

# Mapping thermal comfort in Edison Eastlake Neighborhood with citizen scientists



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## Introduction

The Heat Mappers walk was a community effort to establish a baseline for thermal comfort in Edison-Eastlake Neighborhood near downtown Phoenix. At the walk, two dozen volunteer participants provided an assessment of thermal conditions along strategic walking routes and bus stop locations slated for shade and other improvements. The walk was organized by The Nature Conservancy in Arizona in partnership with Museum of Walking, Phoenix Revitalization Corporation, and ASU, and took place in the afternoon of September 29<sup>th</sup>, 2018.

Edison-Eastlake is a focal point for ASU and CAP LTER research because the neighborhood will undergo significant renovation under a Housing and Urban Development "Choice Neighborhoods Implementation Grant". Assessing and improving the neighborhood resilience to extreme heat is one factor being considered during this reshaping process. During the Heat Mappers event, volunteers walked a predetermined 3 mile loop, and filled out a field guide questionnaire which asked them to record their thermal comfort and other perceptions at a series of stops. Twelve of the participants wore GPS devices, along with heart rate, air temperature, and ultraviolet radiation exposure monitors. This select group of volunteers also participated in walking interviews. These data will complement ongoing data collection in the neighborhood, including weather information from the six weather stations that CAP researchers recently installed in the area and micrometeorological data taken with a mobile microclimate cart. Combining the environmental, health, and human perception data will allow the project partners to better understand the heat exposure and drivers of thermal (dis)comfort in the neighborhood prior to the reshaping process. We will present the methodology for the Heat Mapper event that we intend to repeat in future years to track progress in meeting community goals related to heat and thermal comfort.

Map of the walking route



## Methodology

The methodology was adapted from the scientific literature and further developed by collaborators from The Nature Conservancy in Arizona, Museum of Walking, Phoenix Revitalization Corporation, and ASU.

Participant and volunteer recruitment was completed via public advertising by the Nature Conservancy, Museum of Walking, and ASU. Advertising channels included organizational websites, social media, and in-person announcements at relevant meetings convened by each organization. Students were invited to participate as walkers, runners, bikers, or volunteers (handing out water, snacks, routes, etc.). All participants were required to have health insurance.

The event started with participant registration at 3:30pm at Edison Park and concluded by 6 p.m. There were several tents showcasing organizations with information about urban heat, showcasing scientific equipment, and participant registration.

## Map of the walking route



Each participant received a paper "field guide" for the walk before entering the course. The field guide contained a short questionnaire to be completed while on the course at designated check points.

There were 7 check points on the route. At each check point participants responded to 5-7 questions in the field guide, the vast majority of which were closed-ended. The field guide was also used to collect basic demographic information, risk perceptions associated with heat and sun exposure and clothing conditions. A total of 22 walkers participated in the study.

12 participants collected additional data during their walk. The enhanced data collection experience included a wearable GPS tracker (to be used during the walk/ride only), a wrist-worn heart rate monitor, and a wrist-worn UV exposure monitor. Participants opting in for enhanced data collection also completed a longer-form open-ended interview during the walk. Those participants had an assigned interviewer walking along asking participants to provide a more detailed perspective on the landscape of the neighborhood and their perceptions and preferences regarding shade, cooling features, aesthetics, and other aspects of the neighborhood that may be shaped by the redevelopment project.

## Sample questionnaire page

**START**  
Edison Park

**Stop #1:**  
On 20th street, south of the Edison Park

Q1. What is one or a few words you would use to describe the stretch we have just walked?

Q2. Since the start, what percent of the route was covered by shade? Make your best guess.

Q3. You are at the corner of Edison Park. How often do you use parks in Phoenix in summer months?  
Almost every day    Every week    Few times each week    Never

Q4. If you could make one change to this park what would it be?  
Q4: Currently I am: In full sun    In full shade    In a mix of sun and shade

Q5. At this moment, I am:  
Very cold    Cold    Cool    Slightly cool    Neutral    Slightly warm    Warm    Hot    Very hot

Q7. My current level of thermal comfort is:  
Comfortable    Slightly uncomfortable    Uncomfortable    Very uncomfortable

Q8. My perception of the street segment I just walked is:  
Unpleasant    Slightly unpleasant    Neither pleasant nor unpleasant    Slightly pleasant    Pleasant

At the end of the walk route, there was a tent with a large format map of the neighborhood in which the route takes place. Respondents were invited from among all of the participating walkers as well as any resident community members who pass by the tent. Respondents were given color stickers and asked to mark on the map:

1. Where do you notice something interesting that shows the cultural character of this place? What was it? (e.g. write out the item, mural, people playing, music etc.)
2. Where do you feel "out of place"?
3. Where do you feel happy, connected, or energized?
4. (Local respondents only) Mark a place on the map where you like to hang out.

This data revealed common locations where people gather, and where their socio-spatial perceptions converge and diverge.



## Collected Data

**Surveys**  
More than a 1000 answers

**Interviews**  
120+ hours of recordings

**Weather data**  
Full route micro-meteorological data

**Heart rate**  
Full route heart rate data for 12 participants

**UV exposure**  
Full route UV data for 12 participants

**GPS location**  
Full route GPS data for 12 participants



## Discussion

The Heat Mappers walk is the first of its kind citizen science project piloted in Phoenix with the aim to raise awareness to heat and improve thermal comfort in the hottest neighborhoods of the city. Collected data are being used by The Nature Conservancy and partners to establish baseline indicators for thermal comfort and to track changes in thermal comfort as Edison Eastlake neighborhood is transformed under neighborhood redevelopment plans and new Complete Streets policies. These data are also being used by the City of Phoenix to inform the reshaping of the neighborhood to make it more heat resilient.

The Heat Mappers project has collaboratively developed and successfully tested the methodology that can be further applied to other neighborhoods in the Valley that face similar issues and can be adapted by other cities nationally and globally tackling extreme heat.

