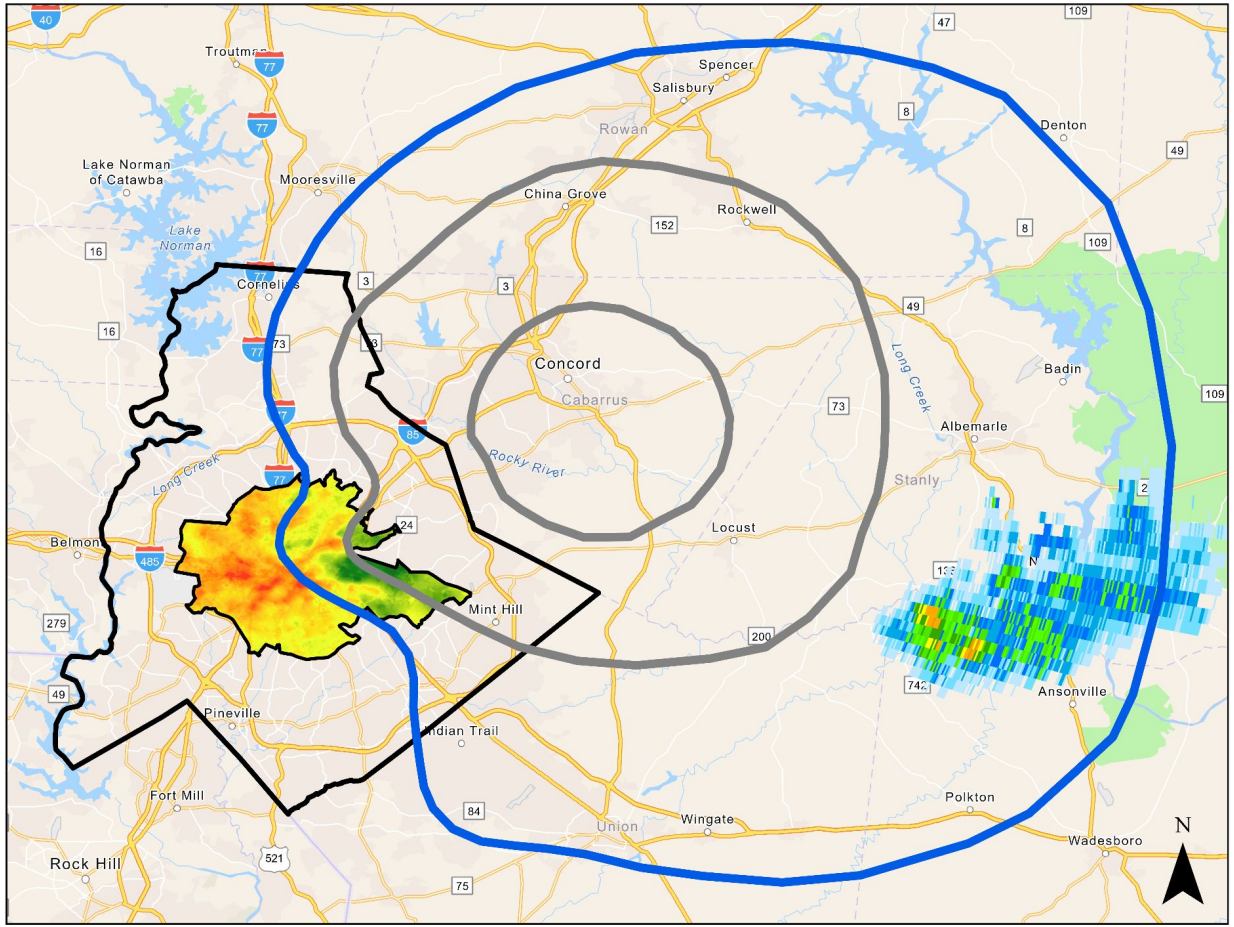
Cooler air moves across mapping area, impacting afternoon measurements



Afternoon

4 pm: End of afternoon data collection

Cooler air continues to move across mapping area, impacting afternoon measurements



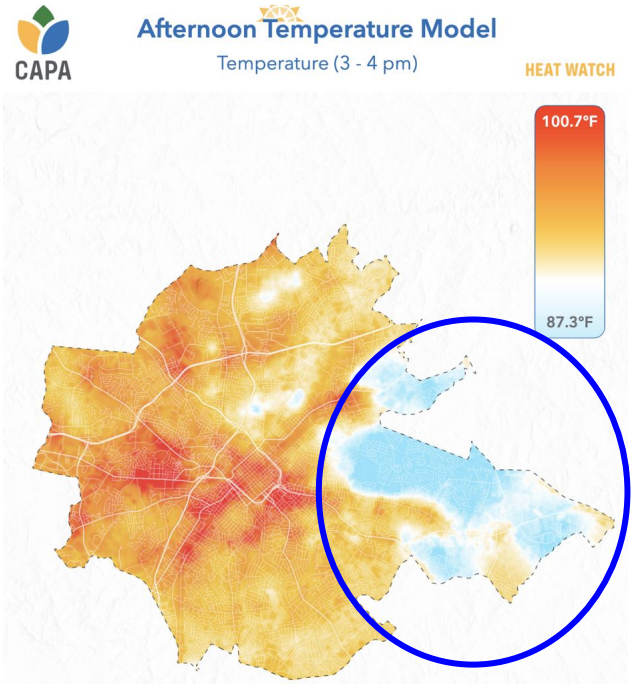
Afternoon

4 pm: End of afternoon data collection

-> Residual impacts of weather system continue to impact evening measurements

Afternoon temperature model

Less Representative

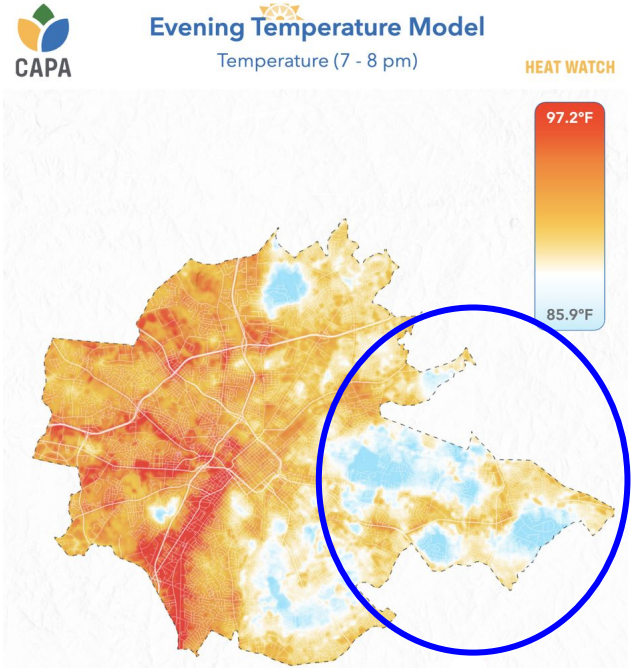


Weather Conditions - Afternoon (3-4 pm)

- Temperatures were 87-100ºF
- Heat Indices > 90ºF everywhere!
- Partly cloudy (increasing cloudiness)
- Light winds (increasing winds)
- No rainfall over the study area
- Thunderstorms in the metro area!
- Eastern half of study area was impacted by a thunderstorm “cold front” entering the study area

Evening temperature model

Less Representative

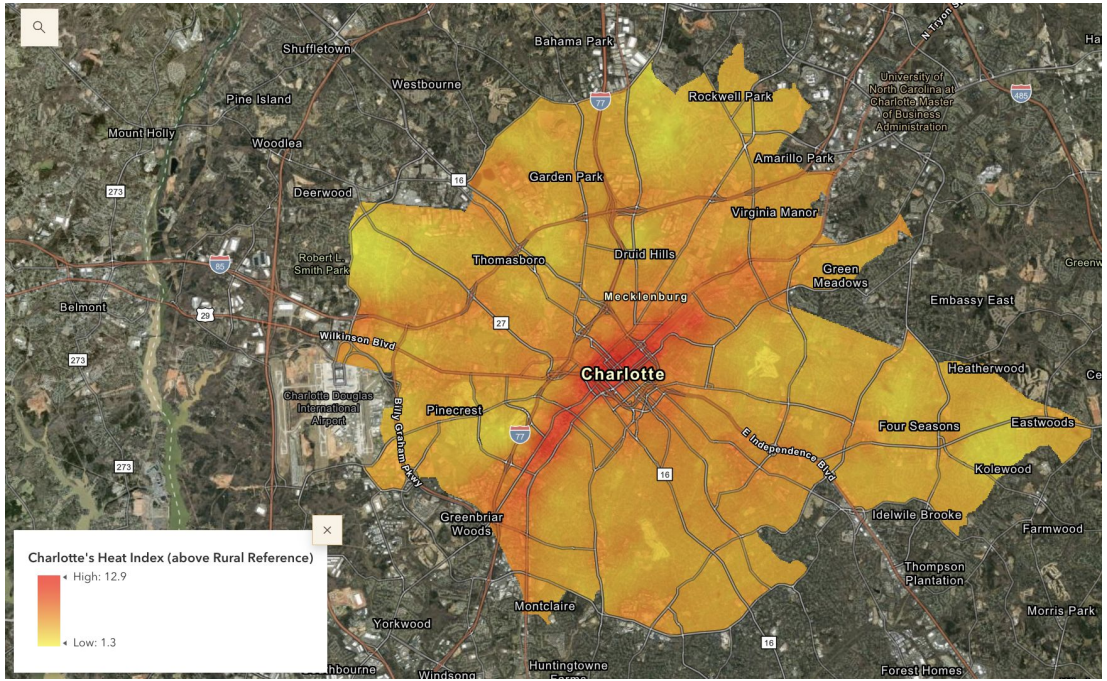


Weather Conditions - Evening (7-8 pm)

- Temperatures were 85-97ºF
- Partly cloudy
- Light winds
- No rainfall over the study area
- No thunderstorms in the metro area

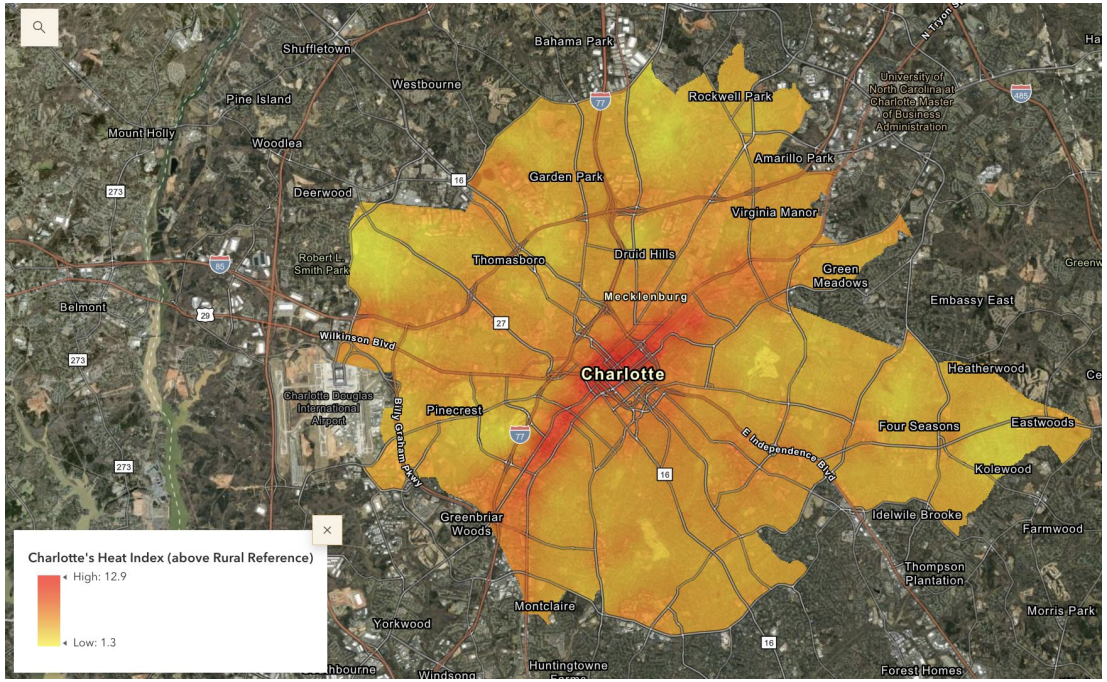
- Eastern half of study area was still impacted by the remnants of the afternoon thunderstorm “cold front” entering the study area

Key takeaways



- **Extreme heat can be widespread across Charlotte!** (Afternoon heat indices were > 90F across most of Charlotte on our mapping date)
- Some areas are hotter than others
- The UHI effect is most intense overnight/in early morning (UHI intensity and air temperature are inversely related)
- This effort would not have been possible without the assistance of 60+ community scientists!!

Exploring Charlotte's Urban Heat Island



bit.ly/charlotteheatstorymap

Explore the interactive heat index StoryMap and note the following:

- Which areas are the hottest? Why do you think that is?
- Which areas are the coolest? Why do you think that is?
- Choose a point or address of interest within the study area and click on it to observe the heat index value - how much hotter is it than the rural reference location?

UNIVERSITY OF NORTH CAROLINA CHARLOTTE | DEPARTMENT OF EARTH, ENVIRONMENTAL, AND GEOGRAPHICAL SCIENCES

CHARLOTTE HEAT MAPPERS

What can Charlotte do to manage urban heat?

Adopt **management strategies** to respond to chronic and acute heat risks

- **Energy:** resilient energy grids, indoor cooling, affordable and accessible energy
- **Personal exposure:** operations of transit systems, schools, parks; occupational safety regulations
- **Public health:** public information and awareness campaigns, heat awareness for healthcare providers
- **Emergency preparedness:** heat response planning, early warning systems, cooling centers and resilience hubs

Source: Keith, L., & Meerow, S. (2022). Planning for urban heat resilience.

What can Charlotte do to mitigate urban heat?

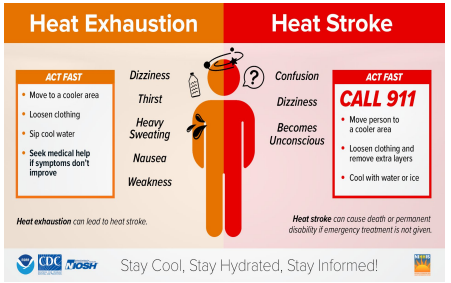
Reduce UHI contributions from the built environment through **mitigation**

- **Land use planning:** urban development patterns (land conservation, roadways and parking lots)
- **Urban design:** street and building orientation, shade structures, cool pavements
- **Urban greening:** urban forestry, parks and open space, green stormwater infrastructure, green walls and roofs
- **Waste heat reduction:** building energy efficiency, cool roofs and walls, vehicle use reduction

Source: Keith, L., & Meerow, S. (2022). Planning for urban heat resilience.

What are some actions individuals can take?

- Sign up for **Heat Health Alerts:** https://epi.dph.ncdhhs.gov/oee/climate/heat.html
- **Learn** about the effects of urban heat and how to **protect yourself** from NCDHHS (see link above) and heat.gov
- **Know your neighbors,** and check on them when it's hot
- **Advocate with your community** for heat mitigation and adaptation policies and actions
- Get involved with Charlotte's **Strategic Energy Action Plan** initiative: https://bit.ly/seapupdate
- Sign up for the **Heat Beat newsletter** at heat.gov (under "Contact" at bottom)



Images: NOAA/CDC/ NIOSH/NIHHIS; CDC

What are other cities doing?

Chief Heat Officers

- These officials are responsible for unifying their city governments' responses to extreme heat.
- CHOs are charged with accelerating existing heat protection efforts and initiating new work to reduce the risks and impacts of extreme heat for their residents and constituents.

In Miami with the world's first chief heat officer

Jane Gilbert is working to figure out how one of the hottest cities in the U.S. can protect its most vulnerable denizens while navigating Florida politics.

Miami-Dade County Chief Heat Officer Jane Gilbert in Miami on May 15, 2023. Wilfredo Lee / AP

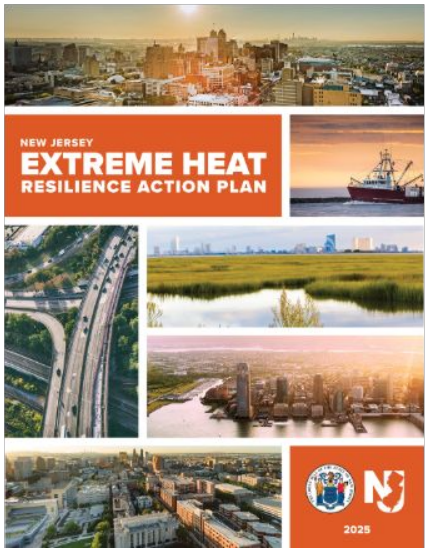
Image: NBC News

What are other cities doing?

Heat Action Plans are basically comprehensive plans comprising coordinated actions, strategies, and policies designed to reduce the health impacts of extreme heat

Miami-Dade County

State of New Jersey

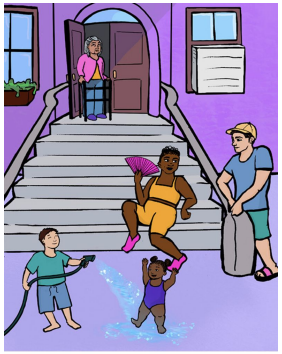


Source: Keith, L., & Meerow, S. (2022). Planning for urban heat resilience.

What are other cities doing?

Community check-in programs

- Example from New York City - **Be a Buddy: A Community-Based Climate Resiliency Model**
- Be a Buddy is a community-led social resiliency program that connects residents most susceptible to the health impacts of climate change-related threats with volunteers who provide wellness checks and connections to city services



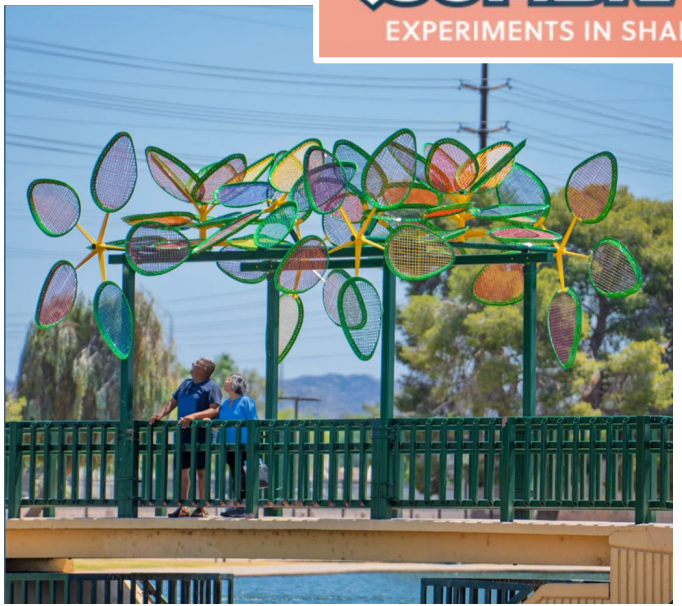
Be a Buddy: Preparing for Hot Weather

Source: City of New York

What are other cities doing?

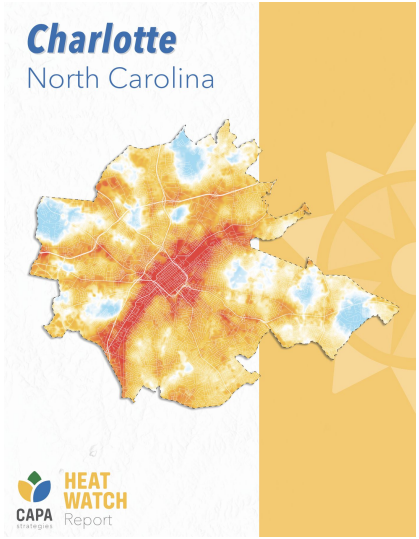
Art and urban design for shade

- **¡Sombra! Experiments in Shade** is an innovative public art project developed by the Phoenix Office of Arts and Culture
- Winner of a $1 million grant from Bloomberg Philanthropies' Public Art Challenge, this project showcases the extraordinary solutions that arise when artists partner with civic leaders.



Source: City of Phoenix

Thank you!



Access Charlotte's **Heat Watch Reports** at https://osf.io/86ume/files/osfstorage

Visit the **Charlotte Heat Mappers StoryMap** to learn more about our heat mapping campaign:

http://bit.ly/charlotteheatstorymap

Learn more about the Charlotte Heat Mappers on our website: https://bit.ly/charlotteheatmappers

Heat Watch Reports

Charlotte Heat Mappers StoryMap