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STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF THE PETITION FOR PROPOSED AMENDMENTS TO 20.6.4.9 NMAC, DESIGNATION OF WATERS OF THE UPPER PECOS WATERSHED AS OUTSTANDING NATIONAL RESOURCE WATERS,

WQCC No. 21-51(R)

Village of Pecos, San Miguel County, Upper Pecos Watershed Association, New Mexico Acequia Association, and Molino de la Isla Organics LLC,

Petitioners.

DENNIS MCQUILLAN'S NOTICE OF TECHNICAL TESTIMONY

Pursuant to 20.6.1.202.A NMAC and the Amended Procedural Order issued in this matter, Dennis McQuillan hereby files his Notice of Technical Testimony. As required by the applicable regulations and Amended Procedural Order, Dennis McQuillan provides the following information in this notice:

i. Identify the person filing the statement:

This statement is filed by Dennis McQuillan, a New Mexico citizen who has enjoyed the exceptional recreational opportunities in the Upper Pecos Watershed and worked as an environmental professional in the Upper Pecos Watershed for decades.

ii. State whether the person filing the statement supports or opposes the Draft Petition:

Dennis McQuillan strongly supports the Draft Petition.

iii. Identify each witness, including name, address, affiliation(s), and educational and work background:

Dennis McQuillan, 3 S Hijo de Dios, Santa Fe, NM 87508, will testify as a citizen who is not representing a client or any other person either on a paid or unpaid basis. Mr. McQuillan's educational and work background are set forth in his resume, which is attached as McQuillan's Exhibit 1.

iv. Estimate the length of the direct testimony of each witness:

Mr. McQuillan estimates that his direct testimony will take fifteen (15) minutes, not including cross examination or rebuttal testimony.

v. Identify all exhibits which are part of the Record Proper and, for exhibits not part of the Record Proper, attach a copy:

Below is a list of all exhibits to be offered by Dennis McQuillan, which are attached, and the page number in the PDF document for each exhibit. Mr. McQuillan reserves the right to offer rebuttal and sur-rebuttal exhibits.

Exhibit	Description	PDF Page
Ex. 1	Resume of Dennis McQuillan	4
Ex. 2	Direct Technical Testimony of Dennis McQuillan	8

vi. List or make available all technical materials relied upon by each witness in making statement of technical of fact or opinion contained in his or her direct testimony:

All technical materials relied upon by Mr. McQuillan in making statements of technical of fact or opinion contained in his direct testimony are listed in McQuillan's Exhibit 2, entitled "References, Facts, and Data Considered" from PDF page 28 to 31, and include hyperlinks.

vii. Attach a summary of the testimony of each witness, stating any opinion(s) to be offered by such witness, and an explanation of the basis for such opinion(s):

A written summary of Mr. McQuillan's testimony, including his opinions to be offered, and explanations for such opinions, are contained within McQuillan's Exhibit 2, from PDF pages 11 to 27.

Respectfully submitted,

/s/ Dennis McQuillan
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In his own capacity.

Certificate of Service

I hereby certify that on March 10, 2022, a copy of this Notice of Technical Testimony was sent via electronic mail to the persons listed below:

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/s/ Dennis McQuillan
Dennis McQuillan

MCQUILLAN'S
EXHIBIT 1

Dennis M. McQuillan
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EDUCATION

University of New Mexico: Bachelor of Science; Geology, 1978; distributed minor in chemistry, mathematics, and physics

Professional Training: Hazardous Waste Operations and Emergency Response (OSHA 1910.120); Incident Command System (US Coast Guard); Healthy Home Specialist (National Environmental Health Association); Inspector (National Association of Wastewater Technicians)

WORK EXPERIENCE

High Desert Science: July 2021 to present; Geologist and Proprietor; Environmental Consultation and Training; https://highdesertscience.net/

New Mexico Environment Department: March 1979 to June 2005 and October 2005 to October 2020; Environmental Scientist, Water Resource Specialist, Geologist, Health Program Manager, Natural Science Manager, Chief Scientist

Consultant, Educator and Freelance Writer: 1987 to 2005; Sites in Arizona, Colorado, New Mexico, Ireland, Nova Scotia, Scotland and Wales

PROFESSIONAL PROFILE

- Multi-disciplinary expertise developed over 43 years of professional experience in the environmental field
- Expert knowledge of New Mexico water resources and water-quality laws and regulations
- Testimony before U.S. Congress, N.M. State Legislature, N.M. District Courts, Federal District Court, N.M. Environmental Improvement Board, N.M. Water Quality Control Commission, N.M. Oil Conservation Commission, N.M. Public Regulation Commission
- Judicially qualified as an expert in both state and federal court
- Appointed as executive designee to statutory committees (N.M. Mining Commission and Carlsbad Brine Well Remediation Authority)
- Frequently sought out by peers and stakeholders for advice or as an invited speaker
- High level of creativity
- Successful problem solving
- Administration of multiple sources of funding; grant application and management
- Supervisor and mentor for more than 38 years

ACCOMPLISHMENTS

Surveillance, Investigation, Incident Response: 250+ site investigations; incident and emergency responses within Incident Command System; regional water-quality surveillance and mapping.

Negotiation, Design and Oversight of Corrective Actions: public sewer and/or safe drinking water service provided to communities using contaminated private domestic wells; source control/removal actions; free-product recovery systems; aquifer pump-and-treat systems; soil-vapor extraction systems; sparge-and-vent systems; treatment systems on contaminated public supply wells.

Research: ground-water quality and public health; laboratory and in-situ biodenitrification; natural attenuation of nitrate, gasoline, chlorinated solvents and high explosives; natural and anthropogenic sources of perchlorate; pharmaceutical residues in ground and surface water; stable isotope geochemistry of ground-water pollution; natural uranium in the Espanola Basin; effect of septic-tank lot size on ground-water nitrate.

Program Development: creation of the "Water Fair" free well-testing program; promulgation and revision of numerical and narrative water-quality standards; development of comprehensive regulations to address water pollution; design and implementation of databases and Geographic Information Systems; development of regulations to allow beneficial reuse of domestic gray water; development of a program to eliminate substandard onsite wastewater systems owned by indigent households.

Stakeholder Outreach and Involvement: negotiated rulemaking committees; training and technical assistance to the regulated community and the general public; guest lectures and seminars at state universities; public presentations; conference papers; news media interviews; cooperation and partnerships with New Mexico Tribes.

EQUIPMENT USED

Water Testing Instruments: pH meters, conductivity/temperature/salinity/dissolved oxygen meters, ion-specific electrodes, colorimeters, spectrophotometers.

Vapor Testing Instruments: flame ionization detectors, photo-ionization detectors, combustible gas and O_2 meters.

Radiation Detection Instruments: Geiger counter, gamma scintillometer, high-sensitivity gamma neutron pager.

Other Equipment: water level/free petroleum product sounders, continuous water-level recorders, pressure transducers, portable well pumps, electromagnetic induction (terrain conductivity) meter, portable X-ray fluorescence spectrophotometer, hollow-stem auger.

PUBLICATION EXAMPLES

McQuillan, D and A. Bodour. 2021. "Environmental Risk Communication and Engagement." New Mexico Geological Society, Annual Spring Meeting, April 15-16, 2021, Virtual Meeting. https://nmgs.nmt.edu/meeting/abstracts/view.cfm?aid=2763

Barrios, K., McQuillan, D., Longmire, P., Reid, B. and K. Yurdin. 2020. "Investigation into Lead Concentrations in the Animas River in New Mexico, N.M." Water Resources Research Institute (WRRI), 5th Annual Animas and San Juan Watersheds Conference: Managing and Improving Water Quality in a Multijurisdictional Watersheds, June 15-19, 2020, Virtual Meeting. https://animas.nmwrri.nmsu.edu/2020/abstracts/ (Abstract 12)

Cook, R., Ratcliff, A., McQuillan, D., Yurdin, K., Austin, S. and L. Parham. 2019. "Water Quality Monitoring in the San Juan River Watershed – Multijursidictional Efforts Using WIIN Act Appropriations." N.M. Water Resources Research Institute (WRRI), 4th Annual Animas and San Juan Watersheds Conference: Successes and Challenges from Headwaters to Lake Powell, June 19-20, 2019, Farmington, NM. https://animas.nmwrri.nmsu.edu/2019/abstracts/oral-presentations/ (Abstract 7)

McQuillan, D. 2018. "Protecting New Mexico's Buried Treasure: A Summary of Groundwater Quality Protection in New Mexico." Keynote Address for 2018 New Mexico Geological Society Annual Spring Meeting, April 13, 2018, Macey Center, New Mexico Tech campus, Socorro, NM. https://nmgs.nmt.edu/meeting/abstracts/view.cfm?aid=792

Linhoff, B., Longmire, P., Rearick, M., McQuillan, D. and G. Perkins. 2016. "Water Quality and Hydrogeochemistry of a Basin and Range Watershed in a Semi-Arid Region of Northern New Mexico." Environmental Earth Sciences: 75:640, http://link.springer.com/article/10.1007/s12665-015-5179-8

McQuillan, D., Holmes, M., Surgeon, B., Esparsen, J. and R. Romero. 2013. "Sustainable Drinking Water Sources." in: 58th Annual New Mexico Water Conference: New Water Realitites - Proposals for meaningful change, November 21-22, 2013, Albuquerque, New Mexico, New Mexico State University, Water Resources Research Institute, Report, v. 364, pp. 155. https://nmwrri.nmsu.edu/wp-content/uploads/2015/watcon/proc58_1/PosterAbstracts.pdf (Poster abstract 31)

McLemore, V.T., D. Vaniman, D. McQuillan, and P. Longmire. 2011. "Uranium Deposits in the Espanola Basin, Santa Fe County, New Mexico." New Mexico Geological Society, Fall Field Conference Guidebook – 62, Geology of the Tusas Mountains and Ojo Caliente, pp. 399-408. http://nmgs.nmt.edu/publications/guidebooks/62/http://nmgs.nmt.edu/publications/guidebooks/downloads/62/62_p0399_p0408.pdf

McQuillan, D. 2007. "Groundwater Contamination by Septic Tank Effluents." in: 51st New Mexico Annual Water Conference Proceedings, Water quality for the 21st century, October 3-4, 2006, Albuquerque, NM, New Mexico State University, Water Resources Research Institute, Report, v. 340, pp. 95-104. https://nmwrri.nmsu.edu/water-conference-proceedings-2/water-quality-for-the-21st-century/

MCQUILLAN'S
EXHIBIT 2

Direct Technical Testimony of Dennis McQuillan

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Acronyms Used

AOC – Administrative Order on Consent

COVID – Coronavirus Disease

EID – Environmental Improvement Division of the N.M. Health and Environment Department, predecessor agency to the New Mexico Environment Department

NMAC – New Mexico Administrative Code

NMED – New Mexico Environment Department, as used in this testimony may include EID

ONRW – Outstanding National Resource Waters

TMDL – Total Maximum Daily Load

UNM – University of New Mexico

UPWA – Upper Pecos Watershed Association

USDOJ – United States Department of Justice

USEPA – United States Environmental Protection Agency

USFS – United States Forest Service

USGS – United States Geological Survey

VMS – volcanogenic massive-sulfide, a type of mineral/ore body

WQCC – New Mexico Water Quality Control Commission

Introduction

My name is Dennis M. McQuillan. I provide this testimony on my own behalf as a New Mexico citizen who has long enjoyed the exceptional recreational opportunities in the Upper Pecos Watershed, and as an environmental professional who is passionate about protecting water resources in New Mexico and who has worked in the Upper Pecos Watershed for decades. I do not represent a client or any other person in this matter either on a paid or unpaid basis.

I strongly support N.M. Water Quality Control Commission (WQCC) Petition WQCC No. 21-51(R) that would designate waters of the Upper Pecos Watershed as Outstanding National Resource Waters (ONRW). My technical testimony provides supplemental information for:

1. Section II.E of the Petition "Activities That Might Reduce Water Quality;"
2. Section III.C of the Petition "Exceptional Recreational Significance;" and
3. Section III.H of the Petition "Designation of Nominated Waters Would be Beneficial to the State."

Qualifications

My resume is contained in McQuillan's Exhibit 1. I earned a Bachelor of Science degree in geology, with a distributed minor chemistry, mathematics, and physics from the University of New Mexico (UNM) in 1978. I began my career as an Environmental Scientist in the Water Pollution Control Bureau of what was then the Environmental Improvement Division (EID) of the New Mexico Health and Environment Department. The state legislature reorganized EID into the New Mexico Environment Department (NMED), a cabinet level agency, in 1991. After a career of more than 41 years of state service, I retired as NMED's Science Coordinator in 2020. I am presently a geologist and proprietor of High Desert Science, an environmental consulting and training business that I founded on July 1, 2021.

From 1981 to 2021, I testified many times as an expert witness in various administrative, judicial, and legislative proceedings. I testified in numerous rule making/amendment proceedings before the WQCC, the N.M. Environmental Improvement Board, the Oil Conservation Commission, and before the Public Regulation Commission. I am judicially qualified as an expert in both state and federal district court. I have also testified before the N.M. Legislature and U.S. Congress.

I served as the NMED Secretary's designee on two statutory committees, the New Mexico Mining Commission, and the Carlsbad Brine Well Remediation Authority.

My professional experience in the Upper Pecos Watershed includes:

1. Investigating water pollution from the Terrero Mine, especially the catastrophic impacts from a runoff event in 1991 and assisting with negotiation of a 1992 Administrative Order on Consent that led to extensive corrective action.
2. Overseeing the NMED's issuance of liquid waste permits in the watershed from 2004-13 and working with the Upper Pecos Watershed Association in 2010-12 on water quality issues from septic systems and illegal cesspools.
3. Investigating potential metals and cyanide contamination from runoff and smoke released by the 2000 Viveash and 2002 Dalton Canyon Wildfires and participating in NMED's emergency response activities during the 2013 Tres Lagunas Wildfire.

I also have observed, first-hand, natural, and anthropogenic threats to water quality the Upper Pecos Watershed. On hiking and backpacking trips while I was in college at UNM and during my early NMED career, I remember driving through Terrero and seeing Willow Creek heavily polluted by acid-mine waste. While some degree of tree mortality has always existed, I have observed the increasing threats caused by warming climate, drought, and bark beetle infestations. I have hiked and camped in Dalton Canyon both before and after the 2002 wildfire. I lived in Pecos during the summer of 2018 when Santa Fe National Forest and the Pecos Wilderness were shut down due to extreme drought, very little snowpack, and extraordinary fire risk. I also have observed the evidence of recreational overuse in many areas of the Upper Pecos Watershed that has been a problem for many years.

Activities that Might Reduce Water Quality in the Upper Pecos Watershed

Potential Hardrock Mining

In addition to the information presented in Section II.E.1 of the petition, the following case history of legacy mining contamination in the Upper Pecos Watershed is summarized from Robinson (1995) and McQuillan et al., (2016).

The Terrero[1] (or Tererro or Pecos) mine exploited a volcanogenic massive-sulfide (VMS) ore body that was discovered in 1881 near the confluence of Willow Creek with the Pecos River. Major ore minerals included sphalerite (ZnS), galena (PbS) and chalcopyrite ($CuFeS_2$). The ore also contained many other minerals including native gold and metalliferous sulfides, carbonates, and sulfates. Large-scale mining occurred from 1927-39 (Figure 1). Ore was conveyed by an aerial tramway to the El Molino (or Alamitos Canyon) mill, located in the region but outside of the Upper Pecos Watershed, for processing. The State of New Mexico acquired ownership of the mine and mill sites in 1950. Up until the 1970s, mine and mill waste had been used as fill material for roads, campgrounds, camping pads, a trailhead, and at the Lisboa Springs Fish Hatchery.

Figure 1. The Terrero Mine in the early 20th Century. (N.M Bureau of Geology and Mineral Resources)

[1] "Terrero" is a Spanish term meaning dump or heap of earth.

Waste from the Terrero mine site was a significant source of water pollution, and cause of periodic fish kills, when I began my career with EID/NMED in 1979. Early spring rainfall runoff from the Terrero mine site in 1991 caused a massive fish kill, and more than 90,000 trout died at the hatchery alone. The fish kill brought attention to the unaddressed contamination from the mine and mill. Concerns about human health led the U.S. Forest Service (USFS) to close forest roads, campgrounds and a trailhead where mine waste had been used as fill. The U.S. Fish and Wildlife Service reported lead concentrations in fish tissue at or near the human consumption criterion and in small mammal tissue above raptor protection criterion. Publicity generated by these 1991 events had a severe impact on the recreational economy of the Village of Pecos.

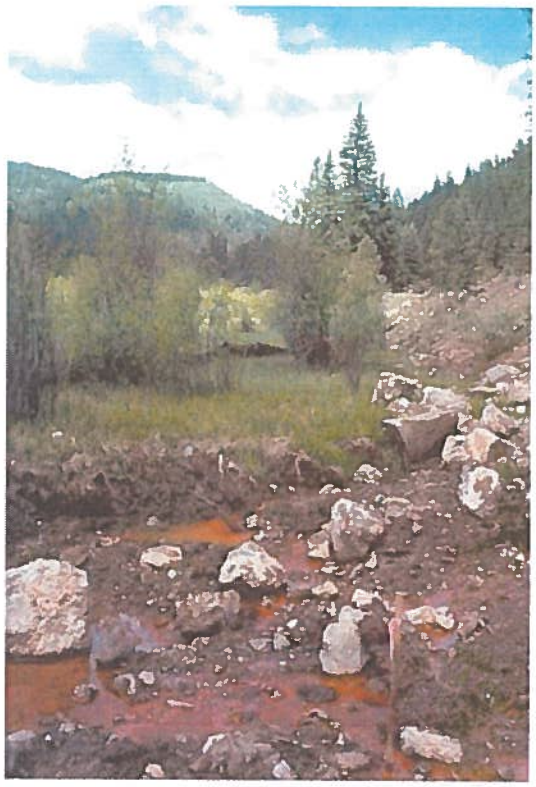
The mining company and state signed an Administrative Order on Consent (AOC) on December 2, 1992 containing many provisions parallel to the Superfund process to be executed under state authority with U.S. Environmental Protection Agency (USEPA) oversight. The AOC included a Cost Sharing Agreement where the mining company was responsible for 80% of the total cost of investigation, remediation and natural resource damages, and the State of N.M. was responsible for 20%. The USFS was not a party to the AOC but allocated $1.2 million to remove or cap mine waste that had been used as fill at roads and campgrounds. Pursuant to the AOC, source control and site restoration actions were conducted at both the mine and mill. No fish kills attributable to the mine have occurred since the mid-1990s, contaminant levels in surface water and stream sediment have decreased, and stream impairments for several parameters have been lifted. As detailed in Section III.H.3 of the Petition, the recreational economy of the Village of Pecos remains intact.

Pictures of Willow Creek before and after restoration (Figure 2) underscore characterization of the Terrero Mine cleanup as a "Success Story" by NMED and USEPA (Guevarra and Meyerson, 2014). Restoration, however, is not entirely complete and, as recently as this year (2022), the N.M. State Legislature appropriated $150,000 towards New Mexico's 20% share of ongoing cleanup costs (N.M. State Legislature, 2022).

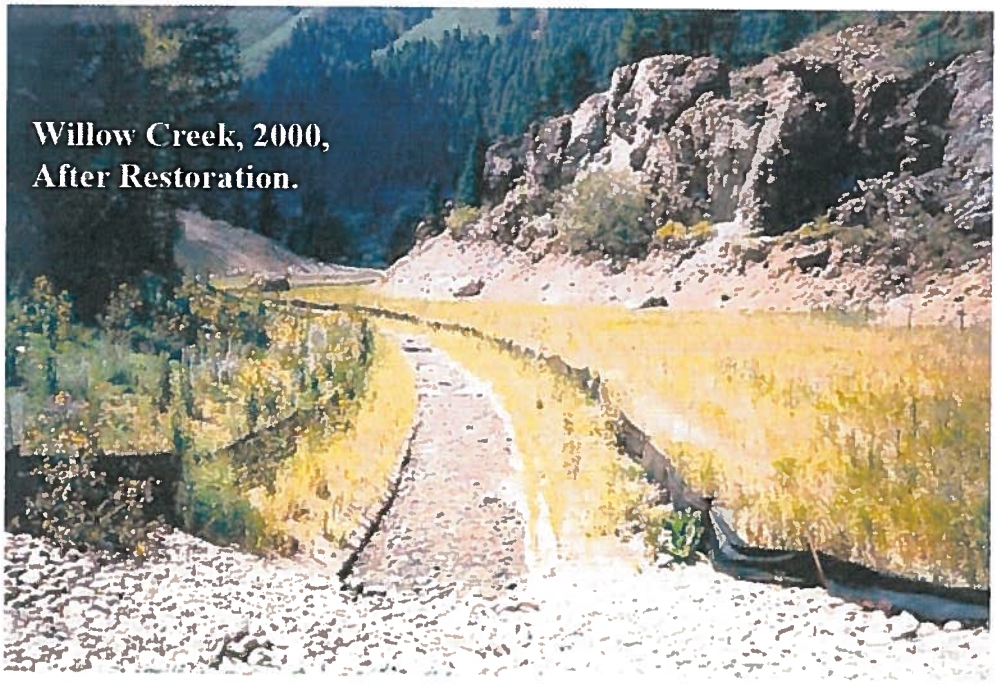
Unexploited VMS mineralization remains in the Upper Pecos Watershed (New World Resources Limited, 2017) and it is possible that additional mining may occur in the future. Designation of the Upper Pecos Watershed as ONRW is important to ensure that:

- ongoing cleanup of the Terrero mine site pursuant to the AOC is completed; and
- any future mining is conducted in a manner to avoid degradation of the existing high quality and exceptional recreational and ecological significance of these waters.

Figure 2. Willow Creek Before and After Terrero Mine Site Restoration. (McQuillan, 2015)



Willow Creek with Acid Drainage from the Terrero Mine Site, 1991, Before Restoration.



Development and Transportation

In addition to the information presented in Section II.E.2 of the petition, onsite wastewater (septic) systems in the Upper Pecos Watershed are a potential source of ground and surface-water quality deterioration (McQuillan, 2007). Septic systems are a common source of groundwater contamination in New Mexico and, in some areas where groundwater flows into gaining streams, these contaminants have contributed to the impairment of up to 400 river miles of surface water in the state (ibid). Potential impacts of septic systems on water quality in the Upper Pecos Watershed are discussed by UPWA (2019).

Increased Recreational Use Without Proper Management

Section II.E.3 of the petition explains the importance of protecting the exceptional recreational value of the Upper Pecos Watershed. Recreational overuse in the Upper Pecos Watershed has been an issue for many years (USFS, 2003; Brunt, 2008), and Dalton Canyon provides an example of increased recreational use related to the COVID-19 pandemic.

> "Always popular for camping, hiking and fishing, the Dalton Canyon area was hit particularly hard by COVID-related recreational use in summer 2020, with mounds of trash left behind, severe soil compaction, human waste on the ground and an oil spill in the creek." (USFS, 2021)

Consequently, Santa Fe National Forest is taking measures to limit vehicular traffic and constructing permanent barriers to allow the Dalton Canyon riparian area to recover from decades of overuse that was especially heavy in 2020. (ibid)

Waste Disposal

In addition to the information presented in Section II.E.4 of the petition, illegal discharges of septage from vacuum trucks, and of black and gray water from recreational vehicles, are potential sources of water contamination (UPWA, 2019).

Wildfires

In addition to the discussion presented in Section II.E.5 of the petition, the following information is provided on actual and predicted wildfire activity.

As explained by the U.S. Geological Survey (USGS):

> "Wildfires are not a new phenomena; they have been influencing landscapes and the lives of plants, animals and people for centuries to millennia. Fire in wildlands can increase the resilience of fire-adapted ecosystems, improve wildlife habitat, and reduce future wildfire risk. However, increases in wildfire size, frequency, severity, and duration are changing the landscape of the United States, killing large tracts of forest, affecting air quality and water supplies, as well as threatening lives and property. These changes in fire are highly influenced by human land use and climate change." (Margolis, 2021)

In New Mexico specifically, wildfire size and intensity have increased over the past several decades (Mueller et al., 2020). Wildfire frequency and severity in the state are predicted to increase over the next several decades (Dunbar et al., 2021). Mueller et al. (2020) found that increasing temperature, aridity, and drought were associated with increasing burn area, and that the area burned at high severity was most closely related to climate variables. An example of a high-severity burn area in New Mexico, where almost all above-ground biomass was consumed, is shown in Figure 3.

After a wildfire, the magnitude of runoff from the burn area often increases due to hydrophobic soils created during the fire, and loss of vegetation. Increased runoff can result in:

- flooding and damage to drinking-water infrastructure (Pecos River after the 2013 Tres Lagunas wildfire https://www.youtube.com/watch?v=5vOO3AKG5Q0);
- accelerated erosion (Whitewater Canyon after the 2013 Whitewater-Baldy Complex wildfire, Figure 4);
- debris flows (Cochiti Canyon after 2011 Las Conchas wildfire, https://www.youtube.com/watch?v=sstvu_aRfqA); and
- increased sedimentation in downstream water bodies (Bonito Lake after the 2012 Little Bear wildfire, Figure 5).

Burn area runoff also can contaminate surface water with ash, sediment/turbidity, major ions, nutrients, metals, and pyrogenic dissolved organic matter (USGS, 2018; Chow et al., 2021; Dunbar et al, 2021). When wildfires burn human infrastructure, such as electronics, plastics, cars, and other artificial materials, runoff contaminants also may include toxic anthropogenic chemicals. Wildfire runoff can damage drinking-water and agricultural infrastructure and harm ecosystems and aquatic life (ibid). While water-quality in riverine systems can rapidly improve with successive post-fire runoff events, wildfire contaminants can accumulate in lakes and reservoirs (Figure 5) creating long-term issues (Chow et al., 2021).

Investigations of wildfire runoff in New Mexico reported the following water-quality impacts:

- increased mercury deposition, and mercury methylation, in Caballo Reservoir (Caldwell et al., 2000);
- elevated concentrations of major ions, metals, radionuclides, and nutrients related to the 2000 Cerro Grande fire (Gallaher and Koch, 2004);
- elevated concentrations of turbidity, total organic carbon, phosphorous, sulfate, mercury, aluminum, and cyanide in the Pecos River related to the 2000 Viveash wildfire (Hopkins, 2001); and
- decreases in dissolved oxygen in the Rio Grande extending more than 70 miles downstream from the 2011 Las Conchas burn area (Ball et al, 2021).

Water-quality degradation caused by wildfire runoff also has caused devastating fish kills in rivers and lakes in New Mexico (Figure 5; Rinne and Jacoby, 2005; Moffatt, 2017; Dunbar et al., 2021). The smothering effects of ash and depletion of dissolved oxygen can kill fish and the aquatic insects they eat.

Figure 3. Remains of Piñon-Juniper Woodland after High-Severity Burn, 2011 Las Conchas Wildfire. U.S. Geological Survey (USGS) scientist observes the results of the extensive, tree-killing fire that consumed almost all above-ground biomass in this part of the Las Conchas Fire burn area in the Jemez Mountains, New Mexico. Photo taken in late August 2011, two months post-fire. Forest drought stress is highly correlated with mortality from poor growth, bark beetle outbreaks, and high-severity fire. (USGS public domain photograph, https://www.usgs.gov/media/images/tree-killing-las-conchas-fire-new-mexico)

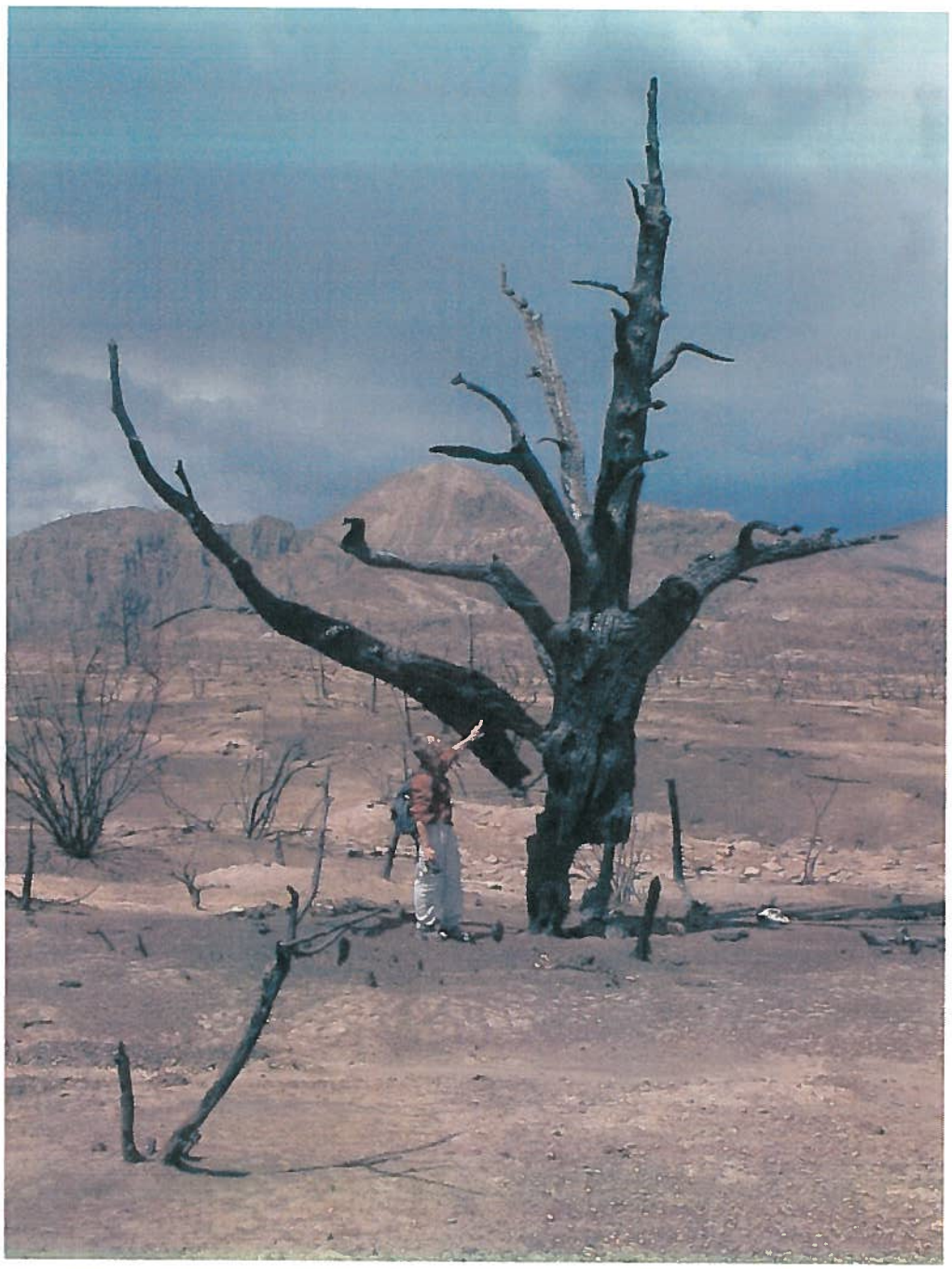
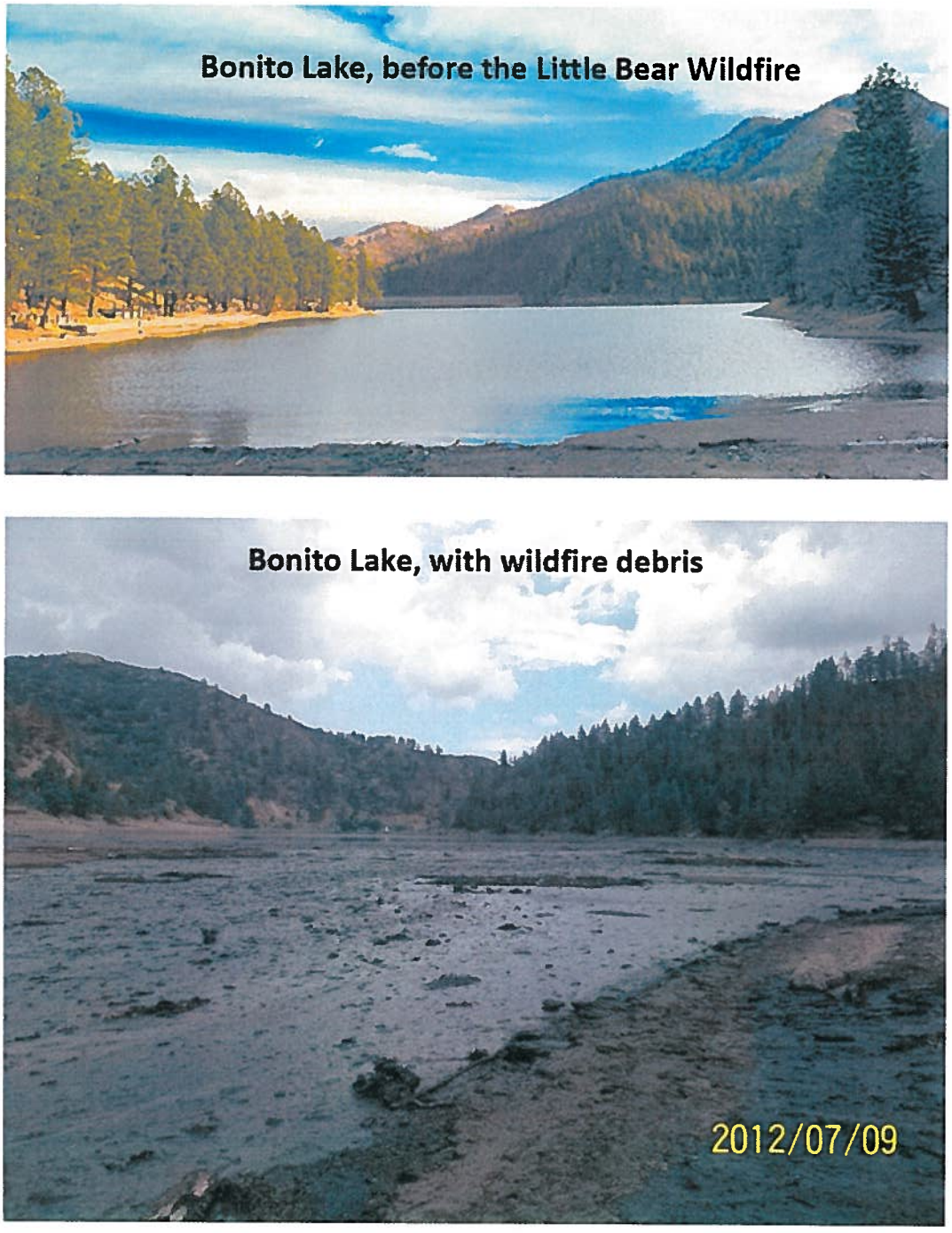


Figure 4. Post Wildfire Runoff, Erosion and Debris Flow, Whitewater Canyon, Glenwood, NM, Whitewater-Baldy Complex Wildfire, 2013. (USGS, public domain photograph, https://www.usgs.gov/centers/new-mexico-water-science-center/science/postwildfire-debris-flow-hazards)

Figure 5. Bonito Lake, Near Ruidoso, NM Before and After the 2012 Little Bear Wildfire. Bonito Lake in Lincoln County was a recreation area and drinking-water source. Runoff from the 2012 Little Bear Wildfire, however, killed all fish and deposited a large amount of sediment in the lake. After 10 years, millions of dollars, and the excavation and disposal of about 580,000 cubic yards of sediment (Stallings, 2019), restoration is expected to finish in 2022 (Maxwell, 2021). (File pictures: pre-fire, N.M. Department of Game and Fish; post-fire, NMED)



Forests typically produce the most stable and highest quality of water for domestic, agricultural, industrial, and ecological needs (Bladon et al., 2014; Liu et al., 2021). Relative to surrounding areas, forests receive high precipitation and yield large quantities of runoff with low contaminant concentrations (ibid). Indeed, water supply reservoirs have been constructed in many watercourses that drain forested areas in New Mexico and elsewhere.

Low-severity surface wildfires may not alter pre-fire forest composition and structure (Coop et al., 2020). High-severity wildfires where most trees are killed (e.g., Figure 4), however, can convert pre-fire forests to a different type of forest or to a non-forest ecosystem (ibid). The Dalton Canyon fire in the Upper Pecos Watershed, for example, resulted in conversion of conifer forest to oak shrubland (Figure 6). Forest recovery may be compromised by climate change, drought, and changing wildfire regimes, and it is uncertain if severely burned forests will ever return to pre-fire ecosystems (Coop et al., 2020). Long-term monitoring is needed to identify any deterioration of water quantity and quality related to ecosystem conversions caused by wildfires.

Significant wildfires have already occurred within and/or near the Upper Pecos Watershed including: Viveash in 2000; Dalton Canyon in 2002; Jaroso in 2013; and Tres Lagunas in 2013. Designation of the Upper Pecos Watershed as ONRW is important to ensure that wildfire prevention, suppression, and restoration are conducted in a manner to avoid permanent degradation of the existing high quality and exceptional recreational and ecological significance of these waters.

Figure 6. Conversion of Conifer Forest to Oak Shrubland after the 2002 Dalton Canyon Fire. (From Dunbar et al, 2021; photograph by Craig D. Allen)

Climate Change

An expert panel convened by the N.M. Bureau of Geology and Mineral Resources concludes,

> "The earth is warming in response to increasing atmospheric carbon dioxide, and this warming will result in greater aridity in many parts of the world, including New Mexico. The primary observed and projected impacts include warmer temperatures, decreased water supply (partly driven by thinner snowpacks and earlier spring melting), lower soil moisture levels, increased frequency and intensity of wildfires, and increased competition and demand for scarce water resources." Dunbar et al. (2021)

Section II.E.6 of the Petition presents information on potential climate-change impacts to streamflow and water quality in the Upper Pecos Watershed. The Pecos River is one of the southernmost snow-dominated rivers in North America and is among the most sensitive rivers in the world to the effects of diminishing snowpack as winter and spring temperatures increase (Dunbar et al, 2021).

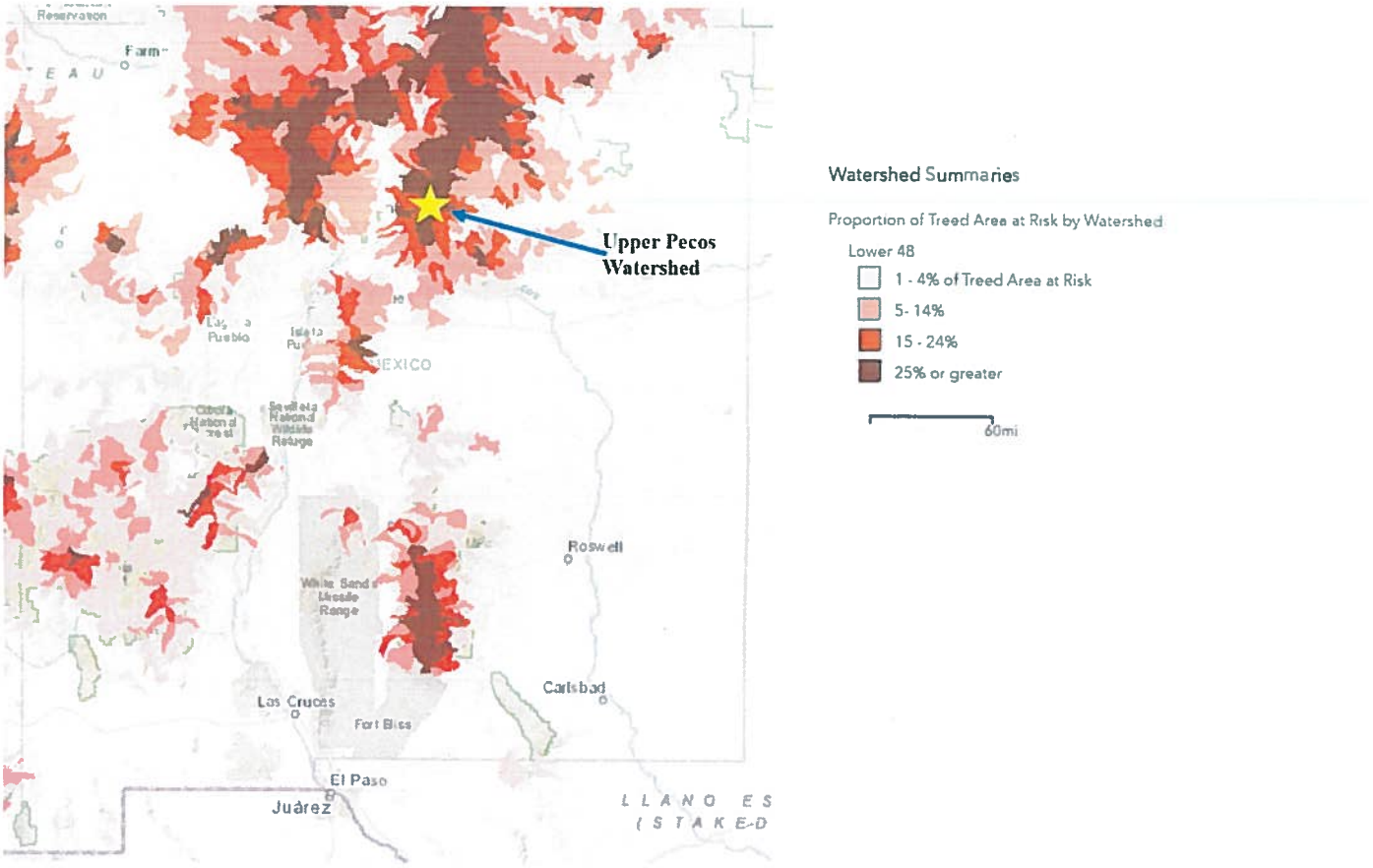
The effects of climate change on wildfire activity in New Mexico, and in the Upper Pecos Watershed, are discussed above.

The U.S. Forest Service National Insect and Disease Risk Map Viewer (USFS, 2022.a) shows significant risks from bark beetles, defoliators, and root diseases in the Upper Pecos Watershed (Figure 7). Trees stressed by drought and climate change are more vulnerable to attack by bark beetles, and trees killed by bark beetles pose a wildfire hazard. Bark beetles have already caused extensive tree mortality in the headwaters of the Pecos River (Dunbar et al., 2021).

Section II.E.6 of the Petition discusses how warming surface water, and consequential decreases of dissolved oxygen, create potential threats to fish.

Whirling disease, caused by the parasite *Myxobolus cerebralis*, has infected the Pecos River and harmed hatchery rainbow trout and Rio Grande cutthroat trout (Matlock, 2013; Niman, 2016; USFS, 2022.b). Research is ongoing into whether environmental variables and warming climate can increase parasitic infections in fish (Casas-Mulet et al., 2021; Fetherman, 2016; Niman, 2016).

Figure 7. Summary Risk Map for Bark Beetles, Defoliators, and Root Diseases in New Mexico. (USFS, 2022.a)



Exceptional Recreational Significance

Section III.C of the Petition provides substantial information on the exceptional recreational significance of the Upper Pecos Watershed. I have frequently visited the Upper Pecos Watershed for hiking, camping, backpacking, picnicking, and cross-country skiing from the early 1970s to the present. Many trails in the Upper Pecos Watershed provide access into the Pecos Wilderness. I have even ice skated on Dalton Canyon Creek when it is frozen into a solid ribbon of ice with little or no snow on the ground. I lived in Pecos during 2017-19, and I presently live about 11 miles southwest of Wildhorse Creek, one of the waters proposed for ONRW designation. For many families in this region, enjoyment of the exceptional recreational opportunities in the Upper Pecos Watershed is multi-generational (Figure 8).

Designation of Nominated Waters Would be Beneficial to the State

As described in Section III.H of the Petition, the Upper Pecos Watershed is one of the state's highest-quality and most-valued surface waters.

In 1971, the people of New Mexico approved the Pollution Control Amendment to the State Constitution that affirms,

> "The protection of the state's beautiful and healthful environment is hereby declared to be of fundamental importance to the public interest, health, safety and the general welfare." (Article XX, Section 21)

I can think of no better example of protecting New Mexico's "beautiful and healthful environment" than the remarkable, decades-long history of federal, state, tribal, county, municipal, citizen, and industry collaboration to protect the Upper Pecos Watershed.

- In 1990, Congress designated 20.5 miles of the Upper Pecos River, including 7 miles within the Upper Pecos Watershed as defined by the Petitioners in this matter, as a National Wild and Scenic River (U.S. Congress, 1990). The authorizing statute, the Wild and Scenic Rivers Act of 1968, declares it is the "policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." (USDOJ, 2015)

- In 1992, federal, state, and local governments, citizen advocates, and industry collaborated to abate legacy water pollution from the Terrero Mine, as described above.

- In 2003, the U.S. Forest Service published a Wild and Scenic River Management Plan for the Pecos River to, "provide a long-term management strategy for protecting and enhancing the river's free-flowing condition, water quality, and scenic, recreational and cultural/historic values." (USFS, 2003)

- In 2005, the N.M. Environment Department established, and USEPA approved, Total Maximum Daily Loads (TMDLs) for the Pecos Headwaters Watershed, that includes the Upper Pecos Watershed as defined by the Petitioners in this matter (NMED, 2005). TMDLs are the maximum amounts of pollutants a water body can assimilate without violating state water-quality standards. Additional TMDLs applicable in the Upper Pecos Watershed were set by NMED and approved by USEPA in 2013 (NMED, 2021).

- In 2006, the Upper Pecos Watershed Association was formed to address non-point source pollution and related issues (UPWA, 2019).

- In 2008, recreational overuse, erosion, pollution of the Pecos River, and desecration of a scared Tribal cave were problematic, and some stakeholders suggested that state properties in Pecos Canyon be designated as a state park to improve management and preservation of the land and water (Brunt, 2008).

- In 2009, the N.M. State Legislature declared, "Pecos canyon contains an outstanding diversity of resources with statewide, and in some cases, national, significance, including areas of scientific, aesthetic, geologic, natural, cultural and recreational value ..." and requested that the N.M. State Parks Division of the Energy, Minerals and Natural Resources Department establish Pecos Canyon State Park (N.M. State Legislature, 2009).

- In 2020, Pecos Canyon State Park opened for day use. Camping at the park opened in 2021.

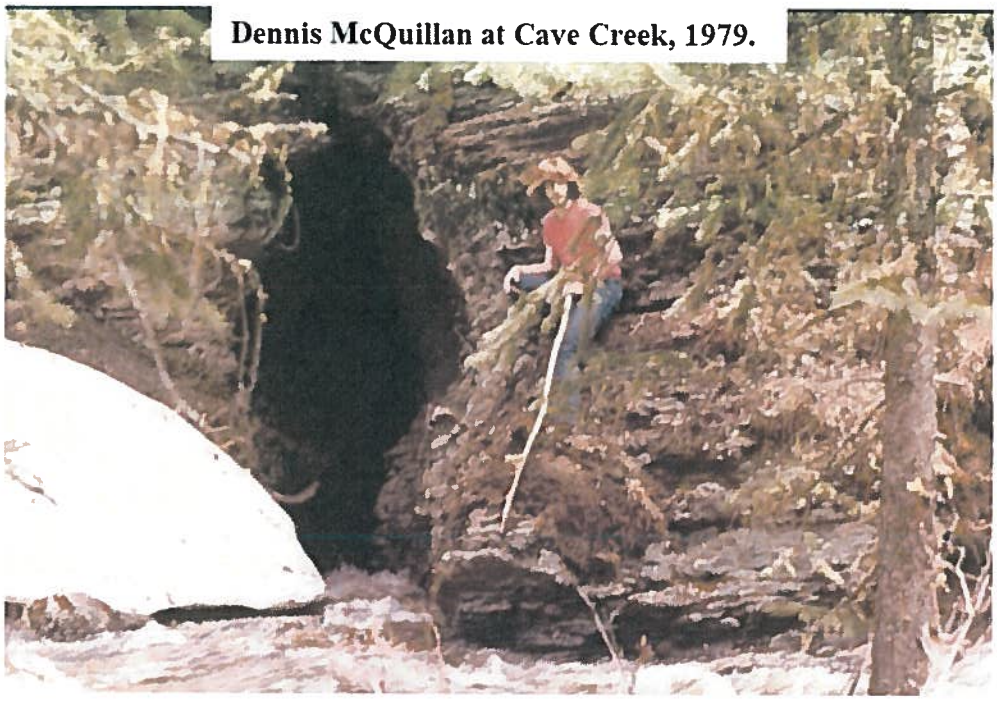
- In 2022, the Petitioners in this matter propose to further protect this exceptional watershed with the anti-degradation provisions of ONRW designation.

Protecting the Upper Pecos Watershed with ONRW designation, unquestionably, would be beneficial to the state and consistent with Article XX, Section 21 of the New Mexico State Constitution. ONRW designation would supplement, not duplicate, the prior actions and protective measures described above.

Figure 8. Multi-Generational Recreation in the Upper Pecos Watershed.

One of my favorite adventures, that I enjoyed both as a young man and later as a parent, is to camp at Panchuela Campground, in the Upper Pecos Watershed, and take day hikes to places such as Cave Creek. The WQCC previously designated Cave Creek as ONRW (NMAC, 2022, Section 20.6.4.9.D.3.b.i).

Dennis McQuillan at Cave Creek, 1979.



Shannon & Aiden McQuillan at Cave Creek with their Dad, 2005.

Discussion and Conclusions

The proposed designation of the Upper Pecos Watershed as ONRW is:

- beneficial to the State of New Mexico;
- needed to protect the existing high quality and exceptional significance of these waters from potential future degradation caused by mining, development, transportation, recreational use, waste disposal, wildfires, and climate change; and
- consistent with the designation requirements of NMAC (2022).

For these reasons, I strongly encourage the WQCC to adopt the regulation amendments proposed by the Petitioners so that the Upper Pecos Watershed can be protected in perpetuity as a source of high-quality water for domestic, agricultural, recreational, and ecological needs.

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