

Statement of Andrew Mueller, General Manager  
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The Western Water Crisis:  
Confronting Persistent Drought and Building Resilience on our Forests and Farmland

Hearing of Subcommittee on  
Conservation, Climate, Forestry, and Natural Resources  
United States Senate

June 7, 2022

Chairman Bennet, Ranking Member Marshall, members of the subcommittee, thank you for the opportunity to speak with you today about these important issues.

My name is Andrew Mueller and I'm the General Manager of the Colorado River Water Conservation District. For over 80 years, the Colorado River District has worked to protect the water interests of Western Colorado and keep water flowing west. We manage, conserve, develop and protect the West Slope's water on behalf of the State of Colorado and the citizens of our 15 counties that form the headwaters of the Colorado River and its principal tributaries. We are also responsible for the conservation, use and development of the water resources of the Colorado River Basin to which the State of Colorado is entitled under the 1922 and 1948 Colorado River compacts.

The precipitation in our district alone provides 65% of the Colorado River's natural flows, a river system that supports over 40 million people, 5 million acres of agricultural land, 2 countries, 30 sovereign Tribal Nations, 7 states and 11 national parks. We are the first link in an immense chain, vital to the health and future of the single most important natural resource in the American Southwest. It all starts in our headwaters state.

**I. Identifying the Single Biggest Threat to Water Security in the American Southwest**

Climate Change & Aridification:

The Colorado River is aptly referred to as the hardest working river in America. Even in wet years, the river no longer reaches its natural mouth at the Sea of Cortez and claims to water exceed the average annual flow. The massive system of federal reservoirs on the Colorado River was designed to accommodate the known natural variability in the Colorado River System and worked extremely well for at least half of a century. However, after the longest and most severe drought on record, that once highly functioning federal system is dangerously depleted with only 34% of system

storage remaining.<sup>1</sup> Over the last 22 years, the flows of the Colorado River have been 20% below average and sound science tells us we should anticipate and plan for further significant reductions in flow. To say that all thriving urban and rural communities and the natural ecosystem of the river face a gravely uncertain future is not hyperbole. While we may hope for a cooler wetter future, those of us responsible for our region and nation's water security must pay attention to credible science and plan for the worst. Our nation's leaders must understand what is happening and what lies at the root of this accelerating crisis.

Climate, commonly defined today as the average weather over a thirty-year period<sup>2</sup>, has always been variable in the American Southwest. We have experienced long dry periods interspersed with generally shorter wet and cooler periods. The climate we have experienced in the last twenty years, however, has been hotter and drier than any period in the last 1200 years<sup>3</sup>. It is indisputable that the climate of the American Southwest has changed dramatically since the start of this millennium. Climate is generally a combination of meteorological variables, importantly including but not limited to temperature and precipitation. Like many meteorological variables, temperature and precipitation are related to one another. In many regions, higher temperatures enable the atmosphere to hold more moisture and therefore result in greater, more severe precipitation events. We see these extreme weather events in many parts of the United States today. In the desert southwest, however, higher temperatures have generally led directly to the aridification or massive drying of the earth's surface. Hotter temperatures over last 22 years have literally sucked the moisture right out of our snowpack, soil and vegetation.

Important for today's hearing is our growing understanding of the relationship between rising temperatures and the volume of water flowing in the Colorado River and its tributaries. Colorado's Western Slope, and the entire Colorado River Basin continue to suffer from the effects of multi-decadal drought and increasing temperatures. The West Slope, the most significant regional source of water in the Colorado River, is an epicenter for a significantly above-average rise in temperature. Colorado counties from Ouray to Mesa to Moffat have experienced a more than 4-degree Fahrenheit rise in average annual temperatures since 1895.<sup>4</sup> The impact of these hotter, drier temperatures on water supplies are real and meaningful. For every 1-degree Fahrenheit rise in average temperature, we see streamflow reductions between 3% and 9%, with most recent studies, including the most recent and in-depth study by the scientists with the United States

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<sup>1</sup> U.S. Bureau of Reclamation, 1<sup>st</sup> consultation webinar for AOP, 6/1/22;  
<https://www.usbr.gov/ColoradoRiverBasin/#AOPColoradoRiverReservoirs>

<sup>2</sup> Glossary of Meteorology. [American Meteorological Society](https://www.ametsoc.org/AMETOC/glossary/). Retrieved 2008-05-14

<sup>3</sup> A, P. W., Cook, B. I., & Smerdon, J. E. (2022). Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. *Nature Climate Change*, 12(3), 232–234. <https://doi.org/10.1038/s41558-022-01290-z>

<sup>4</sup> National Oceanic and Atmospheric Administration's [Climate Divisional Database \(nClimDiv\)](https://www.noaa.gov/climate-divisional-database), monthly temperature data at the national, state and county levels between 1895 and 2019 for the Lower 48 states.

Geological Survey strongly supporting the 9% end of the spectrum.<sup>5</sup> The credible scientific consensus is that we should expect temperatures to continue to rise and therefore natural stream flows and water supply to continue to decrease.

Throughout the headwaters of the Colorado River we have experienced year after year of hot and windy Springs and early Summers that cause our snowpack (which in the American west is our single largest reservoir) to sublime, or turn directly from its solid state to a gas leading it to disappear into the atmosphere instead of melting and flowing into our rivers. Soil aridification significantly compounds streamflow issues. As temperatures rise, moisture evaporates from our plants and soils, creating a massive water debt due when snows melt, drawing water away from rivers and streams. Never has this issue been clearer than in 2021, when our headwaters snowpack averaged at 89% while inflows to Lake Powell reached only 32%.<sup>6</sup>

Fires in this new arid environment burn hotter and faster and behave in wildly explosive ways. In 2020, Colorado experienced the three largest wildfires in recorded history — all in the same season. Watersheds and water infrastructure on both sides of the Continental Divide were seriously impacted by wildfire, resulting in hundreds of millions of dollars in restoration and mitigation expenses in the Centennial State alone. My own hometown of Glenwood Springs, a town of less than 10,000 residents, experienced this first-hand with the significant destruction of our city's watershed in the Grizzly Fire leading to the emergency expenditure of tens of millions of dollars. These continued drought conditions have renewed regional fears of another catastrophic wildfire season that could further damage critical watersheds and negatively impact agricultural and municipal water supplies.

#### Family Farms & Ranches in Crisis:

None have felt these climate impacts more than the family-owned farms and ranches of our Colorado River District and Colorado's Western Slope. The food and fiber produced from our region sustains communities across the state and the nation, but drought-based water scarcity has forced many local producers to downsize or completely shut down their operations.

Cattle sell-offs, or "de-herding," has become commonplace across the agricultural communities in our 15 counties. Not only does this practice impact local economies and our national food supply, but it also holds great emotional weight and repercussions for these families and their neighbors. Families that have been involved in and committed to ranching for four and five generations are being forced to sell their cattle herds and confront a tremendously uncertain future.

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<sup>5</sup> Changing climate drives future streamflow declines and challenges in meeting water demand across the southwestern United States (Olivia L. Miller; et al, Journal of Hydrology, vol. 11, May, 2021); Colorado River flow dwindles as warming-driven loss of reflective snow energizes evaporation ( P. C. D. Milly, K. A. Dunne, Science 2020)

<sup>6</sup> Calculations from NOAA and the Colorado Basin River Forecast Center with data from <https://www.cbrfc.noaa.gov/lmap/lmap.php>

While our agricultural producers regularly experience natural fluctuations in the hydrology each year, these River District constituents, regardless of political affiliation, recognize this recent period as the hottest and driest in collective memory. The latest scientific data establishes that this era is the driest in over 1,200 years<sup>7</sup> and they are looking to our regional and national officials for leadership in this uncertain time. Our present and most likely future reality is hotter and drier with declining water supply. This reality presents a risk to all of our communities in the American Southwest and threatens our nation's water and food security. Confronting and developing adaptation and mitigation strategies is the only way to secure our collective water and food security.

## **II. Adaptation and Mitigation Strategies Must be Developed, Funded and Implemented.**

Our country has a long and admirable history of innovation and adaptation to climate. Tremendous engineering feats driven by individual ingenuity and funded by local state and federal governments has allowed cities and farms to thrive in a hostile and arid environment in the American Southwest. While this quickly changing climate can lead to despair and hopelessness, we cannot simply throw up our hands and surrender our thriving American Southwest to the forces of climate change. Citizens, communities and governments throughout the Southwest are developing adaptation strategies, but as in the past, when our nation has been confronted by existential threats, we need our national government to be an integral partner in our effort to adapt and thrive in this new reality. There are many examples of successful adaptation strategies and many opportunities for the federal government to work hand and hand with our local and regional efforts. And we must recognize that there is no single answer which will allow us to escape this rapidly changing climate, it must be a multi-faceted effort. I will discuss a few concrete examples within our District as well as address a few larger regional efforts which are worthy of your consideration.

### The Use of High Mountain Reservoirs for Climate Mitigation:

Hotter temperatures and the long-running drought have reduced runoff across Colorado's Western Slope, creating unprecedented conditions in our river basins. In 2018, the Colorado Division of Water Resources placed the mainstem of the Yampa River – one of the major Colorado River tributaries – under active administration for the first time in history, shutting down water diversions for local agricultural producers. In a river that historically enjoyed plentiful natural flows, there simply was not enough water to meet all the historical demands. Unfortunately, 2018 was not an anomaly. The Yampa system experienced administrative curtailment in both 2020 and 2021, and we are anticipating the same again in 2022.

Unprecedented drought has also led to unprecedented innovation and collaboration. Last year, the Colorado River District, working cooperatively with the State of Colorado and other partners, helped keep the call off the river to aid downstream farmers and ranchers with releases from Elkhead Reservoir. Managed by the Colorado River District, Elkhead Reservoir provides multi-

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<sup>7</sup> A, P. W., Cook, B. I., & Smerdon, J. E. (2022). Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. *Nature Climate Change*, 12(3), 232–234. <https://doi.org/10.1038/s41558-022-01290-z>

purpose water storage that enhances river flows, provides water for electric power production, supports agriculture and livestock production, and provides significant water to protect the four endangered fish in the Upper Colorado River system.

It is widely acknowledged that the era of building enormous reservoirs such as Powell and Mead is over. It is, however, an era in which strategically placed small reservoirs in high mountain valleys will allow us to successfully mitigate climate change through the retiming of flows which will provide essential water for our streams, our communities and our food supply. Federal assistance, through funding tools like PL 566 will be essential to our effort to adapt and retime water.

#### Implemented & Ongoing Local Solutions:

Improving the efficiency and enhancing the conservation of water through infrastructure investment is critical to the future viability of the American Southwest. The Lower Gunnison Project is an excellent example of a successful local effort funded, in part with federal dollars. The project recently celebrated the completion of its first phase, working in partnership with the agricultural community to modernize conveyance systems and upgrade to high efficiency irrigation systems. The Project secured \$8 million in funding from the NRCS under RCPP and additionally leveraged over \$10 million in funding. Accomplishments included piping nine miles of irrigation canals and installing a regulating reservoir and measurement sensors that collect and record data. The estimated benefits generated by this series of projects are expected to last for decades and is equivalent to \$1.3 million per year.<sup>8</sup> This includes salt load reductions, operations and maintenance savings, producer benefits and reduced travel costs. The project is also directly linked to the successful restoration of the water quality in the Lower Gunnison River, an essential water supply for cities, farms and endangered fish. We applaud Senator Bennet's efforts to champion the RCPP Program, paving the way for success in the Lower Gunnison of Colorado.

#### Building Resiliency Through Natural Infrastructure:

The greatest reservoir for the Colorado River and our water users on the West Slope is our high-mountain snowpack in our forest headwaters. The natural water infrastructure our mountain forests provide allow for slow-timed releases and filtration for the rivers and streams sourced for community drinking water, irrigation and essential habitat for fish and wildlife. Protecting, restoring and properly managing these forest ecosystems can generate incredible public benefits, enhance resilience to climate change and improve water supply.

Emerging science also demonstrates that protecting and restoring natural water infrastructure can help mitigate the impacts of wildfire and drought on water supplies.<sup>9</sup> The 2023 Farm Bill presents

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<sup>8</sup> Lower Gunnison Project Final Summary Report - <https://www.coloradoriverdistrict.org/wp-content/uploads/2021/11/2021-11-12-rcpp-summary-report-v2-1.pdf>

<sup>9</sup> Smokey the Beaver: Beaver dammed riparian corridors stay green during wildfire through the western United States. Fairfax and Whittle, 2020 (<https://emilyfairfaxscience.com/research/firebeavers/>)

multiple opportunities to encourage public investment in forested natural water infrastructure, enhancing the climate resilience of water supplies, supporting workforce development and increasing the pace and scale of watershed restoration.

Keeping Productive Agriculture Viable:

The multi-decadal drought and conclusive climate science clearly demonstrate that our demands greatly outstrip the water supply in the Colorado River Basin. To survive and continue to thrive in the Southwest, we will need to implement an all-hands-on deck approach. Every water use sector from agriculture and industry to municipal water users will have to meaningfully reduce their consumption of water.

The majority of water consumed in the Colorado River Basin is consumed in the production of food and fiber for our nation. Agriculture in the Colorado River Basin is important to our local, regional and national food supply, and is essential to this nation's food security. We must devise, implement and fund programs aimed at keeping productive agriculture viable while reducing the overall consumptive use of water. Conservation and efficiency programs like RCPP incentivize the transition to lower water demand crops and programmatic soil health efforts – all pieces of a successful effort. Yet even with these endeavors, we will unfortunately still need to intelligently incentivize the reduction of irrigated acreage in the Basin.

Our agricultural producers in the Colorado River Basin are and always have been innovative individuals, and we should look to them for ways to model incentives and programs. When faced with a dry year and low water supply, our farmers and ranchers in Colorado and elsewhere in the Upper Colorado River Basin routinely chose to reduce or remove irrigation from their least productive lands in order to sustain their most productive acreage. If Congress is going to incentivize the reduction in irrigated acreage in the Colorado River Basin, any such program must focus on supporting our most productive agricultural land while focusing the incentives on hobby farms (i.e. 35 acre and smaller tracts irrigated primarily for aesthetic purposes) and marginally productive lands. The federal government should not fund the retirement of productive agricultural lands.

Incentivizing hobby farm and marginal land fallowing for longer periods of time will allow for the long-term success of productive agriculture in the Colorado River Basin, as it provides an incentive to focus scarcer water resources on land that produces more consistently profitable crops. Confronting the system imbalance in the Colorado River Basin will require bold and transformational choices, and we support the frank discussion of these policy goals and ideas. Confronting the crisis on the Colorado River will require strong federal leadership and action.

Coordinated Federal Funding Efforts:

Thank you, Senators, for the passage of the Infrastructure Investment and Jobs Act and your support for Western Water infrastructure. With the infusion of federal infrastructure dollars, there

is no better time to ensure that our federal systems and programs work efficiency together. As an example, we encourage the swift adoption of a Memorandum of Understanding between the NRCS and the USBR to streamline the NEPA compliance process and eliminate duplicative costs, time delays and inefficiencies. We also support greater collaboration and a reduced reliance on autonomous business centers at the federal level that often act as silos and create barriers for local community collaboration and support.

Additionally, our water users are experiencing significant inflation pressure and supply chain backlogs, resulting in delayed projects and increased costs. These barriers delay projects that modernize our irrigation systems, build resiliency across our landscapes and ensure that our farmers and ranchers can support their livelihoods. This has been particularly visible in the EQIP NRCS funding program. We support reestablishing the index payment rate (IPR) and other cost overrun programs to ensure projects move forward with construction. We also support phased contracting to allow for design and construction to operate on the most current payment rate schedule. Addressing these project barriers will result in more water conservation projects moving from idea to action.

Conclusion:

We've only seen the beginning of the climate crisis in the American West. We cannot afford to remain idle as rivers and reservoirs dry and families shutter their businesses. In our District on Colorado's Western Slope, our water users – particularly our farmers and ranchers – have done more with less for a long while. Bound by our hydrology and expectations downstream, drought and shortages have become familiar companions, regardless of conditions at Lakes Powell and Mead.

But wishing for snow and rain is no longer an adequate game plan at any level of decision-making. If our communities are going to survive in Colorado and downstream, decisive action at the federal level is needed to help us adapt to a hotter, drier future.

We cannot adequately protect our water supply if we're constantly playing defense against depleted snowpack, increasing temperatures, megafires in our forest headwaters and the aridification of our productive agricultural lands.

We must act now to ensure the health and security of our multi-generational farmers and ranchers, our thriving cities, our recreational economies, our native fish and wildlife and our precious landscapes that form the headwaters of the greater Colorado River Basin.

I encourage your support of western water users and, most importantly, the communities and landscapes that bring life to the rest of the American Southwest.