

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

Progress Report: June 1, 2025 — May 31, 2026

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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 Regional Integrated Sciences and Assessments (RISA) Program since 1998.

2025 — 2026 CLIMAS Research Team

Principal Investigators:

Daniel Ferguson – CLIMAS Lead Investigator and Director; Associate Professor, Environmental Science, University of Arizona

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Michael Crimmins – Professor & Extension Specialist - Climate Science; Environmental Science, University of Arizona

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Christina Greene – Senior Social Scientist, CLIMAS, University of Arizona

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George Frisvold – Professor, Agricultural and Resource Economics, University of Arizona

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CLIMAS Staff & Postdoctoral Researchers:

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Matthew Meko – Applied Climatologist, University of Arizona
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Stacie Reece – Program Manager, University of Arizona

Environment & Society Fellows:

2025-2026 - Talitha Neesham-McTiernan, Lois Ann Polashenski, Alyssa Rosenbaum, A.G. Steig
2026-2027 - Elise Otto, Emily Rockey, Andreanna Roros, Lucila Velásquez

CLIMAS Advisory Committee

Maria Dadgar – Executive Director, Inter Tribal Council of Arizona
Tom Dang – Science Operations Officer, Tucson NWS Office
Amy Ganguli – Professor and Extension Specialist, School of Natural Resources and the Environment, University of Arizona
Molly Hunter – Science Advisor, Joint Fire Science Program
Dagmar Llewellyn – ISET International
Claudia Neirenberg – Independent Professional
Sascha Petersen – Adaptation International
Kevin Werner – Executive Director, Alliance for Water Innovation; Lawrence Berkeley National Laboratory

CLIMAS by the Numbers 2025 — 2026

Presentations Given: 46

Appearances in the Media: 31

Advisory Roles Served: 6

Related New Proposals Funded: 9

Academic Articles Published: 21

Climate Briefs Disseminated: 635

CLIMAS Social Media Followers: 6271

Workshops & Trainings Facilitated: 17

Featured Accomplishment

Climate and Water Connections in the Middle Rio Grande

For centuries, northern New Mexico acequia communities have relied on shared surface water supplies to support the farming practices that are central to these communities. In recent decades, increasing and changing uses of water, along with drought and warming temperatures have presented challenges for the sustainability of traditional farming and water governance practices. Streamflow data suggest that monthly streamflow in this region has shifted, with relatively more flow occurring earlier in the spring, with peak flow dates shifting accordingly. These changes could have implications for water availability, management, and sharing in acequia communities.

Over the past three years, CLIMAS team members have developed relationships with several acequia communities through interactions with the New Mexico Acequia Association (NMAA) and their partners. As our understanding of the acequia culture has grown, we have gained insights into how information on current and trending hydroclimatic conditions could assist acequias in understanding climate as an important control on their water resources, something that had not previously been part of their decision making.

In close collaboration with the NMAA and the Water Resources Research Institute at New Mexico State University, and through a highly iterative process, we have developed monthly climate bulletins for the Santa Cruz, NM basin acequias, Santa Cruz Irrigation District (SCID), and the Rio Chama Acequia Association (RCAA). We also join meetings with the acequia groups via Zoom each month after the distribution of the climate bulletins. The meetings have become a catalyst for discussions within the acequia community about local-scale climate variability and change, anticipating climate related disruptions and disasters, immediate water management concerns and innovative water sharing practices.

New Areas of Focus or Partnership

Exploring the Research to Operations Landscape in US Wildland Fire Management

US wildland fire management is complex and includes high stakes and high-profile decisions. Technical data and information provide critical inputs throughout every aspect of fire management, yet there are few formalized processes to facilitate bottom-up guidance on basic and applied research needs; development of usable and relevant new data, information, and tools; evaluation of outdated, outmoded, or underutilized data, information, and tools; routine, bidirectional interactions between producers and users of data and information. The absence of formal processes to structure these activities contributes to multiple challenges for both development and use of science-based information in wildland fire management. First, research results, technical data, and information products are directed toward the fire community without substantive consideration of the factors that make the environment so complex. Second, unused data, information, and research results clog systems and overwhelm the people who are meant to use them. Third, users lose trust in developers and the research community to produce meaningful data and information to support them.

This emerging CLIMAS project builds on our strong, long-term ties with wildland fire managers and expands our partnerships to include the Southwest, Eastern Area, and Northern Rockies Coordination Centers; National Advanced Fire and Resources Institute and the National Interagency Prescribed Fire Training Center; NWS Storm Prediction Center; as well as managers from multiple national forests across Arizona. Our new projects will address the mismatch between the data, tools, and studies produced in the research realm and what is used by wildland fire decision makers. We seek to understand the decision contexts for both development and use of technical data and information in wildland fire management and how to use iterative processes to develop scientifically based, decision-relevant tools and information products.

State and Local Engagement

Climate Information Tools:

The Southwest Climate Outlook (SWCO): SWCO summarizes climate and weather information from multiple sources in accessible language, providing more than 1,600 people with monthly climate-related information. Since SWCO's inception in 2002, 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 2025 through May 2026.

Rainlog.org Monthly Climate Summary Email Newsletter: **M. Crimmins** authored and sent twelve newsletter issues between June 2025 – May 2026 to subscribers and those who log rain event totals across the region.

The Southwest Climate Podcast: CLIMAS scientists discuss climate-related issues in monthly climate podcasts. The podcasts synthesize climate and weather information, distilling the national and global events into the implications for the Southwest. Ten episodes aired between June 2025 through May 2026.

University of Arizona Heat Resilience Initiative: **L. Keith** distributes a monthly newsletter to 667 subscribers on the latest Heat Resilience news, research, opportunities and events.

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 July, August, and September period. The 2026 game includes a new feature for weekly matchups to increase frequency of engagement.

Data Hubs and Online Tools:

Arizona Station-based Drought Tracker: A real-time station-based drought tracking page to assist with short-term drought monitoring and fine scale adjustments of the U.S. Drought Monitor map across Arizona. This tool accesses precipitation data from over 1300 rain gauges from different networks including volunteer observers to develop drought index values at time periods from the most recent 30 days to the past 365 days.

[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 inform land management decisions.

[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.

[Southwest Burn Period Tracker](#): A monitoring tool developed in collaboration with the Southwest Coordination Center that provides access to a fire weather monitoring product called the Burn Period Tracker.

[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 part of the National Fire Danger Rating System: Energy Release Component and Burning Index. This tool is currently used by fire managers working across the Southwest.

[Southwest U.S. Station Climate Summaries](#): This hub houses station-based climate monitoring plots for 118 stations across Arizona and New Mexico including interactive historical plots of temperature and precipitation for each station with near-real time updates to plots each morning. Several new stations were added in 2026.

[Southwest U.S. Summer Monsoon Season Precipitation Mapping](#): A near real-time monsoon season precipitation mapping system. New maps added for the 2026 season.

[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.

Selected Tool or Data Output:

[Wildfire Burn Period Explorer](#): **M. Crimmins, D. Ferguson, C. Maxwell, C. Bright, and G. Frisvold** published the wildfire burn period explorer app. This app helps visualize and explore Burn Period (hours per day with relative humidity below threshold) values at weather stations across the U.S. This information can be used by wildland fire managers, researchers, and decision makers to assess burn periods across different regions.

[Extreme Weather Events and Enteric Diseases Dataset and GitHub](#): CLIMAS researcher **E. Austhof** developed a combined dataset and GitHub that is publicly available on the topic of research on extreme weather events and enteric diseases.

Selected Advisory Roles:

C. Woodhouse convened and led an Indigenous Data Sovereignty working group at the University of Arizona Laboratory of Tree-Ring Research and has participated in an advisory group for tree ring exhibits.

Selected Workshops and Seminars:

C. Greene and **R. Patterson-Markowitz** organized and hosted “Ruidoso Roundtable” in March 2026 in Ruidoso, NM. This meeting featured perspectives from Ruidoso emergency management, Ruidoso local government, and members of the recovery community, reflecting on their experiences following the McBride, Salt, and South Fork Fires. Speakers included representatives from Ruidoso Community Organizations Active in Disaster (COAD) and NM Weather Services, among others.

D. DuBois presented on trends in New Mexico heat at the Healthy Climate Heat Summit in April 2026.

G. Owen and **E. Greenberg** hosted a series of five Climate Postcard Workshops at the University of Arizona and **G. Owen** with colleague R. Zollinger hosted two workshops at the University of Arkansas in Spring 2026. Participants created postcards and engaged in dialogue about climate change.

C. Greene participated in the workshop "[Opening Up Earth Observations for Climate Adaptation](#)" organized by WMO and the International Space Science Institute in December 2025. The workshop brought together experts from climate science, Earth Observation (EO), adaptation practice, philosophy of science, social sciences, and policy to examine how EO can better serve local adaptation needs within the framework of Open Science.

H. Brown and **D. Ferguson** participated in the workshop “Building Roadmaps for a Resilient Future for Arizona — Changing Fire Regimes in Arizona and the Fire Response Challenge,” at Biosphere 2, in Oracle, AZ in August 2025. This event brought together leaders from state government, tribal nations, federal land management agencies, local fire response departments, private industry, Arizona’s public universities and elected offices for a candid, solution-driven discussion and presentations and regarding challenges for forestry and wildland fire management in Arizona.

M. Meko participated in and presented at the Rural Groundwater Resilience Workshop, hosted by the ASU Arizona Water Innovation Initiative, in Patagonia, AZ, in October 2025.

Social Media:

[New Mexico Climate](#). David DuBois continued his use of X via the NM Climate Center account. This account had 3,047 followers as of June 2026. 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 1,558 followers.

[CLIMAS X](#). The CLIMAS program’s X account has 955 followers as of June 2026.

[CLIMAS LinkedIn](#). As of June 2026, CLIMAS has 394 connections in its LinkedIn network.

[CLIMAS BlueSky](#). As of June 2026, there were 3,434 connections in the CLIMAS network. 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.

Selected Research Findings and Highlights

Increasing Aridity and Impacts to Rural Landscapes across the Southwest

The CLIMAS Aridity and Rural Landscapes team investigated the intensification of wildfire activity across Arizona and New Mexico in recent decades and ecosystem-specific responses to increased aridity¹. The findings reveal that although wildfire activity is rising overall, conifer forests are driving most of the long-term increase in activity. Grassland and shrubland fires, however, vary widely year to year following wet-dry cycles. The study highlights how invasive grasses are increasing fuel in desert regions, creating fire risks in historically fuel-limited areas. Understanding the nuances of the relationship between climate and wildfire in the Southwest is crucial for planning fire mitigation strategies that are tailored to local conditions.

The team also analyzed temporal and spatial landscape change and its influence on changing wildfire dynamics using two new analytical methods:

- Leaf Area Index (LAI) Quantification, which differentiated between evergreen/deciduous woody canopy and understory/seasonal herbaceous growth in remote sensing data.
- AI-Generated Crown Maps, which allow researchers to see a multi-decade, individual-plant record of how grazing regimes, brush removal, and fire have steered woody cover at selected sites.

Exploring the Research to Operations Landscape in US Wildland Fire Management

The focus of this emerging area of research has been on understanding the development and use of decision support tools for wildland fire management. The team has generated preliminary results from a qualitative study of wildland fire information users and decision makers. They have found a persistent gap in research-to-operations (R2O) in wildland fire decision support including a lack of infrastructure to translate research into operational tools. The R2O pipeline lacks a formal pathway, dedicated workforce, or reliable funding mechanism to carry science through its "final mile" into practice. The team also noted that tools for wildland fire decision making are often built without clearly defining the decision they support or what success looks like. Building trust in decision-support systems is an ongoing social and cultural challenge, not merely a technical one. Finally, there are barriers to transferring technology between government and industry with contracting processes, communication issues, and lagging in-house technical capacity as notable factors. The team's complete findings are summarized in a forthcoming publication.

Climate and Water Connections in the Middle Rio Grande

The Water Connections team has focused their research on acequia communities significantly impacted by flash floods in recent years. The team investigated if, how, and when severe short-

¹ Crimmins, Michael A., Hatim M. E. Geli, Christina Greene, Matthew Meko, and Lara Prihodko. 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>

term floods are documented in daily streamflow records on the Rio Chama. Initial findings suggest flooding can arise from different seasonal conditions that vary in spatial extent. While many flood events are documented in published federal agency reports, some floods in historical accounts do not appear directly related to weather events.

The team developed a tree-ring based reconstruction of Rio Chama water year streamflow at La Puente spanning 1296–2011. Drought analyses highlighted the skill of the reconstruction in replicating droughts in the instrumental record and how the worst droughts of the 20th century compare with droughts over past centuries. [Reconstructing Past Rio Chama Streamflow using Tree Rings](#)

Long-Term Wildfire Recovery of Rural Communities

The Wildfire Recovery team’s fieldwork is ongoing with preliminary findings emerging from interviews in Arizona, New Mexico, and Colorado including:

- Cascading impacts from post-fire flooding exponentially increase challenges and timelines of recovery.
- Persistent impacts include underinsurance, protracted insurance battles, permanent or long-term displacement, and post-traumatic stress disorder (PTSD).
- Personal recovery is highly individualized and lags behind broader community progress.
- Private land recovery is a major challenge due to restrictions on public funding for private property needs.
- Communities often face challenges separating Community/Voluntary Organizations Active in Disaster (COADs/VOADs) from long-term recovery groups (LTRGs), which can hinder recovery efforts when people and resources are diverted to response activities.

Supporting Heat Resilience in the U.S. Southwest

The Heat Resilience team completed a literature review on rural heat resilience². The literature review synthesizes the impacts of extreme heat on rural communities as well as current efforts to address risks. The research identifies current gaps within heat mitigation, management, and governance efforts, as well as opportunities for future research directions. Notably, the article explores increased vulnerabilities across rural communities due to limited resources, aging populations and infrastructures, and outdoor-based economies like farming. The review emphasizes the need for place-based governance tools within rural communities.

Making Connections between Public Health and Climate

The Public Health team explored the role of public health practitioners in wildland fire management through interviews with public health professionals in AZ and NM agencies that

² Boyer, Anne-Lise, Minwoo Ahn, Ladd Keith, and Heidi E. Brown. 2026. Striving for Rural Heat Resilience: A Systematic Literature Review. *Weather, Climate, and Society* 18 (1):17-31 <https://doi.org/10.1175/WCAS-D-25-0047.1>

had previously experienced wildfires or significant smoke exposure³. Interviews explored practitioners' perceptions and actions around wildfire preparedness and responses. Although there is limited evidence on best practice for hard-to-reach communities, their research concluded that there is a critical need to disseminate clear and consistent messaging. Effective responses to wildfire will require cross-sector collaboration and engagement with community partnerships.

Program Evaluation and Learning Agenda

We measure CLIMAS program-level impacts using a model refined and operationalized by Co-Is Meadow and Owen⁴ that focuses on specific ways that research is used by decision makers:

- 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 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. This is usually a long-term impact and often not detectable during research project performance periods.

Each project within CLIMAS reports on evidence of impact in the applicable categories. Then our evaluation team (**A. Meadow, G. Owen, and E. Greenberg**) compile the project reports in such a way as to assess the cumulative impact of the program. This process is described in a publication led by the CLIMAS evaluators⁵. We also meet twice each year with each project team to review their progress and discuss challenges or new areas of inquiry. In Year 4, CLIMAS documented:

- 3 new conceptual impacts
- 5 new capacity-building impacts

³ Brown, Heidi E., Erika Austhof, Daniel Ferguson, and Ladd Keith. 2026. Role of Public Health in Wildfire: Lessons from the Field. *EcoHealth* 10.1007/s10393-026-01784-8 <https://doi.org/10.1007/s10393-026-01784-8>.

⁴ Meadow, Alison M., and Gigi Owen. 2021. Planning and Evaluating the Societal Impacts of Climate Change Research Projects: A guidebook for natural and physical scientists looking to make a difference. Tucson: University of Arizona <http://doi.org/10.2458/10150.658313>

⁵ Meadow, Alison M., Gigi Owen, Nupur Joshi, and Elise Lodge Otto. 2024. Combining Impact Goal and Impact Descriptor Frameworks to Elucidate the Societal Impacts of Research: A Pilot Study. *Research For All* 8 (1) <https://doi.org/10.14324/RFA.08.1.03>

- 7 new connectivity impacts
- 1 new instrumental impact

The limitations to this process, which are common across impact-focused evaluation efforts, include the 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 four years, CLIMAS team members have shown increased capacity to undertake this process and dedication to this form of assessment. An additional limitation, as the projects near the conclusion, is having enough evaluation capacity to trace their many impacts – especially projects that have grown and developed in new directions over the course of the last four years. We are working to re-allocate resources to our internal evaluation efforts to fill this gap and contribute to the scholarly work of research impact evaluation.

Our evaluation process revealed some common challenges across the CLIMAS team, which are discussed in the Challenges section on page 19.

In Year 4 we used our evaluation and learning process to identify emerging questions and needs in the region that can help to inform our future work. This process, which is based on a learning agenda model, was recently cited as an innovative practice in university-based climate service provision⁶. Common questions include:

- What are the links between aridity, invasive species, and changed fire regimes in the Southwest?
- What are the connections between future fire regimes and current cattle economics?
- How will wildfires impact future flood risks and water quality/water infrastructure in the region?
- What climate and hazard information is most valuable and most usable for rural public health practitioners?

Evidence and Case Studies of Societal Impact

Increasing Aridity and Impacts to Rural Landscapes across the Southwest

Connectivity

- Publication of a 2025 research article on Southwest ecosystem fire dynamics¹ led to new connections with other regional wildfire researchers studying changing fire regimes in the Sonoran Desert.

Capacity Building

- Arizona researchers, including CLIMAS team members, secured a grant from the Arizona Board of Regents to investigate climate drivers of wildfire fuel in the Sonoran Desert and

⁶ Moss, Richard H., and Katharine Jacobs. 2026. Addressing the adaptation learning gap: a strategic role for university-based climate service hubs. *Climatic Change* 179 (6):138 <https://doi.org/10.1007/s10584-026-04184-7>.

community dimensions of fuel treatment. This project will launch in 2026 and will support and expand the current wildfire research within CLIMAS.

Custom Climate Reports for Natural Resource Management

Conceptual

- Iterative meetings with managers deepened their understanding of climate datasets and drought indices, including the Standardized Precipitation Index.

Connectivity

- Project presentations introduced the climate report concept to new partners such as the U.S. Fish and Wildlife Service, expanding the network of partners and end-users.

Capacity Building

- Climate reports improve access to diverse datasets and provide locally relevant summaries. Land managers report using the information to engage other stakeholders, such as grazing permittees, in discussions about local conditions.

Supporting Heat Resilience in Rural Communities

Instrumental

- **L. Keith** served on the [Arizona Governor's Workplace Heat Safety Task Force](#), which issued heat safety recommendations in 2025. Recommendations include providing adequate water, shade, and rest; employee acclimatization; and heat safety training.

CLIMAS Training and Education

Capacity Building

- Four graduate students in the Environment & Society Fellowship learned and practiced collaborative research methods with the CLIMAS team and one another.

Climate and Water Connections in the Middle Rio Grande

Conceptual

- Climate reports sparked discussions within the New Mexico Acequia Association and acequia community leaders about climate impacts on their water supply and implications for management. Bulletins raised awareness of current hydroclimatic conditions and prompted further discussions of resilience and adaptation approaches.
- A climate bulletin for the Santa Cruz region enabled the Santa Cruz Irrigation District to explore innovative water management and water sharing practices under extreme low-flow conditions.

Connectivity

- By working with a new project collaborator, the project team has connected with a new network in the Rio Chama watershed.
- Monthly community discussions attracted growing participation from acequia communities in the Rio Chama and Rio Santa Cruz watersheds, facilitating knowledge

exchange on water-sharing practices, strategies for adapting farming practices to varying climate conditions, and local observations of changing watershed conditions.

Capacity Building

- Climate bulletins improved climate literacy among acequia community members in northern New Mexico.
- The project team facilitated focus group discussions that strengthened the New Mexico Acequia Association's capacity to represent the broader regional acequia community in a report to the Bureau of Reclamation's Rio Grande Basin Study.

Long-Term Wildfire Recovery of Rural Communities

Connectivity

- The 2026 Ruidoso Roundtable brought practitioners from AZ, NM, and TX to learn from the long-term recovery experiences in Ruidoso, NM; facilitated dialogue across different aspects of wildfire response, including preparedness, response, and recovery; and led to new connections and network among emergency managers in the region.
- Due to connections made at the Roundtable, the Ruidoso, NM Emergency Manager was invited to present at the Arizona Association of Emergency Managers Annual Meeting.

Weather and Climate Information for Southwest Wildfire Management

Connectivity

- This project strengthened a collaborative partnership between CLIMAS researchers and wildland fire management agencies and personnel in the Southwest and nationally. These partnerships enabled two-way communication, allowing researchers to quickly understand fire managers' needs and collaboratively develop targeted tools and resources to improve wildland fire management.

Impact Stories

Custom Climate Reports for Natural Resource Management and Planning

Challenge and Context: Drought, extreme precipitation, and shifting seasonal patterns directly affect rangelands, forests, and grasslands across the American Southwest. These resources are critical to ecological health, wildfire risk reduction, and the livelihoods of rural communities. Natural resource managers face increasing challenges in making informed land management decisions amid these weather hazards and long-term variability. Despite the availability of climate and weather data, land managers often lack access to locally relevant, timely, and digestible climate summaries tailored to their specific management units.

Southwest RISA Contribution: Climate Assessment for the Southwest (CLIMAS) researchers Michael Crimmins and Trevor McKellar developed a collaborative, user-driven process that produces highly specialized and customized climate reports for individual land management units using open-source code and readily available data. Reports contain information based on user-specified time lengths and include a summary of seasonal conditions, current and seasonal Standardized Precipitation Index (SPI) values, a warning matrix flagging potential risks, previous season climate statistics, and drought conditions.

Work began with US Forest Service partners in Region 3 (AZ, NM). Through iterative meetings with land and resource managers, the team developed reports tailored to user needs. These interactions also deepened partners' knowledge of climate datasets and drought indices, including the Standardized Precipitation Index, and built capacity on how to apply these data to decisions. The team refined their report development process to increase speed and efficiency, enabling them to serve an expanding roster of partners.

To date, reports are produced for over 55 different land management areas, supported by 34 different listservs to distribute information and engage with users. The project now serves Forest Service units in Region 2 (CO, KS, WY, NE, SD), Region 1 (ID, MT, ND), and Region 5 (CA, OR), and additional clients including the US Department of Agriculture – Natural Resource Conservation Service, National Parks, Fire Districts, county government agencies, and ranch properties.

Relevance and Impact: Climate reports have informed land management decisions across dozens of management units by improving access to a variety of datasets and providing locally relevant summaries. Interaction between the CLIMAS team and partners led to improved climate knowledge. Land managers report using the information to engage other stakeholders, such as grazing permittees, in discussions about local conditions, thereby building capacity within agencies and a broader community of resource users and rural communities.

The open-source model makes report development adaptable to multiple geographies and management contexts. A technology transfer pilot with Texas A&M AgriLife Extension Service was developed to make the climate report tool operational in new regions without direct intervention by the CLIMAS team, resulting in a set of scripts for Texas A&M staff to produce climate reports for Texas counties. This pilot demonstrates a scalable model for replicating climate services in new regions, contributing to long-term national preparedness.

Keywords: land management, drought, decision support

Partner Testimonials:

"Thank you so much for taking the time to meet with us yesterday. I've had quite a few managers reach out and express how helpful the explanation was. I think your research is really making a difference for land managers and ranchers."

— US Forest Service Land Manager

"I had been doing drought monitoring reports that I would send out to all our ranch partners, where I'd track down a bunch of the different tools. The reports save me a lot of time and effort. It's way better and more useful than what I was trying to do."

— Pima County Natural Resources – Range Program Staff

More Information: <https://cales.arizona.edu/climatereports/>

Impact Stories

Supporting Wildland Fire Preparedness and Response: The Burn Period Tracker

Challenge and Context: Wildland fire activity is increasing across the Southwest US, placing communities, infrastructure, and natural resources at risk. Total area burned as well as average fire size in Arizona and New Mexico have increased significantly in recent decades. Between 1984 and 2021, over 15 million acres of land burned¹. The USDA Forest Services Wildfire Risk to Communities tool places both Arizona and New Mexico in the high-risk category, meaning that close to 10 million people across the two states face wildfire risk each year.

Southwest RISA Contribution: In the midst of this increasing risk, CLIMAS researchers have been working with wildland fire managers to learn what information they need in order to make decisions about preparedness, resource allocation, and response actions⁷. This research, conducted in close collaboration with wildland fire managers in the Southwest, led to the development of the Southwest Burn Period Tracker. This tool is based on a metric identified by managers as a key indicator that was not readily available to them, despite an abundance of wildland fire decision support tools². Burn period in the Southwest refers to the local count of hours per day with relative humidity less than or equal to 20%⁸.

The CLIMAS team of Mike Crimmins, Dan Ferguson, and George Frisvold worked with fire meteorologist Chuck Maxwell (formerly with the Southwest Coordination Center, now with CLIMAS), to create the Burn Period Tracker tool to ease access and promote use of burn period values for planning and response.

⁷ Ferguson, Daniel B., George B. Frisvold, Charles Maxwell, and Michael A. Crimmins. 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>

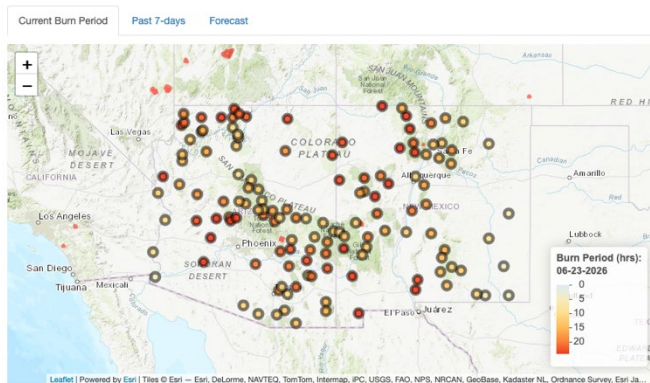
⁸ Crimmins, Michael A., Charles Maxwell, Daniel B. Ferguson, and George B. Frisvold. 2024. Burn Period: A Use-Inspired Metric to Track Wildfire Risk across Arizona and New Mexico in the Southwest United States. *Journal of Applied Meteorology and Climatology* 63 (12):1559-1568 <https://doi.org/10.1175/JAMC-D-24-0067.1>

Southwest U.S. Burn Period Tracker

Updated: 2026-06-24

This page 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% and is calculated at [Piemonte Automatic 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 (see [Crimmins et al. 2024](#) for more information).

Click on markers on the map below to access Burn Period Tracker plots and recent observations at available RAWS sites (Click on marker to bring up plot and observation links; click again to access either product). Active and recent fires are shown in red polygons on the map. Burn Tracker Plots and recent observations are also available through the table below the map. (Plots from past years available here: [Burn Period Tracker Archive](#))



Relevance and Impact: The Burn Period Tracker was taken up for use by the Southwest Coordination Center in late 2024. Then, with data from the new Fire Environment Mapping System and in consultation with the National Interagency Fire Center Predictive Services group and the Southwest Decision Support Committee, the tool was expanded as the Burn Period Explorer, with an adjustable burn period depending on region. Burn period calculations are now available for all stations in the U.S. through this tool.

As of Spring 2026, the Southwest Coordination Center includes the Burn Period Tracker and another CLIMAS product, National Fire Danger Rating System (NFDRS) graphics, in operations briefings for wildland fire management partners across Arizona and New Mexico. The NWS Storm Prediction Center is also using the NFDRS graphics in their National Fire Weather Outlook reports. The Burn Period Explorer is being consulted by fire behavior analysts across the West and beyond, with specific feedback and follow-up coming from Florida, Kansas, and Hawaii.

“All of these relationships are collaborative, with structured feedback processes directly informing CLIMAS scientists of user needs. We’ve got multiple lines in the wildfire decision support R2O waters, are getting it done, and awaiting opportunity!”

– Chuck Maxwell, Southwest Coordination Center Fire Meteorologist (retired)

Keywords: wildland fire, decision support

More Information: <https://cales.arizona.edu/climate/SWBurnPeriod/>

CLIMAS Training and Education – Environment and 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 collaborative research and science communication. Since its inception, the fellowship program has funded 43 graduate students. The fellowship supports workforce development by helping students build their networks, partnerships, and experiences which can translate into job opportunities after graduation.

2025-2026 Environment and Society Fellows

Fellowship projects are designed with and for communities. This year, fellows worked with residents in Cottonwood, AZ to better understand air quality issues and health impacts; fresh produce growers in Yuma, AZ to understand microbial risk in applications of pre-harvest agricultural water; agricultural growers across AZ interested in or affected by agrivoltaics systems; and communities in northern CA interested in applying prescribed burning practices. Fellows attended quarterly meetings to discuss progress and challenges in their research. They practiced science communication through blog posts and a podcast ([Special Edition SW Climate Podcast - 2025 E&S Fellows](#)) to discuss their research experiences.

Talitha Neesham-McTiernan, Geography:

[Mapping the Missing Half?](#)

[Mapping in the meantime: on community-engaged research when the ground shifts](#)

Lois Ann Polashenski, Environmental Science:

[We Are All Impacted by Pollution](#)

[Overlooked Impacts of Circular Economies: Copper Slag Repurposing in Cottonwood, Arizona](#)

Alyssa Rosenbaum, Environmental Science:

[From Lasagna to Lettuce: A Journey into Fresh Produce Safety](#)

[Where Science and Community Meet](#)

A.G. Steig, Sociocultural Anthropology:

[In Fire's Footprint](#)

[Ecological Fire with Prescribed Burn Associations](#)

CLIMAS Small Grants Program

Rising heat and increased aridity in the Southwest are driving changes in pest dynamics, pesticide use, and the risks faced by agricultural and structural pesticide applicators. As pest pressures intensify, pesticide applicators may respond with more frequent applications and broader-spectrum chemical use. At the same time, shifting pest lifecycles complicate application timing. These factors increase the likelihood of pesticide misuse or overuse. Longer growing seasons further compound this issue by increasing the total number of applications per

year, thereby raising cumulative exposure for handlers. Extreme heat also creates significant barriers to safe pesticide handling. Personal protective equipment (PPE) can become difficult or unsafe to wear for extended periods, increasing the likelihood of improper use or non-compliance. In addition, symptoms of heat-related illness (HRI) and pesticide exposure can overlap, making it difficult to distinguish between the two. As a result, both HRI and pesticide-related illnesses are frequently underrecognized, misdiagnosed, and underreported.

The CLIMAS Small Grants Program, which will be administered through the Inter Tribal Council of Arizona (ITCA), seeks to address these risks by making competitive funds available to support Indigenous communities' efforts to provide training and information on safe and effective pest management, particularly Integrated Pest Management (IPM) and/or other pest management strategies that promote community resilience in the face of a changing climate. ITCA has developed the request for proposals and expects to circulate it to eligible tribal communities and organizations in Arizona and New Mexico in the summer of 2026, with activities beginning in early fall 2026.

Challenges

Our internal evaluation activities revealed several common challenges across our research teams. Among these challenges were turnovers and staffing changes within our partnering organizations, including with federal agency partners. Some CLIMAS researchers also experienced lack of access to national data due to hardware failures. The inherent nature of community-engaged research necessitates markedly more time investment with community partners than traditional research projects, so staffing changes were significantly impactful to research timelines. Another challenge is the physical distance between the partners and the research teams. Working collaboratively means that one or more team members must travel, spend time on the ground, and strategically plan activities around multiple participants' schedules. We do our best to mitigate this challenge by hiring team members who can be onsite regularly and/or partner with others who are already embedded in the places we work. Additionally, natural disasters, such as wildfires and floodings, limited opportunities for community engagement.

Next Steps for 2026 – 2027

Each CLIMAS research project has specific goals for Year 5 of our funding cycle. Here we highlight several teams' specific next steps as they seek to complete research, connect findings to decision making and preparedness in the region, and sustain partnership long past the funding cycle.

Increasing Aridity and Impacts to Rural Landscapes across the Southwest

- The Aridity team was invited to present their paper on wildfire risk in the Southwest at the New Mexico Wildland Urban Interface Summit in the fall of 2026.

- The Aridity team will begin to develop outreach and engagement materials to help regional partners understand the likely impacts of the developing historic El Niño event.

Climate Services

- The Climate Services team will launch a formal evaluation of the use and usefulness of its Custom Climate Reports for Natural Resource Management product starting in August 2026. Findings from the evaluation will be used to improve the Climate Reports, generate new training tools to improve the usability of the reports, and provide insights into best practices in climate services.

Making Connections between Public Health and Climate

- The Public Health team has been contacted by public health agencies interested in their study of the role of public health providers in wildfire response. The team will explore how their study framework may be transferable to other communities and agencies.

Long-Term Wildfire Recovery of Rural Communities

- The Wildfire Recovery team will hold a workshop with emergency managers and Cooperative Extension personnel in the communities of Globe and Miami, AZ, which experienced severe flooding in 2025 and are still recovering from the damages. Emergency managers from Ruidoso, NM will attend the AZ workshop to share their experiences with post-flood recovery.

Appendix A: Publications 2025 – 2026

Austhof, E., Brown, H. E., Ferguson, D., & Jernberg, J. B. (2025). What burns in a wildfire influences cardiovascular health outcomes: A systematic review and meta-analysis.

Ecotoxicology and Environmental Safety, 303, 118751.

<https://doi.org/10.1016/j.ecoenv.2025.118751>

Boyer, A.-L., Ahn, M., Keith, L., & Brown, H. E. (2026). Striving for Rural Heat Resilience: A Systematic Literature Review. Weather, Climate, and Society, 18(1), 17–31.

<https://doi.org/10.1175/WCAS-D-25-0047.1>

Boyer, Anne-Lise. 2025. On Barak. Heat: A history. Lessons from the Middle East for a warming planet. Journal of Environmental Studies and Sciences <https://doi.org/10.1007/s13412-025-01033-4>

Boyer, Anne-Lise. (2026) Review of Sabel, Charles F.; Victor, David G., Fixing the Climate: Strategies for an Uncertain World. H-Environment, H-Net Reviews. <https://www.h-net.org/reviews/showrev.php?id=61215>

Brown, H. E., Austhof, E., Ferguson, D., & Keith, L. (2026). Role of Public Health in Wildfire: Lessons from the Field. EcoHealth. <https://doi.org/10.1007/s10393-026-01784-8>

Cvitanovic, C., Karcher, D., Breen, J., Badullovich, N., Cairney, P., Dalla Pozza, R., Duggan, J., Hoffmann, S., Kelly, R., **Meadow, A.**, & Posner, S. (2025). Knowledge brokers at the interface of environmental science and policy: A review of knowledge and research needs. Environmental Science & Policy, 163, 103973. <https://doi.org/10.1016/j.envsci.2024.103973>

Cvitanovic, C., Partelow, S., Bednarek, A., Cairney, P., Pozza, R. D., Downe, J., Hilly, Z., Hornidge, A.-K., Howden, M., Karcher, D. B., Kelly, R., Klenk, N., MacKillop, E., **Meadow, A.**, Melbourne-Thomas, J., West, S., & Wyborn, C. (2026). Principles for ethical boundary spanning between science, policy and practice: A guide for knowledge brokers. Environmental Science & Policy, 179, 104361. <https://doi.org/10.1016/j.envsci.2026.104361>

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. <https://doi.org/10.1175/EI-D-25-0001.1>

Jäger, M. B., Johnson, N., Burk, E., Christensen, N., **Ferguson, D. B.**, Honani, S., Huntington, O., Larson, S., Jennings, L., Johnson, M. K., Juan, A., Strawhacker, C., Taylor, M., Todd, W. F., Walker, A., & Carroll, S. R. (2025). Our lands tell our stories: Supporting Indigenous co-led

research through the Indigenous Foods Knowledges Network. *Arctic Science*, 11, 1–11.
<https://doi.org/10.1139/as-2024-0063>

Keith, L., & Meerow, S. (2026). Commentary: Our “heatshed” moment is now. *Journal of Urban Affairs*, 1–7. <https://doi.org/10.1080/07352166.2025.2526490>

Leyba, B., Meerow, S., Busch, A., Damyanovic, D., & **Keith, L.** (2025). Planning for heat resilience in increasingly vulnerable cities: A case study of Vienna, Austria. *Sustainable Cities and Society*, 131, 106683. <https://doi.org/10.1016/j.scs.2025.106683>

Meadow, A., Wilmer, H., & Ferguson, D. B. (2025). Expanding research ethics for inclusive and transdisciplinary research. In R. Lave & S. Lane (Eds.), *The Field Guide to Mixing Social and Biophysical Methods in Environmental Research* (pp. 59–86). Open Book Publishers.
<https://doi.org/10.11647/obp.0418.05>

McKellar, T. T., & Crimmins, M. A. (2025). Seasonal precipitation variability controls shallow soil water drought events across the southwestern United States. *Agricultural and Forest Meteorology*, 363, 110403. <https://doi.org/10.1016/j.agrformet.2025.110403>

Moore, T. C., Tang, X., & **Brown, H. E.** (2025). Assessing the Relationship Between Entomological Surveillance Indices and West Nile Virus Transmission, United States: Systematic Review. *Vector-Borne and Zoonotic Diseases*, 25(5), 317–328.
<https://doi.org/10.1089/vbz.2024.0072>

Njeri, S., **Greene, C.**, & Phelps, S. (2025). How unexploded bombs cause environmental damage – and why climate change exacerbates the problem. *The Conversation*. (2025-09-03).
<https://doi.org/10.64628/AB.3gcv7qkih>

National Academies of Sciences, Engineering, and Medicine (**DuBois, D.**). 2025. Off-Lake Sources of Airborne Dust in Owens Valley, California. Washington, DC: The National Academies Press doi:10.17226/27958 <https://nap.nationalacademies.org/catalog/27958/off-lake-sources-of-airborne-dust-in-owens-valley-california>

Ponce-Campos, G. E., Heilman, P., Norton, C. L., Gao, S., **Crimmins, M.**, & McClaran, M. P. (2025). Integrating unoccupied aerial systems and satellite data to map the patchiness of bare ground at a landscape scale. *Landscape Ecology*, 40(12), 217. <https://doi.org/10.1007/s10980-025-02226-6>

Sedda, L., Wrench, E., Moore, T. C., Wolfe, K., Tangena, J.-A. A., & **Brown, H. E.** (2025). Challenges in the surveillance and control of mosquito-borne diseases in Europe and United

States. The perspective from public health experts. *One Health*, 21, 101133.
<https://doi.org/10.1016/j.onehlt.2025.101133>

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Woodhouse, C. A., M. A. Crimmins, and M. D. Meko. 2025. "The Role of Seasonal Precipitation Sequences in Shaping the Climate of the United States Southwest." *International Journal of Climatology* 45, no. 15: e70138. <https://doi.org/10.1002/joc.70138>

Zollinger, R., & **Owen, G.** (2026). Nourishing connections: An arts-informed approach to illuminating community food values. *Journal of Agriculture, Food Systems, and Community Development*, 1–19. <https://doi.org/10.5304/jafscd.2026.152.011>