



SOUTH CENTRAL CLIMATE ADAPTATION SCIENCE CENTER



2020-2021 Annual Report

August 1, 2020 - July 31, 2021

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

**South Central Climate
Adaptation Science Center
Hosting Agreement Term Sheet**

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

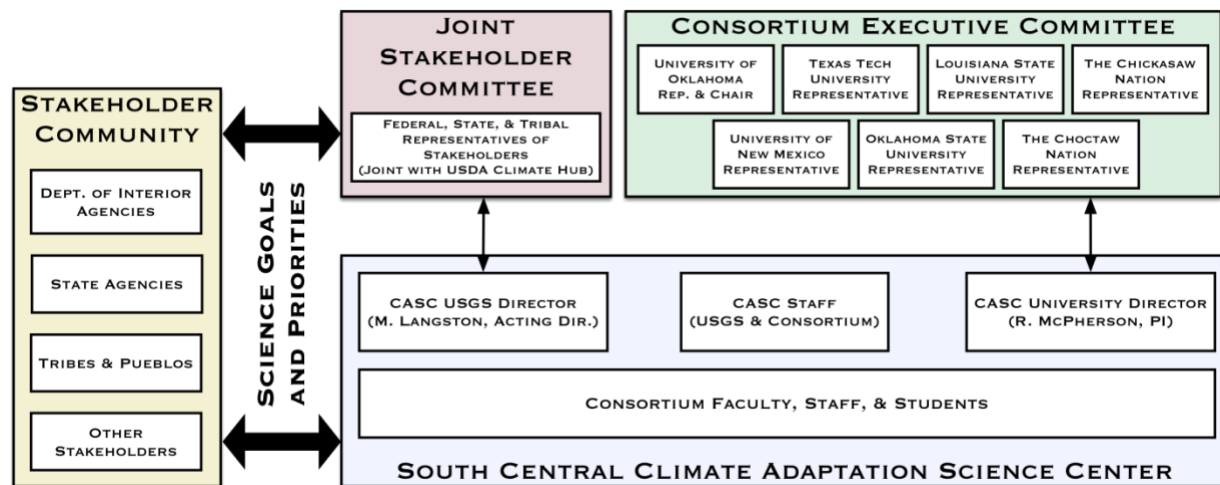
EXPECTATIONS & DELIVERABLES

- In this document, the “Consortium” refers to the University of Oklahoma (OU) and all funded subawardees of the hosting agreement for the South Central Climate Adaptation Science Center (South Central CASC). The “regional USGS office” will refer to those members of the U.S. Geological Survey who work full- or part-time for the South Central CASC. The South Central CASC comprises the Consortium and the regional USGS office.
- The Consortium PIs will pass along the USGS written science priorities to all 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

- 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.

➤ **University Director/Principal Investigator**

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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.

**South Central Climate
Adaptation Science Center
Annual Report**



Administrative

Award Recipient:

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

Contact Information:

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



Photo taken in 2019

Project Title:

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

Award Agreement Number:

G19AC00086

Report Date:

May 28, 2021

Reporting Period:

August 1, 2020 – July 31, 2021

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 2 since it is the first year in our current Host Agreement.

This report provides a summary of the South Central CASC Consortium activities for Year 2 (August 1, 2020 – July 31, 2021). The Consortium accomplished the agreed-upon deliverables for Year 1 outlined in our Key Elements document, and these are discussed throughout this report. In Year 2, the South Central CASC:

- Hosted four online short courses for resource managers world-wide (two in Fall 2020; two in Spring 2021);
- Conducted stakeholder-driven science related to our six science priorities;
- Engaged with stakeholders and built capacity through virtual trainings and workshops (e.g., climate 101s, climate projection trainings, tribal resilience etc.);
- Promoted cross-departmental and inter-collegial engagement at each institution and across the Consortium through new proposal efforts and our Communities of Practice;
- Continued growing our Affiliate Program with nine new Affiliate members;
- Established a working group focused on tribal engagement evaluation;
- Maintained our online presence through our website, social media, and webinars;
- Hosted a virtual Science Meeting in Fall 2020;
- Engaged in cross-network collaborations in research, DEI, and climate training efforts; and
- Submitted the required communications products to the National CASC.



Organization & Approach

Personnel Financially Supported on the Host Agreement

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

| Personnel | Affiliation | Role | FTE on Host Agreement |
|----------------------|----------------------------|--|-------------------------------------|
| Renee McPherson | University of Oklahoma | Consortium PI & University Director | 1 FTE for 1 month |
| Emma Kuster | University of Oklahoma | Consortium Co-PI & University Assistant Director | 1 FTE for 12 months |
| Christiaan Patterson | University of Oklahoma | Science Translator | 1 FTE for 12 months |
| Ellen Robertson | Oklahoma State University | Postdoctoral Associate | 1 FTE for 12 months |
| Tirhas Hailu | Texas Tech University | Postdoctoral Associate | 1 FTE for 2.4 months |
| Emma Roberts | Texas Tech University | Postdoctoral Associate | 1 FTE for 9.6 months |
| Radilyn Senz | Texas Tech University | Undergraduate Student | 10 hours per week |
| Kristine DeLong | Louisiana State University | Consortium Co-PI | 1 FTE for 1 month |
| Victor Rivera-Monroy | Louisiana State University | Consortium Co-PI | 1 FTE for 1 month |
| Kylie Palmer | Louisiana State University | Graduate Student | 0.5 FTE for 12 months |
| Xioachen Zhao | Louisiana State University | Graduate Student | 0.5 FTE for 12 months |
| Dave Gutzler | University of New Mexico | Consortium Co-PI | 0.01 FTE for 9 months |
| Renia Ehrenfeucht | University of New Mexico | Consortium Co-PI | 0.01 FTE for 9 months |
| John Fleck | University of New Mexico | Consortium Co-PI | 0.01 FTE for 9 months |
| Tylee Griego | University of New Mexico | Graduate Student | 0.5 FTE for 12 months |
| Annalise Porter | University of New Mexico | Graduate Student | 0.25 FTE for 12 months |
| Hector Alvarez | University of New Mexico | Graduate Student | 0.25 FTE for 12 months |
| Mollie Hantulla | University of New Mexico | Graduate Student | 0.5 FTE for 3 months |
| April Taylor | Chickasaw Nation | Consortium Co-PI & Tribal Liaison | 1 FTE for 12 months |
| Kelly Roberts | Chickasaw Nation | Evaluator | 55 hours total |
| Asa Samuels | Chickasaw Nation | Undergraduate Student | 10 hours per week |
| Kieren Daley Laursen | Chickasaw Nation | Undergraduate Student | 15 hours per week |
| Jacob Nichols | Chickasaw Nation | Undergraduate Student | 10 hours per week (left Sept. 2020) |

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); Maurice Cruz (NM Tribal Liaison - left Nov. 2020); Cynthia Naha (NM Tribal Liaison & Science Communications Specialist); Noetta Harjo (Financial Administrator); Derek Rosendahl (Research Scientist); Irena Lodangco (Research Scientist); Adrienne Wooten (Postdoctoral Associate); Caitlin Rottler (Postdoctoral Associate); Paulina Cwik (Graduate Research Assistant); Taylor Dewinter (Graduate Research Assistant); Sean Wineland (Graduate Research Assistant); Olivia VanBurskirk (Graduate Research Assistant); Carrie Leslie (Graduate Research Assistant); Amelia Cook (Graduate Assistant - starting summer 2021); Tiana Nguyen (Student Office Assistant - left Dec. 2020); Emma Landeros (Student Assistant); Codie Winn (USGS Student Assistant); Peyton Cavnar (Undergraduate Research Assistant); Jovon Jojola (BIA Pathways Intern - left Aug. 2020); Luke Kerr (Student Office Assistant); Tsali Smith (Undergraduate Research Assistant) |
| Oklahoma State University | Jim Ansley (Consortium Co-PI); Scott Loss (Postdoc Supervisor) |
| Texas Tech University | John Zak (Consortium Co-PI); Katharine Hayhoe (Consortium Co-PI); Venki Uddameri (Consortium Co-PI); Natasja van Gestel (Consortium Co-PI); Ian Scott-Fleming (Research Associate); Kerry Griffiths-Kyle (Faculty); Nick Smith (Faculty) Amin Ferdous (Graduate Student); Garrett Huddleston (Graduate Student); Diana Vargas-Gutierrez (Graduate Student); Erin Stukenholtz (Graduate Student); Pablo Tovar (Graduate Student) |
| Louisiana State University | Chris D'Elia (Consortium Co-PI); Ivan A. Vargas-Lopez (Graduate Student) |
| University of New Mexico | N/A |
| Chickasaw Nation | Kara Berst (Consortium Co-PI); Krisopher Patton (Researcher); Newakis Webber (Researcher); Chaylum Hogue (Researcher); Shane Jemison (Researcher); Jennifer Bryant (Researcher); Wayne Kellogg (Researcher); Matthew Armor (School to Work Intern); Heath Steward (BIA Intern); William Warner (BIA Intern) |
| Choctaw Nation | Ethan Schuth (Consortium Co-PI); Tye Baker (Consortium Co-PI) |

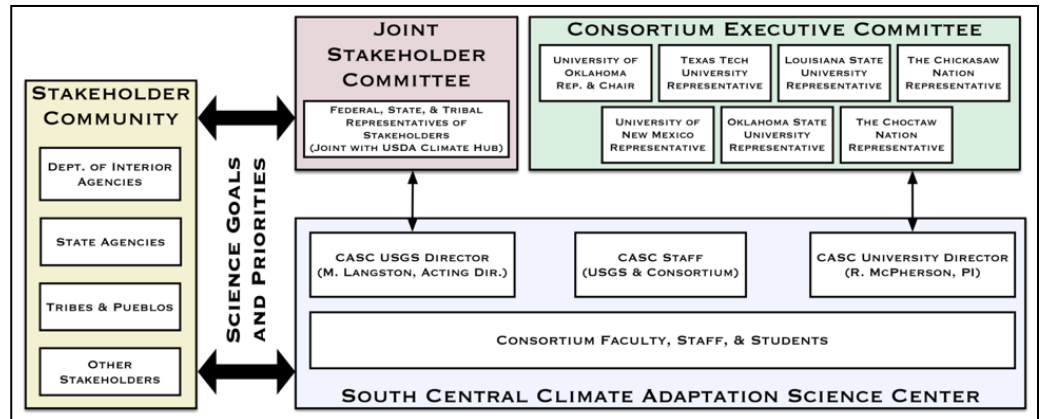
In addition, the CASC has over 95 Research Affiliates across the consortium and at partner institutions.



Organization & Approach

Organizational Structure & Communication

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



The Consortium Executive

Committee (EC) meets annually (typically in March or April) to discuss progress-to-date in a given year and begin planning for the following year. In Year 2, the EC met virtually on March 18th to discuss challenges related to COVID-19, as well as discuss future research, capacity building, and communication efforts conducted through the host agreement.

To facilitate regular communication across the Consortium, we have scheduled bi-monthly Zoom calls to discuss general updates, critical issues, and the science being conducted by students and postdocs.

Personnel Achievements

Dr. Katharine Hayhoe was named Chief Scientist for The Nature Conservancy (TNC), a worldwide organization that uses science to tackle the issues of conservation and climate change. As part of her role with TNC, she will take responsibility for the Conservancy's wider portfolio of global climate advocacy and adaptation work. Dr. Hayhoe began her new role as of June 1, 2021 and topped down as the co-director of the TTU Climate Center and co-PI of the South Central CASC. Her South Central CASC duties have been transitioned to Dr. Natasja van Gestel.

Ms. April Taylor received the Outstanding Tribal GIS Member Award in November 2020 as recognition and appreciation of her dedication, hard work, and outstanding leadership in the climate science and geospatial fields. April is commended on her ongoing efforts to bridge the connection between the global impacts of climate change and tribal communities through climate science education, resources, and technology.

Host Agreement Challenges

We continued to face a few challenges in Year 2 (primarily related to COVID-19), but were able to overcome and adjust accordingly. **Administrative:** Due to delays with the USGS funded projects getting approved, many FY20 and FY21 projects have not yet received funding to begin their projects. **Travel:** Due to ongoing delays, cancellations, or transitions to virtual options for conferences and other events, our team has been unable to use the travel funding in the host agreement. We have requested to move our Year 9 travel funds to salary and fringe to support summer salary for the consortium PIs and other staff. **Cross-Departmental Interaction Challenges:** OU was scheduled to lead discussion groups to foster cross-departmental interactions starting in Year 1. We are still in the process of developing a new program to fit this need, but due to the ongoing situation with COVID-19, we have not been able to re-establish such interactions. Similarly, we have been unable to establish a postdoc exchange program between our institutions, but we aim to start this up in Year 3. **Capacity Building Challenges:** Our CASC had several workshops and listening sessions planned in Year 1 that were transitioned to virtual during Year 2 due to the ongoing COVID-19 situation. This has impacted our ability to engage with some of our stakeholders and tribal partners, but has offered us a way forward in maintaining some engagement during these difficult times. Additionally, virtual options have provided more flexibility in reaching stakeholders that would normally have to travel longer distances to attend in-person events. Moving forward, we will likely have a virtual option available for most of our training and workshop events.



Results

Partnerships

Our goal is to respond to high priority natural and cultural resource management challenges and foster substantive, sustained engagement between scientists and managers. In Year 2, the South Central CASC focused on building new partnerships and strengthening existing partnerships.

South Central CASC staff at OU and Chickasaw Nation participated in listening sessions and provided feedback to the Southern Plains Drought Early Warning System (DEWS) team on their new strategic action plan for the region. We are excited to continue building our relationship with the Southern Plains DEWS team to bring our stakeholders the best drought information possible.

We have continued to strengthen our connection with U.S. Fish and Wildlife Refuge Managers across our region through regular engagement via email and phone calls about climate change training opportunities focused on incorporating climate information into management plans. Additionally, our team has been working with the U.S. Fish and Wildlife Service to provide technical expertise on climate modeling for Species Status Assessments.

The South Central CASC hosted a virtual Science Workshop in Fall 2020 that brought together 50 scientists from across our region to discuss research opportunities related to climate adaptation. Participants were invited to join one of our Communities of Practice (CoPs). At this meeting, we established a new CoP, Understanding Uncertainty. 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 foster their leadership in science-based resource management. In Year 2, we focused building capacity through virtual workshops and training events, webinars, and our Managing for a Changing Climate short course series. The South Central CASC team hosted 15 training or workshop events for resource managers, including two Climate 101 trainings (one is scheduled for June 2021).

Our Managing for a Changing Climate short course series continued to be popular, especially the first two courses that were offered during Fall 2020. Our *Introduction to the Climate System* course had over 600 people register with nearly 180 people earning their certificate of completion. Our *Climate Modeling, Downscaling, and Assessments* course had over 500 people register with just over 120 earning a certificate. These are some of the highest numbers of registrations and completions we have had with our online courses. The completion rates of approximately 30% and 25%, respectively, exceed the median of 12.6% for most online courses. For our Spring 2021 courses, we had over 150 people register for the *Societal Impacts* course and over 170 people register for the *Physical Impacts* course.

South Central CASC staff also offered *How to Use Climate Projections* training opportunities for tribal staff at the National Tribal & Indigenous Climate Conference and for the New Mexico Tribal Resilience Action Network. Over 35 tribal staff from 23 Tribes participated in these events. At TTU, South Central CASC staff hosted a workshop on *Building Sustainable Cotton Production Systems Across the US*. Over 50 individuals participated in this event.

The *Shifting Landscapes: A Guide to Developing Academic and Research Relationships in Oklahoma Indian Country*, was finalized and is now available as a resource on our website for researchers working with Native Nations (<https://southcentralclimate.org/wp-content/uploads/2020/12/ShiftingLandscapes2020.pdf>).

Strategic Planning & Tribal Engagement Evaluation

We updated our Strategic Communications Plan to reflect the goals and objectives of the current Host Agreement, with an emphasis on building stronger relations internally and with stakeholders through actionable science. The plan is available on our website (<https://southcentralclimate.org/about-us/south-central-casc-documents/>). We also developed an Evaluation Committee consisting of Federal agencies, academics, and tribal partners to evaluate our Tribal Engagement Program. Dr. Kim Winton serves as the chair of the committee. The team is actively developing an evaluation plan (expected to be finalized by the end of this project year).



Results

Science

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

- *Sustainable & Usable Water Resources:* CoP members have been working on revising and resubmitting two journal articles on environmental flows across our region. Moving forward, the team will be working on two projects: (1) data synthesis of freshwater conversation initiative participation over time, and (2) understanding the opportunity costs of sustainable resource management. UNM graduate students and PIs have also been working on a project to understand the adaptation strategies that farming communities along the Rio Grande are using to cope with water shortages and the effectiveness of those strategies under future climate conditions. Initial results suggest that there is a significant difference in drought response between commercial farming and “custom and culture” farming. Another UNM group has started to analyze the impact of property tax benefits for those using their land for agricultural purposes on water use in the region.
- *Enhancing the Resilience of Indigenous, Rural, & Vulnerable Communities:* There were challenges with the survey to identify adaptation needs of water managers that was planned for last year, but the team will be moving forward this summer with the survey. Team members of this CoP have taken on a new project idea to investigate climate change and adaptation from the grassroots (e.g., how people are experiencing, interpreting, responding, adapting to, and living with climate change in their everyday lives). UNM students and PIs have also been working in this theme on a recently started project to identify community-based climate adaptation strategies in arid regions. OU students and PIs have also been working on identifying tribal adaptation strategies, primarily related to prescribed fire and seed banking.
- *Mapping & Predicting Changes in Species and Ecosystems:* Team members in this CoP have been working on three projects: (1) conceptual paper to describe climate change effects on species distributions (to be finalized in Fall 2021), (2) proposal to study emerging urban ecosystems, and (3) user-friendly guidelines for management practices that are climate adaptive for the species of concern identified by a survey sent last year. In addition to the CoP, our postdoc at OSU has been working on two projects related to this science theme: (1) understanding how changes in the thermal landscape impacts habitat selection of a terrestrial turtle and identifying management techniques that can help alleviate some negative impacts of warming temperatures, and (2) investigating changes in “green up” within the Central Flyway and how those changes are altering the migration patterns of birds. Additionally, our postdoc at TTU has been investigating the dynamics of infectious disease spread in wildlife under a changing climate.
- *Understanding Teleconnections that Influence Ecosystem Resilience:* CoP members focused on this theme have been working on three main activities for this year: (1) a NSF proposal to build a transboundary, whole-basin collaborative research network in the Rio Grande/Bravo, (2) an article to provide a review of teleconnections, and (3) a literature review on the use of teleconnection concepts in human-environment systems research.
- *Understanding Uncertainty:* This team is working to identify useful resources about working with and describing uncertainty in climate change. They will develop a web site to house materials about communicating uncertainty effectively and understanding the types of uncertainty inherent in climate projections and scientific statements.
- *Resilient Coastal Systems:* Our graduate students and PIs at LSU have been working with Jean Lafitte National Historical Park and Preserve to understand and model how carbon exports are influenced by nutrient eutrophication in the Barataria Basin to help resource managers more effectively manage the landscape to minimize nutrient loading and toxic algal blooms. Another group at LSU is continuing their work to better understand the impact of temperature fluctuations on mangrove distribution and production. Results to date suggest that warming winters will facilitate mangrove encroachment into salt marsh. A third group at LSU has recently started a project using geochemical proxies from coral cores to establish markers for the Anthropocene and investigate environmental shifts from the Little Ice Age to today.



Communications & Outreach Efforts

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

Communications & Outreach

In Year 2, we submitted over 20 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 [901 followers], Twitter [569 followers], LinkedIn [236 followers], YouTube [591 followers], and our newest platform, Instagram [52 followers]), monthly newsletters [618 subscribers], and webinars from partners and Affiliates. Since August 2020, we have had over 5,500 visitors, resulting in over 18,000 page-views on our website.

In a joint effort with the USDA Southern Plains Climate Hub and the Southern Plains Climate Impacts Planning Program, we worked to revamp our former bi-monthly Southern Plains Climate Science Webinar to accommodate for virtual overload and as a result created a quarterly webinar series with varying style approaches for more active audience engagement. Since this change, we are averaging 70-80 registrants for each webinar, which is higher than our average of webinar attendees in Year 1. Webinars that are recorded are made available for viewing on our website (<https://southcentralclimate.org/resources/webinars-workshops/>).

The TTU Climate Center has continued hosting virtual Science by the Glass events each month, averaging 3,000 viewers on Facebook Live. The new format has also fostered more cross-consortium interaction, with April Taylor and Dr. Kristine DeLong being invited speakers for the series.

Additionally, we continued to engage in outreach efforts with youth and educators to build up the next generation of scientists including climate change talks with Project Wet educators in Texas and Georgia, conducting youth activities for the virtual 2020 National Weather Festival and the virtual 2021 Oka' Festival.

Engagement with Regional & Local Decision-Makers

South Central CASC staff at UNM participated in a discussion with the New Mexico State Land Office about incorporating climate change into their land management plans in January. Additionally, our team at TTU met with representatives from the City of Houston to discuss the impacts of climate change and are continuing to work with city leaders on understanding climate impacts and adaptation.

Members from our team at LSU met with the Flower Garden Banks National Marine Sanctuary to discuss research progress and brainstorm new project ideas. LSU staff will work with them to set up a new water monitoring program.

South Central CASC staff at OU created a climate projections report for the City of Oklahoma City Office of Sustainability for their ongoing planning efforts. Additionally, we developed a flooding report (historical and future) for the Eastern Shawnee Tribe to use in their EPA 106 grant report.

Tools & Products

To assist participants in our Climate 101 events, we are developing a digital workbook for use as a work-along during the training. This workbook will highlight the South Central CASC, details on presentations and speakers, and creates a digital space for all note-taking. We will have the first workbook completed by our June Climate 101.

April Taylor and Maurice Cruz were significantly involved in the development of the *Status of Tribes and Climate Change* report. The final report is expected to be released in Summer 2021.

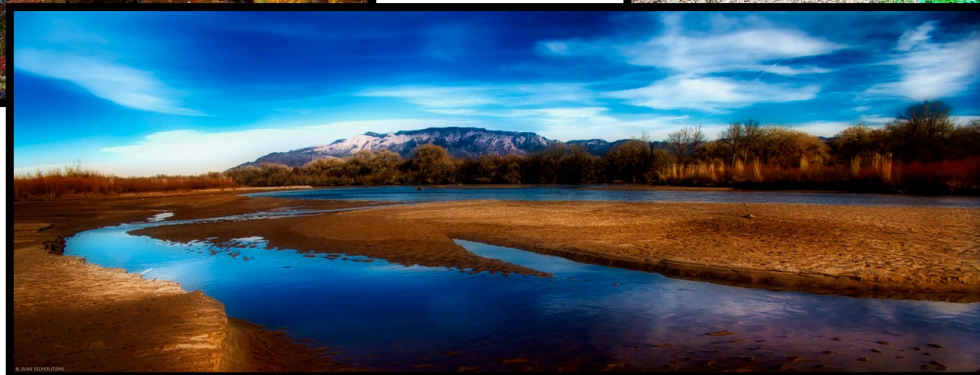
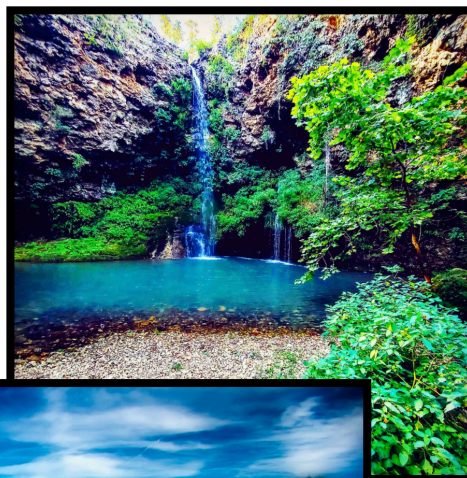
Over this past year, the South Central CASC team submitted over 40 publications and presented over 80 presentations at conferences, workshops, and webinars across our region. A list of selected publications and presentations are highlighted in the appendix. All publications are linked on our website.



Activities Planned for Year 2

In Year 3 of this host agreement, we plan to continue to develop new products and tools, offer trainings and workshops, and engage in actionable science that will assist our stakeholders in adapting to a changing climate. Moving forward, we plan to:

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





South Central CASC Host Agreement Budget

Budget numbers shown below represent expenditures from August 1, 2020 through May 28, 2021.

| Institution | YR 1 Carryover | YR 2 Budget | Expended | Percent Expended |
|----------------------------|----------------|-------------|-----------|------------------|
| University of Oklahoma | \$41,691 | \$294,369 | \$162,087 | 48% |
| Texas Tech University | \$33,764 | \$129,080 | \$37,176 | 23% |
| Louisiana State University | \$0 | \$125,437 | \$64,238 | 51% |
| Chickasaw Nation | \$4,279 | \$123,440 | \$79,910 | 63% |
| Choctaw Nation of Oklahoma | — | — | — | — |
| Oklahoma State University | -\$13,866 | \$98,262 | \$66,233 | 78% |
| University of New Mexico | \$16,680 | \$131,976 | \$68,422 | 46% |

Due to the ongoing COVID-19 pandemic, many of our institutions have faced difficulty in spending from their travel and supply lines. Since many workshops and conferences have been postponed, cancelled, or transitioned to virtual, we have submitted a reallocation request to move travel and supply funds at OSU and UNM to summer salary and fringe for our South Central CASC staff. Additionally, LSU and TTU have requested to move their travel funds to salary support and field work supplies for a few summer projects. An official reallocation request was submitted to OU's Office of Research Services on April 27, 2021. Earlier this year, CN submitted a budget reallocation request to move travel funds to salary and fringe to partially support undergraduate students. We will also be submitting a request to carryover remaining Year 2 funds into Year 3.

Leveraged Funding

In 2014, there was an anonymous donation of \$330,000 provided to the South Central CASC, which has been set up as a Foundation Account at OU. Each year we use that funding to provide three study abroad scholarships and two academic scholarships. This year, we offered two study abroad scholarships in addition to the three that were offered last year but were unable to go. We were also able to offer five academic scholarships this year by leveraging funding from the Oklahoma NASA Space Grant Consortium.

In 2018, the South Central CASC became a consortium member of the Oklahoma NASA Space Grant Consortium. The funding we continue to receive through this partnership has been used to support several postdocs and students at the South Central CASC working on climate-related projects. Additionally, Drs. Adrienne Wootten and Derek Rosendahl were each awarded a Research Initiation Grant this past year through the Oklahoma NASA Space Grant.

Our NM Tribal Liaison receives funding through a separate grant from the Bureau of Indian Affairs. We have been able to secure funding for this position through grants since June 2017.

Climate Science Center Support for Tribal Resilience Planning

Renee McPherson (OU), PI – ongoing, BIA, Start Date: 7/5/2017 (New Funding in FY21: \$75,383)

Drs. Kristine DeLong (LSU) and Elinor Martin (OU) were awarded an NSF grant in which part of the funding will support translating our *Managing for a Changing Climate* videos into Creole French and Spanish.

Collaborative Research: Coral Proxy and Climate Model Comparison to Understand Climate Variability in the Intra-Americas Sea Region

Kristine DeLong (LSU), PI – 3 years, NSF, Start Date: 7/1/2021 (Total funding: \$753,073)

South Central CASC Consortium researchers were successfully awarded 6 and 8 projects through the FY20 and FY21 USGS awards competitions, respectively. Additionally, our Consortium researchers have been invited to submit 12 full proposals to the FY22 South Central CASC USGS Request for Proposals in Summer 2021.

The research team of the South Central CASC successfully submitted eleven additional proposals to other federal agencies, totaling in an additional \$2,722,423 of leveraged funds for CASC-related projects since August 1, 2021. We have additional proposals submitted and currently under review, so this dollar amount may continue to grow for Year 2. Many of these projects are awarded to our PIs because of the expertise built through the South Central CASC network.



Appendix: Additional Achievements & Efforts

CASC Virtual Network & Evaluation

The South Central CASC *Virtual Network* working group (previously considered a CoP) has been developing an online virtual network platform to connect climate change-related researchers, science translators, and decision makers. The virtual network will enable novel climate adaptation strategies and actions to be developed through the acceleration of collaboration, innovation, discovery, and knowledge transfer.

Additionally, we established an evaluation focused CoP to share knowledge and lessons learned about evaluating climate services. Our Evaluation CoP includes representation from the US Dept. of Agriculture Climate Hubs, the Southern Plains Drought Early Warning System group (through NIDIS), the Climate Assessment for the Southwest group (a NOAA RISA), and the Southern Climate Impacts Planning Program (a NOAA RISA).

NASA Earth to Sky Academy

In October 2019, April Taylor and Emma Kuster participated in the NASA Earth to Sky Academy to become regional leaders for the Earth to Sky Program. As regional leaders, we are tasked to build a community of practice in our region focused informal education on climate change. We plan to host our first in-person workshop in Year 3 for tribal educators. [This was originally planned for Year 2, but due to COVID-19, we chose to delay the event.]

Diversity, Equity, & Inclusion Efforts

South Central CASC staff and students participated in OU-led Unlearning Racism in the Geosciences (URGE) Pods through the National Science Foundation project at Woods Hole Oceanographic Institute (<https://urgeoscience.org/>). As part of these groups, we started outlining DEI policies and procedures that could be presented to OU leadership for implementation to foster a more inclusive experience at OU, including at the South Central CASC.

Building New Partnerships

We were approached by the U.S. Forest Service Southern Region to join in a Master Participatory Agreement for collaboration on tribal engagement opportunities. We have been partnering with them to develop a Climate 101 (scheduled for June 15-16, 2021) for forest managers. The audience will be U.S. Forest Service Region 8 forest planners and ecologists and tribal forestry, natural, and cultural resource managers. Moving forward, we plan to continue discussions on fire training, including prescribed and cultural burning. We are also identifying opportunities to work with the U.S. Forest Service Region 8 on climate smart monitoring.

Supporting our Communities of Practice

Using some of our leveraged funding through the NASA Oklahoma Space Grant and our OU cost share, we were able to support three students at the University of Oklahoma to work on summer projects with our Water Resources CoP, Teleconnections CoP, and Enhancing Resilience CoP.

New CASC Employees

In Year 2, the South Central CASC added Cynthia Naha as our new Tribal Liaison and Science Communications Specialist (officially starting on June 14, 2021). Maurice Cruz left this position in November 2020. Dr. Irene Lodangco, Research Scientist, was also hired by the CASC to work on drought forecasting. Moving forward, we hope to continue to grow our team by adding new postdoc and staff positions to fulfill the growing demand for our research and services.

Retired CASC Employees

In Year 2, the South Central CASC team celebrated the retirement of Wayne Kellogg (CN) and teaching retirement of Dr. Dave Gutzler (UNM).



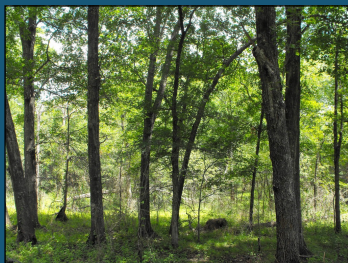
Appendix: Selected Publications

- Chambers, R.M., A.L. Gorsky, E. Castaneda-Moya, **V.H. Rivera-Monroy**, 2020: Evaluating a Steady-State Model of Soil Accretion in Everglades Mangroves (Florida, USA). *Estuaries and Coasts*. [<https://link.springer.com/article/10.1007/s12237-020-00883-1>]
- Cooper, C., T. Zhang, **R. J. Ansley**, 2020: Honey mesquite leaf water relations and gas exchange following partial top-kill: short and long-term effects. *Rangeland Ecology and Management*, 73. [doi.org/10.1016/j.rama.2020.06.002]
- Eischliman, C.M., E. Kuster**, J. Ripberger, **A.M. Wootten**, 2020: Preparing to adapt: Are public expectations in line with climate projection? *Climatic Change*, 163. [<https://link.springer.com/article/10.1007/s10584-020-02875-3>]
- Fordham, D.A., **S.T. Jackson**, S.C. Brown, B. Huntley, B.W. Brook, D. Dahl-Jensen, et al, 2020: Using paleo-archives to safeguard biodiversity under climate change. *Science*, 369. [http://macroecointern.dk/pdf-reprints/Fordham_Science_2020.pdf]
- Fovargue, R. S. Rezapour, **D. Rosendahl, A. Wootten**, H. Z. Sabzi, H. Moreno, **T. Neeson**, 2021: Spatial planning for water sustainability projects under climate uncertainty: balancing human and environmental water needs. *Environmental Research Letters*. [<https://doi.org/10.1088/1748-9326/abdd58>]
- Gill, K.C., R.E. Fovargue, **T.M. Neeson**, 2020: Hotspots of species loss do not vary across future climate scenarios in a drought-prone river basin. *Ecology and Evolution*, 10. [<https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.6597>]
- Martin, E., R. McPherson, E. Kuster**, A. Bamzai-Dodson, 2020: Managing for a Changing Climate: A Blended Interdisciplinary Climate Course. *Bulletin of the American Meteorological Society*, 101. [<https://journals.ametsoc.org/view/journals/bams/101/12/BAMS-D-19-0242.1.xml>]
- Medina-Calderon, J.H., J.E. Mancera-Pineda, E. Castaneda-Moya, **V.H. Rivera-Monroy**, 2021: Hydroperiod and Salinity Interactions Control Mangrove Root Dynamics in Karstic Oceanic Island in the Caribbean Sea (San Andres, Colombia). *Frontiers in Marine Science: Marine Ecosystem Ecology*, [doi.org/10.3389/fmars.2020.598132]
- Sharma, S., J.D. Carlson, E.S. Krueger, D.M. Engle, D. Twidwell, S.D. Fuhlendorf, A. Patrignani, L. Feng, **T.E. Ochsner**, 2020: Soil Moisture as an Indicator of Growing Season Herbaceous Fuel Moisture and Curing Rate in Grasslands. *International Journal of Wildland Fire*. [<https://doi.org/10.1071/WF19193>]
- Vargas-Lopez, I.A., **V.H. Rivera-Monroy**, J.W., Day, et al., 2021: Assessing Chlorophyll a Spatiotemporal Patterns Combining In Situ Continuous Fluorometry Measurements and Landsat 8/OLI Data Across the Barataria Basin (Louisiana, USA). *Water*. [<https://doi.org/10.3390/w13040512>]
- Wootten, A.**, E.C. Massoud, A. Sengupta, D.E. Waliser, H. Lee, 2020: The Effect of Statistical Downscaling on the Weighting of Multi-Model Ensembles of Precipitation. *Climate*, 8. [<https://www.mdpi.com/2225-1154/8/12/138>]



Appendix: Selected Presentations

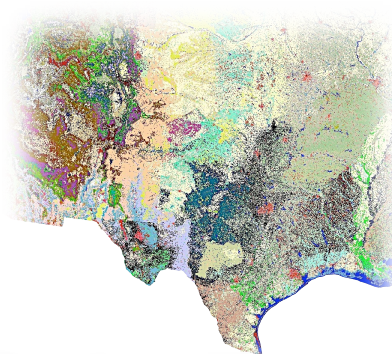
- Austin, B. F. Schalla, W. Kellogg, E. Schuth**, December 2020: “Using Climate Models in Water Supply Sustainability Studies in Southern Oklahoma”- AGU Annual Meeting, Virtual
- Cobb, A. B. and G. W. T. Wilson**, August 2020: “Breeders can Improve Host-Plant Mycorrhizal Responsiveness to Optimize Productivity in a Warmer World” - 105th Annual Ecological Society of America Conference, Virtual
- DeLong, K. L.**, J. Warner, December 2020: “Progress with a Network of Siderastrea Siderea Corals Yields Insights into Past Climate of the InterAmerica Sea” - AGU Annual Meeting, Virtual
- DeLong, K. L.**, November 2020: “The Alabama Underwater Forest: A Time Capsule from the Last Ice Age”- TTU Science by the Glass, Virtual
- Fleck, J.**, January, 2021: “Water Tradeoffs Among Agriculture, Municipalities, and the Environment on New Mexico’s Rio Grande” - New Mexico Water Dialogue, Virtual
- Gutzler, D.**, N. Bjarke, S. Chavarria, September 2020: “Improving Predictions of Water Supply in the Rio Grande Headwaters” - Fourth Texas Water Conference, Virtual
- Hayhoe, K.**, October 2020: “Impacts of Climate Change on Gulf Coast Conservation Issues” - Gulf Coast Conservation Symposium, Virtual
- Kuster, E. and M. Langston**, November 2020: “Climate Adaptation in the South Central U.S.”- Texas Water Development Board, Webinar.
- Martin, E.**, February 2021: “Precipitation Extremes, Whiplashes, and Stakeholder Engagement” - University of Kansas Department of Geography and Atmospheric Science, Virtual
- Rosendahl, D., R. McPherson**, A. Knoedler, December 2020: “Breaking the Barriers to Knowledge Transfer Among Researchers and Stakeholders for Climate Adaptation”- AGU Annual Meeting, Virtual
- Taylor, A.**, April 2021: “Building Capacity on Tribal Health and Climate Change”- Southern Plains Climate Health Conference, Virtual
- Walker, A., A. Taylor, S. Tangen, C. Thornbrugh**, April 2021: “Navigating the Climate Adaptation Science Centers: A National Network of Climate Adaptation Support for Native Nations” - NPS Climate Change Webinar Series, Virtual
- Winton, K. and A. Taylor**, March 2021: “Learning Resilience from Indigenous Communities”- International Economic Development Council, Virtual
- Wootten, A., K. Dixon, D. Adams-Smith, R. McPherson**, December 2020: “False Springs and Spring Phenology: Sensitivity to Downscaling Techniques and Training Data” - AGU Annual Meeting, Virtual
- Zak, J.**, January 2021: “Building Microbial Diversity in Semi-Arid Cotton Production Systems for Soil Health” -Belt Wide Cotton Meeting, Virtual



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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