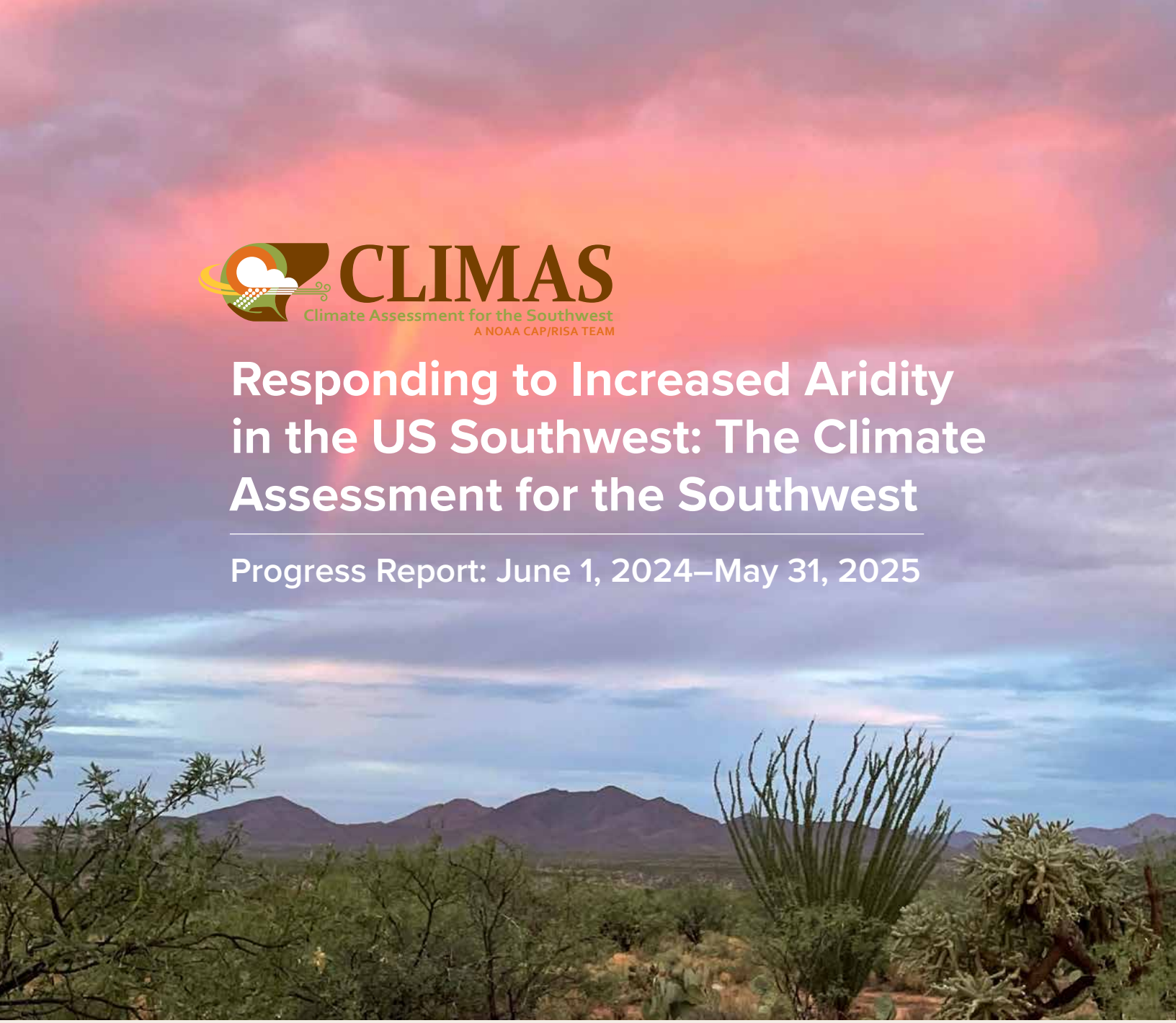

CLIMAS
Climate Assessment for the Southwest
A NOAA CAP/RISA TEAM

Responding to Increased Aridity in the US Southwest: The Climate Assessment for the Southwest

Progress Report: June 1, 2024–May 31, 2025

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CLIMAS Climate Assessment for the Southwest A NOAA CAP/RISA TEAM
NOAA Climate Adaptation Partnerships Formerly RISA
The University of Arizona
NM State University
Inter Tribal Council of Arizona, Inc. 21 Tribal Nations

2024–2025 CLIMAS RESEARCH TEAM

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WHAT IS CLIMAS?

The Climate Assessment for the Southwest, or CLIMAS, serves the people of Arizona and New Mexico by providing information to help communities, resource managers, and agricultural producers make decisions related to drought, wildfire, extreme weather, and the economic and human health impacts of these phenomena. CLIMAS has been funded by the NOAA Climate Adaptation Partnership program (formerly RISA) since 1998.

CLIMAS BY THE NUMBERS 2024–2025

Presentations Given
26

Advisory Roles Served
4

Academic Articles Published
7

Research Reports and Briefs
5

CLIMAS Social Media Followers
9,124

Podcasts Recorded
9

Workshops & Trainings Facilitated
17

Appearances in the Media
25

Related New Proposals Funded
7

Climate Briefs Disseminated
99

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IMPACT STORIES

Supporting Heat Resilience in Rural Communities

An analysis of nationwide emergency medical system (EMS) data found that patients in rural areas experience longer transport times and are less likely to arrive at medical facilities in stable condition, when experiencing a heat-related illness. These findings point to gaps in emergency response capacity during extreme heat events in rural areas. This project has raised visibility of rural heat issues in Arizona and New Mexico and contributed to increased interest from state and county health departments in both states, particularly about rural heat issues.

Custom Climate Reports for Natural Resource Management

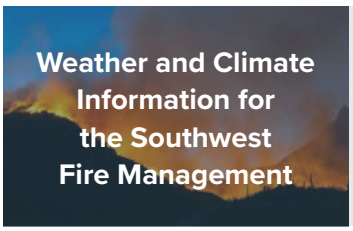
CLIMAS researchers work to support natural resource management across Arizona and New Mexico by producing monthly climate and drought reports for all national forests in the region. The reports are strengthening decision-making by improving access to localized data and facilitating conversations among land managers and stakeholders like grazing permittees. The reports are now being used by 12 national forests, and NRCS unit, and a county rangelands management unit.

Climate and Wildfire Risk in the Southwest

CLIMAS researchers developed new insights into climate and wildfire dynamics across Southwestern ecosystems. Their analysis of climate and wildfire data from 1984 to 2021 revealed that fire behavior in the Southwest varies significantly by ecosystem. In conifer forests, wildfire size and severity have increased in connection with drought and growing aridity. In contrast, shrublands and grasslands are more prone to extreme wildfires following wet periods that fuel vegetation growth that are followed by warm, dry conditions.

Building Regional Food System Resilience

Partnering with a food policy council and an art museum, CLIMAS researchers combined drawing and reflection to surface personal and collective insights about what it means to be nourished. Findings show that nourishment extends beyond nutrients, food and water, to include social, cultural, and environmental connections. Themes of community, care for the environment, and local economic resilience emerged, offering useful insights for both research, policy, and community action.



Weather and Climate Information for the Southwest Fire Management

Through collaboration with wildfire decision makers in the Southwest US, a team of CLIMAS researchers developed a tool to provide real-time, location-specific visualizations of burn periods—the number of hours per day conducive to burning—for wildland fire managers across the Southwest. The Burn Period Tracker has been integrated into the Southwest Coordination Center's Fire Danger Intelligence webpage and is being used to inform operational decisions related to prescribed fire and wildland fire management planning.

Training & Workforce Development

From 2024–2025, four graduate students participated in the Environment & Society Fellowship program. With support from CLIMAS mentors, fellows developed new products to visualize complex quantitative data, practiced skills in spatial analysis and computer cartography, and identified limitations in satellite data due to forest cover in the field.

Climate and Water Connections in the Middle Rio Grande

A climate and streamflow analysis of Rio Pueblo de Taos, NM suggests that peak streamflow—defined as the date when 50% of the calendar year streamflow has passed the gauge—is occurring earlier by nearly two days per decade. Further analysis for the Rio Pueblo de Taos indicates that each 1°C temperature increase would lead to a 13% decrease in average annual streamflow. In consultation with partners in the Bureau of Reclamation, this project piloted an approach for developing streamflow scenarios to assess warming impacts on water resources. The project has helped to expand CLIMAS's connections with research and management communities, including NGOs, tribal groups, and sectoral stakeholders in New Mexico.

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FEATURED ACCOMPLISHMENT

Supporting Heat Resilience in the U.S. Southwest

Project Team Members: L. Keith, H. Brown, E. Austhof, M. Ahn, A. Boyer

Extreme heat is an increasing weather hazard, with the hottest ten years in modern history all occurring within the last decade and 2024 being the hottest year ever recorded. Extreme heat is the top weather-related killer across the U.S., but efforts to address extreme heat as a hazard lag behind other hazards such as flooding, wildfires, and drought. Advances in heat resilience have been made in recent years particularly in larger well-resourced cities, but addressing heat in smaller towns and rural communities in the Southwest and across the nation has remained a critical gap in both research and practice.

Over the past year, CLIMAS made progress in addressing heat resilience in rural communities in the Southwest. The efforts described below demonstrate how CLIMAS has advanced heat resilience research, and also strengthened the practical, institutional, and social dimensions of adaptive capacity in the region.

- The team published a peer-reviewed study in The Journal of Climate Change and Health using national emergency medical services data, which identified a major disparity in heat-related health outcomes between urban and rural communities. This work created a new evidence base for rural heat health vulnerability and laid the groundwork for future rural adaptation planning. A companion systematic literature review paper on rural heat resilience is currently under review and a public-facing summary has been published in the Just Rural Futures blog, further contributing to this knowledge base.

- The team provided research and expert consultation for the Arizona Extreme Heat Preparedness Plan and the City of Tucson's Heat Action Roadmap. Both planning documents incorporate CLIMAS research findings and frameworks, demonstrating how this work informs real-world governance tools and increases the options available to decision-makers. The Heat Action Roadmap has since won two state-level planning awards for its integration of community input and evidence-based decision-making.

- Through events like the Arizona Extreme Heat Planning Workshop, Southern Arizona Heat Summit and the New Mexico Heat Summit, the team helped convene and strengthen networks of practitioners, health professionals, and government officials working on heat resilience and brought additional attention to rural heat resilience needs. Notably, this project's engagement facilitated a new partnership with the New Mexico Department of Health and helped link them to NIHHIS and resources from the heat.gov website.

- This project's focus has raised visibility of rural heat issues in Arizona and New Mexico. The team has received positive feedback from partners and stakeholders who expressed appreciation for bringing attention to these gaps. Increased interest from state and county health departments in both states exemplifies a mindset shift toward recognizing the urgency of heat planning beyond urban centers.

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Active and Collaborative Climate Services: Developing Customized and Automated Climate Reports to Support Natural Resource Management and Planning

CLIMAS researchers are exploring how to use artificial intelligence (AI) to help deliver customized climate services to partners in the Southwest. AI holds significant promise in accelerating weather and climate analyses by streamlining the selection of appropriate datasets, guiding methodological choices, and generating draft code in open-source programming languages. In ongoing collaboration with wildfire managers, a critical need emerged for tools to visualize and analyze fire weather station data. CLIMAS researchers leveraged AI to assist in the development of draft R Shiny App code, enabling rapid prototyping of a tool that served as a valuable 'boundary object.' This prototype facilitated deeper engagement and learning around how wildfire managers interpret and utilize weather and climate information in their decision-making processes.

Work is also being explored to use AI for interpreting weather and climate products in natural language, with the goal of making complex data more accessible to a broader range of users. This includes efforts to translate technical forecasts, climatological summaries, and model outputs into clear, plain-language narratives that can support decision-making in fields such as natural resources management and agriculture. By enhancing the communication of scientific information, this approach aims to reduce barriers posed by technical jargon and improve the overall usability and impact of weather and climate data for non-expert audiences.

Photo credit: Heidi Brown

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Climate Information Tools:

The Southwest Climate Outlook (SWCO): SWCO summarizes climate and weather information from disparate sources in accessible language, providing more than 1,600 people with monthly climate-related information. Since SWCO's inception in 2002, stemming from the END InSight project, the publication has evolved into a tool for two-way communication with stakeholders and a platform for responding to needs throughout the region. Twelve issues were distributed between June 2024 and May 2025.

Rainlog.org Monthly Climate Summary Email Newsletter: M. Crimmins authored and sent twelve newsletter issues between June 2024–May 2025 to subscribers and those who log rain event totals.

The Southwest Climate Podcast: CLIMAS scientists discuss climate-related issues in monthly climate podcasts. The podcasts synthesize information from disparate sources that often do not have a Southwest bent, translating the national and global discussions into what it means for the Southwest. Nine episodes aired between June 2024 through May 2025.

University of Arizona Extreme Heat Network: L. Keith distributes a monthly newsletter to 200+ subscribers from across the U.S. Members of the network submit content to help promote their opportunities, such as grants or partnerships, related to heat.

Data Hubs and Online Tools:

Southwest U.S. Summer Monsoon Season Precipitation Mapping: A near real-time monsoon season precipitation mapping system was developed in May 2019. Several updates were added to maps and charts in 2020 and 2021. This mapping product is often used for the SWCO and podcasts. In 2022, the product was integrated into a revised National Weather Service monsoon tracker: NWS-Tucson: Monsoon. New state-level map pages for Arizona and New Mexico were added in 2022. This page continues to be updated and maintained.

Southwest Monsoon Fantasy Forecasts: Players estimate the total monthly precipitation at each of the five major cities in the U.S. Southwest Monsoon region: Tucson, Phoenix, Flagstaff, Albuquerque, and El Paso. Points are awarded each month depending on the accuracy of the estimate compared to the actual observed rainfall. The goal is to accumulate the most points over the period from July through September. The game was piloted in 2020 via the Southwest Climate Podcast, hosted by CLIMAS researchers M. Crimmins, Z. Guido, and S. Reece. The 2025 launch will feature groups for participants to join and compete against each other.

Climate Reports for Natural Resource Management and Planning: This site hosts climate reports generated for natural resource managers who use weather and climate information to make land management decisions. Through a collaborative process, highly specialized and customized reports are designed for land management units using open-source code and readily available data. So far, partners include: All 12 National Forests in the USFS Region 3 (Arizona and New Mexico), Major Land Resource Areas (USDA-NRCS), and Pima County Rangelands.

Southwest U.S. Station Climate Summaries: This hub houses station-based climate monitoring plots for 118 stations across Arizona and New Mexico. Interactive historical plots of temperature and precipitation were added in 2022 for each station with updated website and near-real time updates to plots each morning. A user guide was developed and published in 2022 as well. This page continues to be updated and maintained.

Standardized Drought Index Visualization Tool: This interactive R-based Shiny app can be used to plot and explore drought indices calculated using NOAA NCEI climate division data. Plots are used in state level drought monitoring, by other climate monitoring efforts, and for general CLIMAS related outreach effort. Several updates were added in 2021 and the page continues to be updated and maintained.

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Burn Period Tracker: A new monitoring tool developed in collaboration with the Southwest Coordination Center that provides access to an experimental fire weather monitoring product called the Burn Period Tracker. Burn period is defined as the number of hours per day where the hourly average relative humidity is less than or equal to 20%. It is calculated at Remote Automated Weather Stations with real-time data and several years of historical data. Values range from 0 to 24 hours per day with higher values associated with increased fire danger. This tool is currently used by fire managers working across the Southwest. An ArcGIS version of the Tracker for integration into national, wildfire assessment platforms and Burn Period Tracker Archive was requested by NIFC for training and research purposes.

Arizona Station-based Drought Tracker: A new, real-time station-based drought tracking page was posted in spring of 2021 to assist with short-term drought monitoring in Arizona. This tool accesses precipitation data from over 1300 rain gauges from different networks including volunteer observers (e.g., Rainlog.org, CoCoRAHS, and home weather stations) to develop drought index values at time periods from the most recent 30 days to the past 365 days. The intention of this tool is to support fine scale adjustments of the U.S. Drought Monitor map across Arizona using as much observation data as possible. This page continues to be updated and maintained.

Southwest U.S. NFDRS Charts: A new monitoring tool developed in collaboration with the Southwest Coordination Center depicts real time and forecasted values of two standard fire danger indices used in the National Fire Danger Rating System: Energy Release Component and Burning Index. Charts are updated each evening using NFDRS data from the Weather Information Management System and plotted against climatological information generated for each Southwest Predictive Service Area by FireFamily+. This tool is currently used by fire managers working across the Southwest.

myRAINgeLog: This online data management and visualization tool is designed for ranchers and land managers who collect and interpret cumulative precipitation observations at remote sites. The account-based tool allows users to collect, manage and analyze multiple gauges and share observations through a public mapping feature. Custom reports can be generated for each gauge with accompanying charts of observations against historical climate conditions and summaries of field notes and photos entered by the user. The site is updated daily. The tool has continued in development as part of a broader rangeland precipitation monitoring program that started in 2017. New features were added in 2022, with additional training workshops conducted online in 2021. A YouTube channel with videos was also added in 2021. This page continues to be updated and maintained.

Selected Workshops and Seminars:

Y. Lyu and **L. Prihodko** hosted a booth during the Earth Day celebration at the Farmer's Market in Las Cruces, NM in April 2025 about "Communicating Climate Change Through Art". The goal of the event was to explore how people understand and emotionally connect with climate change through cultural, personal, and place-based perspectives and identify what climate-related information feels most relevant to their lives, careers, or interests.

A. Boyer presented "What are resilience hubs?" for the Built Environment breakout session at the Southern Arizona Heat Summit in Tucson, AZ in February 2025.

C. Woodhouse gave a talk called "Arid Then: The Tree-Ring Perspective" at the Earth to Sky Workshop sponsored by NASA-NPS partnership, Las Cruces, NM in March 2025.

M. Meko gave a Drought Climate Outlook presentation at a Managing Drought Workshop hosted by the Winkleman Natural Resource Conservation District and University of Arizona Extension in April 2025.

L. Keith presented "Advancing Heat Resilience through University and Community Partnerships" at the Southern Arizona Heat Summit hosted by the City of Tucson, Pima County, and the University of Arizona in Tucson, AZ in February 2025.

L. Keith moderated the 8th Annual Arizona Extreme Heat Planning Workshop hosted by the Arizona Department of Health Services, National Weather Service, Arizona State University, and the University of Arizona in April 2024.

M. Meko and **C. Woodhouse** attended and tabled at the Congreso de las Acequias held in Las Vegas, NM in November 2024. CLIMAS was also a sponsor of the Congreso and provided information about streamflow, climate, and the CLIMAS program.

C. Woodhouse, **M. Meko** and **K. Jendrisak** attended the Regional Tribal Water Summit hosted by the Inter Tribal Council of Arizona held in Santa Fe, NM in May 2025. They presented on "Climate Trends and Hydrologic Basin Modeling in New Mexico". They also provided CLIMAS literature to operators, specifically information about "Changes in Streamflow of the Rio Pueblo de Taos" and "Streamflow Response to Warming Temperatures, Rio Pueblo de Taos".

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Selected Presentations:

C. Woodhouse was selected to be a Distinguished Lecturer for the 2024-2025 year of the AGU Distinguished Lecture Series. She gave a talk titled "Tree Rings and Colorado River Streamflow: Can the Past Inform the Future?" at Wake Forest University (March 2025), University of Montana (March 2025); Universidad Autonoma de Baja California (December 2024), and California State Sacramento (November 2024).

E. Austhof was invited to two public health partner meetings in 2024 to discuss research findings on extreme weather events (precipitation and drought) and enteric diseases in the U.S. Southwest.

- Climate Change & Food Safety, August 2024. Rocky Mountain Food Safety Conference.
- Climate Change & Enterics, June 2024. Arizona Infectious Disease Conference.

T. McKellar presented during the session "Leveraging geospatial technology for rangeland monitoring" at the Society for Rangeland Management Annual Meeting held in Spokane, WA in February 2025.

M. Meko presented on climate, climate impacts on water supply, and the sensitivity of annual streamflow to warming temperatures, "Climate Impacts on Water in New Mexico," at the Regional Tribal Water Summit hosted by the Inter Tribal Council of Arizona held in Santa Fe, NM in May 2025.

Selected Online Content – Podcasts, Opinion Pieces, Interviews, Quotes, and Blog Posts:

The CLIMAS team updated its website interface, focusing on highlighting research projects and impacts. https://climas.arizona.edu/research-themes

E. Greenberg and **G. Owen** created short online videos highlighting CLIMAS research and Southwest climate:

- "Burn Period Tracker – A Simple Tool Making a Big Impact" https://climas.arizona.edu/news/burn-period-tracker-video
- "Saving Lives in Extreme Heat" https://climas.arizona.edu/news/saving-lives-extreme-heat

Social Media

New Mexico Climate. David DuBois continued his use of X via the NM Climate Center account (@nmclimate). This account had 3,108 followers as of June 2025. Activity on this Twitter account generates off-line conversations with local and national media. DuBois posts information, graphs, statistics, and photos of dust storms that impact southern New Mexico. NM Climate is also on Instagram with 1,458 followers.

CLIMAS X. The CLIMAS program's X account (@CLIMAS_UA) has 975 followers as of June 2025. Posts that generated the highest amount of interest were related to guest speaking events, summer monsoon, the Southwest Climate Podcast, and the Southwest Climate Outlook.

CLIMAS LinkedIn. In 2023 the CLIMAS program created a LinkedIn profile to increase professional engagement. As of June 2025, there were 330 connections in the CLIMAS network.

CLIMAS BlueSky. In 2024 the CLIMAS program created a BlueSky profile to increase professional engagement. As of June 2025, there were 3,253 connections in the CLIMAS network.

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Supporting Heat Resilience in the U.S. Southwest

M. Ahn, L. Keith, and H. Brown analyzed national Emergency Medical Services (EMS) data to compare outcomes for heat-related emergencies in rural versus urban areas across the U.S. Findings highlight significant disparities: patients in rural areas experience longer transport times and are less likely to arrive at medical facilities in stable condition, based on EMS triage assessments. Overall, patients in urban areas were 1.24 times more likely to experience positive treatment outcomes than those in rural settings. These results underscore critical gaps in emergency response capacity during extreme heat events in rural areas.

Ahn, M., L. Keith, & H. Brown. 2025. Rural heat health disparities: Evidence from the U.S. National Emergency Medical Services Information System (NEMSIS). *Journal of Climate Change and Health* 22:100432. **https://doi.org/10.1016/j.joclim.2025.100432**

Development of a Custom Fire Weather Monitoring Tool: The SW Burn Period Tracker

CLIMAS researchers published research findings from a climatological analysis of burn period values at 124 fire weather stations across Arizona and New Mexico for the period 2000–2022. Burn period values reflect the strong seasonality in temperature and moisture deficit–driven wildfire risk across the Southwest United States, with risk climbing through the arid spring season, peaking in June, and then falling rapidly with the onset of the summer monsoon in July. Regression analyses show that short-term variability in burn period values is driven by variability in low-level atmospheric moisture in all months with strongest relationships during the summer after the onset of the monsoon. This study highlights the utility of burn period as a short-term wildfire planning tool as well as an example of collaborative weather and climate services development.

Crimmins, M.A., C. Maxwell, D.B. Ferguson, G.B. Frisvold. 2024. Burn Period: A Use-Inspired Metric to Track Wildfire Risk across Arizona and New Mexico in the Southwest United States. *Journal of Applied Meteorology and Climatology* 63(12):1559-1568. https://doi.org/10.1175/JAMC-D-24-0067.1

Water Availability in an Arid Climate

A climate and streamflow analysis of Rio Pueblo de Taos, NM suggests that peak streamflow—defined as the date when 50% of the calendar year streamflow has passed the gauge—is occurring earlier by nearly two days per decade. This shift is more pronounced than in the upper Rio Grande, where peak streamflow is advancing by approximately one day per decade.

A streamflow/temperature sensitivity analysis for the Rio Pueblo de Taos indicates that each 1°C temperature increase would lead to a 13% decrease in average annual streamflow. Researchers extended this analysis to other gauged tributary basins in the study region, including the upper Rio Chama, Rio Hondo, Rio Lucero, Embudo Creek, Santa Cruz River, Rio Nambe, and the Jemez River. Most investigated basins showed similar temperature sensitivity, with streamflow declining 10-20% per degree C increase. However, some higher-elevation basins, notably the upper Rio Chama and Rio Grande headwaters above Del Norte, CO, did not show significant temperature sensitivity.

Increasing Aridity and Impacts to Rural Landscapes across the Southwest

An analysis of climate and wildfire data from 1984 to 2021 demonstrates that fire dynamics in the Southwest vary significantly across different ecosystems. Over this period of time, wildfires in conifer forests have experienced an increase in size and severity linked with droughts and increasing aridity. In contrast, extreme wildfires in shrublands and grasslands see increases in extreme wildfire after wet periods, followed by warm, dry conditions.

Crimmins, M. A., Geli, H. M. E., Greene, C., Meko, M., & Prihodko, L. (2025). Changing Climate, Changing Fire: Understanding Ecosystem-Specific Fire–Climate Dynamics in Arizona and New Mexico. Earth Interactions, 29(1), 250001. https://doi.org/10.1175/EI-D-25-0001.1

Building Resilience in Southern Arizona's Local Food System

A forthcoming publication offers results from a novel arts-informed method for exploring public perceptions of nourishment and strategies for building a sustainable local food system. Partnering with a food policy council and an art museum, researchers combined drawing and reflection to surface personal and collective insights. Findings show that nourishment extends beyond nutrients, food and water, but includes social, cultural, and environmental connections. Themes of community, care for the environment, and local economic resilience emerged, offering useful insights for both research, policy, and community action.

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PROGRAM EVALUATION AND LEARNING AGENDA

CLIMAS measures program-level impact using a model refined and operationalized by Co-Is Meadow and Owen (see Meadow and Owen 2021). This model explores how research is moved into use via a set of indicators of impact:

- Conceptual – Research contributed to changes in people's knowledge about or awareness of an issue.
- Capacity-building – Research contributed to enhancing the skills, expertise, or resources of an organization or group of people.
- Connectivity – Research contributed to new or strengthened relationships, partnerships, or networks that endure after the project ends.
- Instrumental – Research contributed to changes in plans, practices, or policies.
- Socio-environmental change – Research contributed to beneficial changes in social and/or environmental systems such as improvements in health, well-being, or in ecosystem structure or function. This is usually a long-term impact beyond typical research funding cycles.

In Year 3, CLIMAS documented:

- 7 examples of conceptual impacts
- 5 examples of capacity-building impacts
- 5 examples of connectivity impacts
- 4 examples of instrumental impacts

Each project within CLIMAS is asked to report on evidence of impact in the applicable categories. Then our evaluation team (Meadow, Owen, and Greenberg) compiles the project reports to assess the cumulative impact of the program. This process is described in a recent publication (Meadow et al. 2024). The evaluation team meets twice each year with each project team to review their progress and document more substantive examples of impact.

The limitations to this process, which are common across transdisciplinary and impact-focused evaluation efforts, include the amount of training required for investigators to learn a new approach to assessing impact (beyond standard academic metrics) and the time required to collect evidence of impact. Over the last three years, CLIMAS team members have shown increased capacity to undertake this process and dedication to this form of assessment. As investigators grow accustomed to thinking of their projects using the five impact categories above, they also become more adept at documenting and describing their impacts.

Our evaluation process revealed some common challenges across the CLIMAS team. One concern was the slower pace of research in this phase. Feedback fell into two categories: 1) internal team processes, such as building a new team or needing to rescope/rethink original plans; and 2) external engagement challenges, such as establishing new partnerships, or working with over-stretched or resource-constrained partners. When discussing these challenges together, the team shared effective strategies for overcoming them such as reducing the burden on external partners by presenting some data or tools for them to respond to, rather than expecting partners to define their needs before the co-generation process begins.

Another set of reflections highlighted the unique challenges of building partnerships in rural communities. Researchers learned not to assume that urban experiences translate to rural needs and that smaller communities may take longer to open up to outside researchers. An actor mapping exercise that CLIMAS completed as a team in Year 2 was helpful in addressing these challenges. It helped us identify partners who could work across multiple CLIMAS projects or connect us with key local contacts. This coordinated approach allows us to build relationships and trust as a unified CLIMAS program, rather than having each project forge individual connections in rural communities.

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EVIDENCE AND CASE STUDIES OF SOCIETAL IMPACT

Increasing Aridity and Impacts to Rural Landscapes across the Southwest

This research team developed new insights into climate and wildfire dynamics across Southwestern ecosystems. A recent publication analyzing climate and wildfire data from 1984 to 2021 reveals that fire behavior in the Southwest varies significantly by ecosystem. In conifer forests, wildfire size and severity have increased in connection with drought and growing aridity. In contrast, shrublands and grasslands are more prone to extreme wildfires following wet periods that fuel vegetation growth that are followed by warm, dry conditions. These findings highlight the need for ecosystem-specific fire management strategies under changing climate conditions.

Development of a Custom Fire Weather Monitoring Tool: The SW Burn Period Tracker

The Burn Period Tracker has been integrated into the Southwest Coordination Center's Fire Danger Intelligence webpage and is now being used to inform operational decisions related to the execution of prescribed fire and wildland fire management planning. Reports indicate it is actively supporting real-time decision-making.

To expand its impact, training materials are being developed using historical burn period data in collaboration with the National Interagency Fire Center, helping build capacity for broader adoption and use across fire management agencies.

Active and Collaborative Climate Services: Developing Customized and Automated Climate Reports to Support Natural Resource Management and Planning

This project supports natural resource management across Arizona and New Mexico by producing monthly climate and drought reports for all National Forests in the region. In 2025, new report elements—such as temperature impacts on drought—were added based on user feedback. Ongoing collaboration with land managers has enhanced understanding of climate datasets and drought indices, while presentations have expanded the project's reach to new partners like the U.S. Fish and Wildlife Service. The reports are strengthening decision-making by improving access to localized data and facilitating conversations among land managers and stakeholders like grazing permittees.

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Supporting Heat Resilience in the U.S. Southwest

Through expert contributions, data sharing, and thought leadership, this project has directly shaped key heat resilience planning efforts in Arizona. Notably, it informed the City of Tucson Heat Action Roadmap—which cites CLIMAS research and strategies—and contributed to the development of the Arizona Extreme Heat Preparedness Plan. At a broader scale, CLIMAS's focus on rural and tribal communities has elevated the visibility of these areas in state and regional heat planning. This work has sparked interest and engagement from state health departments in both Arizona and New Mexico, who want to better understand how to prepare rural areas for extreme heat.

Additionally, a global heat governance framework and climate-related definitions developed through this work have been cited in high-profile venues including Nature and NOAA reports, advancing public and policy-level understanding of heat as a critical climate hazard. The creation of the Joint Heat Action Team (J-HAT) through Pima County Health Department, which focuses on operational heat policy, planning, and training, has further strengthened regional capacity to address heat risks.

Water Availability in an Arid Climate

This project piloted an approach for developing streamflow scenarios to assess warming impacts on water resources in one river basin in New Mexico. Bureau of Reclamation partners approved of the approach, and it may provide a foundation for broader application across watersheds. Through a new collaborative effort, the team now plans to co-develop tailored climate reports aimed at helping acequia communities integrate climate data into water management decisions. The research team expanded their connectivity to research and management communities, including NGOs, tribal groups, and sectoral stakeholders in New Mexico. These relationships, coupled with increasing interest from acequia leaders in using weather and climate information, signal promising groundwork for future collaboration and impact.

Training and Workforce Development

From 2024–2025, four graduate students participated in the Environment & Society Fellowship program. Through support of this program, fellows developed new products to visualize complex quantitative data, practiced skills in spatial analysis and computer cartography, and identified limitations in satellite data due to forest cover in the field.

Fellows also learned to frame technical research using storytelling methods to improve accessibility for broader audiences. By reflecting on this practice, they learned more about how public communication strategies can enhance the reach and relevance of their research. They also developed a deeper appreciation for the relationship-based nature of collaborative research—recognizing that long-term partnerships can be just as critical as completing initial research goals.

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ENVIRONMENT & SOCIETY FELLOWSHIP PROGRAM

The Environment & Society Fellowship was created in 2013 by CLIMAS, with support from the University of Arizona Office of Research and Partnerships. The fellowship, managed by CLIMAS investigators G. Owen and C. Greene, provides training and funding for graduate students to practice use-inspired research and science communication. Since its inception, the Fellowship program has funded 39 graduate students.

2024 Environment and Society Fellows

Elise Arellano-Thompson, Geography: Building Resilience Through Data: Co-producing a Flood Database

Skylar Benedict, Applied Environmental Anthropology: Supporting and Analyzing the Dynamics of Ecological Restoration Projects

David Manford, Systems and Industrial Engineering: Promoting Makerspace Sustainability through Education and Open-Source Tools

Patrick Robinson, Sociocultural Anthropology: What Is "Nature," Now? Science, Alliance, and Informed Local Self-Determination

2025 Environment and Society Fellows

Talitha Neesham-McTiernan, Geography: Reshaping the Map: Integrating Local Knowledge into Agrivoltaic Suitability Mapping

Lois Ann Polashenski, Environmental Science: Gardenroots: Cottonwood, the Heart of the Verde Valley, AZ

Alyssa Rosenbaum, Environmental Science: Enhancing Industry Resources for Pre-Harvest Agricultural Water Assessments under the FSMA Produce Safety Rule

A.G. Steig, Sociocultural Anthropology: Fire on the Ground in Northern California and the Bay Area

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CLIMAS SMALL GRANTS PROGRAM

The CLIMAS Small Grants Program will focus mainly on promoting the use of Integrated Pest Management (IPM) as a means of dealing with pests thereby helping communities safely adapt to climate driven increases in pests. It will provide direct support to Indigenous communities in Arizona and New Mexico to work on pesticide management, an emergent and under-resourced climate and health challenge. The two overarching goals of the program are: 1) Provide regional Indigenous communities with training and information on safe and effective pest management and/or other climate related management strategies that promote community resilience in the facing of changing climate 2) Build connections between ITCA, members of the CLIMAS research team, and Indigenous communities to provide a foundation for ongoing work related to community health in the context of climate change.

Project implementation will occur in FY26. In the administrative planning process for the small grants program, a top accomplishment has been collaborating with staff that work within pesticide management to identify potential gaps in tribal pesticide program needs that align with the focus of the program, while not duplicating efforts. Tribal program needs in the Southwest have been discussed at external integrated pest management events to ensure that the CLIMAS small grants program is effective, especially during a time of rapidly changing sources of funding and evolving environmental priorities.

By identifying gaps in funding for tribal programs, a potential focus emerged to include public health staff working on structural integrated pest management, not only agricultural staff working with pesticides.

ITCA has been working on developing the administrative process for the program, identifying potential technical assistance partners for tribes, and selecting methods of outreach and distribution once the small grants program launches.

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CHALLENGES

Across CLIMAS projects, several cross-cutting challenges have emerged that reflect both structural constraints and shifting environmental, institutional, and community contexts. Some of these challenges include staffing-related issues, like personnel turnover and difficulty finding researchers with the right combination of skills. In some cases, personnel changes have slowed project momentum, especially where trust and continuity with stakeholders are essential.

Data access and IT infrastructure also posed challenges. Some projects were disrupted when NOAA forecast data became temporarily unavailable due to hardware failure. Additionally, ongoing changes to IT infrastructure at the University of Arizona have made it difficult to develop and maintain long-term technical tools that depend on stable computing environments.

Logistical and geographic limitations—such as not being located near study sites or relying on access to key informants through other research teams—can make consistent community engagement difficult. Other challenges include low survey responses in rural areas, natural disasters like the Ruidoso, NM fires, and the need to rapidly pivot in response to unforeseen events. Despite these obstacles, projects have demonstrated resilience by adapting their workflows, building new collaborations, and creatively maintaining continuity in research and engagement efforts.

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NEXT STEPS FOR 2025–2026

In the coming year, the CLIMAS team will advance its core research projects while continuing to provide tools, information, and resources that supports our partners in the Southwest. The team will deepen engagement with partners and the public through presentations, workshops, and other outreach activities, and will focus on building evidence of its regional impact. Four specific examples for the coming year include:

Water Availability in an Arid Climate
The project team will collaborate with New Mexico researchers and state organizations on the to address acequia and dam management decision-making informed by climate information.

Ongoing and Experimental Climate Services
The project team recently hired a post-doctoral researcher to lead assessment and evaluation components for climate services and other project outputs. Dr. Tristan O'mara will start with the project in June 2025.

CLIMAS Small Grants Program
The CLIMAS Small Grants Program will begin this coming year to promote the use of Integrated Pest Management (IPM) as a means of dealing with pests. It will provide direct support to people in Arizona and New Mexico to work on pesticide management, an emergent climate and health challenge.

CLIMAS Communication and Outreach
CLIMAS will continue its effort to deliver climate information and research findings through multiple channels for a variety of audiences. This includes communicating regularly through the News & Updates part of the CLIMAS website, creating video content for the CLIMAS YouTube channel, and circulating program highlights through social media and other public outlets.

Photo credit: Minwoo Ahn

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APPENDIX A: PUBLICATIONS 2024–2025

Ahn, M., Keith, L., & Brown, H. E. (2025). Rural heat health disparities: Evidence from the U.S. National Emergency Medical Services Information System (NEMSIS). *The Journal of Climate Change and Health*, 22, 100432. https://doi.org/10.1016/j.joclim.2025.100432

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Brown, H. E., Wrench, E., Wolfe, K., Moore, T. C., Tangena, J. A., & Sedda, L. (2025). Collaborative engagement with vector control stakeholders is key to enhance the utility of vector-borne disease models. *Parasites & Vectors*, 18(1), 143. https://doi.org/10.1186/s13071-025-06751-w

Crimmins, M. A., Maxwell, C., Ferguson, D. B., & Frisvold, G. B. (2024). Burn Period: A Use-Inspired Metric to Track Wildfire Risk across Arizona and New Mexico in the Southwest United States. *Journal of Applied Meteorology and Climatology*, 63(12), 1559–1568. https://doi.org/10.1175/JAMC-D-24-0067.1

Ferguson, D. B., Frisvold, G. B., Maxwell, C., & Crimmins, M. A. (2024). How Are Weather and Climate Products and Decision Support Systems Used in Wildland Fire Decision-Making in the U.S. Southwest? *Weather, Climate, and Society*, 16(4), 789–802. https://doi.org/10.1175/WCAS-D-24-0069.1

Frisvold, G. B., Zhang, N., Crimmins, M. A., Ferguson, D., & Maxwell, C. (2024). Demand for Information for Wildland Fire Management. *Atmosphere*, 15(11), 1364. https://doi.org/10.3390/atmos15111364

Wishne, J., Jernberg, J., Buntain, B., Brown, H.E. (2025) Implementing a One Health curriculum across multiple colleges: challenges and lessons learned. CABI One Health. In press: OHJ-2025-0014

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CLIMAS
Climate Assessment for the Southwest
A NOAA CAP/RISA TEAM


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