

Watershed Restoration in New Mexico

Editor's Note: The following papers represent a transcription of the speakers' remarks made at the conference; no follow-up papers were submitted by the speakers. Remarks were edited for publication by the editor. The speakers did not review this version of their presentation, and the editor is responsible for any transcription and editing errors.



Moderated By Connie Maxwell, NM WRI Researcher

Connie Maxwell is an ecological planner who works with communities on local and regional levels. Her current work as a graduate research assistant with New Mexico Water Resources Research Institute (NM WRI) is a collaboration with a broad cross-section of stakeholders in the South Central NM Stormwater Management Coalition to design and conduct watershed restoration within the Hatch/Rincon and Mesilla valleys. Building on this collaboration, she spearheaded the recently formed NM WRI Water and Community Collaboration Lab (WCC-Lab), which fosters links between the best science, communities, stakeholders and students to inform decision-making and education on water and the environment. Maxwell is currently pursuing a doctorate at NMSU in the Water Science and Management Program under Dr. Sam Fernald's advisement, and holds a Master's degree from UNM in Community and Regional Planning with a concentration in Natural Resources and a Bachelor of Arts in English

and Architecture from Columbia University. Maxwell co-founded the Alamosa Land Institute (ALI) in 2010 to engage in ecological planning and restoration with farmers and ranchers, and has been collaboratively introducing and testing innovative land management practices which focus upon restoring arroyos, riparian and agricultural valleys to slow and keep stormwater in watersheds, reduce sediment transport, and recharge aquifers.

We've got a great panel today, with several people highlighting some important initiatives around the state. I would like to begin with a brief introduction to some of the work we've been doing at the NM WRI in southern New Mexico, as well as the work that is central to my focus as a water professional. A key recognition that has been central to this work is that agricultural communities and working landscapes are key to managing our watersheds for sustainability and community resilience. This is particularly true for the Hatch and Mesilla Valley watersheds in southern New Mexico. This recognition led us to instigate a relatively recently formed Water and Community Collaboration Lab (WCC-Lab). We recognize that collaboration is essential to research on complex water issues in New Mexico. The WCC-Lab fosters links between the best science, community stakeholders, and students to inform our decision-making, research, and education on water in the environment. The goal of our work is to be led by the challenges that communities actually face. This is an action research approach, where we collaboratively develop and test innovative and feasible approaches to the complex issues of water supply and usage in New Mexico. A key insight of this action research approach is that complex systems, such as ecosystems, require implementing proposed changes and studying their effects to reveal how the systems actually work. An early proponent of action research, Kurt Lewin, said, "If you want to know how things really work, just try to change them."

So, what are the problems? What underlies the problems that folks down here in southern New Mexico are facing? This is a key insight: what underlies both drought and increased flooding as social crises is a landscape-scale water storage problem. Of course, we have the diminished snowpacks and resulting spring runoff from less winter precipitation as a huge driving factor in droughts and surface water supply for our southern New Mexico region (Figure 1). Not only that, but we also have a large decrease in upland soil moisture levels, which has led to the loss of vegetation. This loss increases our scouring floods and further decreases infiltration, soil moisture levels, and downstream groundwater recharge.

So, what is the key to turning this around? A central part is recognizing that agriculture is the primary land management system, and management practices that slow and spread flow to floodplains support our watershed's buffering capacity to mitigate floods and droughts (Figure 2). These reconnecting floodplain management practices replenish soil moisture and aquifers, reduce runoff, flow energy, and sediment transport. A big goal of my work, in particular, has been to support increasing agriculture's function as a resilient system for recharge and flood control. Farmers and ranchers down here, but also foresters in other parts of the state, manage the floodplains where the water flows in the watersheds and have incentives to manage that—to use water where it can spread flow and so forth.

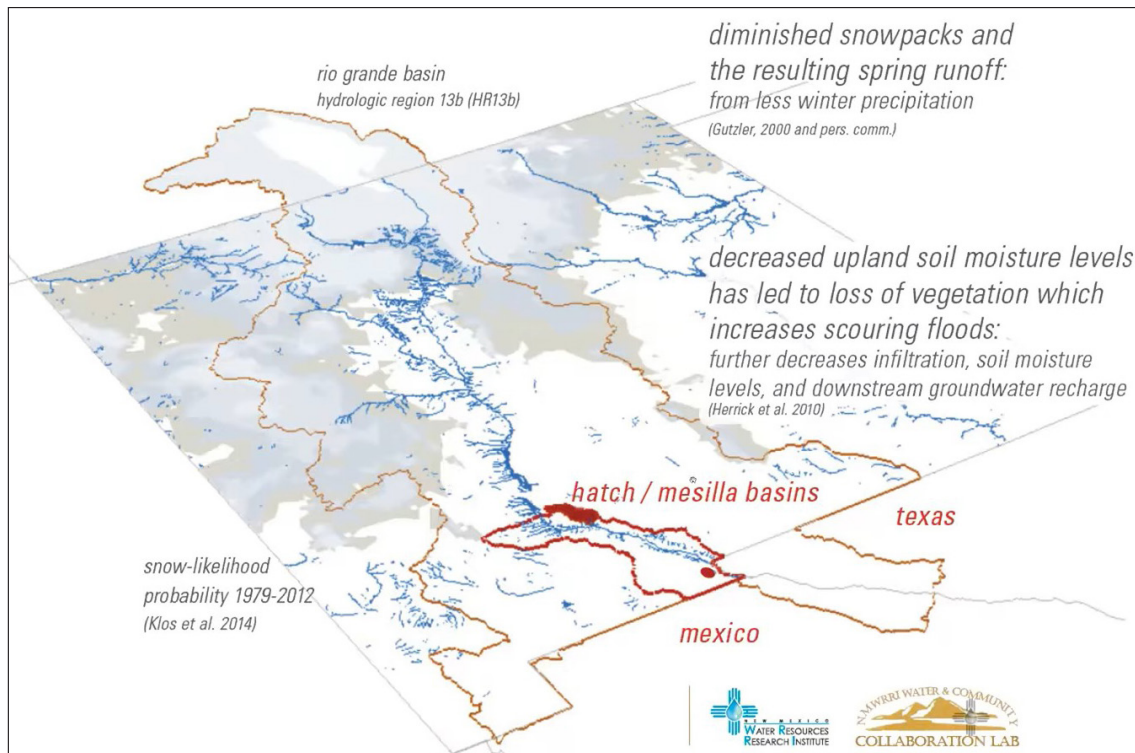


Figure 1. Address the critical natural and social processes - water scarcity and flooding.

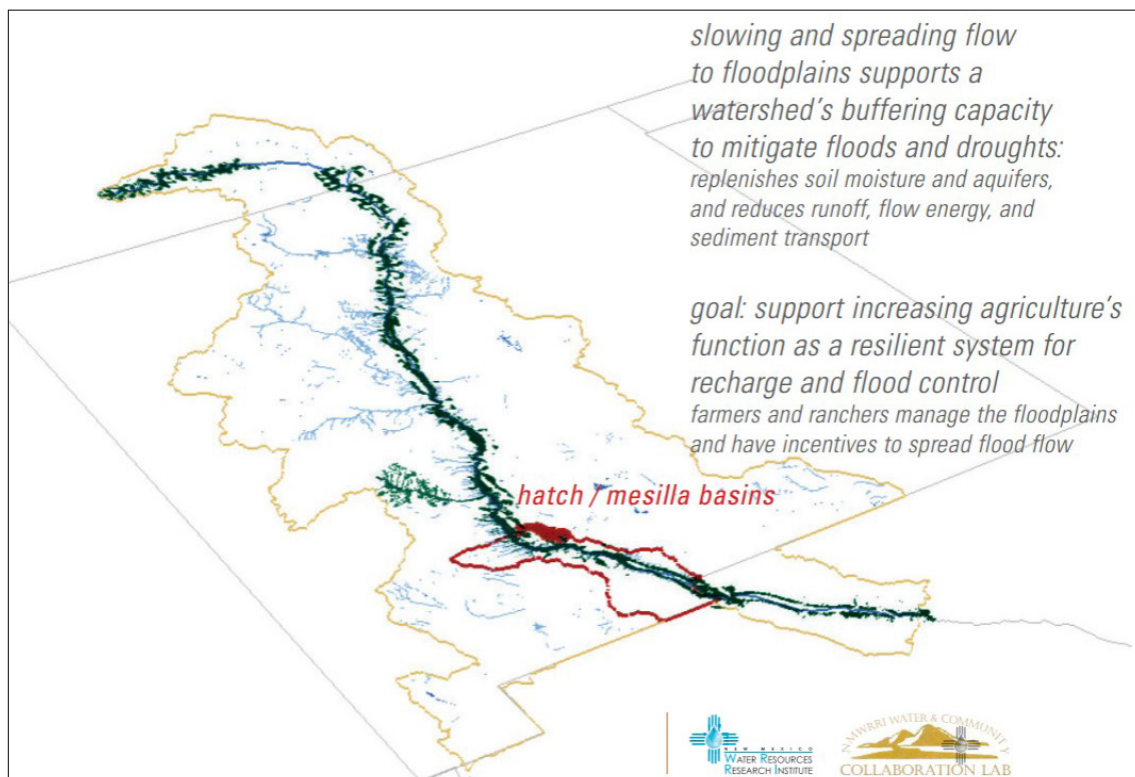


Figure 2. Agriculture is the primary land management system - working landscapes.

Two of the gaps that have been particularly looming in our southern New Mexico community have been the lack of tools to help land managers and water managers effectively implement some of these practices. A focus of my PhD work has been developing a decision support tool that asks, “Where do we reconnect floodplains, and how much benefit are we going to get out of that practice?” This particular tool is a modeling framework called the Flood Flow Connectivity to Landscapes (FlowCon) model (Figure 3). It identifies the optimal areas for infiltration and then estimates the actual benefits—how much peak flow can we really reduce?—and, therefore, we can predict the connectivity management benefits. Of course, tools are only part of it, and extending projects on a whole range of fronts is critical.

We’ve also been instrumental in facilitating and pursuing funding efforts, and in southern New Mexico, we’ve been particularly successful over the last year. We’ve secured four funding efforts (Figure 4). Two of them address issues in our most significant priority project, the Rincon Arroyo Watershed, and two of them address areas throughout the Hatch and Mesilla Valleys. Zack Libbin will be speaking about these initiatives in greater detail. Our collaboration has been fundamentally with the stakeholders in the

Stormwater Coalition, and he’ll let you know who those are. Our two initiatives in the Rincon Arroyo Watershed, a priority watershed, will enable us to implement watershed restoration through the New Mexico Environment Department’s Watershed Implementation Grant, for which we at the institute were the primary recipient. We have also secured the first phase of a relatively large grant from the Natural Resources Conservation Service, which aims to restore the entire Rincon Arroyo Watershed (134 square miles). Additionally, over the next two years, we will be developing a watershed plan with the Reclamation Cooperative Watershed Management Program for the entire Hatch and Mesilla Valleys. The Elephant Butte Irrigation District led an effort to implement watershed-scale stormwater monitoring and capture to extend their aquifer recharge program, and we at NM WRRI will be adapting some of our tools to look at the future scenarios of this region—particularly looking at what watershed-scale stormwater monitoring and capture can do for us and other future water scenarios.

That provides an introduction to our approach as water professionals in southern New Mexico—in particular, my approach—and I look forward to hearing an update on other initiatives around the state.

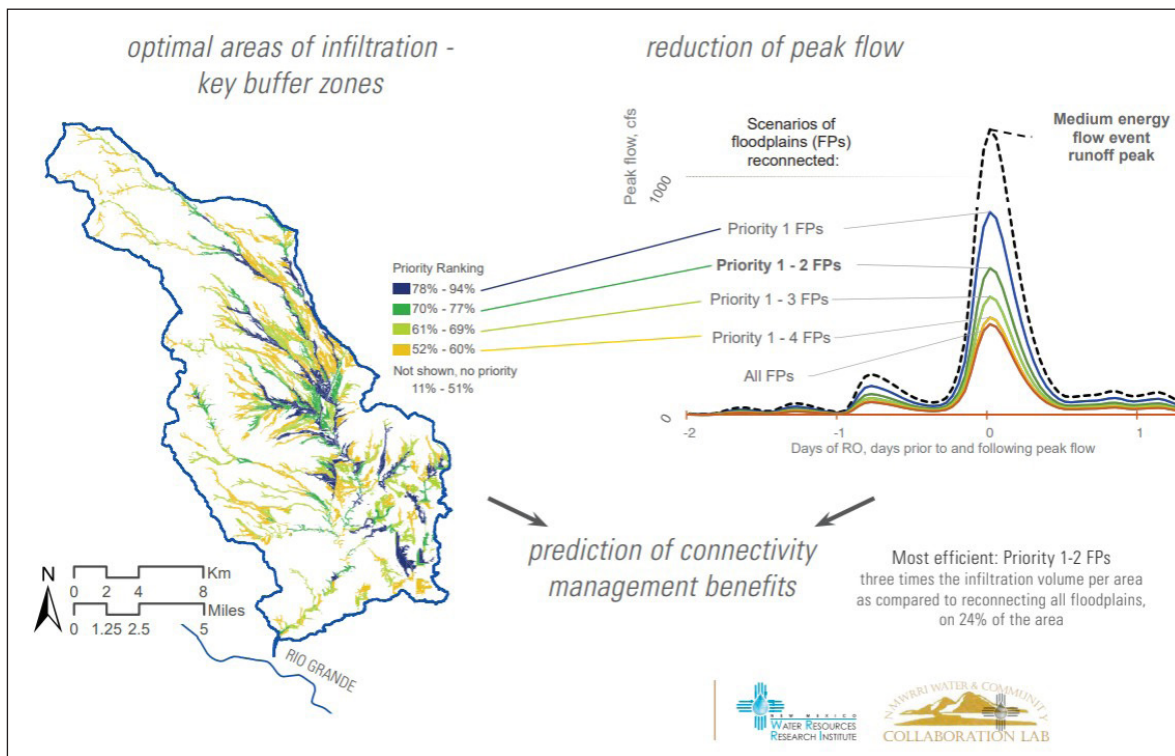


Figure 3. Decision support tool: the Flood Flow Connectivity to Landscapes (FlowCon) modeling framework - quantify the most efficient management efforts.

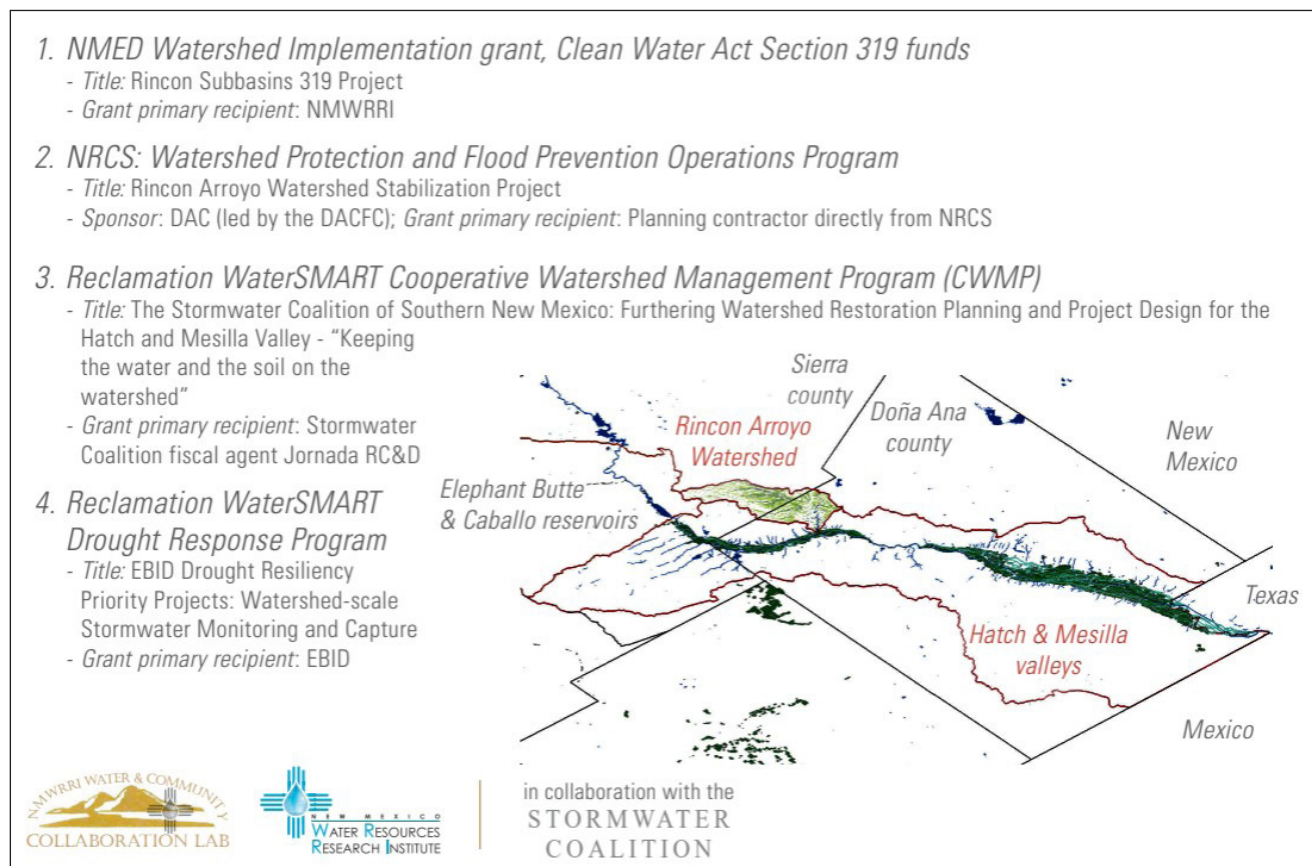


Figure 4. Support funding efforts - two grants address the Hatch and Mesilla Valley Watershed and two address the Rincon Arroyo Watershed.



Laura McCarthy, New Mexico State Forester

Laura McCarthy is State Forester in New Mexico where she is responsible for fire suppression on 43 million acres of state and private lands (e.g. non-federal, non-municipal and non-tribal lands) as well as statewide forest and watershed restoration programs. Previously, she was Associate State Director for the Nature Conservancy in New Mexico and manager of the Rio Grande Water Fund. Laura's prior work includes more than a decade with the USDA Forest Service as a firefighter and planner in Idaho, California, Vermont and New Hampshire.

Laura's professional life was significantly altered by the Cerro Grande Fire in 2000, which fostered her interest in fire and forest restoration practice and policy. The Las Conchas Fire, a decade later, deepened her engagement in water source protection after she watched post-fire debris flows shut down municipal and agricultural water use.

Laura enjoys her role building bridges that connect people to nature, including land and water managers, and urban, rural and traditional cultural communities. She has earned several awards, including New Mexico Environmental Leader of the Year in 2015 and the Yale School of Forestry and Environmental Studies Distinguished Alumna Award in 2017.

I'm Laura McCarthy, and I'm going to cover our new Forest Action Plan for the entire state, and also the Forest and Watershed Restoration Act that was passed in

2019 and implemented in 2020. Our State Forest Action Plan is required by the federal government to enable the state to receive approximately \$9 million per year

in federal funding. However, it's also an important tool for us to come together on a multi-agency and multi-stakeholder basis to set goals and objectives for a 10-year period. I won't cover all aspects of the plan, which includes 10 strategies and 192 actions, but I will focus on three strategies that are particularly relevant to watershed restoration. I'm also going to dive into the interactive priority maps that are based on the assessment, and all of this is available at <https://nmfap.org>.

Figure 1 shows two maps. On the left is the fire risk to communities, with the darkest red indicating the highest level of risk. On the right is a composite map, compiled from all the data in our assessment, that serves as the statewide blueprint for identifying the most important watersheds for us to treat. You can see the little watershed delineations. These are HUC 12 watersheds. You can also see the correlation between the priorities and the fire risk. I also want you to see that we conducted intensive mapping of water. The way we mapped the water was based on whether a watershed supplied water directly to communities, municipalities, mutual domestics, or any kind of agriculture, or provided water to people downstream. That was a different approach to setting priorities, but I think it accurately captured what is important to New Mexico. Then, you can see on our

statewide all-priorities map that we've added bosque and riparian restoration (Figure 2).

We have 10 strategies, as I mentioned, and the first one that I want to cover is restoring forests and watersheds. What I would like to draw attention to is strategy 1.1: Conducting appropriate treatments in large-scale priority areas. Small work is good, and small work adds up, but it's essential if we're going to make a difference in terms of watershed restoration that we go big. This means setting priorities and focusing on an area until it's completed and then moving on to the next priority. I also want to draw attention to strategy 1.5: Developing collaborative strategies to promote a dynamic patchwork mosaic of riparian and wetland vegetation and habitat as water availability and community priorities allow. Riparian restoration, I know, is particularly important to many of the attendees here. This is one of the first times we've called this out in the statewide Forest Action Plan.

The second strategy is fire management. I want to focus, in particular, not just on how we respond to fires, but also on our proactive work in prescribed fires. In 2019, House Memorial 42 prompted us, along with a large stakeholder group, to examine the expansion of prescribed fire use in our state. It culminated in a report that was shared at a Water and Natural Resources Interim Committee meeting

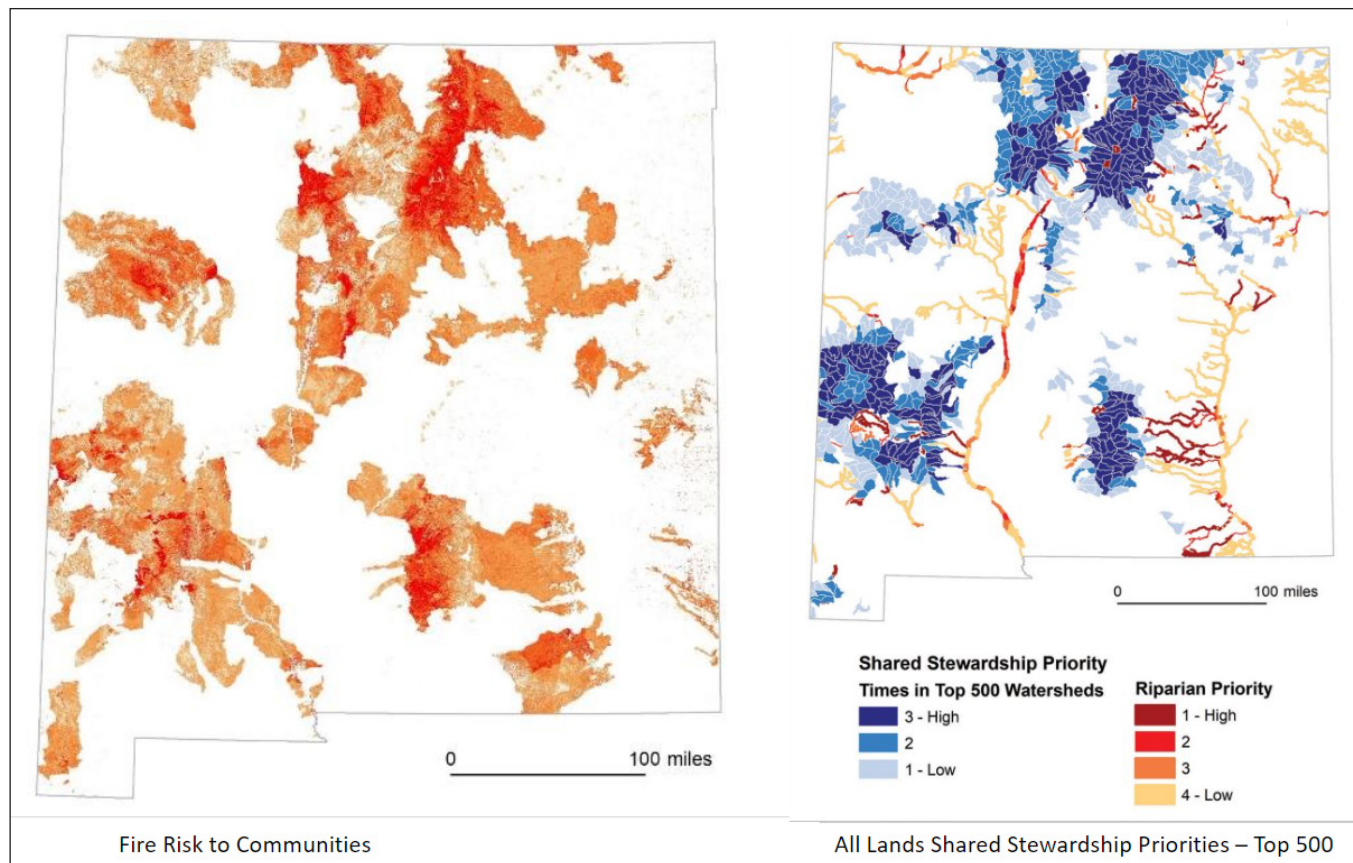


Figure 1. Fire risk and stewardship priorities.

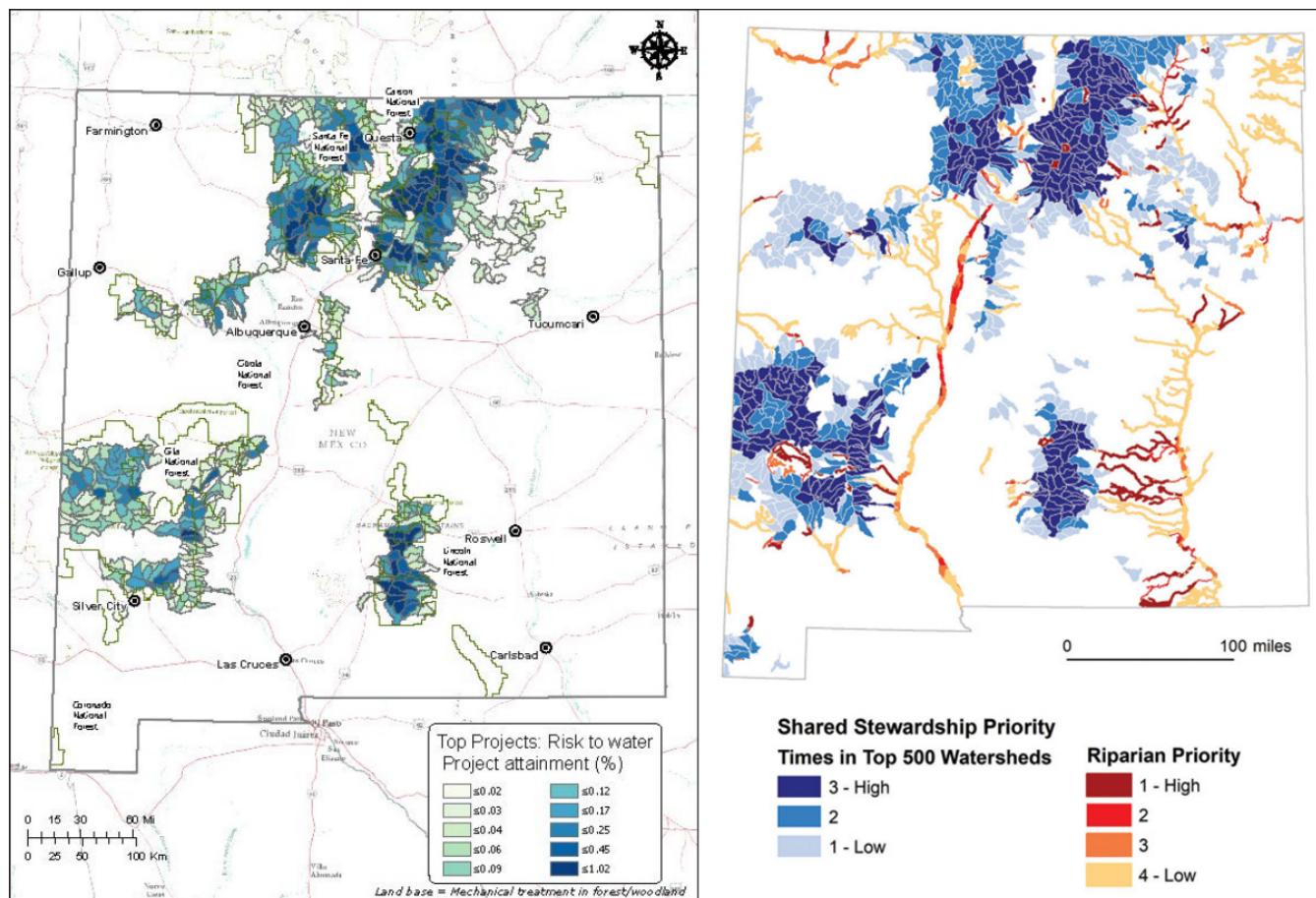


Figure 2. All priorities map.

in July. Now it appears that a prescribed fire act for New Mexico will be introduced, making it more possible for private and state lands to have prescribed fires. It ties to our forest management strategy because prescribed fire enables us to scale up a lot faster.

The third of our 10 strategies that I want to draw attention to is reforestation. We have a large backlog of burned lands that are contributing sediment to downstream water users, degrading water quality, and not properly storing water in headwater areas. Reforestation is very challenging. It's complex, as you can see from these strategies:

- 6.1. Improve and increase seed collection and storage
- 6.2. Expand and improve nursery capacity and seedling production
- 6.3. Improve landscape assessment and site selection to increase seedling survival and tree reproduction
- 6.4. Use demonstration planting projects to advance reforestation strategies
- 6.5. Increase monitoring and utilize adaptive management

We are far away from having the infrastructure and the best practices that we need to reforest burned areas, which

are a super-harsh environment now, and make sure not only that the trees survive in that burned environment, but also that they are able to withstand the climate that we expect to have in the year 2100. This reforestation strategy is relatively new and cutting-edge, and it will be a significant challenge. However, I hope that we're successful and that you hear a lot about it in the years to come.

I'll turn now to the Forest and Watershed Restoration Act of 2019. There was a multi-year effort to pass this legislation, and numerous groups and organizations contributed. It is a recurring funding source for forest and watershed restoration, with funding taken from two existing funds commonly used for water infrastructure and derived from the New Mexico Land Grant Permanent Fund. The Act established an advisory committee comprised of six agencies and three public members. That includes the Office of the State Engineer and the Environment Department (among others), and a public member representing a water interest.

It has been an interesting learning experience to determine how this advisory board needs to work together to review and approve projects for watershed restoration

funding. We've completed one cycle and are currently in the process of another. We are funding a wide range of activities, primarily treatments, but the law, as written, can also be used for planning purposes. For example, the upper Rio Chama watershed successfully secured funding for the upper watershed plan. We have an economic development project in Taos County focused on wood utilization, with the goal of accelerating the pace and scale of watershed restoration.

I'm going to end with a call to action. It's really important that people who work in water and people who work in forests have time to communicate with one another. My call to action for anyone who cares about water security is to get involved in planning large-scale forest and watershed restoration projects. We have the funding streams, we have our planning goals, we know where our priority places are, and we need the engagement of all different interests to come up with the best possible projects. This was driven home to me yesterday. Rebecca Roose, who is presenting later today and serves as one of our advisory board members for the Forest and Watershed Restoration Act, sent along a synopsis of a study about the Colorado River's water supply variability by Utah State University. Two findings were particularly relevant. One is that larger wildfires are correlated with low river flows, and the second is that the tight relationship between river water supply and soil conditions is a predictor of wildfires. So, it confirms what we already intuitively knew. It's all interlinked, and we need to focus as much as possible on the water-forest link to ensure resilient water supplies for the future.

Maxwell: That's terrific. I have one question. This is something I've seen addressed in the Rio Grande Water Fund previously, in terms of priority areas for wildfires. If a community wants to become part of the forestry restoration plans, it obviously looks first to the priority areas. Is there another parallel process that one could use to instigate conversations about particular issues? Do you have a means of collecting impacts throughout the state on folks who have, let's say, leases within the forest itself?

McCarthy: There are multiple ways of going about it. I would recommend either engaging with a local Soil and Water Conservation District or our agency, the New Mexico Forestry Division within the Energy, Minerals and Natural Resources Department. We have six district offices. Everybody in the state is in one of our districts.

Each of those offices has a district forester who has many responsibilities, but one of them is direct engagement in collaborative groups. Whether you go through the Forestry Division district office or through a Soil and Water Conservation District, they are talking to each other constantly. Two roads lead to the same destination.

Maxwell: Terrific. I have another quick question: How can forestry students get involved? Some of what you said applies to that, but I'm sure there are some specific opportunities for interns.

McCarthy: First of all, we're at a unique point where we have several job opportunities. If you are interested in a forestry job, please check the State Personnel Office website and do a search for the word "forest." A number of jobs will come up. Some of them are entry-level, and we need great people in our agencies. Second, collaboratives are great places to get ideas for projects that you could do as part of your student activity and get credit for, potentially, while contributing to something real in a place important to you. Finally, we hire several seasonal or emergency wildland firefighters. While the season is wrapping up now, thank goodness, it will start again in February or March, which is great intermittent work that is ideal for students.

Maxwell: We have one more question. Our ranch in the Gallinas Canyon has a large spring and creek that runs into the Gallinas River Watershed in Las Vegas, New Mexico. Are you aware of the instream use leases that have recently been established? Is there funding for private landowners to help restore their watershed?

McCarthy: I'm going to address the second part, which is the funding for private landowners, because that is more in our area of expertise. That would be a great reason to contact the District Forester. Of the \$9 million in federal funds that come to our agency, \$6 million per year is distributed to private landowners. So, if you're not taking advantage of that, you might be missing out. They are also aware of a number of other funding sources, whether they come from the Natural Resources Conservation Service or elsewhere. There is a whole range of options. Talking to the District Forester is like talking with an expert who can help match what you want to do with your land or how you want to contribute to watershed restoration with the right funding source.

Maxwell: Great. Thank you so much, Laura.



Collin Haffey, The Nature Conservancy

Collin Haffey is a forest and watershed health manager with The Nature Conservancy in New Mexico, where he works to support the Rio Grande Water Fund (RGWF). The goal of the RGWF is to restore a natural fire regime to forests, build resilient communities, and provide water for one million people. His other conservation work focuses on forest restoration, reversing post-fire ecological type-conversion, and helping communities prepare for and respond to climate change driven disturbances.

Thanks for the invitation. My name is Collin Haffey, and I've been working with the Nature Conservancy for three years now. I had the pleasure of working with Laura for about 18 months, and I really learned a lot from her. I feel similarly that it's always nice when the forestry and fire folks get involved in water conferences. Every time I'm out in New Mexico enjoying our beautiful waterways, I'm always thinking about the forests that they're connected to and the interplay between watersheds and forests. Forests and watershed health are closely tied to clean, fresh water.

I will provide some background and history. Our forests used to resemble the one in Figure 1, which was kept open by frequent, low-severity fires that have been suppressed to a significant extent over the past 100 years. Now, most of us have grown up in New Mexico with forests that resemble the one in Figure 2, characterized by fewer large trees and a greater abundance of smaller ones. These trees are part of the restoration programs that Laura mentioned. Some of the work we do is removing some of these trees. Because of our successful century of fire exclusion and fire suppression, we've actually built up so much fuel in the system that now our forests are becoming sort of traps, and we're not able to suppress the types of fire that are burning.

The year 2020 was a great example of what happens when, as the saying goes, nature bats last. We've seen massive fires in Colorado, California, Washington, and Oregon. New Mexico was luckily somewhat spared from any catastrophic fires. We felt the effects of the smoke all summer from the fires in neighboring states and across the West, so it really drives home the issue, as Laura discussed. This is a national issue, not just a state or program issue, such as the Water Fund.

As for the science, the tight connection between forests, fire, and water also extends to the connection between forests, fire, and climate. As the climate has continued to warm since the 1980s and those fuels—the trees—have continued to accumulate, we've seen an almost eightfold increase in high-severity fires. High-severity fires are tree-



Figure 1. Healthy forest.



Figure 2. Unhealthy forest marked by many small trees.

killing fires, the kind that often devastate our watersheds. We've seen this increase in just the past 30 years or so, across the entire West. We've seen this locally as well. Figure 3 shows the Jemez Mountains with Bandelier National Monument outlined, and the Rio Grande running along the right side of the image, highlighting the high-severity fires, also known as tree-killing fires, that occurred from the 1970s to the 2010s. We've seen this increase in both regional and local patterns.

If we examine the Las Conchas Fire of 2011, we can see that the high-severity fire devastated entire watersheds, from the top of the mountain to the Rio Grande discharge,

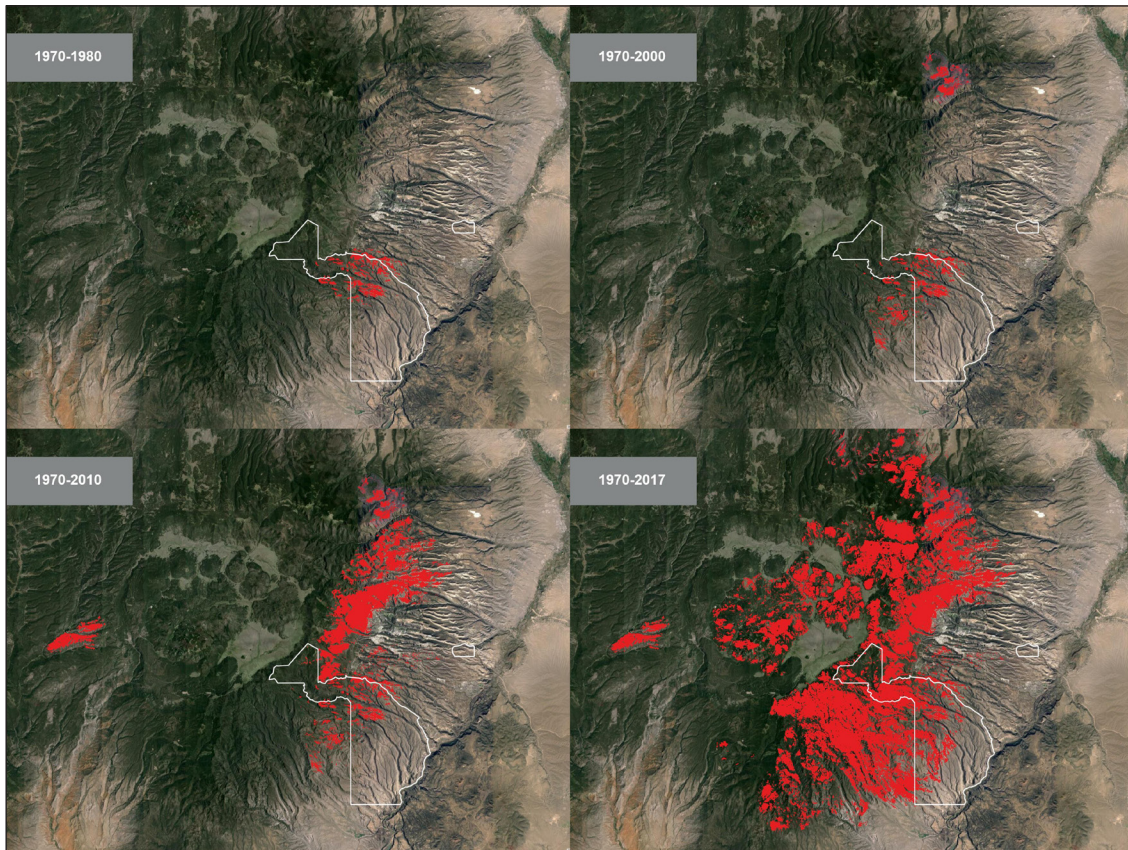


Figure 3. High-severity fires in the Jemez Mountains, 1970-2017.

resulting in significant postfire flooding and degraded water quality.

So, what's the solution? Because of this tight connection between forest, fire, and water, the solution isn't all that complicated. We need more good fires and fewer bad fires. Therefore, we need more of the rejuvenating fire that recycles nutrients and supports the growth of large, tall trees. We need less of the fire that kills trees, devastates watersheds, and causes flooding.

The question is, how do we do that? We achieve this in several ways, including the use of mechanical treatments similar to the techniques outlined in the Forest Action Plan that Laura described. We've employed those tactics across the landscape, and we've seen success. Here's just one anecdote out of the Santa Fe National Forest, the Venado Fire of 2018 (Figure 4). The area in black is untreated, meaning it has not undergone any forest restoration work. The yellow areas are those that haven't been burned yet. The blue area shows where the high-severity fire made a crown-fire run, and it stopped in its tracks once it hit the treated area where the forest had been restored. This demonstrates to me the real importance of ensuring that fire is reintroduced into our forests in a healthy manner. It demonstrates the difference between good and bad fires and their effects.

One way to accelerate forest restoration on the ground is to explore different funding options. Laura outlined one in the Forest and Watershed Restoration Act. I'm going to talk about two more examples from the Rio Grande watershed. One is an early pilot project of the Santa Fe municipal watershed, where funds from water users were used to pay for forest restoration within the municipal watershed. Through Laura's leadership, the Nature Conservancy, and our programs worldwide, we expanded that model to include the entire Rio Grande upper basin, providing water for a million people in downstream communities, including both rural and urban areas such as Albuquerque. Along the way, this clean water is feeding acequias and small farms, as well as the middle Rio Grande agricultural district. So, it is incredibly important work, and that connection is really strong. We've been able to use the funding from some of our downstream water users, particularly the Albuquerque Bernalillo County Water Utility Authority in the Middle Rio Grande Conservancy District, to fund some forest restoration in critical basins of the upper Rio Grande.

All of our processes are science-based. Similar to the Forest Action Plan, early in the Water Fund days, we developed a strategy for identifying key basins where we wanted to conduct restoration work. Then, just as

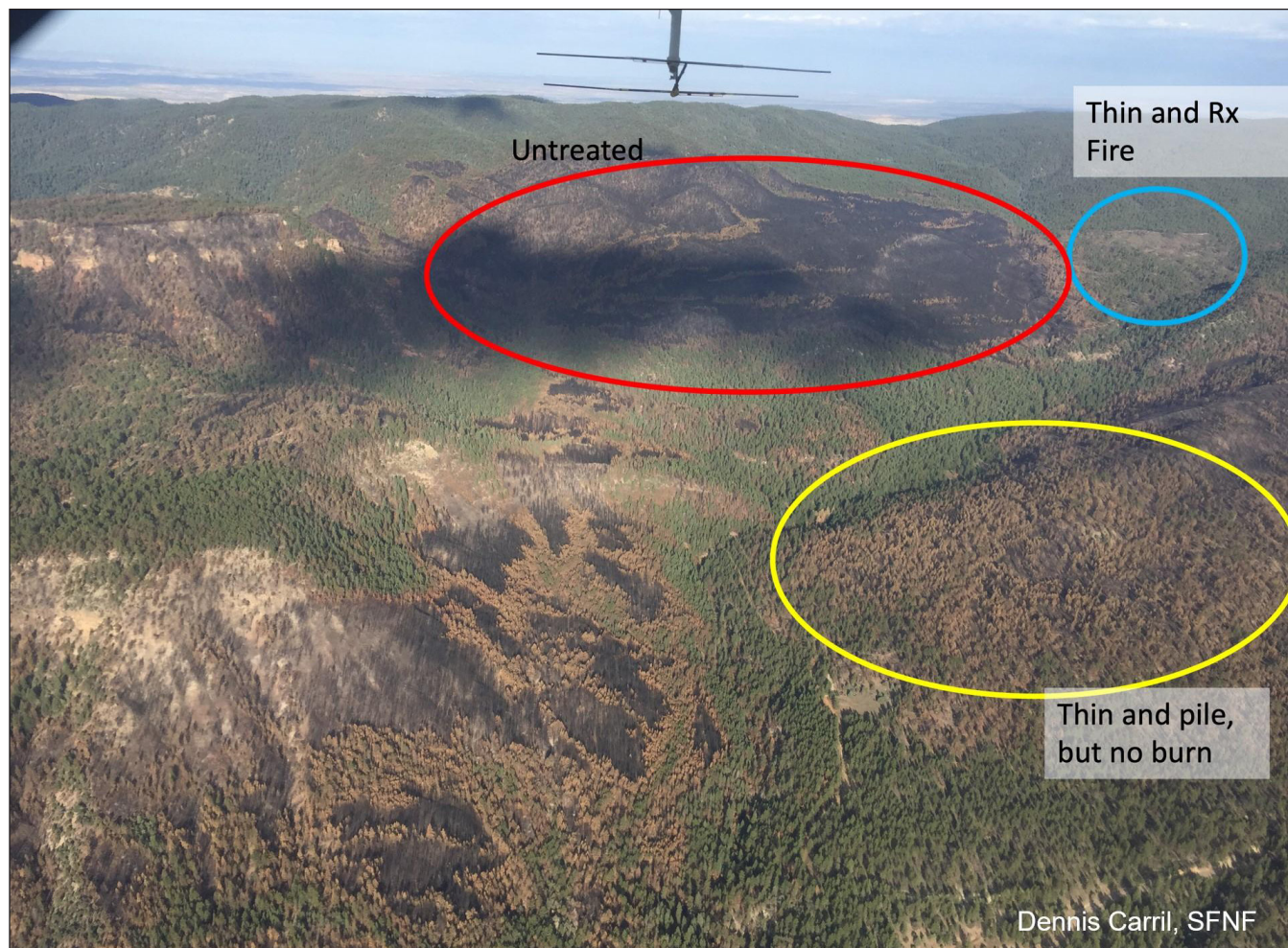


Figure 4. Comparison of treated and untreated forest, Venado Fire of 2018 (Photo by Dennis Carril, Santa Fe National Forest).

Laura described, we've updated those alongside the new Forest Action Plan. Again, we are looking at these high-priority basins within the Rio Grande, focusing on larger geography.

We're six years into the Water Fund. To date, we've directly supported 40 different projects, including collaborative work that spans from conception to implementation, from ideas to the ground. Some of our collaborative groups include the 2-3-2 Partnership, Chama Peak Land Alliance, Greater Santa Fe Fireshed Coalition, Jemez Mountains Firewise Group, Sandia Collaborative, Southwest Jemez Mountains Collaborative Forest Landscape Program, and Taos Valley Watershed Coalition. Those are what make the world work. We're connected with multiple partners and take pride in this. We have 90 signatories we're working with, which include state agencies, federal agencies, tribes, non-governmental organizations, and businesses. Our partners span the gamut, and again, we're working at multiple scales. Someone asked earlier, "How do you get involved?" We have multiple pathways through the Water Fund to engage,

whether you want to participate at the highest level or delve into the weeds at a local collaborative. We have opportunities for people to participate.

To summarize some of the successes since the launch—and we wouldn't have achieved any of this without partnership—we have treated 140,000 acres. We're reaching a critical point in our restoration activities, where, because they're strategically placed, focused, and collaborative, they hold people accountable; we're able to increase the pace and achieve a scale that approaches or matches the scale of the disturbances and challenges we're facing. We have treated 140,000 acres, but we have almost twice that in the planning pipeline, so more acres to come. That will allow for quick investment of state, federal, or private money to go right into on-the-ground restoration. All the time we're doing this, we're creating jobs, and we're supporting the local economy. As we enter into the economic uncertainties of the next year, the restoration economy in New Mexico has an opportunity to play a critical role.

In my opinion, the greatest nexus between water, forests, and fire is beer. For the second year in a row, our neighbors at Second Street Brewery in Santa Fe have been kind enough to brew a beer that supports forest restoration. If you're out in Santa Fe or at a Whole Foods around the state, I think you can still pick up some OktoberForest. It's a great way to support a local business and show your support for forest restoration. We don't receive any compensation for this, but it's a valuable outreach opportunity for us.

For those interested, you can sign up and join our mailing list by visiting <http://riograndewaterfund.org>. We hold an annual signatories meeting, and then we conduct periodic meetings throughout the year. With that, I will open it up to any questions.

Maxwell: Thank you so much, Collin. I'll kick it off with a question for you. I know I've heard Laura speak in the past about the evolution of mechanisms to make these collaboratives function from a financial perspective. I recall that the initial Santa Fe initiative employed a tax mechanism to raise funds, whereas the Rio Grande Project has utilized a charitable mechanism. I was wondering if you had any thoughts about that. There are various ways that ecosystem service payment ideas work (e.g., some people trade, while others receive incentives). I was wondering if you have had any insights over the past little while.

Haffey: Right now, the Rio Grande Water Fund is completely voluntary, and so there's no discussion about trying to put a bond or tax together. We utilize discretionary funds from the water authority and conservancy districts, as well as funding from our other partners, including federal agencies and foundations, which may be used for either general operations of the water fund or specific projects. We've used that model pretty successfully. As we start to look toward the future, one of the biggest limiting factors is matching funds for federal grants. What I hope we can do is find a way to encourage non-federal contributions to the Water Fund that can be tied to federal funds, which we can then leverage, depending on the funding source, at a ratio of five to one or one to one. Providing a one-to-one match is crucial to attracting federal dollars into the state. Matching increases our selling points. We can say that your dollar goes further, that you're able to contribute more, that we turn your \$1 into at least \$2, if not \$5. We hope to tap into the wealth of knowledge of our district foresters at the state forestry office, as we work with them, to explore other funding sources. So, part of what we do is matchmaking between funds for a project.

Maxwell: Terrific. Collin, thank you so much.



Zach Libbin, Elephant Butte Irrigation District

Zach Libbin is a dedicated District Engineer at the Elephant Butte Irrigation District (EBID) in New Mexico. With extensive experience in water resource management and engineering, Zach plays a pivotal role in overseeing the district's irrigation infrastructure and ensuring efficient water delivery to agricultural lands. His work focuses on maintaining and improving the canal systems, addressing water distribution challenges, and implementing sustainable irrigation practices. Zach is also actively involved in community outreach, educating farmers and residents about water conservation and efficient irrigation techniques.

Zach holds a Master's degree in Civil Engineering from New Mexico State University, where he specialized in water resources engineering. Before joining EBID, he worked as a Junior Engineer and later as a Principal Engineer at Libbin Consulting Engineering. His career is

marked by a commitment to innovative engineering solutions and collaborative efforts to enhance water management in the region. Zach has also served as the Chairman of the South Central Stormwater Management Coalition, where he led initiatives to improve stormwater management and reduce flood risks.

Good afternoon. As Connie said, my name is Zach Libbin. I'm the District Engineer for the Elephant Butte Irrigation District (EBID). I'm also the co-chair of the South-Central New Mexico Stormwater Management Coalition (Stormwater Coalition), and I'm also the chair of the steering committee for the New Mexico Watershed and

Dam Owners Coalition. I'm stepping in for John Gwynne today, who had an emergency. John is the chair of the Stormwater Coalition. Today I'll be speaking specifically from the view of the Stormwater Coalition, and I'll try not to let John down. I would also like to thank Connie for the beautiful graphics in this slideshow.

The Stormwater Coalition was officially formed by a joint powers' agreement. Work was done long in advance of that, albeit under a somewhat different name. The coalition was formalized in 2011, with a joint powers' agreement between the Doña Ana County Flood Commission, the Village of Hatch, EBID, the Doña Ana Soil and Water Conservation District, Caballo Soil and Water Conservation District, Sierra Soil and Water Conservation District, Sierra County Flood Commission, and the City of Anthony. It came from the recognition that stormwater—any water, but specifically stormwater—doesn't respect political boundaries. It became apparent that we needed a regional watershed management approach. Flooding is a somewhat obvious part of stormwater; erosion is harder to see. The goal of the Stormwater Coalition was to plan and manage all these efforts, focusing on watersheds on a more regional level. John Gwynne says, "We have changed our philosophy from trying to capture and hold stormwater to trying to slow it down in the watersheds and infiltrate it where we can." As I mentioned, erosion is often difficult to detect, and managing sediment and silt can be equally challenging. It is definitely a significant problem for EBID, the Flood Commission, and the International Boundary and Water Commission (IBWC). For example, the Flood Commission can spend significant money to address sediment that has accumulated at a flood control dam, in order to restore some of the dam's capacity, only to see

it fill up again in the next couple of years, as sediment is an ongoing issue. These stormwater issues can also be an opportunity. In times of drought and severely limited supply, stormwater also presents an opportunity to capture a portion of our water supply, from the perspective of the EBID and the aquifer, encompassing the entire water system.

So, the Stormwater Coalition began by addressing primarily communication and collaboration, working to define goals and discuss regional flood control and broader regional issues. That's still our primary focus, but we've moved on to trying to implement some projects as well. The largest one is the Rincon Arroyo Watershed, which we have selected as a priority project, and one I will elaborate on further. We could have started with a much smaller watershed, but the Rincon Arroyo Watershed is significant for several reasons, including its sediment. The Rincon Arroyo brings an incredible amount of sediment into the river, which is one of the reasons EBID likes to focus on it, as the IBWC struggles to maintain the amount of sediment that comes into the river. Our strategy encompasses upper watershed restoration, extending all the way down to the valley, where the agroecology approach includes stormwater harvesting, sediment capture, and aquifer recharge (Figure 1). We are trying to slow down the water in the watershed and allow it to infiltrate.

The largest project we are attempting to move forward

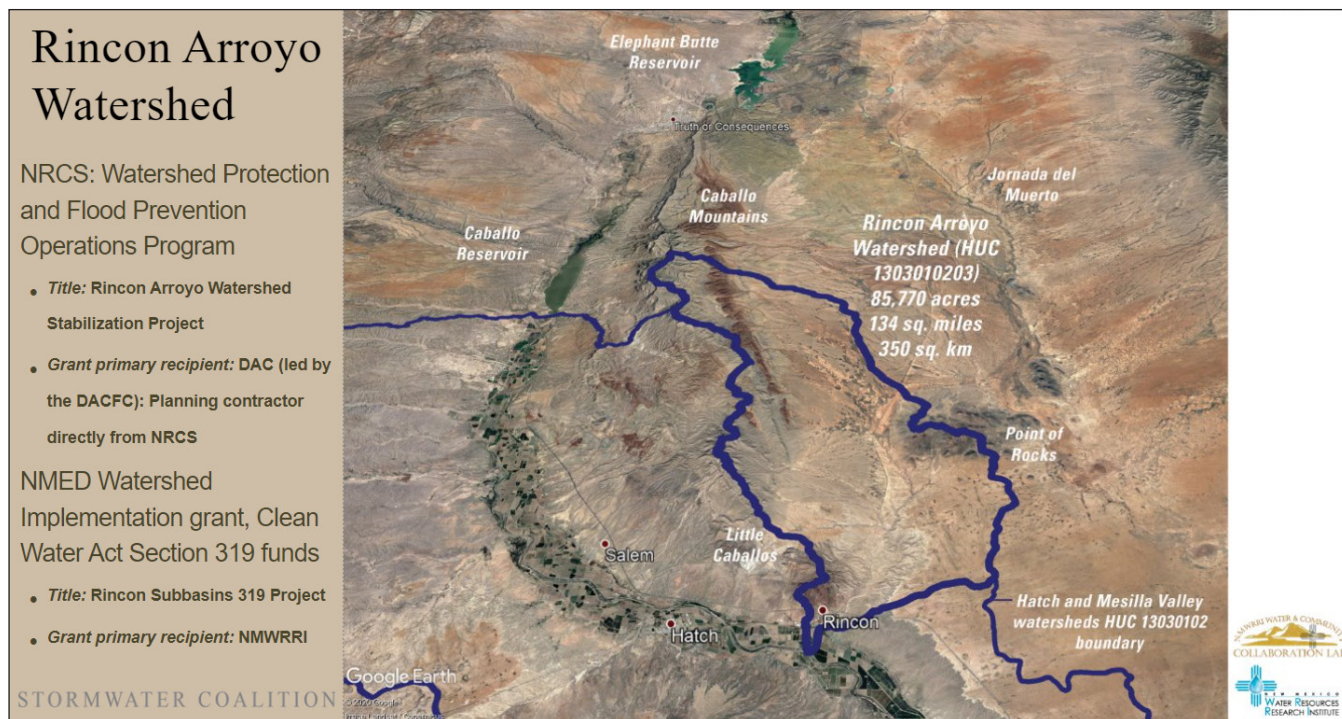


Figure 1. Rincon Arroyo Watershed strategies.

for the Rincon Arroyo is a Watershed Protection and Flood Prevention Operations Program (Watersheds Program) with the Natural Resources Conservation Service (NRCS). There is considerable potential for a watershed-scale approach. The primary recipient is Doña Ana County, led by the Doña Ana County Flood Commission. The NRCS has started contracting for a planning effort to determine possibilities for working on that watershed and implementing some of these efforts that we're talking about here. This is the larger funding opportunity, and planning has been funded so far. The NRCS's programs take a long time, as the wheels of progress turn slowly. We must be patient with some of those.

In the meantime, the NM WRI received an NM Environment Department Watershed Implementation Grant through their 319 Clean Water Act funds. This is a smaller project, not a pilot. Instead, it's a smaller implementation project that we can learn from; it will help us learn how we can implement our projects on a broader scale.

So, within all these watersheds, and similarly with the watersheds that Laura and Collin were discussing, storm runoff can have huge energy, and this high energy

turns into not only damaging flows but also erosion and sediment yield. As shown in Figure 2, when we're talking about 14,000 cfs for a 25-year storm, that is a huge amount of water, and it has damaging effects. This becomes the largest contributing sediment yield in the Hatch and Mesilla Valleys. A study conducted by Tetra Tech, as part of an IBWC initiative, estimated an annual sediment yield of 36.2 acre-feet per year. Considering that the IBWC has not performed maintenance for roughly 20 years, the number of cubic yards of material that needs to be moved just to keep up with the annual yield makes it a challenge to even consider catching up. It's an incredible amount of sediment, and the best way we can deal with it is to try to keep it within the watershed.

This is, of course, somewhat different from the forest and upper watershed issues, but in general, we end up with similar issues and attempt to implement similar techniques, employing softer engineering approaches to slow down and spread out the water. When I'm talking about implementing the project on the Rincon Arroyo Watershed, as an example, we're looking at many small-scale flood control measures. That's tricky and hard to explain to

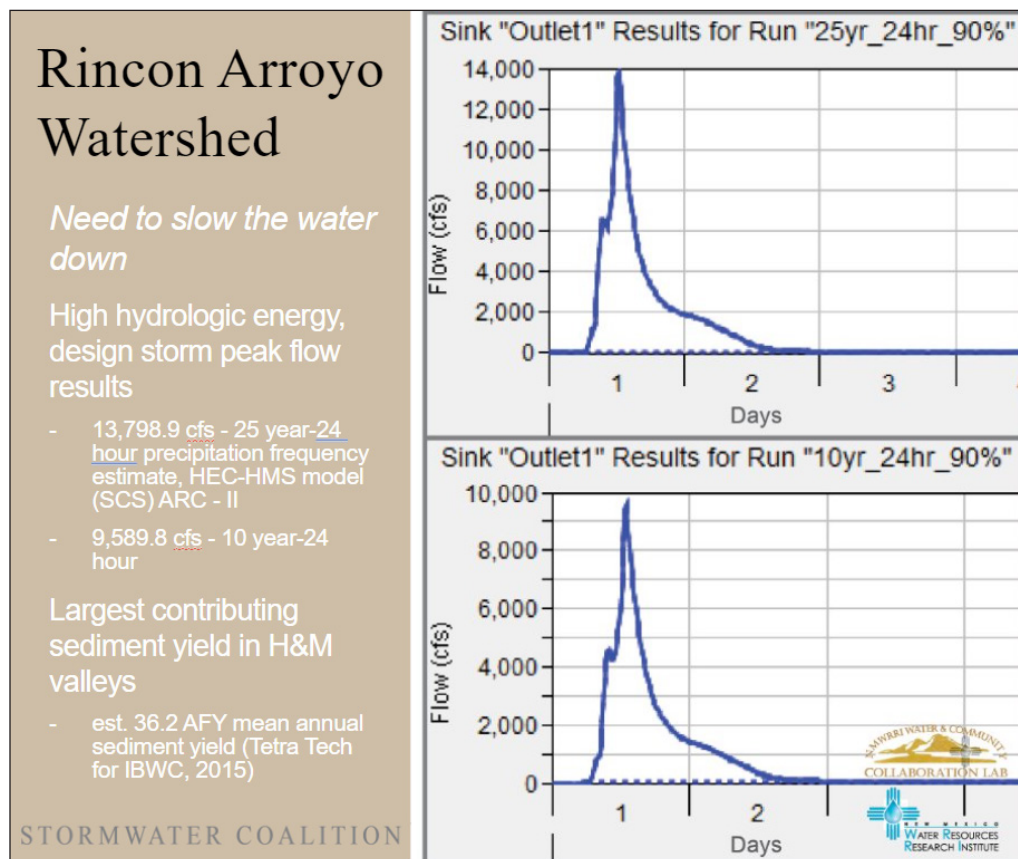


Figure 2. Storm peak flow and sediment yield in the Rincon Arroyo Watershed.

NRCS, for example. They're mostly thinking about dams, and we're talking about hundreds of smaller measures to control that sediment, such as log jams, riparian buffers, berms, swales, terraces, and retention ponds.

We have applied for and received a couple of funding opportunities. The first is the Cooperative Watershed Management Program, which examines a larger area and specifically supports the Stormwater Coalition as the applicant, with the Jornada RC&D serving as a fiscal agent. The idea here is that the Bureau of Reclamation is supporting the Stormwater Coalition and getting the ball rolling on larger efforts and becoming a bit more organized. The next one is a Drought Response Program funded by the Bureau of Reclamation with EBID as the primary recipient.

The largest issue we face is the degradation of our upper watersheds. The erosion and sediment transport are incredible. When you see pictures of 20-foot cliffs that have eroded, it is no surprise where the sediment in the river is coming from. Connie has worked on watershed analysis and lessons from the Rincon Arroyo. The idea is to apply our learning from the Rincon Arroyo to other watersheds in the Hatch and Mesilla Valleys. We also want to expand the early warning system and then develop lower watershed infrastructure to capture that sediment. We're trying to address water supply issues from those larger storms.

Early warning is an effort that the Doña Ana County Flood Commission and EBID are both taking, which involves installing rain gauges and weather stations across the entire valley and watersheds to get a handle on these storms when they come in, be better prepared for flood control, and improve our data and our science for these erosion control efforts.

Certainly, no one here is surprised to hear that we are in an ongoing and persistent drought. These efforts by the Stormwater Coalition can also help us increase our water

supply and improve our resiliency to drought. We are developing opportunities and projects to address some of these issues, potentially without the need for lawyers and without being overly dependent on judges. In supporting Laura's call to action, we can also include our local lower Rio Grande watersheds here, too. No one is surprised to hear that El Paso and Las Cruces are both growing, with El Paso growing toward Las Cruces, and that we have an over-appropriated water supply. We need to face these water issues.

We also have a need for coordinated watershed planning in the Organ Mountains-Desert Peaks National Monument. Some of us had concerns about the monument and wilderness designations within our watersheds, but now we need to find approaches that allow us to work within these designations while still implementing some of these efforts.

I've also already mentioned the watershed-scale stormwater capture efforts of the Stormwater Coalition with EBID as the primary sponsor. A part of that is a design-decision support tool being put together by NM WRRI.

To wrap up, the Stormwater Coalition is a regional effort to try and address these more local issues. Our call to action remains the same—specifically, raising awareness about watersheds, both the forested upper watersheds that Laura and Collin discussed and these watersheds, more local to southern New Mexico, which have faced desert conditions and still require attention. So, with that, I will stand by for any questions, but I know we're out of time, Connie.

Maxwell: We are. Thank you, Zach. I think you can see there are quite a lot of issues down in our area. There are numerous initiatives underway for watershed restoration in New Mexico, but there is still a long way to go. Thank you, everybody, very much.