SOUTH CENTRAL CLIMATE ADAPTATION SCIENCE CENTER



2021-2022 Annual Report

August 1, 2021 - July 31, 2022

The South Central Climate Adaptation Science Center (CASC) is one of eight regional Climate Adaptation Science Centers that are managed by the U.S. Geological Survey (USGS). The USGS Climate Science Adaptation Centers are working across regions of the United States to develop and bring critical science results to managers and stakeholders concerning impacts of climate variability, trends, and extremes with the goal of developing strategies to minimize economic, sociological, and ecological consequences. Priority science activities include measurement, modeling, and decision support that are related to the impacts of climate on natural and cultural resources.

South Central Climate Adaptation Science Center Hosting Agreement Term Sheet

KEY ELEMENTS OF THE USGS-UNIVERSITY OF OKLAHOMA (ET AL.) COOPERATIVE AGREEMENT FOR THE HOSTING OF THE SOUTH CENTRAL CLIMATE ADAPTATION SCIENCE CENTER

EXPECTATIONS & DELIVERABLES

- In this document, the "Consortium" refers to the University of Oklahoma (OU) and all funded subawardees of the hosting agreement for the South Central Climate Adaptation Science Center (South Central CASC). The "regional USGS office" will refer to those members of the U.S. Geological Survey who work full- or part-time for the South Central CASC. The South Central CASC comprises the Consortium and the regional USGS office.
- The Consortium PIs will pass along the USGS written science priorities to all CASCfunded employees within their respective institution on an annual basis when it becomes available for dissemination.
- > The primary roles of OU in this hosting agreement are the following:
 - house the South Central CASC main office,
 - liaise with the full network of regional CASCs (primarily through their university hosts),
 - \circ $\,$ coordinate with the Regional and National CASC offices,
 - oversee the implementation of the hosting agreement and the South Central CASC strategic plans (e.g., science agenda, Tribal engagement plan, communications plan), and, most importantly,
 - provide leadership in and conduct science and capacity building across the southcentral U.S. for the purpose of aiding DOI agencies and their natural and cultural resource partners in adapting to climate variability and change.
- On behalf of the Consortium, OU will provide a stand-alone annual report focused on the hosting agreement activities 60 days prior to the end date of each budget year. The Consortium's report will include the following elements related to the Consortium's work for the South Central CASC:
 - Specific examples of actionable science, including quotes, stories, and links to policy- and decision-making; and
 - List of students, staff, faculty, and post-docs; their major accomplishments during their time associated with the South Central CASC (e.g., publications, presentations), and how their work relates to South Central CASC priorities that were disseminated by the regional USGS office.
- The South Central Climate Adaptation Science Center (South Central CASC) will host an annual in-person meeting or videoconference to highlight the past year's accomplishments in science, regional dialogue, capacity building, and communications.
- All South Central CASC projects will comply with NCASC data management policies [https://casc.usgs.gov/data-policies-and-guidance] and USGS Fundamental Science Practices, when appropriate.
- All South Central CASC products that use the USGS logo will comply fully with the CASC Communication Guidelines. Other products may only deviate from the guidelines when the guidelines are unclear, not applicable, or inappropriate for the audience.
- ➤ The regional USGS office and the Consortium will work together to help implement recommendations, as relevant, from the five-year review report found in Appendix I.

- Through OU, the Consortium will submit the following communication products to NCASC:
 - During each year of the five-year cooperative agreement:
 - At least six USGS Mission Area Highlights
 - At least three items for the Climate Adaptation Insights Newsletter (or similar)
 - At least one resource management- or climate policy-relevant success story from the CASC, to be used in promoting the CASC's work
- The OU Assistant Director will attend the majority of monthly CASC Network Staff calls. As appropriate and available, other OU employees also will attend the calls.
- ➤ At the conclusion of the cooperative agreement, OU will complete the following with the aid of the Consortium:
 - Produce a final report that summarizes actionable science activities, scientific achievements, educational and training accomplishments, and communications highlights from the 5-year period of performance;
 - Host a multi-day, 5-year review of the South Central CASC (Consortium and regional USGS office) that will be coordinated by NCASC; and
 - Archive and deliver all files associated with the Consortium-hosted website to NCASC (in the event of a change in the South Central CASC host at the end of the agreement period).

INSTITUTIONAL ARRANGEMENTS

- ➤ Leadership Team
 - The diagram below overviews the relationships between USGS and Consortium leadership teams and stakeholders as of August 2019.
 - Consortium institutions include: University of Oklahoma, Texas Tech University, Louisiana State University, The Chickasaw Nation, University of New Mexico, Oklahoma State University, and The Choctaw Nation of Oklahoma
 - The regional USGS office oversees the governance, membership, and execution of the Joint Stakeholder Committee or its successor. Additional definitions of roles and responsibilities of the regional USGS office are outlined in a Memorandum of Understanding (MOU).
 - The Consortium oversees the governance, membership, and execution of the Consortium Executive Committee or its successor. Under bylaws originally established in February 2013 and amended as needed at later dates, the Executive Committee governs the consortium and meets annually to "review past year activities and research and provide recommendations on the future direction of the consortium portion of the South Central CASC."
 - Membership and voting rights are extended to the PI for each consortium institution. Non-voting members are the Assistant Director, who serves as Secretary, and the USGS South Central CASC Director or their designee. Other voting or non-voting members may be approved by the Executive Committee.



➤ Governance Strategy

- Governance of the South Central Climate Adaptation Science Center is vested in the regional USGS CASC director and her/his supervisor and in the Consortium principal investigator (aka University director). The regional USGS CASC director oversees the South Central CASC budget, USGS funding calls, development of the scientific strategic plan(s), relationships with other federal agencies and the Joint Stakeholder Committee, and other federal responsibilities. The University director oversees the Consortium budget, response to the USGS funding calls, work with tribes and pueblos, input to science and planning activities, relationships with the broad Consortium network to agencies and individuals, and other university responsibilities. An executive board governs the Consortium as detailed above.
- Hiring authority is vested in the future employee's institution, but the USGS CASC Director can assist with candidate interviews. Tribal sovereignty precludes any request from or requirement of USGS or the University of Oklahoma to be involved in their non-USGS-funded positions (e.g., student interns). Employees' supervisors work for the same institution and oversee annual evaluations and professional development goals.
- To facilitate daily coordination, the regional USGS and University CASC directors are co-located in the same office suite at OU. Non-OU consortium members can interact directly with the USGS CASC Director and staff. OU's Assistant Director liaises among consortium researchers and USGS. Except for official USGS business (e.g., RFP info), OU streamlines interactions between the USGS and consortium by collecting annual report data and communications highlights and providing it to USGS staff.
- Open to all consortium and USGS personnel, regular calls update South Central CASC employees on current activities, discuss critical issues from DOI or USGS HQ, highlight science network-wide, report how science funds in the hosting agreement are meeting the South Central CASC mission, and build collegiality across the network. The USGS also oversees stakeholder advisory committee meetings and calls.
- Upon review by the USGS, should a portion of the Consortium hosting agreement be deemed to not fulfill the South Central CASC mission, the regional USGS

CASC director and the university director will work with the Consortium institution to align the work satisfactorily.

► Awareness and Engagement

South Central CASC affiliates members are defined as those who belong to a consortium institution, are partners on a CASC proposal, or enhance our strengths in key areas. Interested individuals must apply for Affiliate status and be approved by the Consortium Executive Board. Applications are gathered and presented to the Executive Board on a quarterly basis for approval. Affiliates participate in proposal calls, working groups, science workshops, and other activities through active communication and face-to-face visits.

SCIENCE

> Nature of Science Required

- Priority science themes within the hosting agreement are deliberately flexible to adjust as a new CASC Science Agenda is created and to better meet the needs of stakeholders via co-production. Activities outlined below may change as the priorities of our stakeholders evolve over time. As of August 2019, the initial science priorities of the Consortium are as follows:
 - Toward Sustainable and Usable Water Resources UNM, OU, and TTU will work directly with stakeholders to co-produce knowledge about how to manage water sustainably through wet and dry cycles.
 - Toward Resilient Coastal Ecosystems along the Northern Gulf of Mexico – Led by efforts at LSU, we will develop new observational datasets, examine coastal and wetland dynamics through field work and modeling, and study vulnerability, resilience, and adaptation through interdisciplinary efforts.
 - Toward Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities – The Tribal Liaison will aid Tribal adaptation projects. In Year 8, the Tribal Liaison will help develop a regional network of climate adaptation professionals for the Tribes to partner with on their planning efforts. The Tribal Liaison will examine best practices for adaptation from work of other Tribes and will determine how to best apply these ideas in our region.
 - Toward Stakeholder Understanding of Product Sensitivities & Uncertainties – Stakeholders and social scientists will collaborate on projects to better understand uncertainties associated with modeling future water demand, land management strategies, human population and migration, etc.
 - Toward Mapping & Predicting Changes in Species Distributions Led by efforts at OSU and OU, we will identify key species or ecosystems of concern through conversations with our stakeholders and work collaboratively to perform relevant projects that assist our stakeholders in adaptation planning.
 - Toward Understanding Teleconnections that Influence Ecosystem Resilience – Under this theme, OU will team with colleagues at other Climate Adaptation Science Centers to measure, identify, analyze, and adapt to key teleconnections.

 Science conducted under these areas (or what they evolve into during the 5-year project period) will be reported through both regular calls (see Governance Strategy above) and OU's stand-alone annual report (see Expectations and Deliverables above).

REGIONAL DIALOGUE AND INFORMATION SHARING

> Dialogue on Climate Adaptation

- Regional USGS CASC and Consortium personnel will engage in dialogue about climate adaptation with stakeholders every year using multiple methods, including periodic listening sessions, meetings between working groups and resource managers, national/regional conferences, short courses, and workshops/trainings. In particular, OU will engage in the National Adaptation Forum (or similar) by convening sessions, learning from others, seeking collaboration for, and hosting activities for our partners in Years 9 and 11. OU will host four, online short courses for natural resource managers, introducing them to climate science, climate-related products, impacts of climate change, and adaptation strategies in Years 8, 10, and 12. Consortium members also will serve as climate science/adaptation experts on an as-needed basis.
- Desired outcomes include metrics to evaluate co-produced projects (developed in partnership with USGS and congruent with NCASC metrics), outlines or draft text for future proposal submissions, and draft science translation materials.

> Involvement in Activities Related to Indigenous Peoples

- In partnership with the regional USGS personnel, the Consortium's ongoing strategies to partner with Indigenous Peoples are as follows:
 - conduct research with Tribes related to Tribal lands, waters, and peoples;
 - provide scientific expertise and relevant inputs for Tribal development of adaptation strategies and plans;
 - include analysis of culturally significant species when appropriate and accepted by Tribes or Pueblos; and
 - provide scientific trainings for Tribal staff and, when asked, for elders, educators, and students.
- Details of our future plans for Years 8-12 are below in Education, Training, and Capacity Building (see *Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities*).

EDUCATION, TRAINING AND CAPACITY BUILDING

In Years 8-12, the Consortium will focus our capacity building activities on those consistent with the science themes (see Nature of Science Required), and the Consortium commits to activities that are aligned with DOI's Secretarial Priorities.

> Capacity Building Efforts for Each Research Area

• Sustainable & Usable Water Resources – Through the co-production described in the previous section, we will build the capacity of our stakeholders to sustainability manage their water resources.

- Resilient Coastal Ecosystems along the Northern Gulf of Mexico Our LSU members will connect with the strengths of the LA Sea Grant, Center for River Studies, and Center for Coastal Resilience to infuse understanding of the impacts of climate variability and change into these centers' public outreach programs.
- Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities Building on the work done in Year 8, the Tribal Liaison will join with climate adaptation experts to conduct 1-2 trainings/year for Tribal staff. The Tribal Liaison will coordinate with our main office on technical assistance/climate services.
- Stakeholder Understanding of Model Sensitivities & Uncertainties OU will distribute accessible historical climate data and future climate projections for our region (GIS-compatible layers and graphics), with factsheets or presentation slides that guide users in the correct application of the data. OU will deliver initial products in Year 8, adding other guidance documents in Years 9-12. Variables, indicators, and formats will result from stakeholder discussions and will be consistent with the National Climate Assessment process, allowing users to incorporate the information directly in their planning and management strategies.
- Mapping & Predicting Changes in Species Distributions OU will conduct 3 "Climate 101" trainings for refuge managers in Years 8-10 to increase their proficiency on climate impacts on flora, fauna, and habitats. In Years 9-11, OSU will provide geo-referenced, observed-population data for refuge planning as related to important species, including both native and invasive plant and animal species. In Years 10-12, OSU will create factsheets for resource managers, highlighting management techniques that enable each species to better adapt to environmental stressors.
- Understanding Teleconnections that Influence Ecosystem Resilience Predictive products may be an output as we learn about how teleconnection patterns influence natural resources. When that occurs, OU will engage DOI managers and OSU and LSU Extension personnel to pilot some products for water, land, or habitat management.

> Cross-Department and Cross-Institution Engagement

- Working Groups
 - OU will establish 8 thematic working groups that are deliberately selected to cut across institutional barriers and unite expertise. These groups will focus discussion on themes that address key questions across distinct geographic and disciplinary contexts and will seed ideas for further work and joint proposal development. Each group will be co-led by an earlycareer researcher or practitioner who will be mentored by a senior scientist or administrator (ideally from another institution) to effectively engage across the diverse set of people and interests.
 - Themes will be our 6 science priorities (see Nature of Science Required) plus Project/Program Evaluation and Connecting Research and Engagement, which are aligned with our capacity building priorities. OU will select 3 groups for Year 8 and add another group each year until all are active. Over time, groups may retire and others may begin, as needs arise. OU will recruit members of regional, climate-related boundary organizations to serve on some of the groups.

- OU will host a quarterly, South Central CASC webinar that highlights the efforts and successes of our working groups. On occasion, this webinar may be included as part of the recently established Southern Plains Climate Science Seminar Series.
- Cross-departmental and Inter-collegial Engagement
 - The Consortium will grow our efforts in cross-departmental and intercollegial engagement within each of our institutions.
 - At OU, CASC personnel will coordinate research teams across campus, finding interested researchers and connecting them with stakeholders for co-production activities. Post-docs or graduate students will lead a climate-related "journal club" or discussion, mentor students, and conduct a cross-college and multi-institution Severe Weather and Climate Change working group during Years 8–12. Finally, OU will develop a climate adaptation graduate certificate program in Year 10.
 - All universities will host consortium post-docs for a defined period of time to foster cross-member training and research development.
 - At TTU, monthly research meetings and seminars connect new faculty and researchers with stakeholders for co-production, communications, and capacity building. In addition, TTU will lead its popular monthly pub science and movie night events for the local community. Finally, crossunit seminars and speaker's series build networks across campus and highlight funding opportunities.
 - LSU will build new climatology and coastal meteorology programs.
 - UNM will create an interdisciplinary, CASC-centered team that crosses the School of Architecture & Planning and College of Arts & Sciences.
 - OSU will re-tool its climate change courses to add sections related to climate change adaptation, expanding content to interests across campus.
- Tribal Engagement
 - The Tribal Liaison will mentor Chickasaw students at OU during Years 8-12. Also, The Chickasaw Nation will discuss what cultural resources mean to their Tribe, eventually resulting in inter-tribal conversations. The Chickasaw Nation and The Choctaw Nation of Oklahoma will co-convene quarterly discussions on sustainable water planning, engaging staff across multiple departments.
- Course Development
 - The Consortium will establish co-taught courses across our CASC institutions. For example, learning from an experiment of teaching Managing for a Changing Climate (developed by CASC faculty/staff) at both OU and LSU in Fall 2018, TTU will add into this collaborative learning environment by Fall 2020.

> Role of USGS CASC Director in Capacity Building Activities

• The USGS and University CASC Directors are full and active partners who cooperate to process the many external demands from USGS HQ, collaborators, and stakeholders alike.

• As USGS full-time researchers join the CASC team, they are invited to participate in research projects, to lead a CASC working group, to be guest speakers in classes, to help mentor early-career researchers, and to participate in other capacity building efforts.

► Alignment of Activities with CASC Mission

- The proposed activities of the South Central CASC in Years 8-12 directly address our mission to provide natural and cultural resource managers with the science, tools, and information they need to address the impacts of climate variability and change on their areas of responsibility. Our science themes, working groups, and overall priorities shall further this mission and effectively serve stakeholders throughout our region. To ensure this emphasis remains consistent throughout our activities, the Consortium will develop outcomes that inform management and evaluate the extent to which these outcomes are successful. In this manner, the CASC can maximize the time researchers conduct their studies and the relevance of their reported tasks.
- OU will report each project according to the themes listed in the CASC's most recent Strategic Science Plan to ensure alignment with USGS priorities. As metrics for each science theme and capacity building activity are developed, we also will report those metrics annually to aid in the evaluation process.

> Engagement in Indian Country and of Underrepresented Communities

- The Consortium will continue our engagement with Native professionals and Tribal employees through climate adaptation-related trainings and other activities. Also see sections above on Involvement in Activities Related to Indigenous Peoples, Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities (under Education, Training and Capacity Building), and Tribal Engagement (under Cross-Department and Cross-Institution Engagement).
- The Consortium main office in Norman, OK, has been successful in recruiting, hiring, and retaining members of a diverse team, especially those who have been underrepresented traditionally in science, technology, engineering, and mathematics fields. The Consortium will track demographics of its workforce to average 50 percent females and 40 percent non-Caucasians in its employees (both permanent and temporary). The regional USGS office and Consortium institutions will work together to engage marginalized communities of stakeholders in the science and communications activities that result from the CASC.

> Adjunct Faculty Appointments for USGS Personnel

USGS personnel may serve as adjunct faculty at the discretion of the specific institution and department. In most cases, a Federal employee expresses interest in adjunct status within a given department and is nominated at a regular faculty meeting. Most departments require the individual to hold a Ph.D. in that discipline (or closely related field), submit a CV and letter of interest, and present a colloquium prior to a vote. Departments expect adjunct faculty to be in active service, either serving on graduate committees, teaching a course, guest lecturing, assisting a departmental committee, or other activity to enhance the program.

COMMUNICATIONS AND DATA MANAGEMENT

➤ Communications Plan

- A Communications Plan for the South Central CASC has been developed by the regional USGS office and personnel at OU. The Plan features the use of online tools, social media, and in-person events to:
 - promote, facilitate, and improve the use of climate science in resource management decisions;
 - empower science producers and users with resources and spaces for collaboration;
 - strengthen partnerships to broaden the reach of our work.
- The Plan includes specific objectives to achieve these goals and suggests messaging tactics for reaching these audiences.
- In compliance with the Plan, CASC staff and students at OU maintain our website at https://southcentralclimate.org.

Communications staff consistently consult the plan when selecting projects and prioritizing partnership opportunities. Refer to the Communications Plan for details.

➤ Compliance

- OU communications and administrative personnel will coordinate press releases, use appropriate logos, report highlights of future activities, and distribute information from USGS HQ to our network. Our Style Guide, with guidance on color schemes, grammar/style, logo use, etc., was developed to complement (not supersede) NCASC's guidelines.
- OU works with our USGS Data Steward to establish metadata and provide project datasets to ScienceBase for distribution.
- The Communications Specialist in our hosting agreement will complement the work of the USGS CASC Research Coordinator.
- Our Communications Plan will evolve as NCASC guidelines change.

> Additional Activities and Coordination

 OU will develop a survey in Year 8 and administer it in Years 9 & 11 to measure the value of our Tribal engagement efforts and use of climate science in Tribal projects. USGS CASC personnel will review survey questions and analyses. Summaries results will be publicly available.

SPACE



> Main Office of the South Central CASC

- The South Central CASC's main office is 6,629 square feet of contiguous space (layout displayed above) with conference and break rooms, lounge, high-speed internet, and color copier/printer. Reconfigurable to grow, the space facilitates mentoring students and collaborating as a multi-institutional organization. This space (or similar) will be provided for the South Central CASC main office during the entirety of the grant award (Years 8-12).
- See Institutional Commitment (below) for cost of space.
- The regional USGS Director's budget covers materials and supplies used by regional USGS staff; the University Director's budget covers normal maintenance costs for the space.
- OU provides central mail service and oversees a scheduling calendar for conference and workshop room needs.
- USGS supports their specific clerical needs.

ADMINISTRATIVE

> University Director/Principal Investigator

• Dr. Renee McPherson is the University Director and Principal Investigator for the South Central CASC. In her CASC role, she manages and oversees the

consortium activities and budget under the hosting agreement and supervises OU employees.

- Ms. Emma Kuster will serve as the Assistant Director. In her role, she will direct daily operations, engage with stakeholders, coordinate with regional USGS personnel, interact with all Consortium institutions, and conduct scientific activities that promote climate change adaptation across the region.
- OU's Financial Administrator will maintain OU's payroll; handle invoices, purchases, and travel; prepare budget projections; reconcile financial records; and ensure compliance.
- The Communications Specialist will be responsible for implementing our communications plan, including updating website content and social media, writing scientific highlights and newsletter items for DOI, summarizing discussions from scientific meetings, interacting with stakeholders, and communicating their needs to the broader network.

> Institutional-level Commitment

- OU commits \$2.2 million, including \$600K of unrecovered facilities and administrative (F&A) from the hosting agreement; \$90K/year for host expenses (e.g., printing, telecommunications); and \$100K/year for office suite rent (for USGS, OU, Chickasaw Nation employees). Also, OU will retain our status as a University Strategic Organization (USO), with \$100K/year to aid CASC activities.
- OU continues three hard-funded positions created for the Center in 2012 and filled by Dr. McPherson (PI, 9-mo), Dr. Martin (Co-PI, 9-mo), and Ms. Sarsycki (Financial Administrator, 12-mo). Responding to the external review, OU also adds \$28K per academic year as a salary/fringe supplement for the University Director.
- LSU cost shares \$82,340 for PI D'Elia to provide oversight and coordination on the LSU research associated with the hosting agreement.

► Award Processing

- Within OU's Office of Research Services (ORS), 5-6 experts handle proposal development, contract administration, and subaward management, and several hold Certified Research Administrator certificates. All receive annual financial training through OU, including updates on new Federal regulations.
- As of August 2019, Ms. Susan Cates serves as the "CASC Awards Manager," and OU will keep a single point-of-contact.

DIRECT & INDIRECT COSTS

- > Indirect Costs and Pass-Through Funds
 - Indirect costs (IDC) are research support costs incurred by the Consortium and include the cost of facilities usage, building maintenance, utilities, grant administration, and other services. Rates are clearly identified in our Budget Justification and are computed at an institutionally negotiated rate.
 - If the cooperative agreement between the USGS and OU is simply modified yearly, OU will charge IDC on up to \$25K of subawards in the hosting agreement. Once charged, OU will waive its IDC for consortium member

subawardees (and thus USGS) on USGS funding outside of the hosting agreement (e.g., annual CASC science funding). Institutional IDC for each subawardee always will be collected.

Appendix I: Five Year Review Report Recommendations

American Fisheries Society. 2018. Five-year external reviews of the eight Department of Interior Climate Science Centers: South Central Climate Science Center. American Fisheries Society, Bethesda, Maryland. <u>https://casc.usgs.gov/content/annual-reports-reviews</u>

Institutional Coordination:

- ➤ The SRT recommends that funding and staffing to the SC CSC be increased or expectations for operations and productivity be adjusted accordingly.
- ➤ The SRT is concerned about maintaining the ability of Dr. McPherson, or any successor, to be successful in the role of SC CSC university director while being obligated to meet the multiple demands of the university and the SC CSC. The USGS and OU should develop a strategy or incentives to ensure retention of the current leadership and encourage others to serve in CSC university leadership positions.
- ➤ The SRT supports the SC CSC's intention to establish a joint advisory committee with the Southern Plains Climate Hub to improve efficiencies and coordination between programs and avoid overtaxing current and future advisory committee members.
- The SC CSC should consider further integrating New Mexico institutions into programs and projects.
- The SC CSC should consider strategies to continue to proactively engage multiple resource agencies toward common climate adaptation goals in the event that LCCs are dismantled.

Tribal Engagement:

- ➤ The SC CSC should use the trust and partnerships that they have developed with tribal partnerships as a foundation to expand their engagement with tribes and pueblos in New Mexico, Texas, and Louisiana, although the SRT recognizes the limitations of budgets. The SRT recognizes that these efforts are already underway and encourages continued attention to this issue.
- ➤ The SC CSC should evaluate how to shift tribal engagement from the start-up phase to long-term sup- port, information distribution, education, and training. A challenge will be to identify which activities fit within the CSC mission and budget.
- ➤ The SC CSC should continue efforts to identify activities that support tribal empowerment, planning, decision making, adaptation, and management and refine approaches to further strengthen tribal engagement. Building tribal capacity through workshops may provide greater benefits than adding more tribes and pueblos to the consortium.
- ➤ The SRT suggests the development of a strategy for assessing tribal interests, concerns, and needs to determine an appropriate level of engagement and communication with potential stakeholders and partners.
- The SC CSC should continue building tribal technical capacity to work with climate data for use in vulnerability assessment and planning. Guidance from tribal technical experts will define what climate information would be useful to tribes and the appropriate communication tools to disseminate this information.
- ➤ The success of developing tribal technical expertise for using climate data for tribal planning should be evaluated.

Actionable Science:

- ➤ The SC CSC will benefit by conducting an evaluation that will help to decide how, and to what extent, to focus or prioritize science efforts in coming years.
- The use of directed grants and targeted grants is an agile way of addressing emergent stakeholder needs, and it may be instructive for the SC CSC to review the degree to which projects funded through these means are reflected in the priorities identified in the Strategic Science Plan (Winton et al. 2013);
- ➤ The SC CSC consortium has excelled in leveraging funds with other efforts, and it would be helpful to understand and map these projects to the SC CSC priorities and themes.
- Clearly articulating the processes that are in place to coordinate among funding streams would be helpful to all SC CSC partners, stakeholders, and future strategic planning efforts.
- The SC CSC is positioned to continue fostering coproduction of actionable science. The program would be strengthened by working with PIs to demonstrate the extent to which projects build on previous work related to applied climate science;
- Stakeholders strongly supported SC CSC-developed science products, and the SRT suggests continuing to emphasize to investigators the need to demonstrate meaningful coproduction in all funding requests.
- Partners and stakeholders reached during this review expressed a desire for the SC CSC to provide increased assistance with appropriate application and use of CSC data and products.

Communications:

- The SRT applauds and encourages continued development of the Strategic Communications Plan.
- ➤ The SRT suggests making the communication goals more central to the document and fleshing out the Implementation section by explicitly stating what constitutes success for their communications program and then developing metrics to evaluate progress towards that success.
- The SRT applauds the development of, the strategic communications plan and encourages many of the proposed refinements, including a Web site overhaul and communications management plans for funded projects.
- The SC CSC would extend the use of their products by exploring avenues to make data, tools, and information accessible to those who were not directly involved in particular projects (i.e., increase the applicability and accessibility of SC CSC-funded science to the larger SC CSC region beyond simply posting data to ScienceBase).
- ➤ The SRT agrees with the provision of the Strategic Communications Plan to multiply the SC CSC's impact by utilizing existing trusted messengers rather than attempting to cultivate and maintain its own relationships with multiple individual end-users. However, care should be taken to ensure appropriate branding and credit to the SC CSC for its materials and resources so that the ultimate users of that information are aware of the ultimate source of information they value.
- Because "[s]takeholders and staff have expressed a need for a better representation of how the CSC is unique in the landscape of similar boundary institutions" (SC CSC 2017:4), the SC CSC should work with other climate-focused boundary organizations in

the region to identify and clearly communicate what each of them SC CSC uniquely offers and to whom.

- Explore ways to make data, tools, and information accessible to those who were not directly involved in a particular funded project so as to increase the applicability and accessibility of SC CSC-funded science to the larger SC CSC region.
- Consider Science Communication training workshops for investigators and staff (Baron 2010).

Tactical:

- Conduct an overhaul of the SC CSC Web site (SC CSC staff affirmed that this is a high priority)
- Ensure that public access to SC CSC data meets standards for publicly funded data and SC CSC objectives for improving end-user and partner access to SC CSC science and tools (Kuster et al. 2017).
- Revisit whether (and, if so, when) data delivery is restricted behind a firewall (e.g., for the climate change projections developed by the 35 project.
- Continue promoting the online course Managing for a Changing Climate. This is a stellar example of a successful and impactful communications product and could be held up as a best practice for other CSCs to use or develop in their regions.
- Expand the Messaging Guidance for Primary Audiences section (SC CSC 2017:12) to include researchers/scientists as a primary audience.
- Refine SC CSC's and member scientists' communication of climate change uncertainty, clearly distinguishing uncertainty about society's future choices from uncertainty about the climate system response.
- ➤ In other words, take care not to conflate policy uncertainty with climate variability with model uncertainty.

Appendix II: Budget Tables

Host Institution / Consortium: University of Oklahoma - South Central CASC

Cost Category	Budget Year 1	Budget Year 2	Budget Year 3	Budget Year 4	Budget Year 5	Total Budget Years 1-5
1. Salaries and wages	\$379,366	\$414,168	\$366,887	\$440,055	\$453,608	\$2,054,084
2. Fringe benefits/labor overhead	\$103,248	\$113,734	\$97,489	\$122,949	\$127,991	\$565,411
3. Equipment	\$0	\$0	\$0	\$0	\$0	\$0
4. Supplies	\$7,760	\$7,760	\$7,760	\$7,760	\$7,760	\$38,800
5. Services or consultants	\$0	\$0	\$0	\$0	\$0	\$0
6. Travel	\$50,846	\$50,846	\$50,846	\$50,846	\$50,846	\$254,230
7. Publication costs	\$500	\$500	\$500	\$500	\$500	\$2,500
8. Other direct costs	\$31,764	\$33,878	\$35,456	\$37,117	\$38,862	\$177,077
9. Total Direct Cost (items 1-8)	\$573,484	\$620,886	\$558,938	\$659,227	\$679,567	\$3,092,102
10. Indirect cost/General and administrative cost	\$315,470	\$270,135	\$238,404	\$286,533	\$295,220	\$1,405,762
11. Amount proposed (items 9+10)	\$888,954	\$891,021	\$797,342	\$945,760	\$974,787	\$4,497,864
12. Applicant's contribution	\$353,409	\$353,874	\$354,353	\$354,847	\$355,357	\$1,771,840
13. Total Federal and non-Federal amounts it any	\$1,242,363	\$1,244,895	\$1,151,695	\$1,300,607	\$1,330,144	\$6,269,704

South Central Climate Adaptation Science Center Annual Report

Administrative

Award Recipient: University of Oklahoma 201 Stephenson Parkway, Suite 2100 Norman, OK 73019

Contact Information: Renee McPherson, PhD University Director, South Central Climate Adaptation Science Center Email: <u>renee@ou.edu</u> Phone: 405-325-1272



Award Agreement Number: G19AC00086

Report Date: May 31, 2022

Reporting Period: August 1, 2021 – July 31, 2022

Purpose and Objectives

The South Central Climate Adaptation Science Center (CASC) is a research collaboration between the USGS, University of Oklahoma (host institution), Texas Tech University, Chickasaw Nation, Choctaw Nation of Oklahoma, Louisiana State University, Oklahoma State University, and the University of New Mexico. Our team conducts science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change. The South Central CASC collaborates with a wide range of researchers and decision-makers in tribes, state and Federal agencies, universities, and non-governmental organizations. Our Center has existed since March 2012, but in this report we refer to Year 3 since it is the third year in our current Host Agreement.

This report provides a summary of the South Central CASC Consortium activities for Year 3 (August 1, 2021 – July 31, 2022). The Consortium accomplished the agreed-upon deliverables for this year outlined in our Term Sheet document, and these are discussed throughout this report. In Year 3, the South Central CASC:

- Hosted four online short courses for resource managers world-wide (two in Fall 2021; two in Spring 2022);
- Conducted stakeholder-driven science related to our six science priorities;
- Engaged with stakeholders and built capacity through virtual trainings and workshops (e.g., climate 101s, climate projection trainings, tribal resilience, etc.);
- Promoted cross-departmental and inter-collegial engagement at each institution and across the Consortium through new proposal efforts and our Communities of Practice;
- Continued growing our Affiliate Program with three new Affiliate members;
- Developed a plan focused on tribal engagement evaluation to be implemented in Year 4;
- Maintained our online presence through our website, social media, and webinars;
- Hosted a virtual Science Meeting in Fall 2021;
- Engaged in cross-network collaborations in research, DEI, and climate training efforts; and
- Submitted the required communications products to the National CASC.



Photo taken in 2021

Organization & Approach

Personnel Financially Supported on the Host Agreement

The table below highlights CASC employees at our consortium institutions supported on our host agreement.

Personnel	Affiliation	Role	FTE on Host Agreement
Renee McPherson	University of Oklahoma	Consortium PI & University Director	1 FTE for 1 month
Emma Kuster	University of Oklahoma	Consortium Co-PI & University Assistant Director	1 FTE for 8 months
Jenifer Henslee Peck	University of Oklahoma Science Translator		1 FTE for 7 months
Yvette Wiley	University of Oklahoma	University of Oklahoma Tribal Liaison & Research Associate	
Sharon Hausam	University of Oklahoma	Climate Adaptation Planner & Research Scientist	0.5 FTE for 2 months
Ellen Robertson	Oklahoma State University	Postdoctoral Associate	1 FTE for 12 months
Emma Roberts	Texas Tech University	Postdoctoral Associate	1 FTE for 12 months
Radilyn Senz	Texas Tech University	Texas Tech University Undergraduate Student	
Kristine DeLong	Louisiana State University	Consortium Co-PI	1 FTE for 1 month
Victor Rivera-Monroy	Louisiana State University	Consortium Co-PI	1 FTE for 1 month
Kylie Palmer	Louisiana State University	Graduate Student	0.5 FTE for 12 months
Xioachen Zhao	Louisiana State University	Graduate Student	0.5 FTE for 5 months
Ivan A. Vargas-Lopez	Louisiana State University	Graduate Student	0.5 FTE for 12 months
Renia Ehrenfeucht	University of New Mexico	Consortium Co-PI	0.01 FTE for 9 months
Lani Tsinnajinnie	University of New Mexico	Consortium Co-PI	0.01 FTE for 4.5 months
John Fleck	University of New Mexico	Consortium Co-PI	0.01 FTE for 9 months
Annalise Porter	University of New Mexico	Graduate Student	0.5 FTE for 5 months
Maximiliano Trujillo	University of New Mexico	Graduate Student	0.5 FTE for 10 months
Brennan Davis	University of New Mexico	Graduate Student	0.25 FTE for 8 months
April Taylor	Chickasaw Nation	Consortium Co-PI & Tribal Liaison	1 FTE for 12 months

Personnel Who Contribute Time/Service to the Host Agreement

The table below highlights the CASC employees at our consortium institutions that are supported by other means but contribute time/service to the host agreement mission.

In addition, the CASC has over 95 Research Affiliates across the consortium and at partner institutions.

Affiliation	Personnel (Role at CASC)
University of Oklahoma	Elinor Martin (Consortium Co-PI); Mark Shafer (Consortium Co-PI); Berrien Moore (Consortium Co-PI); Cynthia Naha (NM Tribal Liaison - left Dec. 2021); Noetta Harjo (Financial Administrator); Derek Rosendahl (Research Scientist); Irenea Lodangco (Research Scientist); Adrienne Wootten (Research Scientist); Caitlin Rottler (Postdoctoral Associate); Dolly Na Yemeh (Postdoctoral Associate); Laura Bray (Postdoctoral Associate); Paulina Cwik (Graduate Student); Olivia VanBurskirk (Graduate Student); Ebone Smith (Graduate Student); Taylor DeWinter (Graduate Student); Carrie Leslie(Graduate Student); Amelia Cook (Graduate Assistant); Luke Kerr (Student Office Assistant); Rachel Koch (Student Office Assistant); Nondumiso Mndzebele (Social Media Coordinator); Peyton Cavnar (Undergraduate Research Assistant); Matt Davies (Undergraduate Research Assistant); Tsali Smith (Undergraduate Research Assistant); Asa Samuels (Undergraduate Research Assistant); Patrick Painter (Undergraduate Research Assistant)
Oklahoma State University	Jim Ansley (Consortium Co-PI); Scott Loss (Postdoc Supervisor)
Texas Tech University	John Zak (Consortium Co-PI); Katharine Hayhoe (Consortium Co-PI); Venki Uddameri (Consortium Co-PI); Natasja van Gestel (Consortium Co-PI); Ian Scott-Fleming (Research Associate); Kerry Griffis-Kyle (Faculty); Nick Smith (Faculty); Tirhas Hailu (Postdoctoral Associate); Amin Ferdous (Graduate Student); Garrett Huddleston (Graduate Student); Diana Vargas-Gutierrez (Graduate Student); Erin Stukenholtz (Graduate Student); Pablo Tovar (Graduate Student)
Louisiana State University	Chris D'Elia (Consortium Co-PI)
University of New Mexico	Dave Gutzler (Retired Faculty); Mollie Hantulla (Graduate Student)
Chickasaw Nation	Kara Berst (Consortium Co-PI); Krisopher Patton (Researcher); Newakis Webber (Researcher); Chaylum Hogue (Researcher); Matthew Armor (School to Work Intern); Taylor Broadbent (BIA Intern), CJ McLemore (BIA Intern); Clarissa Dixon (BIA Intern); Ian Stevens (BIA Intern); Lex Smith (Student Intern); Buster Beshires (Student Intern)
Choctaw Nation	Ethan Schuth (Consortium Co-PI); Tye Baker (Consortium Co-PI)

Organization & Approach

Organizational Structure & Communication

The University Director and University Assistant Director oversee the Consortium budget and provide guidance on science and planning activities conducted through the host agreement. The diagram shown overviews the relationship between USGS and Consortium leadership teams and stakeholders as of August 2019.



The Consortium Executive

Committee (EC) meets annually (typically in March or April) to discuss progress-to-date in a given year and begin planning for the following year. In Year 3, the EC met virtually on March 31st to discuss future research and capacity building opportunities, the 2022 Fall Science Meeting, and science communication efforts conducted through the host agreement.

To facilitate regular communication across the Consortium, we have scheduled bi-monthly Zoom calls to discuss general updates, critical issues, and the science being conducted by students and postdocs. In Year 3, we started dedicating one call per month for a research presentation and discussion.

Personnel Achievements

Dr. Elinor Martin earned the Edith Kinney Gaylord Presidential Professorship Award from The University of Oklahoma for her outstanding leadership and teaching efforts in the OU School of Meteorology.

Ms. April Taylor received an Honorable Mention for the 2021 Climate Adaptation Leadership Award in the Individual Achievement Category from the Association of Fish and Wildlife Agencies for her outstanding climate adaptation efforts with tribal communities in the South Central US.

Host Agreement Challenges

We continued to face a few challenges in Year 3 (primarily related to COVID-19), but were able to overcome and adjust accordingly:

Administrative: Due to delays with the congressional budget, FY22 projects have not yet received funding to begin their projects. Additionally, OU has experienced some internal delays with processing award paperwork, but this is being resolved.

Travel: Due to ongoing delays, cancellations, or transitions to virtual options for conferences and other events, our team has been unable to use much of the travel funding in the host agreement. We have requested to carry over remaining travel funds or reallocate those to salary and fringe for our research team.

Cross-Departmental Interaction Challenges: Due to the ongoing situation with COVID-19, it has been challenging to promote such interactions. However, our Communities of Practice that have been established over the past few years are helping to fill in this gap and are stimulating new collaborative efforts across departments and institutions.

Capacity Building Challenges: Our CASC had several workshops and listening sessions planned that were either postponed or transitioned to virtual during Year 3 due to the ongoing COVID-19 situation. This has impacted our ability to engage with some of our stakeholders and tribal partners, but has offered us a way forward in maintaining some engagement during these difficult times. Additionally, virtual options have provided more flexibility in reaching stakeholders that would normally have to travel longer distances to attend in-person events. Moving forward, we will likely have a virtual option available for most of our training and workshop events.



Results

Partnerships

Our goal is to respond to high priority natural and cultural resource management challenges and foster substantive, sustained engagement between scientists and managers. In Year 3, the South Central CASC focused on building new partnerships and strengthening existing partnerships.

South Central CASC staff at OU in partnership with the Southern Plains Drought Early Warning System (DEWS) team are planning a Drought Partners Meeting for August of 2022. We are excited to continue building our relationship with the Southern Plains DEWS team and USDA Southern Plains Climate Hub to bring our stakeholders the best drought information possible.

We have continued to strengthen our connection with U.S. Fish and Wildlife Refuge Managers across our region through regular engagement. In Year 3, we conducted brainstorming sessions to identify pilot projects with three wildlife refuges in our region. Additionally, our team has been working with the U.S. Fish and Wildlife Service to provide technical expertise on climate modeling for two Species Status Assessments.

The South Central CASC hosted a virtual Science Workshop in Fall 2021 that brought together over 60 scientists and resource managers from across our region to discuss research opportunities related to climate adaptation. Participants were invited to join one of our Communities of Practice (CoPs). The science being conducted by each group is further discussed in the *Science* section.

South Central CASC staff has been building new partnerships with the National Park Service, in particular with the Climate Change Response Program team and the Intermountain West Region climate coordination team. Ms. Emma Kuster will be working with these teams to update and streamline their climate change workshop process with the ultimate goal to increase the number of parks per year that they can assist in planning for a changing climate. We are starting with a pilot project this year to develop a new framework that can be implemented service-wide and strengthen NPS partnerships with the entire CASC network.

Capacity Building

Our goal is to build a community of researchers and managers and foster their leadership in science-based resource management. In Year 3, we focused building capacity through virtual workshops and training events, webinars, and our Managing for a Changing Climate short course series. The South Central CASC team hosted 15 training or workshop events for resource managers, including our tribal partners.

Our Managing for a Changing Climate short course series continued to be popular, and were spread out over four short courses, two in the Fall of 2021 and two in the Spring of 2022. Our *Introduction to the Climate System* course had over 100 people register with 20 tribal attendees representing 13 tribes. Our *Climate Modeling, Downscaling, and Assessments* course had over 175 people register including 27 tribal attendees representing 13 tribes. For our Spring 2022 courses, we had over 125 people register for the *Societal Impacts* course and over 100 people register for the *Physical Impacts* course.

South Central CASC staff also offered *How to Use Climate Projections* training opportunities for approximately 50 resource managers as part of the Native American Fish and Wildlife Society Annual conference.

Strategic Planning & Tribal Engagement Evaluation

Our team continues to work toward sharing knowledge and lessons learned about evaluating climate services, as well as learning best practices to do so. They are working on a case study with the NM Tribal Action Resilient Network to illustrate long term impacts of the program and will be conducting interviews in the summer of 2022 to assess tribal needs and challenges. Our Evaluation Committee includes representation from the US Dept. of Agriculture Climate Hubs, the Southern Plains Drought Early Warning System group (through NIDIS), the Climate Assessment for the Southwest group (a NOAA RISA), and the Southern Climate Impacts Planning Program (a NOAA RISA).



Results

Science

Our goal is to advance the understanding of the impacts of climate change and variability on fish, wildlife, water, land, and people to support sound resource management and adaptation. Below are research highlights from our Community of Practice (CoP) members and our South Central CASC host agreement efforts:

- *Sustainable & Usable Water Resources:* The Water Resources CoP completed two publications since they started, but now the group is starting to phase out as several members faced changes in their personal and professional lives. We hope to re-establish this group in another year as new needs surface from the management community. Additionally, graduate students at UNM continued to work on projects related to water usage and policy in the Middle Rio Grande. Initial results from their work suggests that increased water use poses risks of unsustainable increases in groundwater pumping, especially in light of climate change.
- *Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities:* The Building Resilient Communities CoP has reframed its purpose and are now focusing on climate change and adaptation on the ground. They are interested in how people in their everyday lives and everyday work lives are experiencing, interpreting, responding and adapting to, and living with environmental change. The team is focusing on the intersections among climate change, environmental change from development patterns and ways of living, and the social and economic changes that accompany environmental change or shape what actions are possible or desirable. They are developing a webinar series on the topic of resilient communities following the model of TTU's *Science by the Glass* series.
- *Mapping & Predicting Changes in Species and Ecosystems:* Team members in this CoP have been working on five focus areas: (1) conceptual paper to describe climate change effects on species distributions (currently under review in *Ecosphere*); (2) creating a white paper studying emerging urban ecosystems; (3) creating species-specific fact sheets for climate-smart guidance for New Mexico and Oklahoma; (4) evaluating the impacts of agricultural practices on biodiversity, species distributions, and landscape connectivity for species; and (5) studying the relationships between animal and human health in the context of a changing climate. In addition to the work done by this CoP, Dr. Ellen Robertson at OSU has continued her work with e-bird to understand how changes in spring green up are impacting the migration patterns of migratory birds in the Central Flyway.
- Understanding Teleconnections that Influence Ecosystem Resilience: CoP members are submitting an article titled Impacts of Atmosphere-Ocean Teleconnections on the South-Central United States to the journal Frontiers in Earth Science. Moving forward, this group will be continuing a literature review on the use of telecoupling to support progress in integrated climate science. They are also working to develop a first draft manuscript on the use of teleconnection concepts in human-environment systems research.
- *Understanding Uncertainty:* This team is working to identify useful resources about working with and describing uncertainty in climate change. They are developing a web site to house materials about communicating uncertainty effectively and understanding the types of uncertainty inherent in climate projections and scientific statements with plans to provide a demo at the 2022 Fall Science Meeting.
- *Resilient Coastal Systems:* A new CoP group, Resilient Coastal Ecosystems was established at the Fall 2021 Science meeting and they are in the process of setting goals and gaining new members.
- NEW THEME: *Extreme Weather and Climate Change:* This group was established at the Fall 2021 Science meeting and has established a central research theme *to address how changes in extreme weather impact our National and State Parks and National Wildlife Refuges.* Progress toward this mission is strong and the National Park Service is currently identifying a few specific parks which are experiencing significant and immediate issues with climate change and extreme weather for the team to begin pilot projects with over the next year.



Communications & Outreach Efforts

Our goal is to understand and respond to information needs and support the integration of climate adaptation in resource management through usable, useful products and tools. Below is a brief description of our outreach, products, and tools resulting from efforts directly funded by the host agreement.

Communications & Outreach

In Year 3, we submitted over 25 highlights to the National CASC that included publications from our researchers, virtual events, and presentations. We maintained and expanded our online presence through our website (https://southcentralclimate.org/), social media platforms (Facebook [960 followers], Twitter [701 followers], LinkedIn [395 followers], YouTube [1000 followers], and Instagram [145 followers]), monthly newsletters [652 subscribers], and webinars from partners and Affiliates. Since August 2021, we have had over 8,000 visitors, resulting in over 18,000 page-views on our website.

In a joint effort with the USDA Southern Plains Climate Hub and the Southern Plains Climate Impacts Planning Program, we continued to host our bi-monthly Southern Plains Climate Science Webinar to accommodate for virtual overload and as a result created a quarterly webinar series with varying style approaches for more active audience engagement. We are averaging around 45 registrants for each webinar. Webinars that are recorded are made available for viewing on our website (https://southcentralclimate.org/resources/webinars-workshops/).

The TTU-Climate Center continued to host virtual monthly Science by the Glass Events that facilitate climate related research presentations and discussions. Participants attended from around the U.S. and internationally. The events average from 100-250 views between live and recorded content. This format has also fostered more cross-consortium interaction, with Dr. Mike Langston and Dr. Kristine DeLong as invited speakers for the series.

Additionally, we continued to engage in outreach efforts with youth and educators to build up the next generation of scientists. Ms. Emma Kuster presented to over 100 state coordinators for Project WET, Project WILD, and Project Learning Tree. We also had a booth at the Oklahoma Indian Education Conference, which led to a new contact with the outreach coordinator at the First Americans Museum, and ultimately participation at a youth outreach event at the museum in March, in which several members of the Center participated.

Engagement with Regional & Local Decision-Makers

South Central CASC staff at LSU met with the Flower Garden Banks National Marine Sanctuary (FGBNMS) to discuss research progress and brainstorm new project ideas. LSU staff will work with them to set up a new water monitoring program as a result of these discussions. They also took part in multiple virtual workshops to address the status and trends of resources in the FGBNMS which will be used to draft a new condition report.

The South Central CASC staff at OU and CN were asked to create a flood history and climate projections report for the Coushatta Tribe in Louisiana.

Members at OSU had discussions with the Cornell Lab of Ornithology about climate change effects on bird migration using citizen-science data and are collaborating on a manuscript together.

Members at TTU started a new collaboration with CEMEX USA surveying biodiversity and wildlife health in the Tans-Pecos region of Texas as it relates to climate change.

Tools & Products

Several staff members are creating a four-page set of flyers for a Climate Adaptation Series on the topics of climate adaptation, seed banking, fire, and floods.

Over this past year, the South Central CASC team submitted over 45 publications and presented over 100 presentations at conferences, workshops, and webinars across our region. A list of selected publications and presentations are highlighted in the appendix. All publications are linked on our website.



Activities Planned for Year 4

In Year 4 of this host agreement, we plan to continue to develop new products and tools, offer trainings and workshops, and engage in actionable science that will assist our stakeholders in adapting to a changing climate. Moving forward, we plan to:

- Continue to grow existing Communities of Practice and establish additional CoPs to synthesize and identify gaps in stakeholder-driven science priorities;
- Implement our Tribal Engagement evaluation plan and use the results to strengthen our efforts;
- Revamp and host our online climate education short course series, and co-teach climate adaptation courses across our CASC institutions (including Managing for a Changing Climate);
- Develop a training approach rooted in adult education practice for providing climate adaptation training to resource managers across our region;
- Continue taking our new projections to DOI agencies and partner agencies to infuse climate information into adaptation and conservation plans (e.g., SSAs, Habitat Plans, and SWAPs, etc.);
- Engage stakeholders directly through listening sessions and workshops to understand priority science needs and provide scientific expertise as requested;
- Educate and support Tribal engagement across the region, including hosting Tribal workshops and pursuing funding opportunities in collaboration with Tribal partners;
- Develop an evaluation plan to evaluate other CASC activities;
- Further enhance partnerships with Tribes and Tribal organizations, National Wildlife Refuges, National Park Service, and other State and Federal agencies across our region; and,
- Strategically develop large-scale inter-institutional and inter-disciplinary regional proposals to establish a broader funding base.





South Central CASC Host Agreement Budget

Budget numbers shown below represent expenditures from August 1, 2021 through May 31, 2022.

Institution	YR 2 Carryover	YR 3 Budget	Expended	Percent Expended
University of Oklahoma	\$41,768	\$302,142	\$171,994	50%
Texas Tech University	\$37,720	\$65,559	\$94,726	92%
Louisiana State University	\$7,794	\$122,592	\$79,550	61%
Chickasaw Nation	\$10	\$125,562	\$79,799	64%
Choctaw Nation of Oklahoma	—	—	—	—
Oklahoma State University	\$68,744	\$48,795	\$83,402	71%
University of New Mexico	\$27,590	\$136,656	\$57,181	35%

Due to the ongoing COVID-19 pandemic, many of our institutions have faced difficulty in spending from their travel and supply lines. Since many workshops and conferences have been postponed, cancelled, or transitioned to virtual, we have submitted reallocation requests throughout the year to move travel and supply funds as needed. We will also be submitting a request to carryover remaining Year 3 funds into Year 4 for OU, CN, and UNM. Remaining carryover is primarily associated with unspent travel funds in Year 3.

Leveraged Funding

In 2014, there was an anonymous donation of \$330,000 provided to the South Central CASC, which has been set up as a Foundation Account at OU. Each year we use that funding to provide at least three study abroad scholarships and two academic scholarships. This year, we offered three study abroad scholarships and four Department of Geography and Environmental Sustainability academic scholarships.

In 2018, the South Central CASC became a consortium member of the Oklahoma NASA Space Grant Consortium. The funding we continue to receive through this partnership has been used to support several postdocs and students at the South Central CASC working on climate-related projects. This past year, we supported four native students on our NASA funding. Ms. Peyton Cavnar worked on a project related to climate adaptation and seed banking, Mr. Asa Samuels has been investigating tribal representation and participation in State Wildlife Action Plans, Mr. Tsali Smith completed the first 3D printed weather station, and Ms. Amelia Cook developed a K-12 curriculum around the weather station and its data.

Our NM Tribal Liaison receives funding through a separate grant from the Bureau of Indian Affairs. We have been able to secure funding for this position through grants since June 2017. The current cooperative agreement will end in Fall 2022 and we are currently working to establish a new Cooperative Agreement. We are looking to fill this vacant position in summer 2022.

Climate Science Center Support for Tribal Resilience Planning

Renee McPherson (OU), PI - ongoing, BIA, Start Date: 7/5/2017

South Central CASC Consortium researchers were successfully awarded 4 projects through the FY22 USGS awards competition. In addition, our team also was awarded 3 projects through directed funding.

The research team of the South Central CASC successfully submitted 5 additional proposals to other federal agencies, totaling in an additional \$15,306,256 of leveraged funds for CASC-related projects since August 1, 2021. We have additional proposals submitted and currently under review, so this dollar amount may continue to grow for Year 3. Many of these projects are awarded to our PIs because of the expertise built through the South Central CASC network.



Appendix: Additional Achievements & Efforts

NASA Earth to Sky Program

In October 2019, April Taylor and Emma Kuster participated in the NASA Earth to Sky Academy to become regional leaders for the Earth to Sky Program. In July of Year 3 we will hold our first in-person workshop for tribal educators, led by April Taylor. This workshop was originally scheduled for the summer of 2020 but was postponed due to COVID-19.

Diversity, Equity, & Inclusion Efforts

In partnership with the USGS CASC, and leveraging previous discussions learned by staff and students, there have been diversity, equity, inclusion, and accessibility (DEIA) discussions and resource building in Year 3. This includes a Padlet that allows the team to share media, tools, resources, and other information of interest that allow for personal and professional growth and group discussions. These discussions have allowed our team to get to know one another better as well as allow us to explore and foster changes that will be beneficial to the South Central CASC and our partners.

Supporting our Communities of Practice

Using some of our leveraged funding through our OU cost share, we were able to support two students at the University of Oklahoma to work on summer projects with our Teleconnections CoP and Species and Ecosystems CoP. These students will be helping the teams with their ongoing work described above in the *Science* section.

New CASC Employees

The South Central CASC added Jenifer Henslee Peck as the new Science Translator and Communications Specialist in January 2022. In Fall 2021, Yvette Wiley and Dr. Sharon Hausam were hired to build out our tribal engagement program. Yvette transitioned to full time as a Research Associate and Tribal Liaison in January 2022. Dr. Sharon Hausam was hired as the Climate Adaptation Planner and Research Scientist and has been working to identify climate adaptation planning efforts in which the Center could assist. In Spring 2022, Dr. Dolly Na-Yemeh started as a Climate Adaptation Specialist (started May 27th, 2022) and will be working with our resource managers on their climate adaptation related science needs. We will be hiring a New Mexico Tribal Liaison in Summer 2022.

Sabbatical CASC Employees

Dr. Renee McPherson, Dr. Renia Ehrenfeucht, and Dr. Kristine DeLong are on a sabbatical from their professorships at their respective universities for portions of Year 3. During their sabbaticals they have been working on research efforts that are benefiting the larger CASC network.

Fifth National Climate Assessment (NCA5)

The South Central CASC is represented in the NCA5 effort with Dr. Renee McPherson serving as the Southern Plains region chapter lead, and April Taylor and Taylor Broadbent as additional authors.

Climate Adaptation Scientists of Tomorrow

LSU was selected as one of the host sites for the Climate Adaptation Scientists of Tomorrow program funded by the National CASC. Students will start their multi-year experience in the summer of 2022 at LSU in partnership with Auburn University, Savannah State University, and Jackson State University. This program aims to 1) increase diversity, equity, and inclusion in STEM; 2) cultivate the next generation of climate scientists; and 3) foster climate science programs at Minority Serving Institutions.

Regional Early Career Researcher Workshop

In July 2022, we are hosting the Early Career Researcher Workshop for the first time since 2018 due to COVID-19 restrictions. The workshop brings together a diverse cohort of graduate students, post-docs, and early career environmental professionals from a wide variety of disciplines and provides them with the skills necessary to conduct and communicate stakeholder-based actionable science.



Appendix: Selected Publications

- Dong, N., Wright, I. J., Chen, J. M., Luo, X., Wang, H., Keenan, T. F., Smith, N. G., & Prentice, I. C. (2022). Rising CO2 and warming reduce global canopy demand for nitrogen. *New Phytologist*, [https://doi.org/ 10.1111/nph.18076]
- Moser, C. D., Chavarria, S. B., & Wootten, A. M. (2021). Streamflow response to potential changes in climate in the Upper Rio Grande Basin. Scientific Investigations Report. [<u>http://pubs.er.usgs.gov/publications/</u> <u>sir20215138</u>]
- Nelson, M., Ehrenfeucht, R., Birch, T. & Brand, A. (2022) Getting By and Getting Out: How Residents of Louisiana's Frontline Communities Are Adapting to Environmental Change, Housing Policy Debate, 32:1, 84-101, DOI: <u>10.1080/10511482.2021.1925944</u>
- Robertson, E. P., Tanner, E. P., Elmore, R. D., Fuhlendorf, S. D., Mays, J.D., Knutson, J., Weir, J. R., & Loss, S. R. (2022) Fire management alters the thermal landscape and provides multi-scale thermal options for a terrestrial turtle facing a changing climate. *Global Change Biology*, 28, 782-796. [https://doi.org/ 10.1111/gcb.15977]
- Stukenholtz, E. E., Hailu, T. A., Childers, S., Leatherwood, C., Evans, L., Roulain, D., Townsley, D., Treider, M., Platt II, R. N., Fritts, S. R., Ray, D. A., Zak, J. C. & Stevens, R. D. (2022). A pigeon's eye view of a university campus. *The Southwestern Naturalist*, 66(1), 13-24. DOI: <u>10.1894/0038-4909-66.1.13</u>
- Tsinnajinnie, L.M., Frisbee, M.D., Wilson, J.L. (2021). Groundwater from perennial springs provide refuge from wildfire impacts in mountainous semiarid watershed. *Journal of Hydrology*, Volume 596. [https:// doi.org/10.1016/j.jhydrol.2020.125701]
- VanBuskirk, O., Ćwik, P., McPherson, R. A., Lazrus, H., Martin, E., Kuster, C., & Mullens, E. (2021). Listening to Stakeholders: Initiating Research on Subseasonal-to-Seasonal Heavy Precipitation Events in the Contiguous United States by First Understanding What Stakeholders Need, *Bulletin of the American Meteorological Society*, 102(10), E1972-E1986. Retrieved May 13, 2022, from <u>https://journals.ametsoc.org/view/journals/bams/102/10/BAMS-D-20-0313.1.xml</u>
- Wineland, S. M., Başağaoğlu, H., Fleming, J., Friedman, J., Garza-Diaz, L., Kellogg, W., Koch, J., Lane, B. A., Mirchi, A., Nava, L. F., Neeson, T. M., Ortiz-Partida, J. P., Paladino, S., Plassin, S., Gomez-Quiroga, G., Saiz-Rodriguez, R., Sandoval-Solis, S., Wagner, K, Weber, N., Winterle, J., Wootten, A. M. (2022) The environmental flows implementation challenge: Insights and recommendations across water-limited systems. *Wiley Interdisciplinary Reviews: Water*, 9(1), e1565. https://doi.org/10.1002/wat2.1565
- Zhao, X., Rivera-Monroy, V. H., Chunyan, L., Vargas-Lopez, I.A., Rohli, R. V., Xue, Z. G., Castaneda-Maya, E., & Coronado-Molina, C. (2022). Temperature Across Vegetation Canopy-Water-Soil Interfaces Is Modulated by Hydroperiod and Extreme Weather in Coastal Wetlands. *Frontiers in Marine Science*, 9. [https://www.frontiersin.org/article/10.3389/fmars.2022.852901]
- Zhao, X., Rivera-Monroy, V.H., Farfán, L.M. et al. (2021) Tropical cyclones cumulatively control regional carbon fluxes in Everglades mangrove wetlands (Florida, USA). *Sci Rep* 11, 13927. [https://doi.org/ 10.1038/s41598-021-92899-1]

Appendix: Selected Presentations and Other Media

- Brome, K., DeLong, K. L., Schubert, B., Polito, M., Wallace, D., Miller, C., Miller, E., Harley, G., Reese, C. A., Obelcz, J., Xu, K., Moran, K., Jones, D., Caporaso, A., December 2021: Snapshots of Late Pleistocene Climatic and Ecologic Variability in the Northern Gulf of Mexico Using Isotopic Analysis of Sediment and Wood Debris" - American Geophysical Union Fall Meeting, New Orleans, LA.
- Canvar, P., May 2022: "The Power of Seeds: Climate Change and Indigenous Knowledge in the South Central Region" South Central CASC office, Virtual
- **DeLong, K.**, Wagner, A. J., Palmer, K., Weerabaddana, M. M., Slowey, N. C., Zinke, J, December 2021: "Geochemical proxies in a long live coral from Flower Garden Banks National Marine Sanctuary as a candidate for the Anthropocene Global Boundary Statotype Section and Point (GSSP)" - American Geophysical Union Fall Meetings, New Orleans, LA
- Ehrenfeucht, R., October 2021: "Seeking Climate Justice: Interest and Outcomes in Louisiana's Climate Relocations" Association of Collegiate Schools of Planning, Virtual.
- Fleck, J., March 2022: "Science and Governance: From Overallocation to Climate Change and Megadrought" Colorado River Compact Centennial Symposium, Stegner Center, University of Utah.
- Martin, E., DeLong, K., Palmer, K., Bromley, G., May 2022: "Understanding Inter-American Seas Climate Variability Using Paleo-proxies and Climate Models", American Meteorological Society 35th Conference on Hurricanes and Tropical Meteorology Meeting, New Orleans, LA.
- Roberts, M., 2021: "Climate Impacts on Wildlife Health" TTU Science by the Glass, Virtual
- Robertson, E. P., Tanner, E. P, Elmore, D., Fuhlendorf, S. D., Mays, J. D., Knutson, J., Weir, J. R., Loss, S. R., February 2022: "Migratory birds track historic averages of spring green-up, limiting flexibility with climate change" - South Central CASC Consortium Call, Virtual
- Schuth, E., March 2022: "Climate Narratives and Climate Justice" OU's Teach-In on Solve Climate by 2030 Keynote presentation, Norman, OK.
- Taylor, A., January 2022: "Losing Culturally Significant Plants due to Climate Change" University of Florida Plant Science Conference, Virtual
- VanBuskirk, O., McPherson, R., January 2022: "What Water Manager Want: Using Climate Information for Decision Making" - American Meteorological Society, 17th Symposium on Societal Applications, Virtual
- Wootten, A., September 2021: "Projecting Evapotranspiration and Evaporation Using Remotely Sensed Data" Texas Water Development Board, Austin, TX.
- Zak, J., February 2022: "Seeing with New Eyes: Connecting Ecology, Stewardship, and Agriculture" 4th Annual No-Till Texas Soil Health Symposium, Amarillo, TX.





Helping to solve real problems in a variable and changing climate

Our region

Water, energy, agriculture, native peoples, and rapidly growing metropolitan areas intersect with a highly variable and changing climate to frame many of the risks, challenges, and opportunities for natural and cultural resources in the south-central United States. National parks, scenic waterways, tribal and trust lands, and other protected areas are prevalent across the region. Spatial and temporal changes in the south-central's climate are linked to changes in biodiversity; key wildlife habitats; wetlands quality and extent; stream sedimentation and flow; range and density of heritage and invasive species; cultural and natural landscapes; water quality; pathogen outbreaks; and health of ecosystem services. Changes in the region also result from other stressors; hence, responses to climate change must be examined in combination with land cover/use change, habitat fragmentation, increasing population, pollution, invasive species, increasing demand for natural resources, and other stressors.



The south-central U.S. encompasses 20 ecoregions, resulting from a significant gradient in annual average precipitation, from 60 inches in coastal areas to 6 inches in the deserts.

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