



Southern Climate Impacts Planning Program

Annual Report 2021-2022



RISA
Regional Integrated Sciences
and Assessments

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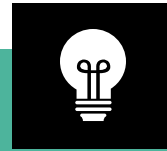
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Our Mission



The South-Central region experiences a multitude of hazards that often result in disasters, which are becoming increasingly common and costly as the climate continues to change and populations grow. The Southern Climate Impacts Planning Program (SCIPP) works closely with practitioners and researchers across the region to investigate changing climatic conditions, understand needs in planning and implementation processes, facilitate information exchange, and produce knowledge that can help address those challenges.



Assist organizations with making decisions that build resilience by collaboratively producing research, tools, and knowledge that reduce weather and climate risks and impacts across the South-Central United States.

SCIPP is funded by the [Regional Integrated Sciences and Assessments \(RISA\) program](#) and is a collaborative effort between the Oklahoma Climatological Survey (OCS), the Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO), the South Central Climate Adaptation Science Center (SCCASC) at the University of Oklahoma (OU), the Department of Geography and Anthropology at Louisiana State University (LSU), the Southern Regional Climate Center (SRCC) at Texas A&M, the School of Public Affairs & Administration Urban Planning Program at the University of Kansas (KU), the School of Natural Resources at the University of Nebraska – Lincoln (Nebraska), and Sea Grant Texas at Texas A&M University (Texas A&M). SCIPP focuses on climate challenges in Oklahoma, Texas, Arkansas, Louisiana.



Our annual performance report is submitted under the title "Southern Climate Impacts Planning Program (SCIPP) Phase III". This year, SCIPP concluded Phase III projects under a no-cost extension. SCIPP Phase III was funded on award NA18OAR4310337.

Our Team

Core Office and Investigators



Dr. Mark Shafer, PI
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Dr. Barry Keim, PI
LSU



Rachel Riley, PI
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OU



Dr. Vincent Brown,
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- Dr. Michael Hayes (Nebraska)
- Cynthia Lyle (Texas A&M)
- Dr. Ward Lyles (KU)
- Dr. Renee McPherson (OU)
- Dr. Randy Peppler (OU)
- Dr. David Sathiaraj (LSU)

Senior Personnel

- Dr. Harold Brooks (OU)
- Dr. Aimee Franklin (OU)
- Dr. Kim Klockow-McClain (OU)

Graduate Students

- Cameron Goff (LSU)
- Marissa Karpinski (LSU)
- Dolly Na-Yemeh (OU)
- Anna Wanless (OU)

Advisory Committee

- Dr. **Nelun Fernando*** (Texas Water Development Board)
- Dr. **Jordan Fischbach*** (Water Institute of the Gulf)
- Dr. **Michael Hayes** (University of Nebraska-Lincoln)
- **Kim Jenson*** (Oklahoma Department of Emergency Management and Homeland Security)
- **Arthur Johnson*** (Lower 9th Ward Center for Sustainable Engagement and Development)
- **Dr. Maria Carmen Lemos** (GLISA - University of Michigan)
- **Julie Lively*** (Louisiana Sea Grant)
- **Tim Lovell** (Disaster Resilience Network)
- **Chris McNamara*** (City of Fayetteville)
- **Dr. Michelle Meyer*** (Hazard Reduction and Recovery Center - Texas A&M University)
- **Leif Olson*** (City of Fayetteville)

*Denotes recent addition to the SCIPP team



Featured Accomplishment

A Pathway to Action: SCIPP Climate Adaptation Summer Academy

There is a growing demand for professionals who have the skills to work in the climate adaptation arena, especially in the South-Central U.S., which is one of the most disaster-prone regions of the country. To help support this ever-expanding demand, SCIPP's proudest accomplishment worked to build interest and increase understanding of climate adaptation through a 5-day all-expenses-paid summer program designed to introduce undergraduate students to climate adaptation concepts and professionals who regularly address solutions to the impacts of the changing climate.

In June 2022, 18 undergraduates from Texas, Oklahoma, Louisiana, and Arkansas participated in the SCIPP Climate Adaptation Summer Academy, where they heard from a variety of speakers on topics including but not limited to: climate-related hazards in the South-Central U.S., social factors and equity in climate adaptation, climate policy, administrative authorities and their responsibilities, and planning and development skills such as geographic information systems and hazard mitigation techniques. The students then had the opportunity to engage with the speakers and participate in activities related to each topic. The Summer Academy also included a tour of the National Weather Center in Norman, OK, and a field trip to Oklahoma City, where the students learned about current adaptation projects from a practitioner in the OKC Office of Sustainability and visited two of OKC's green spaces. The Summer Academy was organized and led by SCIPP Research Associate Erica Kronenberger.



Presently, there is a national effort to promote diversity and inclusion in the geosciences. As part of SCIPP's focus to promote diversity in climate adaptation, we sought students from minority-serving institutions, under-resourced and rural communities, and first-generation college students. This was accomplished by reaching out to professors, advisors, and media personnel who could effectively reach the student body at these schools (see figure 1). A more in-depth explanation of the Summer Academy's contribution to regional adaptive capacity is explained on pages 15 & 16.

Figure 1. Map depicts the recruitment scope across the four SCIPP states.

SUMMARY OF THE SUMMER ACADEMY



DAY 1 : "WEATHER, CLIMATE, AND HAZARDS DAY"

Featured lectures from SCIPP's Darrian Bertrand, Dr. Vincent Brown, Dr. Mark Shafer, and Dr. Barry Keim. The material also included an introduction to climate models and downscaling from Adrienne Wootten, who serves as a research scientist at the South-Central Climate Adaptation Science Center (SC-CASC).



DAY 2 : "SOCIAL FACTORS DAY"

Included talks on equity and environmental justice from Drs. Simone Domingue and Lauren Mullenbach, as well as a talk from SC-CASC Tribal Liaisons April Taylor and Yvette Wiley on traditional indigenous knowledge and climate adaptation in tribal nations. The day also included a tour of the National Weather Center led by K-20 Outreach Program Manager Andrea Melvin.



DAY 3 : "ADMINISTRATIVE GOVERNANCE DAY"

Dr. Franklin presented on fiscal policy, which included an overview of grant management and the role of government in climate adaptation. Her message was supplemented by a presentation from SCIPP Program Manager Caylah Cruickshank, who gave insight into what working with government funds entails and how she sees the field of climate adaptation progressing. Later, the group traveled to Oklahoma City, where Program Planner T.O. Bowman from the OKC Office of Sustainability spoke on current and past city climate adaptation projects. Students were then able to see firsthand some of OKC's sustainability efforts in urban green spaces.

DAYS 4 + 5 : "PLANNING AND DEVELOPMENT DAY" AND "CAREERS DAY"



Included a presentation on hazard mitigation techniques from Kim Jenson and Moriah Stanford from the Oklahoma Department of Emergency Management and Homeland Security. Then, SCIPP Director Rachel Riley spoke on stakeholder engagement and what methods SCIPP uses to connect with groups. On the final day, Adaptation International Director Sascha Petersen presented on climate adaptation careers in the private sector. Students shared the results of an activity they worked on throughout the week, which involved building a profile for a community they chose in the South-Central U.S.

| New Areas of Focus & Partnerships

A New Advisory Committee

This year, SCIPP focused on the strategic re-structuring of its Advisory Committee. The Advisory Committee is comprised of individuals with critical knowledge and experience in their field of work, to capture the breadth of sectors, needs, and activities within the region. They play an integral role in providing overall direction for the program and help strengthen the work that we do. As SCIPP enters a new phase of research, selecting new members was a very intentional process. We selected individuals who provide greater regional representation, and whose areas of expertise closely align with our new research endeavors.

A mix of practitioners, academics, and non-profit leaders, Advisory Committee members are experts in their various sectors (i.e.: emergency management, sustainability, policy research, hazard reduction & recovery, planning, etc.). This collaboration reflects the interdisciplinary nature of SCIPP's work, and we hope to leverage new networks and gain critical insight for future projects. In March 2022, the team convened in New Orleans, Louisiana, for the first in-person committee meeting in over three years. Due to the COVID-19 pandemic, the prior two meetings were virtual. This meeting allowed the new Advisory Committee to get acquainted with SCIPP's mission, purpose, and intended research engagement efforts for the newly awarded [Phase IV grant](#).



Photo of SCIPP with Advisory Committee members in New Orleans, LA.

Pawnee County, Oklahoma

SCIPP began a new relationship with the Pawnee County (OK) emergency manager and a mitigation planner within the Oklahoma Department of Emergency Management and Homeland Security (ODEMHS). SCIPP had an existing relationship with ODEMHS, but engaged with a new contact during this project and grew our relationship with the department. Bertrand and Riley (SCIPP) learned about rural challenges of mitigation and adaptation that we can begin to address in future work. SCIPP also shared resources, such as our [Simple Planning Tool](#), that the county can use to inform future plans. The Pawnee County Hazard Mitigation Plan is currently being developed and the hazard identification and risk assessment that SCIPP provided received positive feedback. Conversations with the mitigation planner led to a collaboration with ODEMHS beyond the scope of the project to promote the benefits of hazard mitigation planning in Oklahoma. We co-developed a fact sheet about why hazard mitigation matters, including eligibility for FEMA-funded mitigation projects. SCIPP will leverage the support and authority of ODEMHS to share this resource with a wider audience and help address some of the mitigation challenges from an educational aspect. This partnership was made possible through supplemental RISA funding received in 2020.

New Areas of Focus & Partnerships

National Hazard Mitigation Association

As part of SCIPP's efforts to advance hazard mitigation and climate adaptation planning in areas that are lagging, we have begun collaborating with representatives of the National Hazard Mitigation Association (NHMA). Prior SCIPP work and other literature has identified that, while standard hazard mitigation plans have certainly benefitted some communities, the full benefits of those plans are not being realized. Several studies have also determined reasons why hazard mitigation planning and implementation are lacking across the region. A substantial number of jurisdictions within the SCIPP region do not even have an active plan (figure 2). One problem that has been identified is that interpretation of the requirements is left to plan reviewers, which leads to immense confusion, frustration, and lack of action at local levels. This project will address the need to develop a hazard mitigation planning template and process that is useful for low-capacity communities, aligns with their capabilities and capacities, and broadly advances climate resilience and disaster risk reduction. During recent months Rachel Riley (SCIPP) and several NHMA representative have been regularly meeting to develop a project plan, which will include an evaluation component. They have also begun having conversations with key federal stakeholders. Engagement with local emergency managers and planners will occur in the near future. This project will be a multi-year effort.

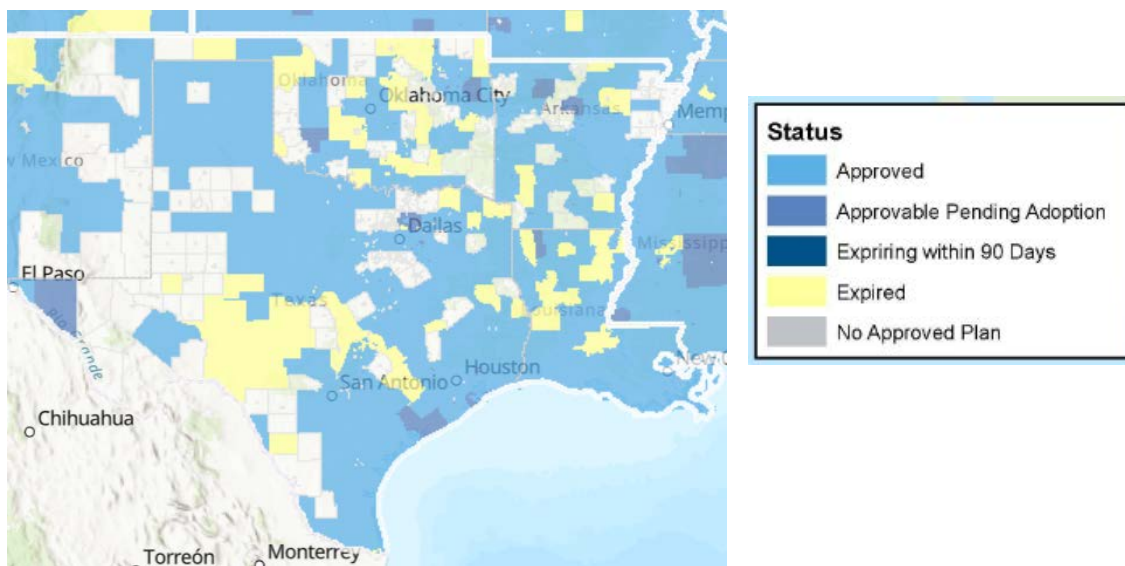


Figure 2. FEMA Hazard Mitigation Plan Status Map as of 6/7/2022. Map courtesy of FEMA.



Research Highlights

Concentrated and Intensifying Humid Heat Extremes in the IPCC AR6 Regions

Simone Speizer, SCIPP Research Associate, collaborated with the Urban Northeast RISA to publish a study in the journal [Geophysical Research Letters](#) that explored the trends in “humid heat” across the globe. Instead of simply looking at temperature, Speizer also took into account moisture in the air using the wet-bulb temperature, a method that more accurately assesses the human health effects of heat. The study examined changes in extreme wet-bulb temperatures at a regional level, using the regions from the most recent IPCC AR6 report. Extreme wet-bulb temperatures were found to have increased in most land regions over the period of 1979–2019, with some areas warming slower or faster than the average. The authors also analyzed the distribution of extreme humid heat days across and within years. On a yearly scale, they observed a concentration of extreme wet-bulb temperatures in years with strong El Niño episodes.

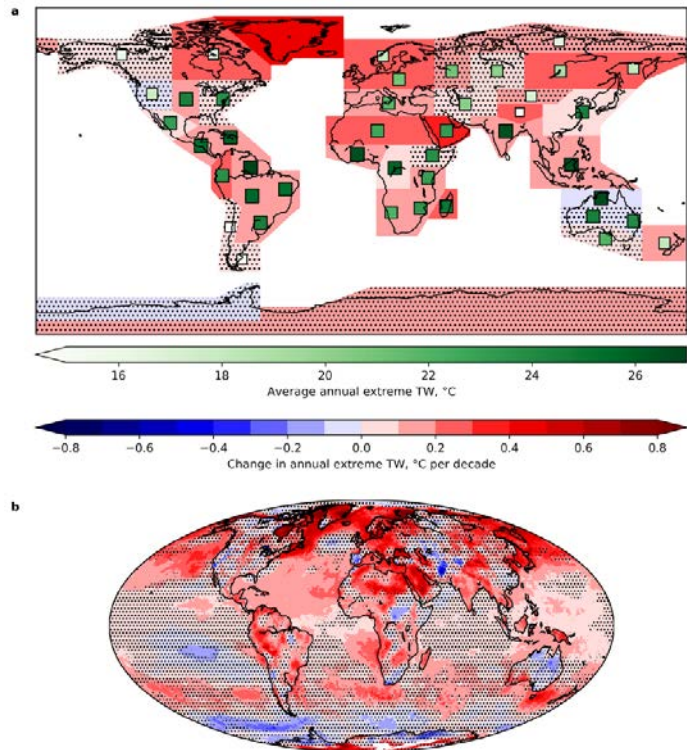


Figure 3. (a) Linear trends in regional averages of the annual extreme (99th percentile) wet-bulb temperature for the Sixth Assessment Report land regions, 1979–2019. Regional averages only include land grid cells, with each grid cell's value weighted by the cosine of its latitude. Shading indicates the coefficient (in $^{\circ}\text{C}$ per decade) of the trend. Stippling indicates where trends are not statistically significant at the 0.05 level. Squares in each region show the average of the annual regionally averaged 99th percentile values; larger and darker green squares indicate higher average values. Only positive averages are shown, and averages below 15°C appear in white. (b) Linear trends as in (a) but computed at a grid cell level.

On a seasonal scale, they found that some typically dry regions tend to have extreme humid heat days in close temporal proximity to each other and to rainfall events. The socio-economic impacts of these changes and patterns were not examined in this study, but Speizer offers the following avenue of study as potential future work: Since our bodies are less capable (or even incapable if a certain temperature is reached) of evapotranspiration in humid heat, extremes can cause serious health effects in humans, and thus it is important to understand the mechanical drivers of such events as well as their temporal patterns. This way, we are better able to prepare for and mitigate the effects of extremes in humid heat, especially as they become more severe.



Research Highlights

An Assessment of the Extremes and Impacts of the February 2021 South-Central US Arctic Outbreak, and how Climate Services Can Help

SCIPP hosted a virtual workshop for water utilities in July 2020. During the workshop, we learned how sensitive water utilities in the region are to freezing temperatures. For example, many coastal water utilities serve camps (raised off the ground), second homes, and short-term rentals that are not occupied all year. When freezing temperatures occur, the pipes in these structures can burst and go unnoticed, bringing down the entire system (lack of pressure in lines). The February 2021 event highlighted this vulnerability and impacted more than just water utilities. The February 2021 event prompted SCIPP to collaborate with researchers across the region to better understand the frequency, impacts, and future projections of such events. The result was a manuscript titled “An assessment of the extremes and impacts of the February 2021 South-Central US Arctic outbreak, and how climate services can help,” published in May 2022 in the [Journal of Weather and Climate Extremes](#).



In the manuscript, Drs. Brown and Keim (SCIPP) and their co-authors highlight the synoptic conditions that caused the event, place it in a climatological perspective, and recommend how climate services can help reduce the impacts of the freeze events. The magnitude of impacts associated with the event suggests a lack of preparedness that needs to be addressed. We are sharing the results of this manuscript with stakeholders in the region to ensure proper planning for freeze events even in a warming climate.

Stalling North Atlantic Tropical Cyclones

SCIPP's Dr. Brown has led or collaborated on multiple tropical cyclone research projects in the past two years. The most recent project, titled “Stalling North Atlantic Tropical Cyclones,” is a collaboration between SCIPP and Texas A&M (Southern Regional Climate Center). The project offers a quantitative definition of a “stalled” tropical cyclone, provides a climatology of stalled events, and assesses the recurrence interval of stalls in the Gulf of Mexico, Caribbean, and Atlantic. Identifying and understanding the climatology of stalling events is important because slower storms, particularly within the coastal zone, often lead to increases in local rainfall accumulation. That, coupled with tracks that recurve or loop through a region, can cause not one but multiple landfalls that further devastate an area. The project advances current tropical cyclone research and will be helpful for stakeholders (e.g., planners, water utilities, etc.) interested in tropical cyclone risk (and rainfall). One of the most prolific examples of a stalled storm is Hurricane Harvey, which devastated the Houston area in 2017. The paper is currently being prepared for submission to the *International Journal of Climatology* and a second paper is being drafted related to the precipitation attributed to stalling tropical cyclones.

Research Highlights

Factors that Enable Adaptation Planning and Action

One phase of a collaborative study with Wester Water Assessment (WWA) investigated decision makers' adaptation enabling environment and the factors that make hazard mitigation and climate adaptation planning and implementation more likely across Oklahoma and Utah. Those are examples of two states that are underperforming in this area. Much is known from the literature about barriers to climate adaptation and hazard mitigation. Instead of focusing on the negative, SCIPP's Rachel Riley and Darrian Bertrand, along with WWA's Seth Arens, examined what *enables* action. The intent was to determine specific needs that could potentially be met by RISA teams or other organizations rather than report broad categories which is common practice within academia. To gather data relevant to Oklahoma officials, SCIPP hosted four 2.5-hour virtual workshops in October 2021. In total, 26 officials participated and represented both rural and urban jurisdictions. Additional results, including from Utah and the other phases of the collaboration, are available in the final [project report](#).

According to workshop participants, factors that enable action include the following:



- ★ Obtaining buy-in from community leaders (e.g. elected officials, businesspeople who have substantial community influence) and regional and state professional associations
- ★ Being able to take advantage of federal programs that provide a few years of pilot funds to hire a staff person to focus on the issues
- ★ Involving officials from multiple departments (e.g., public works, planning, emergency management, etc.) in planning and implementation processes
- ★ Access to climate adaptation and hazard mitigation information that is concise and meaningful to the stakeholder contexts and demonstrates costs over time and costs of inaction
- ★ Workforce training on the benefits of hazard mitigation and climate adaptation
- ★ Clarity and standardization of planning requirements

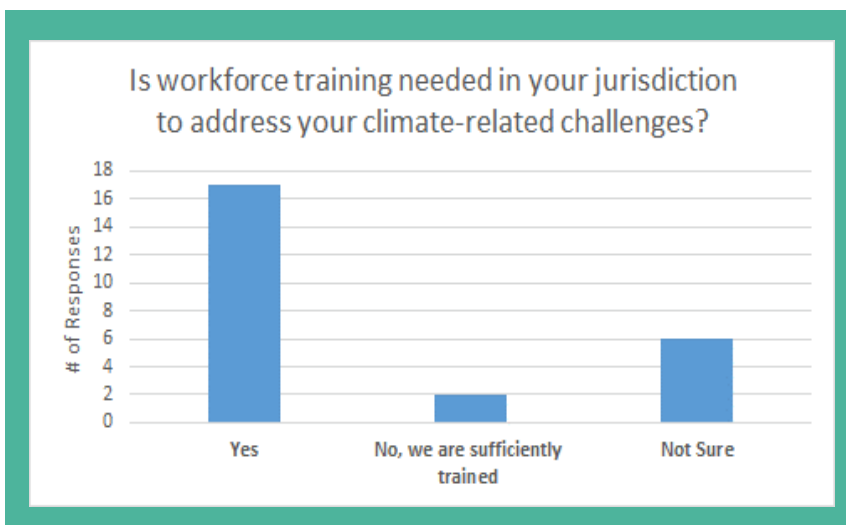


Figure 4. One of the questions asked of participants during the virtual workshops. Responses represent the Oklahoma participants.



Outreach & Engagement

NCA5 Public Engagement Workshops

Climate Assessment Specialist, Darrian Bertrand, and coauthors of the Southern Great Plains chapter of the Fifth National Climate Assessment (NCA5) led discussions during multiple public engagement workshops in February 2022. These workshops allowed the authors to gain direct insight from the general public to shape the topics of the chapter. Participants advocated for some of their concerns, priorities, and values regarding climate change. This information allowed the NCA5 report to represent the general public's sentiments as accurately as possible and ensure the topics were directly relevant to them.



Agricultural Leadership Development Program

Investigators Dr. Barry D. Keim and Climate Research Director Dr. Vincent Brown continued their engagement with the Louisiana State University (LSU) AgCenter Agricultural Leadership Development Program by presenting a talk titled, "Extreme Events in a Changing Climate." LSU's AgLeadership program was designed to enhance leadership in rural Louisiana by preparing practitioners dedicated to agriculture for future challenges in the industry (including weather and climate events). Reaching this group is extremely important because the weather/climate heavily impact agriculture across Louisiana. It also opens lines of communication between scientists and the agriculture industry. Connections were made at the conference, and since, SCIPP has provided data at resources to attendees of the AgLeadership conference.

American Planning Association Cross-Chapter Collaborative



Riley & Bertrand introduced SCIPP at the 2021 APA Cross-Chapter Collaborative Conference.

Rachel Riley (SCIPP) and Darrian Bertrand (SCIPP) collaborated with Danielle O'Neal (OK APA) and Chance Sparks (TX APA) to engage Texas planners at a workshop during the November 2021 American Planning Association Cross-Chapter Collaborative conference that took place in Fort Worth, Texas. The workshop introduced SCIPP, some SCIPP resources, and the concept of the *Simple Planning Tool* and the version that was planned for Texas. Riley and Bertrand sought feedback from conference attendees that informed the content of the *Texas Simple Planning Tool*. Time constraints prohibited SCIPP from gathering in-depth feedback, but the workshop provided the initial opportunity for feedback and developing relationships with planners in Texas. The *Simple Planning Tool for Texas Climate Hazards* is now [available for viewing and download](#).

| Outreach & Engagement

Moving Resilience Research to Action in the Gulf Region

On May 9th, 2022, SCIPP's Dr. Vincent Brown served as a panelist on a National Science Foundation Funded Virtual Workshop titled, "Moving Resilience Research to Action in the Gulf Region." The session was led by Katherine Lieberknecht (University of Texas). It featured two other panelists, Dr. Cecilia Martinez (Principal Advisor for Resilience and Communities for the Bezos Earth Fund) and Dr. Therese McAllister (Community Resilience Group Leader and Program Manager at the National Institute of Standards and Technology.) There were roughly 100 attendees in the session from academia, students, the private sector, and non-profit organizations. Dr. Brown discussed the process and challenges of research to action in the session and provided examples (Sewerage and Water Board of New Orleans, Crawfish Farmers) of recent success stories. Dr. Brown also discussed how he (from the SCIPP perspective) defines and measures resilience and how to integrate multiple definitions of resilience. Finally, the session concluded with how the translation of research to action relates to vulnerable and marginalized populations. Overall, it was a great experience and provided an opportunity for us to highlight SCIPP's approach to resilience and research to action.



Climate Science: The Basics

Rachel Riley, in collaboration with Matthew Bucchin (Halff Associates), presented on a webinar series on 18 February 2022 hosted by the American Planning Association Sustainable Communities Division. The series aims to provide resources, information, and best practices to support planners in creating sustainable, resilience, and equitable communities. Riley's presentation was entitled, "Climate Science: The Basics." Over 500 people attended live and over 900 had registered for the event. Participants who were unable to watch live were able to view the recording. Participants earned continuing education credits for participating. While the demographics of the participants are unknown, the event was free and advertised to planners across the United States.



| Outreach & Engagement

Educators, Artists, and Scientists Engaging Learners (EASEL)

Educators, Artists, and Scientists Engaging Learners (EASEL) [project](#) completed a second iteration of engaging a community in New Orleans. As described in last year's report, this project is a joint venture primarily funded by the National Science Foundation, but with contributions from SCIPP, STEM-Nola, and ArtSpot Productions. This year, Dr. Keim (SCIPP) continued his involvement with the EASEL project, where residents from a different neighborhood, New Orleans-East, were utilized. This region was selected to give a voice to residents who live in a part of New Orleans that has largely been forgotten in the overall recovery of the city in the post-Hurricane Katrina era.



Community members gather for the final production.

The EASEL team solicited participation from neighborhoods of New Orleans-East (predominantly African-American) to put on a production that touched on climate change and its impacts on the neighborhoods of the region. The organically-derived production was held outdoors at the Crown of Life Lutheran Church on June 4, 2022. This innovative engagement approach was a testament to trust building among underserved communities in the SCIPP region. As SCIPP continues to seek effective ways to engage with communities of interest, this initiative was helpful in exploring new approaches to involve community leaders.

University of Oklahoma *Resilient Futures Symposium*

Rachel Riley presented "Climate Change and its Implications for the United States and Oklahoma" at the University of Oklahoma (OU) *Resilient Futures Symposium* on 14 April 2022. Hosted by the OU College of Architecture, the purpose of the symposium was to bring together experts from across the OU campus to share recent research and explore ways our environments may be adapted to facilitate wellbeing for both people and planet. While Riley's opening presentation provided background information that laid the foundation for the day, many of the Symposium presentations focused on or included elements relevant to underserved communities across the United States. Click below for additional resources:

[Event webpage](#)

[Individual sessions](#)

[Recorded talks](#)

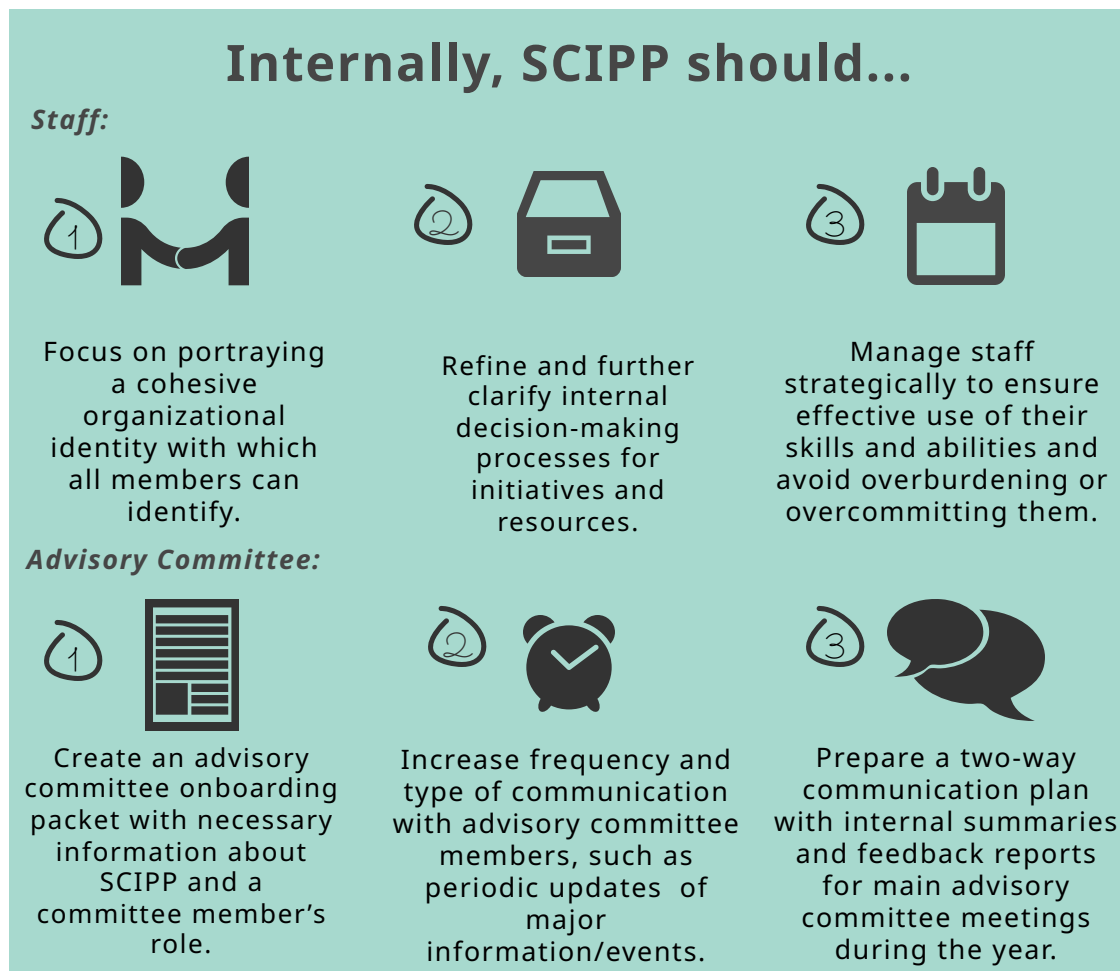
University of Central Oklahoma

SCIPP's Climate Assessment Specialist, Darrian Bertrand, was a guest lecturer for the University of Central Oklahoma's (UCO) Environmental Health class. She presented an overview of climate change and health, including how increased temperature and rainfall can affect human well-being. The class of undergraduate students was very engaged and passionate about climate change and health impacts. Darrian was then asked to participate on a panel of judges for UCO's Master of Public Health in Community Engagement comprehensive oral examinations for students who chose climate change as a topic. The students highlighted current issues in Oklahoma relating to climate change and demonstrated a comprehensive project outline to address the problems with tangible solutions that incorporated community engagement and input.

Evaluation

Internal Perspectives About SCIPP's Work

The main evaluation task that SCIPP undertook during the previous year involved the implementation of recommendations from our internal evaluation. This endeavor was part of our broader program evaluation conducted at the end of our Phase III grant. As outlined in our previous report, our program evaluator, Dr. Ioana Cionea, conducted interviews with staff members and current and former advisory board members to gauge internal perspectives about SCIPP's work. Conclusions from the evaluation indicated that:



This year, SCIPP focused on implementing several of these evaluation recommendations (and will continue to do so). For example, internally, staff management has changed to address item 3. We have been strategic about hiring employees and involving new Co-PIs when the opportunities to do so have presented themselves. Continuing to do so will allow us to better serve our stakeholders and implement our projects.

Evaluation - Cont'd

We have also reconceptualized and reorganized our advisory board meetings to follow the recommendations above. Our March 2022 advisory committee meeting dedicated ample time to item 1, the on-boarding and socialization of new committee members. We have also increased the frequency of communications with our advisory committee. We plan on continuing to work on implementing the internal program evaluation recommendations in the upcoming years. These internal changes should improve our functioning, effectiveness, and ability to complete our projects successfully and interact with and serve our stakeholders in even better ways than before.



Program Manager, Caylah Cruickshank, speaks during the 2022 SCIPP advisory committee meeting.

Furthermore, based on evaluation results from the stakeholders' surveys and interviews conducted at the end of our Phase III grant, we began a sustained assessment effort that entails conducting more frequent evaluations of various components of our work. Earlier this year, our program evaluator designed (and we have recently implemented) a pre- and post-evaluation of our SCIPP Summer Academy, a one-week workshop for undergraduate students interested in climate adaptation. We plan on continuing this model of evaluation, which should yield valuable information that would allow us to adapt and refine our services so that we best serve stakeholders' (sometimes changing) needs throughout a grant cycle.



Research Associate, Erica Kronenberger introduces the Climate Adaptation Summer Academy during SCIPP's advisory committee meeting.

| Societal Impacts

SCIPP's work and collaborations have positively impacted stakeholders in the region. We *elevated a sense of agency by building the expertise, confidence, and capability of partners to act, and boosted learning outcomes, resulting in a deeper understanding of science or local knowledge related to climate, impacts, and adaptation.* Evidence of such impact is sometimes brought to our attention via testimonials:



Building Regional Adaptive Capacity: SCIPP's Climate Adaptation Summer Academy

SCIPP's Climate Adaptation Summer Academy (as described in detail on pages 3 & 4) included a pre-and post-evaluation component that assessed expectations, knowledge gained, satisfaction with the Academy, and impact of the knowledge provided on students. Prior to the Academy, participants indicated a desire to learn more about climate change and to learn from experts in the field as well as an interest in establishing connections and exploring opportunities for future careers in climate adaptation. Their pre-Academy knowledge quiz responses ranged from 5.56% to 83.33% correct answers for a question ($M = 42.11$, $SD = 21.14$).

At the end of the Academy, participants indicated their experience had been a valuable one as they highlighted the content topics covered, the speakers and their expertise, as well as the field trips as some of the best aspects about the Academy. Their satisfaction ranged from satisfied to very satisfied (rating on a 1= *extremely dissatisfied* to 7 = *extremely satisfied* scale) with aspects of the Academy, as follows: **1) the quantity** of information provided ($M = 6.17$, $SD = 0.86$), **2) the quality** of this information ($M = 5.78$, $SD = 1.22$), **3) the topics covered** during the Academy ($M = 5.67$, $SD = 1.03$), **4) the organization** of the Academy ($M = 5.72$, $SD = 1.36$), and **5) the overall** Academy ($M = 6.11$, $SD = 0.76$). Their post-Academy knowledge quiz responses ranged from 5.56% to 100% correct answers for a question ($M = 64.91$, $SD = 26.19$), indicating a significant increase in knowledge compared to the pre-Academy quiz ($M_{\text{difference}} = 22.81\%$, paired means t-test = 3.78, $p < .001$). Furthermore, participants' open-ended responses indicated that the Academy exposed them to new topics that they had not considered before, reinforced (for some) their knowledge and career path they had selected, or (for others) offered them new ideas about possible careers in climate adaptation. Importantly, most participants indicated they were considering some form of career in climate adaptation in the future.

Societal Impacts - Cont'd

SCIPP's Climate Adaptation Summer Academy is evidence of societal impact, particularly on regional adaptive capacity. This major project accomplished the following:

1

Boosted **learning outcomes**, resulting in a deeper understanding of science or local knowledge related to climate, impacts, and adaptation. As evidenced by participants' feedback, they gained knowledge during the Academy about new topics that (some) had never been exposed to. One participant, for instance, explained that they learned aspects about the fiscal, governmental, and social aspects of climate adaptation that do not usually get covered in the classes they take.



2

The Academy shifted **mindsets**, resulting in documented cases of new readiness to act or acceptance of a need to act. Participants' quiz results indicated a significant change in their knowledge about climate adaptation. Furthermore, their feedback supports the idea of a change in mindsets and better preparedness to tackle climate adaptation and/or pursue work in this area. For instance, one participant indicated that they had been interested in climate adaptation but, after the Academy, they "**want[ed] to turn even more of [their] focus towards it.**"



Image courtesy of the Regional Integrated Sciences and Assessments on www.cpo.noaa.gov. ©2022

3

Finally, the Academy elevated a **sense of agency** by building the expertise, confidence, and capability of partners (i.e., Academy attendees in this case) to act. Specifically, students provided feedback about being more knowledgeable about climate adaptation and the various aspects connected to it (e.g., grant management, fiscal policies, city planning), which offered them a more nuanced and well-rounded understanding of the topic. In addition, the Academy empowered participants to make career choices related to climate adaptation. For instance, one participant indicated that "**I feel more prepared for whatever comes my way because of this Academy.**"

See Appendix A for additional photos of the Summer Academy.

| Next Steps

Informational Webinars for Equitable Climate Adaptation

With the newly awarded phase IV grant, SCIPP will begin research under a new theme, which will address the disproportionate impacts of climate stressors on under-represented populations and ensure their voices are incorporated into community decision-making. One project in particular, led by Dr. Simone Domingue, includes a series of informational webinars aimed at building community capacity for equitable climate adaptation. The audience for the webinars will be communities in SCIPP states. The first webinar in this series will provide an overview of new federal funding opportunities for disaster mitigation and community resilience. This webinar will also discuss the Biden-Harris Administration's Justice40 Initiative and share resources related to the program's implementation. The first webinar will take place during the end of July 2022 in partnership with the Louisiana Disaster Justice Network.

Identifying Fiscal Levers Used in Flood-Prone Communities

With the newly awarded phase IV grant, SCIPP will begin research under a new theme, which addresses the need for additional funding and resources to improve community resilience. The primary activity for this new theme will be identifying current fiscal, economic, and financial levers used in communities in the SCIPP region, such as Tulsa, Oklahoma, that are vulnerable to flooding. A follow-on research priority will be to create an inventory of novel fiscal, economic, and financial levers not currently used but suitable for typical flooding events in the SCIPP region. This research, led by Dr. Aimee Franklin, will contribute to the creation of fact sheets for peer communities and for best practices from academic research or professional organizations. These fact sheets will be made available and promoted through multiple communication platforms to SCIPP stakeholders.

Developing a Simple Planning Tool for Louisiana

The *Simple Planning Tool* will be developed for Louisiana as part of SCIPP's Phase IV Climate-Informed Planning Theme. An initial conversation with a NOAA Disaster Preparedness Program (coastal) representative has occurred regarding a State of Louisiana Data Task Force that is in development. The development of the *Simple Planning Tool* will help meet some of the needs of the state task force. As such, SCIPP intends to engage with the NOAA organization, the State of Louisiana task force, the Louisiana Chapter of the American Planning Association, and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness during tool development and to promote the tool upon its completion.

Narrative Case Studies

A Partnership Leading to Changes in Water Management for Orleans Parish



Precipitation was a key research theme in SCIPP Phase III and the Coastal and Ocean Climate Applications grant. Led by Vincent Brown, Alan Black, and Barry Keim, four manuscripts were published from 2017-2020 on precipitation (climatology, extreme events, and trends) across the Southeast United States (Brown et al. [2019a](#), [2019b](#), [2020a](#), [2020b](#)). The results were presented at conferences (e.g., American Meteorological Society, Association of American Geographers, AgLeadership, etc.) and to stakeholders/partners in the region (e.g., small-medium sized water utilities, Sewerage and Water Board of New Orleans (SWBNO), Louisiana, Texas, and Mississippi/Alabama Sea Grant, etc.).

The SWBNO was particularly interested in the research because we determined that hourly precipitation characteristics (frequency, intensity, and duration) changed, favoring more intense events of a shorter average duration. The SWBNO oversees storm water drainage in New Orleans, and their drainage infrastructure capacity is 25.4 mm (1 in) of precipitation in one hour and 12.7 mm (0.5 in) in each subsequent hour. Unfortunately, this capacity has been exceeded numerous times in recent years, causing flooding, frustration, and loss across the city. In fact, residents of the city are now legally allowed to park their cars on the median (called "middle ground") during precipitation events to avoid flood damage - underscoring the problem New Orleans faces with flooding.

To help, SCIPP partnered with the SWBNO and hosted a virtual workshop targeting small to medium-sized water utilities in the region. The goal was to help utilities understand observed changes in precipitation and prepare for possible future scenarios. After the workshop, the SWBNO announced a "once in a generation" effort to improve New Orleans drainage, water, and wastewater operation and management through proactive planning. Climate change, and changes in precipitation, were listed as a high priority in their planning, and SCIPP's research findings are informing SWBNO's adaptation efforts.

Narrative Case Studies - Cont'd

SCIPP, with the support of the SWBNO, was awarded a two-year Adaptation Science Program (AdSci) grant titled "Planning a Flood Resilient Future for New Orleans, LA." The research objectives in the grant directly align with questions the SWBNO had regarding precipitation in New Orleans. For example, we seek to determine if certain parts of the city are impacted more frequently by heavy rainfall events (related to the boundary layer and effects from lake Pontchartrain). Also, we are working with Applied Weather Associates to produce high-resolution spatiotemporal rainfall data (depth-area-duration) for specific extreme events that caused flooding in the city. The data will be used by Ardurra Engineering, the SWBNO engineering firm, as input to their hydrologic models. This will help the SWBNO better understand flooding during certain high-impact events and will enable them to fix inadequacies in their system.

Finally, we are conducting a 500-person survey of Orleans Parish residents to understand better their perceptions of climate change, flooding, and view of the SWBNO. The survey was co-produced with the SWBNO to ensure the questions would help their planning efforts. The results from the survey will help the SWBNO understand public perceptions of climate change and which projects should be given priority from the general public's standpoint (e.g., green infrastructure, limiting building, new fees, building restrictions, etc.). **Our interactions with the SWBNO will lead to changes in water management that impact the nearly 400,000 residents of Orleans Parish and hopefully will make the City of New Orleans more resilient to flooding.**



Narrative Case Studies

Tulsa Achieves a Class 1 Rating with FEMA's Flood Insurance Program



The City of Tulsa, Oklahoma, recently achieved a significant disaster resilience milestone and obtained a [National Flood Insurance Program \(NFIP\) Class 1 rating](#). Many people and organizations have collaborated over the years to work toward the rating, with SCIPP being one of them. SCIPP funded three interns over two summers (2015 & 2016) to assist the [Disaster Resilience Network](#) in their efforts to understand what the citizens of west Tulsa knew about their level of flood risk. The completed work highlighted low-income neighborhood areas, that are particularly vulnerable to flooding, due to poorly maintained levees. Residents in these zones were not traditionally required to have flood insurance but were deemed unprepared to cope with the effects of flooding in their area. Partly due to this research and the thorough contributions of countless other organizations, the City of Tulsa has turned a corner on floodplain management.

The Class-1 designation is the highest rating that the NFIP can give and a title only held by one other city in the country, Roseville, California. The rating is based on four categories: public information, mapping and regulations, flood damage reduction, and warning and response. The City of Tulsa attained this rating through a comprehensive stormwater management program, floodplain development regulations, consistent drainage maintenance, and more. The Class-1 rating also means a 45% reduction in premiums, giving Tulsans the cheapest flood insurance premiums in the nation.

Click [here](#) to view FEMA's link on the Class 1 designation.

To watch a video further explaining SCIPP's contributions to the Class 1 Rating, watch this [video from NOAAClimate](#).



FEMA



Appendix A

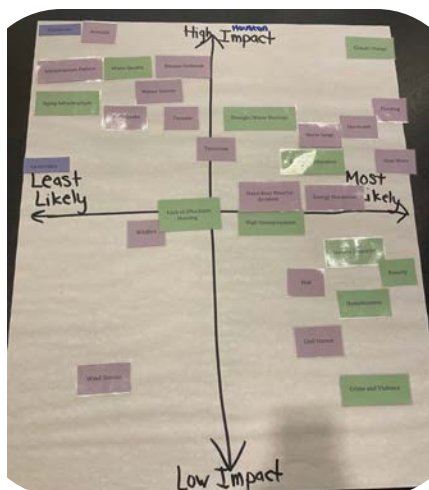
Summer Academy Pictures



Dr. Aimee Franklin (SCIPP) speaking on fiscal policy's purpose in climate adaptation planning.



Rachel Riley (SCIPP) giving examples of how SCIPP has engaged with stakeholders over the years.



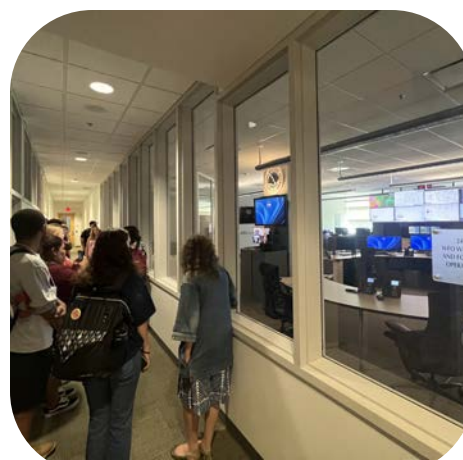
Shocks / Stressors Activity. Students organized different hazards by likelihood and impact.



OKC Councilwoman JoBeth Hamon speaking on sustainability in Ward 6 and goals for the city's future.



Dr. Mark Shafer (SCIPP) discussing natural hazards as they relate to the SCIPP region.



*Students observing the National Weather Service's
Warning & Forecast Operations office in Norman, OK.*

Appendix A - Cont'd



Kim Jenson and Moriah Stanford from OK Department of Emergency Management and Homeland Security lecture on their roles in the hazard mitigation planning process.



SCIPP's Darrian Bertrand and Erica Kronenberger assisting students with an activity.



Yvette Wiley (SC-CASC) discussing Tribal-specific issues in climate adaptation.



Adrienne Wooten (SC-CASC) giving an introduction to climate models and downscaling.



Dr. Barry Keim (SCIPP) lecturing on coastal hazards.



Part of the SCIPP team at Scissortail Park in OKC.

Appendix B

Full Publication List

Bolinger, R. A., V. M. Brown, C. M. Fuhrmann, K. L. Gleason, T. A. Joyner, B. D. Keim, A. Lewis, J. W. Nielsen-Gammon, C. J. Stiles, W. Tollefson, H. E. Attard, and A. M. Bentley, 2022: An assessment of the extremes and impacts of the February 2021 south-central U.S. arctic outbreak, and how climate services can help. *Weather and Climate Extremes*, 36, 100461, <https://doi.org/10.1016/j.wace.2022.100461>.

Brucks, M., J. Le, M.A. Shafer, and A.L. Franklin, 2021: Identifying Roles for Public Administrators to Foster Anticipatory Altruism for Severe Weather Preparedness. *Public Administration Quarterly*, 45 (3), <https://doi.org/10.37808/paq.45.3.5>

Domingue, Simone, 2021: The (In)Dispensability of Environmental Justice Communities: A Case Study of Climate Adaptation Injustices in Coastal Louisiana and Narratives of Resistance. *Environmental Justice*. <https://liebertpub.com/doi/full/10.1089/env.2021.0098>.

Lyles, W., P. Pennel, and R. Riley, accepted: Headwinds in the Heartland? Hazard Planning Lessons from Six Inland Jurisdictions in the Southern Plains. *International Journal of Mass Emergencies and Disasters*.

Osland, M.J., P.W. Stevens, M.M Lamont, R.C Brusca, K.M. Hart, J.W. Waddle, C.A. Langtimm, C.M. Williams, B.D. Keim, A.J. Terando, E.A. Reyier, K.E. Marshall, M.E. Loik, R.E. Boucek, A.B. Lewis, J.A. Seminoff, 2021: Tropicalization of Temperate Ecosystems in North America: The Northward Range Expansion of Tropical Organisms in Response to Warming Winter Temperatures. *Global Change Biology* 27(13):3009-3034. <https://doi.org/10.1111/gcb.15563>.

Riley, R., D. Bertrand, and S. Arens, 2022: Connecting Climate Adaptation and Hazard Mitigation Planning in Climate Discourse-Sensitive Regions: A Cross-RISA Collaborative Project. Southern Climate Impacts Planning Program and Western Water Assessment, 22 pp, www.southernclimate.org/documents/CAHMPCrossRISA.pdf.

SCIPP, 2021: Simple Planning Tool for Arkansas Climate Hazards v 1.6, L. T. Kos, R. E. Riley, and D. Bertrand, eds., Southern Climate Impacts Planning Program, 32 pp. [Available online at: <http://www.southernclimate.org/documents/SPTAR.pdf>].

SCIPP, 2021: Simple Planning Tool for Oklahoma Climate Hazards v 1.6, L. T. Kos, R. E. Riley, and D. Bertrand, eds., Southern Climate Impacts Planning Program, 32 pp. [Available online at: <http://www.southernclimate.org/documents/SPTOK.pdf>].

SCIPP, 2022: Simple Planning Tool for Texas Climate Hazards v 1.0, A. Wanless, D. Bertrand, L. T. Kos, R. E. Riley, and M. Shafer, eds., Southern Climate Impacts Planning Program, 50 pp. [Available online at: <http://www.southernclimate.org/documents/SPTTX.pdf>].

Speizer, S., Raymond, C., Ivanovich, C., & Horton, R. M., 2022: Concentrated and intensifying humid heat extremes in the IPCC AR6 regions. *Geophysical Research Letters*, 49, e2021GL097261. <https://doi.org/10.1029/2021GL097261>.

Appendix C

Relevant Presentations

“Climate Change and Health”, *University of Central Oklahoma*, March 8, 2022, Virtual (Bertrand).

“Climate Change and its Implications for the United States and Oklahoma”, *Resilient Futures Symposium*, April 14, 2022, Norman, OK and Virtual (Riley).

“Climate Change and Potential Impacts”, *Mississippi River: Delta Blues*, June 5, 202, Virtual (Brown).

“Climate Extremes: Impacts on Infrastructure”, *EPA Region 6 Storm Water Conference*, October 19, 2021, Virtual (Keim).

“Climate Science: The Basics”, *American Planning Association*, February 18, 2022, Virtual (Riley).

“Climate-Related Resiliency in Central Texas”, *Brazos Valley Council of Governments (Texas)*, February 15, 2022, Virtual (Riley).

“Connecting Climate Adaptation and Hazard Mitigation Planning in Climate Discourse-Sensitive Regions”, *American Meteorological Society*, January 24, 2022, Virtual (Bertrand).

“Connecting Climate Science with Regional Stakeholders: the NOAA RISA Sustained Assessment Specialist Network”, *American Association of State Climatologists*, June 11, 2021, Virtual (Bertrand).

“Defining Resilience to Action”, *National Science Foundation*, May 9, 2022, Virtual (Brown).

“Developing a Simple Planning Tool for Texas Climate Hazards”, *American Planning Association Cross-Chapter Collaborative (AR, NM, OK, TX)*, November 3, 2021, Fort Worth, TX (Riley & Bertrand).

“Developing Resilient Oyster Populations”, *Louisiana AgCenter Conference*, May 6, 2021, Virtual (Brown).

“Extreme Events in a Changing Climate”, *Louisiana AgLeadership Program*, November 30, 2021, New Iberia, LA (Brown & Keim).

“Framing Climate Change on Social Media: Evaluations of Information from Texas Residents According to Message Framing and Source Credibility”, *The Rural Communication Institute (RCI) and the Texas Social Media Research Institute (TSMRI)*, April 22, 2022, Fort Worth, TX (Howe).

“Hurricane Ida Recap -- 1 Year Later”, *WBRZ News*, May 2022, Baton Rouge, LA (Keim).

“Hurricanes over the Past 2 Years”, *LSU Weather Experts Media Briefing*, May 31, 2022, Virtual (Keim).

“Hurricanes, Storm Surge, Heavy Rainfall, and Freezes in a Changing Climate”, *American Public Health Association*, October 24, 2021, Virtual (Keim).

Appendix C - Cont'd

"Hurricanes, Storm Surge, Heavy Rainfall, and Freezes in a Changing Climate", *EPA Region 7 Storm Water Conference*, October 19, 2021, Virtual (Keim).

"Hurricanes, Storm Surge, Heavy Rainfall, and Freezes in a Changing Climate", *Federal Home Loan Banking Meeting*, August 9, 2021, Virtual (Keim).

"LSU professors discuss climate change, 2022 IPCC report and global protests", *Reveille*, May 2, 2022, Baton Rouge, LA (Brown).

"LSU researchers take closer look at climate change effects", *Brproud Local News*, February 16, 2022, Baton Rouge, LA (Brown & Thompson).

"OU A&GS Career Fair", *University of Oklahoma*, March 1, 2022, Norman, OK (Bertrand & Cruickshank).

"Research Experiences for Undergraduates (REU) Climate Careers Panel", *Research Experiences for Undergraduates*, July 27, 2021, Virtual (Bertrand).

"Several reports find Texas electric grid not ready for another winter storm", *CNHI News*, November 23, 2021, Virtual (Bertrand).

"Summary of the 2020 Hurricane Season and Forecast for 2021", *LSU Weather Experts Media Briefing*, June 14, 2021, Virtual (Keim).

"The Southern Climate Impacts Planning Program and Climate Hazard Resources for Planners", *American Planning Association Cross-Chapter Collaborative (AR, NM, OK, TX)*, November 3, 2021, Fort Worth, TX (Riley).

"The Value of Relationships in Hazards and Disaster Work", *46th Annual Natural Hazards Research and Applications Workshop*, July 13, 2021, Virtual (Lyles).

"Tornadoes", *Lion's Club of Baton Rouge*, June 7, 2021, Baton Rouge, LA (Keim).

"UCO Masters of Public Health Oral Exam Judging", *University of Central Oklahoma*, April 1, 2022, Edmond, OK (Bertrand).

"US coast to see century's worth of sea level rise by 2050. Louisiana projected to see worst of it", *Reveille*, February 16, 2022, Baton Rouge, LA (Brown).

"Weather, Climate, and Litigation", *Keogh-Cox Lawfirm*, June 9, 2021, Virtual (Keim).



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