

**ANNUAL REPORT 2018-2019**

# **SOUTHERN CLIMATE IMPACTS PLANNING PROGRAM**

**A NOAA RISA TEAM**



**RISA**

Regional Integrated Sciences  
and Assessments



**SCIPP**  
A NOAA RISA TEAM



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## OUR MISSION



## Help communities build resilience to weather and climate extremes now and in the future

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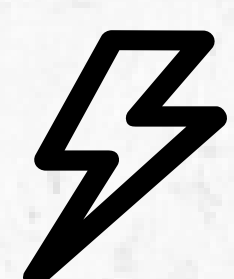
The Southern Climate Impacts Planning Program (SCIPP) is a south-central United States focused climate hazards and research program. SCIPP focuses on climate challenges in Oklahoma, Texas, Arkansas, Louisiana, and coastal Mississippi. From severe storms, flooding, drought, hurricanes and storm surge, heat waves, wildfires, to winter storms, the South experiences among the nation's most extensive collection of climate-related hazards with many southern states ranking at or near the top of the lists in disaster declarations and billion-dollar disasters.

SCIPP Phase III was funded on award NA18OAR4310337. Our annual performance report is submitted under the title "Southern Climate Impacts Planning Program (SCIPP) Phase III".

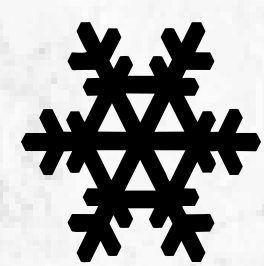
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SCIPP is a collaborative effort between the Oklahoma Climatological Survey (OCS), the South Central Climate Adaptation Science Center (SC-CASC), and the Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma, the Department of Geography and Anthropology and Southern Regional Climate Center (SRCC) at Louisiana State University, the School of Natural Resources at the University of Nebraska – Lincoln, the School of Public Affairs & Administration Urban Planning Program at the University of Kansas and Sea Grant Texas at Texas A&M University.

## OUR TEAM



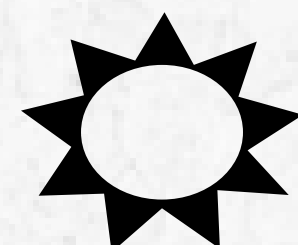
**Principal Investigators:** Mark Shafer (OU); Barry Keim (LSU); Rachel Riley (OU)



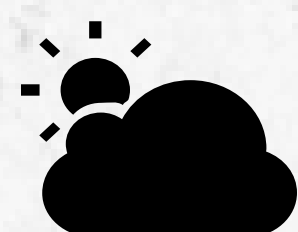
**Co-Principal Investigators:** Renee Edwards (LSU); Michael Hayes (Nebraska); Ward Lyles (KU)\*; Renee McPherson (OU); Randy Pepler (OU); Pamela Plotkin (Texas A&M)\*; David Sathiaraj (LSU)



**Core Office:** Margret Boone - Program Manager (OU); Vincent Brown (LSU); Leah Shore - Climate Assessment Specialist (OU); James Cuellar – Student Assistant (OU)



**Senior Personnel:** Harold Brooks (OU); Kim Klockow-McClain (OU)\*; Aimee Franklin (OU)\*



**Graduate Students:** Vincent Brown (LSU); Nicholas Grondin (LSU); Marisa Karpinski (LSU); Jacob Marchlinski (OU); Penn Pennell (KU); Daniela Spade (OU); Derek Thompson (LSU)



**Advisory Committee:** David Brown (USDA); Bill Hooke (American Meteorological Society); Bill Kiene (NOAA); Maria Carmen-Lemos (GLISA); Tim Lovell (Disaster Resilience Network); Victor Murphy (NOAA); Jamie Olson (Feeding Texas); Sascha Petersen (Adaptation International); Bob Rose (Lower Colorado River Authority); David Schlotzhauer (NWS Lower Mississippi River Forecast Center); Melissa Stults (University of Michigan); and Trevor Timberlake (USACE – Little Rock District)

\*New Team Members as a part of SCIPP Phase III.



## Weather and Climate Impacts on Military Operations

In September 2018, representatives from six Oklahoma military installations along with members of the weather and climate research community across the University of Oklahoma participated in the workshop, Weather and Climate Impacts on Military Operations. The SCIPP team, in conjunction with the Colleges of Atmospheric and Geographic Sciences and Engineering, hosted this workshop. The six military installations represented included: Altus Air Force Base, Tinker Air Force Base, Vance Air Force Base, Ft. Sill Fires Center of Excellence, McAlester Army Ammunition Plant (MCAAP) and the Oklahoma National Guard. This was an accomplishment to bring together representatives from all 6 Oklahoma military installations, 9 University of Oklahoma weather and climate programs, and 4 federal agencies for a one-day meeting.

Building off of the September meeting, CIMMS, in conjunction with NOAA's National Severe Storms Laboratory and SCIPP, submitted a proposal to NOAA to work with the Oklahoma National Guard on enhancing long-term preparedness. The project seeks to improve integration of climate and forecast information into National Guard operations to improve their ability to anticipate and respond to events that may require deployment. Climate change is increasing the frequency and severity of flooding, the intensity of hurricanes, and the frequency of large wildfires, all of which requires National Guard resources. The project will examine advance warning of significant events, use of Warn-on-Forecast information to keep deployed personnel safe, and examination of economic impacts of significant events on National Guard operations and facilities.

Additional discussions have resulted in further collaboration with Altus Air Force Base. A contingent from the Base visited the National Weather Center to expand upon discussions initiated from the September 2018 meeting hosted by SCIPP. The discussions led to connection to training opportunities for weather-related incidents, discussions about use of the Wet Bulb Globe Temperature thresholds used for training safety, and potential climatological analyses that can improve scheduling and operations. These topics will be examined in further detail in Fall 2019.

### September Meeting Stats

48

TOTAL PARTICIPANTS



6

OKLAHOMA MILITARY  
INSTALLATIONS

9



UNIVERSITY

WEATHER AND CLIMATE PROGRAMS



4

FEDERAL AGENCIES



### OKLAHOMA MILITARY INSTALLATIONS



\$10 mil +  
Value-Added  
Economic Activity

> 7% of Oklahoma's  
Economy

*Efforts continue to engage the military community within Oklahoma, and subsequent workshops are expected in the Fall of 2019*



# NEW AREAS OF FOCUS OR PARTNERSHIP

## Business Disruption from Hurricane Harvey

Small to medium sized businesses are especially susceptible to the effects of disaster. To gather more in-depth information about how disasters affect businesses, the National Institute of Standards and Technology (NIST) is launching a study of business disruption in several disasters. One of those locations is the Houston area with Hurricane Harvey.

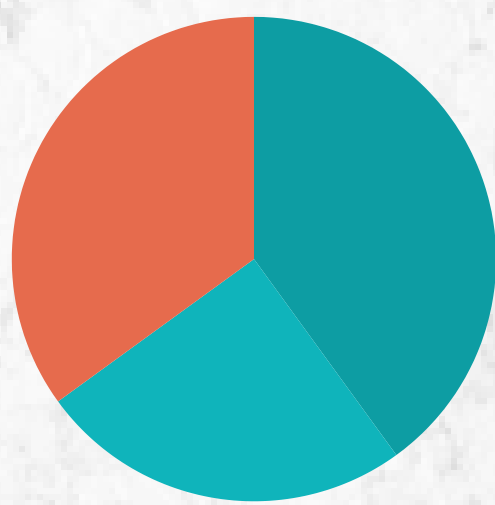
NIST’s coastal resilience initiative will focus on the western Gulf Coast (associated with SCIPP). NIST is developing a business disruption survey, which will be administered through SCIPP and the Texas Sea Grant partners to businesses in the affected areas.

In the Hurricane Harvey area, a special emphasis will be made to collect data from Hispanic- and Latino-owned businesses.

Currently, the survey instrument is complete, awaiting approval from the Texas A&M Institutional Review Board.

**Funding:** NOAA Office of the Chief Economist

## Businesses after a disaster\*



■ Did not reopen (40%) ■ Failed (25%)  
■ Other (35%)

\*FEMA estimates on business statistics after disasters, Insurance Information Institute, 2017.



## Weather Impacts on Monthly Crawfish Production across Louisiana

SCIPP researcher Vincent Brown and Louisiana Sea Grant Extension Agent Mark Shirley are working on studying the weather impacts on crawfish. The research goal is to understand how weather parameters influence the annual production of crawfish.

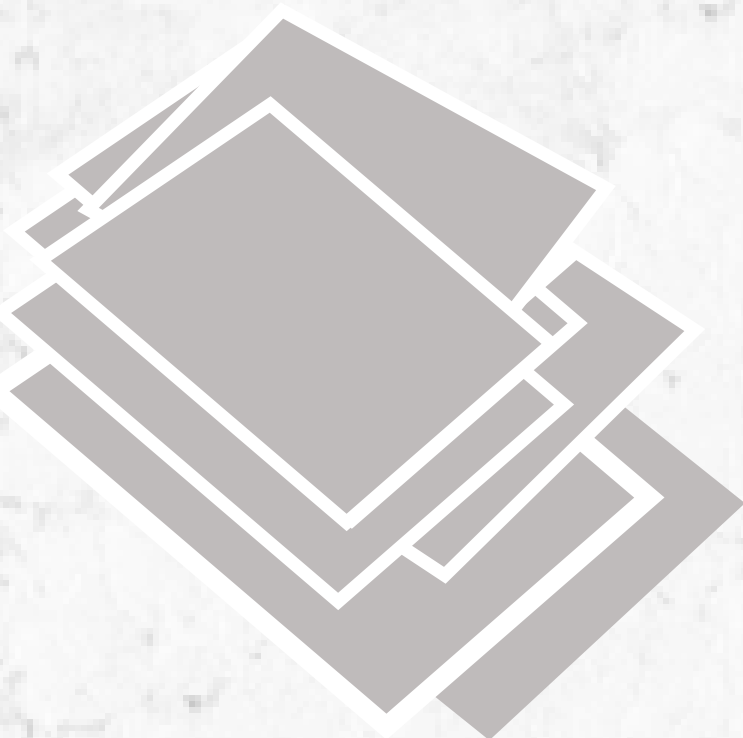
Results will be communicated through Sea Grant and Marine Extension Project meetings.

**Funding:** COCA

## Oklahoma Hazard Mitigation Working Group

SCIPP, along with representatives from the Oklahoma Department of Emergency Management, Oklahoma Chapter of the American Planning Association, Oklahoma Emergency Management Association, Meshek and Associates, LLC., City of Stillwater OK, and City of Duncan OK have formed a working group to address the challenges associated with increasing awareness and action related to hazard mitigation across Oklahoma. Rachel Riley is leading the working group. Although SCIPP has been working with emergency managers and planners for several years, the establishment of a working group and interest from the aforementioned organizations affirms the importance of improving hazard mitigation in Oklahoma.

**Funding:** SCIPP





# Building Resilience to Extreme Events and Water Hazard Planning in Remote, Rural Communities

## A Cross-RISA Project

The goal of this project is to reduce flooding risk from extreme events to small community water systems in Alaska and Louisiana through better information communication and networking. Researchers from both SCIPP and ACCAP are comparing rural case study communities of Nome, Alaska, Bethel, Alaska, and Terrebonne Parish, Louisiana, to understand the rural water and wastewater manager extreme event information needs, and to identify key elements of regional networking, communication, and collaboration for small rural communities that can reduce risk and increase regional resilience to extreme events.

The ACCAP research team in Alaska will conduct in person interviews in the fall of 2019. The SCIPP research team in Louisiana will conduct in-person interviews late in the summer or fall of 2019 in one or two communities. The first is water and wastewater managers for Terrebonne Parish, where Houma serves as the Parish Seat and where a substantial tribal community is anchored. The second community will be either Charenton, Louisiana, where the Chitimacha Indian tribe resides or Elton and Kinder, Louisiana where the Coushatta tribe of Louisiana resides. The area of interest for this project, Southern Louisiana, has been experiencing ongoing flooding since January 2019 due to the ongoing Mississippi River flooding and flood management. The river is expected to fall below flood stage by July 23, 2019. Many of research project target communities are dealing with the current flood event.

**Funding:** SARP, with additional funding from SCIPP and COCA.



## FEMA High Water Mark Initiative

As part of the National Flood Insurance Program (NFIP), the High Water Mark (HWM) Initiative is a community-based awareness program that increases local communities' awareness of flood risk and encourages action to mitigate that risk.

As part of the project, communities post HWM signs in prominent places, hold a high-profile launch event to unveil the signs, conduct ongoing education to build local awareness of flood risk, and complete mitigation actions to build community resilience against future flooding. A variety of audiences, such as local officials, emergency management personnel, community leaders, as well as FEMA Regions, Federal, State, and local entities can learn more about the HWM Initiative in the sections below.

SCIPP Researcher Vincent Brown is working with Carol Franze with the Louisiana Sea Grant on making High Water Mark signs for public view, along with presentations and pamphlets, in Louisiana.

**Funding:** COCA



## The Role of Numeracy and Self-Efficacy in College Students' Understanding of Climate Tools

Numeracy is related to literacy except that it focuses on mathematical abilities. Self-efficacy is a belief that one is capable of doing something - in this case, understanding the weather and being able to interpret charts and graphs.

SCIPP researchers Renee Edwards and Barry Keim are studying the role of numeracy and self-efficacy in college student's understanding of climate tool. Preliminary results show that numeracy and self-efficacy for charts and graphs enhance the ability to understand climate tools. In addition, students believe that everyone and not just experts such as meteorologists should be able to interpret climate tools such as the hurricane cone of uncertainty.

**Funding:** Louisiana Sea Grant and SCIPP



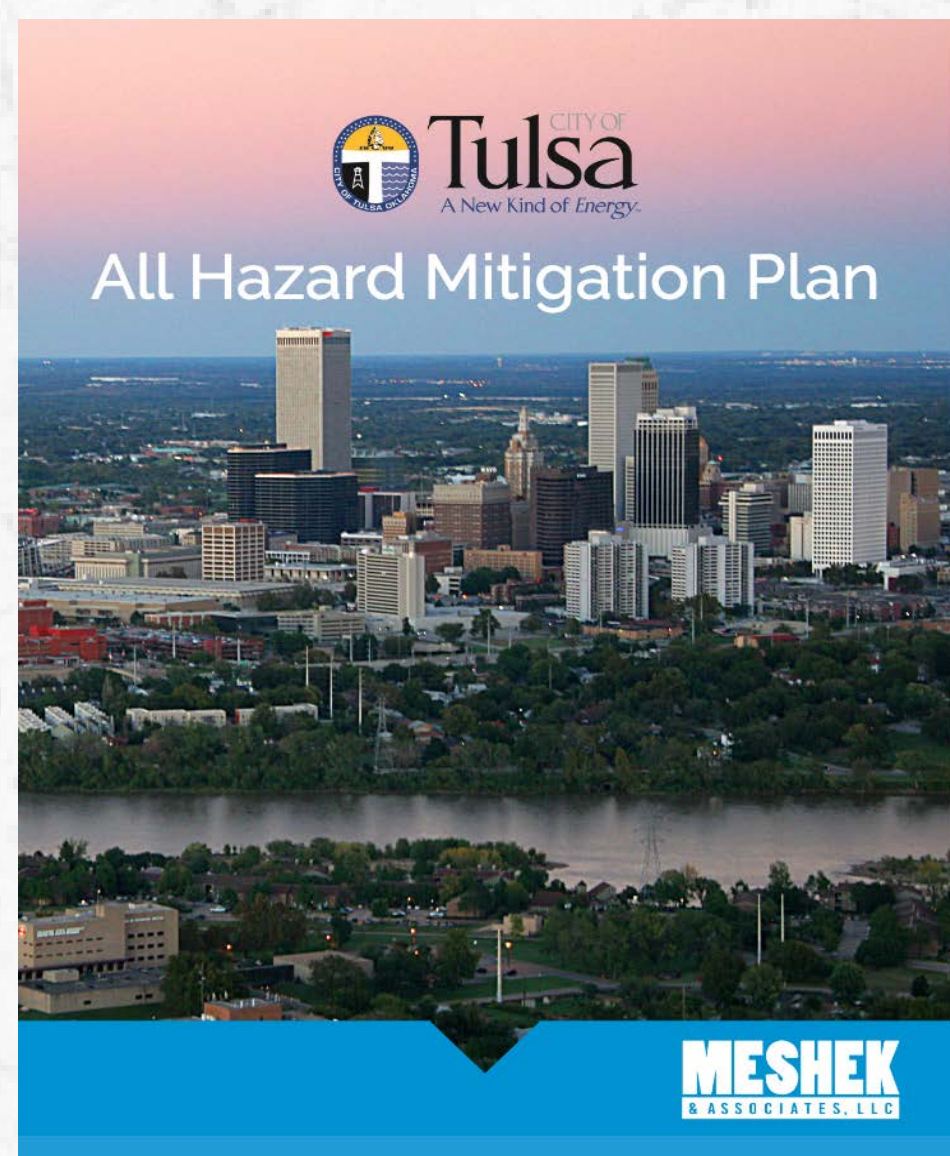
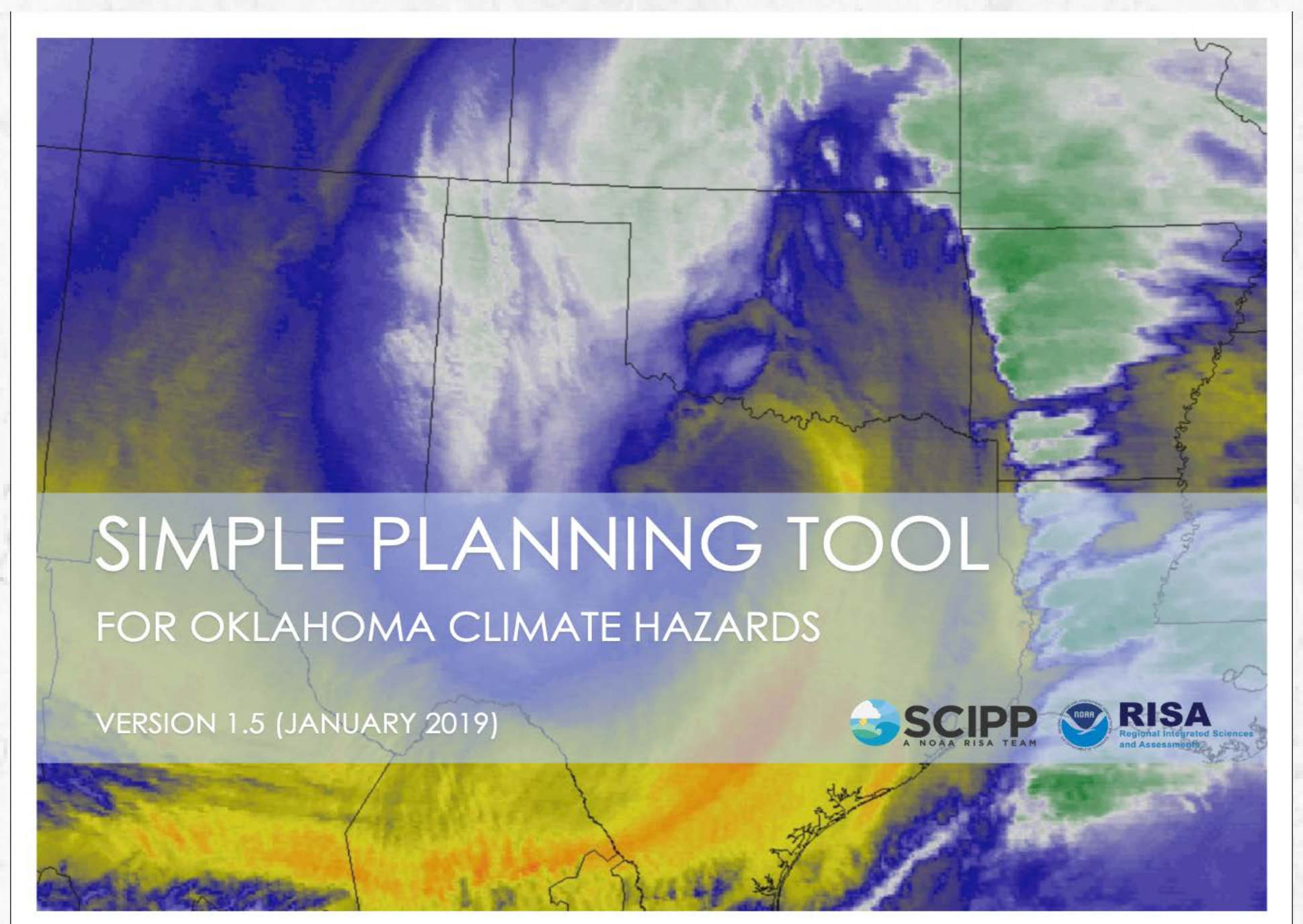
# OUTPUTS

## Regional & National

- The National Renewable Energy Lab and the U.S. Air Force are using SCIPP-created confidence scores on how climate stressors may change under different climate model scenarios for evaluating risk to their installations and prioritize mitigation strategies.
- The RISA network learned that their deliverables have been improving over time and that there has been an increase in the inclusion of important stakeholders in the RISA research process which is important for the continuation and improvement of research projects pursued by RISA teams.
- Preliminary revisions have been made to Probable Maximum Precipitation estimates for the states of **Arkansas, Louisiana, Mississippi and Oklahoma**. Dam owners in those states use the estimates when building or remediating dams.

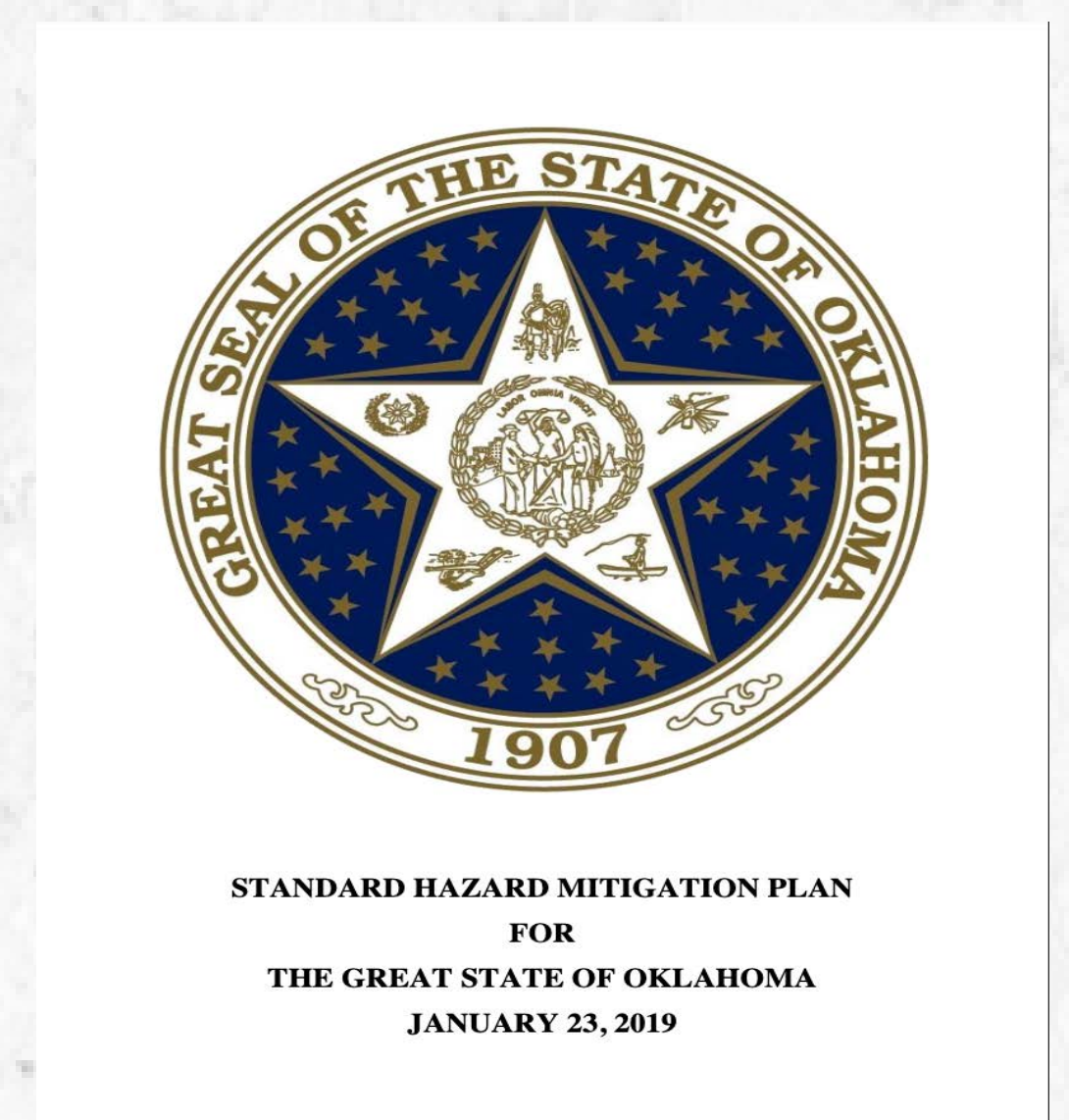
## State

- **Oklahoma** emergency managers, planners, and other decision makers can now use the Oklahoma Simple Planning Tool (Version 1.5), released in January 2019, to assist them with assessing their long-term climate risks.



- The Oklahoma SPT (released April 2018) was used for the hazard assessment portion of the 2019 **City of Tulsa** All Hazards Mitigation Plan, currently under review. The planning process was led by Annie Vest, Meshek & Associates, LLC.

- The state hazard mitigation officer for **Oklahoma** used the SPT (released April 2018) to inform the most recent update of the State of Oklahoma's Hazard Mitigation Plan, approved by FEMA in January 2019.

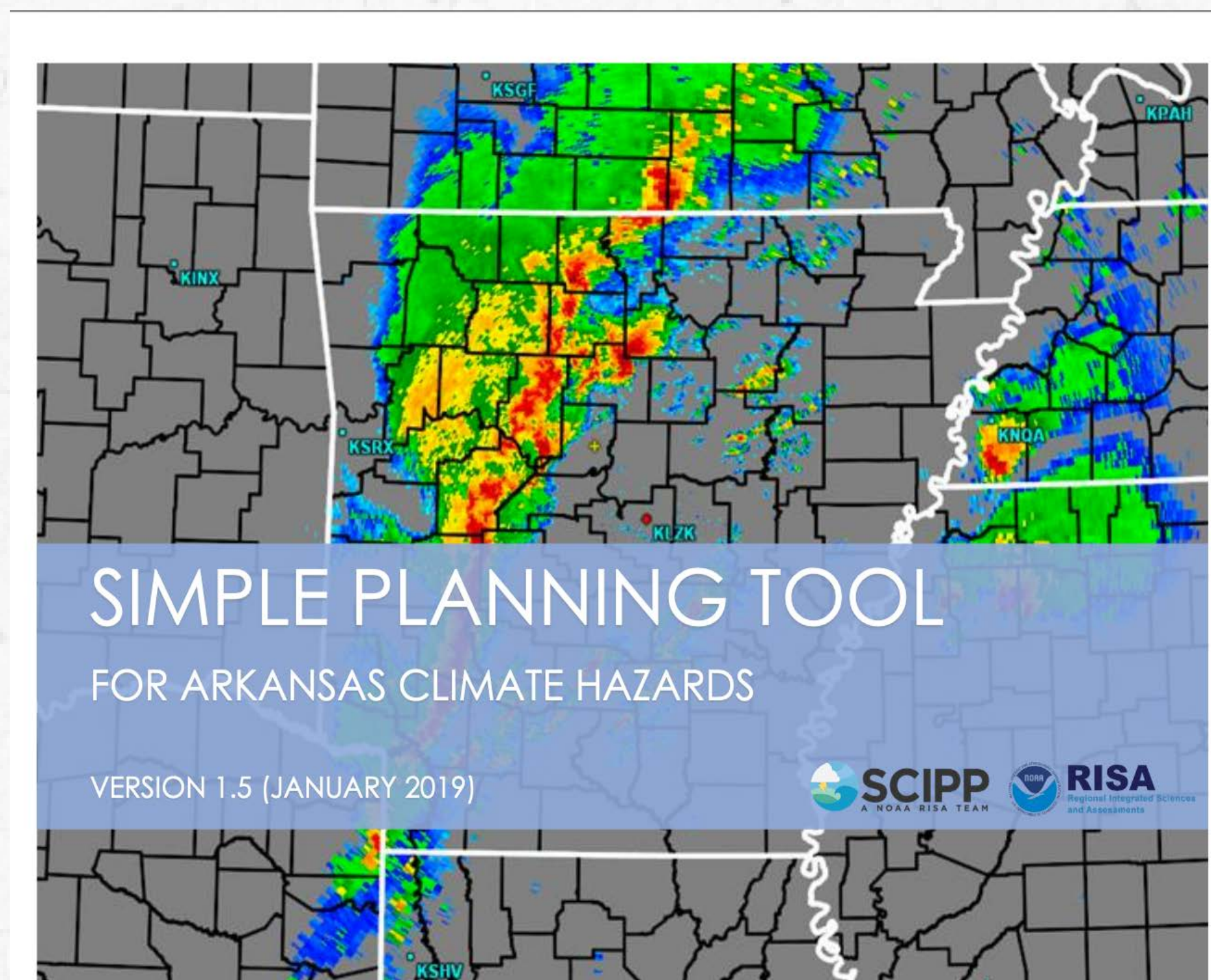




# OUTPUTS

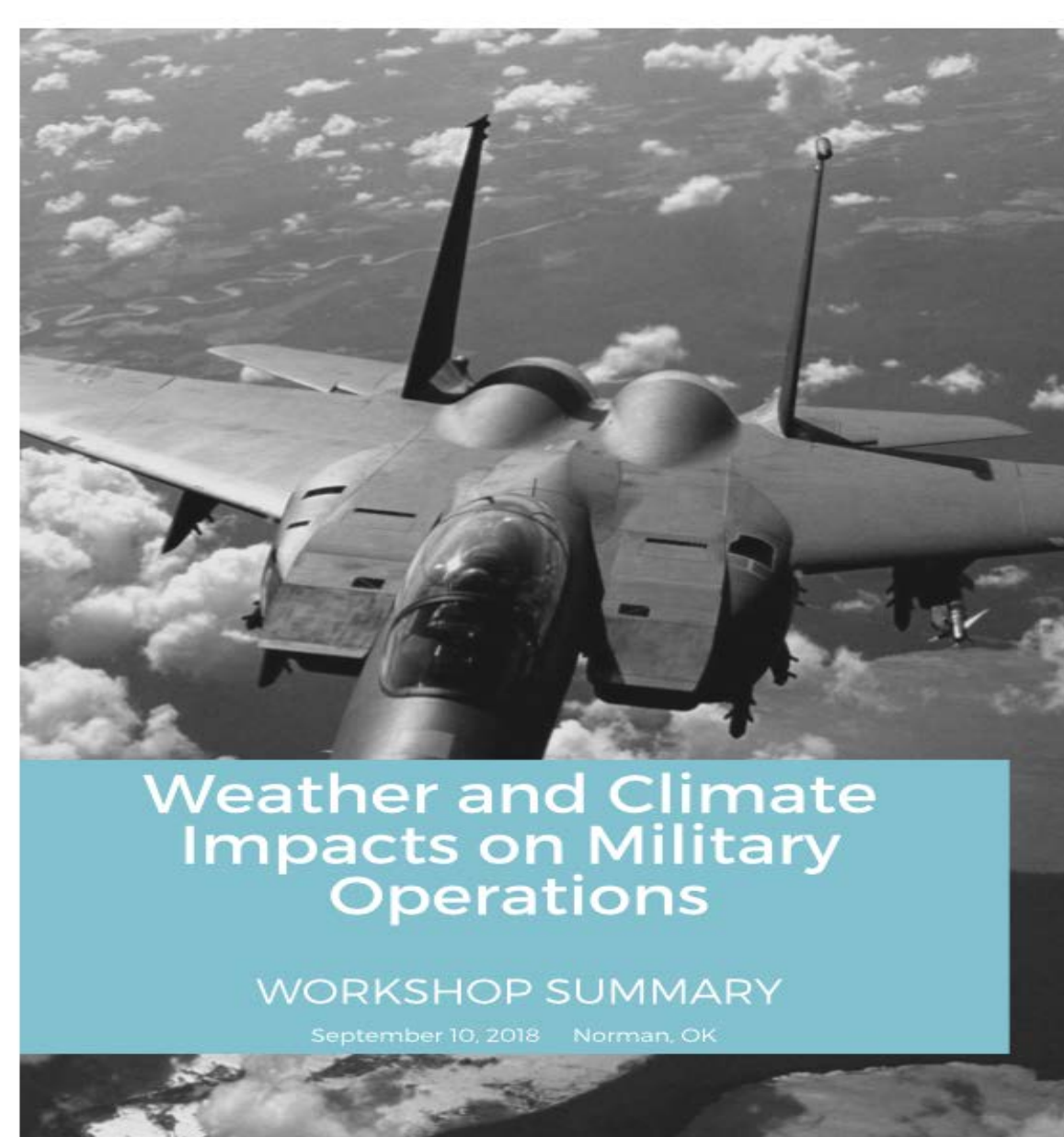
Some local and state emergency managers and planners in **Oklahoma** and **Arkansas** are using the Simple Planning Tools to assist them with their natural hazard-related risks assessments. Preliminary results from the ongoing SPT utility evaluation (see page 13) has revealed that, to date, stakeholder use of the SPT has informed a variety of plans including but not limited to 9 FEMA Multi-Hazard Mitigation Plan, comprehensive plan, emergency operations plan, economic development plan, master draining plan, and climate adaptation plan.

**Arkansas** emergency managers, planners, and other decision makers can now use the **Simple Planning Tool for Arkansas Climate Hazards**, released in January 2019, to assist them with assessing their long-term climate risks.



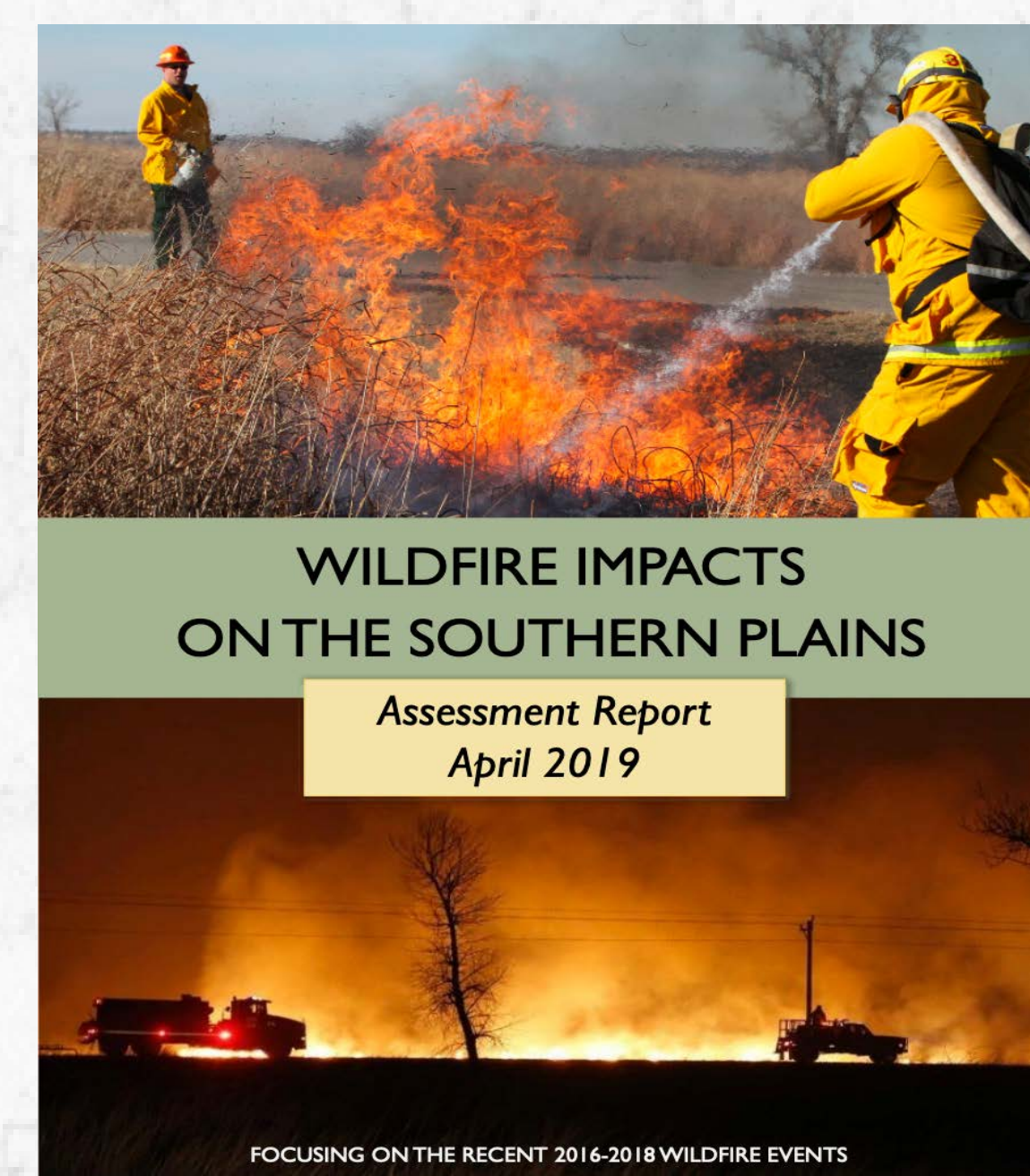
Emergency Managers and Broadcast Meteorologist in **Coastal Louisiana** have been provided with a better understanding of climate tools in order to improve their comprehensions and use of them in community preparation and communication.

Partners in the **Oklahoma** Drought Plan Advisory Meeting can utilize the summary report (see pg. 7) of the meeting to initiate additional steps toward updating the original State Drought Management Plan.



A summary report of the Weather and Climate Impacts on Military Operations is available for stakeholders to reference as they pursue additional workshops and funding opportunities.

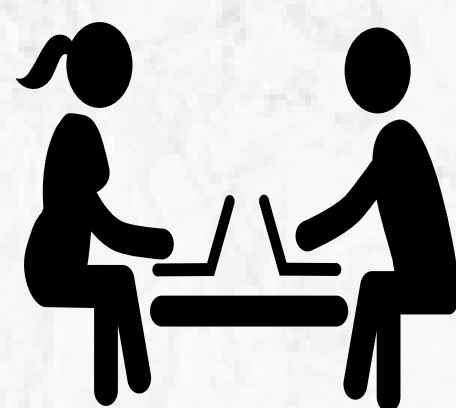
A summary report of the Wildfire Impacts on the Southern Plains Forum was highlighted by the USDA during a Congressional hearing, and has provided relevant information for additional communication between participants and researchers.





## Oklahoma Drought Plan Advisory Meeting

Prior droughts have caused losses in excess of \$1B in Oklahoma, including \$1.6B losses in 2011.



**Stakeholders:** Oklahoma Climatological Survey (OCS), Oklahoma Water Resources Board (OWRB), Oklahoma Emergency Management (OEM), Oklahoma Department of Agriculture, Food, and Forestry (ODAFF), National Drought Mitigation Center (NDMC)



**Primary Funding:** SCIPP

Oklahoma's drought plan was created in 1997. It is a drought response plan which outlines authorities and responsibilities among state agencies and entities. However, the plan pre-dates many drought monitoring tools and practices, including the U.S. Drought Monitor, new products from the Oklahoma Mesonet, new drought indices, and improved planning information from the National Drought Mitigation Center. SCIPP individually contacted agencies listed in the 1997 plan to discuss a meeting to refresh the state drought plan. A meeting was held June 6, 2018 at the National Weather Center in Norman.

The one-day event centered around discussion of the 1997 plan, drought monitoring, communication, response, collaboration, and suggestions for an updated plan that would reflect current practices. SCIPP used the support efforts for Arkansas as a template for Oklahoma's meeting, elements from Oklahoma's 1997 plan, best practices/models from NDMC in state drought planning, and new or improved tools for monitoring and communication. Results from the discussion have been synthesized in a report that has been delivered to the state's drought leadership (Oklahoma Emergency Management, Oklahoma Water Resources Board, and Oklahoma Department of Agriculture, Food, and Forestry) and meeting participants.

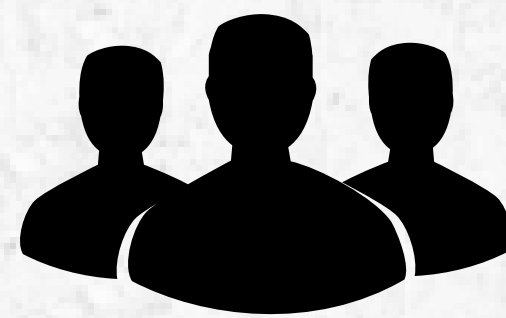
The report is posted on SCIPP's website:  
<http://www.southernclimate.org/documents/6June18DroughtMeetingSummaryReport.pdf>



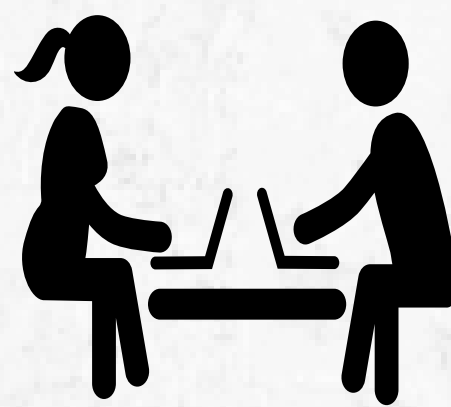
Oklahoma Drought Plan Advisory Meeting, June 6, 2018.



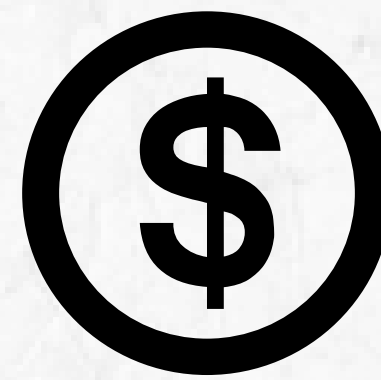
# Wildfire Impacts on the Southern Plains



**Partners:** Mark Shafer, Leah Shore, USDA Southern Plains Climate Hub (David Brown), Earth Observation and Modeling Facility (Xiangming Xiao)



**Stakeholders:** Farmers and Ranchers; Prescribed Fire Associations; Cooperative Extension; local National Resources Conservation Service and Farm Service Agency offices



**Primary Funding:** USDA Southern Plains Climate Hub

Photo Credit: Kayla Williams of  
the Buffalo Weekly News

Between 2016 and 2018, the U.S. Department of Agriculture (USDA) Southern Plains Climate Hub led a project to assess the impacts of the recent historic 2016 and 2018 wildfires on the Southern Plains. Titled the 2016-2018 Southern Plains Wildfire Assessment, this project was coordinated with multiple agencies and organizations across the region including SCIPP, University of Oklahoma's Center for Spatial Analysis, and the USDA Agricultural Research Service (ARS) Grazinglands Research Laboratory, among others. Elements of this project included three local stakeholder events across the affected region as well as a research component investigating characteristics of vegetation recovery within these areas. The findings of both are coupled in this assessment report to encourage the risk reduction measures of future wildfire recovery and preparedness efforts across the Southern Plains.

The stakeholder events included a large forum meeting in 2018 with more than 100 participants, as well as both pre-and post-form local stakeholder listening sessions. The goals of these events were to learn about local impacts and recovery perspectives, discuss federal aid programs, encourage collaboration and communication amongst participants, assess past and future wildfire climatological conditions, and promote future agricultural and wildfire preparedness.

A summary report was produced and can be found at the following link:  
[http://www.southernclimate.org/documents/Wildfire\\_Report.pdf](http://www.southernclimate.org/documents/Wildfire_Report.pdf)

From this large forum meeting, project team members were invited by Forum participants to several other meetings following the forum, including the Northwest [Oklahoma] Regional Taskforce Meeting (50 firefighters/managers) and the USDA National Institute of Food and Agriculture Panhandle Stakeholder Listening Session.



# OUTREACH: PRESENTATIONS

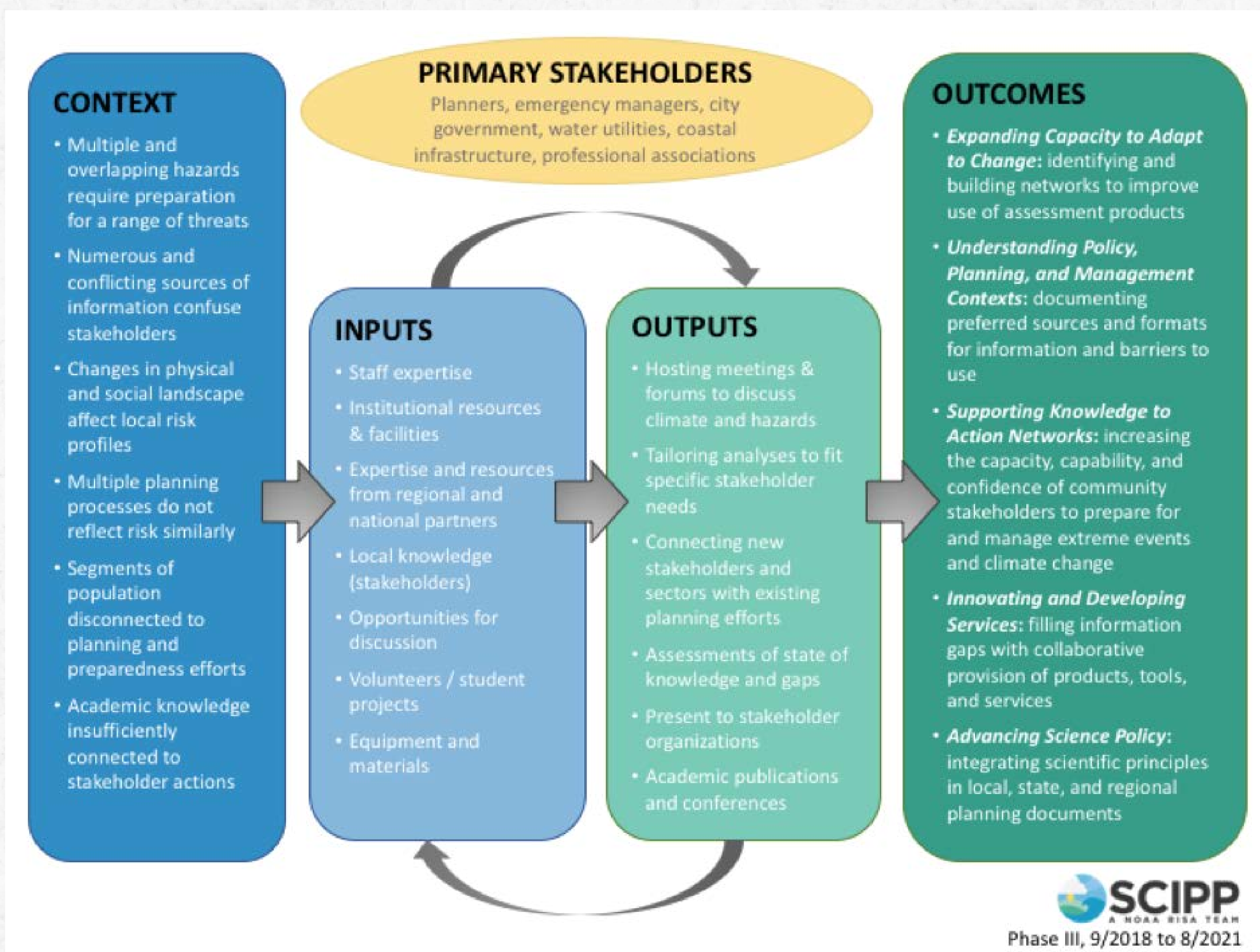
- *4th National Climate Assessment*, June 2018. Presented at the American Association of State Climatologists meeting, Nebraska City, Nebraska (V. Brown)
- Panel participant at the USDA Climate Change Indicators Panel, June 14, 2018. Washington, DC (M. Shafer)
- *The Rockefeller Foundation's 100 Resilient Cities Program: Shocks and Stressors*, July 16, 2018. Presented to the South Central Climate Adaptation Science Center Summer Interns, Norman, OK (L. Shore, M. Shafer)
- *Hazard Mitigation Planning in a Multi-Hazards Context*, July 25-27, 2018. Presented at the American Planning Association/National Drought Mitigation Center Drought Summit, Chicago, IL (M. Shafer)
- *Improving Hazard Planning: Simple Planning Tool Introduction and Mitigation Strategy Discussion*, August 2018. Presented at the Oklahoma Emergency Management Association annual conference, Norman, OK (R. Riley, L. Kos)
- *Baton Rouge Flood: August 2016*, August 8, 2018. Presented at the South Central Climate Adaptation Science Center Early Career Researcher Professional Development Training Workshop, Baton Rouge, LA (B. Keim)
- *South-Central Louisiana Flooding Event: August 2016*, August 13, 2018. Presented at the Louisiana Geological Survey Symposium 'The Baton Rouge Flood Event of 2016: What Happened, What We Did, What We Lost, and What We Learned', Baton Rouge, LA (B. Keim, V. Brown)
- *Tulsa's Climate Hazards*, September 2018. Presented at the City of Tulsa, OK mitigation planning progress meeting, Tulsa, OK (R. Riley)
- *Arkansas Natural Hazards Resilience Workshop II: Debut of the New Climate Hazard Planning Tool*, September 2018. Organized and presented at the workshop in conjunction with the Arkansas State Chapter of the American Planning Association's fall conference, Siloam Springs, AR (R. Riley, L. Kos)
- *Improving Hazard Planning: Simple Planning Tool Introduction and Adaptation Strategy Discussion*, October 2018. Presented at the Oklahoma Chapter of the American Planning Association annual conference, Midwest City, OK (R. Riley, L. Kos)
- *Hazard Mitigation Planning Tools*, October 2018. Presented at the Central Oklahoma Emergency Management Association meeting, Oklahoma City, OK (R. Riley)
- *Building Community Resilience*, October 2018. Presented to Oklahoma Weather Lab students. Norman, OK (M. Shafer)
- *Overview of Sea Level Rise and Coastal Flood Risk*, October 2018. Presented at the NAACP Experience, Environmental Climate Justice, Sea Level Rise, Coastal Flood Risk, and Social Vulnerability Training, Baton Rouge, LA (B. Keim)
- *What Does the Climate Hold for Agriculture?* October 2018. Presented at the 2018 Texas Section Society for Range Management Annual Meeting, Lubbock, TX (M. Shafer)
- *Weather and Climate Impacts on Military Operations Workshop*, November 2018. Presented on the RISA Monthly Call. (M. Boone)
- *Coastal Vulnerability in a Changing Climate*, December 2018. Presented at the Louisiana Ag Leadership Conference, New Iberia, LA (B. Keim)
- *Spatiotemporal Patterns and Recurrence Intervals of Tropical Cyclone Strikes for the Caribbean Islands from 1901 to 2017*, January 2019. Presented at the American Meteorological Society Annual Meeting, Phoenix, AZ (D. Thompson, B. Keim)
- *Assessing and Responding to the Impacts of 2016-2018 Wildfires on Agricultural Systems in the Southern Great Plains*, January 2019. Presented at the 24th Conference on Applied Climatology, American Meteorological Society Annual Meeting, Phoenix, AZ (L. Shore, M. Shafer on behalf of D. Brown and S. Robertson due to government shutdown)
- *The Influence of Cultural Worldviews and Risk Perceptions on Severe Weather Preparation*, January 2019. Presented at the 14th Symposium on Societal Applications, American Meteorological Society Annual Meeting, Phoenix, AZ (M. Shafer on behalf of A. Franklin, J. Le, M. Brucks)
- *Simple Planning Tool for Climate Hazards in Oklahoma and Arkansas*, January 2019. Presented at the 24th Conference on Applied Climatology, 99th Annual American Meteorological Society Meeting, Phoenix, AZ (R. Riley, L. Kos)
- *Deciphering Drought Through Technology and Tools* (panel discussion), January 2019. Presented at Water for Texas 2019, Austin, TX (M. Shafer)
- *Climate and Climate Change*, April 2019. Presented at the Greater New Orleans Clean Air Coalition Meeting, New Orleans, LA (V. Brown, B. Keim)
- *Using hazard planning as an avenue for climate action*, April 2019. Presented at the 4th Biennial National Adaptation Forum, Madison, WI (R. Riley)
- *Evaluating the utility of a new local climate risk assessment tool*, April 2019. Presented at the 4th Biennial National Adaptation Forum, Madison, WI (R. Riley, L. Kos)
- *COCA Updates*, April 2019. Presented on the RISA Monthly Call. (V. Brown)



# EVALUATION

SCIPP is working with Susanne Moser Research and Consulting to develop a set of processes and metrics that SCIPP will use to assess its output and outcomes. The process employs a utilization-focused evaluation strategy (Patton 1986) that includes goals clarification, conceptualizing causal linkages, process, and outcomes measures. Dr. Moser has conducted evaluation work with several other RISA teams and conducted research focused on adaptation to climate change, vulnerability, resilience, climate change communication, social change, decision support, and the interaction between scientists, policy-makers, and the public. All of these are elements of SCIPP and Dr. Moser's understanding of processes and metrics related to these processes will lead to a set of processes and metrics tailored to SCIPP activities that will permit connecting, to the extent possible, outputs with outcomes. One method to evaluate SCIPP is understanding the team's success within the logic-action model layout.

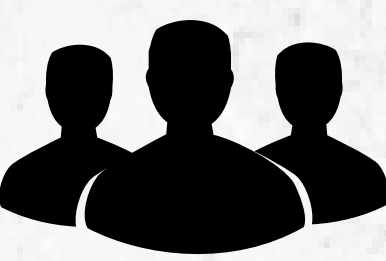
The logic-action model connects program actions directly to RISA's four core elements to address regional challenges and contribute to advances in knowledge about decision processes, climate variability, and climate change. The interactive arrows between inputs and outputs highlights the co-production process, in which stakeholders help define and develop outputs and outputs may affect changes in inputs to further refine the project. Collectively, this work within the context of other climate services provider organizations, stakeholder networks, and broader research and assessment products informs the outcomes of adapting to change, understanding context, supporting knowledge to action networks, innovating and developing services, and advancing science policy.



Logic-Action Model showing how SCIPP plans to connect the regional context of hazards and planning processes with RISA desired outcomes. The arrows between inputs and outputs show that the two are connected through an iterative co-production process with stakeholders.



Exploring knowledge management practices to enhance the use of science in decision making: A case study of NOAA RISAs

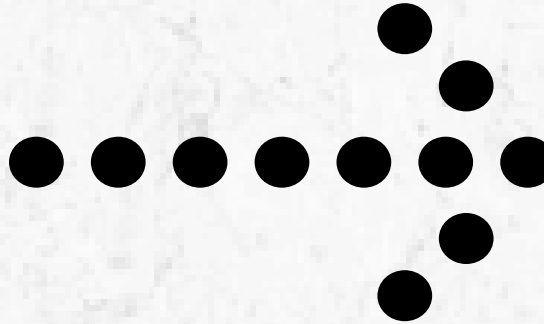
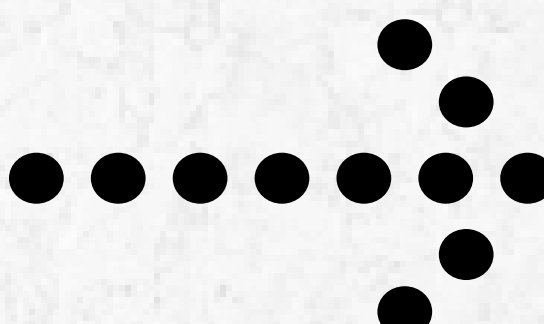
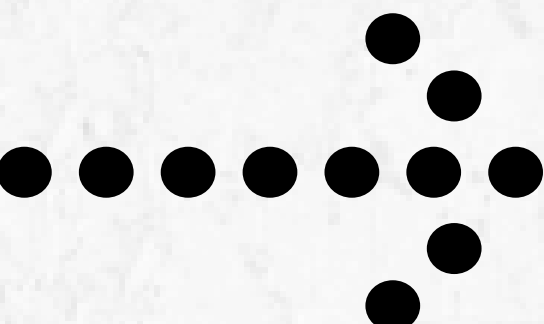
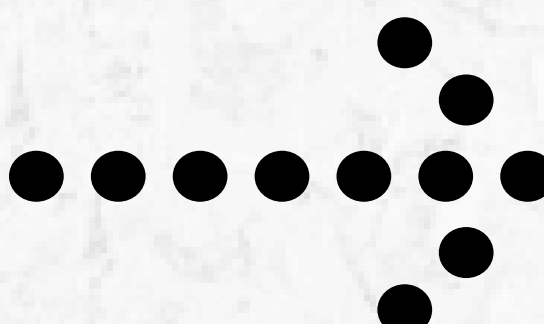
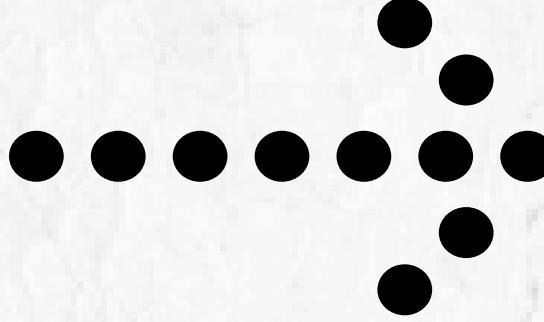
 Aimee Franklin

 Stakeholders: The RISA Network

Knowledge management examines the roles people take within organizations to generate, synthesize, archive, and disseminate information to stakeholders. Researchers at SCIPP sought to document knowledge management practices for acquiring and synthesizing information, disseminating research deliverables, and evaluating impacts among the RISA teams. Survey responses suggest that creating and disseminating project results in communication formats suitable for a range of stakeholders is hampered by the lack of slack resources for someone to function as the communication specialist. Participants identified potential advantages, as well as concerns, related to the introduction of RISA evaluation templates and comparable outcome measures to enhance professional and scientific knowledge utilization. These results inform suggestions for future knowledge management practices.

This mixed method research project reviewed content on RISA websites, interviewed key informants familiar with RISAs and conducted an online survey of RISA members. The survey asked about RISA knowledge management practices, stakeholders, communication tools and impacts measurement.

To further the accomplishment of planning objectives and to increase the efficacy of RISA teams, it is incumbent upon leaders to explore ways to better support RISA activities. In the knowledge management arena, RISAs are effectively making use of their human infrastructure to fill the roles previously discussed; but gaps exist.

Findings		Concerns or Suggestions
RISA program managers are responsible for most knowledge management roles, although PI's and others are tasked with some of the roles as well.		The participants also concluded that it would be difficult for a new person to step in and know where things are located.
Knowledge Gap: Only two of the ten RISAs had a dedicated communications specialist (or an outreach specialist).		A communications specialist could improve the efficiency of translating expert knowledge to the language/format best suited to the external stakeholder.
RISA teams produce information for a wide variety of stakeholders.		When asked if templates would be of use to stakeholders, a majority of respondents said they would be helpful for all stakeholders.
All survey respondents identified multiple communications tools that have been effective for them.		There is some indication that delivering research results in multiple formats for use by different stakeholders can be difficult to prioritize and keep up to date.
How RISAs identify use and impact varies		The majority of respondents believe that standardized metrics of impact might be useful, but it may be difficult to define meaningful metrics on a broader scale since each RISA caters to different regions and different stakeholders.



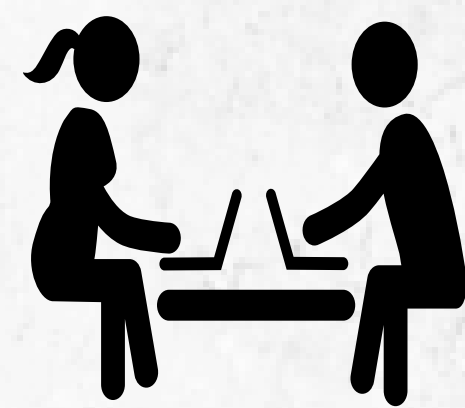
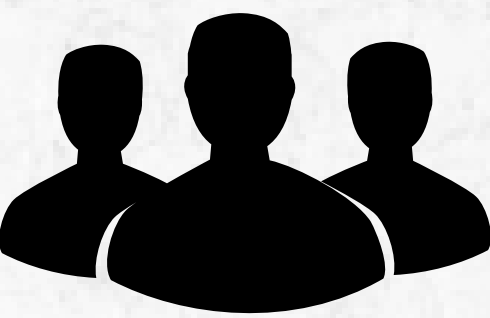
Communicating  
Climate Tools to  
Coastal  
Stakeholders

PI: Renee Edwards

Co-PIs: Barry Keim, Andrea Miller, Alex Haberlie

Graduate Students: Tryfon Boukouvidis, Marisa Karpinski

Community Partner: Josh Eachus, WBRZ in Baton Rouge



Stakeholders: Emergency Managers, Broadcast Meteorologists in coastal Louisiana



Primary Funding: Louisiana Sea Grant

Additional Support: SCIPP

Emergency managers are tasked with helping communities prepare for extreme weather events, while broadcast meteorologists provide information about weather that is used by both the general public and by decision-makers.

Better understanding of climate tools and greater awareness of communication problems will enhance their abilities to accomplish their mission.

Researchers recently administered an online survey of emergency managers and broadcast meteorologists in coastal Louisiana. Currently, researchers are conducting interviews with the listed stakeholders.

Preliminary findings show that the stakeholders show more variability in their use of climate tools than they show in their perceptions of them. This seems to suggest that their time is limited and they are most likely to turn to tools with which they are most comfortable and have the highest confidence. They face multiple communication challenges such as problems with their audiences not understanding important concepts and terminology.

INITIAL SURVEY  
RESULTS

National Hurricane Center  
Hurricane Cone of  
Uncertainty

HIGHLY USEFUL

Storm Prediction Center  
Convective  
Outlooks

MODERATELY USEFUL

US Drought  
Monitor

SOMEWHAT USEFUL

19

PARTICIPANTS

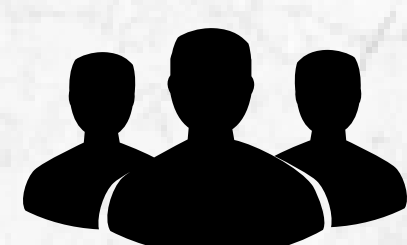
30%

Response Rate

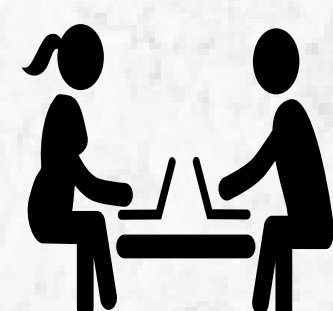




## Evaluation of the Utility of a Stakeholder-Driven Climate Hazard Assessment Tool



**PIs:** Rachel Riley



**Stakeholders:** Oklahoma and Arkansas Emergency managers and city and regional planners, FEMA Region VI, climate service providers



**Funding:** SCIPP

An evaluation of the utility of the Simple Planning Tools (SPT) for Oklahoma and Arkansas Climate Hazards, a stakeholder-driven climate hazard assessment tool produced by SCIPP, was conducted during the reporting period. Data analysis is underway as of this writing. In total, 104 emergency managers and planners from the two states participated in the survey. Forty participants were aware of the SPT and 19 had used it at the time of the survey. The current user group is relatively small but preliminary results show the SPT being useful. Its impact will likely grow as plans are updated (many plans are updated on 5- or 10-year cycles). A few results from the evaluation are highlighted below.

"The SPT made it very easy to find the information I need quickly. Without it, I'm not sure I would really know where to begin." –County Emergency Manager serving a jurisdiction with a population between 100,000 and 499,999.

**Table 1.** Results to the question, "What have you used the SPT for or plan to use it for?" Select all that apply.

Response Options	SPT Users (%)
To become better informed about an issue	68.4
To gather information for a plan	63.2
To gather information for a presentation or meeting	47.4
To inform a new decision	42.1
To gather information for an elected official	31.6
To justify a decision that was already made	15.8
Other (please describe)	5.3

**Table 2.** Results to the question, "What impact has the SPT had on your work, if any?" Select all that apply.

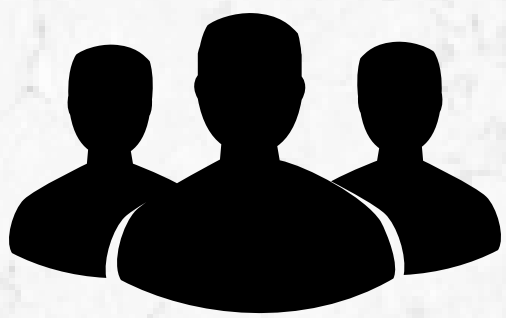
Response Options	SPT Users (%)
It helped me gather more comprehensive hazard data than before	57.9
It saved me time	36.8
It helped me communicate more effectively to an elected official	31.6
It helped me communicate more effectively to a colleague or stakeholder (non-elected official)	26.3
It helped me get a plan approved	15.8
It helped me obtain or be eligible for funding	15.8
No Impact	10.5
Other (please describe)	10.5

When asked what they have used the SPT for or plan to use it for, about two-thirds of SPT users selected "to become better informed about an issue" and/or "to gather information for a plan". Table 1 shows the full results for the question. When asked what impact the SPT has had on their work, a majority (57.9%) selected "It helped me gather more comprehensive hazard data than before." See Table 2 for the complete results of the question. Additionally, several participants identified plans that have been informed by the SPT so far and include: FEMA multi-hazard mitigation plan, comprehensive plan, emergency operations plan, economic development plan, emergency action plan, emergency response plan, master drainage plan, stormwater plan, corridor plan, comprehensive water plan (quality or quantity), climate adaptation plan, evacuation plan, land use plan, and transportation plan.

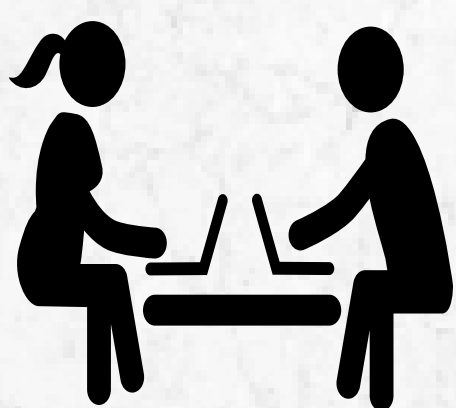


# NEXT STEPS

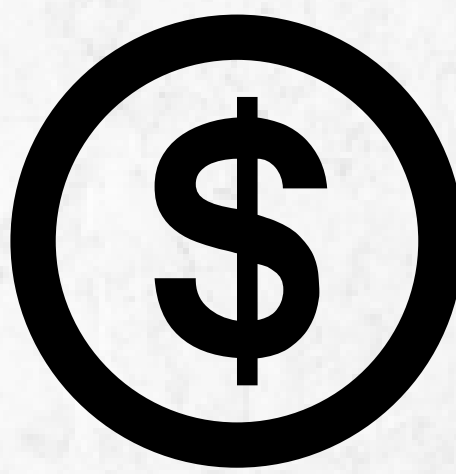
## Probable Maximum Precipitation Study for Arkansas, Louisiana, Mississippi, and Oklahoma



**Team:** Barry Keim (LSU-SCIPP), Bill Kappel (Applied Weather Associates LLC), Whitney Montague (Arkansas State Climatologist), Ed Knight (Louisiana Dam Safety Program Manager – Louisiana Department of Transportation), Devan Mahadevan (Federal Energy Regulatory Commission), Zachery Hollandsworth (Oklahoma Water Resources Board)



**Stakeholders:** Dam Owners in Arkansas, Louisiana, Mississippi, and Oklahoma; Federal Energy Regulatory Commission, Dam Safety Offices in Arkansas, Louisiana, Mississippi, and Oklahoma.



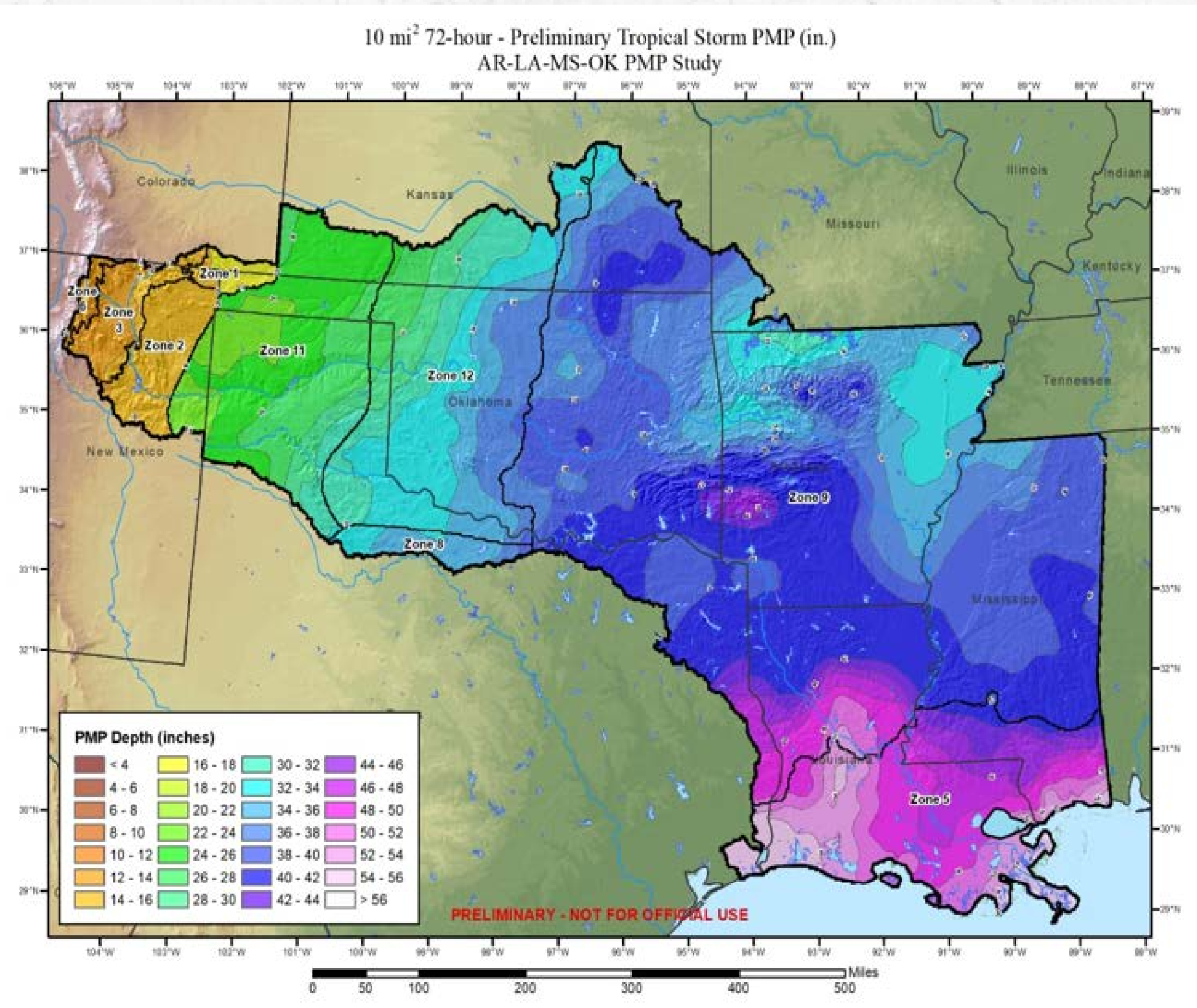
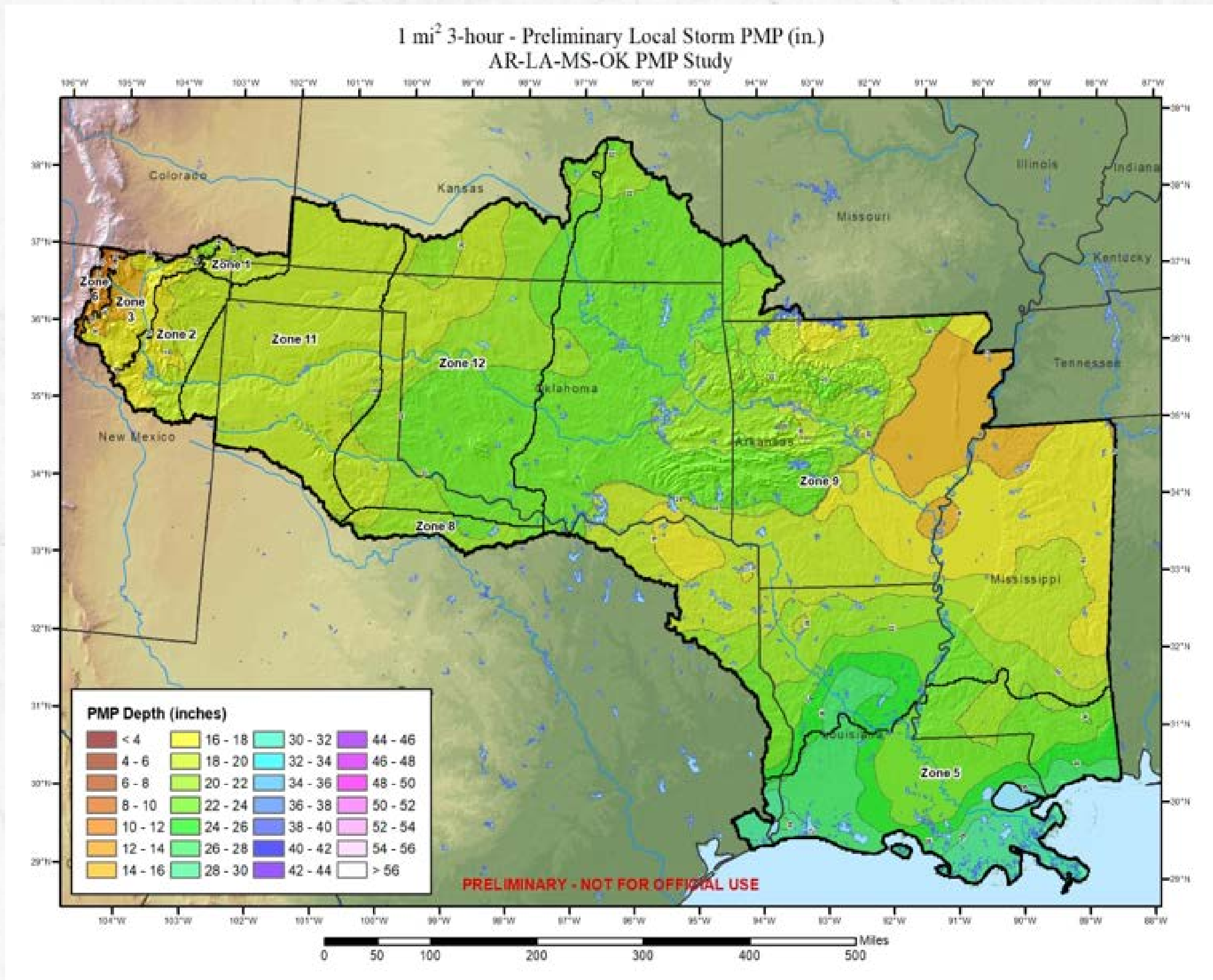
**Primary Funding:** SCIPP

**OVER THE NEXT YEAR**, this effort will culminate with the production of estimates of Probable Maximum Precipitation (PMP) from 1 square mile to 20,000 square miles and for durations from 1 hour to 120 hours.

All high hazard dam owners in the four-state region will need to build or remediate their dams to be able to safely pass the flood (probable maximum flood) that is produced by the PMP.

Preliminary findings indicate that across most of the four state region, PMP estimates will be reduced relative the document that is being superseded – NWS’s Hydrometeorological Report No. 51. As a result, this work will lead to reductions in the overdesign of dams, with estimates of savings ranging between \$50-100 million for dam owners in the first year alone. These findings (lower PMP estimates) will also lead to increased water storage capacity during severe storms, which will mitigate flooding damage.

This project is a joint effort between the client – Applied Weather Associates, with oversight to the project provided by SCIPP (Barry Keim), other state climatologists in the region, dam safety officials from each of the four states, and representatives from the Federal Energy Regulatory Commission.



The following two graphics show the 1 square mile, 3-hour PMP rainfall for the region for Local (Convective) storms, while the second graphic shows the 10 square mile, 72-hour PMP for a tropical storm.

*HMR 51, which has been the guiding document for since 1978, is now over 40 years old. Much has been learned about severe storms that enables us to produce better estimates of the Probable Maximum Precipitation now, than in the 1970s.*

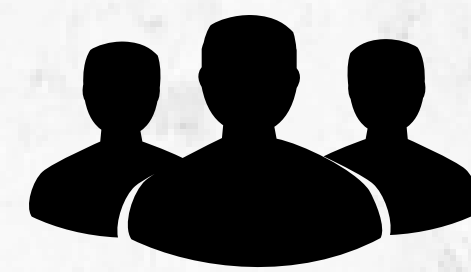


# Addressing disconnects between planners and emergency managers

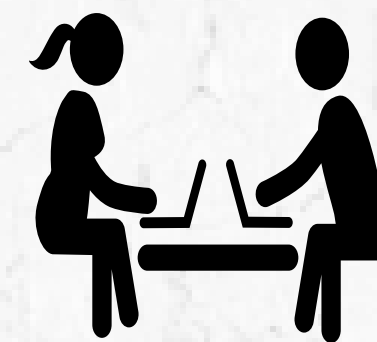
One of the primary barriers to improving hazard and climate adaptation planning and implementation, aside from staffing and funding limitations which cannot be addressed by RISA teams, is the disconnect between emergency managers, planners, public works engineers, and environmental or resiliency professionals. The professions frequently are disconnected within the structures of city management, in their training and skills, approaches to problem solving and communication, conceptions of public service, and attitudes towards the public. This research project, which began in September 2018, seeks to understand the disconnects on a deeper level and determine how best to address them. Six counties within the SCIPP region that include cities with populations ranging from 50,000 to 400,000 have been selected for inclusion in the study based on several criteria that will facilitate comparison.

Hazard risk reduction is a mandated component of FEMA multi-hazard mitigation plans and should be included in other types of community plans but may not be due to varying local mandates. Virtually every county and state in the national engages in pre-disaster mitigation planning. However, research indicates that mitigation efforts often fail to cross disciplinary boundaries and engage a diverse array of stakeholders, particularly as it relates to long-range land use planning to steer development out of hazardous area. Pinpointing specific economic impacts is challenging, particularly in terms of losses avoided, but assuredly improved mitigation planning yields public and private economic benefits. National consensus studies employing cost-benefit analysis methods indicate that hazard mitigation efforts return \$4 of more for every \$1 invested.

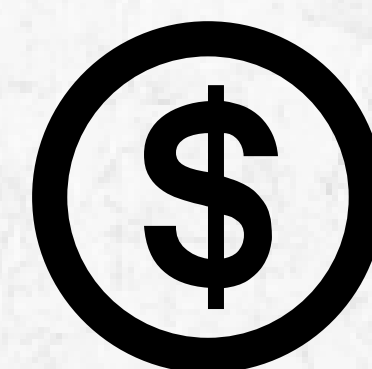
Tasks that have been completed to within the reporting period include: Determining research design, initial prospecting with each city, obtaining plans for each city, establishing a plan coding protocol, and analyzing the content of two Tulsa OK plans. The next steps in this research include coding and analyzing the thirty-five relevant plans across the cohort that were identified during prospecting and interviewing key stakeholders responsible for leading local hazard planning efforts to understand if and how disconnects exists across professional disciplines and with what impacts.



**PIs:** Ward Lyles, Rachel Riley, Penn Pennell

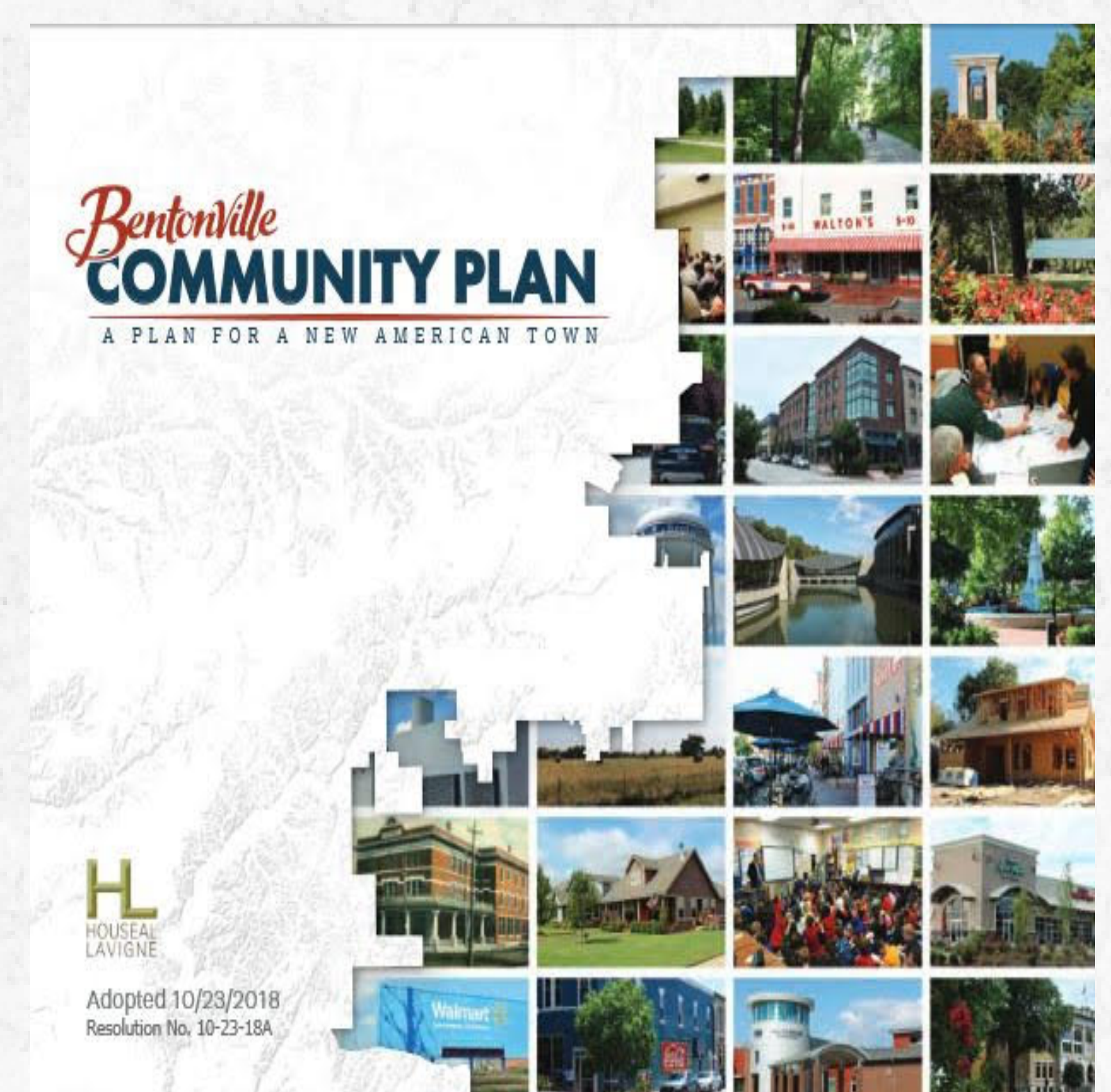
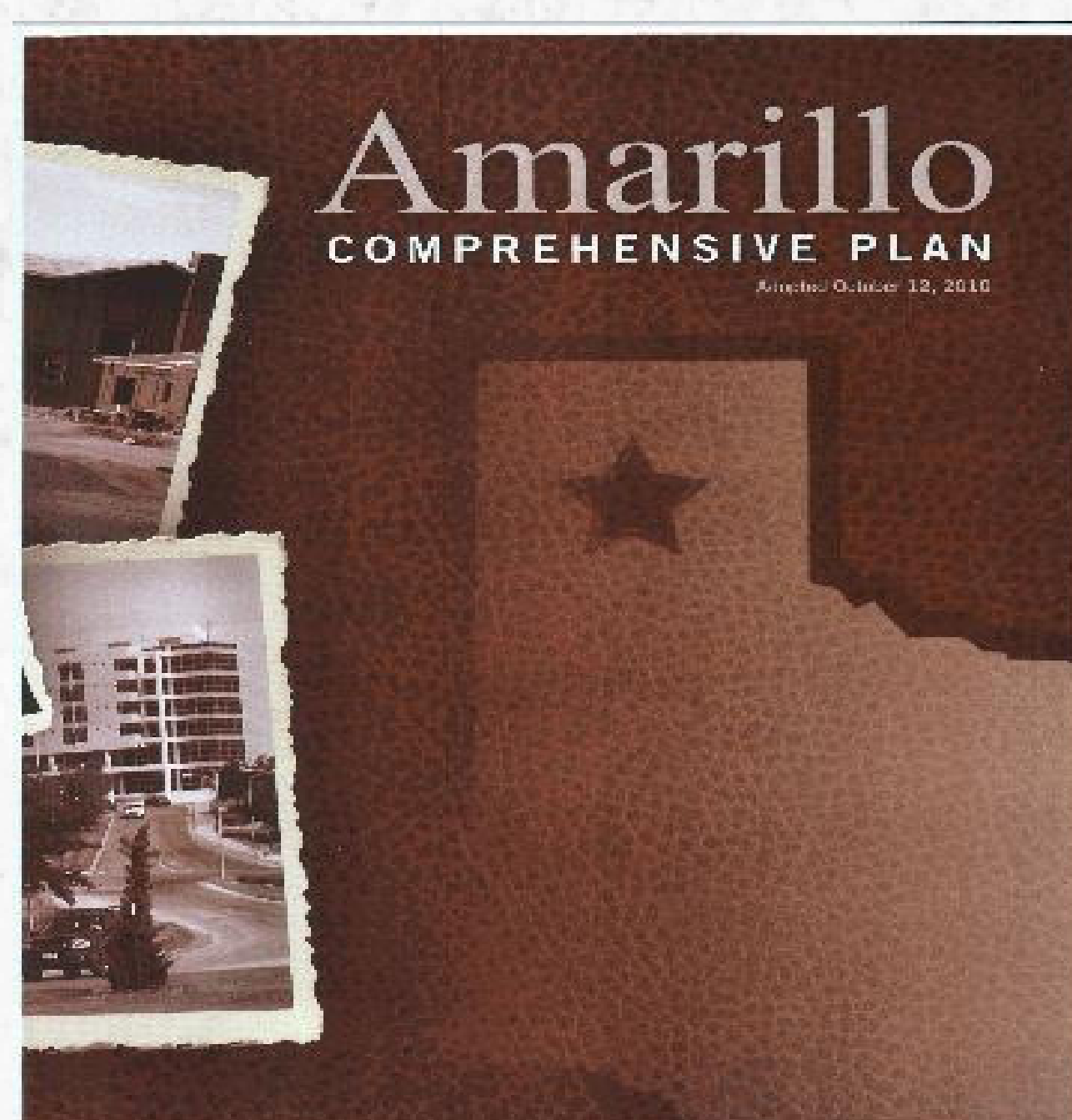
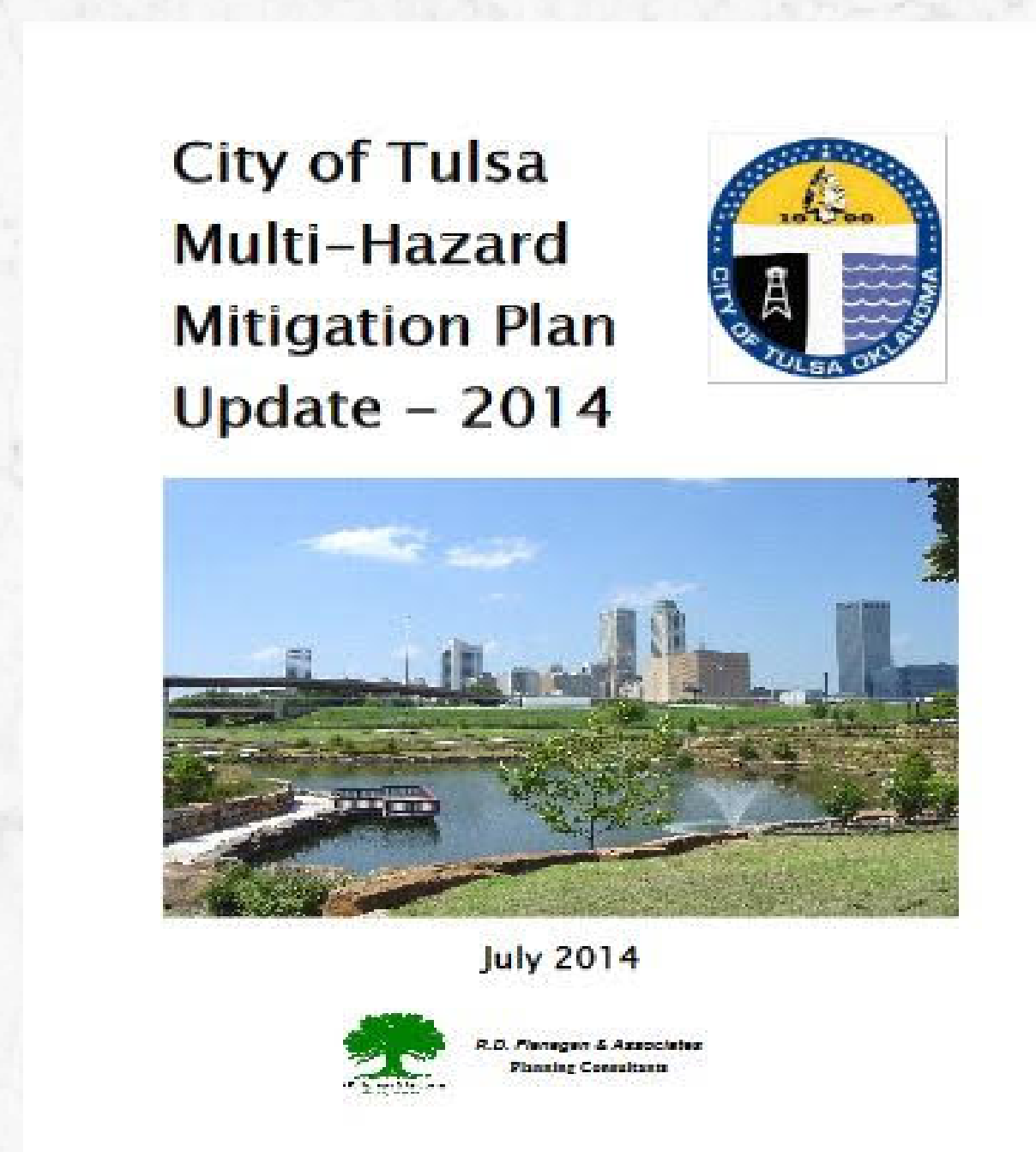


**Stakeholders:** Planners, emergency managers, public works engineers, and related public officials in six case study locations including Tulsa County OK, Potter County TX, Sedgwick County KS, Payne County OK, Benton County AR, and McLennan County TX



**Funding:** SCIPP

*The following are planned for 2019 and 2020: presentations at the 2019 Natural Hazards Research and Applications Workshop (Colorado) and the 2019 International Association of Collegiate Schools of Planning Conference (South Carolina), a 1-3 page policy brief and peer reviewed paper.*

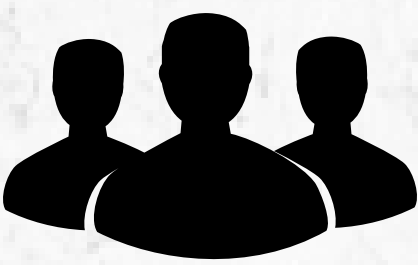


Cover photos for three of the 35 plans that will be coded and analyzed as part of this study.



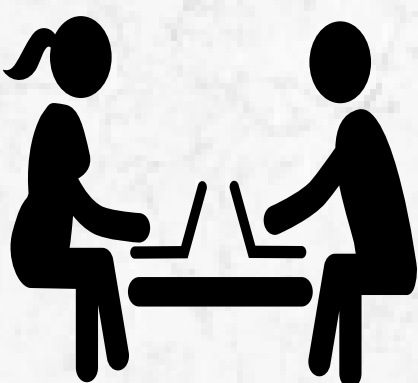
# NARRATIVE CASE STUDY

## U.S. Air Force Civil Engineer Center Energy Resilience Risk Assessment Tool

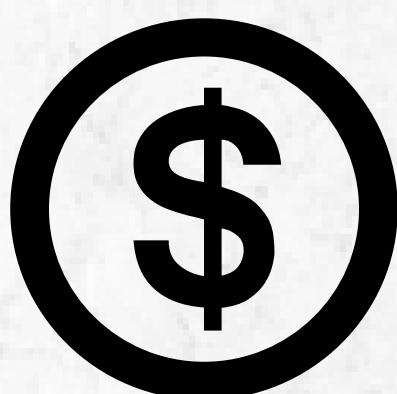


**LSU:** Barry Keim, Alan Black, Vincent Brown, Derek Thompson, Nick Grondin, and Stephen Kreller

**National Renewable Energy Lab:** Lissa Myers



**Stakeholders:**  
National Renewable Energy Lab, United States Air Force



**Funding:** National Renewable Energy Lab, SCIPP

SCIPP has previously partnered with the National Renewable Energy Laboratory (NREL) and the Strategic Petroleum Reserve (SPR) to develop a climate change resilience plan for the SPR. Mission-critical objectives of SPR were identified and the impact of current climate on SPR’s ability to meet those objectives was assessed.

This previous work led to NREL partnering with SCIPP researchers again to provide technical assistance for the development of tools. Researchers prepared confidence scores on how climate stressors (e.g., temperature, sea-level rise, precipitation, etc.) would change under different climate model scenarios for 2050 and 2100.

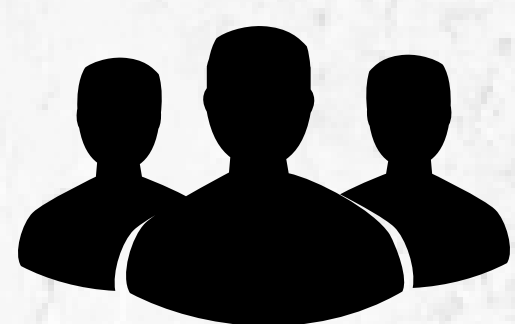
The National Renewable Energy Lab is developing a tool / app that highlights Air Force installation vulnerabilities to the climate stressors (i.e. what will potentially be at risk).



“The Department of Defense has recognized climate change as a growing threat to national security. The Fiscal Year 2018 National Defense Authorization Act, Section 335 established a requirement for the Department of Defense to report to Congress by December 2019 on vulnerabilities to military installations and combatant commander requirements resulting from climate change over the next 20 years. The Air Force has established a vision of “Mission Assurance through Energy Assurance” and is proactively developing methods to evaluate risks to its installations and prioritize mitigation strategies.”



# Improving local capacity of early warning systems for drought across North America



**Partners:** Mark Shafer (SCIPP), Commission on Environmental Cooperation (Secretariat); others on the drought project include NDMC, NCEI, CPO, NIDIS, APA, along with counterparts in Canada and Mexico



**Stakeholders:** Drought information and forecast providers

SCIPP is participating in this project as a member of the steering committee. SCIPP was invited to participate in the Commission on Environmental Cooperation (CEC) meeting held in Norman, Oklahoma, in June 2018. The meeting established an extreme events working group, which developed six potential projects, three of which were selected for funding by CEC in December 2018. The project below, on drought early warning systems, was selected with a budget of \$435,000 over two years. Other leadership from the U.S. group on the project includes the National Drought Mitigation Center, NOAA NCEI, NOAA CPO, NIDIS, and the American Planning Association. SCIPP and APA are particularly focused on objective 2 (increasing local capacity to use available drought information).

The economic, environmental, and social impacts of climate extremes across North America are significant. Not constrained by any nation's borders, drought and its attendant hazards, including wildfire, floods, and landslides, create significant costs for local communities. Coordination and communication between the United States, Canada, and Mexico during recent North American droughts have been essential for minimizing and lessening impacts, such as reduced agricultural productivity, large wildfire outbreaks, and water shortages. Coordinated and integrated drought monitoring and early warning systems may effectively and efficiently mitigate negative drought impacts.

Improved early warning systems and coordinated and integrated drought monitoring may effectively and efficiently mitigate negative drought impacts in areas such as agricultural productivity, large wildfire outbreaks, and water shortages.

Current drought early warning systems focus primarily at national and regional levels; at local levels, there remains uncertainty among many local planners, emergency managers, water managers, tribal leaders, the private sector, and other users about which early warning capabilities, monitoring indicators, and existing drought planning tools and resources are most appropriate and cost-effective to support local drought management. Further, it is critical to “nest” local drought early warning systems within larger-scale early warning systems and also to link local systems with other local systems, particularly in regional settings across transboundary geographies, in order to ensure effective information flows and rapid, low-cost drought response at all levels, from local to tri-national.

The first objective will center on production of a set of guidelines for use of North American drought indicators, which will address a need for understanding which indicators are best used for monitoring drought by local officials and individuals within specific climate regions of the continent (locally relevant indicators). Outcomes include clear guidance on drought indicators relevant to all three countries, which will **improve the ability of local communities to monitor and prepare for drought conditions**.

- The second objective will address a need to **increase local capacity to use available drought information for planning and risk management**, by comparing practices among each of the three countries to identify best practices for drought preparedness, planning, and mitigation. Outcomes include recommendations for local communities on **how to best access and utilize existing drought products and tools, and how to incorporate drought into multi-hazard risk management**.

- The third objective will build on and strengthen existing trilateral partnerships across North America by better assessing the use, and users, of the North American Drought Monitor (NADM), and by responding to user needs to improve NADM access. Outcomes include improvements in the current NADM product and the **development of new user-oriented tools, with an emphasis on transboundary regions across Canada, Mexico, and the United States**.

## \$9 billion

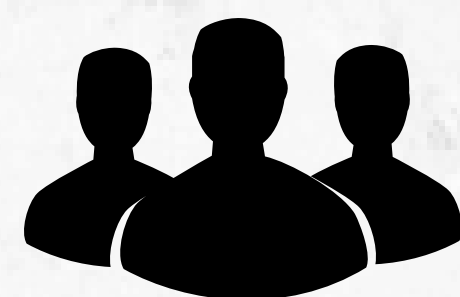
Estimated drought losses per year



## Drought Communication Resources

Drought Communication Resources is a “guide” that provides templates for information that local governments and others can share to inform drought management. The guide contains 6 topics: drought and your yard; drought and water quality; drought and wildfire; drought and wildlife; surface and ground water; drought and recent rainfall. Each topic includes a set of tweets, a one-page pdf “tip sheet”, a more in-depth explanation of processes and management techniques (designed as background information for local governmental officials), a list of additional resources, and a draft script for a short animated video. One video (surface and ground water) was produced as an example, a screenshot of which is included below.

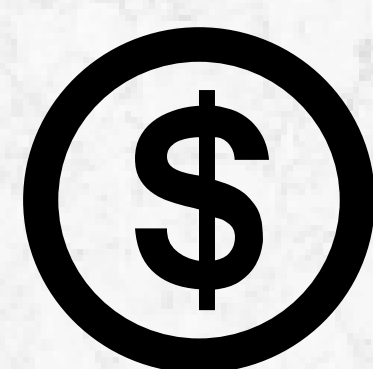
The document has not yet been released publicly but it is anticipated that stakeholders will be able to select tip sheets, tweets, and videos to share with their local networks (social media, websites) to improve conservation and drought management in their communities.



**Partners:** Mark Shafer, Margret Boone, National Drought Mitigation Center, participants from Oklahoma Drought Plan meeting



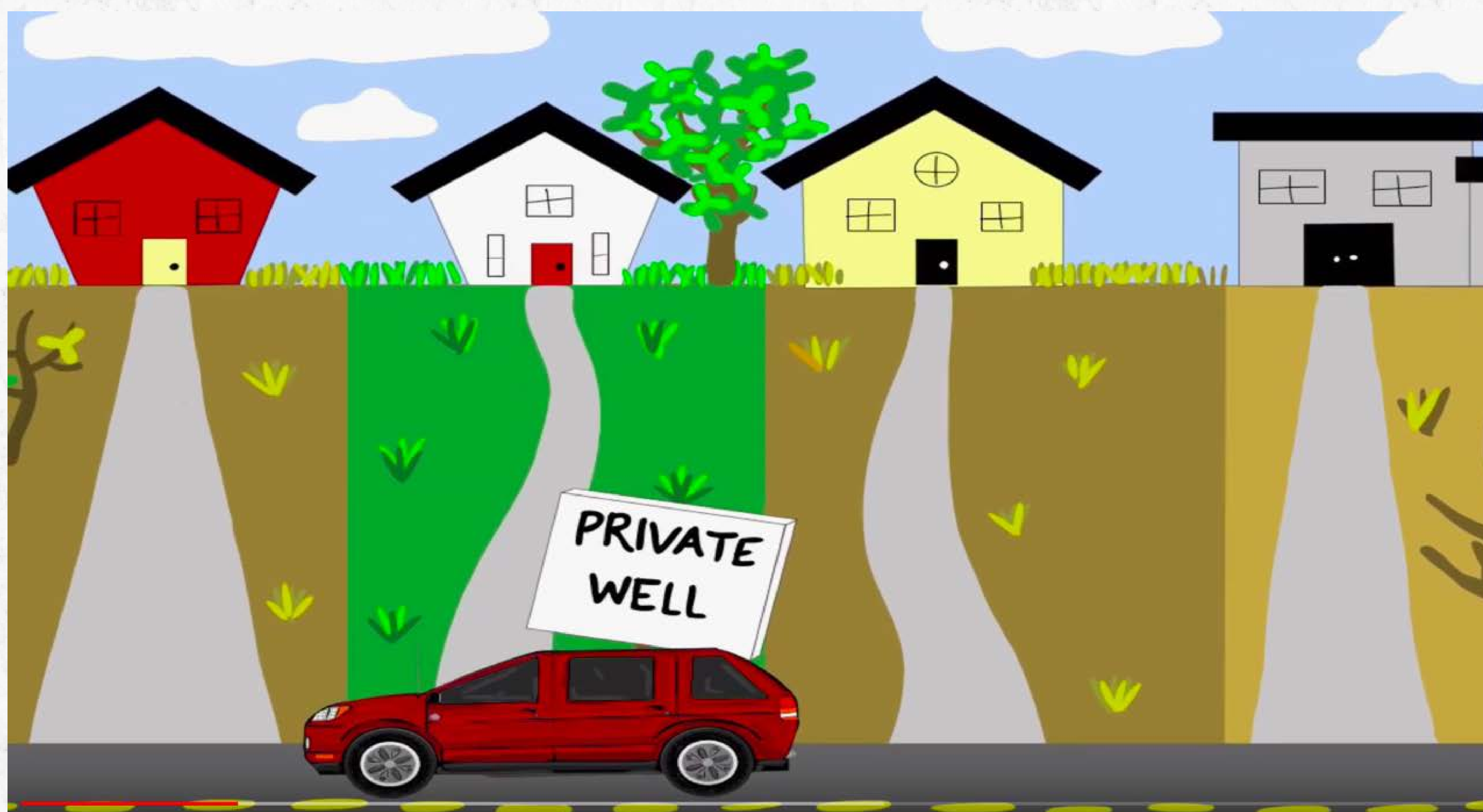
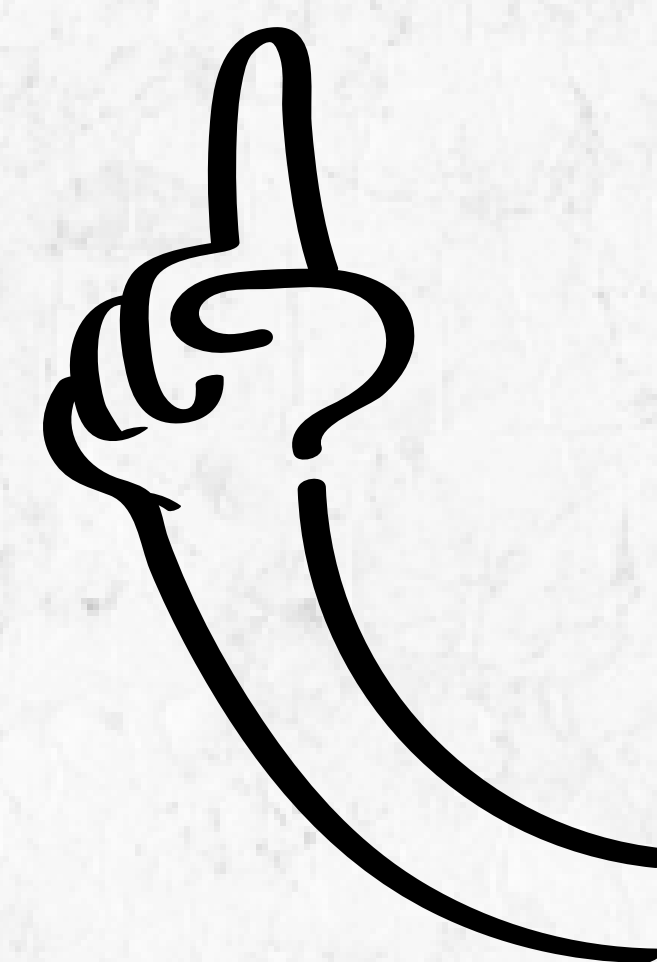
**Stakeholders:** Local governments (water utilities, city managers, emergency managers)



**Funding:** NIDIS

### IMPORTANT!

Local officials have to implement water restrictions and manage other local drought risks; this resource compendium provides more tools they can use to communicate with their communities.



Screenshot from educational video on Drought and Surface and Groundwater.



# FULL PUBLICATION LIST

Boone, M., L. Kos and M. Shafer, 2019: Weather and Climate Impacts on Military Operations Workshop Summary. Southern Climate Impacts Planning Program, 20pp. <http://www.southernclimate.org/documents/MilitaryOperationsWorkshop.pdf>

**Brown, V., A. Black, and B.D. Keim. In Press: An Hourly Rainfall Climatology of Louisiana. *Theoretical and Applied Climatology*.**

*This study will also examine rainfall rates, duration of dry spells, and diurnal rainfall patterns. This study advocates for further use of sub-daily precipitation data. This study introduces a climatology of hourly precipitation and investigates possible changes in the distribution of hourly rainfall by examining trends in the frequency of both percentile-defined (unique to each station) and fixed thresholds of hourly precipitation.*

Eachus, J. D, and B.D. Keim. In Press: A Survey for Weather Communicators: Twitter Information Channel Preferences. *Weather, Climate, and Society*.

**Franklin, Aimee L., A. Grossman, J. Le, and M. Shafer (2018): Creating Broader Research Impacts Through Boundary Organizations. *Public Administration Review*, 79(2), 215-244, <https://doi.org/10.1111/puar.12985>.**

*This article explores the broader impacts provided by these boundary organizations through the establishment of regional research agendas and the communication of research results in ways that influence regional public policy and promote adaptive management.*

Keim, B.D., W.D. Kappel, G.A. Muhlstein, D.M Hultstrand, T.W Parzybok, A.B. Lewis, E.M. Tomlinson, and A.W. Black (2018): Assessment of the Extreme Rainfall Event at Nashville, Tennessee and the Surrounding Region on May 1-3, 2010. *Journal of American Water Resources Association*, 54(2), 1001-1010, <https://doi.org/10.1111/1752-1688.12657>.

Kloesel, K. A., Bartush, B., Banner, J., Brown, D., Lemory, J., Lin, X., McManus, G., Mullens, E., Nielsen-Gammon, J., Shafer, M. A., Sorenson, C., Sperry, S., Wildcat, D., Ziolkowska, J. (2018). *Southern Great Plains. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. Washington, DC: U.S. Global Change Research Program, 987-1035. 10.7930/NCA4.2018.CH23. <https://nca2018.globalchange.gov/chapter/southern-great-plains>.

Mattox, M., 2018: Oklahoma Drought Advisory Meeting: Summary Report, Southern Climate Impacts Planning Program, 27pp. <http://www.southernclimate.org/documents/6June18DroughtMeetingSummaryReport.pdf>.

**Shao, W., B.D. Keim, S. Xian, and R. O’Conner (2019): Flood Hazards and Perceptions – A Comparative study of two cities in Alabama. *Journal of Hydrology*, 569, 546-555, <https://doi.org/10.1016/j.jhydrol.2018.11.070>.**

*The present study represents a unique effort to understand perceptions of flood hazards in light of the geographic background. These results show that people are attuned to their physical environments and take into consideration their personal observations when forming perceptions of natural hazards. Though this study focused on two cities in Alabama, the results are applicable to any coastal region, specifically the SCIPP states of Texas, Louisiana and coastal Mississippi, who experience both inland and coastal flooding.*

Shore, L., 2019: 2016-2018 Southern Plains Wildfire Assessment Report, Southern Climate Impacts Planning Program, 26pp. [http://www.southernclimate.org/documents/Wildfire\\_Report.pdf](http://www.southernclimate.org/documents/Wildfire_Report.pdf).

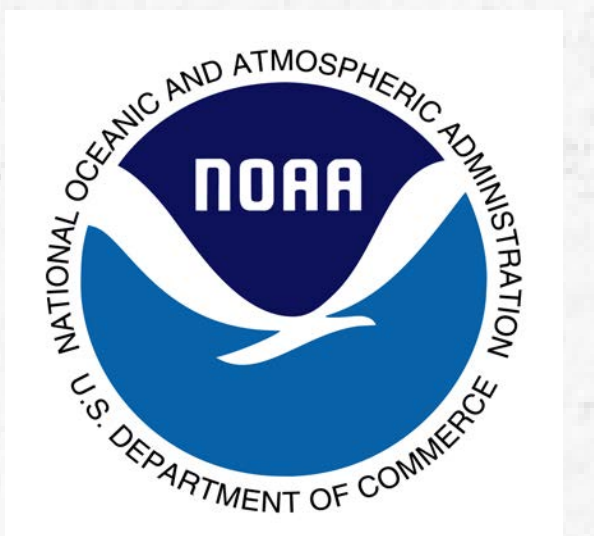




**SCIPP**  
A NOAA RISA TEAM



**KU** INSTITUTE FOR POLICY  
& SOCIAL RESEARCH  
The University of Kansas



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