



ANNUAL REPORT

APRIL 2013 - MAY 2014



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3. OUTREACH ACTIVITIES
4. KEY PUBLICATIONS
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SCIPP Project Team

The Southern Climate Impacts Planning Program team consists of the following investigators, core office staff, research & support staff, summer interns, and graduate students from the University of Oklahoma (OU), Louisiana State University (LSU), Texas A&M (TAMU), and the National Drought Mitigation Center (NDMC). SCIPP's Stakeholder Services Committee (Advisory Committee) is also detailed below. Team personnel are current as of May 31, 2014.

Principal Investigators



Mark Shafer
(OU)



Barry Keim
(LSU)



Harold Brooks
(OU)



Pete Lamb (OU)



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Steven Quiring
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Co-Principal Investigators

Core Office:



Margret Boone
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Program Manager



Rachel Riley
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Associate
Program Manager



Alek Krautmann
(OU)
Research Associate



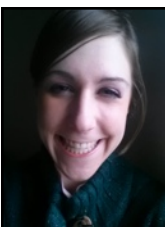
Lynne Carter
(LSU)
Program Manager



Hal Needham
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Katy Christian
(OU)
Student Assistant



Christine Kuhn
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SCIPP Affiliates: Sean Crowell (OU), Scott Greene (OU), Chie Sakakibara (OU), Heather McCarthy (OU), Jeff Basara (OU), Jerry Brotzge (OU), Cindy Rosenthal (OU), Kodi Monroe (OU, Sea Grant), John Nielsen-Gammon (TAMU), Cody Knutson (NDMC), Mike Richman (OU), Theodore Trafalis (OU), and Kai Zhang (UTHealth)

Graduate Students: Laura Becker (LSU), Amanda Billiot (LSU), Jonathan Denham (LSU), Rebekah Jones (LSU), Carly Kovacic (OU), Carrie Pavlowsky (OU), and Zhen Zhang (OU)

Advisory Committee: Margaret Davidson (NOAA), Jeffrey Gaffney (University of Arkansas), Gregg Garfin (University of Arizona), Marilu Hastings (Cynthia and George Mitchell Foundation), Bill Hooke (American Meteorological Society), Rebecca Jennings (Federal Emergency Management Agency), Sascha Petersen (Adaptation International), Putnam Reiter (Oklahoma Department of Emergency Management), Bob Rose (Lower Colorado River Authority), David Schlotzhauer (NWS Lower Mississippi River Forecast Center), Tracie Sempier (Mississippi-Alabama Sea Grant Consortium), Melissa Stults (University of Michigan), Russ Vose (National Climatic Data Center), Suzanne Van Cooten (NWS Lower Mississippi River Forecast Center), and Tom Wilbanks (Oak Ridge National Laboratory)

1. New Areas of Focus and Partnerships

Planning for extreme weather and climate events are central to the work of the Southern Climate Impacts Planning Program, though are not our only focus. The following represent the various new areas of focus and partnerships of SCIPP with a brief description of the questions and issues the SCIPP team is working to address. New partnerships are in **bold**.

Since April 2013, SCIPP has experienced several changes within its core office and co-principal investigators (Co-PI's). With the start of SCIPP Phase II, which started September 1, 2013, SCIPP introduced four new Co-PI's: Harold Brooks (OU), Michael Hayes (**NDMC**), Renee McPherson (OU), and Steven Quiring (**TAMU**). Several of these new partnerships are discussed below. Also, within the LSU Core Office, Dr. Lynne Carter resigned her position as Program Manager to pursue an exciting opportunity with climate change education in Uganda. Hal Needham, previously SCIPP Research Associate, has taken over the position of Program Manager at LSU. Lastly, SCIPP mourned the passing of Co-PI Dr. Pete Lamb at the end of May 2014. SCIPP will continue its close association with the Cooperative Institute through the interim leadership of Dr. Randy Pepler.

The University of Oklahoma is the lead institution. OU hosts the state climate office (Oklahoma Climatological Survey), CIMMS and the **South Central CSC**. SCIPP team members have expertise in meteorology, hydrology, geography, political science, and communications. Among the **South Central CSC** priorities are water resources and indigenous peoples, including transnational concerns with Mexico. The CSC studies of ecological changes complement SCIPP's existing focus on societal change in relation to extreme climate events. Furthermore, the CSC's research on high-resolution global climate modeling (with its Consortium member at NOAA's Geophysical Fluid Dynamics Lab) and downscaling techniques provide relevant climate projection output for SCIPP without having to duplicate the efforts within the RISA Team.

Texas A&M University brings expertise in climatology and geography related to coastal issues and connection to a broader network of research activities within Texas. Researchers at TAMU have conducted research on vulnerability of commercial fishing, climate change impacts on hypoxia, drought impacts on estuarine and near-shore coastal ecosystems, and climate and energy issues along the western Gulf of Mexico.

The **National Drought Mitigation Center** connects national tools, assessment products, and expertise to the south central region. SCIPP provides a fine-scale focus on how communities utilize drought information in planning and responding to drought and encourages participation in national collection of drought impact information led by **NDMC** and participation in the Drought Early Warning System. SCIPP benefits from the synthesis of information produced by **NDMC**, such as guidance on creating state and local drought plans and Drought Ready Communities. This partnership allows leveraging of resources available to each of the partner institutions. Though SCIPP has worked with **NDMC** in the past, the Phase II proposal allowed a formal partnership to be recognized.

Over the past year, close work has continued with the **Sspeed Center** at **Rice University**. SCIPP has provided storm surge data and analysis to this group for several years. In February 2014, SCIPP team members gave a seminar and met with faculty, staff and students involved with this group.

The **Sspeed Center** is proposing to build the Centennial Gate, a flood control device that will protect the Houston Ship Channel. This area contains very dense industrial infrastructure and has the potential to inflict major chemical pollution in large storm surges. A flood control device is an important investment that could save catastrophic losses. Leadership at the **Sspeed Center** estimate a flood control gate would cost around \$1.5 billion, but save \$30-\$60 billion in a major storm surge event. SCIPP is playing an important role by providing unique storm surge data to guide this project development.

The **Lake Pontchartrain Basin Foundation** works on a wide range of projects, including flood protection projects for the Greater New Orleans Metro Area. In the past, they have hosted round-table discussions for all of the major flood-protection players to get together and discuss the state of the flood protection system and future goals.

SCIPP is providing storm surge data and analysis, as well as access to an experimental storm surge tool. These products help determine the risk of storm surge inundation for New Orleans. For example, Hurricane Betsy has long been considered the “standard hurricane” for the New Orleans area, and levee heights are often built to Betsy water levels. Betsy is colloquially considered a 200-year storm. However, through data-driven storm surge analysis, SCIPP has shown that in many locations, Betsy produced the third highest storm surge in the past 115 years, making it more like a 40-year storm surge level. Such analysis shows that the flood protection system around New Orleans is not as safe as many people may think.

SCIPP participated in the **MS-AL Sea Grant** Community of Practice annual meeting in Orange Beach, AL, in April, 2014. This event brought together people from various groups/ agencies (Sea Grant, NOAA, FEMA, coastal communities, etc.). SCIPP helped provide insights into coastal flooding risk for coastal locations.

Mark Shafer was appointed to the **Texas Sea Grant Advisory Committee** and participated in their annual meeting in April 2014 in Port Aransas, Texas. Texas Sea Grant recently added a Climate Change Specialist, Mona Behl, and reached out to SCIPP for expertise on climate science, adaptation, and engagement. Mark continues to serve on the **Gulf Coast Prairie Landscape Conservation Cooperative** Science Advisory Team and has initiated several projects in collaboration between the LCC, South Central Climate Science Center, and RISA Team.

Since March 2014, SCIPP has been involved with the **Heartland Regional Sustainability Network** as a source of climate, climate change, and weather prediction impacts on infrastructure. The goal of the **Heartland Regional Sustainability Network** is to better understand how cities need to prepare for severe weather scenarios and subsequent impacts in the face of a changing climate. Infrastructure includes storm water management, water supplies, public health, land use and emergency management.

SCIPP began the process of discussing potential cross-over tools by hosting a webinar. Invitees included Emergency Managers, Planners, and Users of data to make input on tool decisions. Ideas for potential cross-over tools included partnering with **CCRUN** to deliver county level temperature and precipitation projections with increase in extremes, finding a way to deliver NARCCAP projections and/or other projections developed and used in the US National Climate Assessment, and looking at developing qualitative descriptions.

**Climate Resilience and Adaptation Strategies:
A Capital Area Symposium**

October 4, 2013
LBJ School of Public Affairs, The University of Texas at Austin

Lynne Carter



Dr. Lynne Carter presented at the **Climate Resilience and Adaptation Strategies Symposium**. This was a one-day conference to bring Texas Capital Area stakeholders together to identify and assess the shared challenges we face given the specific impacts of climate change in our region. The symposium provided a forum for learning about climate vulnerability in the region and sharing best practices in the area of resilience planning here in Texas and throughout the U.S.

Dr. Carter and others presented a review of climate modeling methodologies and approaches to evaluation of uncertainty and explain how climate models can be downscaled to provide high-resolution estimates of temperature, precipitation, and other climate indicators at a local and regional level. They also addressed predictions for climate change indicators in Austin

and Central Texas in particular, and explore the implications for the built and natural environment, with an emphasis on putting into real terms the meaning and significance of temperature rise.

Through these partnerships, SCIPP possesses a unique ability to engage decision makers and conduct research in both inland and coastal hazards. SCIPP can work as easily with drought and water resources in west Texas as it can with hurricane storm surge and sea level rise in coastal Texas, Louisiana and Mississippi.

2. RESEARCH FINDINGS

Hybrid Procedure Correctly Matched Muller Weather Types 57% of days for Louisiana

Amanda Billiot and Barry Keim

Louisiana State University

Background: Louisiana experiences large shifts in weather conditions from year to year, especially with regards to precipitation. It is unclear how much large-scale (synoptic) weather variability affects the local weather in Louisiana. There is no widely accepted automated synoptic weather classification system for the Louisiana/Gulf Coast region; however, there is a manual classification system developed by Muller at Louisiana State University, called the ‘Muller Weather Types for Louisiana’.

Objective: Develop an automated synoptic classification system, utilizing the Muller classification system, that will have wide reaching climate and weather applications for Louisiana.

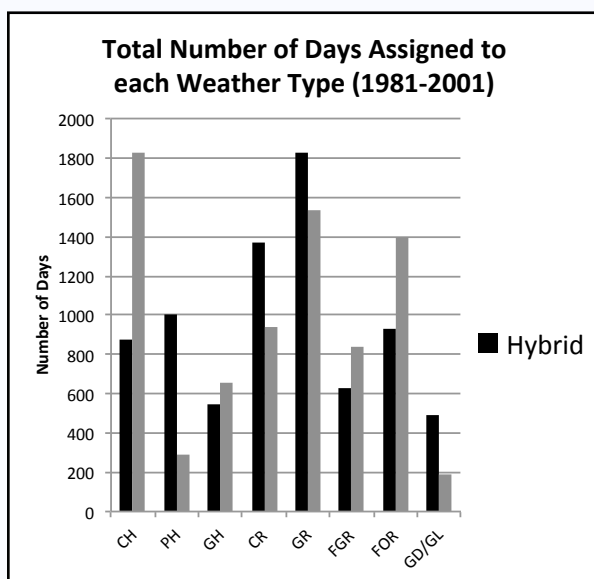


Figure 1: The hybrid procedure correctly matched the Muller weather types at one or more of the point locations for **57%** of days.

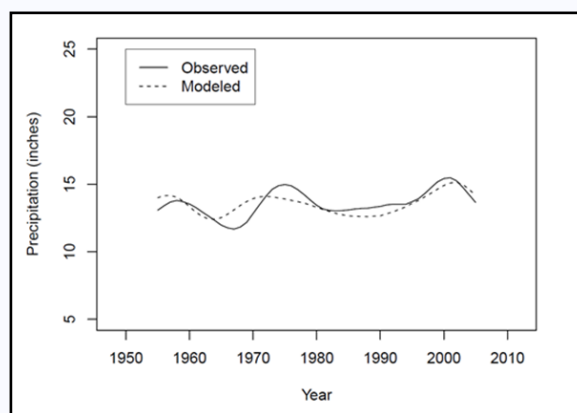


Figure 2: Smoothed observed precipitation versus smoothed modeled precipitation using rainy synoptic types as predictors for the Southeast Louisiana climate division from 1956 to 2005.

Future Work: The automated hybrid classification system can be used for seemingly endless applications in climate and climate impact research for Louisiana, including updates to older studies that used the Muller classification systems as well as new studies, such as synoptic climatological investigations of future climates using GCMs.

Presentations: “A Hybrid Procedure for Classifying Synoptic Weather Types for Louisiana with an Application to Precipitation Variability.” Presented at the Association of American Geographers Annual Conference, Tampa, FL, April 8, 2014.

Floods and Tornadoes rated as top two most important hazards for which to plan, in the South Central United States

Rachel Riley and Renee Edwards (L. Carter, M. Shafer, M. Boone)

University of Oklahoma and Louisiana State University

Background: SCIPP conducted an online assessment to better understand the needs of hazard planners across its region. A survey was administered in early 2013 to decision makers who were thought to be involved in hazard planning. Three hundred forty-two people participated. This was the 2nd time the survey was administered; the first was in 2009. The assessment focused on 1) hazard planning, 2) planning for climate change, and 3) information use and applications across the region.

Results: Seventy-nine percent of respondents (n = 269) were formally involved in hazard planning in their agency or organization. Of those, 45% were emergency managers or planners, and the rest comprised a variety of positions such as extension agents, administrators, environmental specialists, elected officials, and engineers. Over two-thirds of respondents (71%) said three or fewer staff in their department share hazard planning responsibilities for their area. Most commonly, however, only one person in a department is responsible for hazard planning.

The respondents were asked how important they think it is to plan for 14 weather and climate hazards on a scale from 1 “not important at all” to 5 “critically important”. The hazards were then ranked by their mean importance rating. Floods (from rain or rivers; M = 4.17) ranked the highest, followed closely by tornadoes (M = 4.13). Tornadoes slightly edged out floods in 2009 and the largest ranking change occurred with drought (it went from 8th to 3rd). A multi-hazard plan is the most common type of plan used for hazard planning.

The second section of the assessment focused on incorporating climate change into hazard planning. About one-third of respondents (30%) had considered incorporating climate change into their hazard plans. Over half said the barriers to doing so included “limited or no funds to support climate change planning” (68%), “higher work priorities” (61%), “lack of community or political interest” (56%), and “limited or no staff available to support climate change planning” (56%).

Finally, the respondents answered several questions pertaining to information use and needs. The top critical need for including climate change in hazard plans was “more climate information that is applicable to my particular area” (59%), although the spread between the first and last ranked need was less than 18%.

Presentation: Riley, R., R. Edwards, L.M. Carter, M. Shafer, and M. Boone, 2014: South Central U.S.

hazard and climate change planning assessment, 9th Symposium on Policy and Socio-Economic Research, 94th Annual American Meteorological Society Meeting, Atlanta, GA, 9.3

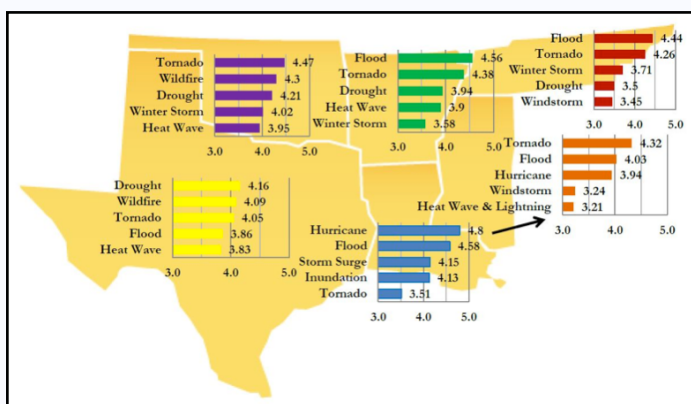


Figure 3: The five highest rated hazards, by state, in terms of how important the respondents think it is to plan for them. The scale ranged from 1 “not important at all” to 5 “critically important”.

Minimum temperatures increases in the Southeast United States outpace maximum temperature increases

Barry Keim and Emily Powell

Louisiana State University

Background: Extremes are particularly important elements of climate in the Southeastern United States. Since 1980, the Southeast has been involved in more billion-dollar weather and climate disasters than any other region in the country, largely due to hurricanes, floods, and tornadoes. Is this reflective of a changing climate, or increasing population and industry across the the region?

Objectives: The objectives of this study were to 1) assess annual spatial and temporal trends in temperature and precipitation extremes from 1948 to 2012 for the Southeast, 2) examine seasonal trends in temperature and precipitation extremes, and 3) develop a regionalization of extreme variability across the region.

Results/Conclusions: The indices reflect increasing trends in warm and wet extremes for much of the region, with drier conditions evident in eastern portions, particularly South Carolina. Increases in extreme heat have been due to upward trends in minimum rather than maximum temperatures, and the rate at which minimum temperatures are increasing appears to be outpacing any increases in extreme maximum temperatures. The asymmetric changes in extreme daytime and nighttime temperatures are narrowing diurnal temperature ranges for most stations.

Presentation: Powell, E. and B.D. Keim. 2013. Temperature and Precipitation Indicators of Climate Extremes across the Southeast United States. Poster presented at the Association of American Geographers Conference, Los Angeles, CA, April 2014.

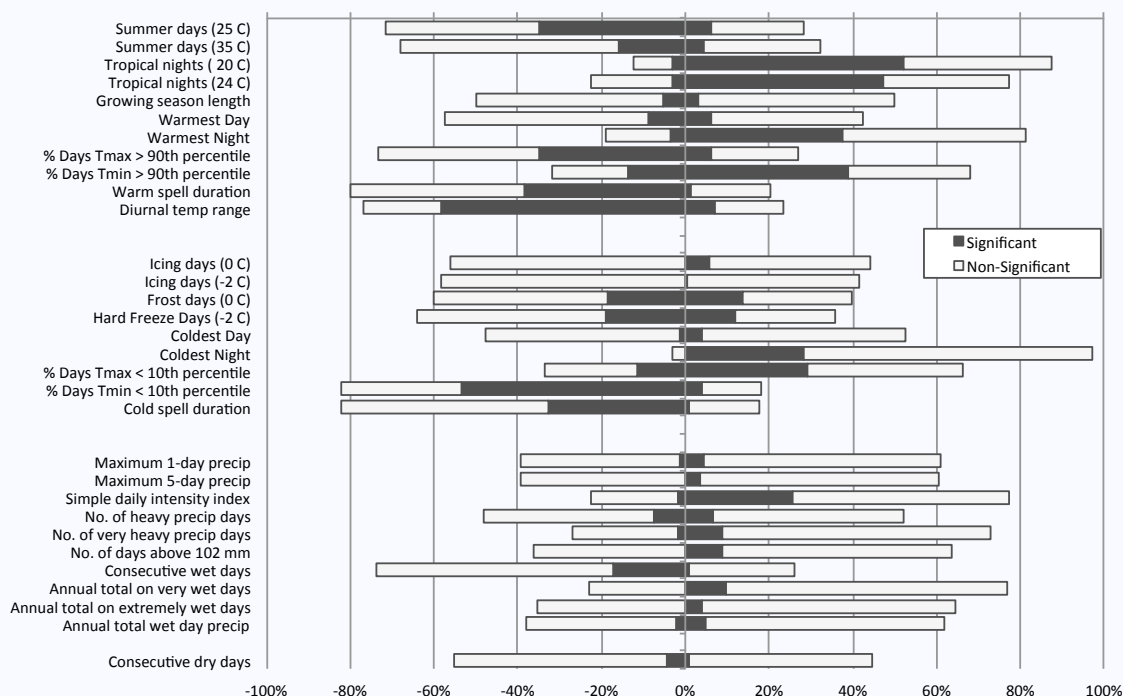


Figure 4: Proportion of stations in the Southeast showing positive and negative trends in extreme indices from 1948 to 2012; image concept borrowed from Insaf et al. (2012).

Planning process important for forging relationships ahead of future disasters

Alek Krautmann, Rachel Riley, Margret Boone, Mark Shafer

University of Oklahoma

Background: The Oklahoma City Metropolitan area has observed eight days with violent tornadoes in just the past 14 years. Given that tornadoes occur relatively randomly and infrequently, the 20 May 2013 tornado that struck three towns in central Oklahoma provides a unique opportunity to learn what impact “repeat” events have on city response and recovery mechanisms.

Objective: SCIPP researchers are conducting interviews with emergency managers and other key decision makers involved in the tornado response and recovery. Under investigation are the institutional and structural policies related to this event in the areas of policy for disaster planning and emergency management. Questions that will be covered relating to emergency management include: What lessons learned from the 1999 and 2003 events were implemented for this event? What decisions were made on the-fly to respond to the disaster? Policy questions include: What interagency relationships are most valuable? What factors were successful or a barrier to providing continuity of services? Additional topics covered in the assessment involve sheltering, managing resources and volunteers, and debris removal. A goal of this study is to promote planning and preparedness as important for mitigating, responding to and recovering from natural disasters.

Results: Central Oklahoma emergency managers indicated that in the past interpreting FEMA rules on debris removal had been difficult, but they were very upfront and clear with this disaster. For example, local officials were relieved during one of the first FEMA meetings in Oklahoma City right after the event to hear that foundation slabs were included by FEMA as storm debris and could go toward reimbursement costs. This had not been the case for previous disaster events. In general, if homeowners could get debris to the right of way along the curb, then the city or county could pick it up.

The outpouring of volunteers and donations were one of the hallmarks of this event that distinguished the response from past tornado disasters in Oklahoma. However, there were challenges and liabilities associated with supervising a large group of unskilled labor. Therefore municipalities are considering or are already implementing donation management and volunteer coordination plans to ensure better continuity during a future event.

One of the lessons learned a central Oklahoma emergency manager identified from 1999 and other events is the importance of getting people back into their neighborhoods and back to their homes as quickly as possible. It is mutually beneficial for the city and the residents to open the neighborhoods back up once utilities are turned off and the roadway is clear because the city can then focus resources elsewhere. Residents can also start the recovery process and move forward.

Full government response can take a while sometimes, so a local government like a county or municipality establishing relationships with local groups like churches or Tribal Nations is crucial to bridging the one to three day gap immediately after a disaster before more permanent solutions and enrollment in government aid can occur. These relationships that can be created before a disaster through the planning process end up being much more important than the plan itself. Going through a planning process helps to identify early on the natural command control coordination, support structure and expected roles and responsibilities for when a disaster arises. Mutual aid agreements with neighboring communities regarding police, fire and municipal staff are also essential to effective and timely local government response.

70% of participants generate implications for themselves, others and society from drought news stories

Renee Edwards

Louisiana State University

Background: Most people, including decision-makers, get information about extreme weather from news reports. They do not have training in climate science. Indeed, they have relatively low scientific literacy and must rely on preexisting beliefs and attitudes as well as their assessment of individual news stories to draw conclusions about the importance and consequences of weather events. Two theories rooted in social cognition address the process of responding to news stories about drought. Message Interpretation (MI) proposes that beliefs and personal experience influence meanings. Individuals with different backgrounds and beliefs may encounter the same information but draw different meanings from it. Story Appraisal Theory (SAT) states that individuals assess news stories for whether they have a point, are plausible, and are representative. If so, people are more likely to generate implications for what the story means for them personally, for others, and for society. Both MI and SAT suggest that meanings and implications lead to emotions, cognitions, and behaviors. Thus, individuals encounter the same story but draw different conclusions from it.

Objective: This project addresses three questions about what happens when individuals access news stories about drought: (1) What do they think? (2) Why do they have different thoughts? (3) What are the consequences for decision-making? The model proposes that thoughts or implications derived from news stories are influenced by experience with extreme weather, belief in climate change, and story appraisal. Implications (both quantity and type) lead to outcomes such as fear, sympathy, and endorsing action.

Background and Story Appraisal --> Implications --> Emotions and Action

Results: In ongoing tests of the model, participants read a summary of a news story followed by open-ended and closed-ended questions about it. The questionnaire asks for implications and measures background information, story appraisal, emotions, and endorsement of action.

Approximately 70% of participants generate implications for themselves, others, and society. The implications focus on issues such as what people and government should do about the drought, the importance of water, and how much people are suffering. Preliminary results are that beliefs about climate change and story appraisal, especially judging representativeness, are associated with constructing more implications. More implications are associated with stronger emotions (fear and sympathy) and endorsing actions such as requiring low-flow toilets.



Figure 5:
Images from news story on drought.



Presentation: Edwards, R., Denham, J., & Condalary, M. (November, 2013). Interpretations and implications: Processing a news story about drought. Paper presented at the annual meeting of the National Communication Association, Washington, D.C.

3. OUTREACH ACTIVITIES

Outreach: Managing Drought in the Southern Plains

Mark Shafer, Alek Krautmann, Margret Boone, Mike Hayes

University of Oklahoma and the National Drought Mitigation Center

Outreach: SCIIPP, in conjunction with the NOAA Regional Climate Services Director for the Southern Region, the National Integrated Drought Information System (NIDIS), the National Drought Mitigation Center (NDMC), and the American Association of State Climatologists (AASC), continued to host a series of forums, workshops, webinars, and briefings to address the current drought situation in the southern plains and promote planning and preparation for future drought conditions.

This Managing Drought in the Southern Plains initiative brought together various state and local agencies, federal officials, and many others tasked with managing drought conditions. The following forums, workshops, and webinars were held during the reporting period:

Forums and Workshops:

- * NDMC and NIDIS co-organized and co-hosted a drought planning workshop for livestock producers and crop producers who use irrigation on January 9, 2014, in Garden City, KS. The workshop was for producers across the Great Plains region. [<http://drought.unl.edu/ranchplan/Overview/Resources/ExtendedExtremeDroughtWorkshop.aspx>]
- * NDMC co-organized and co-hosted the initial meeting for the Missouri River Basin Regional Drought Early Warning System held in Nebraska City, NE, February 26-27, 2014.
- * NDMC co-organized and co-hosted the 40th Annual Center for Great Plains Studies Symposium: Drought in the Life, Cultures, and Landscapes of the Great Plains held in Lincoln, NE, April 2-4, 2014.
- * Texas Water Infrastructure Coordination Committee (TWICC) Forum Wichita Falls, TX (April, 29, 2014)
- * NDMC hosted two webinars related to measuring drought impacts on rangeland conditions May 15, 2014 and May 22, 2014.

Webinars:

- * Summer Drought - August 9, 2013 (95 views on YouTube; 28 live participants)
- * NDMC and the NIDIS Engaging Preparedness Communities Working Group co-hosted a series of webinars on drought impacts that took place on November 6, 2013, December 4, 2013, and January 8, 2014. [<http://drought.unl.edu/AboutUs/CurrentProjects/EngagingPreparednessCommunities/DroughtImpactsWebinarSeries.aspx>]

Drought Briefings:

- * 30 5-min Drought Briefings have been produced and recorded since April 12, 2013 (1815 views on YouTube)

Likewise, SCIIPP provides a monthly newsletter announcing the webinar or briefing available for viewing, along with relevant drought graphics from sources such as the U.S. Drought Monitor, the Climate Prediction Center, the U.S. Department of Agriculture, and others.

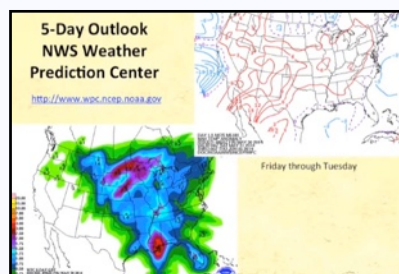


Figure 6: Screen capture from May 30, 2014 Drought Briefing

Outreach: Climate Training for Native American Tribes

Rachel Riley, Mark Shafer, Alek Krautmann

University of Oklahoma

Outreach: Funded through supplemental RISA funds, four 2-day workshops will take place in August and September 2014 in Oklahoma. Tribal environmental professionals from Oklahoma and Texas will participate in the workshops. Material covered will include information on the basics of climate science and climate change, climate planning tools, and how to conduct a basic vulnerability assessment. Work has been ongoing since September 2013 to plan and develop content for the workshops. The purpose of the workshops is to educate on the basics of climate science, to assist tribes in addressing climate science needs and introduce how a vulnerability assessment could be useful for planning.

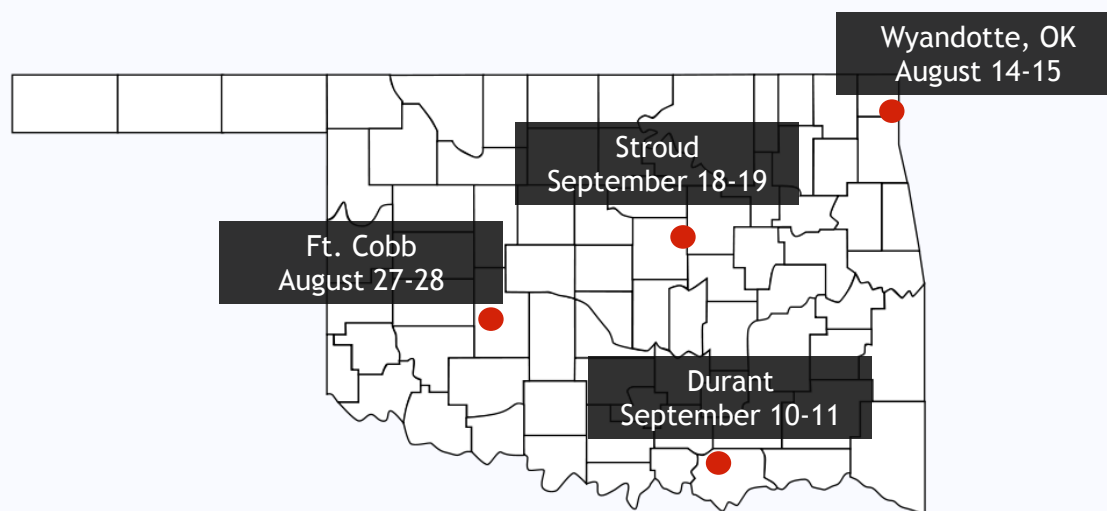


Figure 7: Workshop locations and dates.

Outreach: Intertribal Workshops on Climate Variability and Change

Rachel Riley, Laurel Smith, Renee McPherson, Paulette Blanchard

University of Oklahoma

Outreach: SCIPP, through the leading of the DOI South Central Climate Science Center, helped plan and host four workshops in Oklahoma for tribal environmental professionals and cultural preservation officers in June and July, 2013. The workshops 1) educated tribal representatives across the region about climate adaptation-related products and services, especially related to drought; 2) documented climate impacts on the tribal nations and their peoples, lands, resources, and economies; and 3) fostered dialogue between tribal citizens and government representatives, climate scientists, indigenous geographers, and U.S. government representatives that was previously initiated through three related meetings.

Outreach: Gulf Coast Energy Infrastructure Project

Hal Needham, Barry Keim, Amanda Billiot
Louisiana State University

Outreach: SCIIPP has been working closely with the Sspeed Center at Rice University on a project that will provide critical flood protection for the Houston Ship Channel. This project proposes to construct The Centennial Gate, a flood-control device that would protect this dense industrial area from high storm surges. SCIIPP is providing historical storm surge data for Galveston Bay and the region close to the Houston Ship Channel, as well as storm surge statistics, such as the height of the 100-year storm surge in this area.

SCIIPP has also collaborated with Oak Ridge and Pacific Northwest National Labs on a project that assessed the vulnerability of critical energy infrastructure to storm surge inundation. This project utilized SCIIPP's storm surge data from the SURGEDAT project, along with location and elevation data for oil refineries and powerplants along the U.S. Gulf Coast. The project found that the 100-year storm surge would inundate 72% of the coastal refineries and 63% of the coastal powerplants in the region, without the protection of local levees and other flood control devices.

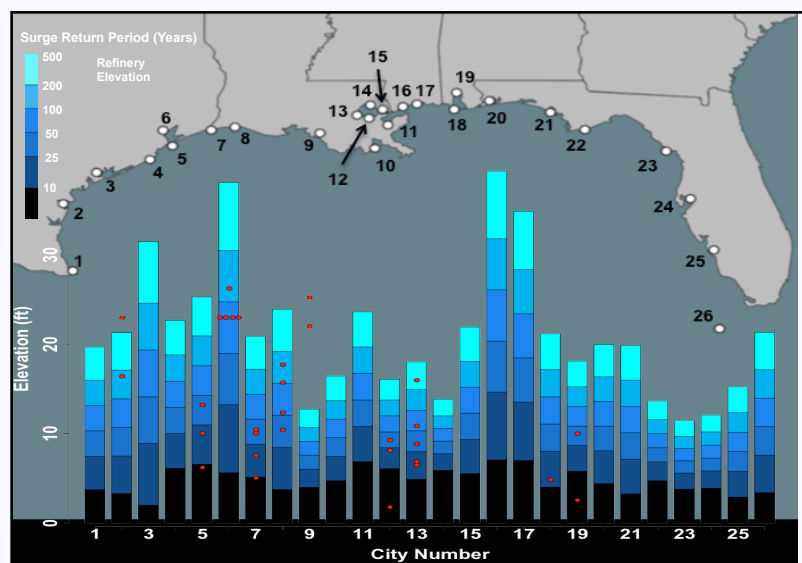
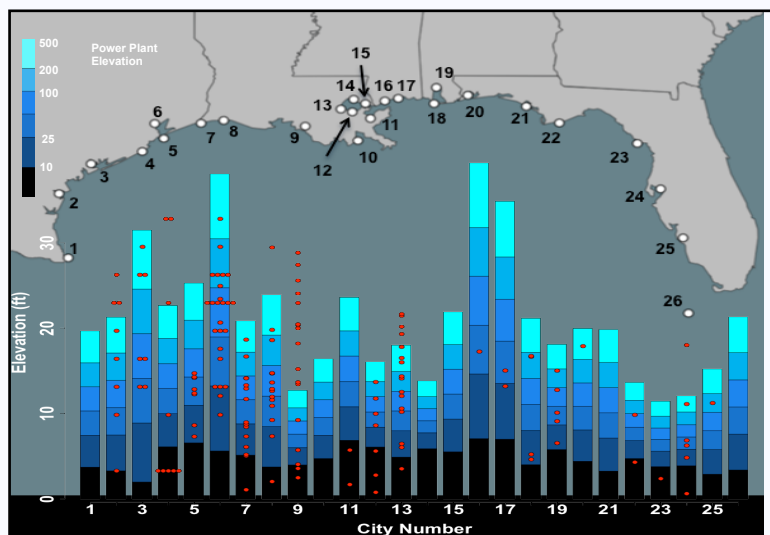


Figure 8: Storm Surge Return Levels and Refinery Elevations for the U.S. Gulf Coast

Figure 9: Storm Surge Return Levels and Power Plant Elevations for the U.S. Gulf Coast



Outreach: SCIPP and Social Media

Margret Boone, Alek Krautmann, Rachel Riley, Katy Christian , Amanda Billiot, Hal Needham
University of Oklahoma and Louisiana State University

Outreach: Over the last year, SCIPP has made a concerted effort to expand our outreach via social media. Listed below are some of the ways SCIPP uses social media.

YouTube Data Products Tutorials:

Average Temperature & Precipitation Tool (111 views)
Drought Tool (75 views)
Climate Trends (59 views)
Climograph (29 views)

YouTube Extreme Events and Hazards Video:

Flash Flooding (264 views)
Severe Weather (244 views)
Winter Weather (205 views)
Hurricanes (192 views)

Facebook:

150 likes. SCIPP posts to facebook about once every few days.

Twitter:

169 followers, 205 retweets, and 127 mentions. Popular retweets include topics such as Field Photos Weekend, quotes from individuals, severe weather, and photos.

Hurricane Hal's Blog:

LSU Program Manager Hal Needham updates his Storm Surge blog covering hurricanes and tropical cyclones worldwide. His social media efforts during Typhoon Haiyan led to an interview on PBS's NOVA special "Killer Typhoon".

YouTube Drought Focus Topic Webinars:

The focus topic drought webinars have been viewed on average 100 times. The most popular topics include Water Resources Update, U.S. Drought Monitor, and the Early Spring Outlook.

YouTube Drought Briefings:

The 5-min drought briefings have been viewed on average 67 times. There often are more views during periods of worsening drought conditions.



YouTube: <http://www.youtube.com/user/SCIPP01>

Facebook: <https://www.facebook.com/SouthernClimateImpactsPlanningProgram>

SouthernClimateImpactsPlanningProgram

Twitter: https://twitter.com/SCIPP_RISA

Hurricane Hal's Storm Surge Blog: <http://stormsurge2010.blogspot.com/>



Outreach: Presentations

Another method of outreach for SCIIPP Team members is presenting the relevant climate information and studies to our stakeholders and stakeholder communities. Below is a list of all SCIIPP presentations conducted over the reporting period.

- “A Data-Driven Storm Surge Analysis for the U.S. Gulf Coast.” Presentation at Lake Pontchartrain Basin Foundation, May 2013 (Needham).
- “A Data-Driven Storm Surge Analysis for the U.S. Gulf Coast.” Presentation at Rice University, February 2014 (Needham).
- “A Hybrid Procedure for Classifying Synoptic Weather Types for Louisiana with an Application to Precipitation Variability.” Presented at the Association of American Geographers Annual Conference, Tampa, FL, April 2014 (Billiot, Keim).
- “A Louisiana Hurricane and Storm Surge History.” Presented at the National Hurricane Conference, New Orleans, LA, March, 2013 (Needham, Keim).
- “Climate Analysis Tools from SCIIPP and SRCC.” Poster presented at the American Association of State Climatologists Annual Meeting, St. Louis, MO, July 2013 (Krautmann).
- “Climate Hazards.” Presented at the Science of Climate Change and Variability teacher workshop, Oklahoma Biological Station at Lake Texoma, OK September 2013 (Krautmann).
- “Coastal Hazards, Risks and Disasters: Enhancing Safety in an Era of Global Change” Invited Panel Member at the Association of American Geographers Conference, Tampa, Florida, April 2014 (Keim).
- “Communicating seasonal climate information: Challenges for NOAA.” Paper to be presented at the annual meeting of the Southern States Communication Association, New Orleans, April 2014 (Edwards).
- “Correlating Storm Surge Heights with Tropical Cyclone Winds at and before Landfall.” Presented at the Association of American Geographers Conference, Los Angeles, CA, April 2013 (Needham, Keim).
- “Drought Risk Management: Regional, Integrated, Sciences, Assessments” at the Annual RISA Meeting in La Jolla, CA, December 2013 (Hayes).
- “Economy, Weather, and Climate: Which Affect the Risk Perceptions of Global Warming? (2001-2010).” Presented at the Association of American Geographers Conference, Los Angeles, CA, April, 2013 (Keim).
- “Extreme Events in a Changing Climate.” Presented to the Western Gulf Silvicultural Technology Exchange, Shreveport, Louisiana, December, 2013 (Keim).
- “Hurricanes in a Changing Climate.” Presented at the International Facility Management Monthly Meeting, Baton Rouge, LA, May 2014 (Billiot).
- “Identifying Extreme Dew Point Variability in the Southeast United States.” Poster presented at the Association of American Geographers Conference, Los Angeles, CA, April 2013 (Keim).
- “Interpretations and implications: Processing a news story about drought.” Paper presented at the annual meeting of the National Communication Association, Washington, D.C., November 2013 (Edwards, Denham).
- “May 20 Newcastle/Oklahoma City/Moore Tornado: Post-Disaster Assessment of Preparedness, Planning and Recovery.” Presented at the American Meteorological Society Annual Meeting, Ninth Symposium on Policy and Socio-Economic Research, Atlanta, GA, February 2014 (Krautmann).
- “Return Periods for Dry Spells in the South Central U.S. Poster presented at the Association of American Geographers Conference, Los Angeles, CA, April, 2013 (Keim).
- “SCIIPP Online Drought Tools”. Presented at the Intertribal Workshops on Climate Variability and Change, June 2013 (Riley).
- “South central U.S. hazard and climate change planning assessment.” Paper presented at the annual meeting of the American Meteorological Society, Atlanta, February 2014 (Shafer, Riley).
- “Storm Surge Data and Risk Assessment for the U.S. Gulf Coast.” Webinar presentation to the Gulf of Mexico Alliance Quarterly Business Meeting, May 2014 (Needham).
- “Storm Surge Risk Analysis for the U.S. Gulf Coast.” Presentation at 2014 Gulf Coast Management and National Estuarine Research Reserve (NERR) Workshop. Sponsored by the Louisiana Department of Natural Resources, 2014 (Needham).
- “Storm Surge Return Periods for the U.S. Gulf Coast.” Paper presented at the International Short Conference on Advances in Extreme Value Analysis and Application to Natural Hazards (EVAN 2013), Siegen, Germany, September 2013 (Needham, Keim, Sathiaraj, Shafer).
- “Storm Surge Return Periods for the U.S. Gulf Coast.” Presented at the Association of American Geographers Conference, Tampa, April 2014 (Needham, Keim).
- “Temporal and Spatial Patterns of Hurricanes Strikes in the United States.” Presented at the LSU Science Café, Baton Rouge, May 2014 (Keim).
- “The Contribution of High Winds Associated with Tropical Systems along Atlantic Canada.” Poster presented at the Association of American Geographers Conference, Los Angeles, CA, April, 2013 (Keim).
- “Weather Conditions—What Do You Watch For?” Presented at the Oklahoma Indian Nations Chapter of the Solid Waste Association of North America Annual Meeting, Tulsa, OK, March 2014 (Krautmann).

4. KEY PUBLICATIONS

Key Publications

- Ford, T. W. and S. M. Quiring, 2011: Comparison and application of multiple methods for the interpolation of soil moisture observations. *International Journal of Climatology*, **34**(8), 2604-2621. DOI: 10.1002/joc.3862
- Needham, H.F., and B.D. Keim, 2014: Correlating Storm Surge Heights with Tropical Cyclone Winds at and before Landfall. *Earth Interactions*, **18**, 1-26. DOI: <http://dx.doi.org/10.1175/2013EI000527.1>.
- Needham, H.F., and B.D. Keim, 2014: An Empirical Analysis on the Relationship between Tropical Cyclone Size and Storm Surge Heights along the U.S. Gulf Coast. *Earth Interactions*, **17**, 1-15. DOI: <http://dx.doi.org/10.1175/2013EI000528.1>.
- Needham, H.F., B.D. Keim, D. Sathiaraj, and M. Shafer, 2013: A Global Database of Tropical Storm Surges. *EOS Transactions, American Geophysical Union*, **94** (24), 213-214. DOI: 10.1002/2013EO240001.
- Riley, R., R. Edwards, L. Carter, M. Shafer, and M. Boone, 2013: South Central U.S. Hazard and Climate Change Planning Assessment. Southern Climate Impacts Planning Program, 38 pp. [Available online at http://www.southernclimate.org/publications/Hazard_Planning_Assessment.pdf].

Other Publications

- Allard, J.M., C.R. Thompson, and B.D. Keim: How Robust is the Pre-1931 National Climatic Data Center - Climate Division Dataset? Examples from Georgia and Louisiana. *Theoretical and Applied Climatology*. In press.
- Book chapter entitled, Understanding context: how do we do it?, which is part of the RISA Climate in Context book. The chapter focuses on the social science methods and strategies that are used within the RISA program.
- Ford, T. W., Harris, E. K. and S. M. Quiring, 2014: Estimating root zone soil moisture using near-surface observations from SMOS. *Hydrology and Earth System Sciences*, **18**, 139-154. doi:10.5194/hess-18-139-2014
- Ford, T. W. and S. M. Quiring, 2013: Influence of MODIS-derived dynamic vegetation on VIC-simulated soil moisture in Oklahoma. *Journal of Hydrometeorology*, **14**, 1910-1921. DOI: 10.1175/JHM-D-13-037.1
- Ford, T. W., Wulff, C. O., and S. M. Quiring; Assessment of observed and model-derived soil moisture-evaporative fraction relationships over the United States Southern Great Plains. *Journal of Geophysical Research-Atmospheres*. In press.
- Konrad, C.E. C.W. Fuhrmann, A. Billiot, B.D. Keim, M.C. Kruk, K.E. Kunkel, H. Needham, M. Shafer, L. Stevens, 2013: Climate of the Southeast USA: Past, Present, and Future. Chapter 2 in *Climate of the Southeast United States: Variability, Change, Impacts, and Vulnerability* (Ingram, K, K. Dow, L. Carter, and J. Anderson eds), pp. 8-42. Island Press: Washington, D.C.
- Labosier, C. F. and S. M. Quiring (2013) Hydroclimatology of the Southeastern U.S.A. *Climate Research*, **57**, 157-171. DOI: 10.3354/cr01166.
- Miot da Silva, G., Martinho, C.T., Hesp, P.A., Keim, B.D., and Ferligo, Y., 2013: Changes in dunefield geomorphology and vegetation cover as a response to local and regional climate variations. *Journal of Coastal Research Special Issue*, **65**, 1307- 1312.
- Nateghi, R., Guikema, S. D. and S. M. Quiring, 2013: Estimating distribution system outages during tropical cyclones in the Gulf region of the U.S. with reduced complexity models. *Risk Analysis*. DOI: 10.1111/risa.12131
- Nogueira, R.C., B.D. Keim, D.P. Brown, and K.D. Robbins, 2013. Variability of Rainfall from Tropical Cyclones in the Eastern USA and its Association to the AMO and ENSO. *Theoretical and Applied Climatology*, **112**, 273-283. DOI: 10.1007/s00704-012-0722-y.
- Quiring, S. M., Schumacher, A. B. and S. D. Guikema, 2014: Incorporating hurricane forecast uncertainty information into decision support applications. *Bulletin of the American Meteorological Society*. DOI: <http://dx.doi.org/10.1175/BAMS-D-12-00012.1>
- Shao, W., B.D. Keim, J.C. Garand, and L.C. Hamilton, 2014: Weather, Climate, and the Economy: Explaining Risk Perceptions of Global Warming. *Weather, Climate and Society*, **6**(1), 119-134.
- Zhu, L. and S. M. Quiring, 2013: Variation in tropical cyclone precipitation in Texas (1950 to 2009). *Journal of Geophysical Research-Atmospheres*, **118**, 3085-3096. DOI: 10.1029/2012JD018554.
- Zhu, L., Quiring, S. M., and K. Emmanuel, 2013: Estimating the risk of tropical cyclone precipitation in Texas. *Geophysical Research Letters*, **40**, 6225-6230, doi:10.1002/2013GL058284.
- Zhu, L., Quiring, S. M., and K. Emmanuel, 2013: Estimating the risk of tropical cyclone precipitation in Texas. *Geophysical Research Letters*, **40**, 6225-6230, doi:10.1002/2013GL058284.
- Zhu, L., Frauenfeld, O. W. and S. M. Quiring, 2013: Seasonal tropical cyclone precipitation (TCP) in Texas: A statistical modeling approach based on a 60-year climatology. *Journal of Geophysical Research-Atmospheres*, **118**, 8842-8856, doi:10.1002/jgrd.50663

6. Plans & Policies

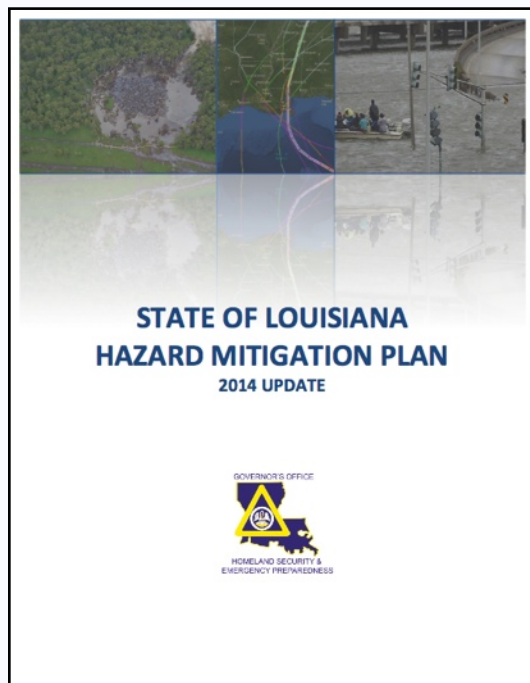
State of Oklahoma Hazard Mitigation Plan

FEMA has required each state to update their Hazard Mitigation Plans every three years in order to receive funding and assistance after a disaster declaration. Over the past year, SCIPP has been influential in the updating of the State of Oklahoma Hazard Mitigation Plan. Alek Krautmann, SCIPP Research Associate, reviewed and updated the Risk Assessment portion of the plan, which includes the state hazard descriptions, hazard climatology and descriptions of notable past hazard events or disasters. The review involved making sure the weather and climate information provided is accurate and offering additional suggestions as needed.

As part of SCIPP's involvement with the State of Oklahoma Hazard Mitigation Plan, SCIPP members attended several of the quarterly Oklahoma Hazard Mitigation Team meetings. The meetings involve partners from the Oklahoma Department of Emergency Management, as well as Emergency Managers from various counties and Tribal Nations.

State of Louisiana Hazard Mitigation Plan

FEMA requires each state to update their Hazard Mitigation Plans every three years in order to receive funding in case of a disaster. Over the past year, SCIPP has been influential in the writing and updating of the State of Louisiana Hazard Mitigation Plan. Lynne Carter, SCIPP Program Manager at LSU, played an influential role in adding sections to the Hazard Mitigation Plan regarding climate variability and climate change in Louisiana, especially with regards to sea level rise. The State of Louisiana Hazard Mitigation Plan was approved by FEMA on April 2, 2014, and is now available online at <http://www.getagameplan.org/mitigateplanupdate.htm>.



STATE OF LOUISIANA HAZARD MITIGATION PLAN iii		
2014 SHMPC LOUISIANA STATE UNIVERSITY ADVISORY TEAM		
Carol J. Friedland, Ph.D., P.E., C.F.M.	Project Manager, Assistant Professor	Department of Construction Management
T. Andrew Joyner, Ph.D.	Assistant Project Manager, Hazard Mapping/GIS	Department of Geography and Anthropology
Kristopher M. Mecholsky, Ph.D.	Technical Writer	Department of Geography and Anthropology
Robert V. Rohli, Ph.D.	Project Manager, Professor	Department of Geography and Anthropology
Joshua Gilliland, M.S.	Hazard Mapping/GIS	Department of Geography and Anthropology
Seyed Armin Madani, M.S.	Hazus Modeling	Engineering Science Program
Shandy Ogea, B.S.	SHPO Assessments	Department of Construction Management
Lynne M. Carter, Ph.D.	Climate Subject Matter Expert	Southern Climate Impacts Planning Program

Figure 10: Image from the State of Louisiana Hazard Mitigation Plan.

Houston Yacht Club

SCIPP developed a comprehensive storm surge database and analysis for the Galveston Bay area, which is important for understanding coastal flooding vulnerability in this region. Such data are important to assess the vulnerability of industrial complexes, residential communities, and specialized infrastructure, such as yacht clubs, marinas and ports. The Houston Yacht Club is an example of a coastal facility that has taken the initiative to adapt infrastructure to minimize losses from storm surges. The facility invested in more than \$1 million in adaptations that will likely offset \$5 million in losses during the next large storm surge event.

SCIPP conducted a storm surge risk assessment for the western end of Galveston Bay, near the Houston Yacht Club at Shoreacres. Such assessments are helpful to validate the need for substantial adaptations in areas at high risk from extreme hazards. This analysis indicates that adaptations along this portion of coastline are worthwhile, as the 100-year storm surge in this location is 17 feet and the 50-year storm surge is 13 feet. Long-term losses in such locations will likely far outweigh the investment to adapt for large storm surges.



Figures 11: Houston Yacht Club mooring ropes (left), and Marina (right).



Houston Ship Channel

SCIPP provided historical storm surge data and analysis to the Centennial Gate Project initiated by the SSPEED Center at Rice University. These data are critical because they indicate that storm surge vulnerability at the Houston Ship Channel is higher than previously thought. Our data-driven analysis indicates that the 100-year storm surge level is 25 feet near the Houston Ship Channel and 18 feet near Galveston. These results are considerably higher than most modeling analyses. For example, a recent probabilistic model indicated an 18-foot surge near Galveston would be an 8,000-year event. Therefore, our work has shown that important industrial complexes in this region are more vulnerable to storm surge inundation than previously thought, and provide crucial data to improve infrastructure planning.

7. MEASURING SUCCESS

How does SCIPP measure success?

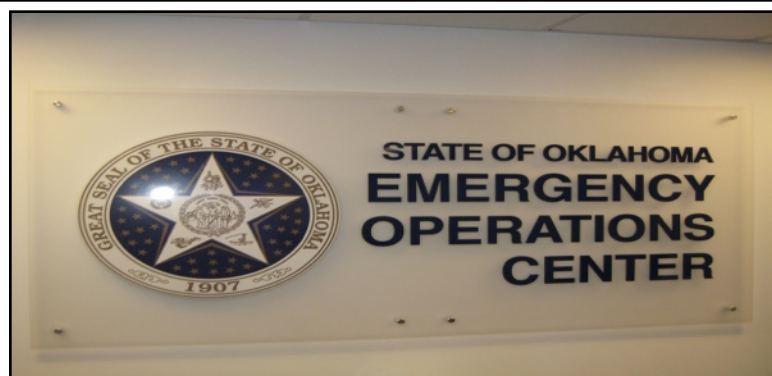
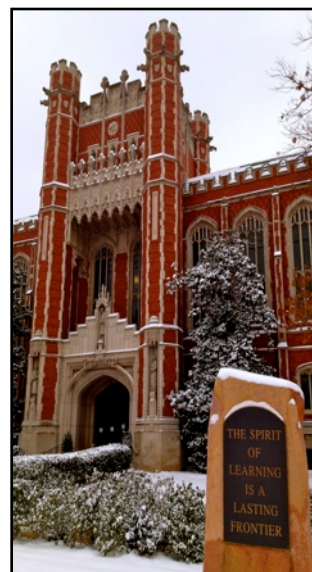
Measuring success in any working relationship can be difficult, whether there is an attempt to quantify the success, or prove an action was successful. One way SCIPP measures success is through our relationships with our stakeholders. Defined below are a few ways in which we measure success. Some points are quantitative (how many people attended a webinar or forum), and some are more qualitative (presenting information). SCIPP has not formally formally assessed our success, but rather we use the following as an informal method to measure success, thereby guiding our research and community outreach.

Success depends on our relationship with the decision maker.

- Approaching us with additional questions after some initial correspondence
- Participation in a webinar, workshop, or forum that we host
- Willing to give a testimony on how information was used
- Use of a product (e.g., Climate Trends Tool) in their work
- Responding to an email (in some cases, e.g., with tribes)
- Inclusion of information or a graphic that we provided in a report or presentation
- Invitation to present at one of their meetings
- SCIPP-provided information influenced a decision or outcome
- SCIPP-provided information influenced a policy change

Decision Maker Relationship Level





The Southern Climate Impacts Planning Program (SCIPP) Phase II was funded on award NA13OAR4310183. For the last five years, our annual performance report has been submitted under the title "Southern Climate Impacts Planning Program (SCIPP)" and has been accepted. Please accept the annual report entitled "Southern Climate Impacts Planning Program (SCIPP) Phase II for the period 4/1/2013-5/31/2014.