SOUTH CENTRAL
CLIMATE ADAPTATION SCIENCE CENTER

2023-2024 Annual Report

August 1, 2023 - July 31, 2024

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

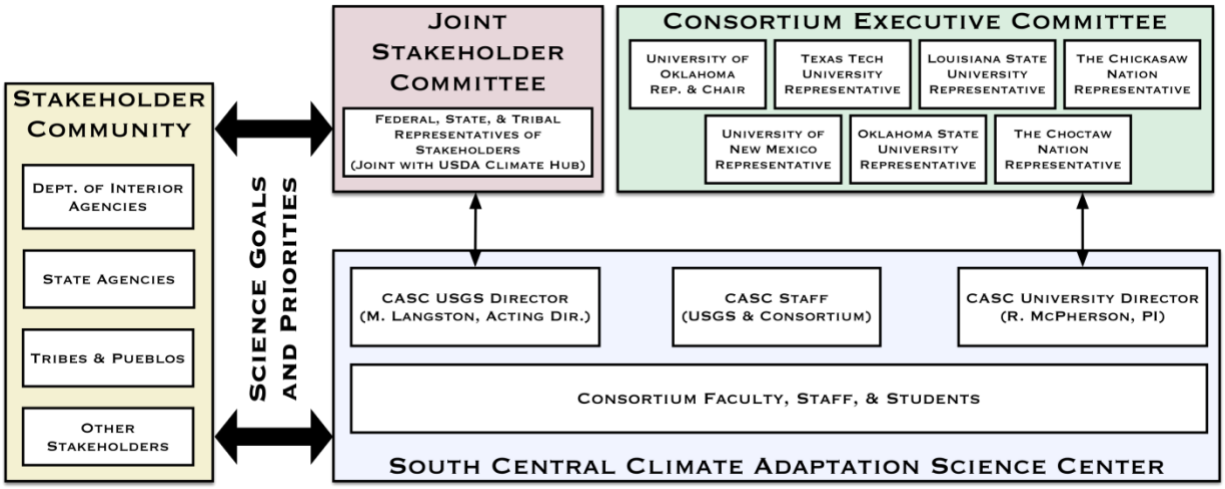
EXPECTATIONS & DELIVERABLES

- 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.

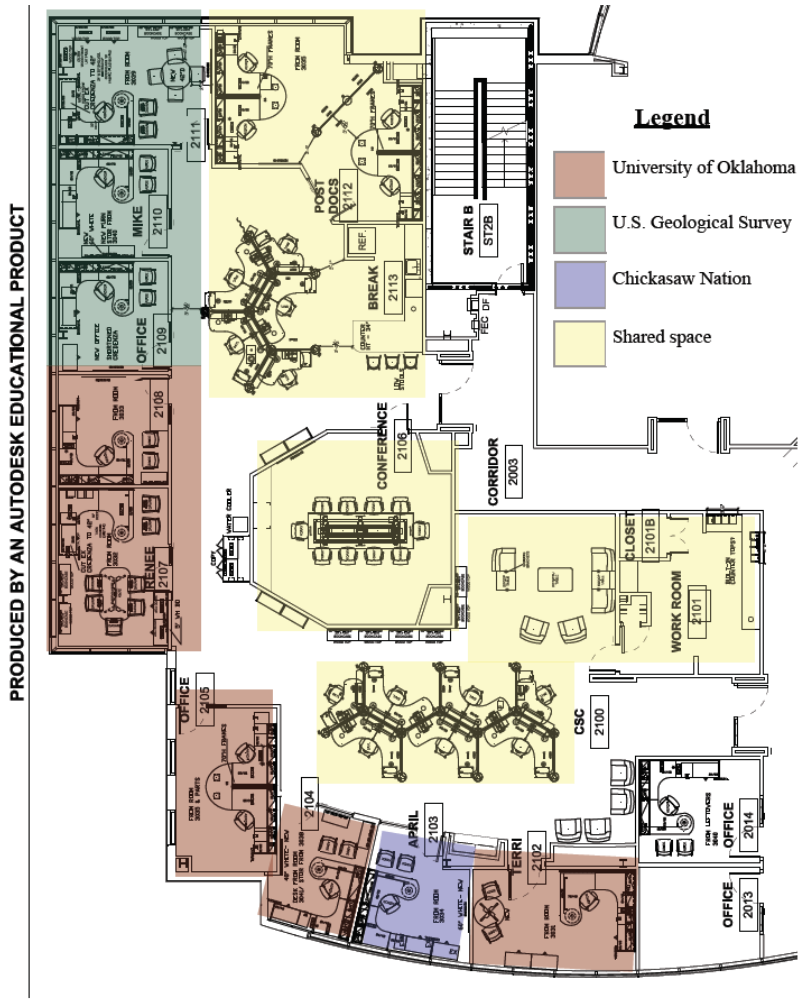
COMMUNICATIONS AND DATA MANAGEMENT

- **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

Annual Report

Administrative

Photo taken in 2024

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

Award Agreement Number:
G19AC00086

Report Date:
June 10, 2024

Reporting Period:
August 1, 2023 – July 31, 2024

Purpose and Objectives

The South Central Climate Adaptation Science Center (CASC) is a research collaboration between the USGS, University of Oklahoma (host institution), Texas Tech University, Chickasaw Nation, Choctaw Nation of Oklahoma, Louisiana State University, Oklahoma State University, and the University of New Mexico. Our team conducts science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change. The South Central CASC collaborates with a wide range of researchers and decision-makers in tribes, state and Federal agencies, universities, and non-governmental organizations. Our Center has existed since March 2012, but in this report we refer to Year 5 since it is the fifth year in our current Host Agreement.

This report provides a summary of the South Central CASC Consortium activities for Year 5 (August 1, 2023 – July 31, 2024). The Consortium accomplished the agreed-upon deliverables for this year outlined in our Term Sheet document, and these are discussed throughout this report. In Year 5, the South Central CASC:

- Conducted decision-maker-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 our online presence through our website, social media, and webinars;
- Hosted a hybrid Annual Science Meeting in Fall 2023;
- Implemented our Tribal Engagement Program evaluation plan to strengthen our efforts;
- Hosted our updated online climate education short course series;
- Continued developing a training approach rooted in adult education practice for providing climate adaptation training to resource managers across our region;
- Continued taking our new projections to DOI agencies and partner agencies to infuse climate information into adaptation and conservation plans;
- 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; and,
- Strategically developed large-scale inter-institutional and inter-disciplinary regional proposals to establish a broader funding base.

Organization & Approach

Personnel Financially Supported on the Host Agreement

The table below highlights CASC employees at our consortium institutions supported on our Host Agreement.

Personnel	Affiliation	Role	FTE on Host Agreement
Renee McPherson	University of Oklahoma	Consortium PI & University Director	0.25 FTE for 1 month, 0.5 FTE for 1 month, 0.75 FTE for 1 month, 1.0 FTE for 1 month
Emma Kuster	University of Oklahoma	Consortium Co-PI & University Assistant Director	1.0 FTE for 3 month, 0.9 FTE for 9 months
Jenifer Henslee Peck	University of Oklahoma	Science Translator	1.0 FTE for 12 months
Noetta Harjo	University of Oklahoma	Financial Administrator & Office Manager	0.10 FTE for 1.5 months
Derek Rosendahl	University of Oklahoma	Research Scientist	0.40 FTE for 0.5 months, 0.688 FTE for 1 month
Irenea Lodangco	University of Oklahoma	Research Scientist	0.25 FTE for 1 months, 0.5 FTE for 0.5 months
Jay Wimhurst	University of Oklahoma	Postdoctoral Associate	1.0 FTE for 1.5 months
Dolly Na-Yemeh	University of Oklahoma	Postdoctoral Associate	0.5 FTE for 1.5 months
Ellen Robertson	Oklahoma State University	Postdoctoral Associate	1.0 FTE for 3 months
Jim Ansley	Oklahoma State University	Consortium Co-PI	1.0 FTE for 1 month
Scott Loss	Oklahoma State University	Consortium Faculty	1.0 FTE for 2 months
Tim O'Connell	Oklahoma State University	Consortium Faculty	1.0 FTE for 0.6 months
Emma Roberts	Texas Tech University	Postdoctoral Associate	0.5 FTE for 12 months
Amin Ferdous	Texas Tech University	Postdoctoral Associate	1.0 FTE for 4 months, 0.5 FTE for 2 months, 0.125 FTE for 1 months
Kristine DeLong	Louisiana State University	Consortium Co-PI	1.0 FTE for 1 month
Victor Rivera-Monroy	Louisiana State University	Consortium Co-PI	1.0 FTE for 1 month
Kylie Palmer	Louisiana State University	Graduate Student	0.5 FTE for 10 months
Sm Mahtab Uddin	Louisiana State University	Graduate Student	0.5 FTE for 2 months
Mia Fraser	Louisiana State University	Undergraduate Student / Graduate Student	9.25 hours/week (Jan-May), 20 hours/week (Jun-Jul)
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
John Fleck	University of New Mexico	Consortium Co-PI	0.02 FTE for 9 months
Becky Bixby	University of New Mexico	Consortium Co-PI	0.02 FTE for 9 months
Brennan Davis	University of New Mexico	Graduate Student	0.25 FTE for 5 months
Walker Williamson	University of New Mexico	Graduate Student	0.5 FTE for 5 months
Ansbert Aduko	University of New Mexico	Graduate Student	0.25 FTE for 7 months, 0.75 FTE for 2 months
Claire Jordy	University of New Mexico	Graduate Student	0.25 FTE for 12 months
Taylor Cain	University of New Mexico	Graduate Student	0.5 FTE for 5 months
Alyssa Ortiz	University of New Mexico	Undergraduate Student / Graduate Student	0.125 FTE for 5 months, 0.5 FTE for 2 months
Abdul Tanko	University of New Mexico	Graduate Student	0.5 FTE for 2 months
April Taylor	Chickasaw Nation	Consortium Co-PI & Tribal Liaison	1.0 FTE for 1 month
Amelia Cook	Chickasaw Nation	Consortium Co-PI & Tribal Liaison	0.9 FTE for 9 months
Lauren Rosenfelt	Chickasaw Nation	Graduate Student	10 hours/week (Jan - May), 15 hours/week (Jun-Jul)

Personnel Who Contribute Time/Service to the Host Agreement

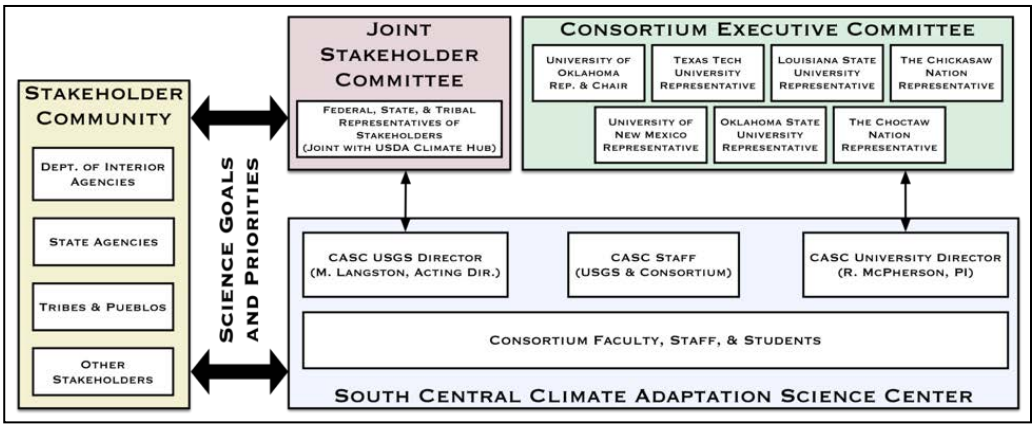
The table below highlights the CASC employees at our consortium institutions that are supported by other means but contribute time/service to the Host Agreement mission.

Affiliation	Personnel (Role at CASC)
University of Oklahoma	Elinor Martin (Consortium Co-PI); Mark Shafer (Consortium Co-PI); Berrien Moore (Consortium Co-PI); Jake Palazzi (NM Tribal Liaison); Sharon Hausam (Climate Adaptation Planner); Caitlin Rottler (Research Scientist); Laura Bray (Postdoctoral Associate); Paulina Cwik (Graduate Student); Ebone Smith (Graduate Student); Hananeh Omidi (Graduate Student); Kyle Oler (Student Office Assistant); Alondra Perez (Social Media Coordinator); Matt Davies (Undergraduate Research Assistant); Asa Samuels (Undergraduate Research Assistant); Liam Thompson (CART Intern); Haylee Kraker (CART Intern); Jack Carter (CART Intern); Miles Leonard (Undergraduate Research Assistant); Hasnat Raza (Social Media Coordinator); Jessica Zimmerman (CART Summer Intern); Ricky Cavaliero (CART Summer Intern)
Texas Tech University	John Zak (Consortium Co-PI); Nick Smith (Consortium Co-PI) Katharine Hayhoe (Consortium Co-PI); Natasja van Gestel (Consortium Co-PI); Ian Scott-Fleming (Research Associate); Kerry Griffis-Kyle (Faculty); Tirhas Hailu (Postdoctoral Associate); Garrett Huddleston (Graduate Student); Erin Stukenholtz (Graduate Student)
Louisiana State University	Chris D'Elia (Consortium Co-PI), Barry Keim (Consortium Co-PI), Jill Trepanier (Research Associate), Huanping Huang (Research Associate), Stuart Nolen (Research Associate), Kory Konsoer (Research Associate)
Chickasaw Nation	Jennie Mosely (Consortium Co-PI); Kristopher Patton (Researcher); Newakis Weber (Researcher); Chaylum Hogue (Researcher); Kiona Tinney (BIA Intern)
Choctaw Nation	Tye Baker (Consortium Co-PI)

Organization & Approach

Organizational Structure & Communication

The University Director and University Assistant Director oversee the Consortium budget and provide guidance on science and planning activities conducted through the Host Agreement. The diagram shown overviews the relationship between USGS and Consortium leadership teams and decision-makers as of August 2019.



The Executive Committee (EC) meets annually to discuss progress to-date each year and to begin planning for the following year. In Year 5, the EC met virtually on April 30th to discuss main takeaways from the 5-Year External Review of the current Host Agreement, participation in the upcoming national CASC conference, future research and capacity building opportunities, and potential new consortium members for the next Host Agreement.

To facilitate regular communication across the Consortium, we have bi-monthly Zoom calls to discuss general updates, critical issues, and the science being conducted by students and postdocs. In Year 5, we continued our updated consortium call formats such that one is focused on sharing relevant research updates and the other on strategic discussions for the Center.

USGS onboarded the new Federal Regional Administrator, Dr. Suzanne Van Cooten, in the fall of 2023. Dr. Mike Langston went on an extended detail with the Department of Defense, and Marina Tomer stepped into the Acting Federal Assistant Regional Administrator role in Year 5.

Personnel Achievements

Dr. Renee McPherson was awarded the Regents' Award for Superior Professional and University Service and Public Outreach at the 2024 Faculty Awards and Honors presentation at the University of Oklahoma.

Dr. Adrienne Wootten was presented with the Award of Appreciation for Service in recognition of her work in developing climate projections for the Edwards Aquifer Authority as well as her presentation at the 2023 EDTalks Seminar Series.

Emma Kuster received her Master's in Adult and Higher Education in May 2024.

Host Agreement Challenges

We continued to face a few challenges in Year 5 but we were able to overcome and adjust accordingly:

Administrative: Due to reduced research administration staff across our consortium, we have continued to experience delays in getting awards set up and modifications completed in a timely manner. We have implemented new checks between our office and the OU Office of Research Services to help identify delays and follow up with individuals to get things moving.

Personnel Changes: In the past year, two of our consortium Co-PIs retired, one of our Climate Adaptation Specialists at OU left for a new position, our Tribal Liaison at CN left for a new position, and our postdoc at OSU left for a new position. While we are excited for our new team members to step into a new life chapter, we had to adjust and bring new people on board. Dr. Becky Bixby at UNM, Dr. Nick Smith at TTU, and Ms. Jennie Mosely at CN are new Co-PIs for the CASC, and they bring a lot of great ideas. We also hired Ms. Amelia Cook as our new Tribal Liaison at CN in November. We are also bringing on a new Climate Adaptation Specialist at OU who will start in August 2024.

Capacity Building: We continued to see a rise of research and data requests over the last year. While our Climate Adaptation Specialists have helped to address many of these requests, we are quickly reaching capacity for what we are able to do. In Year 5, we started conversations about how we can effectively and efficiently balance the number of incoming requests with our capacity to address them and we are exploring ways to streamline certain request types.

Results

Partnerships

Our goal is to respond to high-priority natural and cultural resource management challenges and to foster substantive, sustained engagement between scientists and managers. In Year 5, the South Central CASC continued to focus on building new partnerships while strengthening existing ones.

We continued to strengthen our connection with U.S. Fish and Wildlife Service (USFWS) Refuge Managers across our region through regular engagement. Over the last year, we refined project ideas with inland wetland refuges in our region to investigate changes in extreme precipitation timing and intensity. Additionally, our team worked with the USFWS Science Applications Program to provide climate-based capacity building for sagebrush ecosystem management.

South Central CASC staff has been building new partnerships with the National Park Service (NPS), in particular with the Intermountain Regional Office, Landscape Conservation and Climate Change Program and the Historic Preservation Office, to explore how compound extreme events impact natural and cultural resource management.

Consortium staff at LSU worked with the NOAA Flower Garden Banks National Marine Sanctuary on their Climate Vulnerability Assessment and Condition Report, which is currently being drafted with input from staff. The November 2023 workshop assessed future research objectives required to meet their needs in a changing climate. Flower Garden Banks is the only coral reef in Texas/Louisiana waters.

The South Central CASC hosted a hybrid Annual Science Meeting in fall 2023 that brought together over 80 scientists and resource managers from across our region to discuss research opportunities related to climate adaptation. Participants were invited to join one of our Communities of Practice (CoP). The science being conducted by each group is further discussed in the *Science* section.

Capacity Building

Our goal is to build a community of researchers and managers and to foster their leadership in science-based resource management. In Year 5, we focused building capacity through workshops, training events, and webinars. The South Central CASC team hosted over 15 training or workshop events for resource managers, including our Tribal partners. In addition, the South Central CASC is represented in the published 5th National Climate Assessment (NCA5) with Dr. Renee McPherson serving as the Southern Great Plains region chapter lead. We shared the key messages from the NCA5 through various speaking events (presentations and invited engagements), social media outlets, and direct engagement at outreach events. April Taylor (author), Taylor Broadbent (author), Dr. Sharon Hausam (technical contributor), and Dr. Adrienne Wootten (technical contributor) also worked on NCA5.

In Year 5 the South Central CASC re-launched our updated Managing for a Changing Climate online course series. We proctored four courses: two in the fall of 2023 and two in the spring of 2024. These courses included a Brief Introduction to Climate Change (offered twice), a Deeper Dive into Monitoring and Modeling Climate Change, and a Deeper Dive into Climate Impacts and Adaptation. We had over 800 registrants across the four courses.

Strategic Planning & Tribal Engagement Evaluation

Our team continues to work toward sharing knowledge and lessons learned about evaluating climate services, as well as learning best practices to do so. The Performance Evaluation Committee (PEC) completed the evaluation process and the associated report for our Tribal Engagement Program. The report laid out three key findings: 1) the state of Tribal climate adaptation, 2) 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 included representation from the U.S. Dept. 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).

The center also underwent an external 5-year review of the Host Agreement in March 2024. The feedback gained through that process will be used to improve our work and develop the proposal for the next Host Agreement occurring in Year 6.

Results

Science

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

- *Sustainable & Usable Water Resources:* The Water Resources CoP restarted this year and is working to create a learning network of best practices for climate-resilient water management on the landscape. There were also two graduate students at UNM 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 shows that reducing consumptive use uncertainty promotes cooperation and sustainable water management and that new methods of measuring consumptive use can help to reduce this uncertainty. From the Albuquerque project, they found that agriculture and forested riparian ecosystems are the most effective at urban cooling in the city and effective water management will require a more comprehensive accounting of beneficial externalities to different water uses.
- *Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities:* At the November 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. This topic is unique in its emphasis on how communities are adapting and preserving their cultural lifeways in the face of climate change and environmental change. They are currently focused on learning from each other through presentations in monthly meetings, with the potential to develop short case study reports in the future. They had presentations on post-fire conditions and restoration by Santa Clara Pueblo, drought information, and on Tribal water justice work with the Great Plains Tribal Water Alliance.
- *Mapping & Predicting Changes in Species and Ecosystems:* The Species and Ecosystem CoP has been idle this year, but progress has continued on the adaptation fact sheets. This year, they completed a fact sheet for the Arkansas River Shiner and are currently working on another for the Gray Bat. In addition to the work started by this CoP, the TTU postdoc contributed through her research titled *Towards Mapping and Predicting Changes in Virus Occurrence and Small Mammal Species Distributions in Response to Climate Change* and presented on this work to the External Review Team.
- *Understanding Teleconnections that Influence Ecosystem Resilience:* This CoP has been idle in Year 5, but a publication is forthcoming.
- *Understanding Uncertainty:* The Understanding Uncertainty CoP continued to meet monthly over the last year and collected 48 survey responses to better understand how decision-makers think of uncertainty. They are in the process of analyzing the results. One of our undergraduate students also worked with this group to build a literature review related to uncertainty definitions and practices, which will be sent out for review in summer 2024. The results of the survey and literature review will be presented at the fall 2024 Annual Science Meeting or equivalent.
- *Resilient Coastal Systems:* The Resilient Coastal Systems CoP worked on climate reconstructions for the Flower Garden Banks National Marine Sanctuary and Gulf of Mexico. This work builds upon the work of several LSU graduate students, which has been presented to multiple audiences, including the External Review Team this year, and has resulted in recently published papers.
- *Extreme Weather and Climate Change:* A subgroup of the Extreme Weather and Climate Change CoP continued to make progress on their planning project to explore the impact of compound extreme events on NPS resources. They shifted gears recently to focus on specific parks within the South Central CASC region, rather than looking at a national focus with the NPS Climate Change Response Program. They are developing new partnerships with the NPS Historic Preservation Office and will be engaging in a series of virtual workshops over the summer to identify questions of interest to natural and cultural resource managers at several parks in the region.

Communications & Outreach Efforts

Our goal is 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 & Outreach

In Year 5, we submitted over 13 highlights to the National CASC that included publications from our researchers, virtual events, and presentations. We maintained and expanded our online presence through our website [https://southcentralclimate.org/], social media platforms (Facebook [1058 followers], X (formerly Twitter) [889 followers], LinkedIn [1116 followers], YouTube [1719 followers], and Instagram [349 followers]), monthly newsletters [788 subscribers], and webinars from partners and affiliates. Since August 2023, we have had over 14,000 visitors to our website, resulting in over 30,000 page-views.

In a joint effort with the USDA Southern Plains Climate Hub and the Southern Plains Climate Impacts Planning Program, we continued to host our Southern Plains Climate Science Webinar Series. Webinars that are recorded are made available for viewing on our website [https://southcentralclimate.org/resources/webinars-workshops/].

The TTU Climate Center continued to host monthly Science by the Glass (SBG) events that facilitate climate related research presentations and discussions. The TTU team transitioned back to face-to-face events in the fall of 2023. The SBG events are critical for 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.

Engagement with Regional & Local Decision-Makers

The South Central CASC, in partnership with the the Southern Climate Impacts Planning Program (SCIPP), Adaptation International, and several other prominent organizations across our region [https://www.sccrf.org/planning-committee] hosted the South Central Climate Resilience Forum (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 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 provided opportunities for information exchange and network building.

Staff continued engaging with decision makers at regional and national conferences such as the Southwest Adaptation Forum, the National Adaptation Forum, and the Landscape Ecology Conference.

Tribal staff at the South Central CASC were involved in Tribal communication with the EPA Region 6 Tribal Program and began sitting in on their regular meetings to keep apprised of Tribes interested in working on climate adaptation work.

In May 2024, our Tribal Engagement team hosted workshops for Tribal environmental professionals on the Tribal Adaptation Menu (TAM). The TAM workshop brought together Tribes and Tribal partners to learn how to use the Tribal Adaptation Menu, how Tribes are being impacted by climate change, and how to use the menu framework to integrate climate and identify adaptation options. Of the many Tribes and Tribal Organizations that were represented at this workshop, we were able to start new relationships with three that we have not worked with in the past.

Tools & Products

Over this past year, the South Central CASC team submitted over 40 publications and presented over 80 presentations at conferences, workshops, and webinars across our region. A list of selected publications and presentations is highlighted in the appendices.

Activities Planned for Year 6

In Year 6, the final year of this Host Agreement, we plan to continue participating in listening sessions and other forums to better understand the needs of our partners, engaging in actionable science that will assist our decision-makers and rights-holders in adapting to a changing climate, and offering workshops and other educational opportunities that bridge the science-to-action gap. Moving forward, we plan to:

- Engage decision-makers and rights-holders directly through listening sessions and workshops to understand priority science needs and provide scientific expertise as requested;
- Support Tribal engagement and capacity building across the region, including hosting Tribal workshops and pursuing funding opportunities in collaboration with Tribal partners;
- Further enhance partnerships with Tribes and Tribal organizations, National Wildlife Refuges, the National Park Service, and other state and federal agencies across our region;
- Continue to support existing Communities of Practice as they synthesize and identify gaps in decision-maker-driven science priorities;
- Continue taking our high-resolution projections and relevant NCA5 materials to DOI agencies and partner agencies to infuse climate information into adaptation and conservation plans (e.g. SSAs, Habitat Plans, and SWAPs, etc.);
- Identify ways to adapt the Tribal Engagement evaluation plan to evaluate other elements of our Center;
- Host our online climate education short course series, and co-teach climate adaptation courses across our CASC institutions (including Managing for a Changing Climate);
- Continue developing a training approach rooted in adult education practice for providing climate adaptation training to resource managers across our region; and,
- Strategically develop large-scale inter-institutional and interdisciplinary regional proposals to establish a broader funding base.

Appendix: Additional Achievements & Efforts

New CASC Employees

Amelia Cook started in November of 2023 as the Sustainability Science Manager and Tribal Liaison.

We interviewed and hired for the Climate Adaptation Specialist for New Mexico and West Texas position. They will be starting in August 2024.

Retiring CASC Employees

We celebrated the retirement of Dr. John Zak (TTU) and Mr. John Fleck (UNM) in Year 5. These two individuals served as Co-PIs for the South Central CASC consortium and will be greatly missed, but we wish them the best in their retirement!

Affiliate Program

The South Central CASC has over 57 Research Affiliates across the Consortium and at partner institutions. A redesigned affiliate program was released in August 2023.

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 impacts to 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. Out of the 50 participants, 75% were Tribal/Pueblo Nation staff. 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. The results of this discussion as well as all workshop materials and presentation recordings will be made available upon request, and used as a resource for future South Central CASC workshops and trainings.

CART (formerly known as CCAST) Partnership

Over the last year, our team has continued its partnership with the Conservation Adaptation Resources Toolbox (CART) team directed by the U.S. Fish and Wildlife Service and Bureau of Land Management. In Year 5, we hosted five CART interns who began developing new case studies related to climate adaptation across our region that can inform resource management actions. Since August 2023, our team has published five case studies:

- Grassland Habitat Monitoring for Wintering Chestnut-collard Longspur
- Shrub Control to Restore a Coastal Prairie Ecosystem
- Rivercane Recovery to Support Tribal Cultural Practices
- Mapping the Urban Heat Island in Oklahoma City
- Cultivating Agave Using Regenerative and Indigenous Methods

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

All published case studies are posted to the CART webportal, and available in the CASC Project Explorer database.

Appendix: Additional Achievements & Efforts

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 consortiums includes expanding our knowledge bases and gaining new experiences at the CASC through higher education. Four of our staff members, Emma Kuster (OU), Marina Tomer (USGS), 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.

Climate Products

A recently funded project, "What Makes Climate Science Products Useful? Exploring How Stakeholders Use, Understand, and Feel About Them," in conjunction with the U.S. Fish and Wildlife Service, is investigating whether or not stakeholders' needs are being fully met by scientists' projections of future climate conditions and models of impacts on ecosystems and people. Using information gathered from interviews, observation, and document review, the research will inform the design of tools with climate data and models that better meet stakeholders' needs, including our own high-resolution climate projections.

Tribal Partnerships

The South Central CASC supported the New Mexico Tribal Resilience Action Network's (NM TRAN) work 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, will provide a selection of climate change adaptation strategies, that incorporate relevant case studies and existing resources that are appropriate and valid for the Southwest Tribes. It will reflect Southwest ecology and address Tribes' regional climate concerns and provide 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 lead regular NM TRAN meetings, contributed to discussions, and reviewed and commented on documents defining the purpose and scope of the SWTCAM.

South Central CASC Tribal staff also actively engaged in EPA Region 6 Tribal Division meetings in Year 5. The Region 6 EPA Tribal Program Division includes all Tribes in OK, TX, LA and NM, which coincides with the region of the SC CASC Tribal Engagement Program. Participating with the EPA Region 6 Tribal Meetings allows the SC CASC Tribal Liaisons to reach most of the Tribal environmental and natural resources staff in our region. It is also an avenue for the SC CASC to coordinate and connect with EPA Region 6 staff. Since we started this engagement, EPA staff from both Regions 6 and 7 have reached out to us to cooperate in climate-related outreach.

San Antonio River Authority (SARA)

In one of our state listening sessions, we heard from the San Antonio River Authority (SARA) that they wanted to increase their understanding of climate change as it relates to water resources. Our team, led by Emma Kuster, is regularly meeting with folks from SARA to better understand their needs and to design a workshop around this issue. The workshop is planned for July 2024 in San Antonio, Texas.

Appendix: Additional Achievements & Efforts

Sagebrush Training Series

Following our successful climate-based training series for grassland practitioners in 2022-2023, we once again partnered with the U.S. Fish and Wildlife Service Region 6 Science Applications Program in 2023-2024 to design and deliver a cross-regional climate-based training series for sagebrush practitioners. Emma Kuster represented the South Central CASC in this effort and designed the self-paced introductory course about climate change, provided guest instructors in the virtual classrooms with presentation guidance, co-facilitated one of the virtual classrooms on how to interpret climate projections, and developed an interactive role-playing activity for the in-person workshop. The series spanned from mid-February through the end of May and included science and tools produced by CASC researchers. Participants were encouraged to attend as many of the sessions as possible during the entire training series, as each session was designed to build upon previous sessions. In the in-person workshop, participants had the opportunity to start applying what they had learned through the entire series in a real-world management challenge. Feedback through the entire course series was generally positive. Materials and recorded trainings can be found on our website. (https://southcentralclimate.org/resources/webinars-workshops/training-for-sagebrush-conservation-practitioners/)

Collaborative Research at UNM

In fall 2023, researchers from OU and UNM partnered to develop an EPSCoR proposal that (if funded) would establish respectful, reciprocal, and sustainable land-water-air research and education partnerships that braid Indigenous knowledges and Western sciences to advance Indigenous communities' resilience to climate change in NM and OK. Indigenous peoples are resilient and innovative leaders in responding to human-made destruction of nature, yet, in a changing climate, many Indigenous communities in NM and OK are at high risk for flood, drought, wild and prescribed fires, wind-blown dust, and unmonitored emissions and their impacts, including poor air quality. American Indians/Alaska Natives (AI/AN) comprise over 10% of the population of these two states, where 61 federally-recognized Tribes are headquartered. Climate projections indicate that NM and OK are expected to be hotter and drier, with more extreme precipitation events, droughts, floods, wildfires, and dust storms. These changes affect and will continue to impact how Tribal communities live, work, and practice the cultural traditions that support their continued existence. Indigenous communities have strongly expressed the need for their active participation in the development of scientific research questions, research design, analysis, and reporting. In collaboration with Tribal and intertribal organizations, Indigenous researchers and educators and Western-science climate researchers and educators at the OU, UNM (a minority-serving institution), CN, and the South Central CASC will use two-eyed seeing to braid Western and Indigenous climate sciences through a community-led process to identify information needs, conduct research and understanding, prepare for adaptation planning and actions, and to engage in land-based education.

Facilitation Training

The staff of the South Central CASC partnered with faculty at OU to provide the Facilitation Training Series. During this two-part series, members were taught about facilitation techniques, ground rules, common challenges and suggested solutions. They participated in a mock facilitation experience to practice the techniques that were learned. This training also included partners from the Southern Climate Impacts Planning Program (SCIPP).

Southern Plains Transportation Center

The United States Department of Transportation has provided $3 million in funding for the Southern Plains Transportation Center (SPTC), a regional university transportation center in which the University of Oklahoma is a member and serving as the host institution. Our own University Director, Dr. Renee McPherson, is a Co-Director of the center and Dr. Derek Rosendahl (Research Scientist) is assisting in cross-center work. Through this partnership, we are working to infuse climate-informed thinking into SPTC's transportation research projects and to improve collaboration between the weather & climate and transportation communities to better assess and mitigate the vulnerability of transportation infrastructure to climate change, extreme weather, and sea-level rise.

Appendix: Selected Publications

Birch, T., Nelson, M., & **Ehrenfeucht, R.**, Managing retreat? An empirical reflection on adopting relocation initiatives as adaptation policy in Louisiana. 2024, Climate and Development, 1-10. https://doi.org/10.1080/17565529.2024.2312815

Boyles, R., C. A. Nikiel, B. W. Miller, J. Littell, A. J. Terando, I. Rangwala, J. R. Alder**, D. H. Rosendahl, and A. M. Wootten**, Approaches for using CMIP projections in climate model ensembles to address the 'hot model' problem, 2024, USGS Open-File Report, https://doi.org/10.3133/ofr20241008

D'Elia, C. F., Falls, K., Bargu, S., & Hooper-Bùi, L., Charting The Course to Advance DEI in The Ocean Sciences: A Case Study, 2024, Oceanography, 36(4), 140–145. https://www.jstor.org/stable/27278276

Emert, A., S. Subbiah, F.B. Green, **K.L. Griffis-Kyle, P.N. Smith**, Atmospheric deposition of particulate matter from beef cattle feedlots is a likely contributor of pyrethroid occurrence in isolated wetland sediment: source apportionment and ecological risk assessment, 2023, Environmental Pollution, https://doi.org/10.1016/j.envpol.2022.120493

He, S., Maiti, K., Ghaisas, N., Upreti, K., & **Rivera-Monroy, V. H.**, Potential methane production in oligohaline wetlands undergoing erosion and accretion in the Mississippi River Delta Plain, Louisiana, USA, 2023, Science of the Total Environment, https://doi.org/10.1016/j.scitotenv.2023.162685

Konecky, B. L., N. P. McKay, G. M. Falster, S. L. Stevenson, M. J. Fischer, A. R. Atwood, D. M. Thompson, M. D. Jones, **K. L. DeLong**, J. J. Tyler, B. Martrat, E. K. Thomas, J. L. Conroy, S. G. Dee, L. Jonkers, O. V. Churakova (Sidorova), Z. Kern, T. Opel, T. J. Porter, H. R. Sayani, Grzegorz Skrzypek, and Iso2k Project Members, Globally coherent water cycle response to temperature change during the past two millennia, 2023, Nature Geoscience, https://doi.org/10.1038/s41561-023-01291-3

Keenan, TF, X Luo, BD Stocker, MG DeKauwe, BE Medlyn, IC Prentice, **NG Smith**, C Terrer, H Wang, Y Zhang, and S Zhou, A constraint on historic growth in global photosynthesis due to rising CO2, 2023, Nature Climate Change, https://doi.org/10.1038/s41558-023-01867-2

McPherson, R. (lead author), **A. Taylor, T. Broadbent, A.M. Wootten** (technical contributor), **S. Hausam** (technical contributor), Et. Al., In: Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. Fifth National Climate Assessment. Washington, DC: U.S. Global Change Research Program, 2023, https://doi.org/10.7930/NCA5.2023.CH26

Robertson, E.P., F.A. La Sorte, J.D. Mays, P.J. Taillie, **R.J. Ansley**, **T.J. O'Connell**, C.A. Davis, **S.R. Loss**, 2024, Decoupling of bird migration from the changing phenology of spring vegetation green-up, Proceedings of the National Academy of Sciences, https://www.pnas.org/doi/10.1073/pnas.2308433121

Smith, N.G., Opportunities to improve our understanding of the impact of photosynthetic acclimation on terrestrial ecosystem processes under global change, 2024, Annals of Botany, https://doi.org/10.1002/ajb2.16313

Wiley, D.Y., R.A. McPherson, The Role of Climate Change in the Proliferation of Freshwater Harmful Algal Blooms in Inland Waters of the United States, 2023, Earth Interactions, https://doi.org/10.1175/EI-D-23-0008.1

Appendix: Selected Presentations and Other Media

Castañeda-Moya, E., V. H. Rivera-Monroy, E. Solohin, X. Zhao, November 2023: "Post-hurricane recovery of mangrove forest development in the Florida Coastal Everglades", Coastal and Estuarine Research Federation Conference, Portland, OR.

Cook, A., April 2024: "Working with Tribes and Indigenous Peoples on Climate Adaptation in the South-Central U.S.", South Central Climate Resilience Forum, Dallas, TX.

DeLong, K., November 2023: "Anthropocene results from the Flower Garden Bank", Gulf of Mexico Coral Reef Symposium, Galveston, TX.

Devote P., Haliu T., Osoko T., Singh R., **van Gestel N.**, November 2023: "Regenerative Agricultural Practices Can Enhance the Soil's Resilience to Climate Change in the Semi-Arid Cropping System of West Texas", South Central CASC Fall Science Meeting, Lubbock, TX.

Fleck, J., August, 2023: "Risks to New Mexico's San Juan-Chama Water Under Colorado River Shortage", San Juan-Chama Project Contractors Association, Pagosa Springs, CO.

Fleck, J., September 2023: "Ribbons of Green: A History of Water Management in New Mexico's Middle Rio Grande", Middle Rio Grande Conservancy District, Albuquerque, NM.

Hausam, S., May 2024: "The Intersection of Indigenous Climate Relocation and Land Back", National Adaptation Forum, Saint Paul, MN.

Jordy, C. March 2024: "Co-Stewardship: Cultural Adaptation in the Era of Climate Change", Land and Water Summit, Albuquerque, NM.

Roberts, E., November 2023: "Assessing Impacts of climate change on zoonoses and wildlife hosts in the South-Central U.S.", Symposium for the Southeastern Association of Fish and Wildlife Agencies, TX.

Shanovich, H., **D. Na-Yemeh**, H. Ratcliffe, May 2024, "User-Support for States and Tribes on Resource and Wildlife Management from the Climate Adaptation Science Centers", National Adaptation Forum, Saint Paul, MN.

Smith, N., November 2023: "Takeaways from the 5th National Climate Assessment", Science by the Glass, Lubbock, TX.

Stebbins, A., J. Warner, **K. DeLong**, February 2024: Can Freshwater Flooding be Detected in Eastern Oysters (*crassostrea virginica*) Using Shell Barium to Calcium as an Environmental Proxy, 2024 Ocean Sciences Meeting, New Orleans, LA.

Wiley, Y., September 2023: "Harmful Algal Blooms from an Agricultural Perspective", Kiowa Landowner's Workshop, Oklahoma.

Wootten, A., Na-Yemeh, D., August 2023, "The Future of Water in Oklahoma", Climate Resilience Training for the Tribal Water Sector in Oklahoma, Tulsa, OK.




Helping to solve real problems in a variable and changing climate

Our region

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

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

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