

HEAT ACTION ROADMAP

An action roadmap to prepare
for extreme heat

2024



Tucson
Resilient Together



CITY OF
TUCSON



LETTER FROM THE MAYOR

Dear Tucsonans,

This Heat Action Roadmap is the next step in the implementation of Tucson Resilient Together, the City of Tucson's Climate Action and Adaptation Plan. This people-centered climate action plan and subsequent roadmap reflect the experiences of neighbors, outdoor workers, scientists, faith communities, youth, community-based organizations, and hundreds of Tucsonans who shared with us how extreme heat and climate change are impacting their everyday lives.

This work is data-driven, and reflects input collected through surveys, workshops, climate listening sessions; and most recently, at the 2023 Southern Arizona Heat Summit. I am thankful to the City of Tucson's Chief Resilience Officer and our Climate Action Team, the University of Arizona Subject Matter Expert Advisory Team, and the Joint Heat Action Team comprised of experts from City, County, Tribal Governments, and representatives from the National Weather Service, NOAA.

As the daughter of immigrant farm workers growing up in Somerton, Arizona, I saw first-hand the dangers of extreme heat at an early age. I would see how extreme heat impacted loved ones like my family and neighbors working in triple digit temperatures. These experiences shaped me.

Decades later, extreme heat has worsened. In 2023 we experienced the hottest month in the history of our planet. Extreme heat is impacting our vulnerable communities first and worst: the elderly, children, outdoor workers and workers in non-climate-controlled environments, the unhoused, and people with pre-existing health conditions.

Through this Heat Action Roadmap the City of Tucson is leading with urgency, putting forward 61 actions to protect the public health of our community, our economy, and the Sonoran Desert. We are improving our cooling centers and creating greater accessibility so people can access them, we are enhancing support for Tucsonans to make their homes more energy efficient, and we are educating and developing comprehensive heat safety initiatives to protect workers and residents exposed to extreme heat.

It is going to take all of us, working together to help us mitigate climate change, adapt and meet the challenges of an ever-warming planet.

In Community,

Mayor Regina Romero

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FOREWORD



Land and people acknowledgement

The City of Tucson acknowledges the tribal nations in the S-cuk-Son land. Tucson was founded on the unceded territory of the Tohono O'odham peoples – caretakers of this land from time immemorial. The City further acknowledges the Pascua Yaqui tribe and their multi-millennial presence and stewardship in the region.

By appreciating Indigenous knowledge, as well as the wealth of Tucson's diverse cultures and experiences, the City seeks to implement an intersectional approach to achieving climate equity for present and future residents of Tucson, all while honoring the history of this land and its original stewards.

The City of Tucson seeks to build reciprocity with sovereign tribal nations and Indigenous communities to address local climate change impacts, build frontline community resilience, and inspire Tucsonans today and tomorrow to love and care for the land we share and call home.

Community partner acknowledgment

The City of Tucson's Heat Action Roadmap came together thanks to the contributions of many organizations, agencies, groups and individuals:

State of Arizona Governor's Office

- Southern Arizona Office of Governor Hobbs

City of Tucson

- Mayor's Office
- City Council Ward Offices
- City Manager's Office
- Risk Management
- Tucson Water
- Climate Action Team
- SunTran
- Public Safety Communication Department
- Environmental and General Services Department
- Planning and Development Services Department
- Community Safety, Health and Wellness Program
- Tucson House

Pima County

- Board of Supervisors Districts 1 and 5
- Department of Environmental Quality
- Health Department
- Office of Emergency Management

Tohono O'odham Nation

National Oceanic Atmospheric Administration

- National Weather Service Tucson

The University of Arizona

- Arid Lands Resource Sciences
- Arizona Institute for Resilience
- College of Architecture, Planning and Landscape Architecture
- Climate Assessment for the Southwest
- Drachman Institute
- Mel and Enid Zuckerman College of Public Health
- Southwest Environmental Health Sciences Center
- Southwest Urban Corridor Integrated Field Laboratory
- University of Arizona Cooperative Extension
- Western Environmental Science Technical Assistance Center for Environmental Justice

Community Groups

Faith-based

- Arizona Faith Network
- 4Tucson

Education

- Pima Community College
- Tucson Unified School District

City of Tucson commissions

- Commission on Climate Energy and Sustainability

Climate, sustainability, and interconnected groups

- Arizona Youth Climate Coalition
- Moms Clean Air Force
- Sustainable Tucson
- Tucson Clean & Beautiful
- Flowers and Bullets
- Climate NXT
- Citizens Climate Lobby
- NexoTerra LLC-Repurposing Waste
- PSR Arizona - US Affiliate of International Physicians for the Prevention of Nuclear War
- Physicians for Social Responsibility
- Greater Tucson Climate Coalition
- Tucson Climate Coalition
- Sierra Club
- Union of Concerned Scientists
- Earthjustice
- Climate Tucson

Labor

- Arizona Jobs with Justice
- International Alliance of Theatrical Stage Employees Local 336 (IATSE 336)
- Arizona Council for Occupational Safety and Health (AZCOSH)
- Southside Worker Center

Food security

- Community Food Bank of Southern Arizona

Healthy homes

- Community Home Repair Projects of Arizona (CHSPA)

Public health and healthcare

- Arizona Health Professionals for Climate Action
- Medical Reserve Corps of Southern Arizona
- Global Athletes Alliance

Economic growth and sustainability

- No Dreams Lost Foundation
- Local First Arizona
- YWCA of Southern Arizona
- BrightView Commercial Landscaping

Energy

- Sundial Energy, Inc.
- Tucson Electric Power
- Interstate Renewable Energy Council (IREC)
- Solar United Neighbors
- Solar Possibilities Consulting
- Arizonans for Community Choice (AZ4CC)

Aerospace

- RTX Corporation

Neighborhood associations

- Menlo Park Neighborhood Association

Media and reporting

- Arizona Luminaria
- The Tucson Climate Report

City and advisory acknowledgements

We give our sincerest thanks to Tucson's elected officials and their offices, City staff, and trusted advisors who offered their advice, feedback, and perspective throughout the creation of the City of Tucson's Heat Action Roadmap.

Mayor and Council and City Manager

- Regina Romero, City of Tucson Mayor
- Lane Santa Cruz, Ward 1
- Paul Cunningham, Ward 2
- Kevin Dahl, Ward 3
- Nikki Lee, Ward 4
- Richard Fimbres, Ward 5
- Karin Uhlich, Ward 6
- Michael Ortega, City Manager

Commission on Climate, Energy, and Sustainability (CCES)

- Dr. James Sell, Chairperson
- Alma Anides-Morales, Member
- Adriana Bachmann, Member
- John Andrew Eisele, Member
- Vanessa Gallego, Member
- Camila Martins-Bekat, Member
- Ojas Sanghi, Member
- Garrett Weaver, Member

Project team acknowledgment

Finally, we give our thanks to the Project Core Team, Climate Action Team, Subject Matter Expert Advisory Team, and the Joint Heat Action Team. Their oversight and in-depth review were crucial in the development of the City's Heat Action Roadmap.

Project Core Team

- Fátima Luna, Chief Resilience Officer, Office of the Manager
- Karina G. Martinez Molina, PhD Candidate, Arid Lands, University of Arizona
- Nicole Gillett, Urban Forestry Program Manager, Office of the Manager
- Leslie Ethen, Sustainability Manager, Planning and Development Service
- Stephen Addison, (former) Environmental Scientist, Office of the Manager



FOREWORD

Climate Action Team (CAT)

- Elizabeth Morales, Assistant City Manager, Office of the Manager
- Fátima Luna, Chief Resilience Officer, Office of the Manager
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- Nicole Gillett, Urban Forestry Program Manager, Office of the Manager
- Stephen Addison, (former) Environmental Scientist, Office of the Manager
- Jeremiah Dean, Lead Planner, Housing and Community Development
- Laurice Walker, Chief Equity Officer, Office of Equity
- Laura Sharp, Equity Data Project Manager, Office of Equity
- Michael Catanzaro, Energy Manager, Environmental and General Services
- Frank Bonillas, Environmental Services Administrator, Environmental and General Services
- Blue Baldwin, Storm to Shade Program Manager, Tucson Water
- Jaimie Galayda, Lead Planner, Tucson Water
- Leslie Ethen, Sustainability Manager, Tucson Water
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- Greg Jackson, Deputy Director, Parks and Recreation
- Nick Gasior, Utility Coordinator, Transportation and Mobility
- Oscar Medina, Community Enrichment Coordinator, Community Safety, Health and Wellness Program
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Subject Matter Expert Advisory Team

- Ladd Keith, Assistant Professor of Planning and Sustainable Built Environments, University of Arizona
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- Sara Meerow, Associate Professor, School of Geographical Sciences and Urban Planning, Arizona State University

Joint Heat Action Team (J-HAT)

- Sarah Davis, Pima County Administrator's Office
- Eryck Garcia, City of Tucson Mayor's Office
- Fátima Luna, City of Tucson Manager's Office
- Carlos Aceves, Tohono O'odham Nation
- Julie Robinson, Pima County Health Department
- Kat Davis, Pima County Health Department
- Tom Dang, National Weather Service, NOAA
- Marc Singer, National Weather Service, NOAA
- Ladd Keith, University of Arizona
- Mona Arora, University of Arizona



SUMMARY

Amidst Tucson's desert landscape, climate change is reshaping the region's weather, bringing unprecedented heatwaves and significant temperature rises through the year. Temperatures often exceed critical thresholds – above 105°F during the day and 80°F at night – which are closely monitored for excessive heat warnings during the summer. The increasing frequency of these extreme temperatures poses risks to public health, economic productivity, quality of life, and the environment. This trend reflects the concerns of the Tucson community about prolonged and intensified heat episodes.

These rising temperatures not only bring discomfort but also present a significant health risk, particularly for vulnerable groups such as the elderly, children, outdoor workers and workers in non-climate-controlled environments, the unhoused, and people with pre-existing health conditions. The heat related challenges are further compounded by societal barriers like limited affordable housing, high energy bills, inaccessible transportation, and precarious employment situations, amplifying the vulnerabilities of these heat-vulnerable communities [1].

In 2023, Pima County reported 158 heat-related deaths [2], of which 40% occurred indoors and 60% outdoors. These deaths disproportionately affected males, who accounted for 78% of the deceased. However, heat-related illnesses and deaths are highly preventable, and strategies to mitigate and manage heat can also bring additional economic and environmental benefits.

In response to these pressing issues, the City of Tucson has developed this Heat Action Roadmap, a cornerstone of its broader climate resilience initiatives under the Tucson Resilient Together climate action plan. Developed collaboratively, with community members, stakeholders and experts, this roadmap incorporates benchmarked best practices, relevant regional research, and the lived experiences of community members. It focuses on preventive measures, public outreach, infrastructure enhancements, and cross-sectional partnerships to mitigate the health and economic impacts of extreme heat while promoting long-term sustainability and resilience.

The Heat Action Roadmap is structured around three main goals, ten intersectional strategies and 61 actionable items, aiming to mitigate and manage the adverse effects of extreme heat in coordination with cross-sectoral partners. The City of Tucson prioritizes community engagement, data driven strategies, and continuous adaptation to evolving needs. This approach addresses the immediate challenges posed by rising temperatures and fosters a more resilient and equitable city for all Tucsonans.

2 SUMMARY

GOAL 1: Inform, Prepare and Protect People (IP)



This goal involves raising awareness about heat risks, enhancing extreme heat warning systems and emergency protocols, and protecting outdoor workers and workers in non-climate-controlled environments. It also includes building the capacity of healthcare practitioners to recognize and respond to heat-related illnesses.

IP-1 Build a comprehensive heat safety mobilization campaign to broaden community awareness and preparedness for extreme heat.

IP-2 Develop a comprehensive worker heat safety initiative to better protect workers exposed to extreme heat.

IP-3 Establish a heat advisory committee for community resilience dedicated to guiding local efforts with collaborative, equity-focused, and data-driven approaches.

GOAL 2: Cool People's Homes, and Community Centers (CH)



This goal focuses on enhancing the cooling infrastructure and resources for homes and community centers to better protect community members from extreme heat. It includes improving the operation of cooling centers, supporting energy efficiency and home upgrades, and providing heat relief resources for people facing housing insecurity.

CH-1 Improve cooling centers by establishing operational standards, optimizing accessibility, and supporting transportation.

CH-2. Enhance support for energy efficiency and home upgrades to improve heat resilience, especially for low-income households.

CH-3 Expand heat relief resources for people facing housing insecurity to reduce heat-related illnesses.

GOAL 3: Cool Tucson Neighborhoods (CN)



This goal aims to integrate heat risk into urban and regional planning, expand tree canopy and green infrastructure, improve urban mobility with heat-conscious designs, and develop a workforce skilled in urban forestry and green jobs. These strategies focus on mitigating urban heat, enhancing community resilience, and fostering sustainable development practices.

CN-1 Integrate heat risk into urban and regional planning to create more resilient and heat-safe communities.

CN-2 Expand tree canopy and green infrastructure on public land, including parks and transportation corridors.

CN-3 Cool commutes by enhancing accessibility, comfort, and safety for multimodal transportation systems.

CN-4 Enhance urban forestry and green job workforce development.



GUIDING PRINCIPLES

The City of Tucson is taking a holistic and multi-pronged approach to addressing climate change and increasing its resiliency. The Roadmap follows guiding principles that align with existing city plans, programs, initiatives, and policies to increase urban heat resilience[3].

- **Promote all four dimensions of equity (procedural, distributional, structural and transgenerational)** [4]: Acknowledge historical injustices that have left certain community members with fewer resources to confront climate change. Focus on inclusive engagement and targeted, fair strategies to address these disparities effectively.
- **Enhance safety:** Help communities adapt to extreme heat now while also implementing sustainable, long-term solutions to mitigate future impacts. Ensure that actions taken do not compromise resilience to other hazards.
- **Embrace adaptability:** Develop flexible strategies that can respond to evolving conditions and are adaptable to future challenges.
- **Nature-based solutions:** Utilize natural processes and ecosystem services to address extreme heat.
- **Collaborate with Existing Initiatives** [1,5–9]: Ensure alignment with other federal, state, and local plans and actions to complement long-term planning efforts and promote comprehensive resilience.

The strategies outlined in this Roadmap address the dual challenges of extreme heat health impacts and economic strains, while also empowering youth and the workforce knowledge, skills and expertise. These actions align with existing City plans, programs, and policies. The Roadmap prioritizes the well-being of the most vulnerable community members and seeks to rectify historical inequalities. As a collaborative effort driven by community engagement, the success of this Roadmap depends on our collective commitment to taking decisive action.



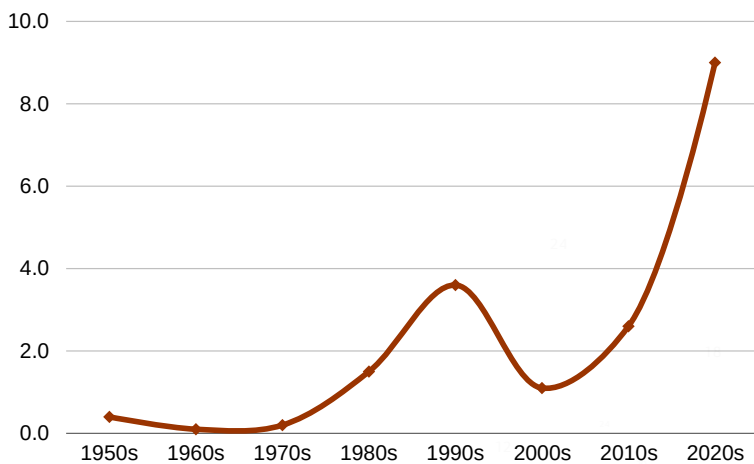
EXTREME HEAT

Cities in the United States (US) Southwest, including Tucson, are experiencing significant climate changes marked by higher temperatures and lower precipitation levels. This pattern, characterized by extreme heat and water scarcity, has been particularly noticeable in Tucson, where temperatures have risen in recent years.

Urban Heat Island (UHI)

The idea that how we plan, design, and operate our cities make them hotter compared to the natural countryside or rural areas.

In 2022, Tucson was ranked the 5th^[10] fastest-warming city in the US, and Arizona was the 7th fastest-warming state, based on annual average temperature increases from 1970-2022. Many people often think of heat as a daytime and summertime issue, but climate change and the urban heat island effect also bring warmer nights and hotter non-summer months. Recently, Tucson has seen record-breaking high temperatures^[11], even during non-summer months (October 2020 and 2023 have recorded 8 and 4 days of 100°F+ respectively)^[12], underscoring the intensifying heat.



In 2023, Tucson experienced an average high temperature of 101.2°F in June, 100.2°F in July, 98.6°F in August, and 95.1°F in September^[11]. The frequency of extreme-heat days is rising significantly. From the 1950s to the 1970s, Tucson averaged less than 0.5 days per year with temperatures of 110°F.

Figure 1: Average Number of 110°+ Degree Days Per Decade

Source: State Climatologist Applied Climate Information System (SC ACIS) Version 2 NOAA Regional Climate Centers

This average increased to 2.2 days per year from the 1980s through the 2010s, and in the 2020s, it has jumped to 9 days per year.

4 EXTREME HEAT

Another indicator of rising heat risk is the number of consecutive days at or above certain temperature thresholds. Since 1990, Tucson has experienced its top 10 events of consecutive days above 105°F[13]. The record for the most consecutive days above 105°F in a single year is 24 days in June and July 1994[13]. In 2023, there were two notable events with 18 days each (June 16 to July 3 and July 13 to 30). Before 1985, there had never been more than 9 consecutive days of 105°F heat.

Tucson's heat risk is projected to continue to increase. From the 1950s through the 1980s, the average number of days with more than 105°F was 12. This average more than doubled to 27.5 days in the following decades through 2023. Depending on future greenhouse gas emissions, the number of 105°F days could increase to 46 to 55 days by 2050 and 56 to 98 days by the end of the 21st century [14].

Heat Severity Map

Severity (0.43-9.26) indicates the deviance from mean surface temperatures in urbanized areas. For example, a heat severity of 9 indicates the neighborhood is, on average, 9° hotter than the mean surface temperature in Tucson.

Heat Severity by Census Tract

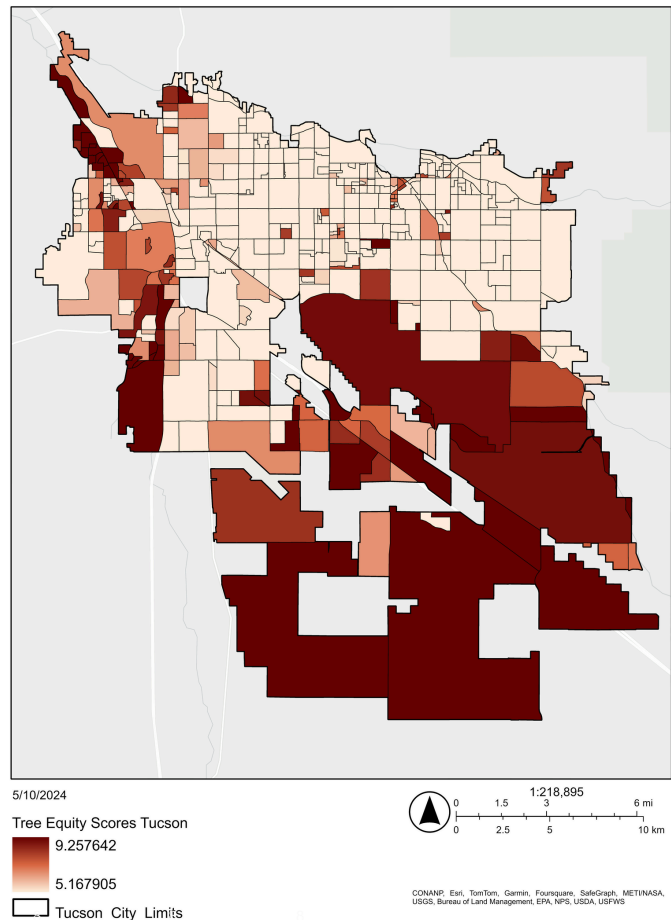


Figure 2. Heat Severity Map by Census Tract for the City of Tucson. Source: data provided by Pima Association of Governments.

Who is most at risk?

While extreme heat poses a risk to all Tucson community members, certain populations are more susceptible than others. The most vulnerable include those living below the poverty line, older adults, people living alone, children under five, pregnant individuals, those with underlying medical conditions, the unhoused, outdoor workers, workers in non-climate-controlled environments, non-English speakers, people of color, and those who lack access to air conditioning or transportation[15,16].

While the entire city is getting hotter, certain neighborhoods and demographic groups in Tucson are more vulnerable to extreme heat due to differences in exposure, sensitivity, and adaptive capacity. This is partly due to historic racist land use practices, such as racially segregated housing, which have led to reduced green spaces and tree cover in low-income and underinvested neighborhoods.

Equity Priority Index

The Equity Priority Index is made up of 12 demographic variables (i.e. income, race, age, education, rent burden, health insurance, vehicle ownership, etc.) that indicate an area's degree of social vulnerability or resiliency

Equity Heat Call Index Map

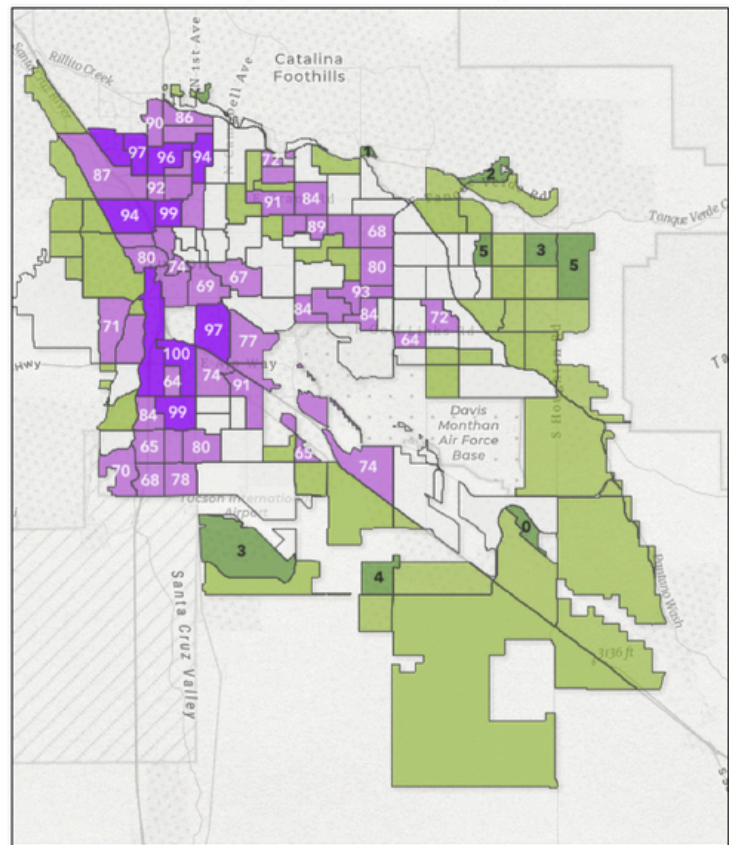


Figure 3: Heat Call Equity Index combines the City's Equity Priority Index with Data on Heat-Related Calls from 2017 to 2023.

Source: City of Tucson Office of Equity (2024).

4 EXTREME HEAT

Impacts of extreme heat

Extreme heat in Tucson is exacerbated by climate change and urbanization, leading to higher temperatures and unequal heat distribution across the city. Urban areas lacking adequate infrastructure are particularly vulnerable, underscoring the need for proactive strategies to manage climate risks[17,18].

Extreme heat is the deadliest climate risk in the US, posing a serious threat to the community well-being[19]. Proactive strategies are crucial to be better prepared to manage and mitigate the negative impacts of extreme urban heat.

Health Impacts

Heat-related illnesses: Increased risk of heat stroke, heat exhaustion, and dehydration. Particularly evident during peak months like June, July and August, as reflected in healthcare data from Pima County. The correlation between temperature and Urgent Care and Emergency Room visits can be seen in the figure below.

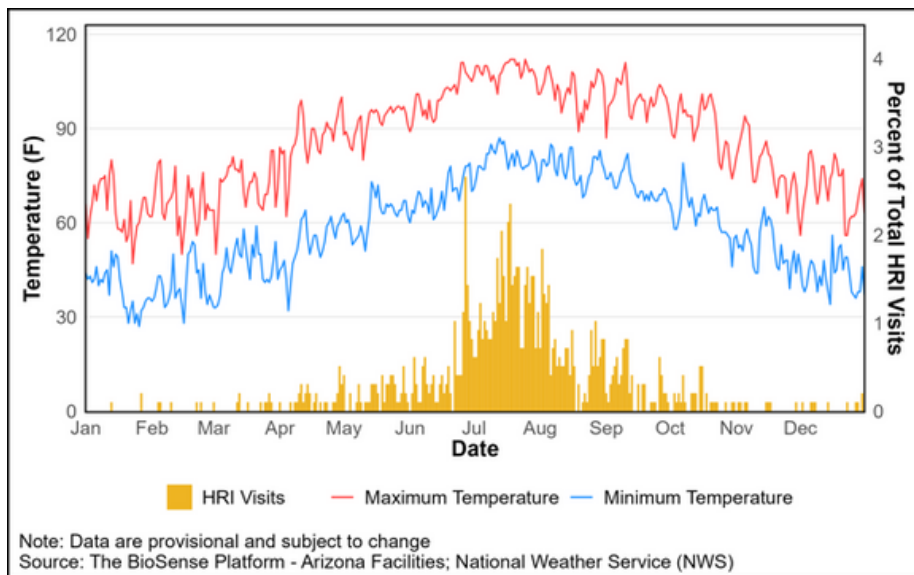


Figure 4. Heat-related Illness (HRI) Hospital and Urgent Care Visits and Temperature in Pima County, 2023. Source: Pima County Health Department (2024)

Exacerbation of chronic conditions: Worsening of cardiovascular, respiratory, and kidney diseases.

Mortality: Higher rates of heat-related deaths, particularly among vulnerable populations such as the elderly, young children, and those with preexisting conditions. Pima County had 173 heat-related deaths in 2023.

Mental health: Increased stress and mental health issues due to prolonged exposure to high temperatures.



EXTREME HEAT

Social Impacts

Vulnerable populations: Greater impact on low-income households, the unhoused, elderly, children, and those without access to air conditioning or adequate housing.

Public heat strain: Increased demand for medical services and cooling centers, straining public health resources.

Inequities: Amplification of existing social and economic inequities, with marginalized communities often bearing the brunt of extreme heat impacts.

Infrastructure Impacts

Power outages: Increased risk of power outages due to higher electricity demand and strain on the energy grid. Compounding danger of power outages caused by severe storms during hot periods. By 2050, Tucson, Arizona is expected to experience 98 days of heat waves that strain transformers, 37 days more than at the turn of the century.

Transportation disruptions: Damage to transportation infrastructure, such as roads, bridges, and railways, leading to travel delays and increased maintenance costs.

The Pima County Multi-Jurisdictional Hazard Mitigation Plan recognizes the risk of power outages during summer storms, which can increase mortality and emergency room visits [20,21].

Environment and Urban Landscape Impacts

Vegetative cover: Loss of vegetation and green spaces, leading to reduced ecosystem services like temperature regulation and water infiltration. Increased risk of wildfires at urban fringes and the surrounding mountain ranges.

Soil degradation: Drying out soil, reducing its fertility and increasing the risk of erosion.

Air quality: Increased formation of ground-level ozone (smog) and particulate matter emissions from wildfire, leading to worsened air quality.

Water resources: Increased evaporation rates, reducing the availability of water resources and exacerbating drought conditions.

Urban wildlife: Disruption of urban wildlife habitats due to loss of green spaces and water resources, leading to potential declines in biodiversity.



EXTREME HEAT

Economic Impacts

Labor productivity: Reduced productivity and work hours due to physical and mental strain from heat, particularly to outdoor and manual labor workers. Declining productivity can lead to fewer hours worked and reduced output.

Energy costs: Increased energy demand for cooling, leading to higher electricity bills and potential strain on power grids.

Regional economic attractiveness: Undermined economic attractiveness of the region due to extreme heat and negative publicity about climate conditions. This can deter investment and tourism, leading to decreased economic growth and fewer job opportunities.

Agricultural losses: Reduced crop yields and livestock productivity due to heat stress and water scarcity.

Infrastructure damage: Increased maintenance, repair, and replacement costs (or reduced asset life) for roadways, bridges, and railways due to heat-related damage such as buckling, rutting, expansion, and cracking.

Education Impacts

School closures: Potential for school closures during extreme heat events, disrupting education.

Learning environment: Negative effects on student performance and cognitive function in schools without adequate cooling systems.

Addressing these interconnected challenges requires a comprehensive approach to increase our community's resilience to extreme urban heat. It's important to note that this Roadmap focuses on the impacts of extreme heat on people and communities. While it acknowledges broader implications such as strain on infrastructure and economic challenges, the primary emphasis lies on understanding and mitigating the direct effects on human health and well-being. This includes implementing proactive strategies to manage climate risks and ensure the safety and resilience of individuals and communities during heat waves.



PROCESS

HOW THIS ROADMAP WAS DEVELOPED

The City of Tucson undertook a comprehensive and inclusive process to develop the Heat Action Roadmap, aiming to manage and mitigate the impacts of extreme heat on the community. This Roadmap was shaped by community engagement, expert input, and best practices from other cities and jurisdictions.

A review of heat mitigation plans from Arizona, Phoenix, Miami-Dade, California, and Jodhpur was conducted. Recommendations for heat resiliency provided to the City of Tucson by a group of students from Presidio Graduate School were also reviewed. Additionally, frameworks such as the American Planning Association's "Planning for Urban Heat Resilience" and the Rockefeller Foundation's "Create a Heat Action Plan" were examined.

CITY OF TUCSON
10TH URBAN HEAT ISLAND WORKSHOP
HOT TOPICS / COOL SOLUTIONS
NEXUS: CLIMATE ASSESSMENT, PUBLIC HEALTH, WATER RESOURCE

The City of Tucson's Landscape Advisory Committee (LAC) invite you to the Tenth Urban Heat Island (UHI) Workshop. In the arid southwest, climate, water and public health are important elements that need to be considered in creating a Great Desert City. This year's workshop focuses on nexus of Urban Heat Island, changing weather patterns and water harvesting. Better understanding the connections will assist us, as implementers and decision-makers, to develop policy and practices to better manage decreasing water resource and address public health safety and welfare. This is an opportunity for practitioners and advocates to meet with implementers and researchers to discuss the implications of changing weather patterns and urban design practices.

The National Climate Assessment report: "The NCA aims to incorporate advances in the understanding of climate science into larger social, ecological, and policy systems, and with this provide integrated analyses of impacts and vulnerability. The NCA will help evaluate the effectiveness of our mitigation and adaptation activities and identify economic opportunities that arise as the climate changes. It will also serve to integrate scientific information from multiple sources and highlight key findings and significant gaps in our knowledge." <http://www.nvccarr.arizona.edu/content/about-report>

This workshop is hosted by the City of Tucson, Tucson Water, Public Information and Conservation Office and chaired by the LAC Urban Heat Island Subcommittee. The LAC Chair is Deborah Munoz-Chacon.

Date: Thursday, August 25, 2016
Time: 10:00 to 4:00 p.m. or there-about
Place: Tucson Electric Power HQ, 8800 N. Oracle Rd., Tucson, AZ

This year's lunch is co-sponsored by the Wheat Design Group

Please RSVP — Space is Limited
By: August 19, 2016
Include: (a)Name, (b)City, (c)Department
To: Valerie Herman, Tucson Water Conservation Office
e-mail valerie.herman@tucsonaz.gov

Pima County Health Department:
Heat and sunburn tips to prevent heat-related illness:
• Limit outdoor activities, including sports, in the hottest part of the day.
• Stay hydrated. Drink plenty of water.
• Check plenty of water.
• Never leave a child, pet, or anyone else in a parked car.

Phonixville Prairie Rainwater Harvesting Workshop
www.phonixvilleprairie.com/rainwater-harvesting-workshop

How to Use Sign:
Hightest Road Signmaster Harvesting & Name Grates for soil stabilization



IRENE OGATA
URBAN LANDSCAPE MANAGER
TUCSON WATER

City of Tucson Urban Heat Island Workshop

The City of Tucson has a long history of community engagement regarding heat-related issues. In 2006, the City, under the leadership of Tucson Water's Urban Landscape Manager, Irene Ogata, launched its annual Urban Heat Island (UHI) workshop, demonstrating a commitment to addressing the growing impact of extreme heat. Since 2006, the UHI workshops have educated city staff and the community on UHI mitigation strategies. These workshops, featuring collaborations with experts from academia, urban planning, and industry, discuss best practices like cool roofs, pervious pavement, and drought-tolerant plants. Initiatives launched from these workshops include urban greening pilot projects, community tree inventories, and trials with silva cells and tall pots for tree growth, showcasing high survival rates. Tucson's efforts have positioned it as a leader in green infrastructure strategies for desert communities, enhancing urban resilience and sustainability.



PROCESS

HOW THIS ROADMAP WAS DEVELOPED

This timeline represents the key milestones in the development of the Heat Action Roadmap.



Research and Drafting

Climate Action Team members reviewed best practices and drafted sections of the Heat Action Roadmap.

Oct-Dec 2023



Southern Arizona Heat Planning Summit

The City of Tucson, University of Arizona and Pima County Health Department hosted the Southern Arizona Heat Planning Summit.

Feb 3 2024



Heat Summit Recommendations

The City of Tucson and University of Arizona shared high-level recommendations from the Southern Arizona Heat Planning Summit with the Governor's Office of Resiliency and the Arizona Department of Health Services.

Feb 23 2024



Stakeholder Conversation

The City of Tucson hosted a virtual Climate Stakeholder Conversation, where Heat Summit results were shared with the community and further input was collected through a survey.

April 2 2024



Draft - Heat Action Roadmap

The first draft of the Heat Action Roadmap narrative, including the strategies and actions, was developed using collected input and best practices.

April 3 - May 6 2024



Heat Awareness Resolution

Mayor and Council adopted Resolution 23761, designating the second week of May as Heat Season Awareness Week, highlighting the importance of extreme urban heat management and mitigation, and previewing the Heat Action Roadmap.

May 7 2024



Internal and Expert Input

Climate Action Team, city departments, and subject matter experts provide input on the first draft strategies and actions in the Heat Action Roadmap.

May 8 2024



Community-wide Input

The City of Tucson, in partnership with the Commission on Climate, Energy and Sustainability (CCES), gathered community input on the second draft of strategies and actions at the [Climate Action, Sustainability, & Eco-Justice Summit](#).

May 10 2024



Additional Input Gathering and Briefing

The draft of strategies and actions for the Heat Action Roadmap was published in the Climate Action Hub; Mayor and Council Offices were briefed and input was incorporated.

May 13-26 2024



Heat Action Roadmap Approval

The final Heat Action Roadmap was submitted to the Mayor and Council for official approval. The Mayor and Council were also asked to take action on a Heat Protection Ordinance for City contractors. An Administrative process also began to provide protection against heat for city workers.

June 4 2024

In total, over 250 community members were involved in the development process of the City of Tucson's Heat Action Roadmap. Engaged individuals included public health professionals, emergency managers, urban planners, utility operators, first responders, labor union representatives, non-profit representatives, university researchers, high school, community college, and university students, and community members, each offering a unique perspective. Together, these community insights and best practices formed the foundation for our comprehensive approach to tackling extreme heat in Tucson.



HEAT ACTION ROADMAP

OVERVIEW

This Roadmap organizes these strategies and actions into three goals: **Inform, Prepare, and Protect People (IP)**, **Cool People's Homes and Community Centers (CH)**, and **Cool Tucson Neighborhoods (CN)**.

To manage and mitigate extreme heat and build community-wide resilience, the Heat Action Roadmap sets three goals to be achieved through 10 strategies and 61 actions. These efforts aim to enhance the Tucson community's resilience against extreme urban heat. The roadmap details each strategy and action, including the roles of leading and supporting City departments and timeframes. Critical to the success of most strategies and actions are our partnerships with regional and local governments and groups, including Pima County, the University of Arizona, community-based organizations, local businesses, and the broader community. These collaborations are essential for achieving our heat resiliency goals.

How to read this plan

The diagram below displays and defines the key elements of the Heat Action Roadmap, providing a visual overview of the strategic framework and essential components designed to enhance community resilience against extreme heat.

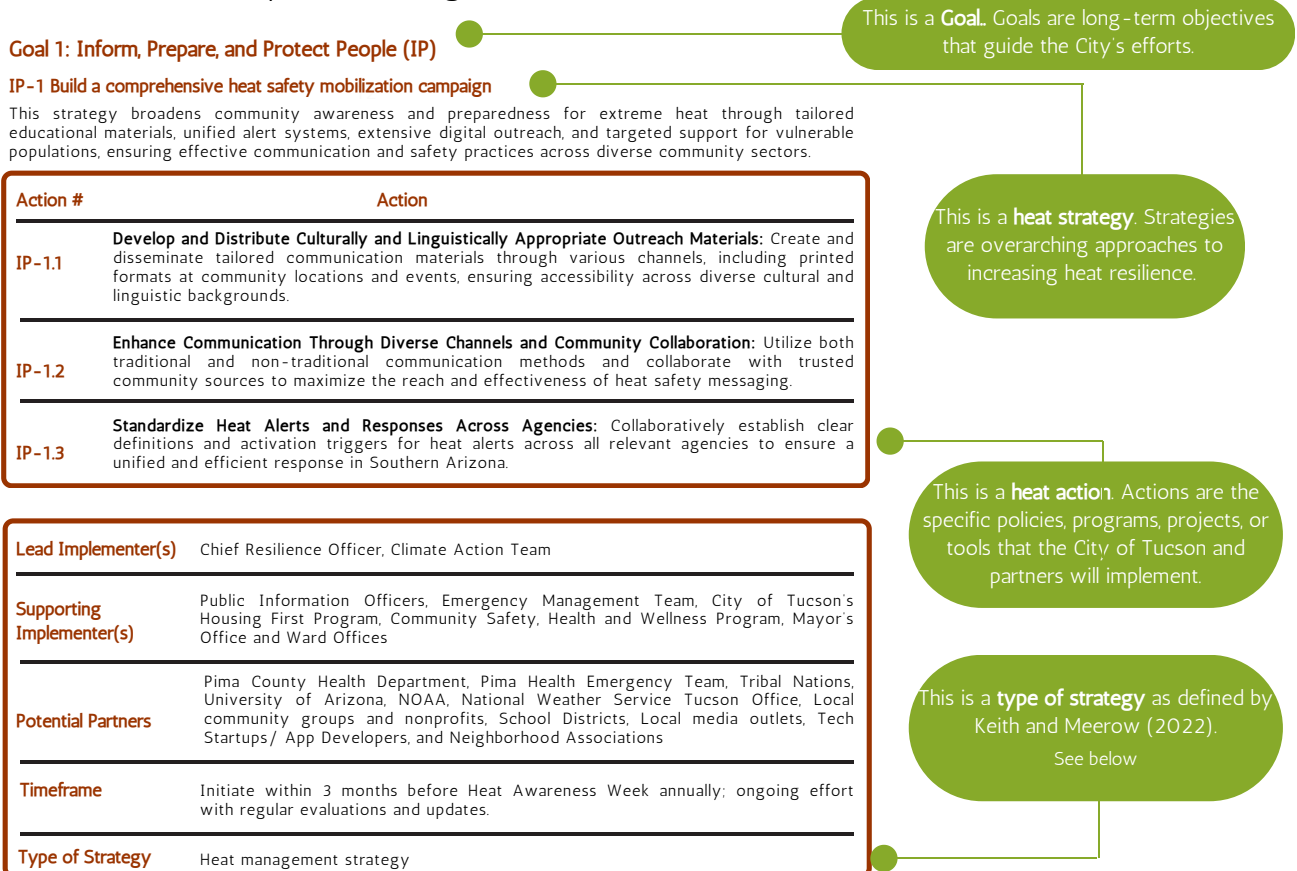


Figure 5. How to Read the Heat Action Roadmap Resilience Strategies.

Urban heat resilience strategies are essential for combating the challenges posed by rising temperatures in cities. As outlined by Keith and Meerow (2022), a comprehensive approach should encompass specific goals and metrics to gauge success, efficient organization of urban heat data, strategic development tailored to urban environments, adept management of uncertainties, an interconnected network of plans, active community participation, and robust implementation and monitoring mechanisms[19].

It's crucial to integrate mitigation strategies alongside heat management techniques, ensuring a holistic and effective heat action plan that addresses the complex dynamics of urban heat islands and promotes sustainable urban development.



Figure 5. Urban Heat Resilience Mitigation and Management Strategies.
Source: Adapted from Keith and Meerow (2022)

Inform, Prepare. and Protect People (IP)





GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

Effectively communicating the risks of extreme heat is essential to prevent illnesses and deaths. Tucson’s Heat Action Roadmap focuses on educating, preparing, and protecting community members to boost community resilience. This involves enhancing educational outreach, improving emergency protocols, and training healthcare providers to tackle heat-related vulnerabilities. The Roadmap also prioritizes public awareness through campaigns and workshops and emphasizes coordinating agency communication for swift heat warnings and safety measures. It also stresses worker safety with training and cool rest areas, while strengthening healthcare capacity to respond to heat events and protect vulnerable populations. These efforts aim to enhance community trust and ensure a resilient response to heat challenges.

Overview of ongoing efforts

The City of Tucson has adopted Pima County’s Beat the Heat campaign, to raise awareness of extreme heat risks and promote protective strategies for community members from June to September.

In May 2024, the City of Tucson’s Mayor and Council, along with Pima County’s Board of Supervisors, signed a Resolution to designate the second week of May as Heat Season Awareness Week.

The City of Tucson has been coordinating with Pima County and partners to expand the Beat the Heat campaign, aiming to increase public awareness of extreme heat dangers and offer resources and tips on staying cool, such as hydration, limited sun exposure, and recognizing health risk factors. The ultimate goal is to develop a comprehensive heat response strategy to protect vulnerable populations and city workers.

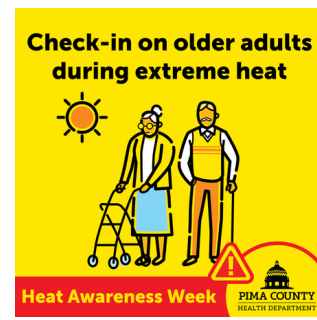
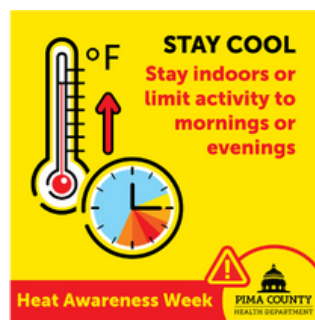
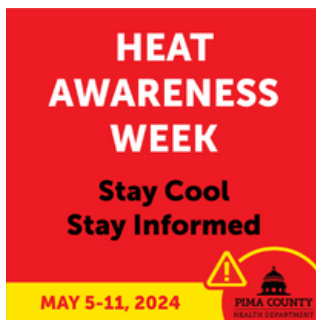


Figure 6. Heat Awareness Week Campaign Advertisement
Source: Pima County Health Department (2024)



GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

IP-1 Build a comprehensive heat safety mobilization campaign

This strategy broadens community awareness and preparedness for extreme heat through tailored educational materials, unified alert systems, extensive digital outreach, and targeted support for vulnerable populations, ensuring effective communication and safety practices across diverse community sectors.

Action #	Action
IP-1.1	Develop and Distribute Culturally and Linguistically Appropriate Outreach Materials: Create and disseminate tailored communication materials through various channels, including printed formats at community locations and events, ensuring accessibility across diverse cultural and linguistic backgrounds.
IP-1.2	Enhance Communication Through Diverse Channels and Community Collaboration: Utilize both traditional and non-traditional communication methods and collaborate with trusted community sources to maximize the reach and effectiveness of heat safety messaging.
IP-1.3	Standardize Heat Alerts and Responses Across Agencies: Collaboratively establish clear definitions and activation triggers for heat alerts across all relevant agencies to ensure a unified and efficient response in Southern Arizona.
IP-1.4	Expand Digital Outreach with Interactive Tools: Work with partners to develop or improve an interactive website and mobile app that provide real-time heat alerts, safety tips, and resources, including personalized risk assessments. This approach will not only educate and engage the community effectively but also encourage public feedback.
IP-1.5	Integrate Heat Safety into Education and Workplace Practices: Work with local schools to integrate heat safety into curricula and the existing Safe Routes to Schools program. Additionally, partner with local businesses to disseminate information on creating heat safety environments, utilizing existing weatherization programs, energy-saving practices, available federal tax rebates, along with other relevant resources.
IP-1.6	Launch Comprehensive Community Engagement Initiatives: Engage community organizations and partners to implement a local media campaign, organize annual heat safety fairs, and establish a Heat Safety Ambassador program to foster community involvement and raise awareness and share resources through multiple touchpoints.
IP-1.7	Develop Targeted Outreach for High-Risk Populations: Work with partners to create specific programs for high-risk groups such as the elderly, children, the unhoused population, and those with pre-existing health conditions. Focus on addressing their unique needs and the risks associated with extreme heat and connect them with existing heat relief services. Additionally, collaborate with the tourist sector to distribute materials that inform visitors, including hikers, about heat safety and promote practices to effectively reduce heat-related risks.



GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

Lead Implementer(s)	Chief Resilience Officer, Climate Action Team
Supporting Implementer(s)	Public Information Officers, Emergency Management Team, City of Tucson's Housing First Program, Community Safety, Health and Wellness Program, Mayor's Office and Ward Offices
Potential Partners	Pima County Health Department, Pima Health Emergency Team, Tribal Nations, University of Arizona, NOAA, National Weather Service Tucson Office, Local community groups and nonprofits, School Districts, Local media outlets, Tech Startups/ App Developers, and Neighborhood Associations
Timeframe	Initiate within 3 months before Heat Awareness Week annually; ongoing effort with regular evaluations and updates.
Type of Strategy	Heat management strategy

IP-2 Develop a comprehensive worker heat safety initiative

This strategy enhances protection for workers exposed to extreme heat through policy enforcement, educational programs, community collaboration, and advocacy for stronger state and federal heat safety regulations, ensuring a safer work environment across various settings.

Action #	Action
IP-2.1	Implement Heat Safety Measures for Workers: Develop and enact an Administrative Directive that includes Heat Safety and Mitigation Plans for City departments with employees exposed to extreme heat. These plans aim to minimize or eliminate exposures to heat-related hazards, ensuring reduced risk.
IP-2.2	Develop and Adopt Heat Safety Expectations for Contractors: Create and implement a Heat Protection Ordinance that integrates heat safety requirements into City procurement processes and contracts. This ensures that all contractors and subcontractors adhere to effective heat safety protocols.
IP-2.3	Offer Training Programs and Protective Supplies for City Workers: Provide City workers with training programs that focus on recognizing symptoms of heat-related illnesses, preventive measures, and learning immediate actions to take in case of heat stress. This training will empower workers to better protect themselves and their coworkers from heat-related illness. Additionally, ensure City workers have access to appropriate protective equipment (PPE).
IP-2.4	Collaborate with Employers and Community Organizations to Raise Awareness: Work closely with major regional employers, labor unions, and community organizations to enhance awareness of the risks associated with heat exposure and the critical importance of safety in outdoor and non-climate-controlled work environments. This collaboration aims to extend reach and impact through community-based education and engagement.



GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

Action #	Action
IP-2.5	Advocate for Legislative Action on Heat Safety for Workers: Support state and federal legislation that advances heat emergency protocols and safety measures such as rest breaks, shade, water access, and comprehensive heat illness training.
IP-2.6	<p>Utilize Advanced Monitoring Technologies: Use technology such as heat monitoring apps or devices that provide real-time temperature alerts and heat stress data to City workers to proactively manage heat exposure and better protect them based on their microclimate conditions.</p> <p>The following tools are available and offer real-time index data and warnings crucial for heat safety:</p> <p>OSHA Heat Safety Tool: https://www.osha.gov/heat/heat-app Pima County Emergency Alerts: MyAlerts.pima.gov</p>

Lead Implementer(s)	Office of Risk Management and Procurement
Supporting Implementer(s)	City Departments, Attorney’s Office, Mayor’s Office, Chief Resilience Officer, and Intergovernmental affairs and Lobbyist
Potential Partners	Labor Unions, Local Businesses and Community Groups
Timeframe	Initiate within 1 month; ongoing effort with regular evaluations and updates.
Type of Strategy	Heat management strategy



GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

IP-3 Establish a heat advisory committee for community resilience

This strategy establishes a Southern Arizona Heat Advisory Committee dedicated to guiding and informing local efforts that enhance resilience through collaborative, equity-focused, and data-driven approaches. This committee aims to coordinate diverse stakeholders to effectively reduce heat risk and strengthen community adaptability to extreme temperatures.

Action #	Action
IP-3.1	Maintain a Central Group for Cooling Center Guidelines: Develop and continuously update guidelines for the operation and distribution of cooling centers to ensure community needs are met effectively and equitably.
IP-3.2	Convene a Working Group for Communication and Preparedness: Form a task force focused on developing comprehensive communication strategies and heat emergency preparedness plans.
IP-3.3	Develop a Learning Community for Neighborhood Connections: Collaborate with partners to create a platform that facilitates the exchange of information and best practices among neighborhood leaders to foster local resilience initiatives.
IP-3.4	Establish a Data Sharing Framework: Implement a system for sharing real-time data and insights on heat-related risks between government agencies, healthcare providers, the University of Arizona, and community organizations.
IP-3.5	Promote Interagency Coordination: Develop protocols to enhance cooperation among local, state, and federal governments, as well as nonprofits, including emergency services, health departments, and the National Weather Service during heat emergencies.
IP-3.6	Enhance Healthcare Response to Heat-Related Illnesses: Support the county, state, and tribal health departments, and healthcare systems in responding to heat-related illnesses through training, developing clinical guidelines, implementing illness tracking systems, and promoting patient education on heat safety measures. These efforts aim to improve diagnosis, standardize care, and foster proactive health interventions during heat waves.

7

GOAL 1

INFORM, PREPARE AND PROTECT PEOPLE

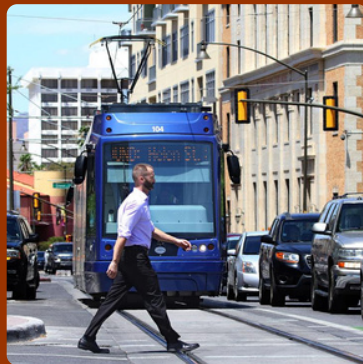
Lead Implementer(s) Chief Resilience Officer, Climate Action Team, Emergency Management Team, Mayor's Office, and Parks and Recreation Department

Supporting Implementer(s) City Departments, Pima County Health Department, Arizona Department of Health Services and Tribal Health Departments

Potential Partners University of Arizona, Healthcare Providers, NOAA, National Weather Service Tucson Office, Utility Companies, and Community Organizations

Timeframe Initiate within 6 months; ongoing effort with regular evaluations and updates.

Type of Strategy Heat management and mitigation strategy



**Cool people's homes
and community
centers (CH)**





GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

Extreme heat significantly affects indoor spaces, especially in poorly insulated buildings where temperatures can soar, increasing energy consumption and health risks. Inadequate cooling systems exacerbate heat-related illnesses and respiratory issues, particularly impacting vulnerable populations. Recognizing this, the goal focuses on improving the operation and reach of cooling centers, enhancing energy efficiency in homes, and providing essential heat relief resources for those facing housing insecurity.

This approach aims to mitigate health risks, reduce energy consumption, and foster community resilience in the face of extreme heat challenges. Key actions include establishing operational standards for cooling centers, supporting energy-efficient upgrades for low-income households, and implementing heat safety protocols and outreach programs.

Overview of ongoing efforts

In 2023, Arizona's hottest summer underscored the need for protecting vulnerable populations. Locally, several programs aim to enhance the living conditions of low-income households and the unhoused community[22]. The City of Tucson, and its partners, have implemented key initiatives to support healthy homes and help the unhoused community cope with extreme heat.

Home Repair Programs: These programs, funded through the Community Development Block Grant (CDBG) program, provide major rehabilitation for low-income homeowners, including roof replacements, HVAC repairs, and other essential home upgrades to ensure safety and sustainability.

Lead Hazard Reduction Programs: Focused on homes built before 1978, these programs aim to reduce lead hazards, particularly for children under five. The program partners with organizations like the Sonoran Environmental Research Institute (SERI) to pre-qualify candidates.

Solar Empowerment Program: This program assists low-income families install solar panels in their homes. This program partners with SERI and Technicians for Sustainability (TFS) and will be expanded to increase solar installation capacity in Tucson.

Thrive in the 05: Supported by a \$50 million Choice Neighborhoods Implementation Grant from the US Department of Housing and Urban Development (HUD), this initiative includes comprehensive neighborhood revitalization efforts. It features home preservation pilots, public plazas, and community food hubs, aiming to enhance health and safety in vulnerable areas.

Housing First Program: This program provides street outreach, housing navigation, emergency shelter, and permanent supportive housing for over 1,000 Tucsonans annually. It focuses on ensuring low-barrier access to housing solutions.

Mobile Shower Program: This program provides mobile shower units to various community nonprofits and faith organizations, addressing basic hygiene needs and building trust with the unhoused community.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

These programs aim to mitigate health risks, reduce energy consumption, and foster community resilience against extreme heat, particularly focusing on vulnerable populations and the unhoused community.

Despite the gains, additional funding is needed to expand their reach and support more households and communities in need.

Additionally, there is a network of cooling and respite centers in the region that activate in the summer. For the 2024 summer, 33 cooling centers and 3 respite centers have been activated, with more expected to join as temperatures increase.

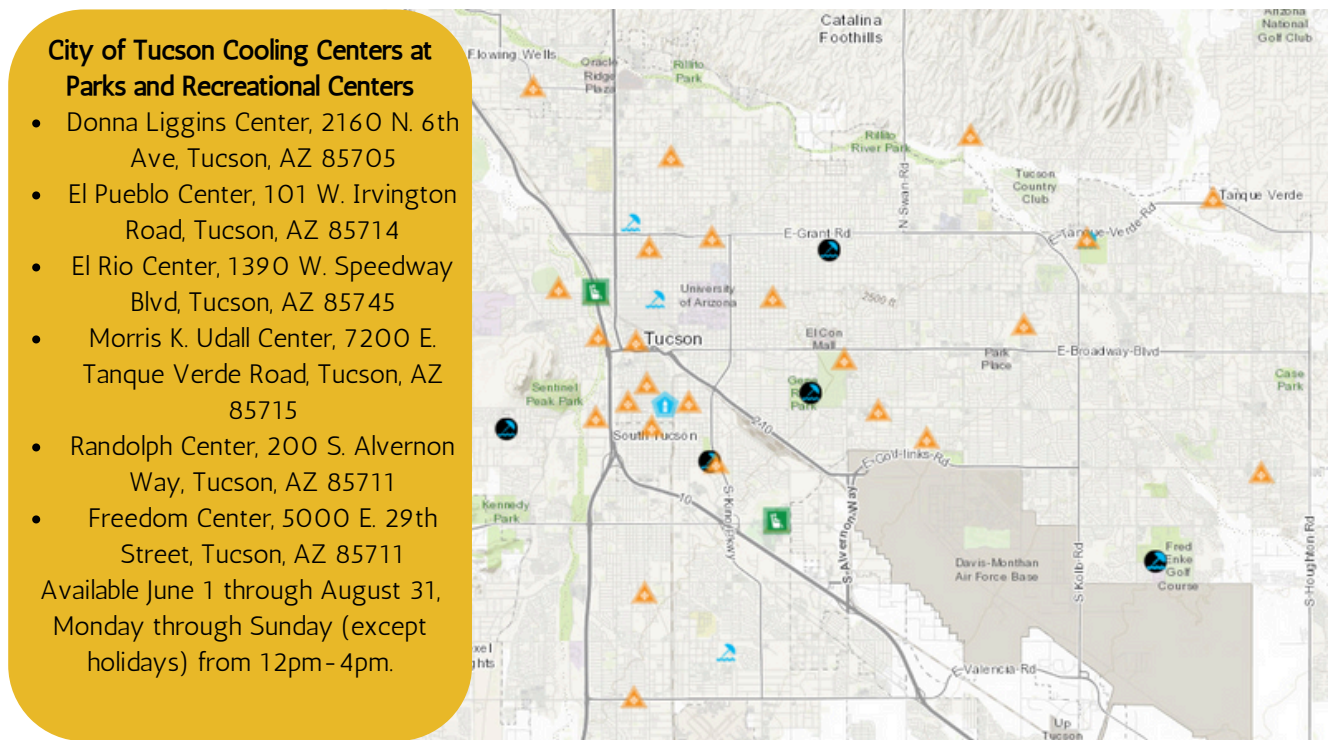


Figure 7. 2024 Cooling and Respite centers available in Pima County. Map developed by the Pima County Health Department. <https://climateaction.tucsonaz.gov/> [26]

The City of Tucson's Department of Parks and Recreation manages the City's network of cooling infrastructure, which includes 136 parks, 20 pools[23], 7 splash pads (with three more coming online soon), 476 drinking water fountains, two water bottle filling stations, and six cooling centers across the city.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

Under Governor Hobb's leadership, the Arizona Department of Health Services has provided the City of Tucson with two COOLtainers cooling units. These units will offer heat relief for unsheltered individuals. The units will be stationed at the historic City Amazon Shelter property, allowing unsheltered individuals to access shelter and supportive services, including healthcare, housing, and behavioral health assistance.

While the cooling centers offer an air-conditioned space and drinking water for people in need of heat relief, the City of Tucson is moving towards transforming cooling centers into resilience hubs. The City has been awarded a FEMA grant for planning resilience hubs, focusing on engaging vulnerable populations, developing protocols and emergency plans, and integrating climate science into regional management. This includes creating the Community Resilience Leadership Academy (CRLA) to establish a model for ideal resilience hubs in Tucson and empower community members to lead community-driven resilience projects with a bilingual curriculum and practical project implementation.

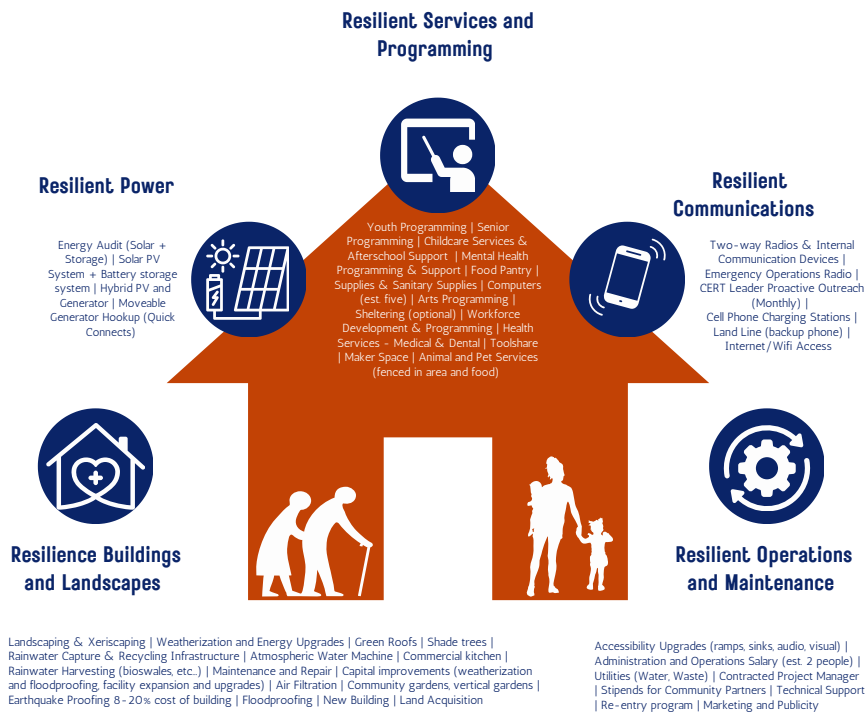


Figure 8. Recommended Components for Resilience Hubs by the Urban Sustainability Directors Network (USDN)

According to the Urban Sustainability Directors Network (USDN)[24], resilience hubs have five key components: Buildings and Landscape, Power, Services and Programming, Communications, and Operations and Maintenance. Incremental progress in creating resilience hubs is the most practical approach, integrating elements into selected facilities rather than striving for an ideal model with all components at once. This acknowledges that tailored, gradual progress builds resilience effectively.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

CH-1 Improve cooling centers

This strategy enhances the effectiveness and accessibility of Tucson's cooling centers by establishing operational standards, optimizing accessibility, and supporting transportation. It expands services, identifies alternate cooling solutions, and strengthens staff and community partnerships. Investments in infrastructure and a resilience approach will transition centers into resilience hubs. A monitoring and evaluation system will ensure continuous improvement in collaboration with partners.

Action #	Action
CH-1.1	Establish Operational Standards for Cooling Centers: Work with partners to develop and enact clear operational guidelines and protocols for activating cooling centers during peak heat times. Enhance visibility and awareness by creating consistent signage and online presence for all cooling center locations in the region.
CH-1.2	Enhance Accessibility and Accommodations: Optimize the placement and operational hours of cooling centers based on available data (i.e. heat risk, exposure data, 911-heat-related calls) to better serve community members with access and functional needs. Ensure these centers are accessible to seniors, individuals with disabilities, and those without transportation. Enhance physical accommodations to include wheelchair access and pet-friendly policies where possible, offer family-friendly amenities, and explore providing storage options for personal property.
CH-1.3	Support Transportation to Cooling Centers: Collaborate with partners to implement sustainable transportation strategies, such as providing free public transit passes and partnering with rideshare services on high-heat days to improve access to cooling centers. Work with partners to conduct walkshed analysis to identify and address gaps, especially in underserved areas.
CH-1.4	Expand Services and Resources in Cooling Centers: Work with partners to provide essential amenities at cooling centers, including refillable water bottles, snacks, sunscreen, and other cooling supplies. Partner with local health organizations, clinics, relief organizations, and colleges and universities to offer on-site social services, health checks, and emergency medical services.
CH-1.5	Identify Alternate Cooling Solutions: Work with partners to inventory and assess the existing network of Southern Arizona cooling facilities and identify gaps and opportunities to reach communities unable to utilize traditional cooling centers, like rural communities and the unhoused. This can include pop-up relief spots or mobile cooling units during heat emergencies.
CH-1.6	Strengthen Staff, Volunteer, and Community Partnerships: Work with partners to develop a training program that includes information and skills related to heat stress awareness and emergency response. Establish partnerships with local businesses, nonprofits, and faith-based organizations to support the operations and reach of cooling centers.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

Action #	Action
CH-1.7	Invest in Infrastructure and Technology: Upgrade city-owned cooling facilities to ensure they are safe and well-equipped. Consider upgrades to physical facilities, weatherization, and the integration of renewable energy sources to maintain operations during power outages.
CH-1.8	Implement a Resilience Approach to Cooling Centers: Work with partners and communities to evaluate existing cooling centers, both government-operated and community-managed, to transition the best-suited centers into resilience hubs following the USDN's resilience hubs framework. Create a phased implementation plan with pilot projects in high-risk areas and identify potential funding sources.
CH-1.9	Implement a Monitoring and Evaluation System: Partner with the University of Arizona to regularly assess the effectiveness of cooling centers through feedback from the community and usage data. Adjust strategies and actions based on emerging trends, community needs, and technological advancements to ensure the cooling centers meet standards of service and accessibility.
CH-1.10	Coordinate with Emergency Management and Energy Providers: Collaborate with emergency management offices and local utility companies to strengthen energy grid resilience and prepare for power outages during extreme heat events.

Lead Implementer(s)	Parks and Recreation Department, Facilities Management, Chief Resilience Officer, and Climate Action Team
Supporting Implementer(s)	Emergency Management Team, Pima County Health Department, Department of Transportation and Mobility, and Fire Department (911 data)
Potential Partners	Tucson Pima Collaboration to End Homelessness (TPCH), University of Arizona, Healthcare providers, Relief organizations, Local businesses, Nonprofits, Faith-based organizations, Utility Companies, Rideshare services
Timeframe	Initiate within 1 month; ongoing effort with regular evaluations and updates.
Type of Strategy	Heat management strategy



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

CH-2: Enhance support for energy efficiency and home upgrades

This strategy improves energy efficiency and home resilience to extreme heat, especially for low-income households. Key actions include updating building codes for green practices, supporting home retrofits with energy-efficient technologies, and promoting awareness of energy savings and federal rebates. It also aims to facilitate solar panel installations, seek funding for energy projects, and enhance workforce development in energy systems. Additionally, it proposes conducting research to identify and improve housing policies for heat safety.

Action #	Action
CH-2.1	Strengthen Sustainable Building Standards: Update city building codes to enhance green building practices, energy efficiency designs, and the use of sustainable materials in new construction and major renovations.
CH-2.2	Support Energy Efficiency Programs for Low-Income Households: Support programs aimed at helping low-income households retrofit their homes with energy-efficient technologies. Enhancements should include improving the insulation and replacing old appliances with energy-efficient models. These changes will reduce overall energy consumption, lower costs, and decrease waste heat emissions.
CH-2.3	Increase Awareness of Energy Savings: Encourage community members and businesses to adopt energy-efficient technologies and practices to reduce costs and waste heat emissions. Establish partnerships to raise awareness and provide training on applying for existing programs. These include federal tax rebates for energy-efficient upgrades, heat pumps, and heating and cooling systems.
CH-2.4	Support Renewable Energy Installations: Facilitate the installation of solar panels on low-income residential homes to reduce dependence on traditional energy sources and improve energy resilience.
CH-2.5	Advocate for Funding and Financing Support: Seek increased public and private funding for energy efficiency upgrades. Partner with private financing institutions to offer low-income loans and grants for energy-efficiency projects. Collaborate with utility companies to enhance rebate programs and incentives for energy efficiency, targeting low-income families.
CH-2.6	Enhance Workforce Development for Energy Systems: Strengthen the local workforce by supporting training and development in the installation and repair of energy-efficient HVAC systems, solar panels, insulation, and weatherization techniques.
CH-2.7	Research Housing Policies for Heat Safety: Conduct research to identify gaps in existing housing policies and propose enhancements to heat safety measures, including improved insulation standards, ventilation requirements, and access to cooling systems.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

Lead Implementer(s)	Housing and Community Development Department
Supporting Implementer(s)	Climate Action Team, and Planning and Development Service Department
Potential Partners	Workforce Development Programs, Local Nonprofits and Community Organizations, Local Contractors and Vendors, Utility and Energy Companies, Financial Institutions, Energy Efficiency Experts and Home Repair Programs
Timeframe	Initiate within 6 months; ongoing effort with regular evaluations and updates.
Type of Strategy	Heat management and mitigation strategy

CH-3: Expand heat relief resources for people facing housing insecurity

This strategy aims to support individuals facing housing insecurity during extreme heat by enhancing cooling systems in transitional homes, distributing heat relief kits, providing transportation to relief locations, and conducting wellness checks.

Action #	Action
CH-3.1	Enhance Cooling Systems in Transitional Homes: Enhance cooling systems and amenities in transitional homes and converted shelters to maintain comfortable indoor temperatures during extreme heat periods.
CH-3.2	Implement Heat Safety Protocols: Introduce heat safety protocols and training for staff and volunteers working in housing programs to effectively recognize and address heat-related illnesses among community members. Additionally, educate support providers on the interactions between heat and substance abuse.
CH-3.3	Distribute Heat Relief Kits: Distribute heat relief kits containing essential items such as water bottles, sunscreen, hats, and cooling towels, among other items to individuals experiencing housing insecurity at critical congregation sites, such as parks and transit stations.
CH-3.4	Provide Transportation to Heat Relief Locations: Explore partnerships to provide transportation and mobility services to cooling centers and other designated heat relief locations, especially for unhoused individuals during heat emergencies.
CH-3.5	Conduct Outreach and Wellness Checks: Collaborate with local organizations, healthcare providers, and community volunteers to conduct outreach and wellness checks for vulnerable populations during heatwaves. Incorporate the "Be a Buddy" program framework, which pairs volunteers with at-risk individuals to ensure their safety and well-being during extreme heat conditions.



GOAL 2

COOL PEOPLE'S HOMES AND COMMUNITY CENTERS

Lead Implementer(s) Housing and Community Development Department

Supporting Implementer(s) Housing First, Community Safety, Health & Wellness Program, Climate Action Team, and the Department of Transportation and Mobility

Potential Partners Tucson Pima Collaboration to End Homelessness (TPCH), Local Nonprofits and Community Organizations, Healthcare Providers, Social Services Agencies and Volunteer Groups

Timeframe Initiate heat relief toolkits before summer; ongoing effort with regular evaluations and updates.

Type of Strategy Heat management strategy



Cool Tucson Neighborhoods (CN)





GOAL 3

COOL TUCSON NEIGHBORHOODS

In Tucson, a lack of green space, heat-absorbing surfaces, and a built environment historically designed primarily for cars create urban heat islands, increasing economic and health burdens. These conditions make cooling homes costly and outdoor activities uncomfortable.

Trees and vegetation provide shade, lower temperatures, and offer benefits such as reduced energy use, improved air quality, and enhanced stormwater management.

This goal aims to integrate heat risk into planning, utilize cool building materials, reduce waste heat from buildings and vehicles, expand tree canopy, improve urban mobility, and develop a skilled workforce in urban forestry and green jobs.

Tucson Tree Equity Scores

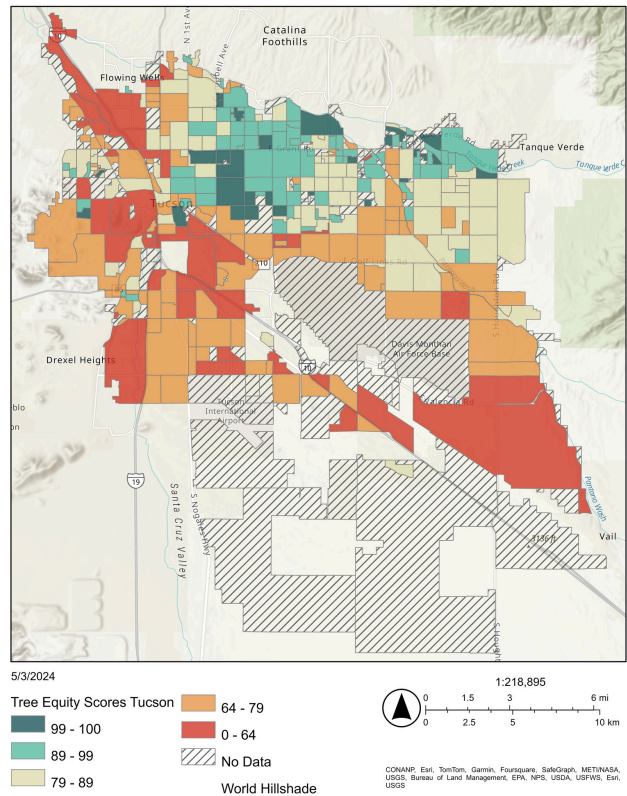


Figure 9: The City of Tucson's Tree Equity Map identifies heat-vulnerable neighborhoods for greening.

Overview of ongoing efforts

The City of Tucson is committed to creating a sustainable, resilient and cooler urban environment through a variety of greening initiatives. These efforts aim to combat urban heat and enhance the overall quality of life for the Tucson community.

Launched in 2020 by Mayor Regina Romero, the **Tucson Million Trees** (TMT) initiative aims to plant one million trees by 2030. This ambitious project focuses on increasing the urban tree canopy to provide shade, reduce heat, and improve air quality. TMT prioritizes planting native, desert-adapted trees, especially in heat-vulnerable neighborhoods. In partnership with Tucson Clean and Beautiful and their Youth Tree Leaders (YTL) Program, the City of Tucson supports youth involvement.

The YTL Program provides young people ages 13 through 25 with training in tree planting and care techniques. In addition to receiving stipends, these youth are being trained to become the next generation of environmental stewards.



GOAL 3

COOL TUCSON NEIGHBORHOODS



Partners



Site: <https://climateaction.tucsonaz.gov/pages/milliontrees>
Email: tucsonmilliontrees@tucsonaz.gov

Accomplishments



107,000+ trees planted/distributed



838 Youth Tree Leader stipends provided



7,400+ volunteers



600+ school children engaged



2,560+ heat vulnerable homes



\$6.8M+ funds raised/granted



205+ planting events

\$170,000 grant funding for arboriculture workforce development (American Forest and Arizona Department of Forestry and Fire Management)
\$910,000+ urban forestry funds raised mainly from the private sector
\$750,000 community forestry grant for planting and tree care (Arizona Department of Forestry and Fire Management)
\$5,000,000 urban and community forestry grant award (US Department of Agriculture)

Donors

Tucson Million Trees is possible thanks to the generous support from individuals, foundations, businesses and government institutions.
Thank you!

The City's Urban Forestry Program (UFP) is dedicated to working across city departments and programs to systematically maintain, preserve, and expand the tree canopy, ensuring the long-term health and sustainability of the urban forest. Through its Community Forest Action Plan and Tree Care Standards and Best Management Practices, the UFP ensures that trees are properly cared for by both city staff and contractors.

The City's Storm to Shade (S2S) Program diverts stormwater runoff from streets to create and support trees and vegetated basins. This program provides multiple benefits, including reducing demand for potable water to maintain public landscapes, reducing flooding, extending the life of the pavement, creating habitat for wildlife, supporting pollinators, and increasing tree canopy for enhanced mobility and recreation.

The City's TREE Center (Tree Resource Education and Ecology Center) was created to increase the tree production capacity to meet the needs of Tucson Million Trees initiative and city departments. It also serves as a workforce program and public learning site for green stormwater infrastructure and tree propagation. The TREE Center is currently growing 5,500 trees that will be planted in heat vulnerable communities across the city.

In addition to these targeted greening efforts, the City is also working with the New Building Institute and several municipalities in the state of Arizona to develop **climate-resilient new building codes** that will address the challenges of extreme heat. These building codes will enhance new buildings through improved energy efficiency and indoor air quality, incorporating materials and designs to withstand high temperatures, ultimately creating safer and more sustainable urban environments.



GOAL 3

COOL TUCSON NEIGHBORHOODS

As one of the biggest contributors to heat trapping gas emissions, **the transportation sector** plays an important role in heat mitigation. To address this, the City of Tucson encourages community members to take public transit by offering a fare-free system. Additionally, the City's bus fleet is on its way to being fully decarbonized with electric and compressed natural gas buses. In fact, the City of Tucson is set to have the largest electric bus fleet in the Southwest, with 20 electric buses currently in operation or on their way to service. By reducing reliance on personal vehicles and promoting clean public transit options, these initiatives mitigate heat and contribute to improved air quality and a reduction in overall carbon emissions.

Together, these comprehensive efforts underscore Tucson's dedication to fostering a greener, healthier, and more sustainable urban environment for all its community members.



LADD KEITH
ASSOCIATE PROFESSOR
COLLEGE OF ARCHITECTURE, PLANNING AND
LANDSCAPE ARCHITECTURE

Exciting News!

Announcing the Center for Heat Resilient Communities

In May 2024, the U.S. Department of Commerce and the National Oceanic and Atmospheric Administration announced the new national Center for Heat Resilient Communities^[25]. This Center will assist communities across the US, including Tucson, with research, expertise, and actionable policies needed to effectively manage and mitigate extreme heat. This initiative supports Tucson's efforts to create a more livable and equitable Tucson community. Congratulations to the University of Arizona and renowned researchers **Ladd Keith, Stephanie Carroll, Laura Bakkensen, and Heidi Brown** for being part of this amazing new Center!



GOAL 3

COOL TUCSON NEIGHBORHOODS

CN-1 Integrate heat risk into urban and regional planning

This strategy focuses on integrating heat risk considerations into urban and regional planning processes to create more resilient and heat-safe communities. It involves collaborating with stakeholders, updating regulations, enhancing infrastructure, fostering collaboration, and monitoring the effectiveness of heat mitigation actions.

Action #	Action
CN-1.1	Develop Risk Assessment Guidelines: Collaborate with urban planners and stakeholders to create and standardize heat risk assessment tools that city planners can use when evaluating new projects, developments, or renovations. These guidelines should include criteria for assessing potential urban heat impact based on geography, existing infrastructure, tree canopy, and demographic data.
CN-1.2	Update Zoning and Building Codes: Review zoning laws and building codes to encourage heat-resilient design in new constructions or major renovations. Considerations should include building shape, massing, and orientation, along with the use of reflective materials like cool roofs. Enhancements should incorporate green infrastructure such as green roofs, vertical greening, adequate onsite shade, permeable pavement, and effective thermal insulations to improve microclimate management.
CN-1.3	Embed Heat Mitigation in Transportation Planning: Design and construct transportation infrastructure to reduce heat exposure, including shaded bus stops, street trees, and reflective pavements. Prioritize expanding shade along cycling paths and at key cycling stops, such as intersections. Integrate land use-based conservation of natural spaces to support green infrastructure, urban forestry, and ventilation corridors.
CN-1.4	Expand Water-Sensitive Urban Design: Enhance urban cooling effects by expanding water-sensitive design approaches. This includes integrating low-impact and infill development practices, green stormwater infrastructure and urban forestry, river and wash restoration projects, rain gardens, drought-tolerant landscapes, and enhanced public water features.
CN-1.5	Foster Inter-Agency Collaboration: Create formal partnerships between urban planning, environmental, health, and emergency management agencies to coordinate and leverage expertise in heat risk management.
CN-1.6	Monitor and Evaluate Heat Mitigation Actions: Collaborate with the University of Arizona and other organizations to monitor and evaluate heat mitigation actions over time. These partnerships will help better understand the cooling benefits and prioritize future investments based on enhanced data-driven insights.



GOAL 3

COOL TUCSON NEIGHBORHOODS

Lead Implementer(s)	Planning and Development Service Department
Supporting Implementer(s)	Department of Transportation and Mobility, Climate Action Team, Urban Forestry Program, Storm to Shade, and the Emergency Management Team
Potential Partners	University of Arizona, Local urban planners and stakeholders, Environmental health agencies, and Community Organizations, Southwest Center on Resilience for Climate Change and Health (SCORCH)
Timeframe	Initiate within 8 months; ongoing effort with regular evaluations and updates
Type of Strategy	Heat Mitigation Strategy

CN-2 Expand tree canopy and green infrastructure

This strategy focuses on expanding and protecting tree cover, green infrastructure, and additional nature-based solutions on public land, including parks, transportation corridors, and facilities. By investing in tree planting (mid and understory) and maintenance programs, this initiative aims to increase shade, enhance biodiversity, and mitigate the urban heat island.

Action #	Action
CN-2.1	Expand Urban Forestry in Heat Vulnerable Neighborhoods: Develop a strategy to reach 15% tree canopy coverage, focusing on planting native, desert-appropriate, and climate-resilient trees in neighborhoods with low- to moderate- tree equity scores.
CN-2.2	Implement Tree Protection and Urban Forestry Standards: Develop and implement standards for urban forest management that emphasize best practices for the selection and care of desert-appropriate low water-use native trees. Identify strategies to preserve and protect high-value urban trees, increase biodiversity, emphasize heat mitigation, and monitor the climate resilience of the urban forest.
CN-2.3	Enhance Urban Forestry Through Inter-Departmental Collaboration: Strategically integrate and implement urban forestry and green infrastructure plans, initiatives, and programs across city departments. Collaborate with regional partners, including service providers, and those in planning, development, and industry sectors, to maximize the impact of these efforts.
CN-2.4	Grow the Urban Forest with Harvested Water: Enhance urban forest growth and sustainability by promoting the use of diverse water sources for irrigation including recycled water, and harvested rain and stormwater.
CN-2.5	Mobilize Support for Greening Projects: Establish partnerships with community groups, businesses, and nonprofit organizations to fund and support urban greening initiatives through sponsorships, donations, and volunteer efforts.
CN-2.6	Strengthen Community Outreach and Collaboration: Educate and engage the public through integrated outreach campaigns, workshops, and educational materials that highlight the benefits of green spaces for heat mitigation, biodiversity, and community health. Simultaneously, identify and implement opportunities for cross-program collaboration, including joint tree planting events and shared educational initiatives on heat safety.



GOAL 3

COOL TUCSON NEIGHBORHOODS

Lead Implementer(s)	Parks and Recreation Department and the Urban Forestry Program
Supporting Implementer(s)	Storm to Shade Program, Planning and Development Service Department, and the Climate Action Team
Potential Partners	Local Nonprofits and Community Organizations, Local Businesses, Planning, Development, and Industry Sectors, Private Sector and the Educational Sector
Timeframe	Initiate within 6 months; ongoing effort with regular evaluations and updates
Type of Strategy	Heat Mitigation Strategy

CN-3: Cool commutes

This strategy aims to enhance public transit, multimodal, and pedestrian accessibility, comfort, and safety during extreme heat conditions. It focuses on improving shaded infrastructure at public transit facilities and providing hydration stations along transit connectors, encouraging community members to use public transit as a cooler and safer alternative to walking and a more eco-friendly alternative to personal vehicles. These actions also have the benefit of reducing vehicle waste heat, a contributor to the urban heat island effect.

Action #	Action
CN-3.1	Enhance Urban Mobility Through Comprehensive Street Design: Collaborate with City and regional partners to implement Complete Streets, Green Streets, and standards for Green Infrastructure and Urban Forestry across all transportation projects. Promote these design concepts to enhance transportation, transit, multimodal access, and pedestrian connectivity across various projects.
CN-3.2	Conduct a Cool Corridors Assessment: Perform an assessment to identify strategic and equitable opportunities for expanding shade along pedestrian pathways and bikeways. Focus on those that connect transit lines, such as shared use paths and bicycle boulevards, to establish comprehensive cool corridors.
CN-3.3	Enhance Comfort and Safety at Transit Sites: Install or upgrade shade structures and trees at bus stops and transit stations to provide relief from direct sunlight. Additionally, explore equipping major transit hubs and stops with amenities such as solar-powered active cooling systems or misting fans, hydration stations, and informational kiosks to promote heat safety.
CN-3.4	Reduce Automotive Waste Heat: Encourage the reduction of waste heat from traditional gasoline and fossil-fuel powered vehicles to cool streetscape and mitigate urban heat. Promote the adoption of electric vehicles (EVs) and hybrids, and enhance transit, walking, and cycling infrastructure to support more sustainable commuting options.



GOAL 3

COOL TUCSON NEIGHBORHOODS

Lead Implementer(s)	Department of Transportation and Mobility and SunTran
Supporting Implementer(s)	Planning and Development Service Department, Environmental and General Service Department, Tucson Water, Climate Action Team, Urban Forestry Program and Storm to Shade
Potential Partners	Regional Transportation Authority, Local Businesses, Environmental Groups, Local Nonprofits and Community Organizations
Timeframe	Initiate within 12 months; ongoing effort with regular evaluations and updates
Type of Strategy	Heat Management and Mitigation Strategy

CN-4: Enhance urban forestry and green job workforce development

This strategy aims to promote urban forestry initiatives and develop a skilled workforce for green jobs. It focuses on supporting youth training programs, enhancing workforce development, creating education and career pathways, promoting green job opportunities, and investing in community capacity building to increase local participation in urban forestry and environmental stewardship.

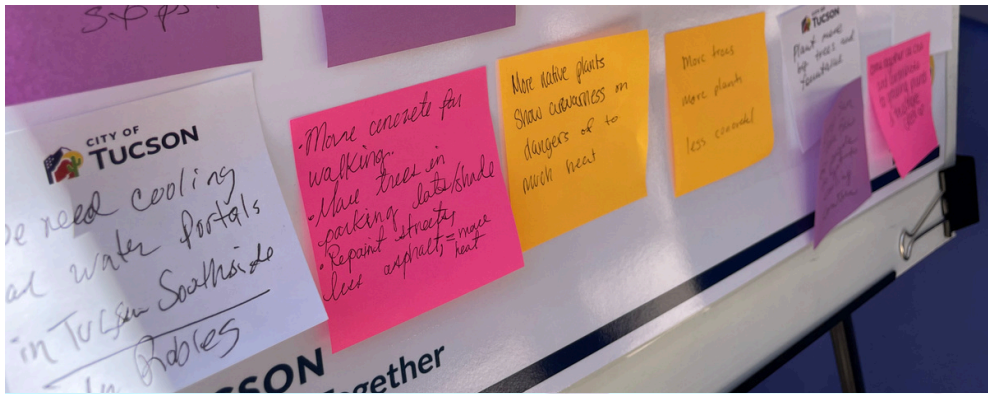
Action #	Action
CN-4.1	Strengthen Youth Training in Urban Forestry and Green Jobs: Support and expand programs like the Youth Tree Leaders Program that train and engage youth in tree planting and care. Develop new initiatives to broaden youth participation in urban forestry and environmental stewardship.
CN-4.2	Enhance Workforce Development in Green Jobs: Collaborate with training and education partners, and local organizations to identify and pursue funding and development opportunities aimed at enhancing workforce development programs that focus on increasing local green jobs, especially in green infrastructure and urban forestry.
CN-4.3	Partner to Develop Education and Career Pathways: Complete an analysis on the current state of the green industry in the regions and identify gaps and opportunities to build bridges and pathways between education, entry positions, and careers into stable, local green fields especially green infrastructure and urban forestry.
CN-4.4	Promote and Educate on Green Job Opportunities: Work with training, education, and workforce partners to promote career and training opportunities in the green industry, such as Pima County Smartscape. Develop educational materials on viable career opportunities, and the transition support, training, and education available to grow into those opportunities.
CN-4.5	Invest in Community Capacity: Partner with resident and community organizations to grow networks of trained neighbors able to steward local green infrastructure and neighborhood urban forests.



GOAL 3

COOL TUCSON NEIGHBORHOODS

Lead Implementer(s)	Urban Forestry Program and the Climate Action Team
Supporting Implementer(s)	Parks and Recreation Department, Local Educational Institutions, and Economic Initiatives
Potential Partners	University of Arizona, Pima Community College, JTED, Training and Education Program, Workforce Development Agencies, Local Nonprofits and Community Groups, Local Arborist Associations and Local Landscape Professionals
Timeframe	Initiate within 8 months; ongoing effort with regular evaluations and updates
Type of Strategy	Heat Mitigation Strategy and Economic Development





IMPLEMENTATION

AND EVALUATION

The successful implementation and continuous improvement of the City of Tucson's Heat Action Roadmap requires a comprehensive and dynamic approach. This section outlines key strategies for the implementation, evaluation, and updating of the plan, along with exploring potential funding sources.

Implementation Strategies

1. Establish a dedicated implementation team: Form a team responsible for overseeing the execution of the Heat Action Roadmap. This team should include representatives from the Climate Action Team, community organizations, and key stakeholders.
2. Detailed implementation strategies: Develop detailed implementation strategies for each strategy and action item, further specifying timelines, responsible parties, necessary resources, and key milestones.
3. Community engagement: Maintain active engagement with the community to ensure their needs and feedback are continuously integrated into the implementation process. This includes regular public meetings, workshops, and surveys.
4. Training and capacity building: Provide training for city staff, volunteers, and community partners to ensure they have the skills and knowledge required to implement and support the various strategies.
5. Interdepartmental coordination: Foster collaboration across different city departments and with external partners to streamline efforts and ensure cohesive action.

Evaluation Strategies

1. Develop metrics and indicators: Establish clear metrics and indicators to measure the effectiveness of the implemented strategies. This includes tracking heat-related illness rates, cooling center utilization, tree canopy coverage, among others.
2. Regular reporting: Integrate Heat Action Roadmap reporting in the Tucson Resilient Together quarterly reports to Mayor and Council.
3. Feedback mechanisms: Create feedback mechanisms to gather input from the community, stakeholders, and implementation team members. This feedback should be used to make necessary adjustments and improvements to the plan.

10 IMPLEMENTATION AND EVALUATION

Updating the Heat Action Plan

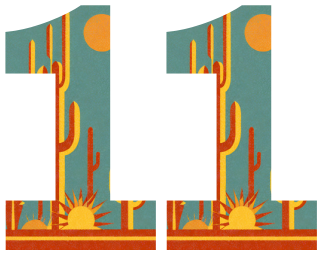
- 1.Regular updates: Schedule regular updates to the Heat Action Roadmap, ideally every two to three years, to incorporate new data, technologies, and best practices.
- 2.Stakeholder workshops: Hold workshops with stakeholders to review progress, discuss challenges, and identify new opportunities for improvement.
- 3.Research and development: Engage in ongoing research to better understand the impacts of extreme heat and to develop innovative solutions. Collaborate with academic institutions, research organizations, and other cities to stay at the forefront of heat mitigation strategies.

Exploring Funding Sources

- 1.Government grants: Seek and pursue federal, state, and local government grants dedicated to climate resilience, public health, and infrastructure improvement.
- 2.Public-private partnerships: Develop partnerships with private sector companies, particularly those in the energy, technology, and construction sectors, to co-fund projects and leverage their expertise.
- 3.Nonprofit and philanthropic organizations: Work with community groups to apply for funding from nonprofit organizations and philanthropic foundations that focus on environmental sustainability, public health, and community development.

By advancing these strategies, the City of Tucson can ensure the successful implementation and continuous improvement of its Heat Action Roadmap, ultimately enhancing the City's resilience to extreme heat and protecting its residents.





DEFINITIONS AND REFERENCES

Climate change: The change of climate due directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods[26].

Early warning systems: The U.S. NOAA National Weather Service issues outlooks such as heat advisories (within 12 hours), excessive heat warnings (12 to 24 hours before), and excessive heat watches (24 to 72 hours) when dangerous heat becomes likely or imminent[27].

Extreme heat: Temperatures that are much hotter and/or more humid than average for a particular time and place[28].

Extreme heat event: A series of days that are hotter and/or more humid than average for a particular time and place. Also referred to as heat waves[19].

Heat equity: The development of practices and policies to mitigate and manage heat with a focus on reducing the inequitable distribution of risk across different groups within the same community [29].

Heat index: also called the apparent temperature, is a measure of how hot it really feels when the relative humidity is considered along with the actual air temperature. Heat index is measured in the shade. Typically, heat index values are highest between June and September, but high heat index values can occur outside these months[30].

Heat management: Preparation and response strategies for extreme heat events, often within the domain of emergency management or public health[19].

Heat mitigation: Design and planning strategies to reduce the contribution of the built environment to urban heat[19].

Heat threshold: Refers to a specific temperature above which environmental conditions are considered extreme or hazardous. These thresholds can be based on air temperatures or other heat stress indicators such as the heat index or Wet Bulb Globe Temperature. Heat thresholds help us understand not just how hot it is, but how the heat might affect us, making it clear when we are facing extreme or hazardous conditions[19].

Thermal comfort: How heat is perceived and experienced by the human body. Thermal comfort is influenced by ambient air temperature, air speed, humidity, radiant temperature, clothing insulation, and the body's metabolic rate[19].

Urban heat: Hotter conditions in urban areas are caused by a combination of the climate, characteristics of the built environment, and waste heat[31].

Urban heat island (UHI): The temperature differences between an urban area, which is typically hotter due to the built environment and waste heat, and surrounding rural and natural areas. Temperatures can also vary substantially within the same community[32].

Urban heat resilience: Proactively managing and mitigating urban heat across the many systems and sectors it affects.

Wet Bulb Globe Temperature (WBGT): is a measure of how heat is experienced by humans in direct sunlight. Unlike the heat index, which is based on temperature and humidity and is measured in the shade, WBGT considers temperature, humidity, wind speed, sun angle and cloud cover.



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12 APPENDICES

APPENDIX A: EXISTING RESOURCES FOR THE CITY OF TUCSON AND PIMA COUNTY

The Heat Relief Network is a regional partnership of Pima County, tribal nations, municipalities, nonprofit organizations, the faith-based community, and businesses. Each year, the HRN coordinates the mapping of heat relief locations, water stations, splash pads, public water fountains, and water donation sites throughout Pima County with the goal of preventing heat-related illnesses and deaths among vulnerable populations.

Cooling Centers

The City of Tucson offers temporary designated areas for the public to utilize and escape the heat during peak hours. The centers will be available from Jun 1, 2024 to Aug 31, 2024. From 12 pm to 4 pm.

- Donna Liggins Center, 2160 N 6th Ave
- El Pueblo Center, 101 W Irvington Road Building #9
- El Río Center, 1390 W Speedway Blvd
- Morris K. Udall Center, 7200 E Tanque Verde Road
- Randolph Center, 200 S Alvernon Way
- Freedom Center, 5000 E 29th Street

More information <https://www.tucsonaz.gov/Departments/Housing-and-Community-Development/HCD-News/Cooling-Center-Locations-in-Tucson>

The Pima County offers more locations as well as respite centers and hydration centers for more information click the link to access the map: <https://www.pima.gov/2307/Cooling-Centers>

City of Tucson – Pools and Splash Pads:

- Catalina Park Splash Pad
- Clements Splash Pad
- Gunny Barreras Splash Pad
- Naida Jane Baker Splash Pad
- Palo Verde Splash Pad
- Purple Heart Splash Pad
- Udall Splash Pad
- Archer Pool
- Catalina Pool
- Clements Pool
- Edith Ball Adaptive Recreation Center
- Sunnyside Pool
- Fort Lowell Pool
- Quincie Douglas Pool
- Udall Pool
- Amphitheater Pool
- El Pueblo Pool
- Freedom Pool
- Himmel Pool
- Jacobs Pool
- Jesse Owens Pool
- Kennedy Pool
- Mansfield Pool
- Menlo Pool
- Oury Pool
- Palo Verde Pool
- Purple Heart Pool

APPENDIX A: EXISTING RESOURCES FOR THE CITY OF TUCSON AND PIMA COUNTY

Pools and Splash Pads:

Pima County:

- Ajo Pool
- Brandi Fenton Splash Pad
- Catalina Pool
- Flowing Wells Junior High School Pool
- Kino Pool
- Los Niños Pool
- Manzanita Pool
- Picture Rocks Pool & Splash Pad
- Thad Terry Aquatic Center
- Wade McLean Pool
- Warden Family Splash Pad

More information:

The city of Tucson: <https://www.tucsonaz.gov/Departments/Parks-and-Recreation/Pools-and-Splash-Pads#section-1>

Pima county: <https://www.pima.gov/1237/Pools-Splash-Pads>

Pima County Libraries

- Caviglia Arivaca Library
- Dewhirst - Catalina Librar
- Dusenberry - River Library
- Eckstrom Columbus Library
- Flowing Wells Library
- Himmel Park Library
- Joel Valdez Main Library
- Joyner Green Valley Library
- Kirk Bear Canyon Library
- Miller Golf Links Library
- Murphy - Wilmot Library
- Nanini Library
- Oro Valley Public Library
- Quincie Douglas Library
- Sahuarita Library
- Salazar Ajo Library
- Sam Lena South Tucson Library
- Santa Rosa Library
- Southwest Library
- Valencia Library
- W. Anne Gibson Esmond Station Library
- Wheeler Taft Abbett Sr. Library
- Woods Memorial Library

More Community Resources:

- Beat the Heat <https://www.pima.gov/2042/Beat-the-Heat>
- [Neighbors Care Alliance](#)
- A/C repair and energy efficiency. Pima County [Home Repair Assistance](#). City of Tucson [Homeowner Repair Program](#).
- Utility Assistance. TEP: [Customer Assistance Programs](#). TRICO: [Customer Assistance Programs](#)
- Renter's rights and cooling. [Heat Relief Arizona Tenant Rights & Repairs](#)

APPENDIX A: EXISTING RESOURCES FOR THE CITY OF TUCSON AND PIMA COUNTY

More Community Resources:

- Resources to help prepare for extreme climate emergencies. [Citizen's Guide to Climate Extremes](#)
- Pima County Emergency Alerts: During an emergency, urgent messaging is effective only if it reaches you quickly. The County's mass notification system can quickly and reliably push emergency messages to many of your electronic devices. Go to [MyAlerts.pima.gov](https://myalerts.pima.gov) to sign up and start receiving emergency notifications.
- View local weather forecasts on the [NWS Tucson Forecast Office](#) page.
- U.S. Centers for Disease Control and Prevention. Heat Risk Dashboard, which offers guidance on what actions you should take depending on heat-related risk levels. <https://ephracking.cdc.gov/Applications/HeatRisk/>

Other Resources:

- Visitor Heat Handout (PDF)
- It's Summer in the Desert—Heat Illness Prevention (PDF)
- The Heat is On—Staying Safe in Extreme Heat (PDF)
- CDC - Food Safety During a Power Outage (PDF)— English | Spanish
- Be Cool with these Heat Relief Tips: Spanish (PDF).
- The Sun and Your Medicine (FDA)
- Heat, medications don't mix (Baylor College of Medicine)
- Tips and Resources During an Extreme-Heat Related Power Outage(Ready.gov)
- It's Hot Outside Brochure [Dari] [Español] [Kinyarwanda] [Pashto] [Rohingya] [Swahili]
- Heat-Related Illness prevention, symptoms, and treatment
- Sign up for excessive heat warnings
- Safety messages for: older adults, outdoor workers, and schools
- Never leave kids or pets inside a vehicle
- ADOT's Extreme Heat Road Kit
- Take precautions when being physically active outside
- It's too hot to walk: Heat safety tips for pets (Arizona Humane Society)
- Hiking safety (Arizona State Parks)
- Arizona Department of Health Services - <https://www.azdhs.gov/heat>

APPENDIX A: EXISTING RESOURCES FOR THE CITY OF TUCSON AND PIMA COUNTY

Other Resources:

- Centers for Disease Control and Prevention, Extreme Heat - <https://www.cdc.gov/disasters/extremeheat/index.html>
- National Integrated Heat Health Information System - <https://www.heat.gov/>
- Federal Emergency Management Agency - <https://www.fema.gov/es>
- Heat Stress Toolbox Talk
- Centers for Disease Control and Prevention, Heat Dashboard - <https://ephtracking.cdc.gov/Applications/heatTracker/>
- National Weather Service <https://www.weather.gov/safety/heat>
- OSHA <https://www.osha.gov/heat>
- [Heat Stress Information from NIOSH](#)

APPENDIX B: EXTREME HEAT DATA SUMMARY

Figure 1: Historic total number of days above 110 F per year. Source National Weather Service: Tucson highs of 110°+ info

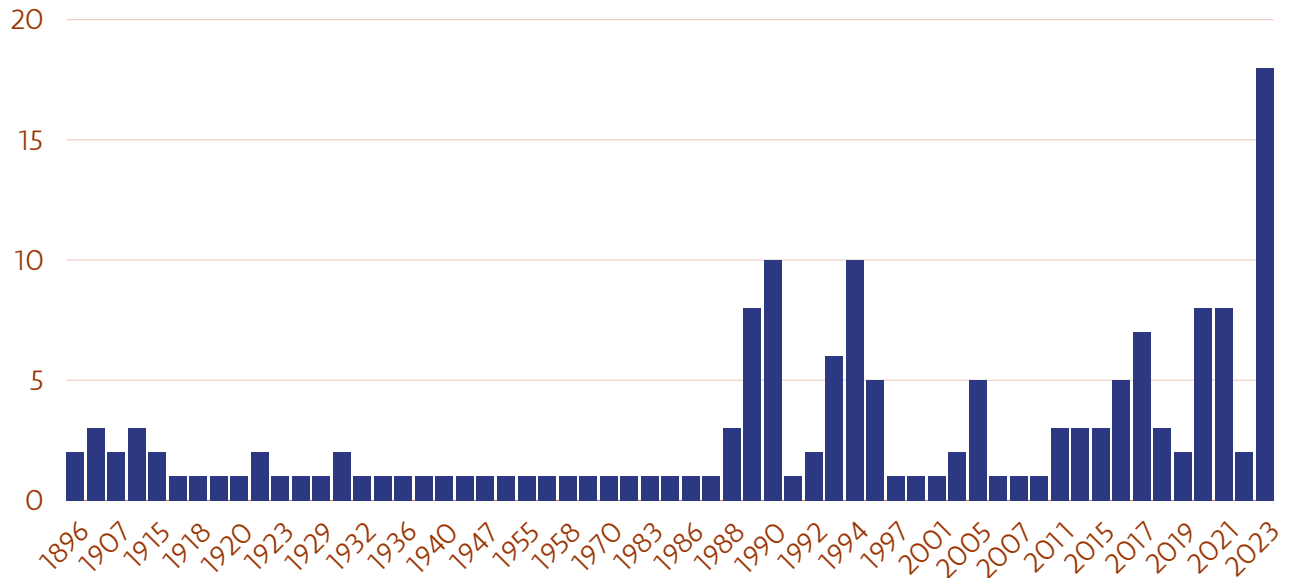
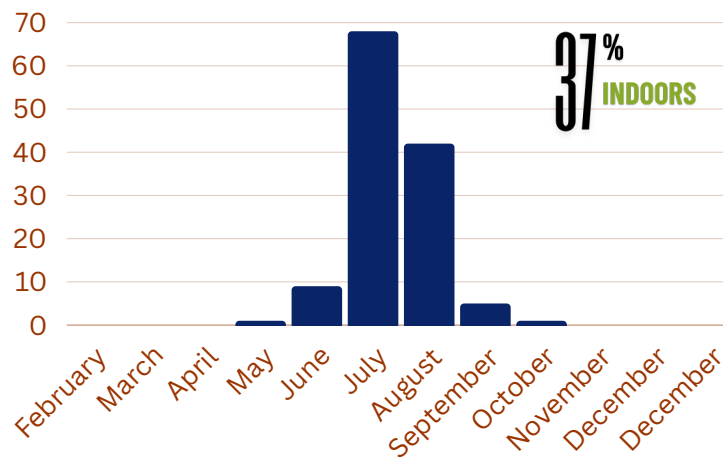


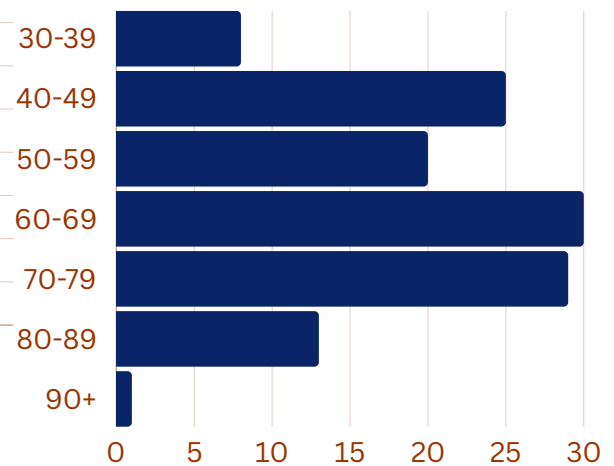
Figure 2: Pima County Heat-related deaths

Heat-related deaths include deaths where environmental heat exposure is either the primary cause of death (heat-caused) or a significant contributing factor to the death (heat-contributing).

Non-UBC deaths by month



Decedent Age Group

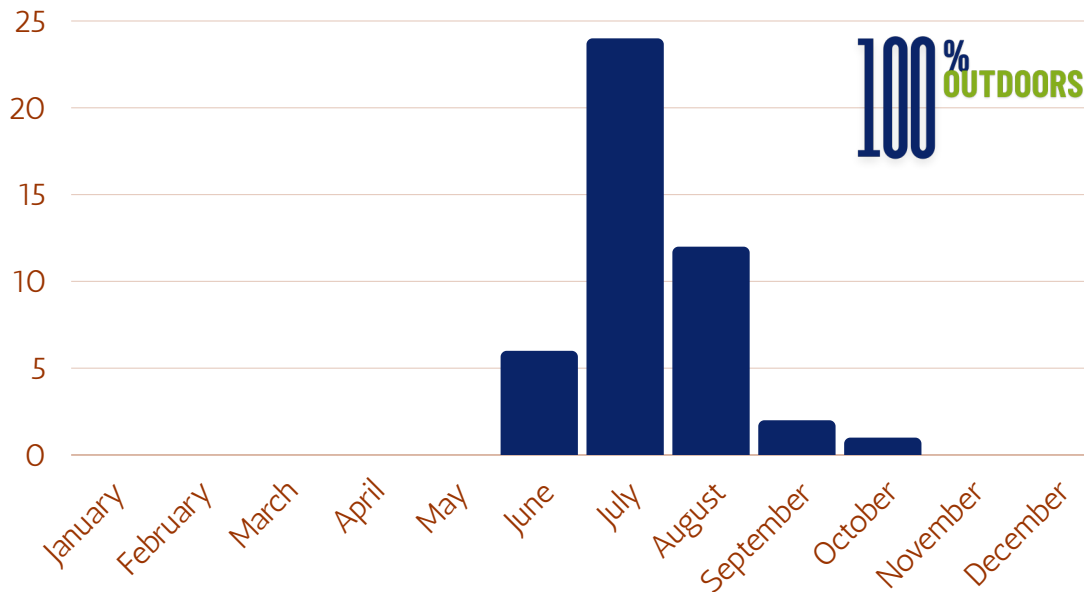


APPENDIX B: EXTREME HEAT DATA SUMMARY

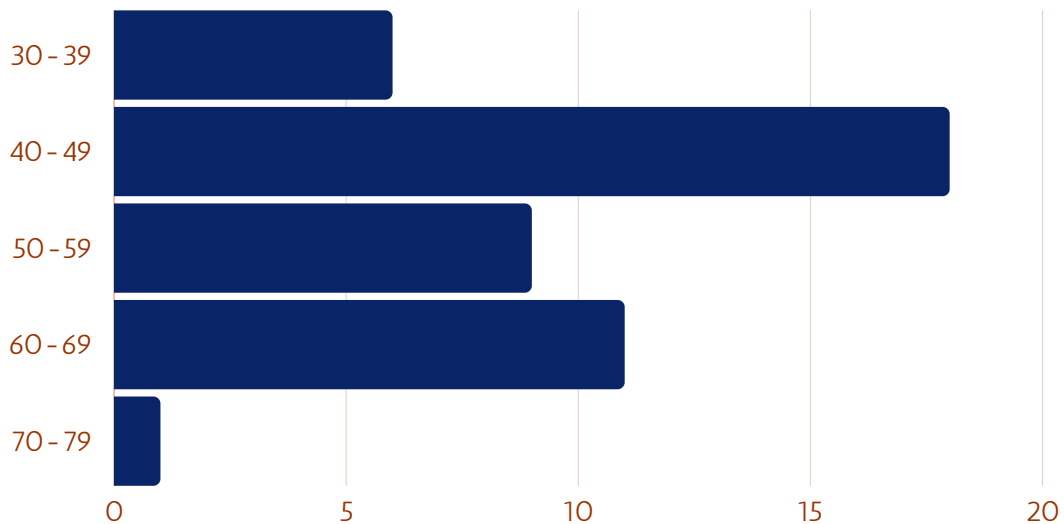
Figure 3: Deaths in persons experiencing homelessness by month

Heat-related deaths include deaths where environmental heat exposure is either the primary cause of death (heat-caused) or a significant contributing factor to the death (heat-contributing).

Deaths in persons experiencing homelessness by month



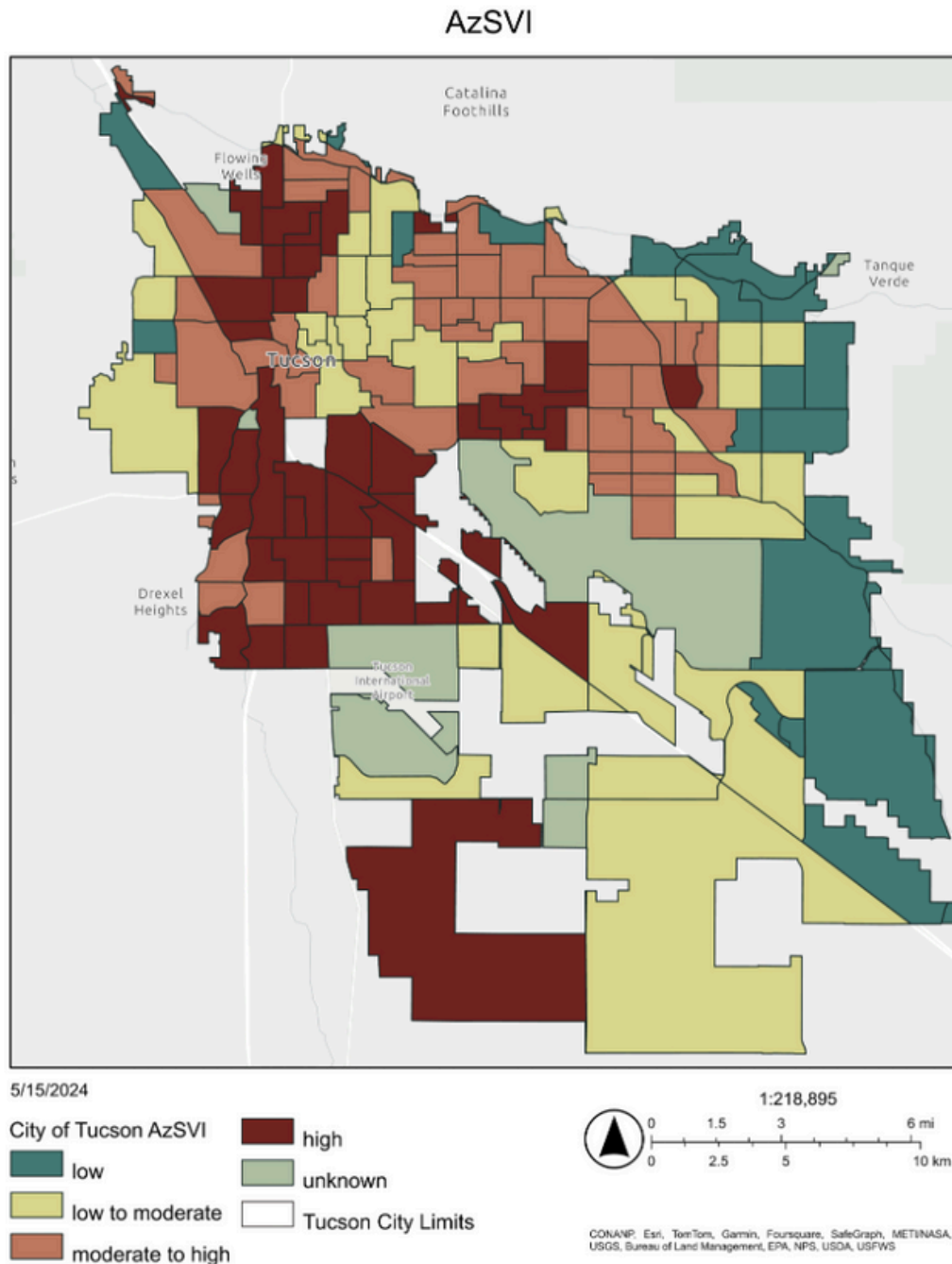
Decedent Age Group



APPENDIX B: EXTREME HEAT DATA SUMMARY

Figure 4. Arizona SVI by Census Tract Map (2023)

The Arizona Social Vulnerabilities Index (AzSVI)[33], provides the Arizona public health workforce, health care providers, policy makers and public a tool to assess the factors impacting Arizona communities, with the aim of addressing disparities and fostering equity



Karina Martinez

APPENDIX B: EXTREME HEAT DATA SUMMARY

Figure 5: Total 911- Heat Related Calls by Census Tract (2017-2023).

Elaborated with Data from Tucson Fire Department

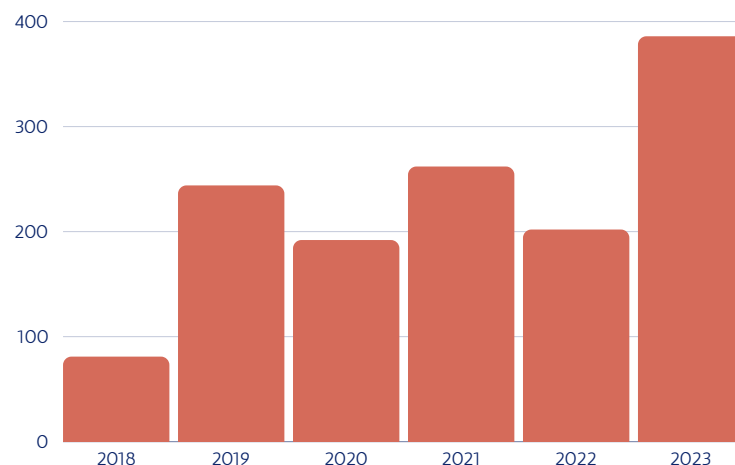
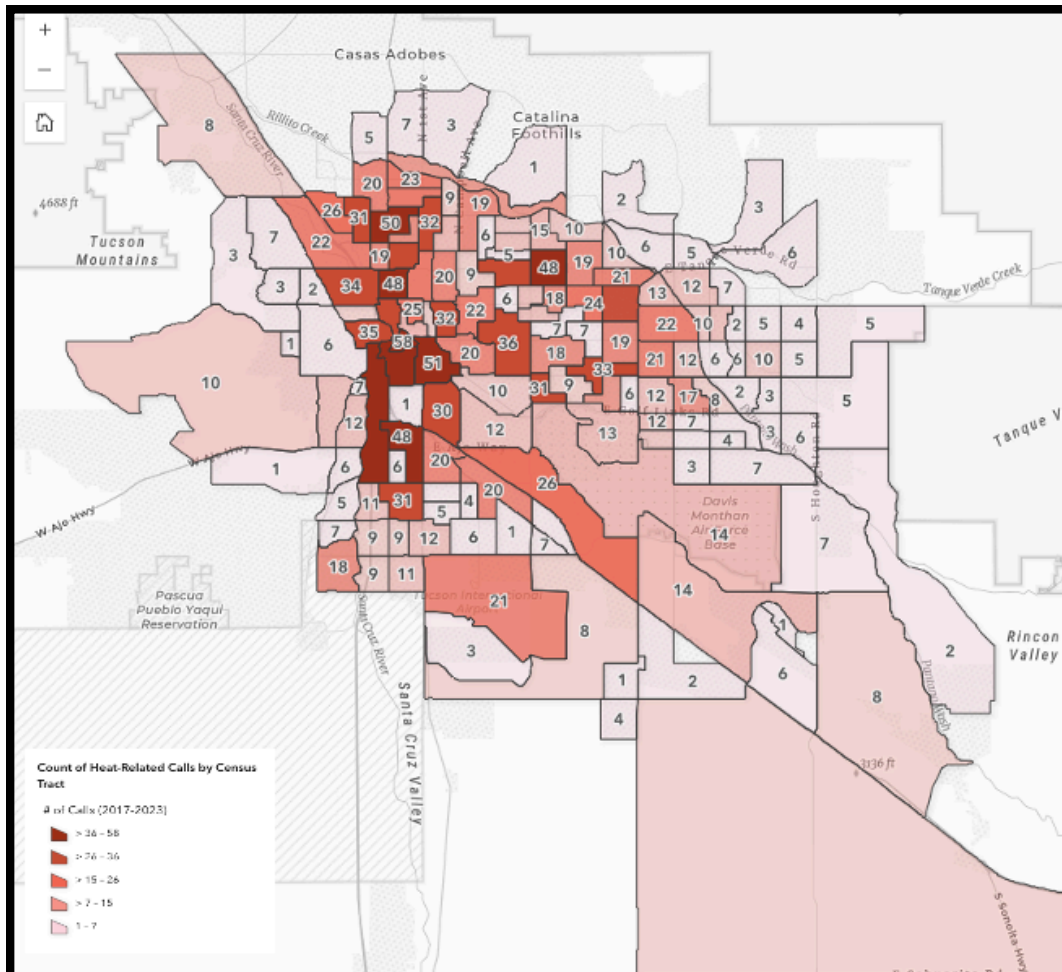


Figure 6: Number of 911- Heat Related Calls by year (2018-2023).

APPENDIX C: TECHNICAL INFORMATION FOR EXTREME HEAT

The Tucson Weather Forecasting office has responsibility for southeastern Arizona and is responsible for their messaging and issuing alerts.

NWS Alert Type	Alert Timing and Basis
Heat Advisory	There is high confidence that unusually hot conditions will develop or are imminent and persist for several days (exact area and timing vary from event to event & included in text of alert). Some heat-related impacts are expected.
Excessive Heat Watch	There is medium confidence that excessively hot weather conditions may develop in the next two to seven days (exact area and timing vary from event to event & included in text of alert).
Excessive Heat Warning	There is high confidence that excessively hot weather will develop or is imminent and persist for several days. Exact area and timing vary from event to event & included in text of alert. Many heat-related impacts are expected.

APPENDIX D: HEAT RISK CHART

The NWS HeatRisk Prototype is a color-numeric-based index that provides a forecast risk of heat-related impacts to occur over a 24-hour period. HeatRisk takes into consideration:

- How unusual the heat is for the time of the year
- The duration of the heat including both daytime and nighttime temperatures
- If those temperatures pose an elevated risk of heat-related impacts based on data from the CDC

This index is supplementary to official NWS heat products and is meant to provide risk guidance for those decision makers and heat-sensitive populations who need to take actions at levels that may be below current NWS heat product levels.

Category	Risk of Heat-Related Impacts
Green 0	Little to no risk from expected heat.
Yellow 1	Minor - This level of heat affects primarily those individuals extremely sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration.
Orange 2	Moderate - This level of heat affects most individuals sensitive to heat, especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and in heat-sensitive industries.
Red 3	Major - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat-sensitive industries and infrastructure.
Magenta 4	Extreme - This level of rare and/or long-duration extreme heat with little to no overnight relief affects anyone without effective cooling and/or adequate hydration. Impacts likely in most health systems, heat-sensitive industries and infrastructure.

More information visit: <https://www.wpc.ncep.noaa.gov/heatrisk/>

APPENDIX E: SOUTHERN ARIZONA EXTREME HEAT PLANNING SUMMIT 2024

On February 3, 2024, the City of Tucson, the Pima County Health Department, and the University of Arizona convened the first Southern Arizona Heat Planning Summit at the ENR2 Building at the University of Arizona. The purpose of the Summit was to bring together local and regional partners to improve heat response, coordination, and mitigation efforts, identify gaps, and recognize opportunities to enhance community heat resilience. The Summit was attended by over 110 representatives from local, non-profit, government, and academic organizations. The Summit participants represented a range of experiences, from public health professionals, emergency managers, urban planners, utility operators, first responders, university researchers, and community members.

The day included presentations from leading experts:

- Ladd Keith, Assistant Professor of Planning and Sustainable Built Environments. University of Arizona
- Dr. Theresa Cullen, Health Department Director. Pima County
- Liz Morales, Assistant City Manager. City of Tucson
- Tom Dang, Science and Operations Officer National Oceanic and Atmospheric Administration (NOAA). National Weather Service Tucson.
- Mona Aurora, Assistant Research Professor, College of Public Health. University of Arizona

Participants self-selected their breakout topic at the time of registration.

Participating Organizations	
Energy and our grid	City of Tucson Climate Assessment for the Southwest (CLIMAS) Commission on Climate, Energy, and Sustainability Local First Arizona Pima County Department of Environmental Quality (PDEQ) Pima County Health Department Pima County Office of Emergency Management Sundial Energy, Inc. Tucson Electric Power Tucson Water Utility

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Participating Organizations	
Community and neighborhood level action	<p>BaRN Community Home Repair Projects of Arizona (CHRPaz) Community Safety, Health & Wellness Program, City of Tucson Medical Reserve Corps of Southern Arizona Menlo Park Neighborhood Association No Dreams Lost Foundation Physicians for Social Responsibility Arizona Public Safety Communication Department, City of Tucson Sustainable Tucson Tohono O'odham Nation of Arizona</p>
Workforce and heat protection	<p>City of Tucson University of Arizona NOAA, National Weather Service AZ Jobs with Justice Pima Community College Southside Worker Center IATSE 336, AZCOSH</p>

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Participating Organizations

Built Environment

Arid Lands Resource Sciences
 Arizona Health Professionals for Climate Action
 Arizona Institute for Resilience
 Arizona Youth Climate Coalition
 BrightView
 Climate NXT- Moms Clean Air Force
 College of Architecture, Planning and Landscape Architecture
 Commission on Climate Energy and Sustainability
 Community Food Bank of Southern Arizona
 Dodge Flower Neighborhood Association
 Environmental and General Services Department, City of Tucson
 Flowers and Bullets
 Mayor’s Office
 Mel and Enid Zuckerman College of Public Health, University of Arizona
 NexoTerra LLC
 Pima County Board of Supervisor Office
 Pima County Board of Supervisors District 1
 Pima County Department of Environmental Quality
 Pima County Health Department
 Planning and Development Services, Plan Tucson
 Southern Arizona Office of Governor Hobbs
 Southwest Urban Corridor Integrated Field Laboratory
 Sun Tran
 Sustainable Tucson
 Tucson Water
 University of Arizona
 Western Environmental Science Technical Assistance Center for Environmental Justice
 YWCA of Southern Arizona

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Participating Organizations	
Public health and healthcare	<ul style="list-style-type: none"> Arizona Department of Health Services Arizona Faith Network AZ Jobs with Justice BrightView City of Tucson Community Safety, Health and Wellness Program, City of Tucson Global Athletes Alliance IATSE 336, AZCOSH Medical Reserve Corps of Southern Arizona Mel and Enid Zuckerman College of Public Health NOAA / National Weather Service Tucson Pima Community College Pima County District 5 Pima County Health Department Southside Worker Center Southwest Environmental Health Sciences Center Tohono O'odham Nation of Arizona Tucson Water UA Southwest Environmental Health Sciences Center University of Arizona Cooperative Extension

Two sessions were held during the summit in each break out room, the first session was focused on conversations, and the second one was focused on idea generation and prioritization.

Crosscutting recommendations were identified across the five response areas, generated by the Summit participants, and are summarized in the following sections. State-level funding to support city, county, and tribal governments in implementing the below recommendation needs to be prioritized to support community heat resilience efforts.