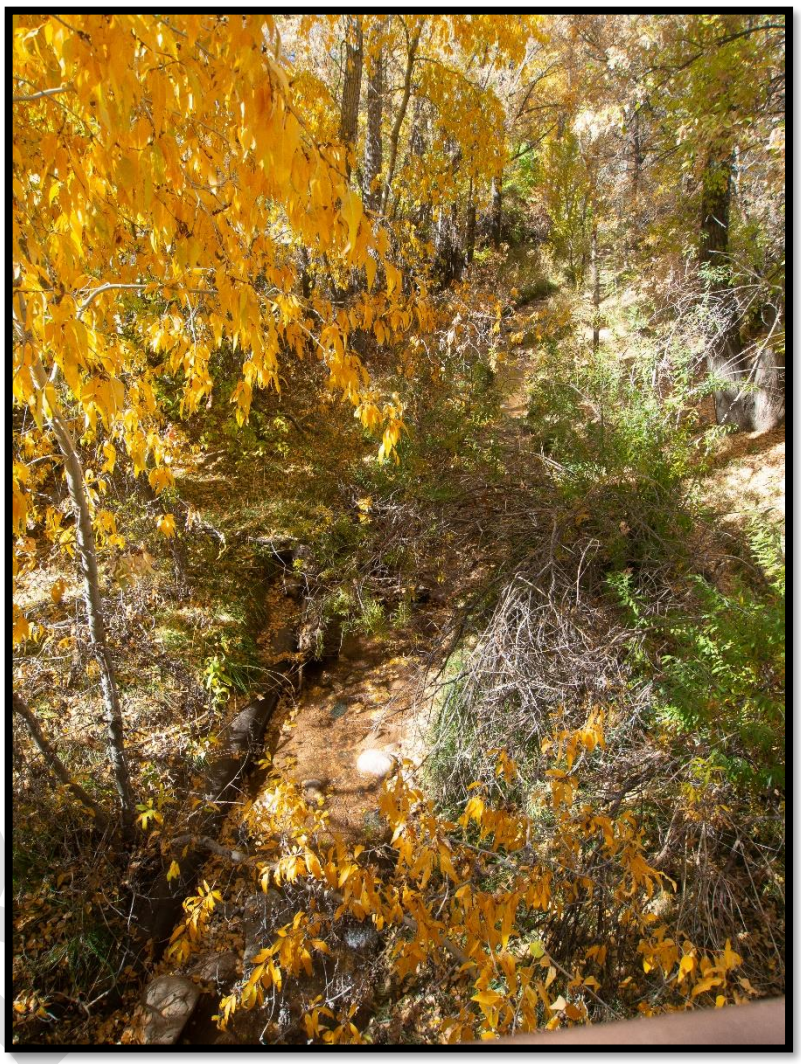

Stakeholder Priorities, Water Management, and Adaptation Strategies in the Santa Fe River Watershed

March 2023

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EXECUTIVE SUMMARY

Given the importance of solving complex water supply and demand challenges for the ever-expanding human population, it is incumbent for government water management agencies to periodically step-back, assess, and refine their public outreach process. This includes understanding alignments and misalignments between government agency priorities and those of their diverse constituents and neighbors. Such an understanding allows agencies to cater communication and engagement strategies to specific stakeholder groups and increase the probability of collectively achieving long-term, resilient water management initiatives in a timely and cost-effective manner.

The Santa Fe Watershed Association (SFWA) was awarded funding through the Bureau of Reclamation's WaterSMART Phase 1 Cooperative Watershed Management Program Planning Grant to design an investigation aimed at understanding the range of water conservation and management priorities among diverse stakeholder groups throughout the Santa Fe River Watershed in northern New Mexico. The purpose was to gain insight into how those priorities and perspectives aligned with or diverged from initiatives proposed or underway by City and County water management agencies. The goal was to share findings with City and County water managers and work with them to identify salient issues relevant to different stakeholder groups across the watershed to help inform their future outreach and implementation efforts in the face of climate and landscape change.

A stakeholder assessment was designed and implemented to gather perspectives on salient issues and priorities from a diverse group of individuals and entities in the Santa Fe Watershed to help highlight public engagement needs and inform possible strategies within watershed planning and implementation processes. There were two phases to the assessment. The first phase involved interviews with key stakeholders representing diverse interests. The second phase involved a sorting of priorities gathered in phase one interviews and was conducted using an online Q-Sort process with a subset of the same individuals who participated in Phase 1. An informal but instructive third phase involved presenting the preliminary results from the interviews and Q-sort to the City of Santa Fe as well as other stakeholders and participants to receive real-time feedback, which helped inform this final report.

Six key findings from the stakeholder assessment are summarized below.

- **A wide range of issues, concerns, and priorities were raised by stakeholder representatives in initial interviews.** The most commonly mentioned water issues and concerns across sectors and interest groups were water flow, wildfire threats, water quality, ecosystem health, and water conservation.
- **The follow-up Q-Sort process revealed overall highly ranked priorities related to climate change, native species, pollution standards, ecological justice, social equity, and fire management and planning.**

- **Despite common themes, there were significant differences in perspective.** Important nuances revealed differences in how interview participants perceived and defined specific problems and solutions within broader priorities.
- **A number of perceived obstacles to achieving Santa Fe River and Watershed priorities were found.** The most often mentioned obstacles were funding, assumptions of opposition, barriers to stakeholder participation, drought, climate change, and invasive species.
- **Concerns were raised about power dynamics and stakeholder engagement within the watershed.** Interview participants often expressed a general lack of satisfaction with public input processes, troublesome upstream-downstream power relations, and a lack of government-to-government communication with Pueblos.
- **Five statistically distinct groups emerged from the Q-Sort Process, with integration across interest groups.** This finding refutes the widely held assumptions that people in the same interest group perceive and respond to river and watershed issues in similar and predictable ways, and vice versa.

One way to think about the resilience of the Santa Fe Watershed is the interactional capacity of the collective array of interests. Interactional capacity refers to the ability of a local community to work together and mobilize resources around shared interests in times of need (Flint and Luloff 2005). Stakeholder interviews conducted as part of this assessment highlighted strong assumptions of opposition related to these interest groups. However, the priority sorting process revealed perspectives that integrate people from multiple interest groups as well as broad themes of consensus among respondents, possibly offering guideposts for deeper community interaction. If there is interest in building interactional capacity to address the river and watershed issues that are important to stakeholders--including those in decision making and management positions--attention toward new modes of collaboration and engagement is warranted.

The authors therefore offer the following recommendations:

- Emphasize the synergy across interests in watershed priorities such as water security and flow, climate change, stormwater management, and groundwater recharge.
- Take time to understand the nuances in perspectives and priorities related to wildfire and forest management, water rights, water quality, and water infrastructure.
- Beware of assumptions of opposition across traditional interest groups.
- Facilitate engagement across stakeholders early and throughout deliberation processes for input and collaboration.
- Ensure proactive government-to-government dialogue and negotiations over water issues with Pueblos.
- Provide and seek out cultural literacy training and information to support building interactional capacity.
- **Build interactional capacity for watershed resilience by catalyzing collaboration, taking time to build trusting relationships around shared goals, and integrating diverse ways of knowing.**

1.0 INTRODUCTION

1.1 Project Background and Purpose

Regional and global climate models predict that New Mexico will become hotter and more arid over the next 50 years due to human-caused climate change (NMBGMR 2022). The primary observed and projected impacts of climate change include increased temperatures, decreased water supply, lower soil moisture levels, increased frequency and intensity of wildfires, and increased competition and demand for scarce water resources (Gonzales et al. 2018). Federal, state and local government agencies charged with managing New Mexico's water resources have been collaborating for many years using climate models and other tools to project changes in water supply and demand over time and to develop science-based strategies for conserving and sustaining both groundwater and surface water supplies for humans and the natural environment. This includes a detailed study jointly prepared by the Bureau of Reclamation (Reclamation), the City of Santa Fe (City), and Santa Fe County (County) titled *Santa Fe Basin Study: Adaptations to Projected Changes in Water Supply and Demand* (herein "Basin Study"; Llewellyn et al. 2015, updated 2019 by Tetra Tech, Inc.).

The Basin Study was developed to evaluate and address the impacts of increased competition for limited water supplies, climate change, and other stressors, and to define options for meeting future water demands for the greater Santa Fe area. The study accomplished this by: 1) identifying the vulnerabilities of systems in the watershed to climate change; 2) assessing Santa Fe's changing water supply and demand, including native surface-water supplies from the Santa Fe Watershed, the Upper Rio Grande, and the San Juan Basin (i.e., imported water from Colorado River tributaries via a trans-basin diversion), as well as groundwater supplies from the City's and County's well fields, and 3) identifying and analyzing potential adaptation strategies for the combined City and County water supplies (Llewellyn et al. 2015).

The Basin Study is just one of several examples of the City and County's forward-thinking, science-based water planning and conservation initiatives. The City has received national recognition for its progressive water policies, including its tiered water pricing policy (New York Times 2015) and its water efficiency rebate program (Glennon 2010). The City's *Payment for Ecosystem Services* program (McGrath & Greenwalt 2008) to protect its municipal water supply through active forest management in the upper watershed was one of the first of its kind in the southwestern United States and has served as a model for similar initiatives within (Parametrix et al., 2013) and outside of New Mexico (e.g., Miller 2015).

Even the best laid scientific and policy initiatives, however, can meet resistance from the public if they misunderstand a program or feel left out of the decision-making process. Indeed, like many government agencies, public water managers in the Santa Fe River watershed can face challenges with consistently employing stakeholder engagement in a manner that feels

genuinely inclusive, collaborative, and informative to the diverse constituencies living in the watershed. Ineffective public and stakeholder engagement has the potential to result in costly delays or at worst, prevent scientifically justifiable water management initiatives from moving forward.

Given the importance of solving complex water supply and demand challenges for the ever-expanding human population throughout the watershed, it is incumbent upon government water management agencies to periodically step-back, assess, and refine their public outreach process. This includes understanding alignments and misalignments between government agency priorities and those of their diverse constituents and neighbors. Such an understanding allows agencies to cater engagement and collaboration strategies to specific stakeholder groups and increase the probability of collectively achieving long-term, resilient water management initiatives in a timely and cost-effective manner.

1.2 Scope and Objectives

In 2019 the Santa Fe Watershed Association (SFWA) was awarded funding through the Bureau of Reclamation's WaterSMART Phase 1 Cooperative Watershed Management Program Planning Grant (Contract No. R19AP00264) to design an investigation aimed at understanding the range of water conservation and management priorities among diverse stakeholder groups throughout the Santa Fe River Watershed. The purpose was to gain insight into how those priorities and perspectives aligned with or diverged from initiatives proposed or underway by City and County water management agencies. The goal was to share findings with City and County water managers and work with them to identify salient issues relevant to different stakeholder groups across the watershed to help inform their future outreach efforts.

To achieve this goal, SFWA collaborated with researchers and watershed managers from Utah State University and GeoSystems Analysis, Inc. to design and implement the project. The project had four core objectives:

Objective 1: gather, organize and synthesize information regarding spatial relevance and context of watershed issues and current and pending management actions, and to compile a comprehensive list of stakeholders in different portions of the watershed.

Objective 2: develop and implement replicable procedures for documenting watershed priorities and concerns of diverse stakeholders and interest groups that affect and are affected by the Santa Fe River Watershed.

Objective 3: share results with City and County water managers to identify opportunities to cater communication and outreach strategies to specific stakeholder groups across the watershed.

Objective 4: document methods, results, and recommendations in a Phase 1 report.

1.3 Background on the Santa Fe Watershed

The Santa Fe River Watershed is a sub-basin of the Rio Grande located primarily[1] within Santa Fe County, New Mexico. Its headwaters are located on the eastern slope of the Sangre de Cristo Mountains near Lake Peak (elevation 12,409 ft) within the Santa Fe National Forest (SFNF). Below the mountains the Santa Fe River courses west/southwest through the City of Santa Fe (City), Agua Fria, La Cienega, La Cieneguilla, and La Bajada villages in Santa Fe County and eventually through the Pueblo of Cochiti before joining the Rio Grande near Cochiti Dam (**Figure 1**). There is a long history of human habitation and interaction throughout the watershed, beginning with pre-Puebloan and Tano peoples, Tewa, Keres, and other Pueblos, Apache, Diné, Ute, and Comanche, and later Spanish, Mexican, and American settlers (Cajete 2010). The watershed drains approximately 285 square miles. The total length of the Santa Fe River is approximately 46 miles (Grant 2002).

Steep forested slopes in the upper watershed can exceed 40 degrees from the mountainous ridgeline down to the zone where pre-Cambrian rocks of the Sangre de Cristo range meet the deep sediments of the Santa Fe Group that underlies most of the Santa Fe River basin (Pittenger and Yori 2007). The topography downstream of the SFNF boundary is relatively gently rolling except in the deeply incised basalt canyon immediately upstream of where the Santa Fe River enters the Pueblo of Cochiti (**Figure 1**). Underlying geology in the lower watershed and surrounding areas creates the conditions for some of the most extensive and cienega wetlands in New Mexico.

Temperature and precipitation in the watershed vary dramatically with elevation. Average annual precipitation ranges from 35-inches per year near the headwaters to approximately 8 - inches per year at the Rio Grande confluence. Snow season typically occurs from November through April with a seasonal average of 225 inches at the Santa Fe ski area (adjacent to the watershed). Average annual high and low temperatures in the center of the watershed are 65°F and 34.8°F, respectively, with highest daytime temperatures in July (avg high 86°F) and lowest in January (avg high 44°F).

Vegetation types in the watershed are primarily controlled by elevation and associated precipitation and temperature but are also influenced by hydrogeology. Alpine tundra is found at the highest elevations followed in descending order by spruce-fir forest, mixed conifer forest, and then around 7,500 feet a transition to mostly ponderosa pine. Below approximately 6,500 feet the vegetation transitions to a mix of piñon pine-juniper woodlands and semi-arid

[1] The downstream most extent of the Santa Fe River enters Sandoval County (see Figure 1).

rangelands covering approximately 80% of the watershed (Grant 2002). Slope, riparian, and cienega wetlands support obligate vegetation such as willows, cottonwoods, rushes, and sedges throughout the watershed. Landscape aridification has occurred across ecosystem types due to factors such as overgrazing, development of impervious surfaces, and resulting erosion, as well as the intensifying impacts of climate change.

Land use in the Santa Fe Watershed includes a mix of wilderness, urban-municipal, agriculture, and grazing. Approximate acreages of each from upstream to downstream are presented in

Table 1. The authors recommend future verification of acreage totals and percentages as some errors in the original table were identified (Grant 2002).

Table 1. Land Uses and approximate acreages within the Santa Fe River Watershed (from Grant 2002, corrected and updated with 2018 census data).

Land Use	**Acreage**	**Percent of Total**
Pecos Wilderness (managed by SFNF)	7,000	3.8
Municipal Watershed (restricted access to protect potable water supply; within the SFNF but exclusive of wilderness)	10,000	5.7
City of Santa Fe (mixed density urban development; 2018 population 84,559)	33,500	18.6
Santa Fe County (mixed density development and open land; 2018 population within the watershed outside City limits approximately 30,976)	81,800	45.4
Caja del Rio (grazing land managed by BLM & SFNF)	27,400	15.2
Acequia-irrigated agricultural land in La Cienega and La Bajada	100	<1
Cochiti Pueblo (grazing land and wetlands)	20,200	11.2
TOTAL (approximate)	**180,000**	**100**

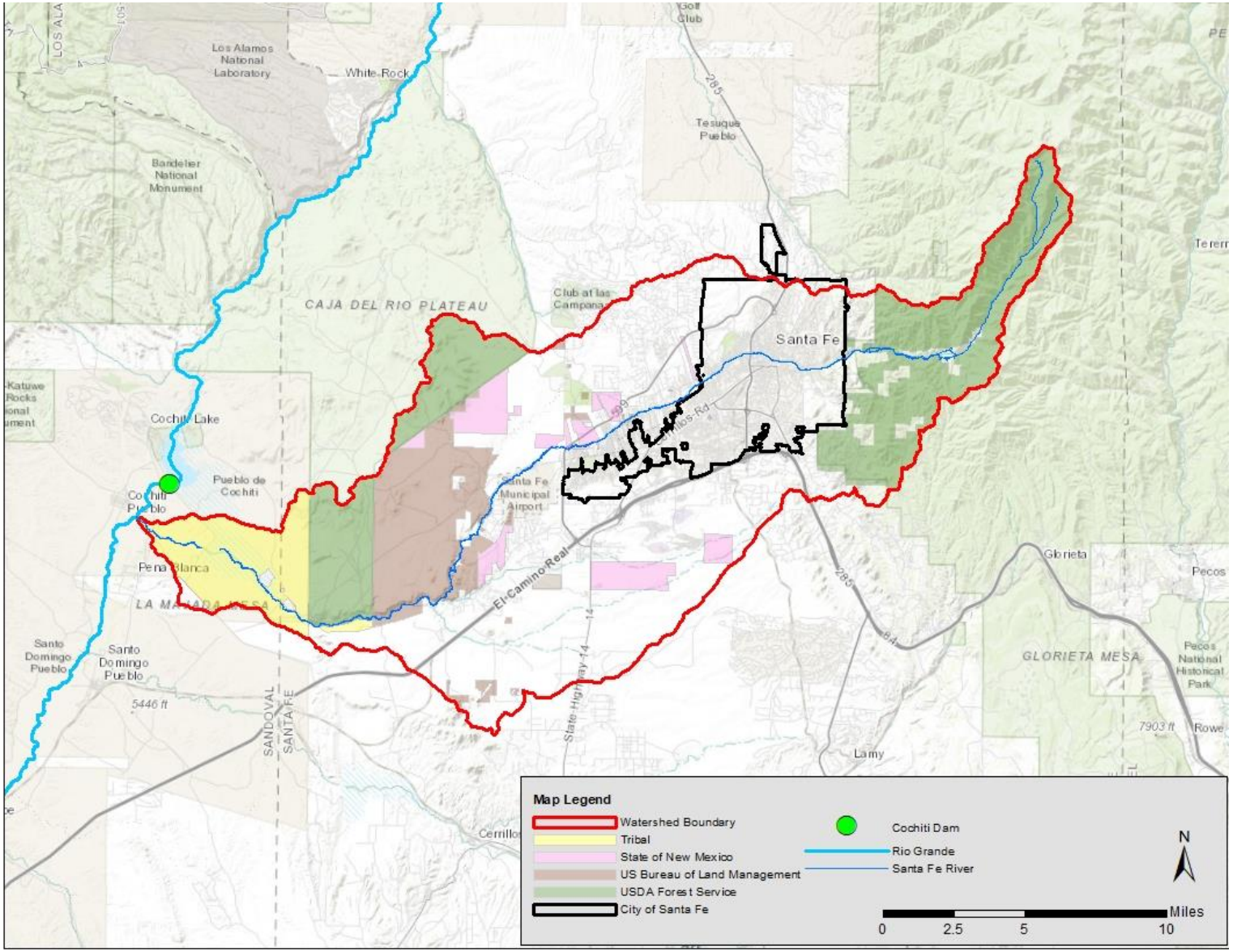

Figure 1. Santa Fe River Watershed

1.3.1 Water Supply Sources and Associated Water Rights

The Santa Fe River Watershed encompasses the City of Santa Fe and the portion of Santa Fe County with both the highest population density and the highest growth rate (Llewellyn et al 2015; Santa Fe County 2015). The City and County water supply systems are strongly interconnected, with the County system surrounding the City system to the west, north and south. Municipal, industrial and agricultural water users residing within the watershed and served by the City and County utilities obtain their water from two surface water sources and two groundwater well fields. The proportion of water from these four supply sources varies each year, but groundwater sources are used primarily to supplement surface water shortages in times of drought (Llewellyn et al. 2015). These water supplies are piped to water users in the City and to villages within Santa Fe County served by the City and County water utility departments. Approximately 22,000 people currently reside in unincorporated portions of the watershed and their drinking water supply relies on groundwater from private or community wells (Santa Fe County 2015). These water sources and associated water rights are summarized as follows:

Upper Santa Fe River: Surface water flowing down the Santa Fe River from the upper watershed is captured in two storage reservoirs. Both reservoirs are located east of the City within the closed upper Santa Fe River municipal watershed **(Figure 2),** which lies wholly within the SFNF. The upper reservoir, McClure, was initially completed in 1929 and was modified in 1935, 1947 and again in 1995 to incrementally increase storage capacity (City of Santa Fe 2021). Today McClure can store up to 3,255 acre-feet (ac-ft). The lower reservoir, Nichols, was completed in 1943 and can store up to 684 ac-ft. The total combined storage capacity of both reservoirs is approximately 3940 ac-ft. All but 1,061 ac-ft of McClure reservoir storage capacity fall under the regulations of the Rio Grande Compact (Compact). Under Compact rules, operations at McClure and Nichols reservoirs are affected by the amount of water held in the Elephant Butte Project storage, and whether New Mexico had an accrued debit or credit at the end of the previous year (Lewis and Borchert 2009).

The City's Canyon Road Water Treatment Plant (CR-WTP) controls water from McClure to Nichols, from Nichols to the water treatment plant, and can control by-pass flows to deliver water to four acequias and to provide managed instream flows to the river (A. Hook, City of Santa Fe, personal communication). The CR-WTP treats water for potability and controls distribution from this source to water users served by the City and County utilities. Acequias receiving by-pass water include Acequia del Llano, Acequia Madre, Acequia de la Muralla, and Acequia Cerro Gordo (Living River report, 2016). All four Acequias serve small private orchards, gardens and pastures.

Instream flows to the Santa Fe River below Nichols Reservoir are required under terms of the 2012 *Living River Program* (Ordinance 2012-10). The ordinance requires up to 1,000 ac-ft/year be provided to the Santa Fe River downstream of the dam based on water supply forecasts. In years when the April snowmelt runoff forecast falls below 75% of the annual average, these instream flows are scaled proportionally downward. Another factor impacting instream flow is that the discharge into the Santa Fe River downstream of Nichols Reservoir cannot exceed the discharge measured at the gage upstream of McClure Reservoir.

The City of Santa Fe owns 5,040 ac-ft/year of Santa Fe River water rights and has a right to store up to 4,000 ac-ft in the reservoirs under Office of the State Engineer Permit 1677. Of the 5,040 ac-ft, 1,540 ac-ft has a pre-1907 (senior) priority date while the remaining 3,500 ac-ft have a 1925 priority date. Acequias Madre and Cerro Gordo have an annual irrigation right of 93.48 ac-ft. Acequias del Llano and de la Muralla have a combined irrigation right of 63.05 ac-ft/year (Living River report, 2016; **Table 2**).

Buckman Direct Diversion: The Buckman Direct Diversion (BDD) diverts surface water from the Rio Grande roughly 10 miles west of the City limits near the historic Buckman townsite (**Figure 2**). The BDD is jointly owned by the City and Santa Fe County. It was completed in 2010 to deliver senior Rio Grande water rights or other San Juan-Chama Project (SJCP) water owned by the City, Santa Fe County and Las Campanas Water and Sewer Cooperative, and the Club at Las Campanas (the latter two fall outside of the Santa Fe Watershed). The BDD project pumps water from the Rio Grande 11-miles and 1,100 vertical feet uphill to the Buckman Regional Water Treatment Plant (BR-WTP; **Figure 2**). The BR-WTP can deliver up to 15 million gallons per day of treated drinking water for City and Santa Fe County water system customers (Llewellyn et al. 2015).

Annual water diversions from the Rio Grande via the BDD Project are limited to 8,730 ac-ft/year. The City has rights to 5,230 ac-ft/year; all of which is imported SJCP water. Santa Fe County currently has annual diversion rights to 2,167 ac-ft (**Table 2**) of which 367 ac-ft is imported SJCP water, 464 ac-ft was acquired through various right transfers, and 1,336 ac-ft are senior (pre-1907) right to “native” Rio Grande surface water.

City Well Field: There are seven active groundwater wells within the City limits, most of which were drilled in the 1950s (A. Hook, City of Santa Fe, personal communication) and all are located near the Santa Fe River (**Figure 2**). The City Well Field was a critical supplement to the upper watershed surface water sources, and in 1951 provided approximately 68% of the drinking water supply (Grant 2002). Today these wells are only used to maintain compliance, assure production capability (e.g., exercise them) and in times of extreme drought and associated shortages of surface water supplies (Llewellyn et al. 2015). The City Well Field has a permitted diversion right of up to 4,865 ac-ft/year (**Table 2**).

Buckman Well Field: The Buckman Well Field includes 13 groundwater wells located outside of the Santa Fe Watershed (**Figure 2**). Nine of these wells were constructed in the early 1970s and four more were operational beginning in 2003 (Shomaker Associates and City of Santa Fe 2018). As with the City Well Field, groundwater supply from the Buckman Well Field is inversely related to surface water availability: groundwater is conserved except to maintain compliance, assure production capability, and when needed to compensate for drought-induced shortfalls in surface water supplies (Llewellyn et al. 2015). The City is permitted to pump up to 10,000 ac-ft/year from these wells (**Table 2**). Between 1972 and 2002, total well field diversions ranged from 16 to 5,890 ac-ft/year. Between 2003 and 2017 total diversions ranged from less than 1,000 up to 5,823 ac-ft/year (Llewellyn et al. 2015).

Santa Fe Wastewater Treatment Plant (SF-WWTP): The SF-WWTP treats an average of approximately 5,800 ac-ft/year of treated effluent. Approximately 20 to 25 percent of this treated effluent is currently sold to users across the watershed each year for: dust control and other construction purposes; irrigation of municipal recreational fields and the infield at Santa Fe Downs; irrigation of the Marty Sanchez Links de Santa Fe and the Santa Fe Country Club golf courses; dust control at the regional landfill; watering livestock on the Caja del Rio; and irrigation of the education scape at the NM Game and Fish facility (City of Santa Fe 2017; HDR 2016). The remainder is currently released to the Santa Fe River downstream of the treatment plant. A portion is diverted by Acequias serving the villages of La Cienega, La Cieneguilla, and La Bajada before flowing into Cochiti Pueblo and the Rio Grande. The authors were unable to verify water rights for these entities by publication time but recommend ongoing efforts. Potential future uses of treated wastewater include off-setting surface water depletions caused by groundwater pumping from the Buckman well field, piping treated water to the Rio Grande near the BDD, and supplementing the basin's potable water supply (Llewellyn et al. 2015).

Table 2. Partial Summary of Water Sources, Permit Holders, and Associated Water Rights

Source	Permit Holder	Water Right (ac-ft/year)
Upper Santa Fe River	City of Santa Fe	5,040
	Acequias Madre and Cerro Gordo	93.48
	Acequias del Llano and de la Muralla	63.05
Buckman Direct Diversion Project	City of Santa Fe	5,230
	Santa Fe County	2,167
Buckman Well Field	City of Santa Fe	10,000
City Well Field	City of Santa Fe	4,865
Private Wells, Lower Santa Fe River System	Agua Fria, La Cienega, La Cieneguilla, La Bajada, Pueblo de Cochiti	Not publicly consolidated; active adjudication

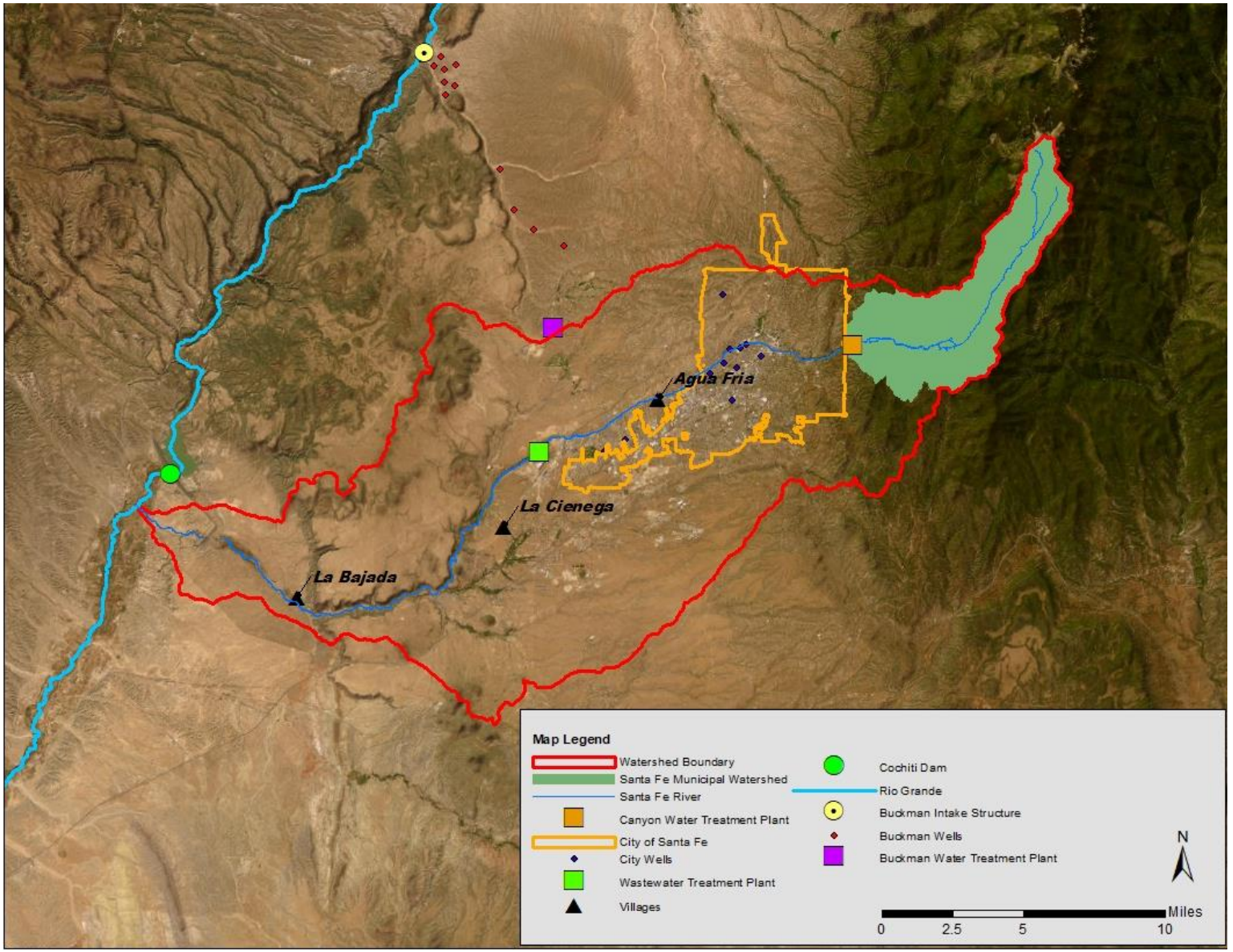

Figure 2. Water Supply Infrastructure

1.3.2. Current Water Uses

The percent of water supply allocated by the City and County utilities to major water-use sectors varies somewhat each year, but the greatest proportion is use by Single Family Residential followed by Commercial and Industrial users. In 2017 water use by Multi-Family Residential users within the City was approximately equal to all "Other" miscellaneous uses combined including fire suppression, irrigation, instream flows to the Santa Fe River, and irrigation delivery to middle and lower Acequias (City of Santa Fe 2017; **Table 3**).

Table 3. Recent Water Uses by Major Sector (data from City of Santa Fe, 2017)

Water Use	City	SF County Utility
Single Family Residential	50%	66%
Commercial/Industrial/Institutional	29%	33%
Multi-Family Residential	10%	-
Other (fire, irrigation, bulk water, acequias, instream flow)	11%	1%

Water Issues: The human population density, socio-economic conditions and ecological character of the watershed vary widely across the watershed. Accordingly, the issues requiring management attention (e.g., wildfire, river drying, riparian habitat loss, urban flood risk, agricultural water shortages, invasive species, water quality, illegal dumping, water conservation enforcement, etc.) also differ widely throughout the watershed. The unifying issue affecting all watershed segments, however, is the concern over future availability, sustainability and reliability of surface water supplies. Rio Grande basin climate models predict a 35% reduction in annual snowmelt runoff by 2100 (Llewellyn et al. 2013), while population projections in the Santa Fe River Watershed were predicted to increase 80% between 2010 and 2050 (Llewellyn et al. 2015). Combined with significant rises in air temperatures, these predicted climatic changes have important implications for human water demands and the health of forests, fish and wildlife, and ecosystems throughout the watershed.

Unsurprisingly, no new sources of water are expected to materialize. To meet current and projected human and environmental water demands, therefore, County and City water managers are collaborating on ways to maximize water conservation and optimize management of their joint water supply portfolios. One important example of this collaboration is a joint City-County partnership with the Bureau of Reclamation to complete the *Santa Fe River Basin Study* (Basin Study). The Basin Study (Llewellyn et al. 2015), funded by Reclamation's WaterSMART Program and completed in 2015, uses models and other tools to identify climate related impacts to water supplies, assess forecasted changes in water supply and demand, and identify and analyze potential adaptation strategies for the combined City

and County water supply. These model projections were updated in 2018 and found very similar, but not identical water supply and deficit values (Tetra Tech 2018).

1.4 City and County of Santa Fe Core Water Supply Conservation Strategies

The Basin Study (Llewellyn et al. 2015) explores opportunities for adaptation to future water supply shortages based on modeling and analyses of the effects climate change and population growth on the City and County's combined water supply portfolios. Accordingly, the Basin Study focused on the following actions:

- Identify the vulnerabilities of systems in the Santa Fe River Watershed to climate change,
- Assess Santa Fe's changing water supply and demand, including native surface water supplies from the Santa Fe Basin, the Upper Rio Grande, and the San Juan Basin (i.e., SJ-Chama Project), as well as groundwater supplies to the City and County's well fields, and
- Identify and analyze potential adaptation strategies for the combined City and County water supply.

The crux of the Basin Study was to assess the vulnerabilities and potential limitations of existing long-range water supply strategies and to recommend a suite of potential management and infrastructure changes to ensure adequate water supplies into the 2050s. The full Basin Study report with appendices is over 350 pages, so readers interested in a deeper dive than what can be provided here are referred to the online version of the complete document[2]. However, some key findings can be summarized as follows:

- A transient analysis of the reliability of surface water supplies provided via the San Juan-Chama Project found that: a) flows could decrease by about 25%; b) flows decrease in summer and increase in spring; c) storage in Heron Reservoir would be reduced; d) full allocation to contractors (like the City of Santa Fe) would be less frequently available, and; e) shortages in the Colorado River Basin could result in decreased supply to New Mexico under the Colorado River Compact.
- Without changes to current water management operations, the Santa Fe Basin could expect shortages of between 5000 and 9000 acre-feet per year (AF/year) by 2055 due to demand growth and climate change impacts on supply and demand.

[2] https://www.usbr.gov/watersmart/bsp/docs/finalreport/SantaFe/Santa-Fe-Basin-Final.pdf

- Model updates (Tetra Tech 2018) predict that without changes to current water supplies or operations, shortages greater than 1000 AF/year may be expected in 10% or more of years in the Santa Fe Basin by 2030 under high growth and hotter-drier climate change scenarios.
- Adaptation strategy "portfolios" (combinations of management actions) were compared and scored based on specific reliability criteria (Llewellyn et al. 2015, Appendix G). Of eight different portfolios analyzed, one (Portfolio #5) met performance criteria better than the others.
- Portfolio #5 includes over 2,200 acre-feet/year (AFY) of **direct water reuse**, approximately 4,000 AFY of **additional conservation**, nearly 600 AFY of **direct aquifer storage and recovery**, nearly 150 AFY of **indirect aquifer storage through infiltration below the Santa Fe River**, and the **acquisition of approximately 1,400 AFY of additional native Rio Grande water rights**. Brief descriptions of each of these adaptation strategies is summarized in **Table 4**.

Table 4. Santa Fe Basin Adaptation Strategies (reproduced from Llewellyn et al. 2015, Table E-2)

Adaptation Strategy	Description	Infrastructure Components
Direct/Indirect Reclaimed Water Reuse	Use reclaimed water from the City wastewater treatment plant to meet contract obligations; remaining reclaimed water for potable reuse or return flow credits for pumping	New conveyance for reclaimed water from wastewater treatment plant to existing Buckman Regional Water Treatment Facility (BRWTF) and distribution system or new conveyance to the Rio Grande for return flow credits
Water Conservation	Reduce water use on a per person per day basis	None
Direct Injection for Aquifer Storage and Recovery	Inject treated water into the aquifer in wet and normal years for use in dry years	Construction and operation of injection well(s); withdrawal using existing wells and distribution system
Infiltration for Aquifer Storage & Recovery in the Santa Fe River	Maintain flow in the Santa Fe River to induce infiltration into the aquifer for use in dry years	Withdrawal using existing wells and distribution system
Additional Surface Water Rights	Additional surface water would be diverted at the Buckman Direct diversion and treated at the BRWTF	Existing diversion, conveyance, treatment, and distribution systems

The City and County have been moving forward with numerous investigations in support of these various adaptation strategies since the Basin Study was completed in 2015. A list of reviewed studies/reports is provided in **Appendix H**.

2.0 STAKEHOLDER ASSESSMENT METHODS

In addition to climate models and corresponding infrastructure components, water managers identified public outreach, engagement, and collaboration as important factors of ongoing management. A stakeholder assessment was therefore designed by the project team to gather perspectives on salient issues and priorities from a diverse group of individuals and entities in the Santa Fe River Watershed to help highlight public engagement needs and inform possible strategies within watershed planning and implementation processes. The assessment was conducted remotely in 2021-2022 due to the COVID-19 Pandemic. There were two phases to the assessment. The first phase involved interviews with key stakeholders representing diverse interests. The second phase involved a sorting of priorities gathered in phase one interviews and was conducted using an online Q-Sort process with a subset of the same individuals who participated in Phase 1. An informal but instructive third phase involved presenting the preliminary results from the interviews and Q-sort to the City of Santa Fe as well as other stakeholders and participants to receive real-time feedback, which helped inform this final report.

2.1 Phase 1 – Stakeholder Interviews

A list of active individual and organizational stakeholders characterized as having considerable knowledge about the Santa Fe River and Watershed was created with the help of the Santa Fe Watershed Association, the City of Santa Fe, and Santa Fe County. Additional stakeholders were identified during interviews. Effort was taken to balance invitations to stakeholders representing five common interest groups: 1) Environmental Civic Groups (those working on environmental issues); 2) Non-Environmental Civic Groups (local organizations not explicitly environmental); 3) Business Groups (for-profit and related associations including water related businesses and non-water related businesses); 4) City of Santa Fe (elected and staff positions); and 5) Other Government Entities (other local, state, and federal governmental entities as well as Acequias and sovereign Pueblos). After preliminary meetings, there was no further participation by Santa Fe County representatives in the assessment. Many participants held multiple roles and fit in multiple stakeholder categories. Participants were organized based on their self-described primary role.

In **Phase 1**, representatives of 105 stakeholder entities and individuals with recognized roles and perspectives in the watershed were contacted and invited to participate in an **online or phone interview. Fifty-six interviews were conducted with 63 stakeholder representatives** between February and June 2021. **Figure 3** shows the distribution of participants across interest groups and includes a partial list of represented stakeholder organizations. Those individuals who declined to be identified by organization name were withheld from the list.

Interviews were recorded and transcribed for analysis. Interviews covered issues and concerns related to the Santa Fe River and Watershed, top priorities for the future of the river and watershed, obstacles to those priorities, perceptions of collaboration, access and participation in decision making practices. See **Appendix A** for the interview questions. Questions were open ended and no specific watershed issues were raised by the interviewers. The map in **Figure 4** highlights the upper, middle, and lower watersheds and key locations in the watershed and was used to guide interview discussions to orient issues and priorities to specific areas.

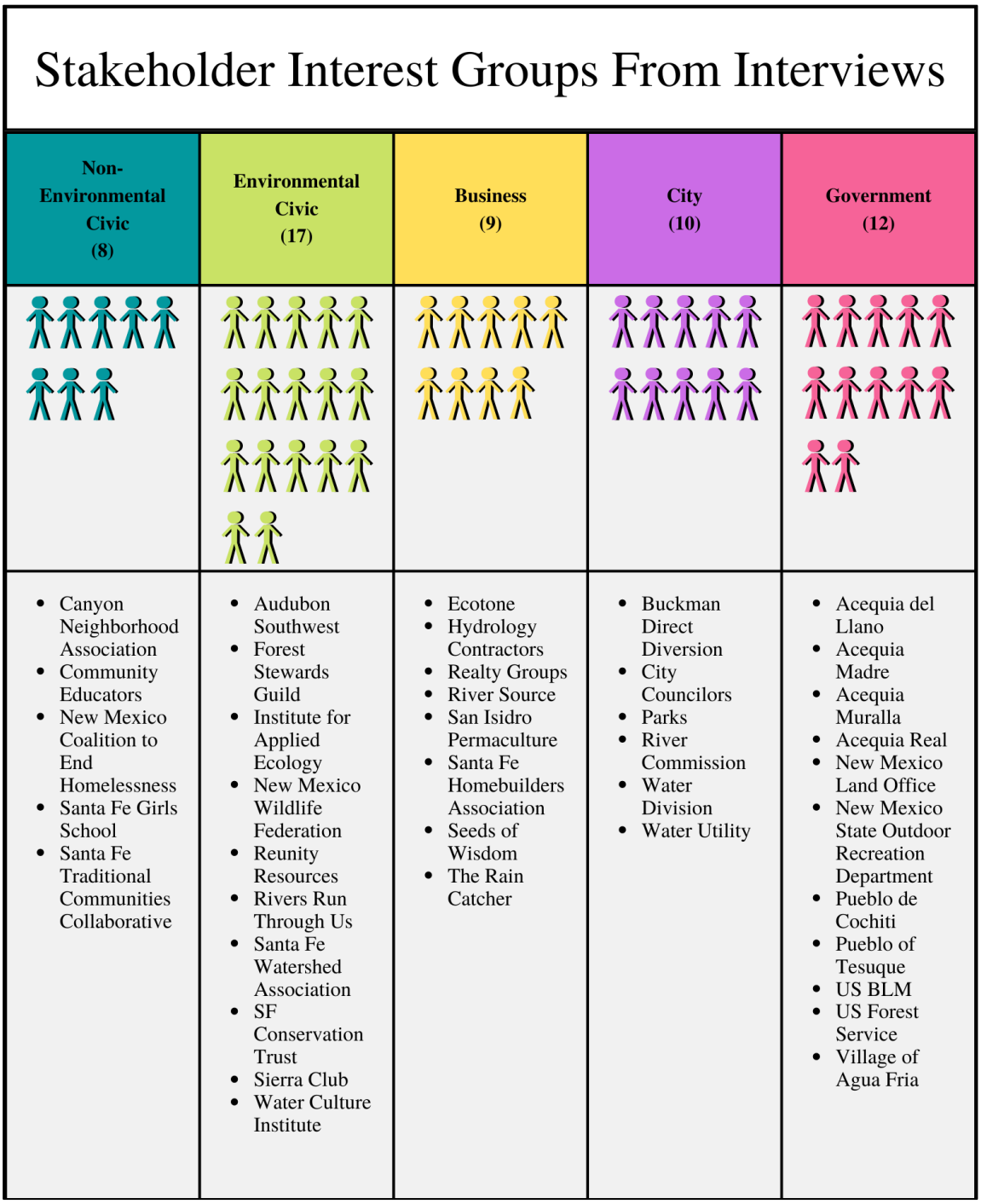

Figure 3. Participants Representing Stakeholder Interests in Assessment Interviews

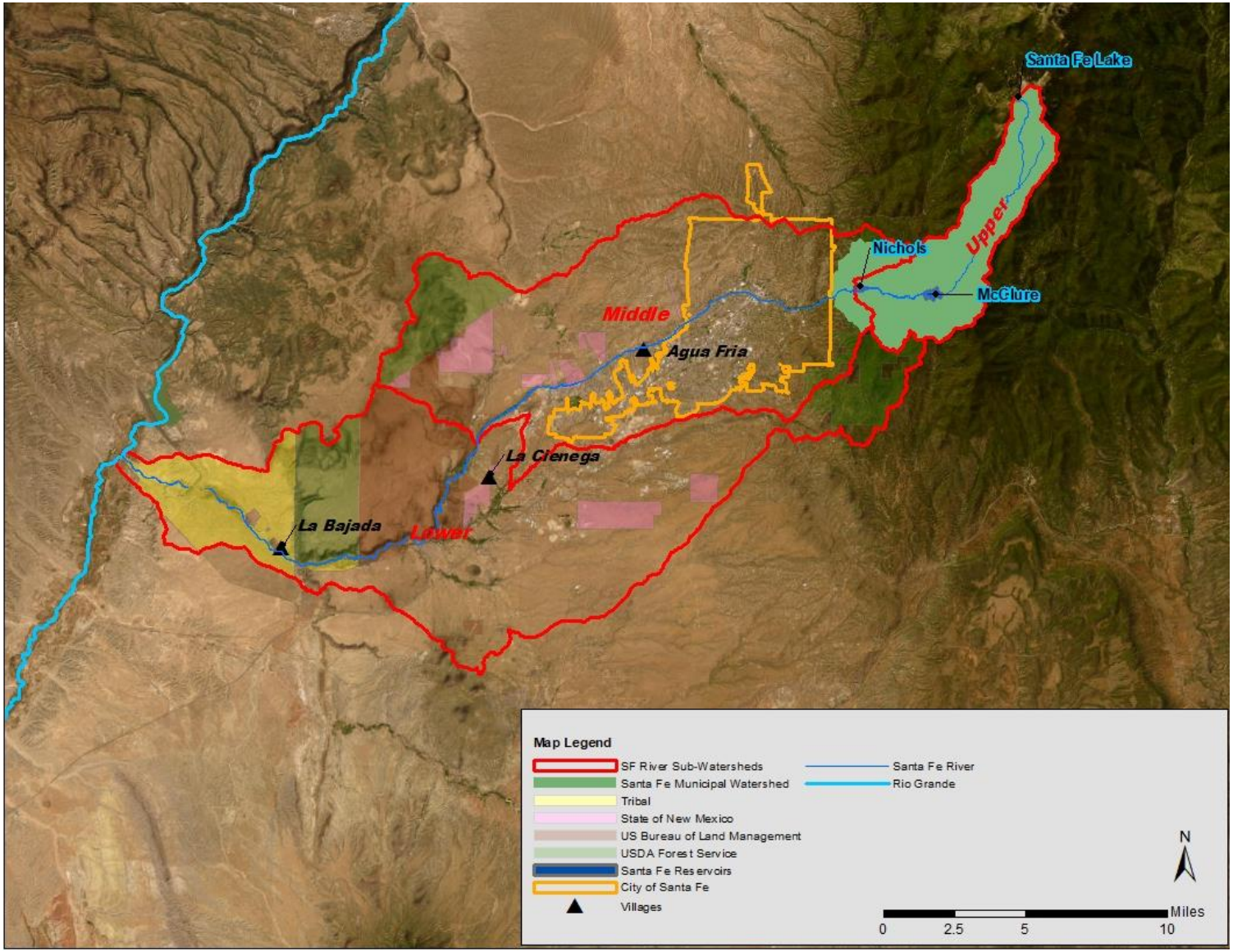

Figure 4. Map of the Santa Fe Watershed Used in Stakeholder Interviews

2.2 Phase 2 – Stakeholder Q-Sort

In **Phase 2**, 193 priorities mentioned in the stakeholder interviews were extracted and synthesized to a more manageable **63 priorities**, with effort to maintain the essence of all of the initial priorities. An online Q-Sort process was created to allow the same participants from the Phase 1 interviews to sort the assembled aggregate priorities. The Q-Sort method allows people to rate items from high to low, followed by statistical analysis to find different groupings of people who rate priorities in a similar way. For the online Q-Sort, **42 of the original 63 stakeholder representatives** from the Phase 1 interview participant group took part in Phase 2 between November 2021 and March 2022. Each interest group was represented in the Q-Sort process. Demographic data was gathered from Q-sort participants (a sub-set of interview participants), revealing that this group was more likely to be white and non-Hispanic, own their home and have a graduate or professional degree. **Figure 5** shows a representation of the Q-Sort participants across interest groups.

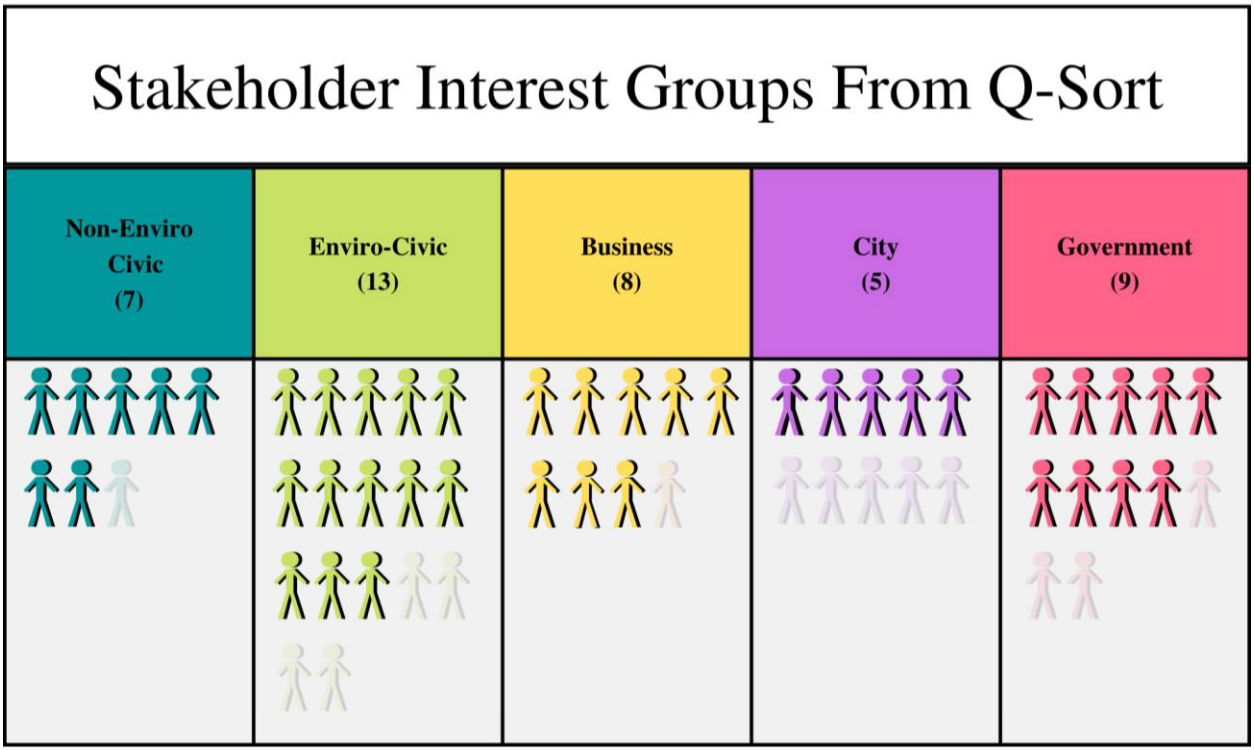

Figure 5. Representation of Q-Sort Participants Across Interest Groups.
*Faded figures represent people from interviews who declined to participate in the Q-Sort process.

Figure 6 shows the template that was developed for the online Q-Sort process. Priority statements were sorted into the template from a low of -6 to a high of +6. The shape of the template generates more neutral or middle-range priorities than high/low priorities. It is important to note that priorities ranked lower are not necessarily priorities to which respondents were opposed, but simply ranked as "least important." The distinction between opposition and low to neutral prioritization is not clearly captured by the Q-Sort.

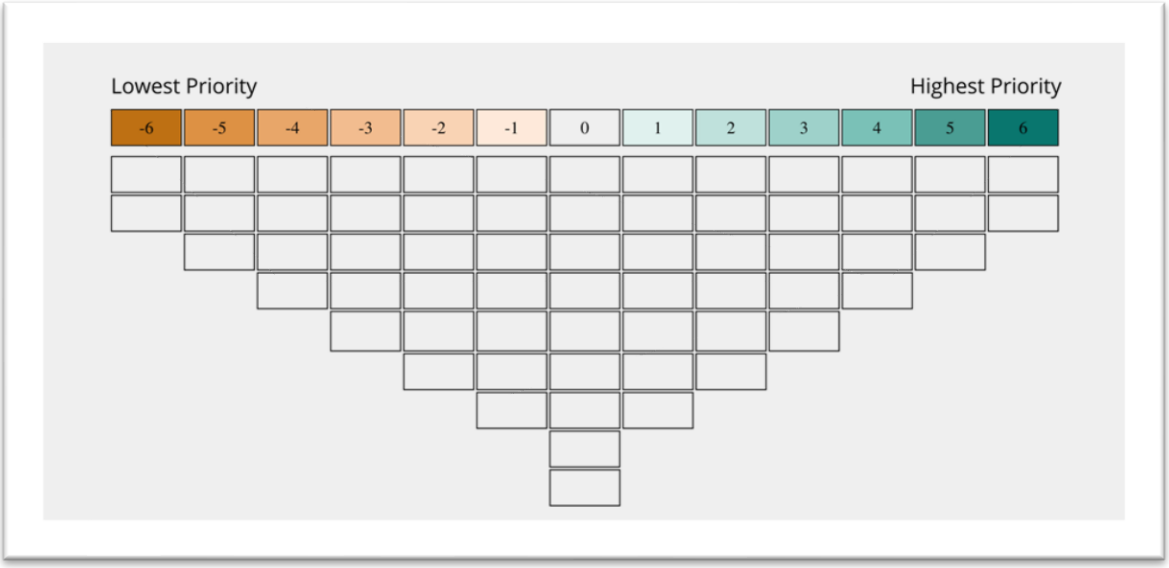

Figure 6. Q-Sort Template Used to Sort Priority Statements from Phase 1 Interviews

Q-Sort analysis is a replicable statistical process that identified clusters of people who sorted priorities similarly. These clusters or "factors" (herein referred to as "groups") do not perfectly match any specific participant. It is possible for someone to be included in a group because they are more different from the others in that group than they are similar to another group. This happened with one person in the Q-Sort process. The Q-sort analysis produces "z-scores" that represent the strength and weight of agreement on the priorities. More extreme ranks were weighted more heavily and priorities that were ranked similarly within groups influence z-scores. Distinguishing statements are those that have z-scores that are significantly different from those in other factors. Some pivotal statements with strong alignment and extreme ranks may not be identified as distinct if they were similarly ranked in other factors. **The findings in this report reflect collective input from the 42 stakeholder representatives who participated in the Q-sort. While these participants represented all the interest groups identified, caution should be taken in generalizing from these results to the wider population.**

3.0 RESULTS AND DISCUSSION

3.1 Findings from Phase 1 Stakeholder Interviews

A wide range of issues, concerns, and priorities were raised by stakeholder representatives.

The Santa Fe Watershed is host to a wide range of perspectives about water issues, unified by deep care and knowledge. In interviews, most of the issues at the forefront of peoples' minds reflect common concerns throughout arid regions in the southwestern U.S. including the planning pressures of climate change, ongoing drought, stormwater management, erosion, floods, wildfire threats, groundwater recharge, invasive species, soil health, water supply, water quality, water conservation, population growth and development, and the impacts of water infrastructure on riparian habitats and social wellbeing. Additional issues more specific to the Santa Fe Watershed were also mentioned such as water utilization within water agreements such as the San Juan-Chama and Rio Grande compacts, management of the upper watershed, and issues relating to the cultural, historical, and legal significance of Acequias and Pueblos associated with the watershed. **Box 1** shows a few representative quotes from interviews across different interest groups on the most commonly mentioned watershed issues.

Box 1. Quotes from Interviews on Key Watershed Issues

"It's a watershed that is threatened, in some ways, is threatened… by wildfire, by flood, by erosion, by human use, by development, by paved roads. … Development is the huge threat in my opinion." (Environmental)

"Looking at climate models and knowing that this part of the country is supposed to get drier even still, that's going to put a lot more pressure on it and the river and water in general." (Government – Acequia)

"The watershed number one issue, do we have water? And do we have enough water? Will my son have enough water? Will there be enough water for people to continue to live here? How do we really balance some of the needs that we have? We need to be smart about how we are utilizing our water and we need to be innovative in some of the water conservation strategies." (City Government)

"The Santa Fe wastewater treatment plant [has] generated a significant amount of waste and contamination contributing to water quality impairments in the Santa Fe River. The Pueblo is concerned about the potential and irreversible contamination to the aquifer, spring sites, and the Rio Grande." (Government – Pueblo)

"I've heard of this return flow pipeline and I think that it's ill conceived." (Environmental)

"Our goal is to have a steady certain flow of water, of clean water, that goes in the river." (Civic)

"We have a high priority of protecting that upper watershed area a lot." (Environmental)

"The highest priority for the water division…is to fully utilize its San Juan-Chama Project water." (City Gov't)

"The saddest part about this is not only are we pumping the groundwater, not replenishing it, but we're filling every bit of water that's coming up the cities with as much pollution as possible. It's really backwards." (Business)

"River health from the top of the watershed to the bottom." (Civic)

The most commonly mentioned water issues and concerns across stakeholder interest groups, such as **water flow, wildfire threats, water quality, ecosystem health, and water conservation**, are highlighted in **Figure 7**. It should be noted that the absence of a mention does not reflect disagreement, but rather a difference in perceived immediacy of issues at the time of the interview. In the figures, each stick figure represents one interview and not necessarily one person. Graphical representation of less common issues mentioned by interview participants from the major interest groups can be found in **Figure 8** and **Figure 9**.

Beyond the common issues of water flowing in the river, managing wildfire and water quality, and having healthy habitat and ecosystems, **a geographic pattern emerged as the need to recognize lower watershed communities was less often mentioned by those representing business and city interests**. Those from environmental interests were more likely to mention wildfire and forest management and education and awareness than water supply. Those from business interests were strongly focused on stormwater and managing erosion and floods, while those representing government interests (other than those from the City of Santa Fe) did not mention this topic. Opposition to the return flow pipeline was voiced by at least two people from each interest group except for those representing the City of Santa Fe. It was striking how many specific issues were mentioned by few participants, suggesting that people have many ways of relating to the Santa Fe River and watershed.

General Coverage of Issues/Concerns/Priorities	Non-Enviro Civic (8)	Enviro Civic (17)	Business (9)	City (10)	Government (12)
Water Flow in River	6	10	5	8	9
Wildfire & Forest Management	4	11	5	6	8
Water Quality & Pollution	3	8	4	6	7
Habitat & Healthy Ecosystem	4	8	5	4	5
Efficient Water Use/Conservation	5	6	6	5	6
Education & Awareness	6	10	3	3	1
Climate Change Concern	2	8	3	5	5
Stormwater Mgt, Erosion, Floods	4	4	9	6	0
Aquifer Recharge	3	5	5	7	2
Drought	2	6	5	5	3
Improve Stakeholder Engagement	1	9	3	4	4
Recognize Lower Communities	6	8	1	1	4
Pueblo Sovereignty & Concerns	2	9	3	1	4
Population Growth & Development	3	6	3	3	4
Soil Health, Erosion & Arroyos	3	5	5	2	3
Return Flow Pipeline – Against	2	7	2	0	6
Reliable Water Supply	2	2	2	6	4
Ecological Aspects of the River	2	5	0	4	2

Figure 7. Dominant Issues, Concerns, and Priorities Raised in Stakeholder Interviews

General Coverage of Issues/Concerns/Priorities	Non-Enviro Civic (8)	Enviro Civic (17)	Business (9)	City (10)	Government (12)
Holistic, Long-term Water Plan	3	6	1	1	2
Upper Watershed Management	1	4	2	2	3
Urban Design for Water Infiltration	4	2	1	4	1
Remove Invasive Species		6	2	1	1
Plant Native Trees, Shrubs Plants	1	4	1	2	1
Housing Issues	3	1	1	3	2
Homeless Issue	3	2	2	1	1
Healthy Lower Riparian Ecosystem	2	2	1		4
Respect Cultural Uses of Water	1	1		1	4
River Restoration		2	2	2	1
Recognize Acequia Interests	1	1	2		3
Recreation Access Upper Watershed		2		2	2
Framework/Plan for Lower Watershed	1	1	1	1	1
Centralized Watershed Management	1	3	1		
Return Flow Pipeline – Pro				4	
Healthy, Equitable River Access		2		1	1
Wetland Restoration	1	2	1		
Keep Upper Watershed Closed	1				2

Figure 8. Less Common Issues, Concerns, and Priorities Raised in Stakeholder Interviews.

General Coverage of Issues/Concerns/Priorities	Non-Enviro Civic (8)	Enviro Civic (17)	Business (9)	City (10)	Government (12)
Water Civilian Conservation Corps		1	2		
Enforce Catchment & Well Rules	1	1	1		
Prioritize Agriculture	1	2			
Upgrade Dams, Reservoirs		2		1	1
More City Funding into Watershed			2		
More Accountability by City		2			
Recreation Potential Downstream		1			
Incentivize No Irrigation in Dry Years				1	
Fix Leaky City Swimming Pool				1	
Cooperation Among City Water Departments				1	
Fix Danger on Canyon Road			1		
Public Health				1	
Oppose Beavers, Cottonwoods	1				
Pass WERS (Commercial, Multi Family)			1		
Low-Income Water Efficiency Program			1		
Don't Raise Water Prices			1		
County Water to La Cienega, Springs	1				
Fully Utilize San Juan-Chama Water				1	

Figure 9. Rare Issues, Concerns, and Priorities Raised in Stakeholder Interviews

Despite common issues there are important differences in perspective.

Despite consensus around key general issues among interview participants, **important nuances revealed different perspectives on concerns or desired management approaches**. Within broader issues such as wildfire threats and upper watershed management, Acequia rights, water quality, conservation practices, and collaboration, there were considerable differences in how interview participants perceived and defined more specific problems and solutions. While concern about the threat of fire was common, there were different perspectives on which aspects were of greater concern and how the upper watershed should be managed. There was agreement on the cultural and historical importance of Acequias, but there were different perspectives on their water rights. There were also different perspectives on water quality and infrastructure issues. **Table 5** shows varying perspectives on watershed issues, including wildfire and forest management, Acequia water rights, water quality, and water infrastructure.

Table 5. Varying Perspectives on Key Watershed Issues from Interviews

Wildfire and Forest Management						
Desire for much more aggressive thinning	vs	Concern about ecological impacts of thinning practices to biodiversity				
More prescribed burns	vs	Concern about the health impacts of smoke				
Maintain restrictions on upper watershed as means of fire prevention	vs	Desire to open up upper watershed for recreation and fostering community care for space and not an inherent fire threat				
Incorporate more Indigenous led forest and fire maintenance	vs	Westernized forestry practices				
Acequia Water Rights						
Some Acequias have litigated water rights	vs	Others relying on good faith relations and agreements with the City of Santa Fe				
Historical and cultural importance of Acequias and guarantee of water	vs	Concern over diminishing water supplies				
More traditional agriculturally focused, communally-governed ditches	vs	Water delivery for home gardens and landscaping				
Water Quality						
Upper watershed water quality concerns	vs	Concern about point sources of pollution within city	vs	Concerns about water quality below the wastewater treatment plant		
Confidence in the quality of water in the watershed and denial of any quality issues below the wastewater treatment plant	vs	Frustration about perceived inadequate water quality standards	vs	Concern about denial or dismissal of water quality concerns		
Water Infrastructure						
Full utilization of San Juan-Chama water via return flow pipeline	vs	Need for further information on return flow pipeline	vs	Focus more on local water conservation rather than return flow pipeline	vs	Concern about environmental and social impacts of return flow pipeline on lower watershed
Aquifer Recharge	vs	Upgrade dams and reservoirs	vs	Water efficiency programs and regulations	vs	Increase green infrastructure and stormwater management

Perceived obstacles to achieving Santa Fe River and Watershed priorities include funding, assumptions of opposition, barriers to stakeholder participation, drought, climate change, and invasive species.

A **lack of funding** to pursue needed water management goals was commonly seen as an impediment. The framing of efficient resource expenditures seemed dependent on position around issues. Critics of the Buckman Return Flow Pipeline saw it as a costly infrastructural project with little guaranteed benefit while withholding water from lower watershed communities, while proponents stressed the significance of the return flow credits as critical for water security in increasingly dry years. Some highlighted the need for more funding generally for municipal, ecological, and cultural water projects including stormwater management, green infrastructure, native plant restoration, community art related to water, and other initiatives.

Another commonly cited obstacle was the **general assumption of opposition** on priorities from other social groups or actors within the watershed. For example, narratives highlighting these assumptions include a) that "environmental groups" were impractical or idealistic, b) that homebuilders and developers were unconcerned with population growth, c) that the City and County have little regard for downstream communities, or d) that traditional communities and Pueblos were unrealistic with their expectations. The results from the 42 Phase 2 participants show much more nuanced viewpoints than often assumed between groups.

Barriers to participation by a broader array of stakeholders were raised in interviews. It was often mentioned that current plans or proposals needed input from a larger plurality of voices for ethical or strategic reasons. Some active decision makers expressed concern about the lack of opportunities for diverse perspectives to be heard, though some cautioned about the inefficiency of continuous public debate or the lack of specified knowledge from those they perceived to be more opinionated than informed.

Drought, climate change, and invasive species were also mentioned in interviews as barriers to water security and ecosystem integrity. The longstanding drought in the region has brought water security to the front of mind and the uncertainties of climate change were mentioned by many interviewees as they looked to the future. According to some of those interviewed, the watershed has seen considerable invasion of non-native species of vegetation, including Russian Olive, Siberian Elm, and Tamarisk, adding challenges to restoring natural ecosystems.

Concerns about power dynamics and stakeholder engagement within the watershed.

Interview participants often expressed a general lack of satisfaction with the power dynamics within the watershed. The City of Santa Fe was identified as the most powerful decision maker in the watershed, and to some extent the County. Stakeholders shared perspectives that public input processes often felt either materially inaccessible, or not worth the time and resources because more powerful actors had already set a course of action in place. Several interviewees emphasized that public input forums were often held only after a decision had already been made; for some it felt as though the input process was more aimed at "selling" the public on a decision rather than seeking their perspectives.

In the interviews, there was a common portrayal of upstream/downstream power relations throughout the watershed. Several interview participants explicitly conveyed that social and economic hierarchies could be neatly mapped along the direction of the flow of the river, with neighborhoods near the upper watershed along Canyon Road representing the wealthiest residents, and downstream communities more and more socially and economically marginalized or disadvantaged. This did not necessarily represent where priorities were focused geographically. Some who worked or lived in the upper reaches of the watershed expressed priorities related to the lower watershed and downstream communities and vice-versa. Participants were more likely to express concerns about the watershed upstream of their homes or work, though several felt this geographic power dynamic was often overlooked, expressing a desire for more humility and accountability from upstream users. Pueblos were seen as integral to the watershed, but some indicated they do not receive the government-to-government communication and inclusion deemed necessary to respect their sovereignty and interests.

3.2 Findings from Phase 2 Q-Sort Process

The Q-Sort process revealed overall highly ranked priorities related to climate change, native species, pollution standards, ecological justice, social equity, and fire management and planning.

All interview participants were invited to participate in the second phase Q-Sort process as described above. While the point of a Q-Sort is typically to understand clusters of people sharing similar response structure, looking at the aggregate data can also be informative. **Table 6** shows the 63 priority statements ranked by the 42 return participants in the Q-Sort and their average score between -6 and +6 and overall rank. The highest ranked priorities overall among the Q-Sort participants were:

- *Planning for Climate Change*
- *Protecting Native Species*
- *Ensuring City Compliance with Pollution Standards*
- *Greater Emphasis on Ecological Justice and Social Equity*
- *Fire Management and Planning in the Upper Watershed*

It should again be noted that priorities ranked low in the Q-Sort process do not necessarily indicate opposition, but could indicate neutrality, lack of understanding, or low importance to participants. The lowest ranked priorities overall included:

- *Incorporating More Community Art in Water Infrastructure*
- *Stopping the Importing of Water into Santa Fe*
- *Humility and Accountability from Upstream Users*
- *Outreach About Camping Hazards*
- *Completing the Buckman Return Flow Pipeline*

Table 6. Priority Statements, Average Overall Scores, and Overall Rank from Q-Sort

Statement	Average	Rank
Plan for climate change impacts on water resources	4.4	6
Protect native species, including birds, fish, and amphibians	4	6
Ensure city compliance with pollution standards	3	5
Place greater emphasis on ecological justice and social equity in water management	2.6	5
Fire management and planning in the upper watershed	2.2	5
Maintain flow of water in the Santa Fe River	2.2	4
Identify and address contaminated sites and other sources of pollution	2.2	4
Establish better wildlife corridors to river	2	4
Increase permeable surfaces, rain gardens, and green spaces for better water infiltration and stormwater management	2	4
Restore native riparian habitat in lower watershed below wastewater treatment plant	1.8	3
Balance water needs of the city of Santa Fe with environmental needs	1.8	3
Recognize Acequia rights as well as cultural and historical significance	1.8	3
Sustainable development and urban design to reduce water use and risks to watershed	1.8	3
Respect traditional and cultural uses and spaces of river and watershed	1.6	3
Aquifer recharge	1.6	2
Acknowledge senior water rights of Pueblos	1.4	2
Support beavers, cottonwood and bosque in lower watershed	1.4	2
Arroyo restoration and stabilization	1.4	2
Extend water efficiency programs and infrastructure upgrades throughout the city and watershed	1.4	2
Involve lower watershed users in full watershed decisions	1.2	2
Address water quality downstream of Wastewater Treatment Plant below the city of Santa Fe	1.2	1
Better collaboration and communication with Pueblos	1	1
Recognize the rights of the river itself (e.g. legal personhood for river)	1	1
Increase coordination and integration in water management	1	1
Maintain water production capacity through water recycling efforts	1	1
More proactive watershed planning	1	1
Remove invasive species such as russian olive along Santa Fe River and arroyos and revegetate with native species	0.8	1
More forest thinning in the upper watershed	0.8	0
Continuity and transparency in government position and processes	0.8	0
Have a civilian conservation corps for watershed	0.6	0
Provide accessible river trails and recreation opportunities for all residents	0.6	0

Statement	Average	Rank
Prioritize local access to water over industrial or corporate interests	0.6	**0**
More water conscious industrial practices	0.4	**0**
Manage the Buckman Diversion in a way that recognizes downstream needs	0.2	**0**
Work to avoid erosion from storms in the upper watershed	0.2	**0**
More active efforts by city and county to gather input from the public as part of decision making processes rather than after the fact	0	**0**
Prioritize clean water in upper watershed management	-0.4	**-1**
Regulation of private wells	-0.8	**-1**
Plant more trees along the Santa Fe River	-0.8	**-1**
More water flow dowsntream Wastewater Treatment Plant below City of Santa Fe	-1	**-1**
Stop development of homes in wildland-urban interface	-1	**-1**
Maintain restrictions on access to upper watershed	-1	**-1**
Stop development in the Santa Fe Watershed	-1.2	**-1**
Increase the price of water	-1.4	**-2**
Address homelessness and associated water impacts through more affordable housing	-1.4	**-2**
Accessible and bilingual water information and education for all	-1.4	**-2**
Allocate more funding for public water education	-1.4	**-2**
Equitable water rates to make water affordable for low-income households	-1.4	**-2**
Provide water quality information and data to the public	-1.4	**-2**
Implement and enforce rules about water catchment systems	-1.6	**-3**
Stop the Buckman return flow pipeline	-1.8	**-3**
Bring county water to upper La Cienega	-1.8	**-3**
Pass the multi-family and commercial water efficiency rating system standards	-2.2	**-3**
Continued structural assessment of dams	-2.4	**-3**
Keep open bypass channel from McClure Reservoir	-2.4	**-4**
Enforce split home (e.g. duplex) regulations on metering	-2.6	**-4**
Fully utilize San Juan - Chama water	-2.6	**-4**
Explore opportunities to open up upper watershed for recreation	-3	**-4**
Incorporate more community art in water infrastructure	-3.2	**-5**
Stop importing of water to the Santa Fe Watershed	-3.2	**-5**
Humility and accountability by upstream users	-3.4	**-5**
Provide outreach to mitigate hazards of camping along the river	-3.8	**-6**
Complete the Buckman return flow pipeline	-4.4	**-6**

Overall, higher ranked thematic areas included sets of priorities related to culture, technological solutions, Pueblos, and government process.

Some of the watershed priorities fell into thematic areas that aided in interpretation. The thematic areas rated more highly overall were priorities related to culture, technological solutions, Pueblos and government process (**Figure 10**).

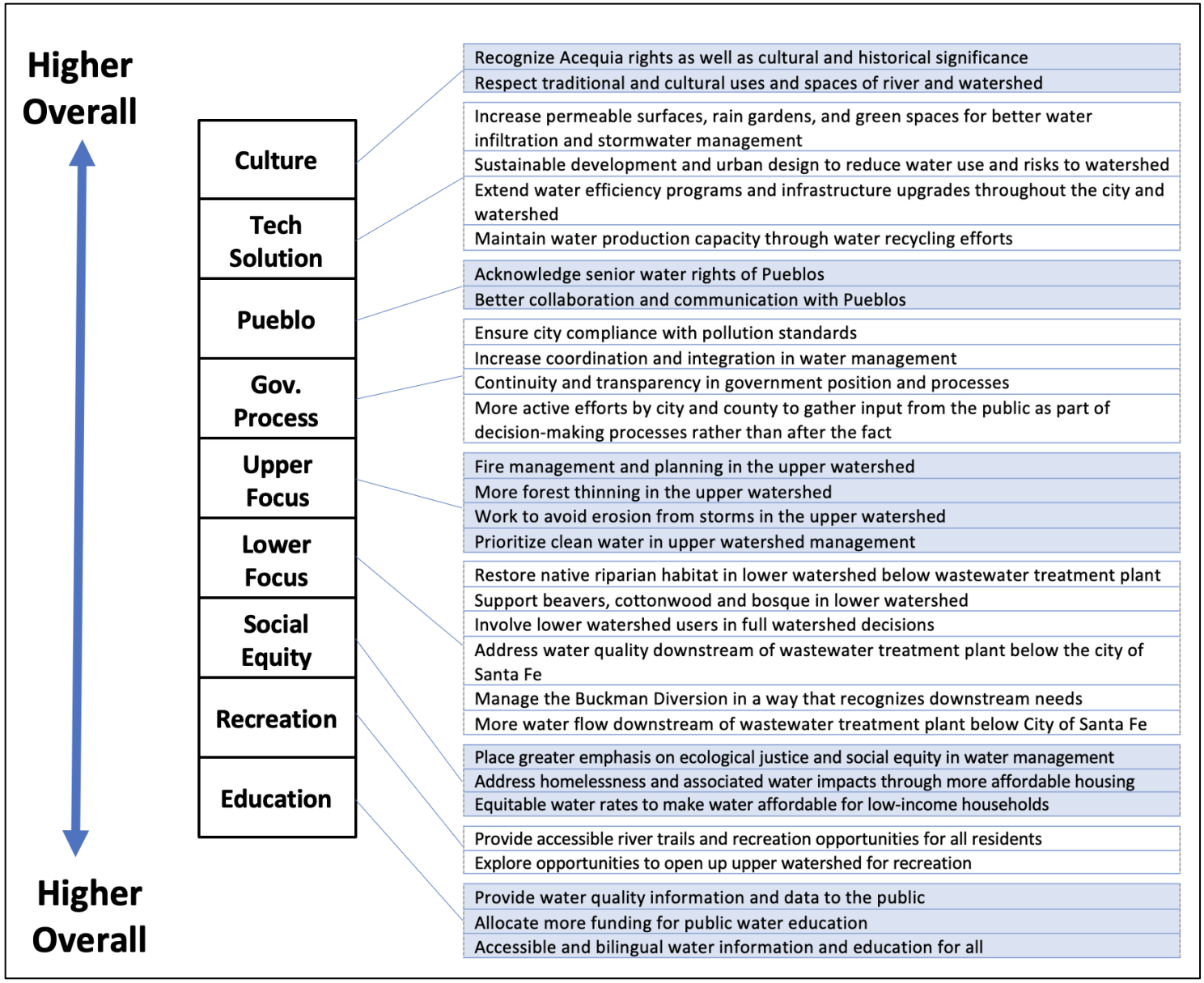

Figure 10. Thematic Clusters of Priorities and Their Overall Position in Aggregate Ranking.

Five groups emerged from the Q-Sort Process, with integration across interest groups.

A Q-Sort reveals groups of people who sort items in a statistically similar way. It is helpful to explore the group characteristics in addition to overall patterns because the groups provide another angle for understanding the dynamics of priority alignments and misalignments. Based on the analysis of the Santa Fe Watershed Q-Sort of watershed priorities, five distinct groups emerged. A key finding is that the Q-sort groups based on watershed priorities involved people from multiple interest groups (e.g., government, environmental groups, business, etc.). **This suggests that people may have more in common with stakeholders in other interest groups than they do with those in their own "sector" and that there are diverse opinions, understandings, and priorities across the watershed.**

The names attributed to these groups were assigned by the researchers based on interpretation of key distinguishing elements. The five groups listed here and described below were:

1) *Multi-Use, Equity*
2) *Urban, Technological*
3) *Ecocentric*
4) *Traditional, Cultural*
5) *Lower Watershed, Collaborative*

Descriptions emphasize the highest and lowest ranked priorities as well as the group's position on thematic clusters (Figure 10).

Group 1: Multi-Use, Equity Viewpoint ("Multi-Use")

The first group emerging from analysis represents an approach of balancing multiple use priorities and social equity. "Multi-use" refers to the variety of use-related interests for this group including recreation, cultural uses, forest thinning, water recycling, etc. The "Multi-Use" group was most closely related to the "Urban, Technological" group, and most distinct from the "Ecocentric" group. This group's composition consists of nine environmental, City, and other government viewpoints.

This group's **highest priorities were '*Planning for climate change impacts on water resources*'** and providing accessible recreation opportunities (Error! Reference source not found.). Compared to other groups, this group was more concerned with recreation and issues concerning the upper watershed. Ecological justice and social equity were high priorities. This group also prioritized 'Respect traditional and cultural uses and spaces' and ranked cultural priorities the second highest among all groups. This group also ranked priorities regarding Pueblos higher than other groups except one. This group's **lowest priorities were *stopping development in the watershed, stopping the return flow pipeline*, '*Incorporate more community art in water infrastructure*'**, and '***Maintain restrictions on the upper watershed***. They were less concerned about addressing issues of government process than most other groups, and the least concerned with issues directly relating to the lower watershed. This lower prioritization of lower watershed issues seems counter to the weight given to issues of social equity, culture, and Pueblos.

Group 1
Multi-User, Equity

Enviro-Civic (3)	City (3)	Government (3)
		

Highest and Lowest Statements	Rank	z-score
Plan for climate change impacts on water resources	6	2.50855
Provide accessible river trails and recreation opportunities for all residents	6	1.89673
Place greater emphasis on ecological justice and social equity in water management	5	1.32808
Respect traditional and cultural uses and spaces of river and watershed	5	1.25702
More forest thinning in the upper watershed	5	1.24806
Stop development in the Santa Fe Watershed	-5	-1.55977
Stop the Buckman return flow pipeline	-5	-1.65451
Incorporate more community art in water infrastructure	-6	-1.91228
Maintain restrictions on access to upper watershed	-6	-2.19367

Figure 11. "Multi-Use, Equity" Group Information

Group 2: Urban, Technological Management Viewpoint ("Urban, Technological")

The "Urban, Technological" Group prioritized urban stormwater management and designs to reduce water use and watershed risks. This group shared more in common with the "Ecocentric" group (though those two groups shared little correlation) and had the least in common with the "Collaborative" group. This group's composition included eight viewpoints from non-environmental civic groups, water-focused businesses, and general businesses.

Group 2
Urban, Technological

Non-Enviro Civic (4)	Business - Water (3)	Business - Non-water (1)

Highest and Lowest Statements	Rank	z-score
Increase permeable surfaces, rain gardens, and green spaces for better water infiltration and stormwater management	6	2.30924
Sustainable development and urban design to reduce water use and risks to watershed	6	2.26399
Aquifer recharge	5	1.9815
Extend water efficiency programs and infrastructure upgrades throughout the city and watershed	5	1.49512
Arroyo restoration and stabilization	5	1.48241
Explore opportunities to open up upper watershed for recreation	-5	-1.36874
Humility and accountability by upstream users	-5	-1.42399
Bring county water to upper La Cienega	-5	-1.55361
Stop importing of water to the Santa Fe Watershed	-6	-1.72145
Stop the Buckman return flow pipeline	-6	-2.17026

Figure 12. "Urban, Technological" Group Information

This group's **highest priorities** were ***'Increase permeable surfaces, rain gardens, and green spaces…'*** and ***'Sustainable development and urban design to reduce water use and risks to the watershed***, (**Figure 12**). This group more highly prioritized technological solutions than other groups. ***'Stop importing water…'*** **and** ***stopping the return flow pipeline*** were the **lowest priorities** for this group.

This group ranked concerns regarding the upper watershed higher than most other groups. They were less concerned with education and social equity than most other groups, and were less likely to prioritize government process, cultural, and Pueblo values than all other groups.

This group was more immediately concerned with addressing water management approaches in urban areas, which may be less of a geographic preference and more of an approach that sees urban development practices as more influential on the ecology of the watershed than social and cultural issues.

Group 3: Ecocentric Viewpoint ("Ecocentric")

The "Ecocentric" group more highly prioritized ecologically-oriented approaches than socially-oriented concerns. This group was most aligned with the "Urban" group and least aligned with the "Multi-Use" group. The "Ecocentric" group includes six viewpoints including people from the City, a water-focused business, and a non-environmental civic group.

This group's **highest priorities were '*Recognizing the rights of the river itself*'** and '***Balancing the water needs of the city and the environment***' (**Figure 13**). The lowest priorities for this group included '***Explore opportunities to open up upper watershed for recreation***' and '***Stop development of homes in wildland-urban interface***'.

Group 3
Ecocentric

Non-Enviro Civic (1)	Business - Water (1)	City (1)	Government (3)
			

Highest and Lowest Statements	Rank	z-score
Recognize the rights of the river itself (e.g. legal personhood for river)	6	2.28376
Balance water needs of the city of Santa Fe with environmental needs	6	1.97351
Maintain restrictions on access to upper watershed	5	1.92222
Plan for climate change impacts on water resources	5	1.81761
Extend water efficiency programs and infrastructure upgrades throughout the city and watershed	5	1.56529
Provide outreach to mitigate hazards of camping along the river	-5	-1.5306
Complete the Buckman return flow pipeline	-5	-1.61055
Address homelessness and associated water impacts through more affordable housing	-5	-1.90456
Stop development of homes in wildland-urban interface	-6	-1.94919
Explore opportunities to open up upper watershed for recreation	-6	-2.76263

Figure 13. "Ecocentric" Group Information

Overall, this group consistently placed higher priority on ecological concerns over social and cultural issues, and compared to other groups, they ranked social equity, cultural, and recreation values the lowest. They ranked the cluster of upper watershed specific priorities lower than all other groups, but they had a high ranking for **'*Maintain restriction on the upper watershed*'**. This group was the most polarized regarding this issue (with restrictions as a high priority and Opening the Upper Watershed as their lowest priority). This may imply a desired "hands off" approach to the management of the upper watershed, as they felt strongly about maintaining restrictions, but overall ranked upper watershed management priorities such as fire management, forest thinning, erosion control, and water quality lower than other groups.

The "Ecocentric" group ranked educational priorities higher than most other groups, and reflected the median position regarding Pueblos, government process, and technological solutions.

Group 4: Traditional, Cultural Viewpoint ("Traditional")

The "Traditional" group represented a more traditional and socially focused management approach with an emphasis on cultural values. This viewpoint was more correlated with the "Collaborative" group than any other group and was markedly different from all other viewpoints. This group represents six viewpoints from environmental groups and government perspectives, as well as those from a non-environmental civic group and a water-focused business.

This group's **highest priorities were *'Respect traditional and cultural uses and spaces'*** and ***'Aquifer Recharge'*** (**Figure 14**). They highly prioritized ***'Acknowledge Senior Water Rights of Pueblos'*** **and** ***'Recognize Acequia Rights…'*** They more highly prioritized cultural and Pueblo values, and education and government process than all other groups.

The "Traditional" group also ranked priorities relating to the lower watershed higher than most other groups. Compared to other groups they were the least concerned with recreation values and ranked upper watershed and technological solutions lower than most other groups. This group's **lowest ranked priority** was ***'Complete the Buckman return flow pipeline'.***

Group 4
Traditional, Cultural

Non-Enviro Civic (1)	Enviro Civic (2)	Business - Water (1)	Government (2)

Highest and Lowest Statements	Rank	z-score
Respect traditional and cultural uses and spaces of river and watershed	6	2.45629
Aquifer recharge	6	1.6084
Stop development of homes in wildland-urban interface	5	1.59636
Acknowledge senior water rights of Pueblos	5	1.57896
Recognize Acequia rights as well as cultural and historical significance	5	1.38554
Continued structural assessment of dams	-5	-1.37763
Explore opportunities to open up upper watershed for recreation	-5	-1.49996
Increase the price of water	-5	-1.60088
Pass the multi-family and commercial water efficiency rating system standards	-6	-1.77685
Complete the Buckman return flow pipeline	-6	-2.45457

Figure 14. "Traditional" Group Information

Group 5: Lower Watershed, Collaborative Viewpoint ("Collaborative")

The "Collaborative" group emphasized a focus on the lower watershed and on collaborative goals. This group shared most in common with the "Traditional" group and was most distinct from the "Urban" group. This group was composed of seven viewpoints from mostly environmental groups, though it also reflects one perspective from a government position (Acequia). This group is unique in that it had one participant who held a City position who had more statistical commonality with opposition to this group than they had in common with any other viewpoint.

This group's **highest priorities were '*Stop the Buckman Return Flow Pipeline*'** and '***Involve lower watershed users in full watershed decisions***' (**Figure 15**). The return flow pipeline was a defining issue for this group as its **completion was inversely their lowest priority**. Overall, compared to other groups they more highly prioritized issues specific to the lower watershed and highly prioritized social equity.

Group 5
Lower Watershed, Collaborative

Enviro-Civic (5)	Government (1)	City (1*)
		

Highest and Lowest Statements	Rank	z-score
Stop the Buckman return flow pipeline	6	2.45629
Involve lower watershed users in full watershed decisions	6	1.6084
Restore native riparian habitat in lower watershed below wastewater treatment plant	5	1.59636
Protect native species, including birds, fish, and amphibians	5	1.57896
Place greater emphasis on ecological justice and social equity in water management	5	1.38554
Provide outreach to mitigate hazards of camping along the river	-5	-1.37763
Continued structural assessment of dams	-5	-1.49996
Fully utilize San Juan - Chama water	-5	-1.60088
Maintain restrictions on access to upper watershed	-6	-1.77685
Complete the Buckman return flow pipeline	-6	-2.45457

Figure 15. "Collaborative" Group Information.
*Indicates oppositional loading of participant.

Despite their high prioritization of lower watershed issues, this group ranked Pueblo related priorities lower than most other groups and were the median group regarding cultural related priorities. They also prioritized upper watershed related issues higher than both the "Ecocentric" and "Traditional" groups. Additionally, they prioritized educational initiatives lower than all other groups.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The stakeholder assessment undertaken in this project sought to identify stakeholders relating to the Santa Fe River and Watershed and to better understand their perspectives and collective relationships. The primary objective was to apply assessment results and provide insights useful for tailoring outreach efforts toward addressing the most salient issues raised by stakeholders and to help inform future watershed planning efforts.

Documentation in plans and studies by the City of Santa Fe, Santa Fe County, and others demonstrates a priority on long-term water security. A focus on this priority is also present across interest groups in the findings from interviews with representative stakeholders (see **Appendix D** for interview quotes related to water security). That said, the stakeholder assessment revealed a large and diverse set of priority issues related to the Santa Fe River and Watershed as highlighted in the report above united by deep care and knowledge. To provide more extensive data from the assessment, **Appendix E-G** highlights interview quotes related to water flow, water quality and fire and forest management.

In addition to documenting water management priorities and perspectives within and among various stakeholder representatives, some valuable *process-related* findings were identified that could inform future City-County stakeholder engagement initiatives. For example, Tribal government stakeholders who participated in project interviews voiced frustration over the lack of direct government-to-government consultation on water management initiatives under consideration by the City or County. Representatives from the Pueblo of Cochiti, for example, expressed concerns about limited direct consultation by City and County representatives about management actions that could impact both water quality and quantity of the lower Santa Fe River below the wastewater treatment plant. Leaders from the Pueblo of Tesuque expressed dissatisfaction with the historic lack of engagement by the City and County on a variety of watershed management issues.

Unlike agencies of the U.S. federal government or the State of New Mexico[3], City and County government agencies are not legally mandated to consult directly with sovereign Tribal governments. Nonetheless, such consultation (or explicit effort towards direct consultation) is important for both demonstrating respect and acknowledging that actions by City and County governments can have important impacts on Tribal resources and cultural/religious practices,

[3] See https://www.gsa.gov/resources/native-american-tribes/tribal-consultation

Also see New Mexico State-Tribal Collaboration Act (https://www.hsd.state.nm.us/wp-content/uploads/2020/12/State-Tribal-Collaboration-Act.pdf)

and for recognizing that Tribal governments and their technical representatives are invaluable collaborators in identifying issues, management alternatives, and mitigation strategies to offset unavoidable impacts to natural and cultural resources. Ultimately, we suggest the resilience of watershed management initiatives cannot be fully realized without the direct involvement of local Tribal governments.

Another important *process-related* finding discussed above was a general feeling among stakeholders that City and County outreach efforts were often "informational interactions" rather than true collaborative engagements. During our stakeholder representative interviews and public meetings, for example, participants expressed dismay that City representatives had frequently invited them to participate in what they believed would be interactive dialogues to vet alternatives on important watershed management decisions but left those forums feeling like the actual decisions had been made *a priori*, and that their participation was simply performative (i.e., a box checker; see Appendix B). City representatives conversely voiced frustration over what they saw as a misremembering of some outreach events, or a retroactive bitterness from stakeholders who had not participated fully in the opportunities provided. Given the complexity and urgency of not only water security but community trust and engagement, however, we suggest that such stakeholder perceptions should be considered seriously and that water managers and policymakers should continue to strive to move beyond solely informational interactions with stakeholders towards processes that are more collaborative.

One way to think about the resilience of the Santa Fe Watershed is the interactional capacity of the collective array of interests**. Interactional capacity refers to the ability of a local community to work together and mobilize resources around shared interests in times of need** (Flint and Luloff 2005). **Figure 16a** shows a representation of the interest groups initially framed for this assessment. **Figure 16b** shows a hypothetical representation of these interest groups coming together in generalized action around common and shared interests. **Figure 16c** represents the groups that emerged from the Q-Sort of watershed priorities from this assessment. The question remains as to whether or not generalized action on shared interests across diverse perspectives is possible.

Fostering interactional capacity is not simple. It depends upon the integration, beginning with consideration, of diverse perspectives and ways of knowing. It takes time and trust to arrive at shared goals and then to implement them. Additionally, it often takes some sort of catalyst that makes building this interactional capacity imperative (Prokopy et al. 2014). In the case of the Santa Fe River and Watershed, this catalyst may be the changing climate and water availability and the diverse set of interests that defy common conceptualizations of interest groups. As shown in **Figure 17**, these factors come together to influence interactional capacity and in turn, its contribution toward social ecological resilience.

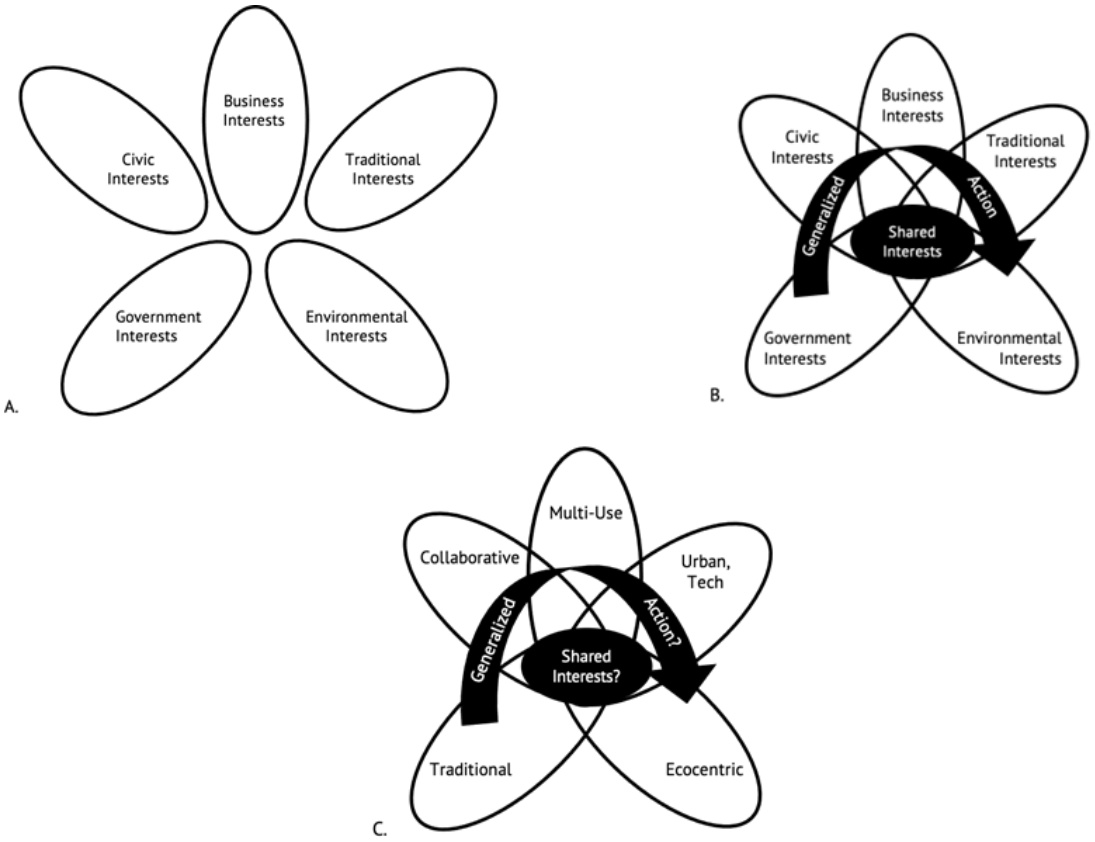

Figure 16. Representations of Interactional Capacity (adapted from Theodori 2005). **A** refers to common interest groups. **B** refers to the generalized action among those representing diverse interest groups around shared interests. **C** refers to the same interaction as B, but with the emerging perspective groups from the Q-Sort process.

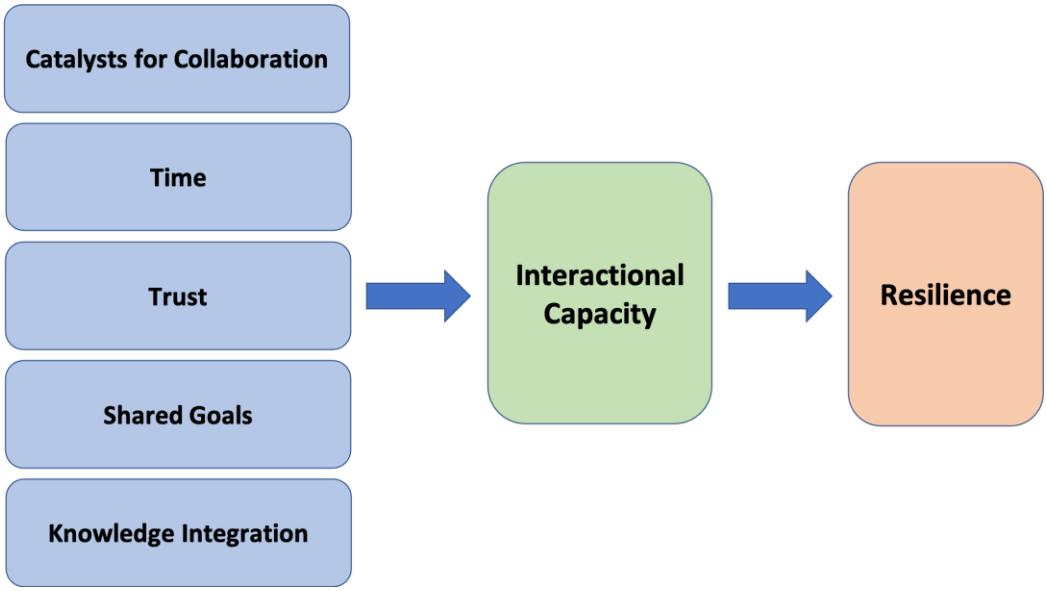

Figure 17. Factors Influencing Interactional Capacity and Subsequently Resilience

The stakeholder interviews conducted as part of this assessment highlighted strong assumptions of opposition related to these interest groups. However, the priority sorting process followed in this assessment revealed priority perspectives that integrate people from multiple interest groups. **If there is interest in building interactional capacity to address the river and watershed issues that are important to stakeholders--including those in decision making and management positions--attention toward new modes of collaboration and engagement is warranted.** While an in-depth discussion is beyond the scope of this report, it should be noted that there are already numerous collaborative forums, both formal and informal, throughout the watershed (e.g., City River Commission, County Water Policy Advisory Council, SF River Traditional Communities Collaborative). Strengthening their roles, and enabling more interaction between them, may be a relatively simple way to continue deepening interactional capacity in the watershed. It might furthermore be helpful to establish a regional water authority or task force for inclusive processes regarding the watershed and water resources as a holistic system.

This assessment revealed a set of common issues and priorities that could provide an avenue for additional efforts to build interactional capacity and catalyze generalized action in the Santa Fe Watershed. **Securing water for the river and various human and ecological needs, managing forests to mitigate wildfire risks, addressing water quality, and adopting practices that ameliorate risks of stormwater, erosion, and flooding are all areas mentioned as important issues across interest and priority perspective groups and do not have strong opposition.** Attention is warranted, however, to the nuance in how people perceive the necessary management strategies related to these issues.

The authors therefore offer the following recommendations for managers and community members:

- Emphasize the synergy across interests in watershed priorities such as water security and flow, climate change, stormwater management, and groundwater recharge.
- Take time to understand the nuances in perspectives and priorities related to wildfire and forest management, water rights, water quality, and water infrastructure.
- Beware of assumptions of opposition across traditional interest groups.
- Facilitate engagement across stakeholders early and throughout deliberation processes for input and collaboration.
- Ensure proactive government-to-government dialogue and negotiations over water issues with Pueblos.
- Provide and seek out cultural literacy training and information to support deepening interactional capacity.
- **Build interactional capacity for watershed resilience by catalyzing collaboration, taking time to build trusting relationships around shared goals, and integrating diverse ways of knowing.**

The findings presented in this report represent the insights gained from interviews and priority sorting approaches conducted in 2021 and 2022 and may not all stand the test of time as issues are dynamic. That said, the common, general themes and priorities highlighted in this report are likely to be more consistent and can provide common ground in ongoing and future outreach and collaboration efforts at multiple scales. As watershed-wide planning and implementation efforts continue, we advocate that new and deeper interactional dynamics between government, civic, and private entities should play a vital role in addressing perceived threats to the resilience of the Santa Fe River and Watershed.

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APPENDIX A

INTERVIEW QUESTIONS

Santa Fe Watershed – Interviews on Stakeholder Water Issues & Priorities

[Black text represents main interview protocol, Blue text represents amendments for Pueblo stakeholders, Red text represents amendments made for Government stakeholders]

Interview protocol and amendments were approved by Utah State University's Institutional Review Board [Protocol #11738]

Introduction

As you have probably heard from the Santa Fe Watershed Association, this project is focused on hearing from stakeholders in the Santa Fe Watershed about how they relate to the river and watershed and what their priorities are. Out of these interviews, our plan is to gather a set of statements that reflect everyone's priorities. Then, we will come back around to everyone with a priority sorting process in a few months.

1.0. **Can you please tell us about [organization/yourself]? Yourself and your role with the Pueblo? Yourself and the agency/department you work for?**

2.0. **Our focus here today is on the Santa Fe River and watershed. How [does organization/do you] relate to the Santa Fe River and Watershed? Generally speaking, what issues, concerns, or values are important to you? Where in the watershed are your issues most focused?**

3.0. **Thinking about the next 10 years or so, what are your [organization's] top priorities for the river and watershed? What would you like to see happen, be maintained, or changed with regards to the river and watershed? Do you have priorities for the watershed thinking further in the future? 40+ years out?**

4.0. **What do you see as the biggest obstacles to addressing your priorities?**

5.0. **Is there anything that you do NOT want to see happen in regard to the watershed in the next 10 years?**

6.0. **Shifting towards thinking about participation, how involved have [you or organization] been in discussions or planning or management of these issues in the watershed?**

- *6.1. Do you feel as though you have a seat at the "proverbial table?"*
- 6.2. How would you describe communication surrounding water governance with other government agencies?
- 6.3. What kinds of collaboration are present?
- 6.3. How involved have you and your department/agency been with other governmental departments/agencies in regard to planning and management?
- 6.4. What does inter-governmental and intra-governmental collaboration look like with regard to the watershed?

6.5. And non-governmental entities – non-profits, businesses, communities

7.0. **What entities do you think are key to accomplishing your priorities?** i.e. Who do you think has to be involved if your priorities are to be addressed?

8.0. **Are there any other stakeholders or groups whose interests and priorities should be considered in trying to fully assess priorities for watershed management looking into the future?**

9.0. **Is there anything else we haven't talked about that you'd like to mention before we finish up?**

Thank you very much for your time.

APPENDIX B

ADDITIONAL INFORMATION ON POWER DYNAMICS

Stakeholder representatives participating in interviews were asked about the degree to which they see themselves as having a "seat at the table" related to decisions and discussions about the Santa Fe River and Watershed. There was a mix of responses ranging from "yes, at the table," "at the table, but only performatively or at the table for some things," "not at the table, but could be through collaboration with others as a vehicle for influence or moving towards the table", to sentiments of outright exclusion or "no." **Figure B-1** represents these four generalized positions in response to this question. Some of those interviewed spoke about organizations they perceived to be at the table but expressed that they themselves did not have an immediate seat at the table or that their participation was invited, but not taken seriously or that they were merely advisors in the process. Some felt they did have a seat at the table but may not be perceived by others as having institutional power to make decisions. A few of those interviewed saw the table as too large or inclusive, though most felt it was too small and/or actively protected through gatekeeping. Some stakeholders did not take issue with their peripheral position to the table. Several felt they were not well informed enough to speak to every issue and trusted at least one perceived decision maker to advocate for positions they aligned with. Others felt they could have a seat at the table but choose not to if their values were already represented. There was a common sentiment that specific organizations, associations, and even individuals operated as vehicles for their voices at the proverbial table, expressed as, "I may not have a seat at the table, but I know people who can advocate for my positions."

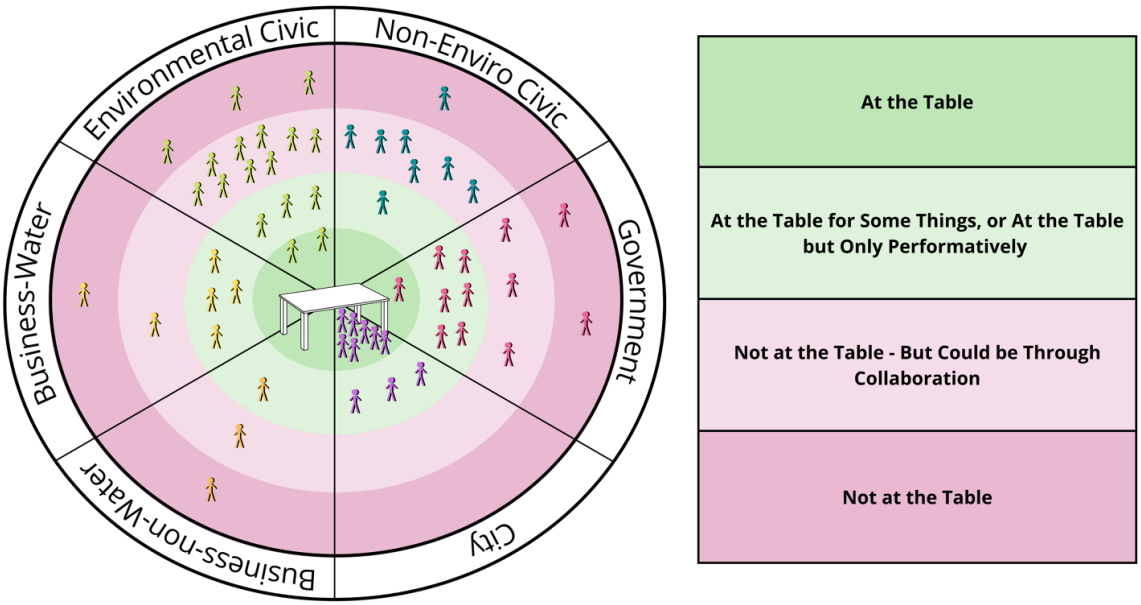

Figure B-1: Perceptions of Proximity to Decision Making Processes by Interview Participants

Since the discussion of power dynamics and proximity to decision making positions was so prominent in the stakeholder interviews, we additionally organized the different groups within this framework. Expressed relationships to the "table" were also mapped for the participants in the Q-Sort by their resulting perspective group as shown in **Figure B-2**.

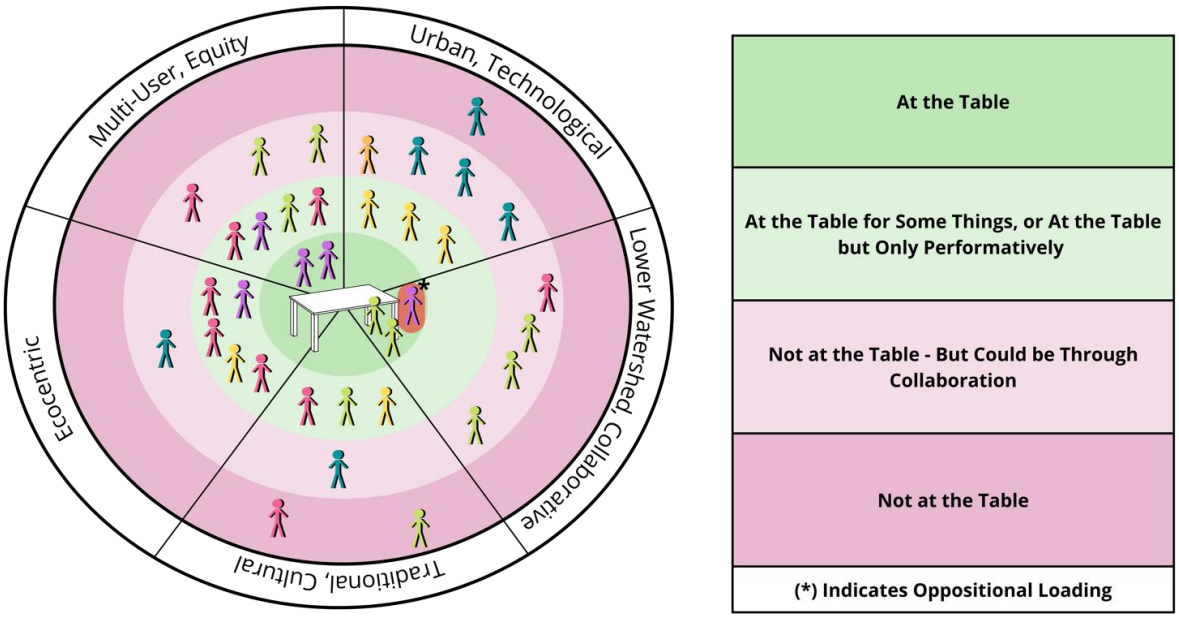

Figure B-2: Perceptions of Proximity to Decision Making Processes By Q-Sort Participants. The shaded figure with * represents a stakeholder with oppositional inclusion in the Traditional, Cultural group.

This is meant to be illustrative of a general perceived representation of different viewpoints in the decision-making process. Because of the different group assemblages, it can't be determined whether one group has more power than another. However, it can be observed that the "Collaborative," "Ecocentric," and "Urban" group participants generally don't perceive themselves to be at the decision-making table, while the "Traditional" and "Multi-Use" groups have two participants who perceive themselves to be at the table, though from different general interest groups. It is important to note that within the "Collaborative" group there is one participant who is included in an oppositional position. Therefore, there is at least one person at the decision-making table, who is significantly opposed to the viewpoints and priorities of the rest of their group.

APPENDIX C

TABLE SHOWING ALL SORTED PRIORITIES AND GROUP RANKINGS

Table C-1. All Sorted Priorities and Group Rankings

Statement	Multi-User	Urban/Tech	Ecocentric	Traditional	Collaborative	Average	Rank
Plan for climate change impacts on water resources	6	3	5	4	4	4.4	6
Protect native species, including birds, fish, and amphibians	3	4	4	4	5	4	6
Ensure city compliance with pollution standards	2	2	3	4	4	3	5
Place greater emphasis on ecological justice and social equity in water management	5	0	0	3	5	2.6	5
Fire management and planning in the upper watershed	3	4	2	0	2	2.2	5
Maintain flow of water in the Santa Fe River	4	2	3	0	2	2.2	4
Identify and address contaminated sites and other sources of pollution	3	2	2	2	2	2.2	4
Establish better wildlife corridors to river	-1	3	4	2	2	2	4
Increase permeable surfaces, rain gardens, and green spaces for better water infiltration and stormwater management	2	6	3	-1	0	2	4
Restore native riparian habitat in lower watershed below wastewater treatment plant	-2	3	1	2	5	1.8	3
Balance water needs of the city of Santa Fe with environmental needs	4	-1	6	-1	1	1.8	3
Recognize Acequia rights as well as cultural and historical significance	4	-3	1	5	2	1.8	3
Sustainable development and urban design to reduce water use and risks to watershed	3	6	2	0	-2	1.8	3
Respect traditional and cultural uses and spaces of river and watershed	5	0	-4	6	1	1.6	3
Aquifer recharge	0	5	0	6	-3	1.6	2
Acknowledge senior water rights of Pueblos	3	-4	3	5	0	1.4	2
Support beavers, cottonwood and bosque in lower watershed	0	4	4	-4	3	1.4	2
Arroyo restoration and stabilization	0	5	0	2	0	1.4	2
Extend water efficiency programs and infrastructure upgrades throughout the city and watershed	1	5	5	-1	-3	1.4	2
Involve lower watershed users in full watershed decisions	1	-1	-1	1	6	1.2	2
Address water quality downstream of Wastewater Treatment Plant below the city of Santa Fe	-2	0	2	3	3	1.2	1
Better collaboration and communication with Pueblos	1	0	0	3	1	1	1
Recognize the rights of the river itself (e.g. legal personhood for river)	-3	-3	6	1	4	1	1
Increase coordination and integration in water management	1	2	1	1	0	1	1
Maintain water production capacity through water recycling efforts	4	2	0	-1	0	1	1
More proactive watershed planning	2	3	-1	3	-2	1	1
Remove invasive species such as russian olive along Santa Fe River and arroyos and revegetate with native species	0	4	-3	0	3	0.8	1
More forest thinning in the upper watershed	5	1	0	-2	0	0.8	0
Continuity and transparency in government position and processes	1	-2	1	3	1	0.8	0
Have a civilian conservation corps for watershed	-2	1	1	-1	4	0.6	0
Provide accessible river trails and recreation opportunities for all residents	6	1	-2	-3	1	0.6	0
Prioritize local access to water over industrial or corporate interests	2	0	2	1	-2	0.6	0
More water conscious industrial practices	-1	2	4	-2	-1	0.4	0
Manage the Buckman Diversion in a way that recognizes downstream needs	0	-1	0	0	2	0.2	0
Work to avoid erosion from storms in the upper watershed	2	3	-4	0	0	0.2	0
More active efforts by city and county to gather input from the public as part of decision making processes rather than after the fact	-3	-3	-1	4	3	0	0
Prioritize clean water in upper watershed management	-1	1	-1	2	-3	-0.4	-1
Regulation of private wells	-1	-1	-3	-2	3	-0.8	-1
Plant more trees along the Santa Fe River	0	1	-1	-3	-1	-0.8	-1
More water flow dowsntream Wastewater Treatment Plant below City of Santa Fe	-2	-1	-3	0	1	-1	-1
Stop development of homes in wildland-urban interface	-3	-2	-6	5	1	-1	-1
Maintain restrictions on access to upper watershed	-6	1	5	1	-6	-1	-1
Stop development in the Santa Fe Watershed	-5	1	-2	1	-1	-1.2	-1
Increase the price of water	-2	0	2	-5	-2	-1.4	-2
Address homelessness and associated water impacts through more affordable housing	-1	0	-5	0	-1	-1.4	-2
Accessible and bilingual water information and education for all	0	-2	0	-4	-1	-1.4	-2
Allocate more funding for public water education	-3	-2	0	2	-4	-1.4	-2
Equitable water rates to make water affordable for low-income households	0	-4	-2	-1	0	-1.4	-2
Provide water quality information and data to the public	-1	-1	-2	1	-4	-1.4	-2
Implement and enforce rules about water catchment systems	-3	-1	3	-4	-3	-1.6	-3
Stop the Buckman return flow pipeline	-5	-6	-2	-2	6	-1.8	-3
Bring county water to upper La Cienega	0	-5	-2	0	-2	-1.8	-3
Pass the multi-family and commercial water efficiency rating system standards	-4	0	1	-6	-2	-2.2	-3
Continued structural assessment of dams	2	0	-4	-5	-5	-2.4	-3
Keep open bypass channel from McClure Reservoir	-5	-2	-3	-1	-1	-2.4	-4
Enforce split home (e.g. duplex) regulations on metering	-4	-4	1	-2	-4	-2.6	-4
Fully utilize San Juan - Chama water	1	-4	-1	-4	-5	-2.6	-4
Explore opportunities to open up upper watershed for recreation	1	-5	-6	-5	0	-3	-4
Incorporate more community art in water infrastructure	-6	-3	-3	-3	-1	-3.2	-5
Stop importing of water to the Santa Fe Watershed	-4	-6	-1	-2	-3	-3.2	-5
Humility and accountability by upstream users	-1	-5	-4	-3	-4	-3.4	-5
Provide outreach to mitigate hazards of camping along the river	-4	-2	-5	-3	-5	-3.8	-6
Complete the Buckman return flow pipeline	-2	-3	-5	-6	-6	-4.4	-6

APPENDIX D

SELECTED QUOTES REPRESENTING DIVERSITY OF PERSPECTIVES ON WATER SECURITY

Illustrative Quotes from Interviews on Water Security and Supply Organized by Interest Group with Q-Sort Group Noted Where Relevant

Business

"I think the city's done a really good job again, in the last 15 years to help find simple and effective ways of water conservation within the home. I think the next big step has got to be how to reduce water consumption on the outside of the home.
… I think the contention with the lower watershed is going to happen if or when like, if a substantial amount of the water is diverted from the wastewater treatment plant back to the Rio Grande, then all of a sudden, the reliability of water going downstream is going to be reduced."

(ID005 Business-Water, Ecocentric Priority Group from Q-Sort)

"You know in some parts of the country that have huge amounts of water here, we're hardly getting any. And I just wonder how long communities can last, you know, on the water supply."

(ID053 Business)

"From the residents' point of view, I think it is really important for our family and for the city, that we have a higher level of water security, and so that when climate change proceeds, it's not if but when, it will create earlier snow melt that will lead to more early flows.
… But what I think is really necessary, is an overarching water management entity that represents all the different agencies and all the different users, and that looks at the comprehensive integrated water management needs, from supply, to purification, to irrigation, to storage, to reuse, and that they influence how much development can take place, how the utilities operate, and what rates need to be set so that their rates are not being used only to pay for the upgrades of the distribution system, but also for maintenance of the landscape, for incentives, for irrigators, for flood control, you name it. And there's nothing new about that. Actually, dozens of countries across the world already do that."

(ID004 Business)

"So, I think that they've, you know, they've done a good job of trying to plan for the future, at least the next 30 years. The, you know, we do need to still have growth in the city, and I know, people have to bring water to those projects. And, you know, there is the belief that there, you know, that we still have enough water to grow to, you know, we can't probably grow at an exponential rate, but to still have, you know, moderate growth in our community. And so, you know, that would, you know, it still would be a benefit to make sure that we, you know, continue to have water get, probably, I suspect that some of what you would likely see in the next 10 years would be more focus on reducing the use of water and trying to do it in ways that continue to economize water, you know, maybe using it, you know, I know, there are more approaches to reusing certain kinds of water, I suspect, we'll see more technology to do those kinds of things. And I also think, the community is generally receptive to those kinds of progressive steps."

(ID036 Business)

"Well, if we keep building houses, people will keep moving here, and there's not enough water in the desert, and is this really okay. And the arguments of this, you know, this leader of the Housing Coalition, were that Santa Fe actually has very aggressive water conservation policies as a city, we have some of the most expensive city water, that's one of them. It's really expensive to drip your faucet in this town. There's a little sign on every public drinking fountain or sink that says like, welcome to the desert, don't waste this."

(ID016 Business, Multi-Use-Equity Priority Group from Q-Sort)

"I think that the pain of making these changes now is going to be tough enough, but if we don't do it, then we are going to kick the can down the road, it's going to be more painful, because then suddenly, you're going to, you're gonna have, you know, mandates handed down like, well, you can't water and you have to tear out these certain kinds of shrubberies that you planted 10 years ago, and you're going to get a class war. You're going to have people on some of those east side neighborhoods are out in Las Campanas who are like, well, we're still watering everything we want to water and then you're going to get- it's going to it's going to turn into a- it's going to be volatile I think if we don't, if we don't make the tough changes now, it's going to be more volatile later. It'll be a privilege to be able to water."

(ID052 Business, Urban – Technological Priority Group from Q-Sort)

"Because if you look at the Santa Fe Watershed and the small little reservoirs that we have, we have nowhere near close to enough water to supply the growth that we've got going on."

(ID008 Business-Water, Urban – Technological Priority Group from Q-Sort)

"All of this stuff, compounds and in the times we live to get an understanding of how a Santa Fe have 10 to 15 new housing development apartment complexes going up all around the city right now. Where are they going to get that water from? We're in one of the largest historic droughts since the 1920s and yet the city is growing by that much of an exponential rate of growth. And the amount of water is actually almost exponentially shrinking the other way, you know?"

(ID026 Business-Water, Traditional – Cultural Priority Group from Q-Sort)

<u>City</u>

"As we get into climate change, you know, you're going to start seeing we've had a study show, you know, over 20% of our watershed yield will be decreased. So, we're not, we're not going to have you know, 1990 levels, 1880 levels, or 1980 levels of watershed yield into our reservoirs. It's going to drop and then further, that's gonna exacerbate drying the drought cycle which drought cycles create invasive species of insects and disease to the trees, now you have more vegetation that's dried out or died, which then exacerbates sort of the wildfire cycle and we're trying to avoid that. Because again, if we lose that watershed, you know, that's pretty much up to 40 to 50% of our supply, we're gonna be, we're definitely going to be turning to our wells. And that instance, then we're, you know, getting into the, to that mode of like, we're mining water for our drinking water supply.

… We're trying to look at, okay, given our resources Now, given potential, would like the treated effluent and that option. Where do we see ourselves, you know, reaching? If there is a population increase? Are we covered? You know, do we need to buy more water rights from farmers, which basically means those farmers aren't producing ag. You know, that's, that's another option. But it's not a popular one."

… we've been short of housing. Definitely even shorter, I would say with rental housing. And so, the developers have smelled that. And now, people want to buy, you know, and our housing because of that shortage of inventory, or housing prices have really gone up. And so, there's pressure on the city to be like, Hey, we got to, you know, like this, this, this market based system of, you know, of trying to find a house and pricing for housing, and it's just getting ridiculous, like, way more units out there. And so the developers have gotten wind, you know, people are buying, so they're building. And that puts pressure on our water system provider to build out that water.

… We've noticed that there has been infiltration in the River Corridor through the city, and that our city wellfield has benefited from that. So when we don't have the reservoirs, or we don't have the ability to pull water from the Rio Grande, we can turn to our city wellfield and very dry drought years, which will probably be this year as a prime example, to then have to lean on our city wells and our groundwater.

Well guess what? That living river system gave us the water to where we're not dropping the aquifer right away that we turn on those pumps. But instead, we're actually you know, being able to maintain that water level, because for a number of years, now we've that flow that it's come by actually seeped into our city wellfield aquifer."

(ID037 City)

"And so, what is unique, in many respects, is in addition to that mission is also trying to achieve, you know, sort of the realm of a water supply that also accounts for the needs of cultural uses of water, as well as environmental. And so, there's the value side. You know, the city has embarked on some water planning studies that we went beyond, in many respects, the requirements of looking at and trying to take into account what we call a triple bottom line analysis of effectively developing metrics on how we manage water that is simply not just the bottom line of, you know, achieving a reliable supply for the cheapest cost or the lowest cost. And so, we are trying to manage the water with those other considerations in account.

… The highest priority for the, the water division at this state is basically to fully utilize its San Juan-Chama project water. And so to try to explain it on a high level sort of term is, is we've, we've invested with the county well north of $300 million to build the infrastructure, to access that water and to bring it into the city for use. And as you're probably well aware, you know, only about- that water takes one pass through the city. So, we divert it, we treat it, we bring it into the city, it enters our potable water supply system. And about 65 to even close to 70% give in a year of that water is returned to our wastewater treatment plant as effluent. So, meaning of that source of supply 30% is consumed on the first pass and 70% is returned to the treatment plant. So, our priority is to basically maximize that portion of our effluent, the San Juan chama water, the imported source, and maximize it, so that we have less reliance on our native water. And, therefore, we can reserve in particular our groundwater sources for times of drought and or fire because another, you know, as I said, it's a multi-pronged challenge.

… We already have a situation where there's a tug of war, if you will, there's insufficient water supply to meet the needs of those three sort-of components environmental, cultural, and water supply. Now, superimposing on that already shortages, this climate change impact. And so how, how we incrementally over the next decade out to 50-60 years down the road in our planning process, how do we still meet the needs for those three core principles in a diminishing water supply? And all the computer models are projecting shortages, it's just how extreme. And so hopeful that you know, back to direct potable being one example is technology being key. Right? On the social side of things, I think everybody in Santa Fe values water like probably more than anywhere. And so, I don't think having an issue of participation and involvement is going to be problematic. What will be is everybody's gonna have to concede.

… It's that classic sort of race to the bottom is water levels of declining shallow system very responsive to climate change. We're seeing this rapid decline. So the springs and seeps are drying up. So what ends up happening is then irrigators are forced to put supplemental water wells in. So then that only exasperates the challenges, you know, we're pumping more groundwater and therefore what we've seen is a pretty big dramatic decline in flows in the Cienega Creek system. Now to the benefit here … there's been a lot of progress made in the past decade on ways to alleviate some of these challenges and all the credit goes to the county in these cases. But point being, you know, again, back to values and where we want to be in 10 years is a more sustainable water, water supply, but also, you know, take into account the needs of the stakeholders.

(ID044 City)

"I think that we do have to work together to come to some consensus about what the priorities are for not only the environmental impacts, but also for creating a more resilient water supply."

(ID039 City, Ecocentric Priority Group from Q-Sort)

I think anything that has the potential for helping us manage our water supply, and really do so in a responsible way, is something that we need to explore. It doesn't mean that we act on it, but I do think that anything, you know, anything and everything has to be on the table as we start to really tackle what some of the issues are. And again, things are constantly changing. There's people that are working on these issues that are coming up with new ideas and new solutions. And so really, I guess- okay, maybe I do have one. The one thing that I would not want to see this, if we were like, hey, were going to do the return pipeline and so we're good. We don't have to look at anything else. So that would be my concern. I guess complacency would be my concern. So I just don't want us to be complacent. We constantly need to be looking at this. This is, this is not a one and done situation. There is no silver bullet.
… And of course, with the watershed number one issue, do we have water? And do we have enough water? Will my son have enough water? Will there be enough water for people to continue to live here? How do we, how do we really balance some of the needs that we do have? I mean, in Santa Fe, we need to develop, we need to have housing, and we need to be smart about how we are utilizing our water and we need to be innovative in some of the water conservation strategies.
… And for do we have enough water, it's do we have enough water for all the things that we would want water for. So, not just for consumption, but also for the ecological purposes of what you know having river, having the water you know, out in nature does, as well as the just kind of, again, that intangible piece that you can't quite put your finger on, of mental well-being, of the social aspect of, you know, recreation. You know, there's all these pieces that are still really important that I think kind of sometimes get lost in the mix."

(ID045 City)

"The next 10 years, top priorities for river and watershed would be, you know, honestly, aquifer stores and recovery along with Santa Fe River, is something that we're looking at fairly closely. And I think that that now, the lower Santa Fe River the return flow pipeline is the big thing we're looking at. And that will have impacts on the lower Santa Fe River. So, you know, I guess in the next five years, it's probably lower Santa Fe River below the treatment plant, I think coming up with a plan on the lower Santa Fe River to sort of look at how that portion of the river might be managed without San Juan Chama water in it anymore. Yeah, that's that'll be a big focus in the for the next three years. And then, assuming that that project goes through that additional San Juan Chama water that we started to have available to us will open up opportunities, I think, for aquifer storage and recharge along the Santa Fe River using native water."

(ID040 City, Multi-Use-Equity Priority Group from Q-Sort)

"There's a lot of, you know, complicated little bits and I get that we need to reduce, that we need sustainable water supply for our city, but reflushing our toilets with potable water instead of having a grey water tank that takes the water from washing your hands in a sink and that goes into a grey water tank in your house and then that flushes your toilet. Big reuse right there. Every city county building, every public restroom, how many gallons? That's potable water. We don't need to flush our toilets with potable water right? It's not necessary. And so rather than coming, coming up with these kinds of solutions, where we can reuse our water in a more efficient way, within the systems that we already have, rather than spending millions of dollars creating some kind of crazy pipeline where you're going to have construction on, you know, a corridor of 50 feet right away, right?"

(ID011 City, Lower Watershed – Collaborative Priority Group from Q-Sort)

"Housing in Santa Fe is growing. That is a concern for some of our community members. Is there enough water for new growth?
… Even though I'm not expecting a lot of water delivered this year from the San Juan-Chama project, the BDD should still be able to call for the amount of water that is needed in order to meet demand. And BDD works with the city and the county to coordinate how we manage that supply source so that in years like this, when there's just not going to be much water in the system, we're still able to meet demand and that's kind of what I was getting at earlier. Like when I think out 10 years, 20 years, 50 years, we may not have that water in storage anymore. I don't know what- we'll deal with that as it comes, I guess.

(ID042 City, Opposition to Lower Watershed - Collaborative Priority Group from Q-Sort)

Civic

"It really is development number one. Right now, Santa Fe is booming. They're building homes and apartments all over the place. We haven't had a you know, boom and bust like this in years. And development, people need water. So, they're getting water wherever they can you know, up in the reservoirs, the wells, Buckman. And it's always been- being an environmentalist- it's always been a big concern of mine about development. I'm not against development, because, you know, the world grows and population, stuff like that. It just has to be done right. And, you know, we need to use, use more gray water, be more conservative with water. Santa Fe has been pretty good. Santa Fe has one of the lowest per capita rates of water consumption in the country. It's really- people here are very aware of it. You rarely see lawns anymore. Parks have grass, sort of, but most residences don't have grass. People are xeriscaping. Very conservative here as far as water goes. But you still need water for development. So, so that takes water away from the river. And not only the Santa Fe River but, the Rio Grande diversion. You know, the Rio Grande is dropping rapidly, and it dries up in certain parts of the state now, which is really sad. If I see the Rio Grande go dry. That's, that's scary. That is really scary. We don't have a lot of water, and we need to conserve it. We need to look at green building, green technology. And most of the builders here are into that."

ID023 Civic

"…especially with all these people moving to this area who don't understand. You know, they might be coming from someplace like New York, or I don't know where, that has a lot more water than we do and it's easy for people to kind of transport their lives from some other place here and think that they can just use water- like that it's infinite, you know. And so, I think it is really important to educate people, especially with this influx on how to conserve water, why to conserve water, where water comes from, you know, why it's so important to have these trees in the watershed and kind of rehabilitate the river."

(ID030 Civic, Urban-Technological Priority Group from Q-Sort)

"…people love to act when there's a crisis. And sometimes it takes that crisis for people to act. And so if people understood that in Santa Fe, we're going to have to go from sewer to tap soon. And and would they be willing to rearrange the way they think about things in order to avoid that, if we could? What would that do? I don't know. I don't like presenting crisis as a way to change things. But it seems to be sometimes the only way we can do things.
… I guess my biggest thing is, really, we're just gonna keep building houses and keep bringing people in here and keep adding, adding, adding adding with it sort of feels to me like, oh, because we're going to find the water no matter what. And I just feel like that's a really, what is the saying, bass-ackwards way to go about stuff. You know, I think there seems to be that we need to set limits somewhere and be bold enough to do that."

(ID010 Civic, Ecocentric Priority Group from Q-Sort)

"…we don't know what precipitation is going to be like here in the future, we know it's going to be hotter. We know it's going to be hotter earlier and later in the season, we're still going to get freezes. But there's still a lot of questions about like, are we gonna get more precipitation, less. And I think being prepared for a number of different circumstances is going to be really important in planning those resources way out. Because our aquifers only have so much down there."

(ID031 Civic, Urban – Technological Priority Group from Q-Sort)

Environmental

It's not all pessimism. The optimism is though, so the city uses about 10,000-acre feet of water a year, right now. And that may expand a bit as population increases, of course, 10 years from now or more, 35 years from now. So, but the sort of the catch is that on our 256,000 acres of this watershed, we get on average, 12 inches, one foot, of precipitation a year throughout the watershed. Higher in the upper watershed. Less than the lower watershed. So, we receive 256,000 acre feet of water a year on average, and we only use about 10,000-acre feet with this city. So, there should be some water available. But it's not because of past, I'll say engineering projects, and impervious surfaces. All the streets and everything get that stormwater off and an out of here as soon as they can. So, that's our challenge. So, there's a water management function that can actually bring us to a functioning watershed, not just the city taking their 10,000-acre feet."

(ID002 Environmental, Lower Watershed – Collaborative Priority Group from Q-Sort)

"And I know that City of Santa Fe is already you know, bringing in water from other areas to be able to actually provide for its entire residential population, and even beyond.
… Like there's been a lot of negative impacts to users downstream and a lot of significant impacts to natural resource that I know that we are very concerned about, especially because you know, the lower Santa Fe River no longer reaches the Rio Grande. And we only expect that to continue to worsen over time. And so what does that mean? If pieces of that should be, should in theory start to dry out? What does that mean for Cochiti Pueblo? What does that mean for our cultural resources?"

(ID022 Environmental)

"I think the main- there's an ideology in the way, which is when water is scarce, you look for new sources of supply or you look for, for ways to divert more water out of the already endangered Rio Grande. I mean where that goes dry regularly and in huge portions of the reaches of the Rio Grande go dry and we're still trying to take more water out of it. So, what, what I don't, what I don't like about the return flow pipeline proposal, … what it's not doing is it's I think we need to change our, our kind of go to concept of what to do when water is scarce. And we need to look at our, the water that we have that we're sitting on in the aquifer. And Santa Fe's aquifer has 1000 roughly private wells which are effectively unregulated. On paper, they're regulated, but they're not actually regulated. And, and the regulation legally has to come from the Office of the State Engineer not from the city itself. But so what we're what we're failing to do is inventorying our water sources. Not just the Rio Grande and the Santa Fe River, but our groundwater sources. We are tapping, we are tapping our aquifer in Santa Fe and the surrounding aquifers near Buckman. But we are not making any effort as a community to rein in water use by the private wells. There is no appeal to the to the owners of private wells. Remember water is a commons. The water that you're using is water that the city relies on for our future. Or raising funds to for a buyback program to buy out the private wells or to find a way that the community can become more dependent, more reliant on the water that we already have at our disposal but it's met, it's,

cornered by, it's privatized. It's privatized in these private wells. And yet, though, what's privatized is water that is not legally but morally and, and factually a common good that the whole community relies on but, but only the 1000 people that already have wells in the city limits, can pump out can use those wells. I can't ask for a new well to be built in my backyard because we don't do that anymore. But so, what we need to change is the idea that when we need more water, we go out and take more from nature, when nature is already giving us more than it can afford to give.
… And in fact, we can't take more water from the Rio Grande without a high- well as a sustainable source of supply. Because we know from projections, from climate change projections that the Rio Grande is not going to be healthy enough to give us the diversions that we're, that we're becoming dependent on, that we're already dependent on. So, we need to look at toilet to tap arrangements where we can just treat our water our wastewater back to drinking water and blend it with some new water as well. And that's clearly the direction that we're, that as a city Santa Fe is going to have to move towards. It's a matter of how quickly are we going to make that transition into truly sustainable sources of supply and how much damage we're going to inflict on, on our rivers in the meantime. So, I feel like what we need to do is, is quickly adopt principles that will carry us into the 22nd century as and, and still be able to survive in a in a very dry environment, very dry and unpredictable environment."

(ID027 Environmental)

"I think urgency is a big obstacle. I'm finding this in a lot of things that, you know, people who are want to build a project want to get it done, and they want to get it done now, because, you know, there's water scarcity on the horizon. And they have all these reasons for urgency. And I think that urgency is a very Western cultural trait. And I think that if you have a longer vision of what the watershed looks like that you have a better opportunity of doing the right thing now, rather than just rushing forward with something. So I think urgency is definitely an obstacle, especially urge or urgency from the kind of white settler system that's been put upon this area. I mean, there's not a shortage of obstacles. I mean, climate change is a huge obstacle. Because while you know, water scarcity is a real issue, I think that it just adds to the urgency because people feel like, oh, if we don't do this pipeline, now, we're not going to get it done, and we're not gonna have water. And so, to think about what are the other options in terms of conservation, like climate resilience, that don't involve infrastructure, I think that's another kind of area where we've kind of fail is thinking that we have to use technology to combat natural processes, like climate change, versus maybe, like, I'll give it just a silly example. But beavers, right? beavers are like the ultimate climate warrior, right? They stop water, slow it down. Shade it, you know, they do all these crazy things to create these little pools and create habitat. And a lot of times water managers want to get rid of beavers, because beavers, slow down water, and it doesn't get to where it's going. And so, to think about, like, what kind of solutions might actually help people in certain areas, and that might be more nature based rather than engineering, concrete based?"

(ID033 Environmental)

"Looking at that watershed, and looking at the, the concentration of people who live there, you've, you've got a number of different ways that water comes to those folks that you know, that it reaches them to meet the need, at least currently. And they, as I recall, the reservoir supply typically is about 40%. Maybe the population has increased and the drought and climatic conditions have changed that. It's probably less than that now. But it's a significant amount of water for the city. And, you know, the other portion, though, that is less visible, they've got groundwater pumping going on. And they've also got the pipeline coming from Buckman. And they all of those things sort of presuppose that you've got a handle on, you know, how much water is there and how much the city has a right to. But in looking at the management of a watershed, you've got unresolved questions in New Mexico, across the board, not just there, but everywhere, about, you know, what are the water rights and what is the water supply.

And unlike other states in the West, New Mexico has never quantified water rights or priority dates of water rights or addressed the fundamental question, how much water? … What's Santa Fe going to do if Buckman diversion is dry, and where's that water going to come from? And I think that facing a situation like that, with a lack of rigor in the courts, a lack of political will to resolve these questions of, you know, prior appropriation and water rights and demand and supply all those things, you have to just, you have to put that up against the fact that there's not the political will to stop development.
… Because when shortages appear, and they will, the people are going to be forced to reduce and not have a garden or even perhaps not be able to take a shower are going to be folks who have lived there a long time whose families have been there forever, who've already paid for the infrastructure that was big enough to support the population that existed when they built their house. So, I feel I mean, I'm not covering the government up there anymore, but I don't see any evidence that there's the kind of discipline necessary to address the shortages that not only Santa Fe, but this region faces in terms of development and water usage. So, you know, I can't speak for, say Cochiti Pueblo, but I don't think it'd be hard to imagine that they're concerned. You know, somebody upstream is allowing, you know, exploding growth, profligate use of water, golf courses, all that sort of stuff. And they're downstream counting on a water supply to support their lives, that they predate everybody and their water rights are senior to everybody's. You know, where does that leave the situation? So I feel it's, it's not just an issue of what we want to see, I think that I'd like to see discipline. And I'd like to see a sense of reality and if that means that you can't develop, you know, as many houses as somebody might want to develop up there, that's what it's going to take because the day of reckoning is coming here."

(ID029 Environmental)

"…(H)ow many people are putting, as they call it out here, you know, putting straws into the water, and drinking. We have a lot of unregulated use. And we have a lot of- and that, you know, our county has and our city has gotten pretty active on monitoring water use and looking at the rate that wells drop, and, you know, when they drop, how seasonal, how to best recharge them. We're still, you know, we're still permitting lots of development. And that's, you know, that's the flip side. So, in terms of what are the greatest concerns, it's maintaining some kind of very conservative balance of water use, and basically trying to make any new development, a net zero in terms of water use. In other words, they need to bring the water into the, into the development, whether it's through energy, water saving devices, you know, capturing rainfall, you know, any number of ways of bringing, you know, some water to the project is really being pursued, and it could be pursued even more. So, I think that's, that's a direction that we want to support.
… if you've ever been to New Mexico, and you've gone to some of our high plateau areas where there's literally no water, there is not much vegetation and, you know, you're existing on maybe seven, eight inches of rain a year and, you know, the wind and the snow and everything is extremely harsh, and it's an extremely harsh environment, you begin to realize that there's a reason why biodiversity is so important, and why the Indigenous cultures preserve that biodiversity. That is almost like a core belief. You know, you don't take something from the ground, or from the air, or from the water without, in some way, restoring it. And you certainly never overuse that that resource because you know it will go away, and then your community will fail and usually in a very drastic and unpleasant way. So, you know, there's those lessons have not been learned by modern society. We just think we can continue to grow. And the Indigenous societies have definitely learned the limits to growth, which I don't think we have.

(ID028 Environmental, Traditional – Cultural Priority Group from Q-Sort)

"Yeah, so I think a lot about kind of like people's relationship with water, and especially in the southwest, it's like, the most precious resource we have, right? So, you know, it's both really important for people to know and understand water conservation issues in Santa Fe, in particular, which is like a

very big water user. And, and also, like, have a personal connection with the water and the ecosystem that lives there. So that's a big part of what influences, but I also like, have concerns that we want to make sure that the water and the watershed itself is protected from just like, usage. And things like that. So, they're kind of, I don't think they have to be at odds, but they sometimes are.

(ID020 Environmental)

"The other element of, of you know, speed bumps in the watershed is variations on a theme of rain gardens. The more that we can be harvesting the water from a sudden rainstorm, and introducing it into the landscape in a way that serves infiltration and, and irrigation of vegetation. That that's really beneficial. I would also say, anything we can do- I mean, Santa Fe does a remarkably good job and … it's mostly because our water is so expensive. And so that makes us good, you know, water conservers. Our per capita water use is substantially less than most Southwestern cities because it's expensive. And I have no apologies for that. I think that's, whatever it takes to make people take it seriously. And hitting them in their pocketbook is going to be a good way to do it. But I would still like to see more in the way of management of the water that is incident. Precipitation in a way that we make the best use of it in local areas of the landscape rather than letting it rush down to the river, and, and go away."

(ID003 Environmental, Lower Watershed – Collaborative Priority Group from Q-Sort)

Other Government

"Well, from a personal perspective, or the perspective of the acequia itself, our concern is getting the water, getting enough water out of the river to supply the irrigation. But also, I would say we are very cognizant of the other demands of the river and recognize that we, we do need to have this, some kind of priority system. Recognize that other people also need water. There isn't enough water for everybody. How do we balance that?

… I don't feel like let's invite as many people as want to live in this area. You know, we can't welcome everybody. There's just not enough water for everyone. And I wouldn't want to take the view of we will shut off any other use of this water, except for municipal water. I wouldn't, I wouldn't support that. I'd say we've got to, we've, we've got to put value on other aspects in this watershed. And if it comes, if push comes to shove, we might have to say we can't welcome, we have to limit the number of people moving here because we don't have enough water for them. And I hope if and when that day comes- and I think it will, it's just a question of when- when that day comes, I hope the people making the decisions will have allocated certain amounts of water to be at the acequias, the river channel itself. So that that that that value is recognized above an overpopulation.

… As with a growing population, the conflicts grow with it. Water is a limited resource. Population hasn't seemed to be looked at as a limiting resource. It is, it is something that is constantly growing in the country, in the world, in our, in the southwest, in the mountains, mountainous Southwest. So we've got a population that's growing, and we're in a desert. And we've got climate change that's threatening even the amount of moisture that we've had in the past. So, we have to be careful, I think that the population pressure somehow is limited or self limits, something that's slows population growth, if in fact we do enter or we have entered a period of less moisture, less, less rainfall, less snowfall. If that's happening, we have to have that reflected in the population growth in the city. I think most of our conflict has to do with numbers of people."

(ID013 Other Government – Acequia, Multi-Use-Equity Priority Group from Q-Sort)

"Yes, for the next 10 years, I think what we were looking at was restrictions regarding development, restrictions regarding folks that might want to develop in the area by way of roads or other but by the same token, protection in the area of fire in the area of the traditional cultural place. We consider that

whole entire mountain our watershed our traditional cultural place. We want to make sure that we have clear and abundance of water for the future, without restrictions as far as folks coming in, but more in particular, and most important are the first group of people the first race, which will be the Pueblo people, and more particular the Tesuque Pueblo people, would be the senior water rights of this basin."

(ID051 Other Government – Pueblo)

"What do you see as the biggest obstacles to addressing our priorities? Mine is development. When does it end, the population increase? And as a, you know, as a biologist, one of the principles, you know, taught is carrying capacity. You know, an ecosystem can only handle so much of a population and working together in sync with other natural beings, you know, there's a lot going on. And so, if human is the main priority for the watershed, then I don't know, I don't think humans are gonna exist here very well. I would hate Santa Fe to end up being like Las Vegas, or like, Phoenix. And there has to be limits, limitations, because not everybody can live off of what's being provided from nature. Capturing and harvesting water for human consumption and landscaping must have limitations."

(ID051 Other Government – Pueblo, Traditional-Cultural Priority Group from Q-Sort)

[re: Priorities] "There's probably direct consequences of this, but just like a more, like sharply refined conservation strategy that recognizes, you know, water is going, like water storage of snow packs, they're going to continue to be depleted. There's no coming back from that in the short or medium term, so how can we prioritize conservation, water access, and of course, providing the city with the water that the residents need?

… But just I wouldn't want the emphasis over the next, like, decades as we continue to be in this mega drought to just be on providing water to agricultural or residents. Like, ideally, right, we're thinking broadly about what that river brings to the ecosystem, and animal and flora, fauna and human as a whole. I don't know if that's that articulate, but just like having this really holistic look at what it means to have water in a high arid desert that just going to get more arid.

(ID050 Other Government – State, Multi-Use-Equity Priority Group from Q-Sort)

"There's so many competing interests for that water. So, we have been approached by you know, communities and neighborhoods all throughout this area that that's on your map here to drill wells, divert water. So, both the ground and the surface resource are under a tremendous amount of pressure from population growth, development, just the size of that city. And so, I think that is one challenge.

… We really want to advocate for recycling of wastewater to the extent that that is cleaned up and then permitted. And then the second thing is, you know, proper watershed management, which could create environments, circumstances for water to be conserved, not evaporated so quickly. And that is a whole combination of, you know, erosion control and planting, soil health within the watershed."

(ID049 Other Government – State, Multi-Use-Equity Priority Group from Q-Sort)

APPENDIX E

SELECTED QUOTES REPRESENTING DIVERSITY OF PERSPECTIVES ON WATER QUALITY

Illustrative Quotes on Water Quality Organized by Interest Group with Q-Sort Group Noted Where Relevant

Business

"I worry about mud coming down and contamination coming down into our Rio Grande because it all flows right down."

(ID052 Business)

"Although Los Alamos I do think, you know, because of the, you know, LANL, the Los Alamos National Labs, you know, they're, you know, they've got to again think long term and of course have issues probably with water quality because of the nuclear work that they've done.
… Toxins, and, and I think toxins here, you know, I think there are still concerns about wells, and toxins in wells, because of some natural occurring problems that you can have in the West with wells.
… And I mean, obviously, environmental groups and things like that, that are worried more about the toxins and making sure that, you know, we have clean water, because Santa Fe has been pretty good about keeping out the oil and gas industry in their area."

(ID036 Business)

"So, from the residents' point of view, I think it is really important for our family and for the city, that we have a higher level of water security, and so that when climate change proceeds, it's not if but when, it will create earlier snow melt that will lead to more early flows. And therefore, flash flows in the river that are probably more sediment laden, or have other contaminants that are loosened up in the sediment. Therefore, it is harder to get those sediments purified."

(ID004 Business)

"And then recently, man, since about 2014, I've been really interested in urban stormwater, because if you look at why our world is polluted, in my opinion, it's urban environments. You can't imagine the toxins that are coming off of streets, and we've got biological contaminants like E. coli and coliform and you know, dog poop, cat poop, stuff like that, then you've got your chemicals, people washing their cars, or, you know, spraying pesticides on the street out in front of their house, you name it, all that kind of stuff, you've got your heavy metals coming off of streets. And then of course, streets themselves, are toxic. They have polyaromatic hydrocarbons in them, the petroleum products used for asphalt, they weather, the rain hits, all those are picked up and they're transported. And everything's transported directly off of streets into a storm drain into a pipe and into some drainage or into a lake or into some river, or into the ocean even worse. And so basically, our urban environments have been set up to toxify, everything that we do, and make sure that water does not soak back into the ground where it can be purified through the soil, through the biology through the roots, through the microbes."

(ID008 Business-Water, Urban-Technological Priority Group from Q-Sort)

"Keeping debris out of the river is a priority. And that includes everything from, you know, blown debris that goes in and to random, random, you know, bottles and whatnot that get thrown because of lack of understanding. And also, that includes debris in somewhat invisible format, which is like the oils from the cars and, and street debris. And that's where those rain gardens can really help facilitate that, are by, are by helping clean the water before it goes into the river."

(ID007 Business-Water, Urban-Technological Priority Group from Q-Sort)

"Right now, they're not upgrading their wastewater treatment plan. It's been out of compliance for I'm guessing 18, somewhere around 12 to 18 months. … You look at the bottom stream, it's covered with algae. And they're not investing in it because you know what they're trying to do? They're trying to get what- you know what a return flow credit is? You know, in terms of cleanliness, because right now, they're flat out failing and actually harming downstream people just below and its horrible water, dude. It stinks."

(ID026 Business-Water, Traditional-Cultural Priority Group from Q-Sort)

"I primarily am focusing on the consequences of urban and impervious development on stormwater runoff and pollution and trying to kind of shift policy and opportunities towards stormwater catchment, and rain gardens, bioretention basins, as a means to passively irrigate trees for urban forestry and remediate stormwater pollutants, things like that."

(ID005 Business-Water, Ecocentric Priority Group from Q-Sort)

City

"Water quality certainly. You know, from strictly from the utility perspective, it's probably the sort of the provision of clean water by the watershed to the cities is the number one for, for me with that hat on only."

(ID040 City, Multi-Use-Equity Priority Group from Q-Sort)

"Because now you start getting what you thinned out a little bit of places and you start getting like, dynamic, like a dynamic system where there's meadows and openings is not super dense. And there's different climactic variation and heterogeneity of your forest, you could actually improve water quality. And then you also get better water storage. So, for us as a water utility, having healthier forests gives us a better, in a way, quality of water."

(ID037 City)

"And we, you know, work on different campaigns, we've been doing a lot of kind of scoop the poop campaigns, we call it, keep it clean, we're all downstream to kind of help, you know, really a lot of it's just focused on providing resources and educating the public on our limited resource that is water."

(ID043 City, Multi-Use-Equity Priority Group from Q-Sort)

"I mean trash removal you just got to do all the time as a constant, but you know, and then that way, you are improving that infiltration into the ground, and then maybe the springs and everything that you have actually, and increase in the quantity of water that you have in the river. And the quality because it's not bringing all those pollutants down with it, it's infiltrating into the, into the ground.
… And then I think that, you know, people look down when they're walking along, and they see all the other trash and so then they just chuck their trash in. And, so having actual water in there more often I think would, would help alleviate some of those issues, because people would start seeing it as opposed to this dry dump that, you know, because we all appreciate water."

(ID011 City, Lower Watershed-Collaborative Priority Group from Q-Sort)

"Yeah, so much of what I'm thinking about is the shallow aquifer recharge, as well as water quality, because the storm flows can bring in a lot of pollutants. What I really would love to also do is really tighten up on some of our pollution control contributions. Yeah, huge problem that we have right now and it's gotten a lot worse in the last few years, but particularly in the pandemic, is homelessness, and

the pollution that that causes is significant in our river and that's a very complex problem that I think the city is doing a pretty good job at, like, understanding the factors that need to change. But it's gonna be- we're gonna need a huge commitment to it and, but you know, that is a major polluting factor that is hard to deal with and I would love for us to be able to solve that problem."

(ID056 City)

"Water quality is another strong consideration throughout the city, and through the sources that we have. … The upper reach, which is effectively wilderness area, no public access for the most part, high risk for fire, which, you know, obviously will have massive implications on water quality, if and when that burn takes place. As we head into the urban reach, the middle reach, you know, the river has been modified in many parts of this reach. It's channelized. It suffers from stormwater effects on water quality and erosion. … Obviously, when you have drought, and you have lower flows, you know, any issues with dissolved oxygen to TDS become an issue, not just from drinking water, but also environmentally, you know, salinity from, you know, treatment of roads in the winter. All these effects are pretty severe, particularly in times of drought, right. You just don't, you know, you don't have as much dilution. We also, you know, Santa Fe is an old city. It's a capital city. We have a lot of groundwater contamination issues. And so back to that nexus of trying to reserve groundwater for drought reserve, it's really important in short, it's clean. And, you know, the more we look, unfortunately, the more we find. And so that's always a concern of mine again, you know, water can always be treated, it's just a matter of cost and energy, right. And that's two things we're trying to minimize. … On the surface water side, we have, you know, again, went beyond the call of duty, we built one of the most robust state of the art treatment plants as part of this Buckman direct diversion system. The challenges that we face on the Rio Grande, in terms of water quality, is twofold the natural volcanic spine sediments that are dissolved or suspended in the water, are like liquid sandpaper, very abrasive. And it really tears up equipment, pumps, and treatment processes. So, it's a concern. And then as we lived in 2013, after the Cerro Grande fire, the effects of ash on water quality are severe and linger for quite some time. So again, trying to conjunctively manage surface water and groundwater certainly has its challenges on that side of things. … Santa Fe is an old city. It's a capital city. We have a lot of groundwater contamination issues. And so back to that nexus of trying to reserve groundwater for drought reserve, it's really important in short, it's clean. And, you know, the more we look, unfortunately, the more we find. And so that's always a concern of mine again, you know, water can always be treated, it's just a matter of cost and energy, right. And that's two things we're trying to minimize. … Like, for example, emerging contaminants, you don't know. Like, there's, there's a chemical out there, maybe you've heard of called PFOS that 10 years ago, no one even knew was on the radar of a health concern, and now it's being measured in the parts per trillion and, and is a major concern. And, and we know was used at the National Guard in Santa Fe. It's possible we may have PFOS in certain areas, you know. So, I only mentioned that as you mentioned, looking ahead, looking ahead, is you, you got to factor in your risk analysis the unknowns, right."

(ID044 City)

<u>Civic</u>

"I know that that whole lower watershed community is interested in trying to make sure that their water downstream of the wastewater treatment plant maintains a level of quality that might be difficult as the city grows."

(ID009 Civic, Urban-Technological)

"Canyoncito's had horrible water problems, basically, water quality, and water quantity. And so, this is something that everybody supports. And fortunately, we have hope that the Eldorado - it's called the Eldorado areas water and sanitation district - will take advantage of that and take our wells offline. So that's our hope. … Our, kind of, our goal is to have a steady certain flow of water, of clean water that goes in the river. And that means addressing the issues that the, I call the artificial bosque, has created."
(ID006 Civic, Traditional-Cultural)

"I mean, as we increase our population worldwide it decreases our capacity to provide clean water no matter where we are. How do you do it? That's facing everybody."
(ID010 Civic, Ecocentric Priority Group from Q-Sort)

"We know that there are hazards like people living in the river, to the water quality."
(ID024 Civic, Urban-Technological Priority Group from Q-Sort)

"There's sometimes an issue with, we do get, you know, with hikers and dogs, you get poop. And that can wash into the river. And there are people who live up in the mountains. Currently, I think a few that have been over the years more kind of squatters who live in simple structures."
(ID017 Civic)

<u>Environmental</u>

"And I mean, it's funny, you know, picking up trash, it seems like such a sort of sideline, but it gets people in there. And it begins to, you know, create the message that we care. And we don't want our arroyos and our river to be just, you know, a place that people throw their wrappers and stuff. So, it just brings the community there and begins again to give them something to believe in and invest in.
… It requires I mean additional treatment and the whole the whole location of that drinking water system, the, the gallery wells in in the bed of the Rio Grande that I was talking about, it's downstream of the Canyons in Los Alamos where they did nuclear weapons testing for decades beginning with the Manhattan Project. Those canyons are known to be contaminated with transuranic waste. And they, every time there's a good gully washer, toad floater, that stuff comes right down to the Rio Grande. Now, it doesn't go into the drinking water because it's attached to the sediments. But you've got nuclear waste contaminated sediments that you're accumulating at this drinking water diversion. This is a problem."
(ID003 Environmental, Lower Watershed – Collaborative Priority Group from Q-Sort)

"And there are a lot of parking lots here I'm looking at our, the surfaces here. They need to be permeable surfaces. … There's a lot of new construction going on right now here in Santa Fe. That means parking lots in those parking lots are like you know, big flat surfaces that are made out of asphalt that also leach oil into the water system. So, what they're made out of is one issue but the fact that they're not that they're not permeable is also a problem."
(ID034 Environmental, Lower Watershed-Collaborative Priority Group from Q-Sort)

"So, the other thing we could do is clean up the contamination of our groundwater. There are contamination zones that are already mapped that- and this is something the city can do, or has the authority to do, as far as I'm aware. Old gas stations, dry cleaning establishments, and I think those are the two main ones. So, there are there are some efforts to clean up. But it's not seen as a as a priority because we can just take more water from the Rio Grande."
(ID027 Environmental)

"There has been 8000 acres of good forest management in the watershed to reduce wildfire risk. But that doesn't mean that wildfire under the conditions we have now, you know, or that we expect to happen in the next two months, wouldn't overcome the management and still lead to bad outcomes. Bad outcomes for water quality, bad outcomes for soil, bad outcomes for using the water, you know, filtering and all those things.
… But you know, I mean, I personally think about the wastewater that's going to the agriculture in La Bajada into the pueblos down in the valley below. You know, like I, I hope we are filtering our water and delivering clean water down because this, you know, the water just gets used and used and used over and over.

(ID021 Environmental, Multi-Use-Equity Priority Group from Q-Sort)

"And I do think that there's something there around, you know, going back to that system, but from like, a municipal standpoint is like, what are the priority uses? And how do you ensure that, you know, everyone has those basic fundamental needs, which is drinking cleaner, clean, accessible drinking water?"

(ID033 Environmental)

"Meanwhile, you've got entire communities of homeless populations bathing in the river next to the, next to the Capitol building. And so, it's really an interesting, interesting dynamic, and there's certainly a separation of class going on. But I also think there's, there's hygiene concerns, and there's pollution concerns with, with regard to the lack of, I don't know, if it's perhaps a lack of services that are provided for some of those members of the community."
… There was a mine in Tererro many years ago and they, I mean, it turned into a Superfund site. The amount of pollution and environmental devastation that that resulted because of that mine being in operation is just immense."

(ID029 Environmental)

<u>Other Government</u>

"And we're also concerned about pollutants in the water as well. There's been a number of issues just this year, where the city was not in compliance with what they're releasing into the river. … We're concerned about pollutants. There's a lot of pharmaceuticals that aren't really- PFAS you know- aren't really addressed. And, you know, they meet the federal standards, but they're minimum standards, and there's no real standards, I think for the, you know, the quantity or quality of you know, these pharmaceuticals that are being dumped, flushed down the toilet and then dumped in the river."

(ID025 Other Government – Acequia, Lower Watershed – Collaborative Priority Group from Q-Sort)

"You know, water quality, there's a lot of nutrients due to the wastewater treatment and all that. But that's just goes with the territory."

(ID047 Government Other – Federal, Ecocentric Priority Group from Q-Sort)

"The issue that we have is, we want to be on record saying that these are some of the things that we call part of our tribal religion is having water and clean water at that…
… It's critically important that, again, water is life and we want to make sure that with ever, ever mounting development in and around the Santa Fe area, downstream, upstream, that one of the issues that we're looking at is hopefully there's no contaminants or point source, people that are doing things up out there along the river, that is not contaminated."

(ID051 Other Government – Pueblo)

"Regular releases from the Santa Fe Waste Water Treatment Plant ("WWTP") have generated a significant amount of waste and contamination contributing to water quality impairments in the Santa Fe River. The Santa Fe River is hydrologically connected to the Rio Grande via groundwater recharge to the regional aquifer, where the Pueblo currently receives its drinking water. The aquifer discharges to spring sites along the Rio Grande, natural resources which also serve as invaluable cultural resources for our Pueblo. The Pueblo is concerned about potential and irreversible contamination to the aquifer, spring sites, and the Rio Grande.
… For example, there are environmental impacts that would cause the river to be contaminated with an overload of nitrates and nitrites, E. coli from cattle, pharmaceuticals, and other chemicals from the Waste Water Treatment plant and other potential sources of contamination. Different types of contamination do come from the city, through drainage and rainfall, but the primary potential contamination would come from the treatment plant. We all know the treatment plant treats human waste via the sanitary sewer system, but it does not clean up other sources of contamination, such as pharmaceuticals. This is what gets passed into the Santa Fe River and all the users downstream.
… *[re: Priority for next 10 years]* Water quality baseline data and quarterly testing at certain sites to determine and monitor potential sources of contamination. Examples of major points within the Santa Fe River system: at the reservoir, half way through the city limits, at the end of the city limits, below the treatment plant, before and after each community along the river. This testing will help determine how areas are being affected and by what potential sources of contamination. This information should also be accessible by the public."

(ID055 Other Government – Pueblo)

"Maybe starting from like north to south, I'd love to see, proactively developed outdoor recreation access to the upper watershed in a way that prioritizes clean water. … And our most specific work around watersheds is actually taking place in three watersheds north of Santa Fe. We're putting forth a state petition to protect their water quality in perpetuity. That's a tool that I could see us leveraging for the Santa Fe River, especially the upper boundaries of it, the headwaters. Really interesting tool that basically yeah, protects the water quality."

(ID050 Other Government – State, Multi-Use-Equity Priority Group from Q-Sort)

"We really want to advocate for recycling of wastewater to the extent that that is cleaned up and then permitted."

(ID049 Other Government – State, Multi-Use-Equity Priority Group from Q-Sort)

"So, you know, when they come back in 1946, there is no more water. And so, then the city said, well, okay, it's state law that we have to provide the acequias water. So, we're going to give you water from our effluent plant. And, you know, that was kind of good deal, because it was kind of like liquid fertilizer. And, and everyone was going along, doing their farming. And then, you know, the number of products that, for cleaning toilets came about, you know, Clorox was used, you know, all these toilet bowl cleaners. The hospital used to wash out the X ray machine into the sewer system, you know, all of this stuff started accumulating. And I have some oral histories of people that said that you know, their bean plants would only grow three inches tall. And, and the beans would just be laying down in the sewer water. … There's a lot of pollution coming down underground, from the city of Santa Fe, and what it is, is mainly dry-cleaning fluids and gasoline stations, the petroleum. And so, there's some abatement sites, ringing the Agua Fria village. And so, we've been monitoring that."

(ID001 Other Government – Village, Traditional-Cultural Priority Group from Q-Sort)

APPENDIX F

SELECTED QUOTES REPRESENTING DIVERSITY OF PERSPECTIVES ON THE FLOW OF WATER IN THE SANTA FE RIVER

Illustrative Quotes on Water Flow, Living River Organized by Interest Group with Q-Sort Group Noted Where Relevant

Business

"There is very poor relationship between all the different forms of water management and certain issues of water management like the water that flows in arroyos, the water that benefits wildlife, etc., is not being managed actually. There is nobody really in charge of that. And that is because they fall outside the purview of certain agencies. And especially now with the new water rule, the Army Corps is no longer really in charge of that, nor is the state environment department, because ephemeral streams are not falling under any jurisdiction. Now, but these streams have all kinds of benefits, water infiltration, wildlife, amenities, recreational, you name it. So that's a big black hole in water management in the city, and the watershed."

(ID004 Business)

"You know, again, more historical, but there used to be a flowing river. And that river no longer flows. It was dammed, I think in the 1950s, and so they manage their water use in the river. I do think, in more, more modern times, since I've been here, they've tried to create more flow in the river because I think it … somehow enriches some of the water that's- the way the river used to flow. And I think they've tried to create more flow to enhance the benefits of that kind of recharging, you know, I guess some of the, the, the natural water flows, but so that's been helpful. It's been nice to, to live here. I do live near the Santa Fe River and I do get to see it run during a lot of the spring."

(ID036 Business)

"And making sure that we manage our water wisely enough to allow the river to continue to flow. I mean, for many years in the what 20 plus years that I've lived here, there were many years when the river didn't flow. And so, for us to see even a trickle of water in our watershed now, in our river now in the city is really amazing. I mean, from someone who's seen it be dry over and over again for years on end, where you have these really light pulses. Well, somehow the river and watershed has been able to keep some real trickle flow happening in the river this past year. And it's really amazing. It's really amazing to see what happens when that occurs, and how we're able to recharge the aquifer."

(ID007 Business-Water, Urban-Technological Priority Group from Q-Sort)

"I think for me the- all of it's really important, right? Habitat and people's, like, enjoying the river, but none of that's going to happen, or all of that is very much limited if there's, if there's, if the river is being drained, right? So, it all starts from water, whether you're looking for healthy soils, or to grow plants, or to have enjoyment for people, you know. You can walk up a dry arroyo, but it's going to be much more rewarding, a lot more relaxing and pleasurable to like, walk up a stream that's actually running and there's maybe fish in the stream, or there's actually living trees on the side instead of just a dry rock bed, right? I think is one of the most kind-of endangered rivers in the country and, and so I think that- and it's a huge benefit to the city that it flows right through downtown."

(ID032 Business-Water, Urban-Technological Priority Group from Q-Sort)

City

"We have the living river initiative where we put out pulses. And, you know, that was a huge community effort to get that passed and funded. And so, you know, it's better than, you know, without that, but to have like a real living river that provides wildlife habitat, that provides you know the environmental

services of the evapotranspiration and vegetation, actually cools down an area and hot climates, you know. … Because people want a healthy, functioning River. It's just, there's the conflict of the drinking water supply, you know, the water supply for the city and the water supply for the river. And you know, it has the Living River Ordinance where it's 1000-acre feet a year except for in drought years, where we get 300. … we still need that healthy living river, otherwise, all the land, the whole watershed depends on that. You know, it's all one basin connected. And so, if you're putting development in one area, you know, they might not think that the health of the river is going to the health of that land underneath those developments, but it is it's dependent on the whole watershed. You know, it creates this, this whole cycle that people don't quite realize is that water flowing that that lifeforce. It's kind of like it's the veins, the water is the veins of the land is the blood flow."

(ID011 City, Lower Watershed-Collaborative Priority Group from Q-Sort)

"My goals are to have a healthy ecosystem and I would like to see a more regular flow. … It would be awesome if we could get a lot more water. … I would love to see that. I'm not sure that we have the resources to do it. Yeah. Yeah, I think if we manage it better and, and we really do, you know, infiltrate the water, we could, we could have more flow."

(ID056 City)

"The other thing is the city back in 2011 decided, you know, and, and they came up with this idea of it's called the ordinance for Santa Fe River target flows for Living River Initiative, the idea to living rivers, like instead of us hoarding all the water, just keeping into the reservoirs is there's a certain amount of water, we would allow it to go past the reservoirs through the city, you know, keep the riparian corridor alive. There's, there's a lot of tourism in Santa Fe, a lot of visitors and instead of having a dead dry ditch that goes through the middle of the city, at least try to keep it alive. … And so, when they came up with the Living River Initiative, it sort of brought water through the city. There's been like fishing derby events where it's stocked with trout and it's been sort of this middle Santa Fe River process. … It's been a success going on now 10 years. So. again, it's, you know, it has very specific goals of like trying to keep this riparian corridor alive. … There's the economic part of it, but there's also the social and environmental part of every kind of analysis and this is what the community of Santa Fe wanted, you know, and they were willing to say, we're willing to do up to 1000-acre feet, on average, going to the sea. And if that means we have to pump groundwater to make up the difference for drinking water, we're willing to do that. We're willing to pay for that. So, it was a big deal. Yeah. 'Cuz some are like, 'oh my God, you're just wasting that water!' It could have been stored in the reservoirs, but people are like, no, no, no, this is gonna benefit, like the heart of the city of Santa Fe, which grew up around this river. … That living river system gave us the water to where we're not dropping the aquifer right away that we turn on those pumps, but instead, we're actually you know, being able to maintain that water level, because for a number of years, now we've that flow that it's come by actually seeped into our city wellfield aquifer. …

(ID037 City)

"From the river commission standpoint, like I said, I think the, the main goal is to just make sure that living river, those flows are maintained, and they're not sort of overtaken by other interests and also just to keep the river healthy and clean in that reach."

(ID041 City)

"I don't want our living river flows to be limited. I think every year, it seems like we are losing more and more of our river flows due to various reasons. And I'm so I don't want to see those slowly disappear. And I don't want to see the- I don't want to see water in the river disappear. I think we're growing

exponentially and we're just especially because of COVID, there's a lot of people moving here. We have a ton of development and it's much needed even for locals. We're kind of in the housing shortage, but I don't want to see us lose perspective, because, you know, I feel like there's a way to do it all, you know, and I don't want to see the river lose its priority."

(ID043 City, Multi-Use-Equity Priority Group from Q-Sort)

"Living river, you know, obviously, has a strong tie to those other considerations, not water management per se, but also environmental and cultural, right, you know. And so, so the city and the water division strongly values, those principles. And again, we're trying to stretch a finite resource and so there may be other policy decisions made at the governing body level, that may potentially in the future, modify the living river into an aquifer storage recovery project."

(ID044 City)

"We want our river to run, you know, we have our whole Living River Ordinance. We want that to be- I have a [young child] now and I love to take him down to many spots in the Santa Fe river to just splash in the water and to, you know, sit by the river, and there is that component that brings joy to individuals, as well as the balance of, you know, the other creatures and plants that that need that river to thrive. And again, thinking about the balance of the ecosystem, and that there is, there is this, you know, selfish human interest that we want our ecosystem to stay balanced, because, you know, we die without it too. Plants and animals are not just something to be tamed, but you know, we really do need to continue that balance, and water is the life source for everything so without it we're in trouble. … I do want to make sure that we hold on to that living river, you know, and we follow that ordinance to our best ability. … Having community members at the table to say, listen, you want the river to flow more. Great. Let's talk about all the different ways that people are drawing water out of the river, whether it's for watering your lawns. Do we got to have grass? I don't know. Is that a good idea. Like is that something that you value, that we have grass instead of native plants? Do we get to have, have, you know, agricultural practices? How do we look at those? Do those need to change? And yes, it's going to be different. It's going to be different than the way you did it before. But I think that really having those very truthful conversations with members of the community of, we can keep doing things the way that we're doing, and here's the consequences, or we can change it and this is what we're hoping we're going to get out of it without being able to really tell the future, but this is what, what our goals are."

(ID045 City)

<u>Civic</u>

"I do feel like in general, people have such a disconnected understanding of water cycles, and I'm just more holistic with that. So, I want there to be an understanding of the importance of water for an environment and an understanding of water that allows for just non-human, you know, like, rights of nature, for example, rights of rivers to flow as rivers, and allow for the ecosystems that we're a part of, but also the ecosystems that were really disconnected from, to survive as much as we do."

(ID010 Civic, Ecocentric Priority Group from Q-Sort)

"My number one issue is just seeing the river alive, the Santa Fe River. When I was growing up here, it was- it's never been a river. It has just been a stream or Creek. You know, I always laugh when you call it the Santa Fe River. Look at it. It's just a little trickle of water going down. When I was a kid, there was water year-round and a decent amount of water, we used to inner tube in the summertime, it would freeze over the summer, and then in the winter, we'd ice skate on it. It was really a living feature. And then sometime in probably the early 2000s when Santa Fe really started booming development-wise, it

dried up. And the only time it was flow was when there was a big heavy rainstorm. But all the water was going towards development at that point. And that's one of the reasons how the Watershed Association came about just to create a living river again. So that's why I agreed right away to get on board. It's really has been the lifeblood of Santa Fe. You know, if the river wasn't here, Santa Fe wouldn't be here. You know, now we get a lot of water out of the Rio Grande with the Buckman diversion, and we pump water through massive wells around town. But for centuries, that was the lifeblood of Santa Fe. That's what kept the city, the town going. So, it's important for me, number one is just to see the river alive and running year-round."

(ID023 Civic)

"I would say one thing that's just coming to mind is, the more that we can all conserve water, so that we can have the releases down the river to keep that habitat alive, both for the beauty of it and all of that, but really for the wildlife and, and to have that tree canopy, you know, alive and vibrant to continue to shade. … And I hope you know- I know that the way the- it's not really an ordinance- I don't know. The language is written in terms of how much of a release the river will get based on rainfall levels. So, when we get down like last year was terrible rainfalls, like, I don't know, five and a half inches or something, is what I just heard, but I need to verify that anyway. When we have lower rainfall, the river isn't entitled to as much water you know, because we have to save it for the humans. Anyway, I guess I'm just saying that I would like to prioritize the river a little bit more, you know, make sure that the river gets her due so that we do keep it healthy."

(ID030 Civic, Urban-Technological Priority Group from Q-Sort)

"And there's something about the Living River Ordinance, which I guess I didn't mention, though I was kind of circling around, but basically, the City Council, I want to say, like 15 years ago, 20, quite a while ago, created, which gives the water, right, gives, excuse me, the river, a right to some water, that a certain amount will go in every year to keep the plants and fish and wildlife alive. And it's determined by a formula, how much and with occasional pulses. And I think people are generally supportive of that out and in a wet year, there's no issue. In a dry year, there's pressure to just close off all the water, keep it in the dam, so people can drink it or flush their toilets with it or whatever and but that would choke off and kill the river and so there's some pressure on maintaining the living river rights. … On the water issue, the water rights issue, the living river issue, there has been some, sometimes some sense that that decision gets made by a city attorney, interpreting the Living River Ordinance in a particular way, which is not congruent with what some of the other stakeholders feel is the actual legal language or intent of the Living River Ordinance, and that the city attorney then informs the city council of that without bringing in those alternative views. So, over the years, there has been some frustration with that, but overall, I'd say the communication is good."

(ID017 Civic)

<u>Environmental</u>

"So, 2007, the Santa Fe River was named as the most endangered river in America by American Rivers. So that was the big red flag that went up nationally. So, I think that having a living river is quite a goal. And we're still not there yet even though there have been some remarkable commitments from the city to put water back in the river."

(ID002 Environmental, Lower Watershed-Collaborative Priority Group from Q-Sort)

"My feeling about the river is that it would tell us when we were getting it right, in doing watershed management. And so, my focus was less, oh, let's have a babbling brook through town. Partially because

I honestly didn't think that a babbling brook was natural in the landscape. I thought that it was, as far as I could tell, it had been perennial to approximately where St. Francis crosses the river. … And the thing that troubled me about when people would focus on, we want a river, you know, it's not a river without water. It's like, let me introduce you to the southwest, you know? And because I think a lot of those attitudes came from immigrants that just, you know, wanted it to be a river."

(ID003 Environmental, Lower Watershed-Collaborative Priority Group from Q-Sort)

"So from a personal place, I think that, you know, obviously, when I came back as an adult and there had been a ton of restoration on the river through town, I was really pleased to see that like, that value of just having, you know, honoring the thing, the, the, the, you know, living river that runs through town in a way that, you know, restored the willows, cottonwoods, and you know, tried to create a new and more kind of natural environment. I really appreciated that. I think there's a long way to go. … I think that we would be interested in is some sort of environmental flows and benefits assessment of maybe the entire watershed to determine, you know, what flows in the river- I mean, there's a Living River Ordinance in the city that- it's actually pretty revolutionary, but it's not actually, it's pretty voluntary. And so, there's not like a requirement, and I don't- I'm not even sure they know exactly what flows in the river are necessary to keep certain, you know, biological and ecological benefits, provide those benefits. So my sense is, if there was some sort of, kind of instream flows slash, you know, environmental amenities analysis that was done on the river, so you could look at, you know, the headwaters from in the upper section, like, what, what do the flows look like historically? And how can you maintain those flows? And what are the values associated with those flows in terms of species, of plants and animals, and environmental benefits in terms of like wetlands or- and then same thing in the middle of that, in the middle section there on your map. Around like, what does it look like through the city? I know it has, you know, limits because obviously, they're- you know, it's kind of an entrenched little- it's not like this free channel anymore. It's kind of this little channel that's been- oh, there's a road on this side of the channel and then there's a neighborhood on this side of the channel, so kind of looking at those maybe different environmental values in the city. And then same with the lower reach, which is like what are the environmental values of a ephemeral stream and how- are there restoration efforts that could, could occur to ensure A) that, you know, water is being transferred down the channel when it is there and also B) like that it does it in a way that is, provides the most ecological benefits. So like, if there were trees historically there that would have shaded the river so the fish could actually live there or whatever, like those, like to look historically and try to figure out how to- I mean, you're not going to restore it back to the way it was 100 years ago, but there's probably some middle ground of restoration that you could, you could reach. And, and I also think that in that, in that process one of the important- or too, engagement of the important traditional and Pueblo communities is also important because they have a lot of traditional ecological knowledge that could be, could be provided in terms of what, what did the lower Santa Fe River look like? And how was it? How did it operate? And was it above ground? And you know, what things can we do to help it be what the Pueblos want it to be whether it's something that was historical or something that is now different? Like, what, what's their vision I guess, too? So, I think that maybe those are two things. Maybe it's like this assessment, but then having, you know, definitely a place in that assessment for those traditional communities to provide their- both their historical knowledge and their vision."

(ID033 Environmental)

"The Living River Ordinance in Santa Fe that allocates water to the to the river in a normal year. also means that in an abnormal year, which is basically what we're going to have in the future, you're not going to have normal years, there's going to be less water allocated to the Santa Fe River. And basically, an insignificant amount, that won't do any, won't give you a river that has any environmental flow. So,

we're, we're arbitrarily taking 1000-acre feet of water as a standard for what a living river will require for a living Santa Fe River would require. That's not a scientific judgment, that's just a political judgment."

(ID027 Environmental)

"One of the critical components, I think, is instream flows. You know, we've seen better instream flows, but to Ben's point, we've got booming development, population growth, urban sprawl, mixed with extended drought, and increasing temperatures. So, I just don't know how that goal could even be realistically achieved. I mean, I don't know how you get better instream flows when you're dealing with those kinds of issues."

(ID029 Environmental)

"The value that I really hold is the is the spring pulse, so that, you know, timing of flows through the system. When you when you have the ability to release water from reservoirs for various reasons, like they did this last fall. They did a release for the compact, but if they could have held that water, onto that water and done it at the right time, it would have been a greater benefit for the system. And that's the spring pulses, what really drives these systems is the ecology, snowmelt runoff. And so, making sure that you know if you can get that somehow get that that pulse going through the system for the ecology, I think is really important. … Is there a way to do that stuff that it actually still ensures that there's adequate environmental flows at the right time, the right magnitudes flowing through the reach to the river?"

(ID018 Environmental, Lower Watershed-Collaborative Group)

"I know, we have a Living River Ordinance, which has been pretty great, but at a certain- I am worried about how long and like what that's going to look like, in the future as the water goes down. You know, like, as it is, like, the water is only sometimes and it's sometimes like this much and like, what, what's going to happen in 10 years, when it's drier, and you know, what that looks like? Yeah, and how do you manage as maybe fire danger increases in the next year? So, I don't know if that's a barrier, it's just like, overlying, like the climate crisis, sort of, it's just this overhanging giant storm cloud that's coming down the mountain. … And we've talked a lot with our, like water conservation, about, like how a lot of species just rely on the cycle of water in New Mexico, and like, the traditional flows and things like that, and without that, like, certain plants won't grow and like, that sort of thing. So, trying to mimic that as much as possible, which is very hard, is important."

(ID020 Environmental)

<u>Other Government</u>

"We instituted what we call living river water and then the city controls that and that water still has to be coming in. It can't, living river water can't take water that would normally go into storage. So, it has to be enough water coming above McClure that they can put water in for the living river and since they've been doing that, It's made life a lot easier for me to take scheduled diversions on the upper end because the living river water keeps the river bottom wet. So that seems to work out pretty good."

(ID015 Government Other – Acequia, Ecocentric Priority Group from Q-Sort)

"There was a city ordinance that got passed 10 to 15 years ago called the Living River Ordinance. And it says that on a normal year, normal snowpack year the city will release, I think it's 1000-acre feet, over the course of the year. And they, usually in the spring, April 1, they use the NRCS numbers and they say, okay, this is about 90% of normal snowpack or 100%, or something like that. And they say, okay, so we're going to take, we've got 1000-acre feet, and here's how we're going to release it during the year.

We're going to have a pulse in the spring to mimic the normal spring flow if there weren't dams. We'll have another pulse early in the summer, basically, to, to feed the riparian system that's around on the river. And so, they have this system set up to release water. And so that's, that's the main place that our acequia takes water from. So, there we are competing with what the citizens of the city decided was a good idea, which was to have water running down the river course through town. Of course, everybody loves that. I love that. But we now are going to be taking water from that because the city doesn't release to us. … I mean, we'd love to see water flow down the river through the city. The citizens of Santa Fe have a stake in this also. I think it benefits tourism. It benefits businesses through the tourism to have a beautiful course of water running through the city. So that's, that's happening also. Other stakeholders will- we are only one of the acequias. There are four acequias pulling water off. We have to work with them also. If we all, if all four of us pulled water off the river at the same time, it generally means a significant decrease in flow further down river. Now, I should also say I mean, particularly for anybody who's not that familiar with Santa Fe, our Santa Fe River, most of the year is something you could jump across."

(ID013 Government Other – Acequia, Multi-Use-Equity Priority Group from Q-Sort)

"The issue that we have is, we want to be on record saying that these are some of the things that we call part of our tribal religion is having water and clean water at that and making sure that the water flow is there, making sure that there's enough water at the aquifer level, so that, you know, we can continue to practice our religion, wherever it takes us. … Here within, within the Pueblo we're feeling that pinch as well, and as far as water is concerned. We are, we're traditionally farmers. So, we utilize the surface flow for irrigation purposes. But unfortunately for this year, there's no surface flow."

(ID051 Government Other – Pueblo)

"So, my answer is the area of greatest concern in the watershed is the headwaters to the confluence of the Rio Grande. The river is culturally important, as to the river is a living and breathing being giving life to other living things. It must be treated with respect. Springs and wetlands are also important as they are complex components, which provide ecological services for wildlife and humans. … Priorities for the river/watershed are actual flow of water through the river. Capturing and harvesting water for human consumption and landscaping must have limitations."

(ID051 Government Other – Pueblo, Traditional-Cultural Priority Group from Q-Sort)

"I guess the two things that come to mind as opportunities and challenges is just like the first is that it is not a year-round living river and to be able to come up with some sort of management plan to do that, to make sure we have the healthy cottonwood stand on the south side of Santa Fe that people who live farther downstream actually have access to that flowing water, I think is a real, like social and environmental justice question. I also know how complex that is, so I don't like, I guess I don't throw it out lightly, but that's just something that I'm certainly aware of. … In that region, then as well as like by the historic Agua Fria community and just having like year-round flows there. I guess those are kind of the two areas that I think of when I say that, like, mention that living river priority. … I would love to see the river run as a living river for the ecological and the cultural and the recreation aspect that that can bring, just the benefit of having that water in your backyard. … And I really want any management of the watershed to take that holistic look of how do we increase access for everyone within this community, to a living river, to a riparian zone, to shade, and yeah, living trees, and to think about how we do that throughout the watershed as a whole. Yeah, that's, I would love to see that. … I think it's just like taking into account what access to these waters looks like to the watershed in general. Recognizing the realities of the climate crisis, and weighing that with trying to develop policies that enable a living river that actually, you know, all New Mexicans have access to in a, in a real and concrete way. And I think

that can take any number of forms. But just that question of equitable access and planning for a drier future. We've kind of already talked about that, but that those are two points that I put some emphasis on. … But just I wouldn't want the emphasis over the next, like, decades as we continue to be in this mega drought to just be on providing water to agricultural or residents. Like, ideally, right, we're thinking broadly about what that river brings to the ecosystem, and animal and flora, fauna and human as a whole. I don't know if that's that articulate, but just like having this really holistic look at what it means to have water in a high arid desert that just going to get more arid."

(ID050 Government Other – State, Multi-Use-Equity Priority Group from Q-Sort)

"So, coming from a rural pastoral setting, there's a lot of reverence for the river. Because if you don't have a good flow in the river, you're not going to have good crops."

(ID001 Government Other – Village; Traditional Cultural Priority Group from Q-Sort)

APPENDIX G

SELECTED QUOTES REPRESENTING DIVERSITY OF PERSPECTIVES ON WILDFIRE AND FOREST MANAGEMENT

Illustrative Quotes on Fire/Forest Management Organized by Interest Group with Q-Sort Group Noted Where Relevant

Business

"So, it's not a matter of if, but when, when we have a wildfire, just a crazy coincidence, where it's high wind, high heat, and it gets sparked. You know, there's certainly they're doing a lot of forest management in the upper watershed. But let's just, you know, turning towards reality, there could be a wildfire in the bosque along the Rio Grande or, or in the upper watershed. And then the trees burn, and then how are we going to maintain the water that we have when it's in the blazing sun?
(ID052 Business, Urban-Technological Priority Group from Q-Sort)

"You know, I'm worried about our watershed, just because we're in a high fire area. I want to, I want to know that there's a backup system. I want to know that that's not our only source of water. And I want just really good management of our water system. You know, I want, so that's always going to get top priority. I think it's just management of the water systems that we have in place. … And, yeah, I do worry, you know, I hope that you know, we do control burns here, which I have mixed emotions on the controlled burns, but I do want to make sure that we're fireproofed around our headwaters there."
(ID053 Business)

"I know that the upper watershed, they're doing a lot of thinning and, and for kind of fire mitigation, which, you know, there's people on both sides of that issue. I've kind of read pros and cons of that issue on both sides. I mean, I think it's good to reduce the fire mode and fire risk and maybe increase more grasses and understory forbs, instead of dense forest, that there's nothing growing on the floor, you know, so I can see that point of it."
(ID032 Business-Water, Urban-Technological Priority Group from Q-Sort)

"I really appreciate what's been done in the upper watershed in the last 15-20 years. You know, I think there's, there are a number of various environmental groups and stuff that I think oftentimes are, are concerned or sometimes, you know, create decent obstacles to thinning regimes aimed at fire. The, you know, reducing fuels for potential catastrophic fires. And so, the upper watershed in terms of what's been done up there in the last 15 or 20 years with fuel reductions and trying to protect kind of the most affordable water source we have, which are the reservoirs has been great. I wouldn't mind continuing to see some work done up there. I don't know if I'd like it to you know- like, I think there's been some talk about thinning the kind of more, let's see, it's above the, the mixed conifer, like the dry mix conifer and areas of the upper watershed kind of up near McClure."
(ID005 Business-Water, Ecocentric Priority Group from Q-Sort)

City

"I don't want to see it burn. I don't want to see the upper watershed burn in the next 10 years."
(ID040 City, Multi-Use-Equity Priority Group from Q-Sort)

"I guess another thing to think about with impacts of climate change, and less water is the fire risk to, to the watershed, and how, gosh, like, how devastating that would be. And it's so, you know, it's interesting, that interplay between those two. The less water we have, the more fire risk we have, which then you know, threatens the watershed. I know that our fire department works with the forestry service and the county to really do some mitigation. And we've seen some contracts coming through on, on how we protect our watershed in the risk of forest fire."

(ID045 City)

"The upper reach, which is effectively wilderness area, no public access for the most part, high risk for fire, which, you know, obviously will have massive implications on water quality, if and when that burn takes place. As we head into the urban reach, the middle reach, you know, the river has been modified in many parts of this reach. It's channelized. It suffers from stormwater effects on water quality and erosion. But we've done a fair amount of some would deem cutting edge fire management practices in the upper watershed."
… [re: Is there anything that you don't want to see happen to the river or watershed in the next 10 years?] Well, the obvious, I'll state the obvious is a forest fire in the upper watershed. That's, that's catastrophic for us on many fronts. In terms of the source and also how that ties into our water system and distribution, and we lose that source of supply."

(ID044 City)

"And some models suggest that that watershed would not produce treatable water for perhaps up to 10 years after a catastrophic crown fire, both from ash and sediment and all the things that come along with that. So that would be devastating. But in that regard, the city of Santa Fe, in conjunction with the United States Forest Service has a really good program of managing that watershed, keeping the forest end and keeping ladder fuels under control, and so that even if there was a fire, and it would be a nice, cool ground fire and not get up into the canopy."

(ID042 City, Lower Watershed – Collaborative Priority Group from Q-Sort)

"And so that's another thing is looking at if climate change is gonna bring this continued and elevated risk of wildfires, like what is our plan for post fire flooding, and debris flows. And that has not, we've identified it, but we haven't entirely incorporated that, that threat into our emergency action plan for our reservoirs. And there's a difference between flooding when it's just like a super rainy day, and it continues to rain, rain versus flooding, when it's like ash, you know, it's like ashes just jam in through. And the soils are hydrophobic after a fire. And there's nothing holding back that, you know, surface flow coming off from a rain event.
… So, we're not, we're not going to have you know, 1990 levels, 1880 levels, or 1980 levels of watershed yield into our reservoirs. It's going to drop and then further, that's gonna exacerbate drying the drought cycle which drought cycles create invasive species of insects and disease to the trees, now you have more vegetation that's dried out or died, which then exacerbates sort of the wildfire cycle and we're trying to avoid that. And so that's another thing is looking at if climate change is gonna bring this continued and elevated risk of wildfires, like what is our plan for post fire flooding, and debris flows. And that has not, we've identified it, but we haven't entirely incorporated that, that threat into our emergency action plan for our reservoirs."

(ID037 City)

<u>Civic</u>

"If we ever had a fire- I mean, it was starting about 20 years ago that they started to figure out that they needed to manage the land up there. If you look at the land in the upper part of the watershed, 20 years ago, you couldn't move. There was so many small dead trees. It was waiting for a fire to hit. It is the worst nightmare in Santa Fe, is that we ever get a fire in the area that you've got listed as upper and going up there. If it does- nobody really knows what this community is going to do. Well, both of our, both of our operative reservoirs are within that boundary area. If anything was ever to happen there, oh, my goodness. So yes, there is a- that's part of what I mean by we have to understand the river as a

whole, particularly going under environmental change. Fire up there is going- even with all the work they've done to clear out the undergrowth- it's going to become a higher and higher risk and only takes one guy smoking a cigarette. That's all it takes. One firecracker, and it could decimate the oldest community in the continental United States. It's a very profound concern. And we have had fires in the mountains in the past few years, the likes that I had never seen before. So, it is very scary."

(ID024 Civic, Urban-Technological Priority Group from Q-Sort)

"Really, forest fires is a huge concern. Now that, because of climate change, and the planet warming, I mean, you can really see it. A lot of the trees dying and a lot of ponderosas are dying. Pinyon trees are dying. And you know, they're dying in the watershed and it's getting really dry up there and I think it's only a matter of time before there's a catastrophic fire, catastrophic fire up there in the watershed which is going to be disastrous for Santa Fe."

(ID023 Civic)

"I say that the biggest challenge that faces the watershed and in municipal water supply- at least relative to the approximately 40% of the municipal water supply that originates in the closed watershed on an average water year- is that for decades fire particularly in ponderosa pine forests was largely suppressed. And that resulted in unnaturally dense ponderosa pine forests which have to be mechanically thinned and the slash from that thinning process needs to be dealt with before prescribed fire or a natural, more natural fire regime can be reintroduced as an element of forest management. And the pinyon pine Juniper forests that dominate at this elevation are, many of them are on extremely steep slopes where mechanical thinning is challenging. And the fuels that are generated by mechanical thinning or from beetle kill during drought has to be dealt with and you can't get a chipper on a 30 degree plus slope, so you've got, you're left, if you're not careful, you end up just redistributing the fuel, not removing it. And unless dealt with on a landscape scale, both on national forest and adjoining mountainous terrain, it's largely not a question of if it'll burn it's a question of when it will happen and whether it can be effectively dealt with and finding the harmonious visual status that is acceptable to the residents of the city which results in adequate reduction in forest density so that a lightning strike or some other source of ignition doesn't result in a catastrophic fire"

(ID012 Civic)

"Fire is a huge concern. Yeah, the general understanding is it's not if, but when. And because it's a relatively narrow canyon with as I say, just two little roads come in as basically a loop, Cerro Gordo on one side and Upper Canyon on the other with little tributaries. And they're, you know, one and a half lane type roads. And if there were ever a fire, it would be blocked in. If people are trying to get out and a fire truck was trying to get in, you know, we'd be blocked pretty effectively and you know no way out. And so, fire is an enormous concern.
… People love their trees, and, you know, they want to plant trees and maintain trees near their homes. And the, you know, the biggest single advice on the fire prevention or catastrophic fire prevention is to, you know, cut down the trees near your home, and people don't want to do that. So that's a natural conflict I guess, also. You know, the balance between maintaining a fire safe environment and, you know, beautiful natural environment with trees, and other vegetation."

(ID017 Civic)

<u>Environmental</u>

"And there have been ongoing efforts to lower the fuel loading within those stands of cottonwood and Siberian elm and willow. And I think those efforts have been very laudable. There could be more done

by the city to assist landowners to get their properties thin down. Here, the fire risk is not so much concerning future floods, as it is with the upper the far upper watershed, as it is about just a blaze in the riparian zone that could spread to a lot of houses. And, and also, of course, damage the riparian zone, because periodic fire is really not a constituent of that ecology, it would be a real ecological, black eye injury.
… Little can be done up there to thin dense stands of trees has already been done, but it's not very much really because there's most of the watershed is too steep to operate within even separate from land management policies that may restrict activities. So, the reality remains that the watershed, it's not if but when it burns, and when it burns the downstream consequences will be quite severe or can be, it depends on the kind of fire and the kind of preparedness that then are in place."

(ID035 Environmental)

"You know, when they were talking about doing thinning up there- this is before the big fire in Los Alamos, the Cerro Grande fire burned through there in 2000, and destroyed several 100 homes and burned out a lot of property and I think, served to open people's eyes around here to the real danger of wildfire in a way that hadn't happened before. But before that, people in Upper Canyon Road, were saying they didn't want the heavy equipment going up there to thin the forest because they live in such historic homes, that the truck traffic would hurt their Adobe houses by vibration. That's what you're hearing. You know, it's like guys, if you burn that watershed, you're not gonna have to worry about your homes anymore because there's going to be a wall of mud coming down the first time it rains, you know, but there's a level of nimbyism and selfishness in the east side of Santa Fe that really knows no bounds."

(ID029 Environmental)

"We've had the fire department, come around and do public simulations, so you can see how fire behaves, for example. That's a critical understanding for people. All of a sudden, building that cute little house in the woods takes on an all different meaning when you see how fire behaves in a canyon, for example, or how fire behaves when there's a high wind which we are having right now.
… I think also, having your city and county planners at the table are important because they need to look at the WUI, you know, the wilderness urban interface. And really no development should be allowed in the WUI."

(ID028 Environmental, Traditional-Cultural Priority Group from Q-Sort)

"The national cohesive wildland strategy calls for three things. Safe and effective wildfire response, which is like our suppression army. The next one is resilient landscapes, which is kind of this picture behind me of like, you know, good fire in ponderosa pine. And, and, you know, sometimes thinning works, sometimes managed wildfire. This particular one behind me is a prescribed fire. And then fire adapted communities that coexist in these landscapes that have fire as a part of them. So that's the national piece of strategy, and we're actors in that realm.
...I support the, you know, all the work in the upper watershed to reduce the risk of fire, and they've done other work there, too. There has been 8000 acres of good forest management in the watershed to reduce wildfire risk. But that doesn't mean that wildfire under the conditions we have now, you know, or that we expect to happen in the next two months, wouldn't overcome the management and still lead to bad outcomes."

(ID021 Environmental, Multi-Use-Equity Priority Group from Q-Sort)

"I know that they do a lot of thinning and everything for forest, for fire protection, especially of the watershed itself, of the water itself, which can be really great, but sometimes it needs to be balanced a little bit with how they, how they do that management.
… I do think that like people's emotions is a- I don't want to say barrier because like people have, emotions are valid- but like, it's, you know. I remember, was it like a year or two ago there was like, they were doing thinning up in the watershed and people like freaked out about doing control burns and thinning, because they're like, there's a very emotional connection to like cutting down trees, even though it has to happen. And so, I think that's part of that, like, the communication piece and education piece really needs to try to balance out - I was gonna say combat - balance out that like emotion that people feel about things that may seem bad, but are actually in the best interest of that ecosystem."

(ID020 Environmental)

"I know that whenever there's a prescribed burn in the watershed, the you know, the complaints from the folks of Santa Fe, who kind of don't understand the fire ecology are, are pretty intense, and there's protesters and stuff. So, you know, education around that is important. But I think we definitely like need to be in the doing phase and not perpetually stuck in the planning phase."

(ID019 Environmental)

Other Government

"We also haven't mentioned another huge one, which is fire suppression, and the role of the you know, river within that, and, you know, within the valley within the watershed. We had a, there was a big fire last summer I guess it was, in La Cienega, the village to the south and they were able to use the water from a pond, you know in the village."

(ID025 Other Government – Acequia, Lower Watershed-Collaborative Priority Group from Q-Sort)

"There's not a real bunch of trails up there of course that's because just forest land. It's being used to develop the savings of water for the, for the reservoirs. I know there's an awful lot of conversations about the prescribed burns, but I know that have gone up in the watershed and have cleared out a lot of the debris, because forests are you know, there's a lot of opinions on what you're supposed to do with the forage, but to let it build up was fuel for fires is is dangerous. And I think, sometimes I think prescribed burns can be harmful. I think they can get- I know the thought is just not a whole lot of heat and just burn up the stuff that's on the ground. And I'm not sure what the long run is on, the ground cover plants. So, I had mixed emotions on prescribed burns on that sense. Then they of course have, on occasion have gotten out of hand. And that's a dangerous thing when you're dealing with just the watershed."

(ID015 Other Government – Acequia, Ecocentric Priority Group from Q-Sort)

"The only conflict that comes to mind is just amongst citizens who say, how do we treat our watershed up above the city? And that's relative to forest fires. And some people feel like, you know, no, thinning the forest is not the way to approach this. And of course, others- and I'm in the other group- I said, I think thinning is going to be very important. And I think we should do that."

(ID013 Other Government – Acequia, Multi-Use-Equity Priority Group from Q-Sort)

"So, I think in the wildlife realm, there is habitat in there for spotted owls, the Mexican spotted owls that is, is kind of a bit on the bubble in terms of the quality of it, but what we're finding is these areas, you know, they provide habitat, and so doing something in there to protect the habitat from fire and help it develop into better habitat is something that we'd be working with.

… There's the upper watershed. And I think, I think keeping to move it into a resilient, fire, fire resilient state, would be the number one up there because everything else would follow. Getting, getting wildlife habitat. There's a great turkey population up there, wild turkeys that you see sometimes. And so yeah, having it kind of as a- because it's closed to the public, it could be one of those fire resilient, but cool place to, to encourage wildlife to have a little less interfered with, maybe that's what I'm looking for. But then when you get down to the lower part, which is down around La Bajada."

(ID046 Other Government – Federal,

"I guess, the biggest fear for the watershed is catastrophic wildland fire. Fire is a natural process. But you know, if, if it didn't happen in the upper watershed in the wilderness, you know, there would have to be actions to allow the fire to happen. But, you know, the post fire effects would be, you know, detrimental and costly. … And, you know, those dams, if something were to happen, you know, like a catastrophic fire, it's going to cost a lot of money to, you know, dredge them or repair them.
… And I think I'm kind of seeing, you know, the opposition from you know, people in Santa Fe that don't want fire, that don't want smoke, they don't want no thinning. And then Forest Service, you know, uses a prescription that says, whatever, 8-inch diameter or 10-inch diameter. If it's a healthy tree, and, you know, it survived, let it survive. But I think, you know, just going in there and wiping out trees, just because they don't meet a certain height, or, you know, or, or diameter shouldn't be the management strategy. There has to be diversity. You have to have that, you know, midstory, upper-story. I can understand, you know, the lower canopy, like the floor level, you know, fire, you don't want it to climb up into the canopy, and you know, have it cause a crown fire. But I think that, you know, fire, you know, has been the main driver, and the fear of fire. That's why a lot of all this work has happened in there, but as for being a part of burning, in there, asking us where things are, we haven't been included.
… So, to add to that too like with fire, you know, the whole Smokey Bear campaign is what, you know, is put fire out, fire's bad. And that whole 100-year campaign of putting fires out, we're realizing the, I guess, the wrong or the decisions made back then were not good for us here in the future. And so, as an indigenous people, I think we're a part of nature. We allow fire to happen naturally. As for utilizing fire in the Pueblos, we pretty much used it for clearing lands for agriculture, or using fire to clean ditches, to rid of biomass. And so as for putting fire on the landscape, fire was a natural occurring thing that was integral. And so, people can see the fire scar of the Aspen basin, that's the headwaters of the Tesuque River, which we are a part of. And people don't understand that that was a high intensity fire, at higher elevation where it was a transition, you know, fire where it went from spruce fir and mountain to Aspen. And so people have to understand the fire belt, like where fire exists and understand, you know, just fire in general is, you know, a teacher. It can be good, and it can be bad. Understanding that fire as a natural process. It's what helps the forest to you know, cleanse, you know, it provides new growth. And so, you know, fire has to happen. And when you exclude fire then you have catastrophic fire. We throw drought and climate change into that. You're just making a catastrophic event."

(ID051 Other Government – Pueblo, Traditional-Cultural Priority Group from Q-Sort)

APPENDIX H

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