Summary of the South Central Climate Adaptation Science Center New Mexico Stakeholder Listening Session Notes

Timber Mountains in Arrey, New Mexico. Photo: Codie Winn

SOUTH CENTRAL
CLIMATE ADAPTATION SCIENCE CENTER

June 27th-30th, 2022

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Executive Summary

This document summarizes outcomes from three stakeholder listening sessions convened in New Mexico by the South Central Climate Adaptation Science Center (SC CASC) [one was co-hosted by the SC CASC and the USDA Southwest Climate Hub]. The listening sessions brought together natural and cultural resource managers to discuss the impacts of climate change on agriculture, forests, and water throughout the state. These sessions provided an opportunity for CASC staff and others to learn about the climate science needs of managers, explore opportunities for collaboration with state, federal, tribal organizations, and for participants to share information on climate-related activities and research needs throughout the state.

This report summarizes notes from each of the listening sessions as well as themes and research needs identified across the agriculture, forests, and water topics. As such, interested parties may want to read this synthesis as it provides a snapshot of the current climate adaptation challenges in New Mexico from the perspective of resource managers.

The first session focused on Climate Change and Agriculture and was led by the USDA Southwest Climate Hub on the New Mexico State University campus in Las Cruces. Participants identified drought, extreme events, increased temperature, decreased soil moisture, increased evaporative demand, disruption of monsoonal rains, and wildfire as some of the key climate- and weather-related challenges facing New Mexico. Expanding weather stations, data on evapotranspiration, information on healthy soils, and irrigation specialists were identified as key climate needs related to agriculture.

The forest listening session was held in Santa Fe and included presentations focused on the New Mexico Forest Action Plan. Discussions centered on the unprecedented fires in New Mexico that are being intensified with climate change. Managers shared that they are actively working on incorporating extremes into long-term planning. Other needs identified include: better predicting fire behavior, modeling fire based on fuel type, and evaluating the effectiveness of different burning and thinning treatments on forests.

The water listening session held in Albuquerque at the Bureau of Reclamation office included presentations highlighting the New Mexico Fifty Year Water Plan, the Bureau of Reclamation’s WaterSMART program, and their Rio Grande Basin study. Discussions focused on the importance of strong relationships up and down the Rio Grande, the need for funding for the production of regional water plans and for technology that can make sure that water availability data is accurate.

A number of research themes emerged across the listening sessions. Recurring themes across topic areas include:

- *Best practices in tool development*: A lack of connection between those who use tools and the researchers who develop these tools was identified across listening sessions.
    - The importance of usability of tools designed for managers emerged as a theme in each of the listening sessions. Participants noted that it is critical that tools be updated regularly. Outreach at every stage with end users is key to gathering feedback on necessary improvements. Longevity planning with tools is also important.

- *Scale mismatch in data generation and application:* There is a need for climate related data and models at the appropriate management scale. Often there is a mis-alignment of these scales that makes it difficult to use this information and apply it to a management context.

- *Ecosystem approaches to research and management:* The importance of holistic, ecosystem-scale approaches to research and management was a theme repeated in all of the listening sessions.

- *Collaborative and community approaches:* Social capital and trust play a key role in social and ecological resilience in the face of a changing climate. All sessions highlighted the role of information-sharing and community approaches to resilience. For example, ranchers sharing information about sources of feed for livestock in times of low availability, the All Hands All Lands project, regional water plans, and the Forest Stewards Guild are all collaborative/community-driven approaches to climate resilience mentioned throughout the listening sessions.

- *New normal*: All of the listening sessions highlighted that climate-driven extreme events are becoming more frequent and that the current state of agriculture, water, and forests in New Mexico has changed under these threats. This raised a broader question: at what point does departure from normal become the “new normal?” Many individuals depend on local knowledge they have gained from living in a particular place over time. What are the implications for place-based knowledge given that things are changing so quickly that this place-based knowledge may no longer be applicable?

Introduction

Staff from the South Central Climate Adaptation Science Center (SC CASC) visited New Mexico from June 27th-June 30th to convene a series of stakeholder listening sessions with natural and cultural resource managers. Listening sessions centered on three topic areas: Climate Change and Agriculture (June 27th), Climate Change and Forests (June 28th), and Climate Change and Water (June 29th).

These listening sessions provided an opportunity for CASC staff to learn about the climate adaptation challenges in New Mexico, to better understand the climate science needs of managers, explore opportunities for collaboration with state, federal, tribal organizations, and to share information on climate activities throughout the state. Information gained from these sessions is key to ensure that SC-CASC funded research priorities align with the needs of managers throughout the South Central region.

Each listening session was structured to facilitate dialogue between researchers, managers, and practitioners. Following a series of presentations focused on current climate-related research being carried out by various agencies in each topic area, participants were invited to contribute to an open discussion centered around the following core questions:

1. *Where are there similarities between the goals and work of the South Central CASC and your agency?*
2. *What are your top priorities for near-term work, and how do you think you might use existing South Central CASC resources (data, research, staff expertise) for that work?*
3. *What high-priority knowledge gaps do you see that might benefit from our collaboration?*
4. *What other activities might be fruitful for our collaboration?*

Document Overview

This document summarizes notes from the agriculture, fire, and water listening sessions with stakeholders in New Mexico organized by the South Central Climate Adaptation Science Center. Notes were taken by multiple individuals in each of the listening sessions and synthesized. Full presentations are available in the New Mexico listening session folder and are linked throughout the document for reference.

With input from session organizers, key themes were identified across listening sessions and highlighted. Research questions and needs identified by participants within each of the sessions and major themes that emerged across all three sessions are identified and summarized below.

Themes Identified Across Listening Session Topic Areas

- *Best practices in tool development*: A lack of connection between "end users" who use tools and researchers who develop these tools was identified across listening sessions.
    - The importance of usability in tools designed for managers emerged as a theme in each of the listening sessions. Participants noted that it is critical that tools that are updated regularly don't sit on a shelf. Outreach at every stage with end users is key to inform the design and implementation of the tool and get feedback on necessary improvements. Longevity planning with tools is key.

- *Scale mismatch in data and application:* There is a need for climate related data and models at the appropriate management scale. Often there is a mis-alignment of these scales that makes it difficult to use this information and apply it to a management context.

- *Ecosystem approaches to research and management:* The importance of holistic, ecosystem-scale approaches to research and management was a theme repeated in all of the listening sessions and brought up by many agency personnel.

- *Collaborative and community approaches:* Social capital and trust play a key role in resilience. All sessions highlighted the role of sharing information and community approaches to resilience. For example, ranchers sharing information about feed for livestock in times of low availability, the All Hands All Lands project, regional water plans, and the Forest Stewards Guild are all collaborative/community-driven approaches to climate resilience mentioned throughout the listening sessions.

- *New normal*: All of the listening sessions highlighted that climate-driven extreme events are becoming more frequent and that the state of agriculture, water, and forests in New Mexico is different under these threats. This raised a broader question: at what point does departure from normal become the "new normal?" Many depend on local knowledge they have gained from living in a particular

place over time. What are the implications for place-based knowledge given that things are changing so quickly that this knowledge may no longer be relevant/applicable?

Research Questions & Needs Identified in Listening Sessions

A. Research Questions and Needs Identified Across Topic Areas

- *Uncertainty around predicting and modeling future climate:*
    - Season and sub-seasonal forecasts (at time scales less than 1 year) to inform fire, drought, soil moisture, etc.
    - Major research need: Better understanding wind and evaporative demand.
    - Better rain spatiality modeling.
- Need to better model/understand the connections between snow to surface water runoff to groundwater.
- Better understanding of groundwater depletion emerged as a need identified in all the sectors.
- How should our values change with a changing climate?
    - What are some underlying values that help or hinder our resilience efforts?
- There is a need to better understand the role of trust and relationships (social capital) in building resilient social-ecological systems (ranchers and gov., communities and government).
- Carbon sequestration - Best practices to sequester carbon.

B. Agriculture Research Questions and Needs

- The role of social capital in agriculture: Does increased social capital make farmers more resilient to climate change? (by increasing information sharing, sharing resources, etc.).
- Is climate change making local knowledge of farmers less applicable?
    - Systems perspective: traditional knowledge plays a key role in helping people understand the ecosystem, however we are living in a dynamic and unpredictable environment where this knowledge may no longer be applicable.

C. Forest Research Questions and Needs

- Wind modeling for fire behavior modeling.
- How can we better predict fire in burn scar areas?
- Can we use prescribed fire to protect forest refugia?
- Are reforestation efforts/knowledge keeping pace with the conditions?

- How effective is thinning and piling compared to prescribed burning/evaluating the effectiveness of different burning/thinning treatments.
- The effects of burns on water quality.
- There is a need to predict fire behavior more accurately.
- The effects of prescribed fire on air quality (the effects of smoke on health).
- The role of social capital and relationships between agency staff and community members in support for prescribed fire.
- Better understanding the communities impacted by fire.

D. Water Research Questions and Needs

- More research on intermittent streams.
- How do we get produced water safely through treatment to livestock?
- There is a need for climate change resource planning and a need to work together to fully leverage studies and efforts in creating helpful products.
- Assessing the amount of water availability from different resources and the impacts of climate change on these resources.
- Better understanding of Western stream flow and native fish.
- Need for technology that can make sure the water availability data is accurate.
- The need for grass roots production of regional water plans.
- Lack of funds for communities to develop sustainable water resources.
- In the Rio Grande/Bravo, there is a lack of relationships up and down the river. Most managers and conservationists in the area only know people in their small reach of the River.

Acequia in Dona Ana County, New Mexico. Photo: Codie Winn

Day 1: Climate & Agriculture Listening Session Notes

Wootton Hall, NMSU Campus, Las Cruces
06.27.22

Soliciting perspectives from participants in the listening session:
What is the biggest climate and or weather related challenge facing NM agriculture?

- Drought, water quality and timing (irrigation, spring flows), extreme events (intense storms), increased temperature, soil moisture, wind, precipitation (lag in the response between summer and cooler precipitation), evaporative demand, management coordination, carbon sequestration, monsoons, fire.

When you and/or the people you work with are making crop and/or livestock decisions, what information resources or tools (if any) do you use?

- **Master gardeners:** Master gardener hotline receives calls about junipers dying - They work to educate the callers on how to water smarter and incorporate mulch. Master gardeners are research based information providers - they focus on increasing community resilience/connection between ag and urban areas by

helping people connect with nature. They are eager and willing to learn and understand climate science.

- **The role of trust and social capital in knowledge exchange**: “You would be hard pressed to know a local rancher who knows all the science-backed resources out there. Word of mouth and fellow rancher knowledge reign supreme. There is a lot of distrust between ranchers and agencies.”
    - “Scientists will make these tools that will just sit there collecting dust. Because they failed to ask what the ranchers need or what they would like to see.”
    - “There is a lack of outreach - or when there is some in the beginning, there is no followup to educate the future products of those tools.”
    - “There needs to be a stronger connection with the people we are building these tools for and reporting on the success (or lack thereof) of these tools being used by end-users.”
- Plant ID apps are popular with ranchers and the general public.
- “A lot of the time, these online tools are not updated, improved, then a lot of people will quit using them and others.”
- Annual Rio Grande Operating Plan issued in April - Rio Grande Project reservoir projections are updated monthly.
- A tool that is great to work with - openET (https://openetdata.org/)

What does the CASC do?

Presentation by Dr. Mike Langston, Acting Director of the SC CASC

- Introduction to the CASCs, overview of the annual grants competition process, highlights of the foundational activities that the CASC is engaged in (funding actionable science, tribal engagement, education and training, climate projections and downscaling, technical assistance).

Links to a selection of CASC-funded projects in New Mexico:

- *Assessing Climate Variability and Adaptation Strategies for the Rio Grande Basin*: https://www.sciencebase.gov/catalog/item/5b5a35cee4b0610d7f4dcd42
- *Understanding new Paradigms for “Environmental Flows” and Water Allocation in the Middle Rio Grande River Basin in a Changing Climate*: https://www.sciencebase.gov/catalog/item/5d49b75ee4b01d82ce8de6e8
- *Informing the Management and Coordination of Water Resources in the Rio Grande Basin*: https://www.sciencebase.gov/catalog/item/5601b4ffe4b03bc34f5445d6

- *Synthesizing Management Outcomes and Information on Climate Change Impacts on Surface Water Flows in the Rio Grande Basin (Phase 1)*: https://www.sciencebase.gov/catalog/item/615dcb2dd34e7b019243c058
- *Analyzing the Response of Waterflow to Projected Climate Conditions I the Upper Rio Grande Basin*: https://www.sciencebase.gov/catalog/item/5b5a2fe0e4b0610d7f4dcd11
- *Assessing the State of Water Resource Knowledge and Tools for Future Planning in the Upper Rio Grande-Rio Bravo Basin*: https://www.sciencebase.gov/catalog/item/5ca62befe4b0c3b0064c24f1
- *Quantifying Future Precipitation in the South Central US for Water Resource Planning* : https://www.sciencebase.gov/catalog/item/551ebfd5e4b027f0aee3b936
- *Susceptibility of Rio Grande Cutthroat to Displacement by non-native brown trout*: https://www.sciencebase.gov/catalog/item/5b5a322ce4b0610d7f4dcd26

What does the Climate Hub do?
Presentation by Dr. Caiti Steele, Coordinator and Deputy Director, SE Climate Hub

- Overview of the history of the Climate Hubs, and priority focus areas (stakeholder outreach and education, research science and translation, tool development).
- Highlights of tools:
  - **Drought Learning Network** (https://dln.swclimatehub.info/)
  - **CoCoRaHS** (Community Collaborative Rain, Hail, and Snow Network) (https://www.cocorahs.org/Content.aspx?page=CoCoRaHS_Uses),
  - **Grass-Cast** (https://www.climatehubs.usda.gov/hubs/northern-plains/tools/grass-cast-grassland-productivity-forecast#:~:text=Grass-Cast%20indicates%20for%20ranchers%20and%20other%20grassland%20managers,local%20area%20%28individual%206-mile%20x%206-mile%20grid%20cells%29.)
  - **TOBI: Tools for the Beef Industry** (https://webapps.jornada.nmsu.edu/livestock/#:~:text=%20Tools%20for%20the%20Beef%20Industry%20%28TOBI%29%20,5%20AgroClimate.%20%206%20AgWeatherNet.%20%20More%20)

Open Discussion:
We previously discussed various climate and weather-related challenges impacting NM agriculture. Are there any innovations you have used, know about, or that you want to know more about for responding to these challenges?

- Dave Dubois - is working to expand the weather stations across the state from 31 to up to 90. The stations can measure up to 30km away, will be the most dense mesonet in the Nation. They will be all online. They will include soil moisture.
- When there is a low production of hay, ranchers have to drive 100+ miles to purchase expensive grains or hay to feed their herds. There is discussion in creating co-ops to assist these communities. There are co-op models to follow but not sure what would be the needs for these communities. Maybe do cost share for the transportation and a central location to access shared materials. There are not any pilot projects for this at this time.
- There is interest in any science or monitoring that can guide land management to support healthier "small water cycles" (or healthier soils). Are there any sources of success stories? People want help in caring for their soil.
- Reclamation has several WaterSMART programs to help address issues: including a Cooperative Watershed Management program, Phases 1 and 2, for organizing groups and implementing watershed programs. (www.usbr.gov/watersmart/).
- Is there an irrigation specialist in New Mexico? It would be highly beneficial to have one. Maybe there could be a way to help supplement funding for this position.
- "Irrigation specialists along with a master irrigation group having a connection to these tools and a conveyer to this information would be really amazing."

Wrap-up question: The SC CASC offers climate 101 training and the hub hosts climate adaptation training and climate conversations for nature resource professionals - might any of these be useful to you or the people you work with?

- Are these trainings something that can be connected to local extension offices?
- Could the Hub develop tool training for a specific audience like New Mexico Acequia Association?
    - The Hub can facilitate a meeting between the tool experts and the specific audiences.

Angel Fire, New Mexico. Photo: Codie Winn

Day 2: Climate and Forest Listing Session Notes

Old Senate Chambers, Bataan Memorial Building, Santa Fe
06.28.22

Presentation: *Forest and Watershed Management- Reforming to a Changing Climate*
Lindsey Quam, New Mexico Forestry Division

- Hermit's Peak fire – that size is unprecedented, but so were other recent fires – where are we going from here?
- Hot temps = burn windows affected, limited prescribed burning, variable fire season.
- Increase in wind – hard to predict and not a lot of models out there, sustained gusts for longer times, higher temps.
    - Fire used to die down at night but not anymore.
- Need to plan for extremes – "business as usual" planning is not effective.
    - Climate change is very real and we are dealing with it now.
    - "Average and normal" don't mean anything anymore with more extreme weather and events.
    - Will have to think about extremes and implement that into long-term planning – extend that to policy makers,managers, planners etc.

- Las Conchas Fire: Fire didn't expand past thinned and prescribed fire area but did go past thin and pile, but no burn.
    - Forests that have been thinned and burned – **stopped approaching fires immediately.**
    - Management actions do work and prescribed burning is a key tool. Need to share this with the public.

How is the NM Forestry Division doing this?

- 2020 **Forest Action Plan** – Details how they're implementing management in the next 10 years.
  Focused on science-based assessments, threats, and opportunities
  Worked with multiple partners – they attempted to take away political boundaries and do this collectively. 10 strategies, 192 actions, interactive priority maps.
    - **Strategies**
        - Restore forests and watersheds
        - Fire management
        - Private land stewardship
        - Utility rights of way
        - Rare plant conservation – endangered plant program
        - Reforestation – NM forestry division hasn't really done this before
            - There is only one nursery which can provide 300-400 seedlings per year.
            - Working on how to maximize finite resources into the future – Matt Hurteau
        - Urban and community forestry – mitigate heat island effects
        - Promote reforestation economy – small timber industry now and not big enough to support the raw material.
        - Land conservation
        - Outdoor recreation
    - **Maps**
        - USFS shared stewardship – where are the priority watersheds? Maps of both USFS and state priority areas. The people are concentrated in these high priority areas
            - Identified 10 priority areas – riparian zones all as one
    - **Prescribed Burning Act – 2021**
        - Current statute is to put out all fires no matter what.
        - Now allows prescribed burning on private lands.
        - Reduces liability (for those who have gone through the certified burner program).
        - Created a certified burner program (non-nwcg) – still working on this. Don't have it ready yet.
            - Reduces liability to those who complete the certificate program.

            - Pile burn certificate – most common among landowners, basic course.
            - Broadcast burn certificate – larger land areas, higher complexity = more training needed.
            - Something they can contract out – business/economic opportunity.
            - NRCS promotes this and can help fund it – state division can't directly help fund landowners to support this – can work with other orgs and partners.
        - All Hands All Lands Burn Team – pilot test
            - Group works across the state, helping to develop and implement prescribed burning.
            - Other states have much more advanced programs – NM is trying to catch up.
- Working to step back and assess, step into strengths and reach out to others for help with weaknesses then adapt and re-engage.
- APPROACH:
    - Place based – relevant to the people, politics, culture etc
    - Science informed
    - Fire effects and not fence lines
    - Adapting with the landscape
    - Working with social and ecological scientists – haven't done this before

Needs:

- Las Conchas Fire 2011 – There was a recent fire in May 2022 in the same burn area – model showed it should have been huge, but it burned like a prescribed burn with low severity. They had a hard time picking which model to use.
    - Need more accurate fire behavior predictions for already burned areas.
- Shrub/log/grass fuel type is hard to predict fire behavior in – need more specific and accurate models by fuel type.
- Reforestation – keeping pace with future predictions.
    - **o** NM reforestation center – getting going (NMHU, NMSU, UNM, Forestry division).
        - Addresses seed, nursery, planting, post-planting.
- Climate change is making our models obsolete.
- Need to develop a warning system for fires.
- Is funding the right answer? (vs policy, etc.)
- Monitoring – hard to implement.
- Money should go towards mitigation over suppression/firefighting – way less money.
- Dr. Ellis Margolis (Fort Collins Science Center)– working with USGS to update fire models and develop the "next generation" of fire behavior models.
- Get buy-in from people in the different regions – understand the communities

- **o** Resistance to government – state and federal forestry agencies are most often seen as the same, general lack of trust of government.
- **o** There are a select few who have worked closely with state forestry that know the difference.
- **o** Outreach has helped – showcase tangible results, local community engagement, quicker action from state typically than Forest Service.
- **o** Recently hired someone to help roll out this program that has a background in policy and education.

Adapting to Climate Change Southwestern Region (R3) – Anita Rose

- USDA climate smart agriculture
- Wildfire Crisis Strategy
    - o Fire sheds – large landscapes that are vulnerable to fire.
        - ▪ High priority fire sheds map.
    - o Wildfire Risk Reduction.
    - o Work with partners.
- Adaptation strategy for the region.
    - o Assess vulnerabilities and risk and tailor work to those.
    - o RRT
        - ▪ Northern Institute of Applied Climate Science (NIACS) – adaptation workbook – SW adaptation strategy built on this framework.
    - o NEPA process
        - ▪ Not easy getting the word out – values and training of conservation agency staff may present barriers.
            - NPS for example - Mission is preserve resources as is – but that becomes increasingly difficult or impossible with climate change. They may need a culture shift?
            - The South Central CASC has funded a project to assess how agencies use climate information. The lead researcher is Tom Neeson at OU.
                - o Opportunity to enlighten agencies on how staff views climate change and whether they are willing to adapt.
    - o When enacting change on the ground – we must keep in mind the folks working on the ground and their inability to pivot quickly

- SWFireClime
    - o Anita participating

Listening Session and Discussion – Mike Langston

- *Where are there similarities between the goals and work of the South Central CASC and your agency?*
  Needs:

    - Communication, collaboration, and a holistic perspective needed – Dr. Jeremy Klass
    - Projections and what is going to happen – USFS, Anita Rose
        - Climate 101 trainings, projections
    - Projection information, scale of information, uncertainty associated with projections and how that affects decision making – Dr. Matt Hurteau
        - Dr. Adrienne Wootten (OU, SC CASC) has expertise in uncertainty in climate models.

- Building relationships in local communities to enhance trust and support actions (Forest Stewards Guild:(SC CASC hosted a Webinar on this topic).

Grio Grande in Radium Springs, New Mexico. Photo: Codie Winn

Day 3: Climate and Water Listening Session Notes
Bureau of Reclamation, Albuquerque Area Office
06.29.22

Agency presentations:

Presentation: New Mexico 50-Year Water Plan
Andrew Erdmann, Interstate Stream Commission

- This is a governor's initiative, the audience is decision-makers and the general public.
- The 50-Year plan is not the state water plan (that comes out every 5 years).
- Many partners engaged in the effort.
- Recommendations centered on **sustainability, stewardship, equity.**
- Executive level document.
- Heavily emphases partnerships and public participation.

- Climate change assessment (“Leap Ahead” summary).
- Resilience assessment.
- Status & next steps: final document is available in the fall.
    - Stewardship:
        - Recommendations include: improve upland watershed health
        - Protect groundwater health
        - Improve health of rivers, lakes, and reservoirs
    - Sustainability:
        - Continuing to lead in water conservation, modernize administrative practices for water
    - Equity:
        - Increase engagement with tribes, pueblos and nations

Presentation: Rio Grande Basin Study

Emma Kelly and Dagmar Llewellyn (Bureau of Reclamation)

- Temperatures in the basin are steadily rising (2x the global average in NM).
- Water temperatures mean more precipitation falls as rain rather than snow, and the snow we do get melts off faster.
- Water has primarily been stored in mountains historically, but now NM mountains are getting more rain resulting in snow melt off that is less predictable.
    - Implications for snowpack and loss of availability to store water as snowpack through the spring and into the summer in headwaters.
    - Water supply timing and abundance impacted by temperature
    - Decreased annual runoff throughout the basin.
    - Some regions have increased cool season runoff and reduced warm season runoff.
        - Implications to infrastructure and water management.
    - Exponential relationship between air temperature and water-holding capacity.
        - At higher temperatures, small change can lead to significant increases in water demand.
    - Increasing aridity and wind, along with overgrazing, make snow dirty/dark, which makes it melt faster. Dust from increasing aridity, as well as overgrazing and other poor ag practices results in increased dust deposition on snow, which causes it to melt faster.
    - Groundwater: Cascade of primary impacts on groundwater.
        - Large increase in evaporation losses from shallow groundwater
        - Increase in water use by plants (transpiration)

        - Decrease in soil-water content
        - Decrease in water infiltration below the root zone
        - Reduced groundwater recharge
    - Temp changes affect ability to maintain the natural systems (NM is losing our snow and our forests).
        - Beetle Kill
        - Wildfire
    - Conclusions from Park William's Work:
        - Temp increases cause increased vapor-pressure deficit and therefore increased drought stress on trees, regardless of species or location.
        - Drought stress corresponds well with area killed by bark beetles, and area burned by wildfire.
        - If climate models are correct, average drought stress by the 2050s will match that of the worst years during the largest megadroughts in the last 1000 years.

Reclamation's WaterSMART Program

- Basin Study Program: Reclamation program under larger waterSMART program (est. after 2009 Secure Water Act).
- BOR is channeling Infrastructure money in existing programs.
- One of many collaborative studies, cost-shared with non-federal partners
- Evaluate water supply and demand.
- Identify strategies to address imbalances.
- Four key elements of the projects:
    - State of the art projections of future supply and demand by river basin.
    - An analysis of how the basins existing water and power operations and infrastructure will perform in the face of changing water realities.
    - Development of strategies to meet current and future water demands.
    - A tradeoff analysis of strategies identified.

Rio Grande Basin Study: Lobatos Gage to Elephant Butte

- Non-Federal applicant: Middle Rio Grande Conservancy District
- Engaged tribes
- Memorandum agreement with many partners
- Partner organizing and modeling preparation have been happening for several years
- Resilience analysis

    - Basin Study Partners have begun a resilience analysis of different values in the Basin
        - Value: identified by various partners with different background and water use needs.
        - Sugnpost: Identifies a condition in which a value is compromised, or at which compromise is imminent, reflects indicators along a trajectory.
        - Threshold: Identifies a point at which conditions in the basin are no longer suitable to sustain a certain value; reflects points of no return, or system failure points.

Modeling History:

- Received hydroclimate projections from SC CASC/USGS and the National Center for Atmospheric Research (NCAR)
    - USGS: BCSD downscaling, PRMS hydrologic model
    - NCAR: LOCA downscaling, VIC hydrologic model
- Although the temperature and precipitation coming from the Global Circulation Model forcings can be used in the model, the flows from the VIC and PRMS model correlate poorly to the historical record (1950-2019).
- Three General Circulation Models used by the SC CASC appear to be biased toward less water and wetter in the SW (related to monsoons).
- Partnership with UMass Amherst Hydrosystems Research group to:
    - Leverage a new screening-level planning model developed through the WWF's Report Card effort.
    - Use a weather generator and decision scaling method to develop storylines of potential futures in the basin.
- The Upper Rio Grande Water Operations Model (URGWOM) will be used for detailed analyses of selected adaptation strategies.
- Outcome: The Basin Study will collaboratively develop an interactive decision-support tool to support future decision-making in the basin.
- No decisions will be made as part of the Basin Study, which will allow for a free exchange of ideas, and for the consideration and modeling of adaptation options that are not currently possible or legal.

Open Discussion:

Where are there similarities between the goals and work of the South Central CASC and your agency?

- Emma: Climate change resilience planning, need to work together to fully leverage studies and efforts into a final, helpful, product for decision makers.
- Laila: Data in easy to find repository. Data gaps in climate data. Continuing to make updated models.
- Connect with Andrew (who?) on NM projects and research needs
- Adam: National fish habitat assessment. Needing to integrate multiple datasets to understand fish habitat.
    - Water rights: loss of surface water
- NMED (John Rhoderick): State cleanup programs, river steward project, evaluating other water sources.
    - Need access to information, readily accessible information
- Aaron: Lots of data in the region, potentially not accurate. The water data act. Regional water plans.
    - Lack of resources, lack of capacity to apply for grants.

What are your top priorities for near-term work, and how do you think you might use existing South Central CASC resources (data, research, staff expertise) for that work

- Native fish work
- Laila: funding needs
- Adrian: trying to create community, lack of relationships (collaborative solutions)
    - Relationships are key
- Lack a shared understanding on water resources themselves
- Shared use of remote sensing tools
- Colorado river open ET data

Appendix A: Meeting Agendas

DAY 1

Weather, Climate and Agriculture in New Mexico

Wootton Hall, NMSU Campus, Las Cruces

06.27.22

AGENDA

8:30 am	Open for coffee & registration
9:00 am	Welcome
9:10 am	Participation introductions
9:20 am	What do the SC CASC & the SW Hub Do?
9:50 am	Q&A
10:10 am	Break
10:25 am	Discussion Session: Climate informed decision-making
11:00 am	Report Back
11:15 am	Discussion Session: Responding to challenges
11:45 am	Report Back
12:00pm	Close for lunch
1:00pm	Workshop close

USDA United States Department of Agriculture Southwest Climate Hub

SOUTH CENTRAL CLIMATE ADAPTATION SCIENCE CENTER

DAY 2

Climate and Forests

9:00 am – 12:00 pm, Tuesday, June 28, 2022
Old Senate Chambers Bataan Memorial Building
400 Don Gaspar Ave, Santa Fe, NM 87501

Agenda

I. Welcome – *Mike Langston, SC CASC*

II. Introductions – *All* (20 minutes)

Share each person's name title, and agency, and have one person per agency summarize the agency's mission.

III. The South Central Climate Adaptation Science Center – *Mike Langston and SC CASC Team*

IV. Agency Presentations

1. Lindsey Quam, NM Energy, Minerals, and Natural Resources Department, Forestry Division

2. Anita Rose, USDA Forest Service, Southwest Region

V. Short Break (10 minutes)

VI. Listening Session and Discussion – *Mike Langston, SC CASC* (approx. 1 hour 40 minutes)

1. Where are there similarities between the goals and work of the South Central CASC and your agency?

2 What are your top priorities for near-term work, and how do you think you might use existing South Central CASC resources (data, research, staff expertise) for that work?

3. What high-priority knowledge gaps do you see that might benefit from our collaboration?

4. What other activities might be fruitful for our collaboration?

VII. Recap and Close – *Mike Langston, SC CASC* (5 minutes)

DAY 3
Climate and Water
9:00 am – 12:00 pm, Wednesday, June 29, 2022
Bureau of Reclamation, Albuquerque Area Office
555 Broadway NE, Albuquerque, NM 87102 Rio Grande Conference Room

Agenda

I. Welcome – *Mike Langston, SC CASC, and Sarah Branum, Bureau of Reclamation* (5 minutes)

II. Introductions – *All* (20 minutes)
Share each person's name title, and agency, and have one person per agency summarize the agency's mission.

III. The South Central Climate Adaptation Science Center – *Mike Langston and SC CASC Team*

IV. Agency Presentations

1. New Mexico 50-Year Water Plan – *Andrew Erdmann, Interstate Stream Commission* (20 minutes)

2. Rio Grande Basin Study – *Emma Kelly, Bureau of Reclamation* (20 minutes)

V. Short Break (10 minutes)

VI. Listening Session and Discussion – *Sharon Hausam, SC CASC* (approx. 1 hour 40 minutes)

1. Where are there similarities between the goals and work of the South Central CASC and your agency?

2. What are your top priorities for near-term work, and how do you think you might use existing South Central CASC resources (data, research, staff expertise) for that work?

3. What high-priority knowledge gaps do you see that might benefit from our collaboration?

4. What other activities might be fruitful for our collaboration?

VII. Recap and Close – *Mike Langston, SC CASC* (5 minutes)

Appendix B: Participant List

Name	Affiliation	Email	Listening Session Attended
Aaron Chavez	San Juan Water Commission	achavez@sjwc.org	Water
Adam Ringia	Pueblo of Laguna	ringiaa@pol-nsn.gov	Water
Adrian Oglesby	Utton Center	adrian@lawoftheriver.com	Water
Amy Muise	NMSE/Rancher	smiamy@nmsu.edu	Agriculture
Andrew Erdmann	Interstate Stream Commission	andrew.erdmann@state.nm.us	Water
Anita Rose	USFS	anita.rose@usda.gov	Forest
Anne Tillery	USGS	atillery@usgs.gov	Water
April Ulery	NMSU-PES	aulery@nmsu.edu	Agriculture
Ariane Pinson	USACE	Ariane.Pinson@usace.army.mil	Water
Cait Rottler	SC CASC	caitlin.m.rottler@ou.edu	Forest, Water, Agriculture
Caiti Steele	NMSU	caiti@nmsu.edu	Agriculture
Carolyn Donnelly	BoR	cdonnelly@usbr.gov	Water
Codie Winn	USGS SC CASC	cwinn@usgs.gov	Forest, Water, Agriculture
Connie Maxwell	New Mexico Water Resource Institute	alamosa@nmsu.edu	Agriculture
Dagmar Llewellyn	BoR	dllewellyn@usbr.gov	Forest, Water, Agriculture
Dave Moeser	USGS	cmoeser@usgs.gov	Forest
David Gilroy	TSWCD	dgilroy@tswcd.org	Agriculture
Debra Hill	FWS	debra_hill@fws.gov	Water
Emma Kelly	BoR	kelly@usbr.gov	Agriculture, Forests, Water
Evanne Caviness	National Young Farmers Coalition	evanne@youngfarmers.org	Agriculture

Helen Deswood	NMSU	hdeswood@nmsu.edu	Agriculture
Helena Deswood	SW Climate Hub	helena.deswood@usda.gov	Agriculture
Jacob Pederson	EMNRD	JacobJ.Pederson@state.nm.us	Forest
Jennifer Faler	BoR	jfaler@usbr.gov	Water
Jeremy Klass	NM State Forestry	Jeremy.klass@state.nm.us	Forest, Water
Jim Wilber	BoR	JWilber@usbr.gov	Water
John Fleck	UNM	fleckj@unm.edu	Water
John Rhoderick	NMED	John.Rhoderick@state.nm.us	Water
Johnny Chavez	Valencia Soil and Water	johnnychavez@valenciaswcd.org	Agriculture
Kristin Chavez	NRCS	kristin.grahamchavez@usda.gov	Agriculture
Laila Sturgis	New Mexico Bureau of Geology	Laila.Sturgis@nmt.edu	Water
Lara Prihodko	NMSU	prihodko@nmsu.edu	Agriculture
Linda Miller	Master Gardener	lindafloydmiller@gmail.com	Agriculture
Lindsey Quam	New Mexico Forestry Division	lindsey.quam@state.nm.us	Forest
Marcia Wilson	Master Gardener	sleepingsafe@yahoo.com	Agriculture
Maria Lowman	EMNRD	maria.lohmann@state.nm.us	Forest
Marina Cucuzza	USGS SC CASC	mcucuzza@usgs.gov	Forest, Water, Agriculture
Matt Wunder	NM Game and Fish	matthew.wunder@state.nm.us	Forest
Matthew Hurteau	UNM	mhurteau@unm.edu	Forest
Maude Dinan	NMSU	mdinan@nmsu.edu.	Agriculture
Max Henkels	NMDA	henkelma@nmda.nmsu.edu	Agriculture
Meg Friggens	USDA	megan.friggens@usda.gov	Forest, Water
Mike Hamman	Office of the State Engineer	Mike.Hamman@state.nm.us	Water
Mike Langston	USGS SC CASC	mlangston@usgs.gov	Forest, Water, Agriculture
Rolf Schmidt-Peterson	Interstate Stream Commission	Rolf.Schmidt@state.nm.us	Water

Sam Fernald	NM WRRI	afernald@nmsu.edu	Agriculture
Sara Goldstein	Interstate Stream Commission	Sara.Goldstein@state.nm.us	Water
Sarah Branum	BoR	sbranum@usbr.gov	Forest, Water
Saroj Dhital	JER/NMSU	sdhital@nmsu.edu	Agriculture
Sharon Hausam	SC CASC	shausam@ou.edu	Forest, Water, Agriculture
Skye Aney	NMSU	sierra25@nmsu.edu.	Agriculture
Stephanie Walker	Asombro Institute	swalker@nmsu.edu	Agriculture
Stephanie Walker	NMSU Extension	swalker@nmsu.edu	Agriculture
Yvette McKenna	BoR	yrmckenna@usbr.gov	Water, Agriculture