SOUTH CENTRAL
CLIMATE ADAPTATION SCIENCE CENTER

2019-2025 Final Report
August 1, 2019 - September 30, 2025

The South Central Climate Adaptation Science Center (CASC) is one of nine regional Climate Adaptation Science Centers that are managed by the U.S. Geological Survey (USGS). The USGS Climate Adaptation Science Centers are working across regions of the United States to develop and bring critical science results to managers and decision-makers 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

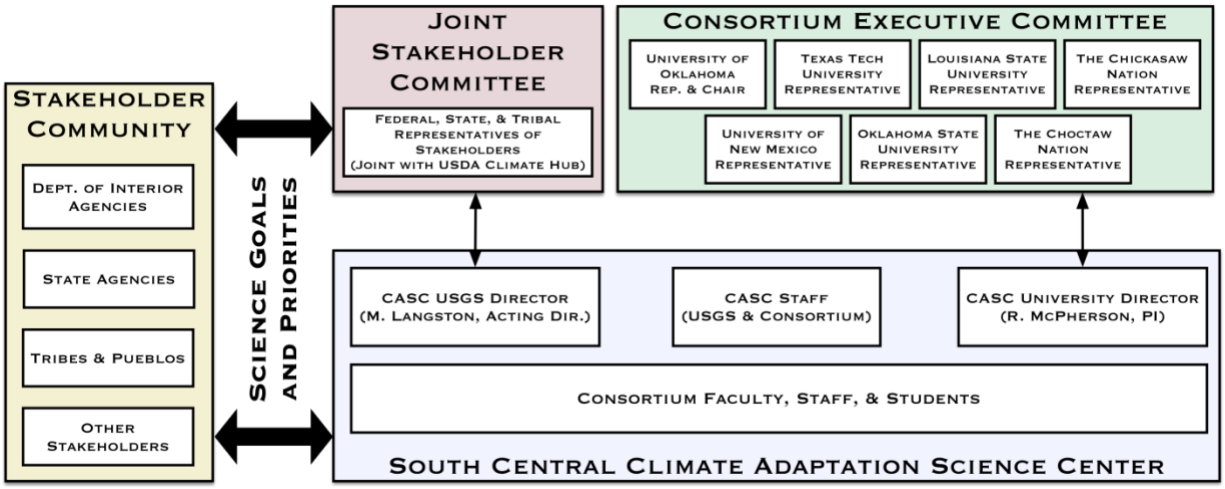
EXPECTATIONS & DELIVERABLES

- 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 CASC-funded 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),
    - 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 south-central 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 early-career 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 inter-collegial 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, cross-unit 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.

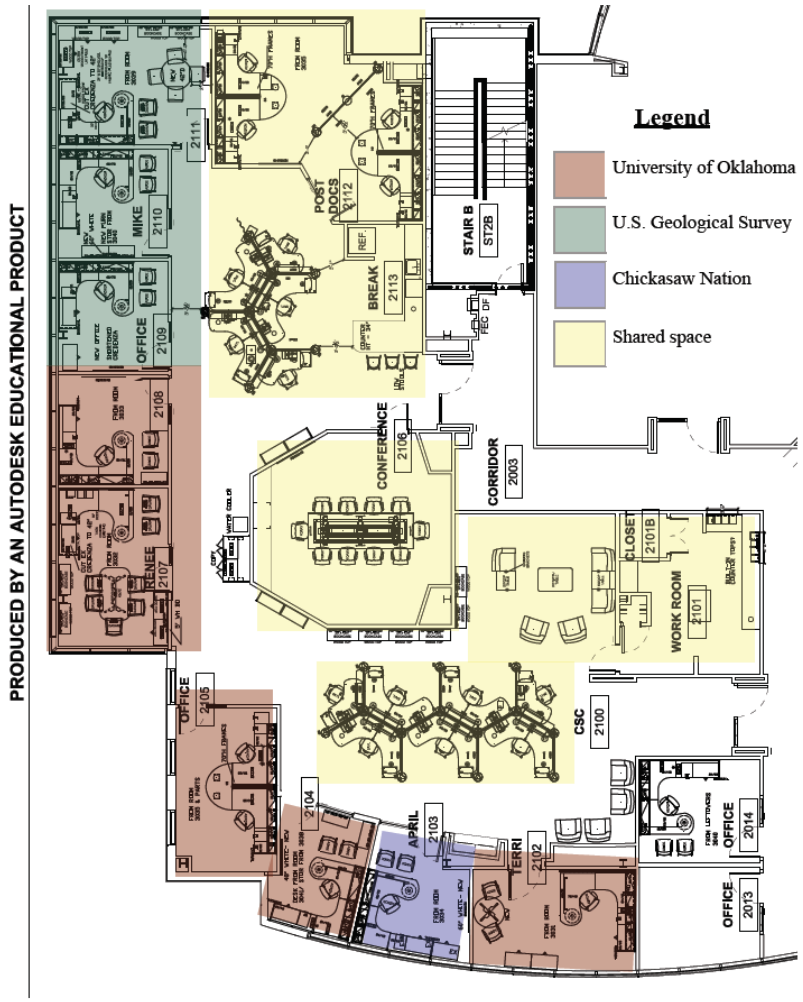
COMMUNICATIONS AND DATA MANAGEMENT

- **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. https://casc.usgs.gov/content/annual-reports-reviews

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.

South Central Climate Adaptation Science Center

Final Report

Administrative

Award Recipient:
University of Oklahoma
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Photo taken in 2025

Project Title:
Hosting the Department of the Interior's South Central Climate Adaptation Science Center

Award Agreement Number:
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Reporting Period:
August 1, 2019 – September 30, 2025

Purpose and Objectives

The South Central Climate Adaptation Science Center (CASC) is a research collaboration between the USGS, the University of Oklahoma (host institution), Texas Tech University, The Chickasaw Nation, Choctaw Nation of Oklahoma, Louisiana State University, Oklahoma State University, and the University of New Mexico. Since 2019, our team conducted science to help fish, wildlife, ecosystems, and the communities they support adapt to climate change. During this time, we collaborated with a wide range of researchers and decision-makers. While our Center was established in March 2012, this report serves as the final report for our current Host Agreement.

This report provides a comprehensive summary of South Central CASC Consortium activities since August 1, 2019 through September 30, 2025. The Consortium accomplished most of the proposed deliverables outlined in the Term Sheet document (included), which are thoroughly discussed in this final report.

Below is a list of major activities accomplished by the South Central CASC over the past six years:

- Conducted partner-driven science related to our six science priorities on the Host Agreement;
- Promoted cross-departmental and inter-collegial engagement at each institution and across the Consortium through ideating events and our Communities of Practice;
- Maintained an online presence through our website, social media, and webinars;
- Hosted our Annual Science Meeting (or similar);
- Implemented our Tribal Engagement Program evaluation plan to strengthen our efforts;
- Updated and implemented our online climate education short course series;
- Supported Tribal engagement and capacity building across the region, including hosting Tribal workshops and pursuing funding opportunities in collaboration with Tribal partners;
- Further enhanced partnerships with Tribes and Tribal organizations, National Wildlife Refuges, National Park Service, and other State and Federal agencies across our region;
- Finalized high-resolution climate projections for the south central U.S. and produced documents and workshops to assist managers in using the products; and
- Strategically developed large-scale inter-institutional and inter-disciplinary regional teams to continue building upon the initial work supported by the CASC.

Purpose and Objectives (cont'd)

As outlined in our 2019-2025 Host Agreement, OU (host institution) oversaw the implementation of this Center, including the Tribal engagement plan, communications plan, Consortium-led research, and the annual and final reports. We implemented relevant recommendations from the first five-year review cycle to continue strengthening our program. Further, we liaised with the entire Regional and National CASC (NCASC) network and with our Consortium partners to ensure that we conducted a broad array of relevant work in our region. We hosted annual meetings to highlight the previous year's accomplishments in science, regional dialogue, capacity building, and communications for the south-central region. Our Center continued to show leadership in conducting actionable science and capacity building across the region for the purpose of aiding DOI agencies and their natural and cultural resource partners.

Science

Our science priorities through the Host Agreement began as: 1) Toward Sustainable and Usable Water resources, 2) Toward Resilient Coastal Ecosystems along the Northern Gulf, 3) Toward Stakeholder Understanding of Product Sensitivities & Uncertainties, 4) Toward Mapping & Predicting Changes in Species Distributions, and 5) Toward Understanding Teleconnections that Influence Ecosystem Resilience. These themes were derived from communication with our partners and evolved over the six years based on their needs. For example, approximately halfway through the cycle, we added an Extreme Weather and Climate Change theme to address emerging research questions associated with extreme events and resource management. Additional information about these efforts are included in our Results section.

Cross-Department and Cross-Institution Engagement

OU originally proposed creating a "journal club" for post-doctoral research associated and graduate students. While we were unable to maintain this effort beyond one year, we strongly encouraged all graduate students and post-docs to engage in our Communities of Practice. Throughout the Host Agreement, we hosted webinars to highlight the efforts of our Communities of Practice and other CASC researchers in the region. These webinar recordings were linked on our website and remain accessible to those interested.

South Central CASC staff coordinated networking spaces through Ideation events for researchers across departments and across Consortium institutions. These events were well received by all involved and provided a space for new and existing ideas to come together where they otherwise may not have.

OU successfully implemented a Climate Adaptation undergraduate minor and a Climate Adaptation and Mitigation Graduate Certificate, and LSU established new climatology and coastal meteorology programs. The Managing for a Changing Climate course was implemented at OU and LSU, but not at TTU due to the disruptions from the COVID-19 pandemic. However, TTU continues to share their work through the TTU Climate Center and the Science by the Glass series.

Communications and Data Management

OU CASC staff worked to update and implement the communications plan to help researchers know how to share their work through online tools, such as social media, as well as through in-person events. Our Science Translator and Communications Specialist also provided regular guidance on proper branding for external documents to ensure consistent messaging. We also worked to provide all metadata and project datasets and other products in coordination with the USGS Data Steward to archive and make publicly available the work conducted through this Host Agreement. OU staff successfully shared with NCASC annually at least six USGS Mission Area Highlights, at least three items for the Climate Adaptation Insights Newsletter, and at least one resource management or climate policy-relevant success story to be used in promoting the CASC's work.

We participated in regular dialogue about climate adaptation with partners across the region, engaged in national and regional forums, hosted online short courses for natural resource managers, and engaged with Indigenous Peoples across all the years. All of these efforts are discussed in further detail in their respective sections below.

Organization & Approach

Personnel Financially Supported on the Host Agreement

The table below highlights South Central CASC employees at our Consortium institutions that were at least partially supported by our Host Agreement during Year 6 (Aug 1, 2024 – Sept 30, 2025). Please refer to previous annual reports for a list of supported personnel each year during this Host Agreement.

Personnel	Affiliation	Role	FTE on Host Agreement
Renee McPherson	University of Oklahoma	Consortium PI & University Director	0.50 FTE for 3 months
Emma Kuster	University of Oklahoma	Consortium Co-PI & University Assistant Director	0.80 FTE for 12 months; 1.0 FTE for 2 months
Jenifer Henslee Peck	University of Oklahoma	Science Translator & Communications Specialist	1.0 FTE for 14 months
Adrienne Wootten	University of Oklahoma	Research Scientist	1.0 FTE for 2 months
Derek Rosendahl	University of Oklahoma	Research Scientist	0.50 FTE for 6 months; 1.0 FTE for 2 months
Stephanie Mladinich	University of Oklahoma	Climate Adaptation Specialist	1.0 FTE for 2 months
Yvette Wiley	University of Oklahoma	Tribal Liaison	1.0 FTE for 1 month
Chelsea Begay	University of Oklahoma	Tribal Liaison	1.0 FTE for 1 month
Amelia Cook	Chickasaw Nation	Consortium Co-PI & Tribal Liaison	0.75 FTE for 9 months 1.0 FTE for 5 months
Jim Ansley	Oklahoma State University	Consortium Faculty	1.0 FTE for 2 months
Holly Todaro	Oklahoma State University	Graduate Student	0.50 FTE for 5 months
Matthew Broadway	Oklahoma State University	Graduate Student	0.50 FTE for 6 months
Sydny Hager	Oklahoma State University	Graduate Student	0.50 FTE for 6 months
Kyungrok Hwang	Oklahoma State University	Graduate Student	0.50 FTE for 4 months
Addison Galante	Oklahoma State University	Undergraduate Student	0.25 FTE for 6 months
Aryanna North	Oklahoma State University	Undergraduate Student	0.25 FTE for 5 months
Alissar Cheaib	Texas Tech University	Postdoctoral Associate	1.0 FTE for 8 months
Favour Egbune	Texas Tech University	Undergraduate Student	216.25 hours
Delaney Mooney	Texas Tech University	Undergraduate Student	89 hours
Shravanie Kardekar	Texas Tech University	Undergraduate Student	217.5 hours
McKenzie Griffin	Texas Tech University	Graduate Research Assistant	96 hours
Azaz Mahmud	Texas Tech University	Graduate Research Assistant	0.50 FTE for 3 months
Clara Drake	Texas Tech University	Graduate Research Assistant	0.50 FTE for 3 months
Gwendolyn Watt	Texas Tech University	Graduate Research Assistant	0.50 FTE for 3 months
Isabella Belltran Triana	Texas Tech University	Graduate Research Assistant	0.50 FTE for 3 months
Daniel Owusu Kwakye	Texas Tech University	Graduate Research Assistant	0.50 FTE for 3 months
Kristine DeLong	Louisiana State University	Consortium Co-PI	1.0 FTE for 0.97 months
Victor Rivera-Monroy	Louisiana State University	Consortium Co-PI	1.0 FTE for 1 month
Reilly Corkran	Louisiana State University	Student Research Assistant	0.50 FTE for 4.5 months
Sm Mahtab Uddin	Louisiana State University	Graduate Student	0.50 FTE for 14 months
Mia Fraser	Louisiana State University	Graduate Student	0.17 FTE for 1 months
Gwendal Dolou	Louisiana State University	Student Research Assistant	0.50 FTE for 7.87 months
Renia Ehrenfeucht	University of New Mexico	Consortium Co-PI	0.03 FTE for 9 months
Lani Tsinnajinnie	University of New Mexico	Consortium Co-PI	0.03 FTE for 9 months
Becky Bixby	University of New Mexico	Consortium Co-PI	0.07 FTE for 9 months
Ansbert Aduko	University of New Mexico	Graduate Student	0.50 FTE for 14 months
Claire Jordy	University of New Mexico	Graduate Student	0.25 FTE for 4 months
Alyssa Ortiz	University of New Mexico	Graduate Student	0.25 FTE for 12 months
Abdul Tanko	University of New Mexico	Graduate Student	0.50 FTE for 4 months
Chantell Victoino	University of New Mexico	Graduate Student	0.25 FTE for 7 months

Organization & Approach

Personnel Who Contribute Time/Service to the Host Agreement

The table below highlights South Central CASC employees at our Consortium institutions who are/were supported by other means but contribute(d) time/service to the Host Agreement mission over the past six years. Members are shown as Year 6 first, and then all others who contributed time/service prior to August 2024.

Affiliation	Personnel (Role at CASC)
University of Oklahoma (OU)	(August 2024 - present) Elinor Martin (Consortium Co-PI); Mark Shafer (Consortium Co-PI); Berrien Moore (Consortium Co-PI); Thomas Neeson (Associate University Director); Noetta Harjo (Financial Administrator); Jake Palazzi (NM Tribal Liaison); Sharon Hausam (Climate Adaptation Planner); Dolly Na-Yemeh (Research Scientist); Paulina Cwik (Graduate Student); Hananeh Omidi (Graduate Student); Olivia VanBurskirk (Graduate Research Assistant); Kyle Oler (Student Office Assistant); Matt Davies (Undergraduate Research Assistant); Asa Samuels (Undergraduate Research Assistant); Liam Thompson (CART Intern, Undergraduate Research Assistant); Hasnat Raza (Social Media Coordinator); Jessica Zimmerman (CART Intern); Hozshona Post (Student Office Assistant); Fausto Coronel Vega (Student Office Assistant); Bijan Gurung (Postdoctoral Associate); Lauren Rosenfelt (Graduate Student) (Prior to August 2024, not already listed above) Tyler Pearson (IT Staff); Michael Malahy (IT Staff); Maurice Cruz (NM Tribal Liaison); Terri Sarsycki (Financial Administrator - retired Dec 2020); Laura Bray (Postdoctoral Associate); Caitlin Rottler (Postdoctoral Associate); Melissa Perkins (Graduate Research Assistant); Taylor Dewinter (Graduate Research Assistant); Sean Wineland (Graduate Research Assistant); Tiana Nguyen (Student Office Assistant); Codie Winn (USGS Assistant); Peyton Canvar (Undergraduate Research Assistant); Adam Siebel (Website Coordinator); Jovon Jojoba (BIA Pathways Intern); Cynthia Naha (NM Tribal Liaison & Science Communications Specialist); Irenea Lodangco (Research Scientist); Carrie Leslie (Graduate Research Assistant); Emma Landeros (Student Assistant); Luke Kerr (Student Office Assistant); Tsali Smith (Undergraduate Research Assistant); Ebone Smith (Graduate Student); Rachel Koch (Student Office Assistant); Nondumiso Mndzebele (Social Media Coordinator); Patrick Painter (Undergraduate Research Assistant); Alondra Perez (Social Media Coordinator); Rayle Blevins-Odle (Undergraduate Research Assistant); Haylee Kraker (CART Intern); Jack Carter (CART Intern); Miles Leonard (Undergraduate Research Assistant); Ricky Cavaliero (CART Intern)
Oklahoma State University (OSU)	(August 2024 - present) Scott Loss (Consortium Co-PI) (Prior to August 2024, not already listed above) Jim Ansley (Consortium Co-PI); Gail Wilson (Faculty); Omkar Joshi (Faculty)
Texas Tech University (TTU)	(August 2024 - present) Nick Smith (Consortium PI); Natasja van Gestel (Consortium Co-PI); Ian Scott-Fleming (Research Associate) (Prior to August 2024, not already listed above) John Zak (Consortium Co-PI); Katharine Hayhoe (Consortium Co-PI); Venki Uddameri (Consortium Co-PI); Anne Stoner (Research Faculty); Rosalyn Vasquez (Outreach Coordinator); Erin Stukenholtz (Graduate Research Assistant); Kerry Griffis-Kyle (Faculty); Diana Vargus-Gutierrez (Graduate Student); Pablo Tovar (Graduate Student); Tirhas Hailu (Postdoctoral Associate); Amin Ferdous (Graduate Student); Garrett Huddleston (Graduate Student); McKenzie Griffin (Graduate Research Associate)
Louisiana State University (LSU)	(August 2024 - present) Clint Wilson (Consortium PI); Chris D'Elia (Consortium Co-PI), Jill Trepanier (Research Associate), Huanping Huang (Research Associate), Stuart Nolen (Research Associate), Kory Konsoer (Research Associate); Sarah Franzen (Research Associate); Jacob Warner (Graduate Student), Tyler Drake (Undergraduate), Cam Cooks (Undergraduate), Anna Stebbins (Undergraduate) (Prior to August 2024, not already listed above) Barry Keim (Research Professor); Ivan A. Vargas-Lopez (Graduate Student); Georgia Davis (Student Research Assistant)
University of New Mexico (UNM)	(Prior to August 2024) Dave Gutzler (Retired Faculty); Mollie Mantilla (Graduate Student)
Chickasaw Nation (CN)	(August 2024 - present) Jennie Mosely (Consortium Co-PI); Kristopher Patton (Researcher); Newakis Weber (Researcher); Chaylum Hogue (Researcher); Leandra LeForce (Mellon Fellow; ESPCOR Project Coordinator) (Prior to August 2024, not already listed above) Kara Berst (Consortium Co-PI); Wayne Kellogg (Researcher); Matthew Armor (School to Work Intern); Heath Steward (BIA Pathways Intern); Shane Jemison (Researcher); Jennifer Bryant (Researcher); William Warner (BIA Intern); Taylor Broadbent (BIA Intern); CJ McLemore (BIA Intern); Clarissa Dixon (BIA Intern); Ian Stevens (BIA Intern); Lex Smith (Student Intern); Buster Shires (Student Intern); Kiona Tinney (BIA Intern); Landon Eck (School to Work Intern); Sariah Beckham (School to Work Intern); Tamera Nealy (School to Work Intern)
Choctaw Nation (CNO)	(August 2024 - present) Tye Baker (Consortium Co-PI) (Prior to August 2024, not already listed above) Ethan Schuth (Consortium Co-PI)

Select Personnel Achievements from Year 6

Dr. Renee McPherson, University Director, received a Regents' Professorship from The University of Oklahoma, as well as the Cleveland Abbe Award for Distinguished Service to the Atmospheric and Related Sciences from the American Meteorological Society (AMS) for "extraordinary efforts to develop programs, tools, and relationships to translate weather and climate information for use by communities." She was also named a 2026 AMS Fellow.

The following team from OU, CN, and UNM was awarded a $4 million NSF EPSCOR grant: Elinor Martin, Sharon Hausam, Emma Kuster, Renee McPherson, Marcela Loria Salazar, Jennie Mosely, Amelia Cook, Lani Tsinnajinnie, Leola Paquin, and Elspeth Iralu. Read more about this project in the appendix.

Received the Climate Adaptation Leadership Award (team award) with the Southeast CASC in the "Broad Partnerships" category for partnership on the Southeast Conservation Adaptation Strategy, Association of Fish and Wildlife Agencies.

Dr. Victor Rivera-Monroy, LSU Co-PI, was promoted from Associate Professor to Full Professor in Spring 2025. "This promotion is due in part to the extensive work and products generated by collaborative efforts with colleagues from the South Central CASC," Dr. Rivera-Monroy said.

Additional personnel achievements are highlighted in previous annual reports.

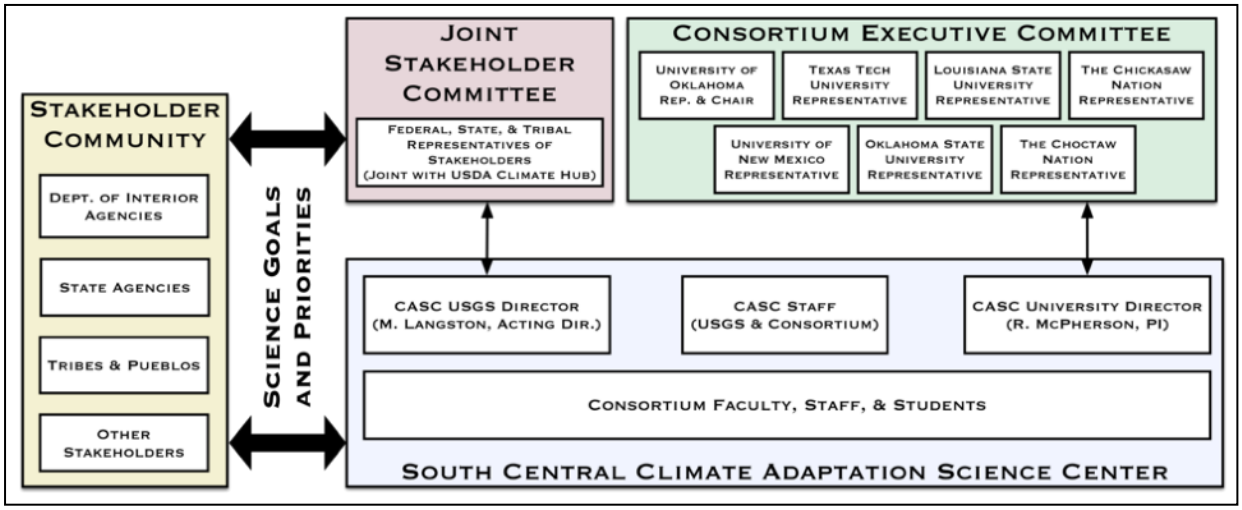
Organization & Approach

Organizational Structure & Communication

Between August 1, 2019, and September 30, 2025, the University Director and University Assistant Director provided regular oversight on the Consortium budget and guidance on science and planning activities conducted through the Host Agreement. In August 2024, the South Central CASC added a University Associate Director (funded by OU) to the university leadership team for succession planning.

The diagram shown below overviews the relationship between USGS and Consortium leadership teams, as well as key decision-makers and partners as of August 2019. Within the last six years, the Joint Stakeholder Committee was revamped under the guidance of the USGS Regional Administrator as the Science Advisory Committee. The aim of this group remained the same and was guided by the USGS CASC to review and select projects for annual funding. They also provided valuable insight to the Consortium about on-the-ground management needs from natural and cultural resource managers across the Tribes and Federal and State agencies.

To facilitate regular communication across the Consortium, OU hosted bi-monthly Zoom calls to discuss general updates, critical issues, and the science being conducted by students and postdocs. The first call of the month was facilitated by USGS leadership, while the second call of the month was facilitated by OU leadership. The Executive Committee (EC) met annually to discuss progress to date and plan for the following year. These annual meetings were held virtually during the spring semesters. In Year 6, the EC met virtually on May 8th to discuss future research opportunities and the status of the next Host Agreement.



In addition to regular Consortium meetings, South Central CASC team members participated in cross-CASC meetings to stay connected and share relevant information with the other regional CASCs. The University Director and University Assistant Director regularly met with their counterparts to discuss programmatic challenges and opportunities for the Consortium. The Science Translator and Communications Specialist also participated in monthly CASC communication calls facilitated by National CASC and other leads from across the network to stay apprised of updated guidance and share ideas for new messaging approaches.

In November 2025, 12 members of the South Central CASC, including four federal, one CN, and seven OU personnel, traveled to San Diego, CA, for the CASC Futures Forum. This event brought together federal staff members from across the CASC network to engage with other CASCs, divide into smaller breakout sessions with cross-CASC counterparts, and explore the results of 15 years of work done across the CASC network. We did extensive planning for the future of the network, and how we can continue to improve serving our various regions, and continue to learn from each other to continue the gold standard of science work we've become known for throughout USGS.

Organization & Approach

Host Agreement Challenges and Opportunities

Throughout this agreement, our team faced several challenges, but in all instances, we adjusted our plan and sought opportunities to evolve and still fulfill our goals for the South Central CASC. Below are several examples of the challenges we faced and how we adjusted our plans accordingly. Additional details can be found in previous annual reports.

Administrative: Due to reduced research administration staff capacity across the Consortium and new financial systems that were implemented in the last few years, we experienced delays in getting awards set up and modifications completed in a timely manner. To address this issue, our team implemented new processes to help streamline grant implementation and offset administrative delays that were outside of our control.

Personnel: Over the last few years, the South Central CASC has experienced several changes in personnel as some individuals were hired and others chose to pursue advanced degrees, left for new opportunities, or celebrated their retirement. In the Norman office of the South Central CASC, there were four individuals balancing full-time jobs and part-time Doctoral studies. Additional personnel supported by OU funding helped to support some of the administrative duties of these four individuals.

In 2025, we celebrated the retirement of Dr. Christopher D'Elia (LSU), Dr. Jim Ansley (OSU), and Dr. Suzanne Van Cootten (USGS). Dr. Dolly Na-Yemeh (OU), Codie Winn (ORISE), and Marina Tomer (USGS) left the South Central CASC to pursue other opportunities.

Starting in 2025, Dr. Clint Willson became the lead PI for LSU, Dr. Scott Loss became the lead PI for OSU, and Dr. Kristine Metzger became our Acting Regional Administrator for USGS. Dr. Tom Neeson started in 2024 as our new University Associate Director. Chelsey Begay was hired in 2025 as our new NM Tribal Liaison, and Stephanie Mladinich was hired in 2025 as our new Climate Adaptation Specialist. Additional details about personnel changes each year are available in previous annual reports.

Capacity building: We had planned to establish a postdoc exchange program during this agreement, but complications with COVID-19 prohibited us from getting that program started. Due to lingering impacts from travel restrictions and health concerns, this program was not established during this agreement. However, we strongly encouraged the involvement of postdocs and graduate students in our Communities of Practice to help stimulate new collaborative efforts across departments and institutions. Similarly, several workshops that we had planned in the first couple of years were postponed or transitioned to virtual to adjust for the ongoing travel restrictions at the time. While virtual gatherings impacted our ability to engage with some partners, they did provide a way forward in maintaining some level of engagement. In particular, many Tribes eliminated in-person meetings for an extensive time during COVID-19.

Research objectives: Due to some of the changes in personnel throughout this agreement, some planned research activities were modified to better suit the expertise of new team members. Specific details of how research objectives were modified are included in previous annual reports.

Bison grazing in a field during a visit with the Coushatta Tribe of Louisiana. Credit: Dr. Dolly Na-Yemeh

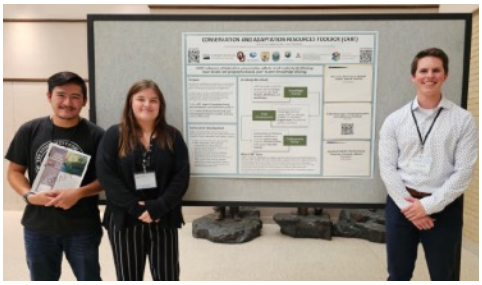
Results

Partnerships

Our primary partnership goal has been to respond to high-priority resource management challenges and foster substantive, sustained engagement between scientists and managers. For example, over the past six years, members of the South Central CASC have participated in listening sessions to hear from managers, researchers, and decision-makers across the region about their science and information needs to best serve them and provide the best available science. Below are a few examples of key partnerships that we have developed over the years. Additional partnerships are included in previous annual reports.

U.S. Fish and Wildlife Service

Between May 2023 and May 2025, we collaborated with the U.S. Fish and Wildlife Service (FWS) to develop case studies for the Conservation and Adaptation Resources Toolbox (CART). These case studies were designed to translate complex research and tools into management-relevant information that others could easily access through the CART case study library.



CART Interns presenting their work at the Annual Science Meeting in 2023.

Each case study was developed using a rigorous process established by the CART team and highlighted important climate adaptation projects that were either funded by the CASCs or were relevant for climate adaptation planning. During this time period, our Center hosted two cohorts of OU students who led the development of over 20 case studies, ranging from river cane recovery to mussel conservation to grassland management. Once finalized, the information for each case study was published through the online library hosted by the FWS and as a 2-page handout. The funding to support this work was primarily through a cooperative agreement with the U.S. Geological Survey, separate from the South Central CASC Host Agreement. Host Agreement funding and the associated cost-share at OU also supported some of the students and their supervisor. A full report for this project is available through ScienceBase. All published case studies are posted to the CART webportal, and are available in the CASC Project Explorer database.

Southern Plains Transportation Center

The U.S. Department of Transportation established the Southern Plains Transportation Center (SPTC) in 2023, a regional university transportation center with the University of Oklahoma as the host institution. Our CASC University Director, Dr. Renee McPherson, is Co-Director of the SPTC, and CASC Research Scientist Dr. Derek Rosendahl provides expert guidance. Through this partnership, we are working to infuse weather-informed thinking into SPTC's transportation research projects and to improve collaboration between the weather and transportation communities to better assess and mitigate the vulnerability of transportation infrastructure to extreme weather hazards. In April 2025, we co-hosted a Transportation and Extreme Weather Symposium that brought together 65 researchers, students, and practitioners from across both transportation and weather-related disciplines to identify research challenges, develop collaborations, and foster interdisciplinary discussions able to lead to new and innovative research to improve infrastructure resilience.

Flower Garden Banks National Marine Sanctuary

Over the past six years, Consortium staff at LSU continued their work with the staff at the NOAA Flower Garden Banks National Marine Sanctuary (FGBNMS) on a Climate Vulnerability Assessment and Condition Report. Flower Garden Banks is the only coral reef in Texas/Louisiana waters, and it is vulnerable to warming waters. In November 2023, FGBNMS held a workshop to assess future research objectives required to meet their needs in a changing climate. Information gathered from this workshop was used to inform their climate assessment report, which was disseminated in late 2024. The LSU team also worked with FGBNMS to gather baseline information from corals, allowing them to reconstruct water conditions back to 1755 for resource managers in the area.

Results (continued)

Partnerships (continued)

Edwards Aquifer Authority

The Edwards Aquifer Authority (EAA) is a regional groundwater management agency that regulates groundwater withdrawals in the Edwards Aquifer. Since 2019, the partnership between the EAA and South Central CASC has led to actionable research projects that both expand scientific understanding and inform planning and decision-making. Together, our work has provided significant benefits in managing the Edwards Aquifer, helping to ensure the aquifer water supply will be available for human needs, continued economic growth, and the preservation and protection of habitat and threatened and endangered species in the region. We have three planned projects in the future as we continue to build on this important partnership.

Accelerating Resilience Innovation in Drylands Institute

Our team worked in collaboration with the UNM Accelerating Resilience Innovation in Drylands (ARID) Institute to co-host, design, and deliver two workshops. The 2024 workshop brought together 114 resource managers, community health practitioners, business and economic leaders, non-profits, community leaders, researchers, and students to discuss priority questions, issues, and concerns related to the future resilience of NM to a changing climate. Manager information needs and gaps were analyzed and synthesized in a report to inform a Resilience Research Plan for NM. The 2025 workshop brought together natural resource managers, farmers, Tribes and Pueblos, and researchers to develop a shared understanding of probable climate futures for the Middle Rio Grande (MRG) basin of NM, center water uses within a framework of ecosystem functions, discuss the futures impacts on the MRG's ecological, hydrological, and recreational resources, and identify appropriate adaptation strategies to implement and test across different water uses throughout the basin.

Strategic Planning & Evaluation

Tribal Engagement Program Evaluation

Our team continued to work toward sharing knowledge and lessons learned about evaluating climate services, as well as learning best practices to do so. During this Host Agreement, we established the Performance Evaluation Committee (PEC), which completed the evaluation process and an associated report for our Tribal Engagement Program (TEP). This report was the first comprehensive evaluation of the TEP since the South Central CASC's establishment in 2012.

Work on this evaluation started in earnest in early 2020 to establish the PEC, which worked on the initial draft of the evaluation planning document, including approaches and questions. The final report laid out three key findings: 1) the state of Tribal climate adaptation, 2) the benefits and value of South Central CASC engagement, and 3) opportunities and future directions. It provided recommendations around each finding to improve and guide the strategic planning focus for the next 5 years of Tribal engagement. The PEC was comprised of 18 members, which included representation from the U.S. Department of Agriculture Climate Hubs, the Southern Plains Drought Early Warning System (through NIDIS), the Climate Assessment for the Southwest (a NOAA CAP/RISA), and the Southern Climate Impacts Planning Program (a NOAA CAP/RISA). This report, and its findings, were used to help improve the proposal for the next Host Agreement cycle by including more targeted outcomes and more intentional planning processes.

Shifting Landscapes

Shifting Landscapes: A Guide to Developing Academic and Research Relationships in Oklahoma Indian Country was developed by the South Central CASC Tribal Engagement team and was used throughout our current Host Agreement as one of the main documents in several workshops with OU researchers who were new to working with Tribes. The South Central CASC and the OU Office of the Vice President for Research co-hosted these workshops. Additionally, Bray and Hutchinson (2024) noted in their review of the CASC's Tribal Engagement Program (TEP) that the "TEP can prepare researchers to better understand and navigate the social and political differences between tribes." Shifting Landscapes is a helpful report to start those conversations.

Results (continued)

Tribal Partnerships

New Mexico Tribal Resilience Action Network

During the current Host Agreement, the South Central CASC supported the New Mexico Tribal Resilience Action Network (NM TRAN) to develop a pathway for creating a Southwest Tribal Climate Adaptation Menu (SWTCAM). NM TRAN is an ad hoc committee with a mission to improve Tribal resilience to climate change by collectively examining anticipated changes, raising awareness about impacts, sharing information about adaptation and mitigation tools, and supporting tribal planning and implementation. The SWTCAM, informed by a Tribal adaptation menu developed for the Great Lakes region, provides a selection of climate change adaptation strategies that incorporate relevant case studies. The guide also includes existing resources that are appropriate and valid for the geographic region of the Southwest Tribes. It reflects Southwest ecology and addresses Tribes' regional climate concerns and provides information on the benefits, consequences, and methodologies for the optional integration of indigenous and traditional knowledge, culture, language, and history. South Central CASC staff helped facilitate regular NM TRAN meetings, contributed to discussions, and reviewed and commented on documents defining the purpose and scope of the SWTCAM.

Environmental Protection Agency Region 6

South Central CASC Tribal staff also actively engaged in EPA Region 6 Tribal Division meetings during the current Host Agreement. The Region 6 EPA Tribal Program Division includes all Tribes in OK, TX, LA and NM, which coincides with the region of the South Central CASC Tribal Engagement Program. Participating in the EPA Region 6 Tribal Meetings allowed the South Central CASC Tribal Liaisons to reach most of the Tribal environmental and natural resources staff in our region. Since we started this engagement, EPA staff from both Regions 6 and 7 have reached out to us to cooperate in climate-related outreach.

Native Science Symposium

The *Research as Relationship* Native Science Symposium, which was held on Nov. 1, 2024, was largely coordinated through the South Central CASC Host Agreement by Amelia Cook and Lauren Rosenfelt (student assistant). The event was planned and hosted in celebration of Native American Heritage Month and in honor of the campus visit by renowned Indigenous scholar and researcher Dr. Robin Wall Kimmerer. It was a collaboration between South Central CASC, OU's Department of Geography and Environmental Sustainability, OU's Institute for Resilient Environmental and Energy Systems, and OU's Native Nations Center. The event brought together university and tribal community members to explore Indigenous approaches to science, research, and education through the lens of relationship, responsibility, and reciprocity.

The symposium featured presentations by researchers from OU, OSU, and the Choctaw and Cherokee Nations, as well as a special artistic experience led by Choctaw artist Andrew L. Jacob. Amelia Cook, representing the Chickasaw Nation and the South Central CASC, presented alongside Yvette Wiley on *Teach Like an Ancestor*, emphasizing how Indigenous knowledge and values inform science learning and leadership. Additional sessions highlighted community-based approaches to resilience, agroecology, and the interconnections between land, sky, and story, fostering dialogue among academic researchers and tribal practitioners. The event welcomed attendees from nine different tribal nations and served as a meaningful gathering space for university faculty, students, and community members to engage in discussions on how Indigenous knowledge systems and research methods can guide climate adaptation, education, and sustainability efforts.

Following the event, Amelia Cook had an opportunity to meet with Dr. Kimmerer and discuss the South Central CASC Tribal Engagement Program and opportunities for continued partnership in community-based research. The *Research as Relationship* event exemplified the value of collaboration through the Host Agreement, showing how relational science and shared leadership can connect tribal and academic communities in meaningful and lasting ways.

Results (continued)

Capacity Building

Through our work, we have continued to build a community of researchers and managers and foster their leadership in science-based resource management. Most of our capacity-building efforts have been through workshops, training events, and webinars.

Climate Adaptation Workshops

Since August 2019, the South Central CASC has hosted or co-sponsored over 50 workshops for natural and cultural resource managers, including Tribal environmental professionals. Most workshops were conducted in person, but some were held virtually. All workshops were designed based on our partners' needs to ensure that we were delivering useful and usable information to those that we serve.

Specific examples include two ecosystem-based climate adaptation workshops supported by and co-designed with the U.S. Fish and Wildlife Service and other regional CASCs for grassland and sagebrush ecosystems. Both of these workshops included a series of virtual webinars leading up to an in-person event in which the participants engaged in a real-world management exercise that helped them connect climate information to their existing management decisions. Participants across both workshops shared similar sentiments that the workshops were "informative" and that the organizers "did an outstanding job overall of distilling complex topics into applicable take-home information." Challenges to applying the information still included local staffing and funding constraints, but some participants noted their appreciation for allowing them to build connections with and learn from others at these workshops.

A similar workshop was conducted for the San Antonio River Authority, in which participants worked through a management scenario focused on water use and noted how they appreciated that this workshop was not an "information dump" but rather they found it "valuable and engaging." Other examples worth highlighting included our co-designed workshops and webinars with the U.S. Forest Service that were specifically designed for Tribal and Federal forest managers. Through this partnership, we co-hosted over five events ranging from wildfire management to climate extremes to climate modeling. Each workshop generally received good feedback from the participants. It is our intention to continue serving our partners by delivering the best available scientific information to help them adapt to climate extremes in the future.

Early Career Workshops

In 2022, a USGS CASC-funded Early Career Researcher Workshop was conducted that brought together a cohort of 18 early-career professionals to develop their knowledge, leadership, and science communication skills and provide stakeholder engagement with the help of South Central CASC researchers, partners, and stakeholders. The workshop offered participants guidance on how to communicate and conduct interdisciplinary and partner-driven research. Some funding support was provided by the Host Agreement (e.g., partial funding for workshop organizers). Additional workshops were anticipated but could not take place because of the ongoing pandemic at the time. More information can be found in the final report on ScienceBase.

Graduate Certificate in Climate Adaptation and Mitigation at OU

The Graduate Certificate in Climate Adaptation and Mitigation was approved in November 2024 and became effective Spring 2025. Development of the certificate followed the successful implementation of the undergraduate minor in Climate Adaptation in Spring 2021 within the Department of Geography and Environmental Sustainability. The graduate certificate was designed by an ad hoc committee that included students and faculty. It was modeled after the Geospatial Technologies graduate certificate program and is available here: https://ou-public.courseleaf.com/atmospheric-geographic-sciences/geography-environmental-sustainability/climate-adaptation-mitigation-grad-certificate/.

Results (continued)

Capacity Building

Managing for Climate Extremes (formerly Managing for a Changing Climate)

During the first Host Agreement, our team created a series of more than 50 educational videos for use by our in-person classes at OU and LSU. Researchers at OU and LSU successfully secured non-USGS funding to make the massive online course "Managing for a Changing Climate" available to French speakers in the Caribbean, Central, and South America. Both LSU and OU Consortium members have continued teaching a for-credit version of this course, which set a record at LSU with 34 students enrolled during the Fall 2025 semester, and over 170 undergraduates took the OU version of this course.

Adapted from the in-person version, the original online course was created during the first Host Agreement. Given its success and demand, we continued to offer this online short course series over the past several years for individuals who were interested in a more self-paced option for learning about climate science, climate modeling, climate impacts, and climate adaptation. Since its launch in 2016, over 3,000 individuals have enrolled in the course. In 2018, the single course was divided into four shorter courses, which were restructured again in 2022-2023 to become a three-course series.

Each course now features a suite of short educational videos, key takeaway messages, and bonus material for those interested in diving a little deeper into the topics. In 2024, 6 new videos were created to discuss new topics and to update previous videos, as information has changed since 2015, when most of these videos were created. Of the 65 videos currently available in the course playlist, a handful of the videos have proven valuable to many people and have been seen over 10,000 times, while one video, *Earth's Energy Budget*, has been viewed over 110,000 times! Additionally, we have seen a growth of ~240% in the number of people subscribed to our South Central CASC YouTube channel, largely in part to these videos.

The three-course series remains popular with individuals across the world, ranging from college students to working professionals. The geographical footprint of our participants now includes every state in the Union, plus a few territories. Over 650 individuals from across our four-state region have participated. Overall, the feedback from participants remains positive, with most individuals saying they agree or strongly agree that the content added to their existing knowledge. See the **StoryMap** we created for more details about participants and their feedback.

Tribal Adaptation Menu Workshop

In May 2024, the Chickasaw Nation hosted a Tribal Adaptation Menu (TAM) Workshop through support from the South Central CASC and BIA Tribal Climate Resilience funding, bringing together tribal environmental professionals from across the nation to learn and apply the TAM framework for culturally grounded climate adaptation planning. The multi-day event, co-facilitated with the Great Lakes Indian Fish and Wildlife Commission and the Northern Institute of Applied Climate Science, guided participants in developing action adaptation strategies that integrate Indigenous values, traditional knowledge, and local priorities to strengthen community resilience. The workshop inspired several tribes to apply the TAM approach to their own climate plans and helped build regional collaboration among tribal, academic, and agency partners. Building on this success, South Central CASC representatives attended a TAM Train-the-Trainer workshop in August 2025, expanding the center's capacity to facilitate future TAM workshops and assist other tribes and regional partners in advancing tribally led climate planning and implementation.

Results (continued)

Science

Fall Science Meetings

Each Fall, the South Central CASC hosted an Annual Science Meeting, which provided an opportunity for our team to showcase their hard work and build new collaborations and partnerships. Graduate students, post-docs, and funded researchers were encouraged to share their work during poster sessions and oral presentations. The meeting brought together 50 to 60 scientists and resource managers annually who were interested in climate adaptation to identify management needs and share relevant science. To increase participation of local decision-makers, we began hosting the meeting at our Consortium institutions rather than in Dallas, TX, as we had during the previous Host Agreement. Most of the meetings were held in person, though we did transition to virtual meetings during 2020 and 2021.

Communities of Practice

The purpose of our Communities of Practice (CoPs) is to promote interdisciplinary and cross-consortium interactions focused on specific science themes. Many of our CoPs were first established at our annual gatherings and were aligned with our proposed science priorities on the Host Agreement. The CoPs would then meet regularly with their team members and work together on small projects. Summaries for each Community of Practice are below. Publications associated with each of these CoPs are available in ScienceBase.

Sustainable & Usable Water Resources:

This group was originally tasked with working directly with partners to co-produce knowledge about how to sustainably manage water through wet and dry cycles. To that end, the group started with a synthesis paper in 2019 related to challenges and opportunities of environmental flows under climate change. In 2020, a subset of this group continued with a data synthesis of freshwater conservation initiative user participation to understand the opportunity costs of sustainable resource management.

Graduate students at UNM contributed to this theme by conducting research to document water resources within the San Juan Basin for the Navajo Nation using Traditional Navajo Ecological Knowledge. Through this work, our team compared adaptation strategies used by communities in the San Luis Valley to those in the Middle Rio Grande Valley, which showed very different responses! Additionally, this work improved our understanding of the adaptation strategies that farming communities along the Rio Grande use to cope with water shortages and the effectiveness of those strategies under future climate conditions. An analysis of the impact of property tax benefits for those using their land for agricultural purposes was conducted. Then they focused on water usage & policy in the Middle Rio Grande. That work suggested that increased water use poses risks of unsustainable increases in groundwater pumping, especially in light of climate change.

In 2021, this CoP published two papers. In their work, the researchers found that many intersecting social, political, economic, and environmental factors act as significant barriers to e-flows implementation. Trade-offs between human water security and freshwater biodiversity will be a persistent challenge in water-limited systems with growing populations and decreasing water availability.

Starting in 2023, UNM had two additional graduate students who worked on water-use-related projects around Santa Fe and Albuquerque. The Santa Fe project focused on consumptive use uncertainty in water banking. Their research showed that reducing consumptive use uncertainty promoted cooperation and sustainable water management and that new methods of measuring consumptive use can help to reduce this uncertainty. The Albuquerque project focused on the question of heat mitigation impacts of agriculture, riverside forest, and green space. They found that agriculture and forested riparian ecosystems are the most effective at urban cooling in the city, and additionally, that effective water management will require a more comprehensive accounting of beneficial externalities to different water uses. This work was highlighted during our 5-year external review in 2024. While the graduate students concluded their work, other parts of the group started work toward creating a learning network of best practices for climate-resilient water management on the landscape.

Results (continued)
Science (continued)

Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities:
This CoP compiled information to build a regional network of climate adaptation professionals for Tribes and other communities to partner with on their adaptation planning efforts. Starting in 2020, they also developed and distributed a survey for water suppliers, in collaboration with the Southern Plains Climate Hub, to gather feedback about needs and priorities of water adaptation planning that would inform water adaptation guidelines.

A sub-set of this CoP conducted a brief, student-led project to identify community-based climate adaptation strategies related to prescribed fire and seed banking. A series of handouts were produced explaining climate adaptation from an Indigenous perspective for prescribed fire, seed banking, and soil health.

In 2022, the CoP continued to evolve and new team members began looking at ideas for a webinar series that focused on the intersections between climate change and environmental change, social and economic changes associated with environmental change, and potential adaptation actions. In early 2023, they hosted a webinar entitled "How Communities Contend with Climate: Rainwater Harvesting and Restoration."

At the 2023 Annual Science Meeting, the Building Resilient Communities CoP discussed the possibility of shifting to different topic areas, such as drought, wildfire, desertification and soil health, and extreme events, but opted to continue with their current topic focused on adapting and preserving cultural lifeways in the face of climate change and environmental change. Towards the end of this Host Agreement, the team focused on learning from each other through presentations in monthly meetings focused on post-fire conditions and restoration by Santa Clara Pueblo, drought information, and the Tribal water justice work with the Great Plains Tribal Water Alliance. Moving forward, they hope to develop short case study reports to showcase successful efforts that have enhanced community resilience to climate change.

Resilient Coastal Systems:
This CoP, primarily led by researchers at LSU, was originally tasked with developing new observational datasets, examining coastal and wetland dynamics through field work and modeling, and studying vulnerability, resilience, and adaptation through interdisciplinary efforts.

One of the first projects they undertook was how warming temperatures impacted mangrove productivity along the northernmost edge of their range and how changes in hydraulic conditions affected the interactions between temperature and productivity. In 2021, they worked with Jean Lafitte National Historical Park and Preserve to understand and model how carbon exports were influenced by nutrient eutrophication in the Barataria Basin to help resource managers better manage the landscape to minimize nutrient loading and toxic algal blooms. Results on mangrove distribution and production, at the time, showed that warming winters will facilitate mangrove encroachment into salt marshes.

The CoP also focused on coral-based climate reconstructions for the Flower Garden Banks National Marine Sanctuary and the Gulf of America. Geochemical proxies from coral cores were used to establish markers for the Anthropocene and investigate environmental shifts from the Little Ice Age to today. The climate reconstructions in this project worked because corals grow continuously, have long life spans (many centuries), have annual growth banding - similar to tree rings - that provide accuracy, and environmental chemistry woven into the coral skeleton. The coral core records have shown increasing nitrogen load in the Mississippi River, which is also linked to the dead zone off the coast of Louisiana. This effort builds upon the work of several LSU graduate students. These results have been presented to multiple audiences, including the External Review Team, and resulted in multiple peer-reviewed papers.

Results (continued)

Science (continued)

Understanding Uncertainty:

This CoP was tasked with collaborating with stakeholders and social scientists to better understand the uncertainties associated with modeling future water demand, land management strategies, human population and migration, etc. In 2021, they began identifying useful resources related to working with and describing uncertainty in climate change projections. One goal for this CoP was to develop a website to house materials about communicating uncertainty effectively and understanding the types of uncertainty inherent in climate projections and scientific statements. The CoP continues to develop a website to highlight this work and plans to complete it during the next Host Agreement.

At the 2023 Annual Science Meeting, they gathered information on how decision-makers think of uncertainty via their online survey. During this meeting, they also started recording preliminary interviews with in-person participants to expand upon the survey questions. The team collected a total of 48 survey responses, in addition to their in-person interviews, to better understand how decision-makers think of uncertainty. In 2024, they began the process of analyzing the data and had an undergraduate student develop a literature review related to uncertainty definitions and practices. The literature review discussed how uncertainty in the climate projections might be perceived, but additional research is needed to determine how different users perceive that uncertainty.

This group also found that a standardized framework to communicate uncertainty in the climate projections should be developed and implemented for all official products that use climate projections. Such a framework would benefit from the use of margins of error and confidence intervals to help users visualize the uncertainty where necessary. In essence, users need and want more information to help them navigate the uncertainty associated with climate projections and other similar types of data. Additional research is needed to determine the appropriate framing of this uncertainty because it may impact how individuals perceive the data itself. For example, too much emphasis placed on the projected impacts of climate change may result in feelings of hopelessness, whereas a positive framing may encourage continued engagement in climate adaptation efforts. This work, “A Review: Communicating Uncertainty within the Global Climate Projections”, was published in 2025 and is included in the list of selected publications in the appendix.

Extreme Weather and Climate Change:

This theme was established in 2022 to explore how changes in extreme weather events may impact natural and cultural resources across the region. Researchers with expertise in extreme weather, impacts of extreme events, community engagement, and compound extreme events (i.e., extreme events that occur concurrently or sequentially) formed a Community of Practice (CoP) around this topic, similar to other CoPs coordinated by the South Central CASC. Initial partnerships to explore this theme included the U.S. National Park Service and the U.S. Fish and Wildlife Service.

Over the last few years, this team conducted proof-of-concept work to showcase the possibilities for understanding and projecting changes in extreme events and compound extreme events at two National Park sites: Alibates Flint Quarries National Monument and Pecos National Historic Park. This team explored trends in past extreme heat events, extreme precipitation events, and precipitation whiplash events (i.e., swings from abnormal dry periods to abnormal wet periods, or vice versa). All historical trends suggest that these types of extreme events are increasing in frequency at these locations. Data were created for the extreme heat and extreme precipitation events for both parks. The team was supported by a pilot project through the USGS, but additional support has been leveraged through the CASC Host Agreement and associated cost-share, National Science Foundation Research Experience for Undergraduates, and other sources. Additional information about the projections is available in the final report for the pilot project supported by the USGS.

Results (continued)

Science (continued)

Mapping & Predicting Changes in Species and Ecosystems:

This CoP originally chose to identify key species or ecosystems of concern through conversations with our partners and working collaboratively to perform relevant projects that assist our partners in adaptation planning. This team first started by developing a white paper on the impacts of climate change on species distributions across the region. The white paper was later transitioned into a manuscript for publication in 2022. Through this work, they discovered that climate change, combined with human-driven landscape changes, is reshaping ecosystems and biodiversity, with foundation species playing a critical role in these shifts.

Effective adaptation and restoration require informed, region-specific strategies, as public misunderstanding and shifting economic priorities may hinder conservation efforts. To address this need, additional work was started on user-friendly guidelines for management practices that were climate-adaptive for the species of concern based on a prior survey. This effort led to the creation of species-specific fact sheets for the Douglas Fir, the Arkansas River Shiner, and the Gray Bat.

In 2020, a subgroup of this team at TTU used citizen science to study climate change and soil health. They determined that microbial biomass and diversity of microbes are indicators of good soil health, which helps producers build more resilient croplands. They also evaluated the impacts of agricultural practices on biodiversity, species distributions, and landscape connectivity for species, and studied relationships between animal and human health in the context of a changing climate. Additionally, a postdoc at TTU investigated the dynamics of infectious disease spread in wildlife under a changing climate. Her research, titled *Towards Mapping and Predicting Changes in Virus Occurrence and Small Mammal Species Distributions in Response to Climate Change,* was presented to the External Review Team in 2024.

A separate subgroup at OSU investigated changes in “green up” within the central flyway and how those changes are altering the migration patterns of birds. From their work, they found that spring vegetation green-up generates important food resources for many migratory animals, provided the timing of green-up matches the timing of migration. The researchers' findings reveal that migrations of most species synchronize more closely with long-term averages of green-up timing than with current green-up conditions.

Understanding Teleconnections that Influence Ecosystem Resilience:

This team was tasked to identify and analyze key teleconnections that influence climate change and natural resource management in the region. This group developed a review paper on the impacts of atmosphere-ocean teleconnections in the south-central U.S. and wrote a synthesis paper reviewing teleconnections from a multidisciplinary perspective. Their research provides more accessible and comparable results for interdisciplinary use on climate impacts beyond the atmospheric-environmental science. Additionally, they started literature reviews on the use of teleconnection concepts in human-environment systems research and on the use of telecopying to support progress in integrated climate science.

CASC Involvement in the National Climate Assessment

The South Central CASC was represented in the published 5th National Climate Assessment (NCA5), where Dr. Renee McPherson (University Director) served as the regional chapter lead for the Southern Great Plains. April Taylor and Taylor Broadbent (authors), as well as Drs. Sharon Hausam and Adrienne Wootten (technical contributors), also worked on various chapters associated with NCA5, infusing CASC knowledge and resources into this report.

Since it was published, we have shared the key messages from the NCA5 through various speaking events (presentations and invited engagements), social media outlets, and direct engagement at outreach events. This follows our involvement in the two prior National Climate Assessments and shows our commitment to continuing work on larger collaborations that feature our region and the impacts seen here.

Results (continued)

Impacts across the Consortium

Over the past six years, our Center has supported faculty, staff, and students across the Consortium. The support provided by the South Central CASC has resulted in ground-breaking and actionable research that continues to advance climate adaptation across the region. In this section, we highlight some of the voices from across the Consortium as they share their about their experience that contributed to many of the accomplishments our team had since August 1, 2019.

Gwendolyn Watt (MS student): "My research would not have been possible without the support of the TTU Climate Center and the funding from CASC. I am in the process of conducting a floristic survey of the South Llano River State Park and TTU Center at Junction, the results of which will be used to aid in land management and conservation. My first data collection trip was in May of 2025, and it was a huge success; we collected all of my abundance data and over 300 specimens. I was able to afford this trip due to the CASC funding, and I was only able to collect so much data thanks to the help of the Climate Center director and his lab."

Isabella Beltran (PhD student): "The Climate Center supported my participation in one of the largest conferences for Earth scientists, where I had the opportunity to connect with researchers across diverse fields and share my own work with colleagues conducting related studies, which opened new perspectives and possible collaborations in the future."

Azaj Mahmud (PhD student): "The South Central CASC's mission to connect climate science with real-world decisions has strongly influenced my research. Inspired by its focus on climate-driven ecosystem management, my work examines how fuel dryness influences fire behavior at the community scale and how well we can predict stand-scale fire behavior using information from lab-based flammability studies. My research aims to help guide fire management in a changing climate."

Matt Broadway (PhD Student): "South Central CASC support gave me the chance to present my research to both scientists and stakeholders, which helped me see the real-world impact of my work."

Holly Todaro (PhD Student): "Being part of a South Central CASC-funded project helped me grow as a researcher and connect with a broader community working on climate and conservation issues."

Mahatab Uddin (MS student): "The South Central CASC funding has allowed me to advance my professional interest and research training in issues that are vital to manage natural resources in my country of origin, especially the opportunity to participate in a multi-disciplinary group focused on the translation of science in the solution of urgent environmental problems."

Dr. Nick Smith (Lead PI at TTU): "Funding from the South Central CASC has enabled and catalyzed a number of research projects and initiatives that would not have been possible otherwise. A large portion of that funding has gone to support projects on understanding how biological organisms across the kingdoms of life respond to climate and how these responses interact with other abiotic and biotic variables to enable better prediction of how species distributions are changing. This work has taken place in both natural and managed (including agricultural) settings. The work has benefited from partnerships that were formed between TTU researchers and stakeholders. The stakeholder groups included producers, land managers (e.g., at state and national parks), conservationists, and private land owners. CASC funding has enabled TTU researchers to engage with these groups locally and at conferences. These connections have been further strengthened by engagement and outreach activities supported by the South Central CASC, such as monthly Science-by-the-Glass events. These South Central CASC-supported activities have strengthened the connection between TTU climate scientists and stakeholders in ways that have enabled actionable science."

Results (continued)

Dr. Scott Loss (Lead PI at OSU): "Over the past six years, support from the South Central CASC has significantly advanced research and collaboration within the OSU Department of Natural Resource Ecology and Management. CASC funding enabled a four-year postdoctoral research project investigating how weather extremes and shifting vegetation phenology affect wildlife habitat use and movement patterns. Additionally, it supported two graduate student projects: a global meta-analysis of climate change impacts on avian nesting success and modeling future distributions of declining nightjar species. These efforts have led to two peer-reviewed publications, with several more manuscripts in preparation. CASC support also facilitated student and postdoc travel to conferences and stakeholder meetings, enhancing professional development and fostering meaningful engagement with resource managers. These opportunities have been instrumental in building partnerships and research capacity that likely would not have emerged without CASC involvement."

Dr. Kristine DeLong (Co-PI at LSU): "The South Central CASC played a key role in the NSF grant we are currently finalizing with collaborators at OU and the CASC. The goal of the NSF study it to understand the sources and predictability of SST anomalies on seasonal to decadal timescales in the Inter-American Sea (Gulf of America and Caribbean) and their effects on hydroclimate variability in the U.S. and surrounding regions. We build a network of coral Sr/CA and $\delta^{18}0$ reconstructions in the Inter-American Sea (IAS), to examine hydroclimate and sea surface temperature changes extending back to the Little Ice Age. We partnered with climate modelers in the CASC to explore past climate variability in the IAS, including the understudied dipole between the Gulf and fluctuations in the Atlantic Warm Pool (AWP). Additionally, we documented the onset of the current drying trend in the Caribbean (1950s) and identified a significant trend in $\delta^{18}0$ seawater in the northern Gulf, which began in the 1880s and had previously gone unnoticed. These trends in the Caribbean align with variations in the size of the AWP and shifts in the spring dipole. These hydroclimate variations highlight the complexity of climate processes in the tropical Atlantic Ocean and the Intra-American Sea. We continue our collaboration with researchers at OU and the CASC on climate model research to better understand the climate dynamics related to this shift."

Dr. Victor H. Rivera-Monroy (Co-PI at LSU): "Sustaining our international collaborations in coastal ecology and management, particularly in Mexico, Panama, Puerto Rico, and Ecuador, has allowed us to broaden our research scope by translating regional results to continental scales, improving our understanding of carbon and nutrient cycles within the regional boundaries of the South Central CASC. For instance, it provides valuable feedback on specific issues related to ecosystem resilience and sustainability."

Dr. Renia Ehrenfeucht (Co-PI at UNM): "Over the last six years, UNM researchers and student researchers had a significant focus on water resources from topics such as identifying culturally relevant water sources, to formalizing Santa Fe Water Bank to the impacts of property tax policy on water use, small agriculture operations water use along the Rio Grande and flooding (and flood reduction interventions) in arid lands. They worked on climate readiness planning with the Pecos National Historical Park and Valley del Pro National Wildlife Refuge. For the last two years, research assistants working with Lani Tsinnajinnie investigated the impacts of climate change on groundwater and surface water resources on the Navajo Nation, with particular focus on the Chukka Mountains, to develop a report that summarizes climate impacts and recommends adaptation strategies for water-dependent systems in the Chukka Mountains and nearby Navajo Nation communities. The research assistants working with Renia Ehrenfeucht focused on how climate adaptation planning intersects with cultural resource planning in a wide range of contexts. The student researchers have mostly transitioned to practitioners who translate their knowledge and research about climate adaptation to their professional positions."

Communications and Outreach Efforts

Our communications and outreach goal has been to understand and respond to information needs and to 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

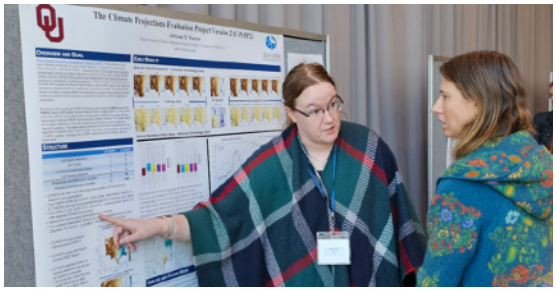
During this Host Agreement, we submitted over 85 highlights to the National CASC that included publications from our researchers, virtual events, and presentations. Early in this Host Agreement, we updated our Communications Plan to be aligned with our center's practices. We maintained and expanded our online presence through our website [https://southcentralclimate.org/], social media platforms (Facebook [1088 followers], X (formerly Twitter) [804 followers], LinkedIn [1382 followers], YouTube [2010 followers], and Instagram [410 followers]), monthly newsletters [843 subscribers], and webinars from partners and affiliates. Since August 2024, we have had over 40,000 visitors to our website, resulting in over 100,000 page views. We have seen a sizable increase in our following across all platforms since 2019, with the largest increases seen on LinkedIn and our website. These increases reflect the nature of our professional and resource-seeking audience.

In a joint effort with the USDA Southern Plains Climate Hub and the Southern Plains Climate Impacts Planning Program, we hosted the Southern Plains Climate Science Webinar Series. Over the course of this Host Agreement cycle, 22 webinars, which were recorded, were hosted and are available for viewing on our website [https://southcentralclimate.org/resources/webinars-workshops/]. Due to changes in capacity and personnel at the three centers, the last video in this series was hosted in November 2024.

We also created a short video series called *Ask a Climate Adaptation Specialist* to help answer common questions that we encounter in our outreach work. These videos have been viewed over 1,300 times since their release in early 2024. The videos are available on our YouTube channel.

On our website, we created a page dedicated to outreach materials produced by our center. These materials include species fact sheets, funded project highlights, informational sheets, and the link to the aforementioned climate adaptation video series. These informational sheets highlight climate adaptation and how it relates to seed banking, prescribed fire, and soil health, and include primers on climate projections and downscaling, the differences between weather and climate, and forecasting and climate projections. Other resources for different areas of interest, such as our Tribal Engagement Program and items geared toward researchers and educators.

The TTU Climate Center continued to host monthly Science by the Glass (SBG) events that facilitate climate-related research presentations and discussions. This program has been running for over 12 years. During the pandemic, these events were hosted virtually over Zoom, and the TTU team transitioned back to face-to-face events in the fall of 2023. The SBG events are credited with helping the public and decision-makers understand the efforts that have been ongoing from members of the CASC to address critical adaptation needs across the region and the challenges faced by extreme weather events. These events have highlighted work on numerous topics and included guest speakers from members of our Consortium. Speakers ranged from local stakeholders, researchers, and professors from LSU and TTU, a previous Acting Regional Administrator of the South Central CASC from USGS, to the state climatologist of Texas.



Right: Members of the South Central CASC presenting their work at the CASC Futures Forum in San Diego, CA, in November 2024.

Communications & Outreach Efforts (continued)

National and Regional Adaptation Forums

We presented and led activities in the National Adaptation Forum (NAF), held in Baltimore, MD, in 2022, and in St. Paul, MN, in 2024. Networking at NAF has led to participation in regional forums such as the Southwest Adaptation Forum (SWAF), and the South Central Climate Resilience Forum (SCCRF).

South Central Climate Resilience Forum

The South Central CASC, in partnership with the Southern Climate Impacts Planning Program (SCIPP), Adaptation International, and several other prominent organizations across our region [https://www.sccrf.org/planning-committee] hosted SCCRF in Dallas, TX, from April 2-4, 2024. This forum brought together representatives from non-profit organizations, all levels of government, community groups, the private sector, and academia from Arkansas, Kansas, Louisiana, Oklahoma, and Texas. The goals of SCCRF were to improve understanding of the climate-related challenges facing the region and increase awareness of the work that is being done to enhance resilience in the region. The forum included a series of presentations, symposiums, and workshops on resources, research, tools, knowledge, and experiences, as well as providing opportunities for information exchange and network building. Our team presented a climate projections workshop, which was well-received by participants. Through SCCRF, we strengthened our relationships with the CART program, the outcome of which is discussed in detail in the results section.

Because of the success of the first SCCRF meeting, this team is once again working to co-host SCCRF in April 2026 in San Antonio, TX, and is currently reviewing proposals. The South Central CASC has two representatives on the planning committee working to bring together another forum of networking opportunities, workshops, knowledge exchanges, and presenters from all across the region. One emphasis during this planning work has been to be intentional about bringing in Indigenous perspectives.

Southwest Adaptation Forum

The Southwest Adaptation Forum (SWAF) is a biennial meeting that co-convenes with multiple organizations with direct impacts on the southwestern U.S. In 2022, this event provided an opportunity for over 165 managers, stakeholders, and educators to come together to discuss the current issues facing the Southwest and how we might adapt to them while considering how unity between different levels of management could help alleviate these challenges. The South Central CASC co-hosted this event, and several members of the CASC attended and presented. SWAF allowed us to build and strengthen our relationships with the USDA Southwest Climate Hub and the Southwest CASC.

Conferences of the Association of Fish and Wildlife Agencies

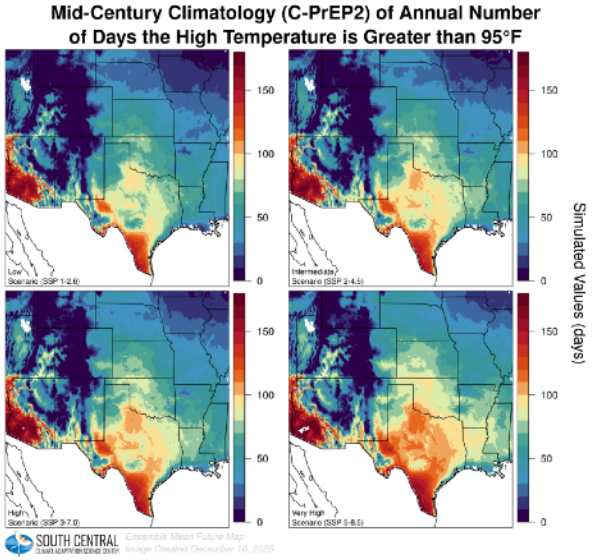
Each year from 2023 to 2025, we partnered with the Southeast CASC to present symposia for the Southeastern Association of Fish and Wildlife Agencies (SEAFWA). These sessions contributed to improving the capacity of these agencies to effectively manage and conserve fish and wildlife in the face of a changing climate. These symposia also provided opportunities for networking, collaboration, and knowledge exchange among participants, including researchers, practitioners, policymakers, and managers. In 2024, we attended, presented, and engaged with managers and State Wildlife Action Plan (SWAP) coordinators on their needs and what services the CASC could provide at the Association of Fish and Wildlife Agencies (AFWA) Wildlife Diversity Program Managers Meeting in Arizona. In 2025, we attended the Western AFWA summer meeting. Major outcomes included discussions and strategies for supporting implementation and communication of the SWAP and possibilities for increased collaboration with the NM Department of Wildlife.

Communications & Outreach Efforts (continued)

Tools & Products

Climate Projections

The South Central Climate Projections Evaluation Project (C-PrEP) was finalized in 2020. Downscaled climate projections are a widely used product for the South Central CASC. Global climate models (GCMs) are research tools used to simulate our planet's complex climate system. However, GCMs operate on scales that do not capture the potential impacts of climate change on local scales. C-PrEP uses statistical downscaling to correct GCM biases and translate future climate projections of temperature and rainfall to local scales in the south-central US. Since 2020, this data set has been used by researchers, practitioners, and partners across the region to better understand and prepare for future scenarios in their areas. We have also provided multiple hands-on workshops showcasing how to use these data projections for a given area and how to plan based on the projections, their uncertainties, and simulated management objects of concern to a community, in order to better utilize the information to make informed decisions. The next generation of these datasets, or C-PrEP 2, using newer climate models and making adjustments to the final output maps, based on feedback from users over the years, was completed in Fall 2025 (publications pending). A tool to allow our personnel to generate maps, other images, and analysis on the fly has been built and is currently being tested so that we can provide data to decision-makers in a more timely and personalized fashion. (See image above for an example)



An example of the C-PrEP 2 projections.

Status of Tribes and Climate Change Reports

The Status of Tribes and Climate Change (STACC) report is an ongoing series written for Tribal managers, leaders, and community members; federal and state agencies and decision-makers, and non-governmental organizations. Led by the Institute for Tribal and Environmental Professionals, it came about because many in the Tribal communities felt that a stand-alone report dedicated to highlighting the efforts, voices, and leadership of Indigenous People and communities was needed. After several years of planning, the report was first published in 2021. Two members of our Tribal engagement team were significantly involved in the creation of that report, which later became known as Volume One. A second volume was published in 2024 and again included members of our team participating in the creation of this report. The reports can be accessed online at **http://nau.edu/staccreport**

Understanding how Stakeholders View Climate Science Products

This CASC-funded project aimed to conduct ethnographic fieldwork to determine how stakeholders currently use climate data and products in their decisions. To do this, the team interviewed current end-users to learn more about the heuristics they use to think and communicate complex climate data, their perceptions of tolerance for risk, and the specific decisions that may hinge on estimates of future climate conditions. To date, the team has conducted 81 interviews. Preliminary results of the ethnographic research on how the U.S. Fish and Wildlife Service uses climate information suggest that the types of climate information used vary based on the program (e.g., Ecological Services, Science Applications) or system (National Wildlife Refuges), but there is collaboration among programs. There are also variations related to the species or habitat, for both the type of climate variables considered and the spatial and temporal resolution required. The project overall will enable the South Central CASC to better tailor existing and future climate data and products to end users' needs.

Communications & Outreach Efforts

In Year 6, the South Central CASC team submitted over 35 publications and presented over 40 presentations at conferences, workshops, and webinars across our region. Over the course of the Host Agreement, the South Central CASC submitted over 225 publications and over 460 presentations. A list of selected publications and presentations is listed here. Additional selected publications and presentations from previous years are available in past annual reports.

Select Publications

Cheaib, A., Chieppa, J., Perkowski, E.A., and, **Smith, N.G.**, (2025), Soil resource acquisition strategy modulates global plant nutrient and water economics. New Phytol, 246: 1536-1553, https://doi.org/10.1111/nph.70087

DeLong, K.L., Kilbourne, K.H., Guilderson, T.P., et al. New and old coral radiocarbon records revisited for the subtropical and tropical Atlantic Ocean. Radiocarbon. 2025;67(3):487-512. https://doi.org/10.1017/RDC.2025.5

Devkota, P., Singh, R.K., **Smith, N.G.**, Slaughter, L.C., and **van Gestel, N.C.**, Residue addition can mitigate soil health challenges with climate change in drylands: Insights from a field warming experiment in semi-arid Texas, 2024, Soil Systems https://doi.org/10.3390/soilsystems8040102

Dornelas, M., **Rivera-Monroy, V.**, et al, BioTIME 2.0: Expanding and Improving a Database of Biodiversity Time Series, 2025, Global Ecology and Biogeography, https://doi.org/10.1111/geb.70003

Kuster, E.L., & Lim, D.H. (2025). Gamifying climate content to enhance climate literacy: Opportunities for adult learners. Journal of Geoscience Education, 1-15. https://doi.org/10.1080/10899995.2025.2531580

Kuster, E.L., & Miller Hesed, C.D. (2024). Designing and delivering climate training for natural resource managers: Increasing climate literacy and action through education and engagement. Conservation Science and Practice, 6(10), e13225. https://doi.org/10.1111/csp2.13226

McPherson, R. A., K. E. Alger, & E. Hofmeister (2025). Climate-related drivers of migratory bird behavior and health in the south-central United States. *Biological Reviews*, **100**, 1272–1293, http://dx.doi.org/10.1111/brv.70000.

Odé, A, **Smith, N.G.**, Rebel, K.T., and de Boer, H.J., 2025, Temporal constraints on leaf-level trait plasticity for next-generation land surface models, Annals of Botany, https://doi.org/10.1093/aob/mcaf045

Puxley, B.L., Martin, E.R., 2025, A Continental United States Climatology of Precipitation Whiplash Using a New Event-Based Definition. International Journal of Climatology e70223. https://doi.org/10.1002/joc.70223

Wimhurst, J.J, Koch, J., McPherson, R.A., Identifying Multiscale Basin Management Challenges and Current Research Priorities based on Topic Modeling of the Mississippi River Basin, 2025, Annals of the American Association of Geographers, In Progress

Thompson, L., A. M. Wootten, I. L. Corporal-Lodangco, J. Nielsen-Gammon, and J. Trepanier, 2025: A Review: Communicating Uncertainty within the Global Climate Projections. Wea. Climate Soc., https://doi.org/10.1175/WCAS-D-25-0039.1

Zhang, P, Seabloom, E.W., Foo, J., MacDougall A., Harpole S.W., Adler, P., Hautier Y., Eisenhauer, N., Spohn, M., Bakker, J., Lekberg, Y., Young, A., Carbutt, C., Risch, A., Peri, P., **Smith, N.G.**, Stevens, C., Prober, S., Knops, J., Wardle, G., Dickman, C.R., Ebeling, A., Roscher, C., Martinson, H., Martina, J.P., et al., Dominant species predict plant richness and biomass in global grasslands, 2025, Nature Ecology and Evolution, https://doi.org/10.1038/s41559-025-02701-y

Communications & Outreach Efforts

Selected Presentations and Other Media

Beltran Triana, I., Smith, N.G., August 2024: Dynamic responses of acquisitive species to precipitation drive plant community dynamics in a semi-arid grassland under eutrophication, Annual meeting of the Ecological Society of America, Long Beach, CA.

Cook, A., October 2024: Tribal Engagement Program, InterTribal Council - Natural Resources Division, Thackerville, OK.

Corporal-Lodangco, I. D. L., R. A. McPherson, and M. B. Richman, Improvement of drought prediction model through sensitivity analysis of predictor variables. 38th Conference on Climate Variability and Change, New Orleans, LA, January 16, 2025.

Davis, G, January 2025: Impacts of Extreme Weather Conditions on Coastal Fisheries Near Bayou Teche, Louisiana from 2019-2023. 2024 AMS Meeting, New Orleans, LA.

Ezekannagha, E., **Smith, N.G.**, August 2024, Are grasslands changing gears: Long-term global grassland experiment reveals a shift in C4 vegetation cover driven by temperature and soil nutrient availability, Annual meeting of the Ecological Society of America, Long Beach, CA.

Frazier, A. G., A. Lustig, M. H. Chang, E. Elias**, R. A. McPherson**, V. W. Keener, Z. N. Grecni, E. Mecray, P. Chardon-Maldonado, and D. D. White, 2025: The critical role of regional chapters in the National Climate Assessment: Lessons from NCA5, AGU 2025.

Hausam, S., April, 2025: Where to Start with Climate Adaptation: Two Tribal Examples, Southwest and South Central Climate Adaptation Science Centers Tribal Climate Resilience Webinar Series, Online.

Kielbassa, A., **Martin, E, DeLong, K., Palmer, K.,** Susich, N., Dolou, G., and Bromley, G, December 2024: Utilizing Observations and Coral Reconstructions to Analyze the Variability of Sea Surface Temperatures in the Intra-Americas Sea, American Geophysical Union Fall Meeting, Washington, DC.

Kuster, E., June 2025: Preparing for Heat, Oklahoma City EMs, Office of Sustainability, First Responders, Oklahoma City, OK.

Lee, C.I., **Wimhurst, J.J.**, Pensky, J.L., Behnke, M.I., Aryal, Y.N., Nusrat, F., December 2024: What Goes with the Flow: A Review of Linkages among Climate Change, Low-Flows, Water Quality, and Instream Flow Management Response across the United States, American Geophysical Union Fall Meeting, Washington, DC.

Martin, E.R., Mosely, J., November 2025: Collaborative Research: RII FEC: Enhancing Indigenous Community Resilience to Climate Change Impacts through Partnerships and Co-Development of Adaptation Planning, Ethical Tribal Engagement Series, Norman, OK.

Puxley, B., Martin, E., Basara, J., Christian, J., January 2025: The Wildfire Impacts of the 2017-2018 Precipitation Whiplash Event Across the Southern Great Plains, AMS Annual Meeting, New Orleans, LA.

Smith, N.G., August 2024: Plants aren't dumb: Using optimality theory to address big questions in plant ecophysiology, University of Nebraska - Lincoln, Lincoln, NE.

Todaro, H.M., Nessell, M.P, Galante, A.W, North, A.M, Duchardt, C.J**, Loss, S.R.,** March 2025: Birds in a changing climate: A global meta-analysis of weather effects on avian reproduction including implications for conservation of Oklahoma's birds, Oklahoma Natural Resources Conference, Oklahoma City, OK.

Uddin, S.M.M., Rivera-Monroy, V.H., Blanchard, T.P., **Zhao, X., Fraser, M.G.**, Davila-Lechuga, C., Sahona, J.C., **Vargas-Lopez, I.**, June 2025: Scrub and Fringe Mangrove Wetlands Leaf Productivity and Expansion are controlled by Air Temperature, Phosphorus Availability, and Salinity in Port Fourchon, Louisiana, USA, 14th International Symposium on Biogeochemistry of Wetlands & Aquatic Systems, Baton Rouge, LA.

Summary

At the South Central CASC, our team has diligently worked to fulfill the obligations that were laid out in the Host Agreement with USGS for the current performance period (August 1, 2019 - September 30, 2025). While some unforeseen challenges occurred, our Center quickly adapted and worked to provide the key expectations and deliverables that we sought to accomplish.

Throughout the Host Agreement, we provided actionable science, built and maintained relationships with multiple agencies and decision-makers, accomplished numerous research and capacity building activities, including those needed to enhance partner knowledge, and provided research, publications, presentations, and other communications materials across our region.

We accomplished the work outlined throughout this report by bringing together researchers from a wide range of disciplines and institutions through Communities of Practice and Ideation sessions, working and learning together on a multitude of projects, and through shared experiences. We have advanced gold-standard science and regional dialogue and information sharing throughout the Department of the Interior, Tribal partners, across our region, and across the National and Regional CASC network.

The partnerships that we have built and strengthened throughout this Host Agreement have allowed us to continue to improve upon the existing foundational science and to advance the science to the next level, and provide our partners with answers to their on-the-ground management issues.

The South Central CASC contributed to the advancing and strengthening the current and future workforce by working with the current and next generation of scientists, researchers, students, decision-makers, and community members through education activities, workshops, and other capacity-building exercises.

Members of the South Central CASC in attendance at the CASC Futures Forum, November 2024

Appendix: Additional Achievements & Efforts

Affiliate Program

The South Central CASC has over 55 Research Affiliates across the Consortium and at partner institutions. The number of affiliates was adjusted after the program was redesigned in 2023 due to a lack of engagement. The program is continuing to be revised for the next Host Agreement.

Capacity Building for Tribes

In September 2023, our team hosted a Harmful Algal Bloom (HAB) Training for Oklahoma Tribal Staff. This two-day workshop, hosted in Norman, OK, provided participants with an opportunity to learn how climate change and land use can promote and increase the frequency of HABs. The workshop also covered the monitoring of HABs and their impacts on agriculture, livestock, and the economy. Attendees also participated in a field trip to Lake Thunderbird, where a demonstration with monitoring equipment was set up, and a trip to the planktonic laboratory on the OU campus.

Tribal Drought Workshop attendees

Our New Mexico Tribal Liaison, in partnership with the Southwest CASC, USDA Southwest Climate Hub, and the Southwestern Indian Polytechnic Institute, also hosted a Tribal Drought Workshop in Albuquerque, NM, for two days of training with Federal, Tribal, and private professionals who have extensive experience in drought planning and mitigation. During the workshop, participants learned about the fundamentals and types of drought, regional drought data resources, experiences in Indigenous drought planning, and engaged in discussion around technical training needs.

Coushatta Tribe CSCI project

This project built capacity for understanding climate vulnerabilities and identified opportunities to build resilience with the Coushatta Tribe of Louisiana. The project team identified community assets, evaluated exposures, and analyzed risk and vulnerability through a partnership of the South Central CASC, Coushatta tribal staff, and a Coushatta Advisory Committee. These efforts increased the strength of the community climate resilience objectives and criteria for evaluating and prioritizing programs and projects, forming the basis for a draft climate resilience plan informed and supported by Tribal objectives and priorities. By centering inclusive engagement and traditional knowledge, this project resulted in a culturally rooted and relevant vulnerability assessment and Climate Resilience Plan designed to address the needs of the Coushatta Tribe. Broad participation fostered trust and intergenerational learning that extends beyond this effort. Communication and capacity-building created a foundation for sustainable, community-led decision-making now and in the future.

Building Internal Capacity

At the South Central CASC, several members of our team are building their own capacity to further contribute to the mission of the CASC. A major benefit of working in the CASC Network and consortia includes expanding our knowledge bases and gaining new experiences at the CASC through higher education. Three of our staff members, Emma Kuster (OU), Amelia Cook (CN), and Noetta Harjo (OU), are pursuing PhD degrees across several disciplines to further their contribution to climate adaptation work in the region. As they increase their knowledge, they help us build internal capacity and allow us to provide better resources to our partners.

Indigenous Kinship Circle for Climate Futures

Several South Central CASC team members developed a collaborative proposal that was selected for funding through the National Science Foundation Established Program to Stimulate Competitive Research, Research Infrastructure Improvement Program in September 2024. The project, Enhancing Indigenous Community Resilience to Climate Change Impacts through Partnerships and Co-Development of Adaptation Planning, has

Appendix: Additional Achievements & Efforts (continued)

strengthened the partnership between The Chickasaw Nation, The University of Oklahoma, and the University of New Mexico by fostering tribally-led, community-based research that connects science, education, and resilience. Due to the CASC's strong connection to tribal communities in the region, the South Central CASC was essential in bringing these partners together and laying the groundwork for a successful proposal and the first year of project implementation. This foundation allowed the project to launch the Indigenous Kinship Circle for Climate Futures (IKCCF) summer research internship during its first year, which engages college students in meaningful, hands-on research and community learning experiences.

The project's central goal is to build capacity for Indigenous climate adaptation by braiding scientific and community knowledge, developing a diverse research and education network, and supporting future generations of Indigenous scientists and leaders through experiential learning and mentorship. This collaboration emphasizes co-production of knowledge and ensures that Indigenous perspectives guide how climate science is designed and applied to address local priorities across Oklahoma and New Mexico. While many team members were partially supported by the project, our Senior Tribal Liaison utilized her role on the Host Agreement to provide a significant foundation and ensured that the project was built upon shared values of respect, reciprocity, and community benefit. Moving forward, the partnership is expanding into new areas of research and education that include co-developing land-based curricula for tribal communities, advancing air quality monitoring efforts on tribal lands, and supporting watershed research that informs long-term climate adaptation strategies.

Leveraged Funding

Over the past several years, the South Central CASC has leveraged funding from other funding agencies to expand our capacity and build new collaborations. Examples of leveraged funding are below, but specific details about year-to-year funding and leveraged activities are available through our annual reports.

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 the interest accumulated from that funding to provide at least two academic scholarships for undergraduate students in the Department of Geography and Environmental Sustainability at OU and three study abroad scholarships for students interested in climate adaptation abroad.

The Bureau of Indian Affairs provided additional annual funding to support our Tribal Engagement Program. They provided salary for our New Mexico Tribal Liaison (since 2017) and our Western Oklahoma Tribal Liaison (since 2022), as well as funding to support up to four tribal workshops per year.

In 2018, the South Central CASC became a Consortium member of the Oklahoma NASA Space Grant Consortium. The funding we continued to receive through this partnership was used to support research scientists, postdocs, and students at the South Central CASC working on climate-related projects that supported our Communities of Practice and other CASC priorities.

Since 2019, OU has invested over $2.3 million in the South Central CASC, with the funding aimed at strengthening research, outreach, and workforce development.

Dr. Renee McPherson serves as a Co-Director of the Southern Plains Transportation Center (SPTC), which provides $9 million over 5 years to support improving transportation infrastructure in the region. Through this partnership, we are working to infuse weather-informed thinking into SPTC's transportation research projects and to improve collaboration between the weather and transportation communities.

In 2024, South Central CASC researchers at OU, CN, and UNM were awarded a $4 million grant to establish respectful and reciprocal relationships between tribal communities and researchers on climate change adaptation, as discussed directly above.




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.

Visit our website at southcentralclimate.org

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