



2023–2024

SOUTHERN CLIMATE IMPACTS PLANNING PROGRAM

ANNUAL REPORT





SOUTHERN CLIMATE IMPACTS PLANNING PROGRAM



The work highlighted in this report covers the performance period of June 1, 2023 - May 31, 2024, and is supported by the National Oceanic and Atmospheric Administration's Climate Program Office through grant #NA21OAR4310306.

*Sunrise Over Mt Scott From Little Baldy, Wichita Mountain, Oklahoma
Credit: GracedByTheLight*

*Front cover: Bird Flying in the Louisiana Swamp
Credit: Jamie Tuchman*

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WHO WE ARE

The Southern Climate Impacts Planning Program (SCIPP) is a climate hazards research and engagement program that serves the 4-state region of Oklahoma, Texas, Arkansas, and Louisiana. SCIPP is a partnership between the University of Oklahoma (OU), Louisiana State University (LSU), Texas Sea Grant at Texas A&M University, and Adaptation International (AI). Established in 2008, it is one of several NOAA Climate Adaptation Partnerships (CAP) teams, formerly Regional Integrated Sciences and Assessments (RISA). The needs of our stakeholders drive every aspect of our program, from scoping new research projects to addressing unmet stakeholder needs, to synthesizing and sharing relevant and quality climate information, to developing new tools and datasets to make it easier for them to access needed climate information.

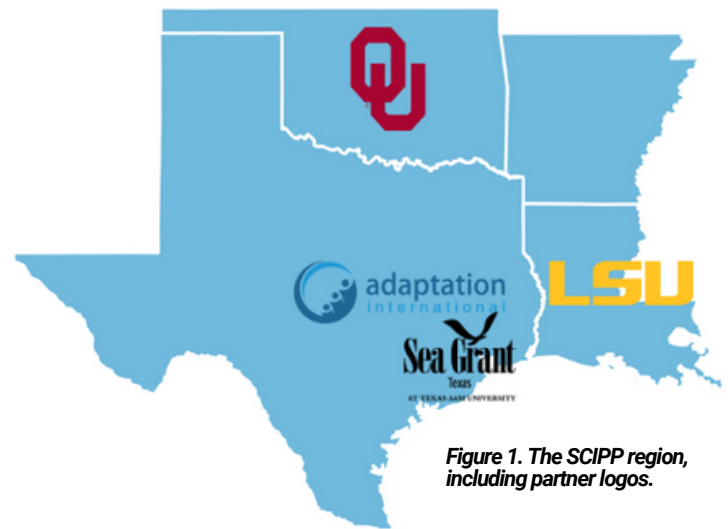


Figure 1. The SCIPP region, including partner logos.

At our core lies our mission of assisting organizations and communities with decision-making that builds resilience through collaboratively producing research, tools, and knowledge that reduces weather and climate risks and impacts across the South Central United States.

SCIPP Phase IV: Planning for Long Term Change in a Short Term World focuses on long-term resilience to climate impacts, and rests on the interconnectedness of its four research themes: (1) **Climate-Informed Planning**, (2) **Developing Governance & Collaborative Capacity**, (3) **Extreme Events in a Changing Climate** and (4) **Climate Justice**.



This year, SCIPP formally began its Phase IV project endeavors with official partner Adaptation International, a private-sector company, leveraging opportunities such as supplemental funding, and the ability to delve deeper into focused community engagement work throughout the region (especially in Texas). Although our organizations have collaborated in the past, this formal partnership greatly adds research and engagement capacity, with the hope of better connecting with underserved communities and enhancing overall resilience.

MEET THE TEAM

**Denotes recent addition to the SCIPP team*

Core Office & Investigators



Rachel Riley, PI - OU
(Director)



Mark Shafer, PI - OU
(Deputy Director)



Barry Keim, PI - LSU
(Investigator)



Darrian Bertrand, Co-PI - OU
(Climate Assessment Specialist)



Vincent Brown, Co-PI - LSU
(Climate Research Director)



Evan Chladny - OU
(Student Climate Communications Assistant)



Caylah Cruickshank, Co-PI - OU
(Program Manager)



Charles Simson - LSU
(Data Analyst)



Derek Thompson - LSU
(Research Associate)

Co-Principal Investigators & Researchers



Aimee Franklin, Co-PI - OU



Cassandra Jean* - Adaptation International



Lauren Mullenbach, Co-PI - OU



Sascha Petersen, Co-PI - Adaptation International



Celine Rendon* - Adaptation International



Debalina Sengupta, Co-PI - Texas Sea Grant

Senior Personnel



Ioana Cionea - OU



Renee Edwards - LSU



Renee McPherson - OU



Randy Peppler - OU

Students

- Denis Cheruiyot* - Graduate Student, OU
- Jordan Fazio - Graduate Student, LSU
- Xochitl Hidalgo* - Undergraduate Research Assistant, OU
- Sarah Seibold* - Graduate Student, LSU
- Anna Sitzman - Graduate Student, LSU
- Olivia Van Buskirk - Graduate Student, OU
- Amy Wold - Graduate Student, LSU

Advisory Committee

- Nelun Fernando - *Texas Water Development Board*
- Jordan Fischbach - *Water Institute of the Gulf*
- Michael Hayes - *University of Nebraska-Lincoln*
- Kim Jenson - *Oklahoma Department of Emergency Management*
- Julie Lively - *Louisiana Sea Grant*
- Tim Lovell - *Disaster Resilience Network*
- Michelle Meyer - *Hazard Reduction and Recovery Center (Texas A&M University)*
- Leif Olson - *City of Fayetteville, AR*



The South Central Climate Resilience Forum

The inaugural [South Central Climate Resilience Forum \(SCCRF\)](#) was held from April 2-4, 2024, at the Kay Bailey Hutchison Convention Center in Dallas, TX. The Forum focused on fostering meaningful dialogue on climate resilience and adaptation across Arkansas, Kansas, Louisiana, Oklahoma, and Texas. It brought together over 250 representatives from all levels of government (40% of attendees), academia (26%), the private sector (18%), and non-profit organizations (16%) from across the region.

The goals of the event were to improve understanding of the climate-related challenges facing the region and increase awareness of work being done to enhance the resilience of the region. The program included presentations (100+), symposiums, and workshops (7) about resources, research, tools, knowledge, and experiences relating to climate resilience and provided opportunities for information exchange and networking. This was the first time a regional branch of the National Adaptation Forum has occurred in the south-central U.S.



SCIPP and partner Adaptation International were the lead organizers of SCCRf, accompanied by other academic institutions, municipalities, federal agencies, and organizations on the [Planning Committee](#). Presenters and attendees shared their research, experiences, and lessons learned and made new connections to broaden their networks (see the full program [here](#)). Dr. Katharine Hayhoe (The Nature Conservancy, Texas Tech University) gave an inspiring keynote address about climate change in our region and finding hope through action. Her address was followed by the *Science to Action* panel with Dr. Hayhoe, Dr. Earthea Nance (EPA Region 6), T.O. Bowman (City of Oklahoma City), and Arthur Johnson (Lower 9th Ward for Sustainable Engagement and Development), moderated by Alejandra Martinez (Texas Tribune). Details regarding the Forum's overall impact, survey response data, and attendee feedback statements can be found on [page 15](#).



Figure 2. Various photos of Forum participants and the keynote panel (center).

NEW FOCUS/PARTNERSHIPS


Engaging With Community Organizations in the Lower Rio Grande Valley

Between January and April 2024, Dr. Cassandra Jean and Celine Rendon partnered with community leaders in Brownsville, TX, part of the Lower Rio Grande Valley (RGV), to establish equitable relationships with underserved groups in the area. This is a region that faces many climate-related and socioeconomic challenges and in which SCIPP has not previously engaged. The RGV faces many climate-related challenges such as extreme heat, flooding, hurricanes, and droughts, aggravated by its flat terrain and poor drainage. Water demand and droughts pose threats to agriculture and food security. The population is projected to double by 2045, straining resources, increasing housing costs, and heightening vulnerability. Additionally, air pollution from cross-border trade and industrial emissions further impacts the region.



Figure 3. Jean and Rendon interact with community leaders during their site visits to Brownsville, TX.

Through a series of virtual and in-person interviews, Jean and Rendon identified the significant concerns of frontline community organizations related to community resilience, climate, environmental, and disaster justice. They co-facilitated the virtual interviews to capture detailed notes and quotes shared by frontline organizational leaders who serve low-income, Spanish-speaking, Latine, mixed-status families in Brownsville and the wider RGV area. For instance, they met with a *Sierra Club* organizer and discussed significant issues faced by residents, such as inadequate heating and cooling, unsafe building structures, and inadequate blue and green infrastructure. This engagement effort paves the way for future Story Mapping projects, educational campaigns, and outreach events targeting residents of all ages. Collaborative climate justice endeavors could be a great way to make infrastructure investments, guarantee access to clean water, improve drainage, increase the reliability of electricity, promote health equity, and enhance community resilience.



In Brownsville, current health threats, lack of clean water, and poor air quality are exacerbated by industrial expansion. Although community leaders are responding with support initiatives, communication gaps and insufficient environmental monitoring persist. Prominent organizations such as *TRUCHA*, *Sierra Club*, and *Border Workers United* have spearheaded efforts to educate vulnerable populations who primarily speak Spanish.

New Connections in Fayetteville, AR

In 2024, Dr. Lauren Mullenbach and PhD candidate Olivia Van Buskirk traveled to Fayetteville, AR, to conduct interviews with stakeholders who had been involved with updating the city's Climate Action Plan. Our connection to Fayetteville through our advisory committee member was instrumental, and SCIPP's tie to the city grew stronger as a result of this data collection effort. Mullenbach and Van Buskirk interviewed city planners, the city's Environmental Action Committee (a group of residents, city council representative, industry representative, and the sustainability director), as well as area nonprofits who helped write the plan. Fayetteville represents the second case study in a SCIPP multi-year project, following the first [case study in Tulsa](#) in 2023. The climate justice communities in Fayetteville are low-income households and unhoused people—who are disproportionately located in the south part of the city, with some of the worst flooding issues. These issues will be exacerbated by the city's recent (and projected continued) population growth and booming development.

Non-profits in Houston, TX

An ongoing research project by undergraduate researcher Xochitl Hidalgo and Dr. Mark Shafer focused on non-profit organizations' response to natural disasters began this past year. Non-profit organizations were identified as a key component of post-disaster recovery as they supplement what government agencies are unable to provide, delivering aid to the most vulnerable and overlooked populations. Houston experienced unprecedented need in the wake of Hurricane Harvey, and non-profit organizations were vital in meeting that need. Preliminary results of the ongoing study indicate that Hurricane Harvey increased the exposure and funding being received by organizations while also fostering new relationships. An interview question relating to resiliency yielded more varied answers, with organizations indicating their preparedness for future events and expressing concern about the city's resilience. As SCIPP explores increased collaboration with local non-profits throughout the region, this project fosters new connections in the Houston, TX, area and allows us to better assess the reality of community disaster recovery efforts on the ground.

*The Ozark Mountains
Credit: Paul Knightly*

RESEARCH HIGHLIGHTS

THEME 1

Climate-Informed Planning is focused on learning how to incorporate climate information effectively into long-term municipal, county, and state plans.

THEME 4

Climate Justice is focused on learning how the voices of all community members can be represented in policies and activities taken to lessen the impacts of climate events.

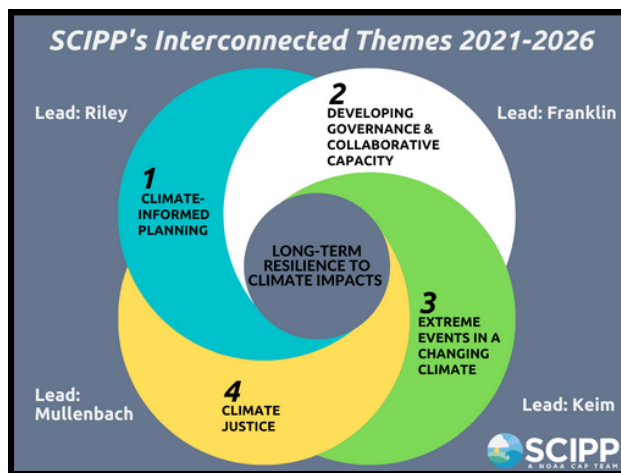


Figure 4. SCIPP Phase IV research themes. Four distinct research themes are presented; however, some of the projects intersect more than one theme. Further, at least one project from each theme will focus on a common geographical location, allowing for a unique, deep dive into a single city.

THEME 2

Developing Governance and Collaborative Capacity is focused on investigating the financial and policy levers that municipalities and counties can use to build resilience to climate impacts.

THEME 3

Extreme Events in a Changing Climate is focused on understanding trends in the frequency and intensity of extreme events, with a significant focus on precipitation.

Climate Justice in the South Central U.S.: A Three Case Study

THEME 4

➤ SCIPP Investigators: Dr. Lauren Mullenbach and Olivia Van Buskirk, University of Oklahoma

Research on the first of three case study cities (Tulsa, OK) concluded and a [public-facing report](#) was produced. The report was distributed to interview participants, the non-profit group who facilitated connections to resident interviewees, and the SCIPP advisory committee. It was also reported on by Fox23 meteorologist Mike Grogan, who created a [video story](#) about the report. The report highlights the context of climate justice issues in Tulsa, findings from interviews and a survey, as well as recommendations for how the City can address these justice issues. The main findings were that the City downplays environmental and climate issues and has put up roadblocks for itself to delay or prevent action on climate change—which will harm its Black and low-income residents the most.

Reduction in Freezing Temperatures and Tropicalization of Temperate Climates

THEME 3

➤ SCIPP Investigators: Dr. Vincent Brown, Derek Thompson, Charles Simson and Dr. Barry Keim, Louisiana State University

Collaborator: Dr. Buren “Buck” DeFee, Louisiana State University

This reporting period, SCIPP made progress in relation to the tropicalization project, which works to determine how climatic changes to extreme low temperatures and freeze return intervals have changed over the last century. To date, SCIPP investigators have provided a climatological definition of the tropical-temperate transition zone, and for every county in the contiguous U.S., provided time series for multiple cool season metrics (e.g., winter minimum temperatures, coldest day per year, freeze days, etc.). Results demonstrate broad, statistically significant warming patterns in all metrics. SCIPP investigators are also developing a tool at the county level for the public. A manuscript is being finalized.

Understanding and Leveraging Stakeholder Motivation in Community Engagement Processes

THEME 2

➤ SCIPP Investigator: Dr. Aimee Franklin, University of Oklahoma
Collaborator: Dr. Ani V. Ter-Mkrtychyan, New Mexico State University

This past year, SCIPP answered, “How can community dialogue inform natural disaster mitigation planning?”. Stakeholder analysis was used to explore public engagement related to flooding in three U.S. cities (Tulsa, OK; Fayetteville, AR; and Waco, TX). The results identified different kinds of stakeholders and the factors motivating them to contribute to community discourse about disaster response efforts.

The research found a wide range of engaged stakeholders representing governments, organizations, groups, and individuals directly and indirectly impacted by a natural disaster. These stakeholders contribute financial and non-financial resources throughout the disaster cycle, especially by identifying how lessons learned can be used to strengthen future mitigation plans to reduce the costs of responding to and recovering from extreme weather events. These results provide information valuable for tailoring direct engagement efforts to reach residents not participating in the discussion, especially those with elevated vulnerabilities or untapped resources, who can co-produce flood mitigation strategies designed to make their property and public infrastructure more flood-resilient and improve community sustainability.

The journal article “*Stakeholder Analysis in the Context of Natural Disaster Mitigation: The Case of Flooding in Three U.S. Cities*” can be found [here](#).



The Moses Bayou cutting into the rural farmland of East Texas
Credit: Art Wager

Building Capacity for Hazard Mitigation Planning in Low-Capacity Communities

THEME 1

➤ SCIPP Investigators: Rachel Riley and Darrian Bertrand, University of Oklahoma
Collaborators: Ed Hecker, Annie Vest, and Yelena Martinez (National Hazard Mitigation Association), Shanene Thomas (FEMA Region 6)

This project is working to determine how to make the hazard planning process more meaningful and effective. Several advancements were made during the reporting period. The 2nd (virtual) and 3rd (in person) rounds of focus groups took place. Questions asked during the focus groups aimed to answer the following research questions:

- What additional capacities and capabilities are needed so that low-capacity communities can address their hazard challenges that are being or will be exacerbated by climate change?
- How should a hazard mitigation planning process be designed so it:
 - a) better aligns with the capabilities and capacities of low-capacity communities and b) advances the lifecycle of climate resilience and disaster risk reduction broadly rather than only meeting a FEMA hazard mitigation plan requirement?
- What capability and capacity gaps exist that could be addressed by the National Hazard Mitigation Association Disaster Risk Reduction Ambassador Curriculum or other applicable training curriculums?

Data analysis from the 2nd and 3rd round of focus groups is underway. Preliminary findings indicate how the existing FEMA Region 6 hazard mitigation planning template could be improved. This includes but is not limited to hyperlinking to standardized hazard definitions and potential grant opportunities, listing the various authorities who typically have jurisdiction over particular risk types, and clarifying some of the planning requirements. Additional preliminary findings reveal the need for more information on actions that low-capacity communities can take to mitigate their risk, including actions that specifically align with FEMA rules and regulations. Thirdly, there is need to improve awareness of the value of hazard mitigation as well as communicating climate change in succinct ways that are salient to local contexts, particularly in rural areas. To date, 31 participants have been involved in at least one round of focus groups. Altogether, these participants work in approximately 160 jurisdictions across the four-state region. This project will conclude during the next reporting period. A report and prototype solutions will be produced. The researchers will also make efforts to acknowledge relevant FEMA reforms and resources from other organizations that have been announced since the project began.

"Hazard mitigation really works. I just wish people would understand how important it is." -Research study participant

"I'm just a grant writer. I'm not a hazard mitigation expert. . . . I'm sure not an expert in climate change." -Research study participant

"If their way of life is threatened, they're not going to resonate with climate change." -Research study participant

OUTREACH & ENGAGEMENT

PBS News Hour

As an author on a chapter of the 5th National Climate Assessment, Darrian Bertrand was contacted by a journalist from PBS News Hour, a national news media outlet for the PBS Network, for an interview regarding the impacts of warming winters in the U.S. Bertrand provided information about the February 2021 winter weather outbreak; impacts of warming winters to ecosystems, health, and recreation; and the importance of mitigation and adaptation. The online article is available [here](#).



Louisiana Sea Grant Fisheries and Seafood Leadership Meeting

There has been sustained engagement with the LSU AgCenter and Louisiana Sea Grant through the years. Dr. Brown and Dr. Keim present at the LSU AgCenter's Agricultural Leadership Development Program each year. The program's mission is to enhance leadership in rural Louisiana and prepare men and women who are dedicated to agriculture with the skills needed to be leaders in a future with challenges, especially related to weather/climate. Additionally, Louisiana Sea Grant started a Leadership Program for the Louisiana Seafood Industry. The first inaugural meeting was held in Houma, LA, in March 2024. Dr. Vincent Brown, Dr. Barry Keim, and Derek Thompson attended and presented on observed and future changes in Louisiana's climate. Future engagement will consist of attending leadership meetings and discussing weather/climate issues with individuals in the seafood industry.



Historically Black Colleges and Universities Climate Change Conference

In October 2023, Caylah Cruickshank participated in the Ninth Annual Historically Black Colleges and Universities (HBCU) Climate Change Conference in New Orleans, LA. The conference brought together environmental justice leaders, climate professionals, HBCU students and faculty, researchers, and community residents impacted by toxic facilities and severe weather events to address issues pertaining to climate justice and adaptation. Cruickshank hosted a booth to showcase SCIPP's work and current research projects in conjunction with the University of Oklahoma College of Atmospheric and Geographic Sciences. The event paved the way for meaningful interactions, knowledge exchange, and new connections with conference attendees.



Cruickshank in front of the SCIPP booth

White House Summit on Building Climate Resilient Communities

In September 2023, Dr. Mark Shafer participated in the White House Summit on Building Climate Resilient Communities in Washington, D.C. The Summit, which was announced by President Biden, brought together local, state, Tribal, and territorial leaders and practitioners focused on climate resilience. The Summit explored opportunities to develop effective and equitable climate resilience strategies that are locally tailored and community-driven, with the aim of building communities that are not only resilient to the impacts of a changing climate, but also safer, more equitable, and economically stronger. The meeting was planned, hosted, and led by the White House's Climate Policy Office. There was a plenary session featuring a variety of speakers, including leadership of White House offices and federal agencies, followed by breakout sessions in which invitees discussed more specific topics related to their area of expertise in moderated small groups. A [summary](#) of the Summit was published.



Extending Impact of Hazard Mitigation Planning Research

Rachel Riley engaged with communities and organizations across the region about the *Building Capacity for Hazards Mitigation Planning in Low-Capacity Communities* project through two virtual events. The first was at the FEMA Region 6 Mitigation Virtual Workshop which included approximately **275 participants**. The second was on the Natural Hazards Center Making Mitigation Work webinar series, which included about **70 live participants**. Four planning and emergency management low-capacity community representatives (from the Panhandle Regional Planning Commission, City of Yukon, OK, Northwest Arkansas Economic Development District, and City of Wichita Falls, TX) joined Riley during the webinar and helped answer audience questions at the end of the presentation. The practitioner involvement provided further insight into the presented challenges and added on-the-ground perspectives that resonated with webinar attendees and spurred additional discussion. A recording is available [here](#).

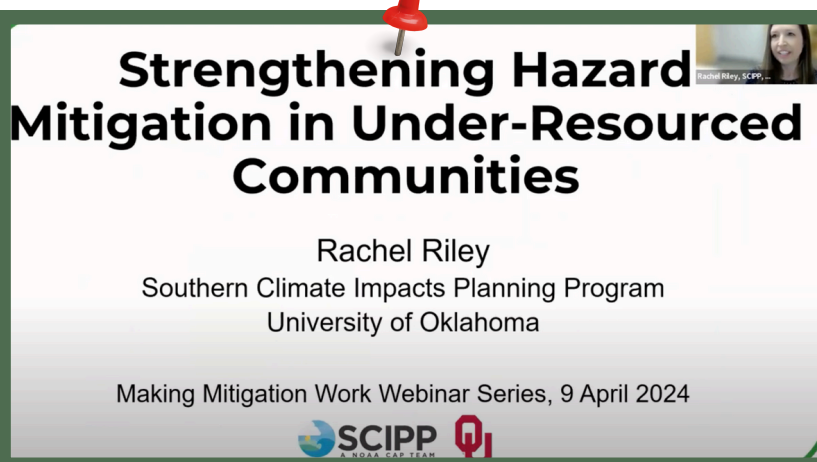


Figure 5. Riley's presentation slide for the FEMA Region 6 Mitigation Virtual Workshop.

American Society for Adaptation Professionals Academy

In November 2023, SCIPP co-led a session for the American Society of Adaptation Professionals' (ASAP) Private Sector Climate Service Providers Academy. The virtual Academy provided an opportunity to help private sector companies grow



ASAP Private Sector Climate Service Providers Academy

the climate services marketplace by introducing them to regional climate data information and tools, offering examples of relevant resilience practices, and providing space to connect with potential collaborators. The South Central session featured presentations from both SCIPP and the South Central Climate Adaptation Science Center. Dr. Vincent Brown and Caylah Cruickshank represented SCIPP, as Brown presented a few of [SCIPP's tools](#) and discussed climate challenges specific to the South Central region. Annie Vest (*Freese & Nichols*) also contributed to SCIPP's presentation, as a private sector company case study example. Vest discussed her company's connection to SCIPP and highlighted her use of SCIPP's tools in decision-making. The Academy concluded in December with optional, one-on-one sessions between private sector participants and Academy session presenters. Click [here](#) to read more.

Inland Marine Underwriters Association

Dr. Vincent Brown contributed to the Inland Marine Underwriters Association (IMUA) micro-learning series "[Quick Bites](#)" in January 2024. In the "Quick Bite," Dr. Brown discussed the characteristics of tropical cyclones (TCs) and potential TC changes in the future. Following this engagement, in June 2024, Dr. Brown and Dr. Keim gave a live webinar on the 2024 Hurricane Season and TC-generated rainfall. Before this interaction, Dr. Brown presented to the IMUA in Tucson, AZ, at their 92nd Annual Conference in April 2023. IMUA is the national association for the commercial inland marine insurance industry, and its members represent at least 90% of inland marine premium writings. The IMUA aims to provide its members comprehensive training and educational offerings, including live and on-demand classes, webinars, seminars, courses, research papers, and more. Future engagement is planned for upcoming IMUA webinar series and future annual meetings.



This engagement enables SCIPP to collaborate with practitioners and stakeholders in the insurance, reinsurance, and commercial insurance industry (Guy Carpenter, Munich RE, Swiss RE, Travelers, Axis, etc.). Future, in-depth engagement is being planned regarding SCIPP's depth-area-duration database, which enables users to identify storm depths and durations by geography. While direct outputs remain unclear, the database may provide context on some of the biggest rainfall events in areas where insurance companies plan to provide coverage.

CHALLENGES

Focus Group Attendance and Frequent Turnover

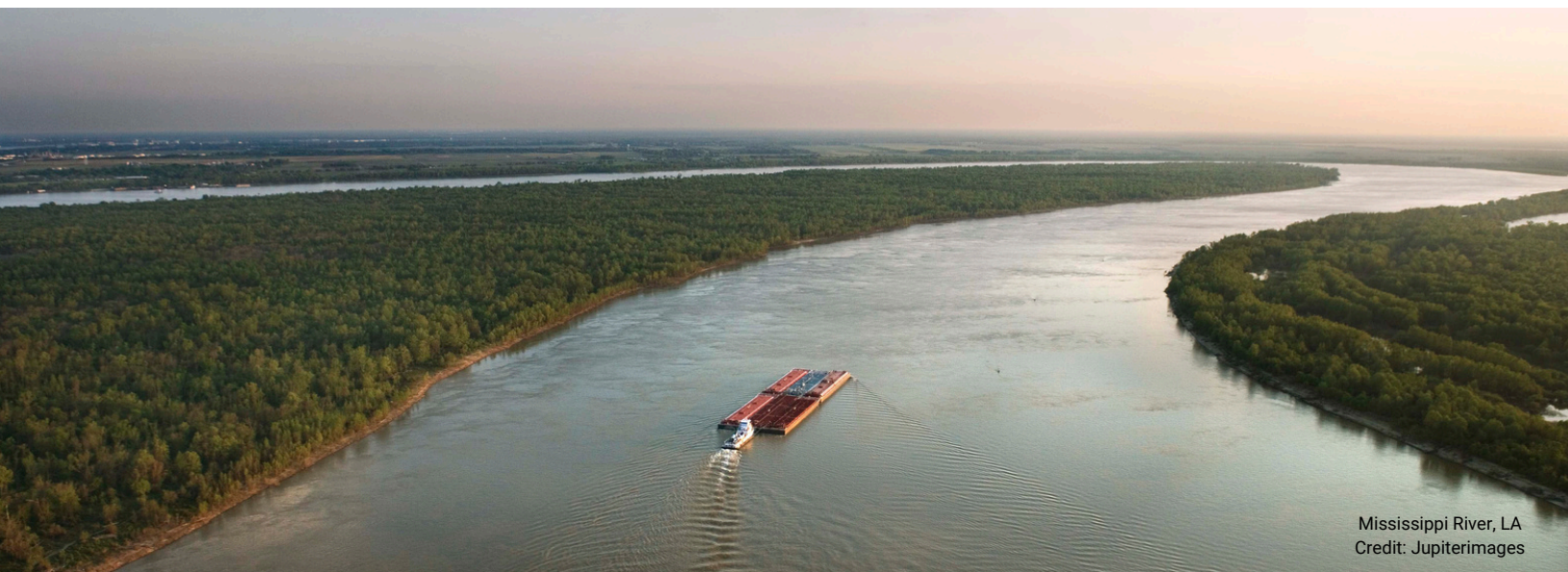


A challenge of Theme 1 project *Building Capacity for Hazards Mitigation Planning in Low-Capacity Communities* was focus group attendance. Given the study's aims to build capacity for local decision makers whose jurisdictions have limited capacity for hazard mitigation planning in the first place, it is not necessarily a surprising challenge. However, some focus groups were smaller than anticipated due to the lack of time and capacity these stakeholders have to participate in a research study. Another challenge with participation was frequent practitioner turnover, which has historically been a hurdle. When a practitioner leaves their position, there is not always someone else in their city or organization that has their breadth of local knowledge and expertise that we can replace them with. Changes in focus group participants also affect the overall relationship of the group, as they build trust with other participants over time. Additional impacts of participation include severe weather-related events (e.g., large wildfires in the Oklahoma and Texas Panhandles prevented some focus group participants from attending the in-person meeting, as their job duties include emergency response and recovery for such events).

Low Survey Response Rates



A challenge associated with Theme 4 data collection efforts that occurred in summer 2023 in Tulsa, OK, was low survey response rates. Two surveys, one focused on extreme heat and the other on flooding, was administered to interviewees and promoted on SCIPP social media accounts and FOX23 News, the Tulsa Farmer's Market, and a local library. Ultimately, resources were exhausted and only 29 (heat) and 21 (flood) residents participated in the surveys for Tulsa data collection efforts. This experience led to the decision to remove the survey as a data collection method for Fayetteville and Waco (two subsequent case study cities). The information that was previously gathered through the survey is now being collected in interviews.



Mississippi River, LA
Credit: Jupiterimages

LOOKING AHEAD

SCIPP expects significant progress on projects within all [four research themes](#) in the next reporting phase. Highlighted below are examples outside of our existing research themes.

1 NOAA Climate-Ready Workforce Grant, The Climate Resilient Skills Training Program (CREST)

SCIPP personnel from Louisiana State University and the University of Oklahoma will soon be involved in a major project that will be led by the Flood Mitigation Industry Association and have an initial focus on the Lake Charles, LA, area. SCIPP is one of several organizations that will be involved in the effort. While not a core SCIPP project, this new grant will leverage SCIPP's expertise and provide opportunities to 1) help build a climate resilient skilled workforce in an underserved and frontline area of Louisiana and 2) partner with the non-profit Flood Mitigation Industry Association, which works directly with private sector flood mitigation companies - an entirely new subset of stakeholders for SCIPP. It should be noted that the Flood Mitigation Industry Association first became aware of the NOAA CAP program and SCIPP through their participation in the [ASAP Private Sector Academy](#). This is a successful example of relationship-building and leveraging new connections.

2 Bipartisan Infrastructure Law Funding

This year, through the Bipartisan Infrastructure Law funding, SCIPP will partner with [GLISA](#) to build on a three-year partnership to co-produce [FloodWise Communities \(FWC\)](#) and explore how the FWC process can be enhanced to meet the decision goals of both frontline communities and practitioners. The FWC process is a collaborative municipal stormwater vulnerability assessment and has been used with 55 communities in the U.S. Gulf South region. While focused on city practitioners and decision support, it has yet to fully and directly center community member voices in the process. In this project, SCIPP will collaborate with two communities in our region and GLISA will collaborate with two communities in the Great Lakes to explore how best to integrate community priorities and dimensions of justice, equity, diversity and inclusion into the FWC framework. One goal is to enable frontline communities to lead the assessment process and help ensure that co-produced results are reflective of their perspectives, needs, and priorities. To enhance community collaboration, the project will build on existing engagement efforts in the RGV and also provide a stipend to two community liaisons for each of the Gulf communities who will help coordinate and conduct two workshops in each community.

3 Texas Sea Grant: Coastal Resilience and Adaptation Conference

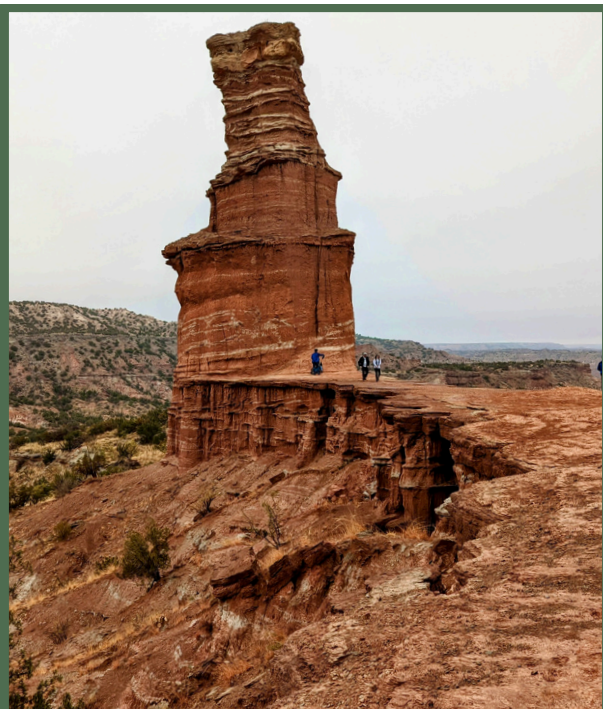
SCIPP partner, Texas Sea Grant, will be hosting a virtual, 2-day Coastal Resilience and Adaptation Conference in September 2024. The goal of this conference is to "inform coastal communities including decision-makers, elected officials, city and county staff, natural resource managers, academics, the private sector, etc. of technology and engineering solutions" that fall within four thematic topic areas: (1) Coastal Energy Transition, (2) Marine Debris and Circular Economy, (3) Natural and Nature-based Solutions, and (4) Early Warning Systems for Coastal Hazards (read more [here](#)).

EVALUATION

The major evaluation activity this year entailed preparing for the mid-grant program evaluation, which will be conducted early in the following reporting cycle. The evaluation model entails a dual-pronged approach of surveying stakeholders and interviewing three different groups of individuals: stakeholders, staff, and advisory board members. The survey includes closed-ended scale items, some of which were used in SCIPP's 2020 program evaluation, and open-ended questions for further elaboration. Some of the results from the mid-grant evaluation will be able to be compared to the 2020 results. In addition, survey results will inform further interview questions for stakeholders, which are expected to provide a more nuanced understanding of some of the survey data.



The main limitation that SCIPP has faced and continues to face is low response rates. The survey has been streamlined in hopes of receiving more responses. Even when open-ended responses to survey questions are brief, there is often valuable information contained in them that motivate us to continue the approach of soliciting such data to complement the quantitative data. During the last evaluation cycle, the interviews yielded significantly better data in terms of details, complexity, recommendations, and overall assessment of SCIPP's work from both internal and external perspectives.



The Lighthouse Rock in Palo Duro, TX
Credit: Caylah Cruickshank



Palo Duro, TX
Credit: Caylah Cruickshank



The South Central Climate Resilience Forum

The [South Central Climate Resilience Forum \(SCCRF\)](#) was a first of its kind in our region, and pointed to evidence of societal impact as it relates to adaptive capacity. Feedback was obtained near the end of SCCRf through May 3, 2024. Of the 253 forum registrants, 73 responded to the survey. Some data are presented below.

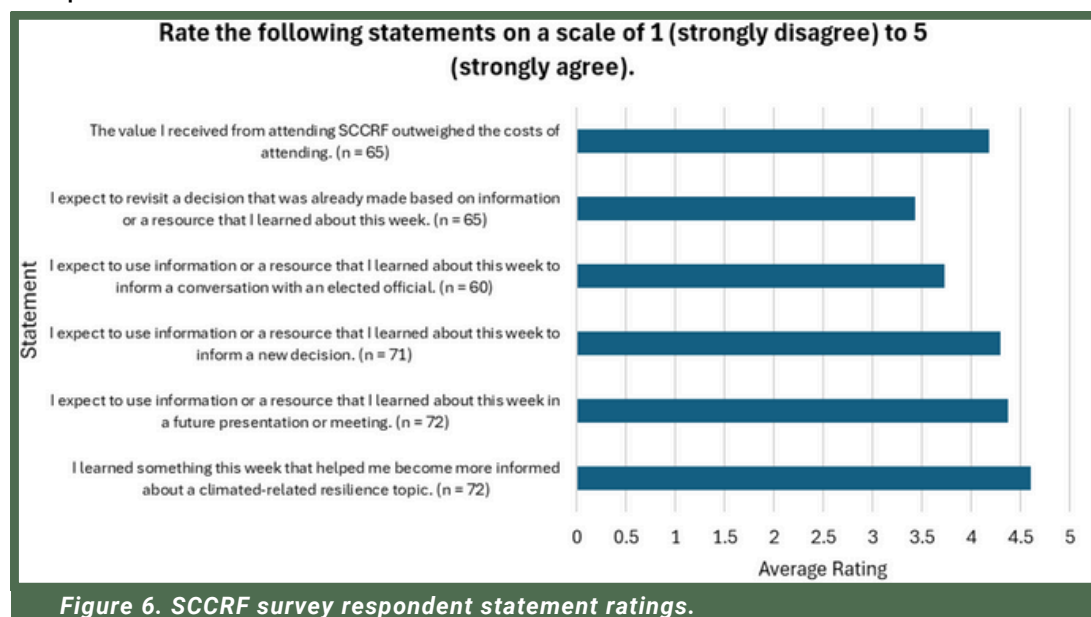


Figure 6 indicates that most respondents thought SCCRf's value outweighed the costs of attending, and that they expect to use the info/resources they learned at SCCRf to inform a new decision, presentation, or meeting. The highest rated statement was that they learned something that helped them become more informed about a climate-related resilience topic.

Open-ended, post-Forum responses demonstrated how much attendees valued the opportunity to build new connections and network with other professionals across the region: **"I learned so much information that is applicable to my work and made more connections than I imagined I would make. Overall, I had such a great experience at this Forum, and look forward to having an opportunity to attend the next one!"**. The event offered a wide range of presentations, boosting attendee learning outcomes : **"Overall, a great mix of presentations and subjects that were both specific to the region and mostly applicable to my local jurisdiction. Very worthwhile and valuable!!"**.



SCIPP team members who participated in SCCRf
Credit: Chris Fiebrich

Overall, attendees were very pleased with the Forum, and would recommend it to colleagues. A survey respondent noted: **"There was so much good content at this conference!! Some conference talks feel like sales pitches, work with my company, buy my product, but this one stood out because every lecture was educational. I loved the science and case studies, hearing how other regions have had success with climate resilience initiatives. I feel like I really learned things I can take back and apply to my job to improve my City's sustainability. So much gratitude for the organizers! FANTASTIC JOB. 100/10 would come again"**. Testimonials such as this point to SCIPP's ability to *elevate a sense of agency by building the expertise, confidence, and capability of partners to act*. Not only did attendees expand their knowledge as it relates to climate and adaptation, but they intend to use what they have learned at the Forum to self-organize and explore new approaches to building resilience.

"This was great. I wish I could take another day away from my regular work to just digest all this, check out resources I learned about, and follow up with new connections. I would love to see this become a regular event."
-SCCRF Survey Respondent

"This was fabulous! Hope to attend future events, this will be my baseline for future events."
-SCCRF Survey Respondent

"Thank you! Great conference, well-tailored to the audience."
-SCCRF Survey Respondent

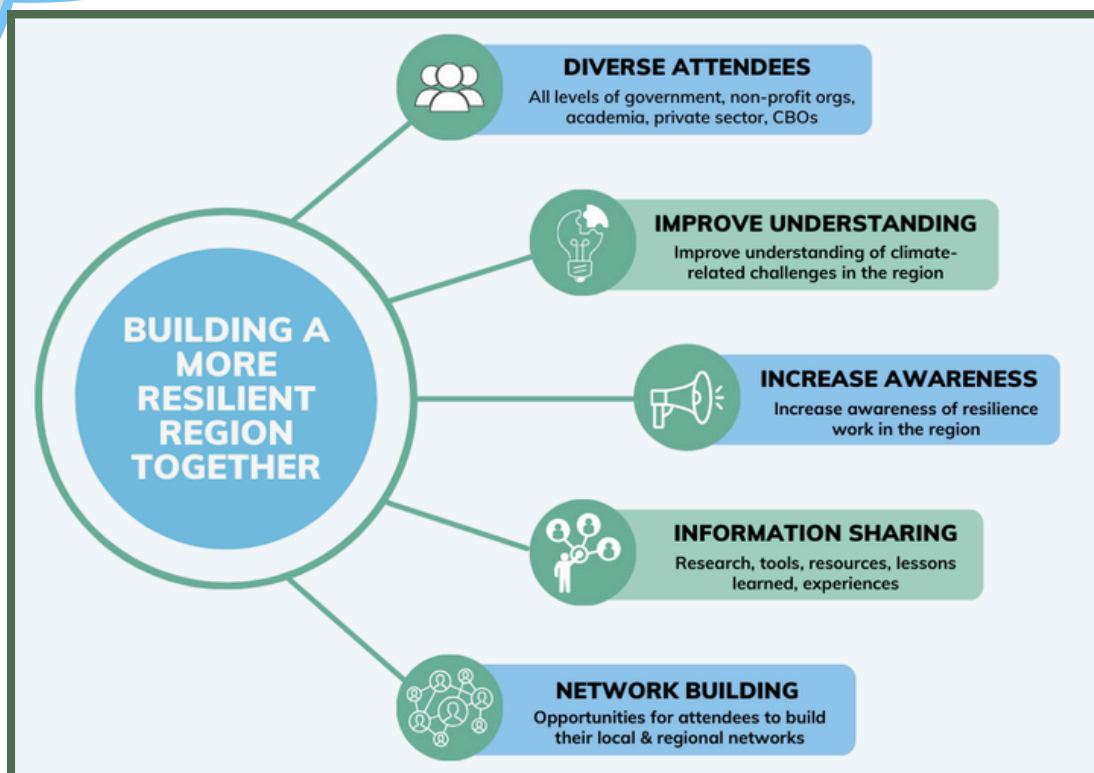


Figure 7. Image outlining the goals of the Forum.

Texas Impact Enterprise Awards



Figure 8. Darrian Bertrand and Caylah Cruickshank accepted the award on behalf of SCIPP. The South Central Climate Resilience Forum played a central role in receiving this nomination and showcased SCIPP's work, along with the CAP Program, across the state of Texas.

In May 2024, SCIPP was an award recipient at the inaugural [Texas Impact Enterprise Awards](#). The award spotlights entities across sectors that are making positive strides toward climate-smart, inclusive economic development across the state of Texas. Nominees were organizations considered most likely to impact over a million people within three years. Out of 130 nominees, SCIPP was one of 25 organizations recognized as a Champion, “making progress toward holistic, forward-facing solutions to some of [Texas’s] biggest challenges”, during the ceremony.

Uses of the Simple Planning Tool Across the Region and Beyond

The redesigned [Simple Planning Tool for Climate Hazards \(SPT\) version 2.0](#), launched in spring 2024, transformed the previous 4 state PDFs into an online platform that allows users to access content quickly and easily and provides SCIPP staff with more flexibility to evolve the tool based on stakeholder needs. While a formal evaluation did not occur this year (one is planned for year 5 of the grant), we became aware of several instances in which stakeholders used the tool in planning processes. This has the potential to increase capacity of communities to develop and implement various plans.

On a national scale, the SPT was featured in a report authored by the National Renewable Energy Laboratory and U.S. Department of Energy’s Grid Deployment Office called “Distribution Utility Resilience Planning for Hurricanes and Non-Winter Storms.” A FEMA Region 6 staff member was introduced to the SPT v2.0 and invited SCIPP to train additional staff on how to use the tool so they may utilize it when assisting communities across the region with their hazard mitigation plans. This training will take place after this report is published. On a state scale, the Oklahoma Department of Emergency Management cited the SPT in the Oklahoma State Hazard Mitigation Plan and they are valuable supporters of the tool. Additionally, the Northwest Arkansas Economic Development District actively uses the SPT for local hazard mitigation planning and has promoted the tool to other planners in Arkansas.



Figure 9. Cover page for the redesigned SPT.

NARRATIVE CASE STUDIES

OKC Heat Mapping Campaign

SCIPP was one of many organizations involved in Oklahoma City's NOAA Urban Heat Island Mapping Campaign.

Oklahoma City (OKC) was one of 18 cities selected in 2023 for funding to map urban heat and air quality across the city, using citizen scientists to take measurements, and take action to reduce heat risk. A goal of the City of Oklahoma City's campaign, and additionally a goal in the City's first sustainability plan [adaptokc](#), was to better understand the distribution of heat across the city so they can prioritize risk reduction in more vulnerable areas. The City was also involved in a [Heat Vulnerability Index](#) (HVI) study in 2020 that identified vulnerable, underserved areas of the city and could be coupled with campaign results to prioritize where mitigation actions are most needed.

SCIPP has a long-standing relationship with the City and shared the NOAA project application announcement to our City stakeholders. Once selected, the City requested that SCIPP participate in the campaign by providing a historical heat analysis of OKC so they could better understand the heat vulnerabilities of the city and plan to reduce their risks. SCIPP presented the results to the City and campaign partners and participated in meetings throughout the campaign to provide feedback on analyses and reports. SCIPP may also be involved in an engagement workshop in summer 2024. Though SCIPP's contribution was small, the campaign was an impactful collaborative effort between the City and many organizations. Through multiple assessments and surveys, an intervention guidebook, *Heat Mitigation & Adaptation Guidebook – Strategies for Oklahoma City*, was produced and includes heat mitigation and adaptation strategies for city staff and individual residents. Campaign results and engagement with OKC residents led to a better understanding of where the City should prioritize resources and attention to reduce heat risk and energy burdens, particularly in low-income and high HVI areas.

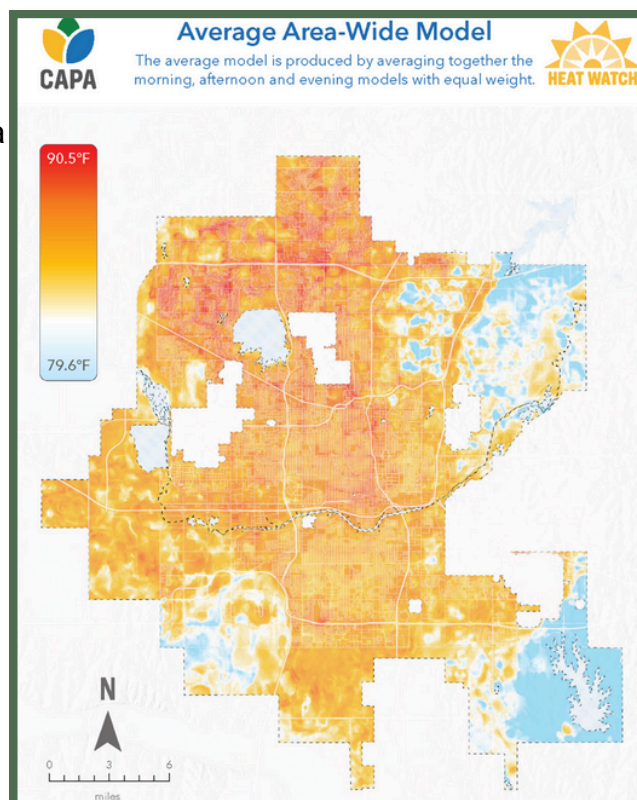


Figure 10. Model of average temperatures measured across Oklahoma City during the three observation periods of the OKC Urban Heat Island Mapping Campaign, where red (blue) areas indicate warmer (cooler) surface temperatures. One caveat of this map is that weather conditions during the data collection period included scattered showers and clouds, which likely reduced the heat in some areas.
Source: CAPA Strategies OKC Heat Watch Report.

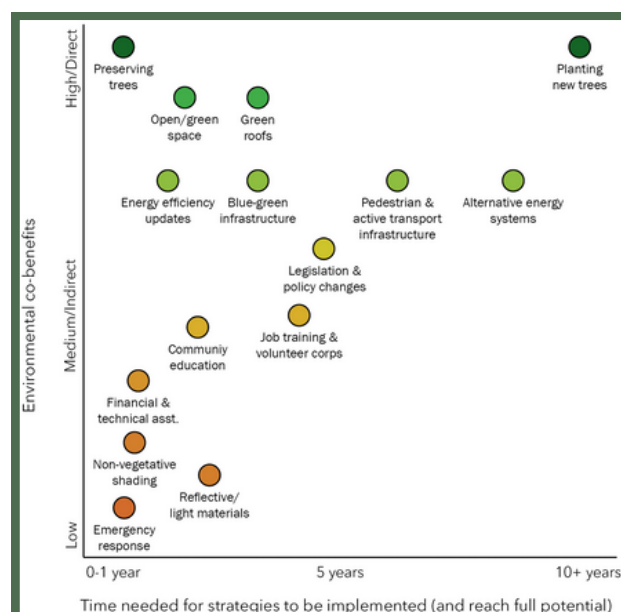
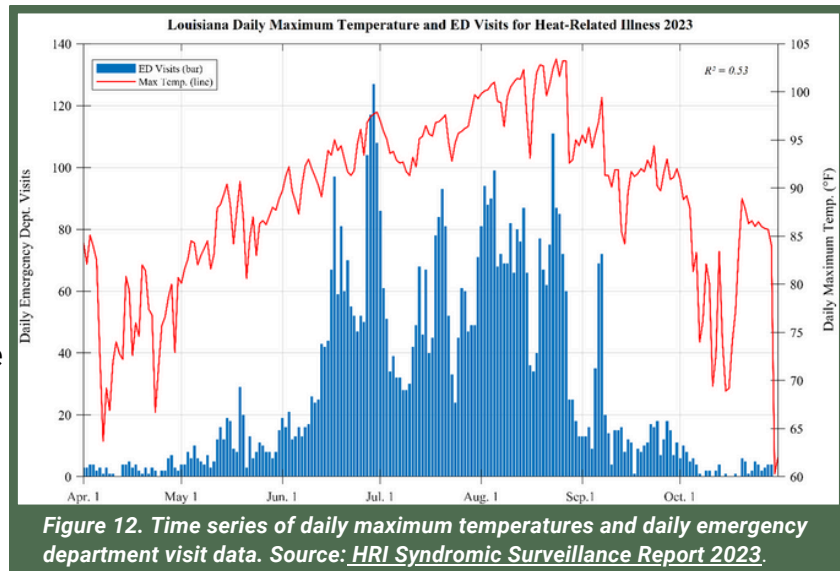


Figure 11. City-scale heat mitigation strategies, including the time needed for strategies to be implemented vs. environmental benefits.
Source: [OKC Heat Mitigation & Adaptation Guidebook - Strategies for OKC](#).

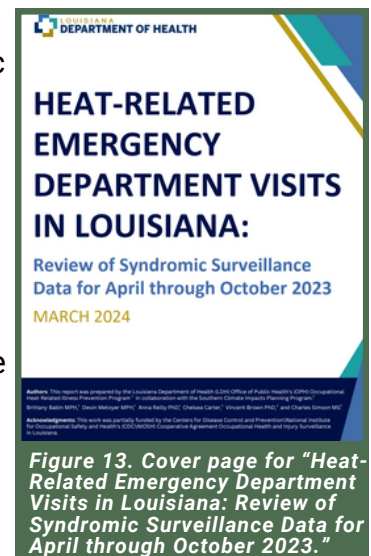
Examining Heat-Related Illness Across Louisiana

SCIPP's partnership with the Louisiana Department of Health (LDH) continues to study emergency department visits, hospitalizations, and fatalities across Louisiana caused by heat-related illnesses. Heat-related illnesses predominately affect the elderly and outdoor workers, and Louisiana has a large elderly population (> 760,000, according to Census Bureau estimates) and exhibits the highest rate of occupational (i.e., work-related) heat-related emergency department visits and hospitalizations among nine southeastern states, according to a prior study*.



Following the hottest and driest year for portions of Louisiana in 2023, including the capital, Baton Rouge, SCIPP researchers generated a time series of daily maximum temperatures and daily emergency department visit data compiled by LDH (see figure 12). This ongoing research is helping to uncover unique temperature thresholds that trigger emergency department visits among different groups across Louisiana. For example, we have identified a change point in the relationship between daily maximum temperature and emergency department visits of around 91°F. Once the daily maximum temperature exceeds 91°F, heat-related emergency department visits grow exponentially with every degree increase. This information is being used to help tailor how LDH communicates with citizens regarding the dangers of heat.

In winter 2023/2024, SCIPP worked alongside LDH to draft a report titled, *[“Heat-Related Emergency Department Visits in Louisiana: Review of Syndromic Surveillance Data for April through October 2023.”](#)* The report details the historic heat of 2023 and provides important information for heat safety. Additionally, SCIPP's Dr. Vincent Brown and Charles Simson co-produced Python code with the LDH for a [heat-related illness dashboard](#) on their website that shows near-real time daily maximum temperatures and emergency department visits across Louisiana. Their site credits SCIPP directly and includes a link to our webpage. Finally, Derek Thompson is currently working with the LDH to analyze how emergency department visits, hospitalizations, and fatalities relate to extreme heat, as defined by temperature, heat index, and wet-bulb globe temperature. This ongoing research also includes information regarding occupational heat exposure, with the goal of providing a better understanding of when workers tend to exhibit negative health outcomes due to heat.



*Harduar Morano, L., Bunn, T.L., Lackovic, M., Lavender, A., Dang, G.T.T., Chalmers, J.J., Li, Y., Zhang, L. and Flammia, D.D. (2015). Occupational heat-related illness emergency department visits and inpatient hospitalizations in the southeast region, 2007–2011. *Am. J. Ind. Med.*, 58: 1114-1125. <https://doi.org/10.1002/ajim.22504>

APPENDIX A: PUBLICATIONS

Babin, B., D. Metoyer, A. Reilly, C. Carter, V.M. Brown, and C. Simson, 2024: Heat-related emergency department visits in Louisiana: Review of syndromic surveillance data for April through October 2023. Louisiana Department of Health, 19 pp, https://ldh.la.gov/assets/docs/lah/HRI_Syndromic_Surveillance_Report_2023.pdf.

Day, J.W., Y.J. Xu, B.D. Keim, V.M. Brown, L. Giosan, M.E. Mann, and J.R. Stephens, 2024: Emerging climate threats to the Mississippi River Delta: Moving from restoration to adaptation. *One Earth*, **7**(4), 558-571, <https://doi.org/10.1016/j.oneear.2024.03.001>.

Hemel, D., W. Shao, H. Moradkhani, B.D. Keim, B.G. Peter. In press. Urban Flood Susceptibility Mapping Using Frequency Ratio and Multiple Decision Tree-Based ML Algorithms. *Natural Hazards*.

Lavaud, R., M.K. La Peyre, B. Couvillion, J.B. Pollack, V. Brown, T.A. Palmer, and B. Keim, 2024: Predicting restoration and aquaculture potential of eastern oysters through an eco-physiological mechanistic model. *Ecological Modelling*, **489**, 110603, <https://doi.org/10.1016/j.ecolmodel.2023.110603>.

Lyles, W., P. Pennel, and R. Riley, 2023: Headwinds in the heartland? Hazard planning lessons from six inland jurisdictions in the Southern Plains. *International Journal of Mass Emergencies and Disasters*, **41**(2-3), 208-222, <https://doi.org/10.1177/02807270231211838>.

McPherson, R.A., P.A. Fay, S.G. Alvarez, D. Bertrand, T.L. Broadbent, T. Bruno, A. Fares, B. McCullough, G.W. Moore, B. Moorhead, L. Patiño, A. Petersen, N.G. Smith, J.L. Steiner, A. Taylor, and T. Warziniack, 2023: Ch. 26. Southern Great Plains. In: *Fifth National Climate Assessment*. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA, <https://doi.org/10.7930/NCA5.2023.CH26>.

Na-Yemeh, D.Y, M.A. Shafer, and C.A. Shivers-Williams, 2024: U.S. military installations and extreme weather: an Oklahoma case study on preparation. *Environmental Hazards*: 1-26, <https://doi.org/10.1080/17477891.2024.2343389>.

Ter-Mkrtychyan, A.V., and A.L. Franklin, 2023: Stakeholder analysis in the context of natural disaster mitigation: The case of flooding in three U.S. cities. *Sustainability*, **15**, 14945, <https://doi.org/10.3390/su152014945>.

Thompson, D. T., B.D. Keim, and V.M. Brown, 2024: Construction of a tropical cyclone size dataset using reanalysis data. *International Journal of Climatology*, 1–23, <https://doi.org/10.1002/joc.8511>.

VanBuskirk, O.G., and L.E. Mullenbach, 2024: Understanding climate and environmental impacts for vulnerable residents in Tulsa. Southern Climate Impacts Planning Program, 22 pp, <https://www.southernclimate.org/wp-content/uploads/Understanding-Climate-and-Environmental-Impacts-for-Vulnerable-Residents-in-Tulsa.pdf>.

Wanless, A.C., and R.E. Riley, 2023: Examining extreme rainfall forecast and communication processes in the South-Central United States. *Weather, Climate, & Society*, **15**, 787-800, <https://doi.org/10.1175/WCAS-D-22-0141.1>.

APPENDIX B: PRESENTATIONS & INTERVIEWS

"5th National Climate Assessment and Oklahoma Impacts", Oklahoma Daily, November 14, 2023, Norman, OK (Bertrand).

"5th National Climate Assessment", South Central Climate Resilience Forum, April 3, 2024, Dallas, TX (Bertrand).

"5th National Climate Assessment", University of Oklahoma Climate and Renewable Energy Class Guest Lecture, April 18, 2024, Norman, OK (Bertrand).

"A Freeze Climatology for Southeast Louisiana", Gulf of Mexico Conference Meeting, February 20, 2024, Tampa, FL (Keim).

"Assessing Non-Profit Response and Adaptation to Hurricane Harvey", South Central Climate Resilience Forum, April 2, 2024, Dallas, TX (Hidalgo).

"Barriers to Climate Justice in Small-to-Medium-Sized Cities: A Case Study of Tulsa, Oklahoma", Geography and Environmental Sustainability Colloquium, October 27, 2023, Norman, OK (VanBuskirk).

"Barriers to Climate Justice in Small-to-Medium-Sized Cities: A Case Study of Tulsa, Oklahoma", Southwest Association of American Geographers Annual Meeting, November 2, 2023, Laredo, TX (VanBuskirk).

"Breakout Discussion", White House Summit on Building Climate Resilient Communities, September 28, 2023, Washington, DC (Shafer).

"Building Capacity for Hazard Mitigation Planning in Low-Capacity Community", FEMA Region 6 Mitigation Virtual Workshop, October 25, 2023, Virtual (Riley).

"City of Oklahoma City Heat Mapping Campaign", KFOR-TV Interview, July 28, 2023, Oklahoma City, OK (Riley).

"City of Oklahoma City Heat Mapping Campaign", KGOU (NPR) Radio Interview, July 29, 2023, Norman, OK (Riley).

"City of Oklahoma City Heat Mapping Campaign", The Norman Transcript, July 29, 2023, Norman, OK (Riley).

"Climate & Climate Change", Teaching Climate Science Workshop, August 5, 2023, Norman, OK, (Shafer).

"Climate Change and Health", University of Central Oklahoma Guest Lecture, February 29, 2024, Edmond, OK (Bertrand).

"Climate Change and Sea Level Rise in New Orleans", Washington Post Interview, June 8, 2023, Baton Rouge, LA (Keim & Brown).

"Climate Change Impacts to Oklahoma Agriculture", Oklahoma Mesonet Ag Educators Meeting, April 24, 2024, Norman, OK (Bertrand).

"Climate Change, Coastal Impacts, and Extreme Heat", Louisiana Sea Grant Fisheries and Seafood Leadership Program Meeting, March 20, 2024, Houma, LA (Keim, Brown, & Thompson).

"Climate Equity in Tulsa, Oklahoma", Fox23 Television Interview, July 10, 2023, Tulsa, OK (Mullenbach).

"Climatology and the Built Environment in Louisiana." American Institute for Architecture - Louisiana Conference, September 28, 2023, New Orleans, LA (Keim).

"Convective Storms and Climate Change", Inland Marine Underwriters Association Annual Meeting, April 30, 2024, San Antonio, TX (Keim).

"Developing Governance and Collaborative Capacity", State University of New York – Albany, April 2024, Albany, NY (Franklin).

"Developing Solutions to Climate Planning Challenges Across the Region", South Central Climate Resilience Forum, April 4, 2024, Dallas, TX (Riley).

"Drought: Climate Services Partnership", NCAR Earth System Science and Technology Hubs (NESTs), September 12, 2023, Omaha, NE (Riley & Shafer).

"Extremes in a Changing Climate", First Presbyterian Baptist Church Speaker Series, April 10, 2024, Baton Rouge, LA (Keim).

"FEMA National Risk Index and CDRZs", Politico Interview, November 2, 2023, Virtual (Riley).

"Hurricane Season in Louisiana", Louisiana Illuminator Interview, June 12, 2023, Baton Rouge, LA (Keim).

"Hurricanes, Storm Surge, Heavy Rainfall, and Freezes in a Changing Climate", Housing and Urban Development Climate Resilience Roundtable, July 21, 2023, Metairie, LA (Keim).

"Impacts of Climate Change in Louisiana", Annual Meeting of the National Environmental Health Association, August 1, 2023, New Orleans, LA (Keim).

"It's Getting Hot in Here: Planning for Extreme Heat", Center for Planning Excellence (CPEX) 2024 Louisiana Smart Growth Summit, April 25, 2024, Baton Rouge, LA (Keim).

"Louisiana and Texas: Canaries in the Climate Change Coal Mine", Department of Environmental and Geosciences Forum Series at Sam Houston State University, May 1, 2024, Huntsville, TX (Keim).

"Louisiana: The Canary in the Climate Coal Mine." Louisiana Remote Sensing and Remote Sensing and GIS Workshop, April 9, 2024, Mandeville, LA (Keim).

"National Risk Index – Drought Discussion", FEMA National Risk Index Developers, August 21, 2023, Virtual (Shafer).

"Natural Hazards: Causes and Impacts", University of Oklahoma Architecture Design II Class, January 19, 2024, Norman, OK (Shafer).

"NCA5 Southern Great Plains Engagement Webinar", U.S. Global Change Research Program, December 6, 2023, Virtual (Bertrand).

"NCA5 and Warmer Winters", PBS News Hour Interview, December 11, 2023, Virtual (Bertrand).

"North Atlantic Tropical Cyclones", Inland Marine Underwriters Association Quick Bites Micro-Learning Series, January 8, 2024, Virtual (Brown).

“Observed and Future Precipitation and Tropical Cyclone Changes”, Inland Marine Underwriters Association Webinar on Tropical Cyclones, June 3, 2024, Virtual (Brown & Keim).

“Oklahoma Climate Trends”, Oklahoma Association of Conservation Districts Meeting, November 2, 2023, Lawton, OK (Bertrand).

“Reduction in Freezing Temperatures and Tropicalization of Temperate Climates”, South Central Climate Resilience Forum, April 2, 2024, Dallas, TX (Thompson).

“SCIPP Updates”, Southern Plains Drought Early Warning System Partners Meeting, September 19, 2023, Virtual (Bertrand).

“Simple Planning Tool for Climate Hazards”, South Central Climate Resilience Forum, April 4, 2024, Dallas, TX (Bertrand).

“South Central Climate Resilience Forum”, DFW GreenSource Interview, March 27, 2024, Virtual (Bertrand).

“Strengthening Hazard Mitigation in Under-Resourced Communities”, Making Mitigation Work Webinar Series, April 9, 2024, Virtual (Riley).

“Summer 2023, Hurricanes, Storm Surge, and Heavy Rainfall in a Changing Climate”, Life City Impact Officer Roundtable, November 9, 2023, New Orleans, LA (Keim).

“The Impact of Extreme Heat on Morbidity and Mortality in Louisiana”, Louisiana Department of Health Climate and Health Workgroup Meeting, April 9, 2024, Virtual (Thompson).

“The Southern Climate Impacts Planning Program (booth)”, 2023 HBCU Climate Change Conference, October 11, 2023, New Orleans, LA (Cruickshank).

“The Southern Climate Impacts Planning Program (booth)”, South Central Climate Resilience Forum, April 2, 2024, Dallas, TX (Thompson, Keim, Bertrand, Riley, Cruickshank, Shafer).

“The Southern Climate Impacts Planning Program (booth)”, University of Oklahoma Career and Internship Fair, February 28, 2024, Norman, OK (Cruickshank, Bertrand, Chladny).

“The Southern Climate Impacts Planning Program”, 2023 ASAP Private Sector Climate Service Providers Academy, June 1, 2023, Virtual (Cruickshank & Brown).

“Tropicalization of the Temperate Zone”, Gulf of Mexico Alliance COMCON, February 20, 2024, Tampa, FL (Brown & Keim).

“Understanding Climate and Environmental Impacts for Vulnerable Residents in Tulsa”, Fox23 Television Interview, February 6, 2024, Tulsa, OK, (Mullenbach).

“Understanding Climate and Environmental Impacts for Vulnerable Residents in Tulsa”, Freelance Climate Journalist Audrey Gray Interview, April 26, 2024, Virtual, (Mullenbach).

“University of Oklahoma Researchers Studying Extreme Heat (OKC Heat Mapping Campaign)”, University of Oklahoma VPRP, July 26, 2023, Norman, OK (Riley).

“Youth Engagement and Climate Justice Workshop”, South Central Climate Resilience Forum, April 3, 2024, Dallas, TX (Jean & Rendon).



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