

Reservoir of Resilience: Colorado River Drought Impacts on Sense of Place and Adaptation for
Blue Mesa Reservoir Communities

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A thesis submitted to the
University of Colorado Boulder
In partial fulfillment
Of the requirements to receive
Honors designation in
Environmental Studies

Defense date: 30 October, 2023

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Abstract

Humans who attach a key element of their identities to natural environments and outdoor recreation gravitate towards regions that fulfill those needs. They develop strong attachments to these areas and assign to them feelings, emotions, and beliefs, a phenomenon referred to as “sense of place.” Changes to these areas due to factors such as aridification and environmental degradation can have profound impacts on individuals’ wellbeing, livelihoods, and sociocultural identities, which inform their senses of place.

The Colorado River Basin faces an ongoing megadrought which began in 2000. Drought impacts people who rely on the river for domestic water; additionally, the communities that have formed around the river’s reservoirs have experienced adverse emotional impacts with declining water levels. This paper examines how prolonged drought has impacted the members of the Blue Mesa Reservoir community near Gunnison, Colorado. Interviews with stakeholders in this community highlighted the importance of understanding the role of sense of place in culture, economy, political dynamics, and adaptation to climate hazards as the community addresses water scarcity and a changing reservoir.

Acknowledgments

I'm immensely grateful for this research experience, which helped me focus my academic interests in areas that I hadn't previously thought of exploring. I wouldn't have had the freedom to travel to Blue Mesa and fully experience local recreational activities without generous funding from the Undergraduate Research Opportunities Program (UROP). I became deeply connected to my research as a result, which led to my full understanding of sense of place and the experiences of our interview participants. I'd like to also extend gratitude to my friend and guide, Ethan True, for spending a weekend teaching me how to fish on the reservoir, an experience that tied this work together for me.

I greatly appreciate the time invested by my committee members, Dr. Nancy Billica and Dr. Cassandra Brooks. Both gifted me with their infectious enthusiasm and desire for knowledge and I'm so grateful to know and learn from them. I admire these two professors greatly, and they have inspired me during my time at CU.

Dr. Karen Bailey, I don't know how you do it. Dr. Bailey pours an incredible amount of work and care into multiple students and advisees, and teaches me something new with each interaction. Her gentle prodding to keep me on track, her open door, sympathetic ear, and wisdom have carried me through the difficulties of going back to school and taking on this project. I will forever appreciate her time, guidance, feedback, and warmth.

To my partner, Parker Halcomb, sorry for using you as a human thesaurus but you always know exactly which words I'm trying to find. Thank you for sustaining me with love, calmness, support, and snacks during my years in undergrad. I feel so incredibly lucky to have you by my side.

I'd also like to thank Gary Halcomb for encouraging my education and following me through every tough journey I ever began. Thank you for treating me like your own child and always being there for your family. I'm proud to continue your fishing legacy and that your trout and fly rods made it to Colorado. You were right—I've got this.

Finally, I'm thankful to the Blue Mesa community, and most of all, our interview participants for their time and knowledge that made this research possible.

INTRODUCTION

Despite humans' growing need for urban development and infrastructure to sustain city life, we find ourselves drawn to natural landscapes—mountains, beaches, rivers, forests—developing attachments to particular places, many of which we continue to visit in order to recapture the gratification we attribute to our fondness for the location. We value memories of both physical and social characteristics of these areas, drawn toward them by a phenomenon identified as “sense of place” (Quinn, Bousquet, & Guerbois, 2019). Sense of place describes the integration of our feelings into geographic areas for which we have developed a fondness or sense of nostalgia, particularly those in which we live or travel frequently, distinguishing between the place's location and its effects and impressions on us (Silver & Grek-Martin, 2015). Our historical and personal experiences in these places allow us to personalize locations with emotional responses, beliefs, and meanings (Knapp, 2021). We can react strongly when our special connections fade with disruptive changes or degradation, prompting anger or action to preserve our sense of place and ensure our ability to enjoy future experiences. Understanding these psychological factors can contribute to supporting community security when considering future policies for adaptation to environmental hazards (Grothmann & Patt, 2005).

Severe drought has threatened the senses of place for the members of modern economic and recreational communities that have formed around Colorado River reservoirs, namely the recreationists, business owners, and jobholders at the Blue Mesa reservoir, near Gunnison, Colorado. The Colorado River Basin (Figure 1) has faced a megadrought for the past 23 years, leaving Basin states with shortages and conflicts over their mandated allocations of the River's water (Interior, 2022; McCoy et al., 2022; Walcher,



Figure 1. Map of Colorado River Basin (USGS, 2016).

2021). Water laws mandate that certain reservoirs must relinquish large amounts of their supply to downstream sources to satisfy contractual obligations, visibly lowering the levels of the artificial lakes (Kuhn & Fleck, 2022; Reclamation, 2021). Recreation and livelihoods tied to water—key identity elements for Blue Mesa’s residents and visitors—consequently suffer, leaving community members to assign blame to water policies, development and resource competition, rather than climatic factors (Kuhn & Fleck, 2022). Given these contentious impacts to sense of place, economy, and wellbeing, I sought to understand the complex relationships within the active outdoor community of Blue Mesa reservoir (Figure 2) as reflected in their perceptions of water management and climate change.

Warming temperatures in Colorado dramatically spike during summer months and dry up smaller recreational water sources, driving tourists to high-altitude reservoirs, but heat and scheduled releases to the lower Basin have strained Blue Mesa’s recreational resources. Local residents subsequently find limited access to activities and landscapes to which they have grown



Figure 2. Blue Mesa Reservoir from Hermit’s Rest Trail.

accustomed and formed emotional attachments (McCoy et al., 2022). Development and growth have further impacted locals’ enjoyment of Blue Mesa because increased tourist numbers disrupt the area’s small-town atmosphere. Outside change includes both climate and unwelcome crowds, but many individuals in the area fear losing their sense of place regardless of the catalyst (Hunter, 2008).

Drought and other climate hazards’ impacts on places to which community members attach security and wellbeing frequently impair senses of place, creating competition, both internally and between communities and perceived outsiders (Clayton & Manning, 2018). People in these small communities tend to gatekeep, police, and criticize both in- and out-group members to preserve their ideas of the place’s sanctity (Clayton & Manning, 2018). While state and federal decision makers propose plans to address scarcity in reservoir communities, individuals’ sense of place risk tolerance influences their ability to accept top-down interference from agencies outside of their social comfort zones (Quinn, Bousquet, & Guerbois, 2019; Yang et al., 2020). Given this contention around water and the importance of

sense of place to the region, I formed research questions that would explore the changes that Blue Mesa's community members and stakeholders had experienced during the drought, what sociocultural impacts that landscape and water changes had created, and how political, economic, and emotional factors had influenced individual adaptations and senses of place.

With this thesis, I hoped to answer the following research questions:

1. How has a changing landscape impacted sense of place for Colorado River reservoir communities?
2. How are reservoir-dependent community members adapting to climate hazards in Blue Mesa?
3. How can local policymakers work with Blue Mesa's community to support drought resilience while preserving the area's unique identity?

This paper examines the ongoing Colorado River megadrought's social and emotional impacts to Blue Mesa community members and their ability to adapt their senses of place to reservoir changes. With this paper, I seek to contribute data to the under-researched concept of sense of place and organize these findings to provide usable information for decision makers and stakeholders in the area.

BACKGROUND

Sense of Place

“Sense of place” as a distinct concept emerged into social sciences in the mid-20th century (Ungvarsky, 2021). It refers to the unique emotional attachments human beings form to specific places—primarily the places that feel like “home”—while integrating our impressions, beliefs, memories, and experiences into our attitude towards the locales (Frank, 2003; Silver & Grek-Martin, 2015; Ungvarsky, 2021). The emotions we associate with sense of place are usually positive when we spend enjoyable time in beautiful landscapes—nostalgia from the scent of campfire and bubbling chili mac ‘n’ cheese while laughing at inside jokes with friends in the woods at sunset—but we can also form a negative sense of the same places if we experience trauma there (Ungvarsky, 2021).

Members of communities suffering ill effects of climate change, such as devastating drought or wildfires, may experience emotional distress due to diminishment of their sense of place. Psychological impacts of climate change, including fear of future conditions, impaired emotional attachment to places, and abated ability to experience joy in the face of destruction, reduce sense of place and quality of life on several scales (Clayton & Manning, 2018). Factoring in emotional and cultural determinants, understanding individuals’ responses to climate change can advise suitable methods for collective adaptation to environmental risks (Quinn, Bousquet, & Guerbois, 2019). Decision makers in these situations frequently take sense of place integrity into consideration with hazard management and development projects, aiming to preserve places’ particular characteristics in order to appease residents while also appealing to outsiders to increase tourism revenue (Ungvarsky, 2021).

Visitors to the area with no personal stake in the reservoir understandably hold differing senses of place, acceptable risk, and subsequent adaptations than those held by local business owners and residents of wilderness-adjacent lands (Grothmann & Patt, 2005; Quinn, Bousquet, & Guerbois, 2019). Visitors return to areas where they develop place attachments, viewing them as special, magical—somewhere imprinted in their personal histories. Their senses of place face few challenges provided they are able to enjoy the same activities, their secret spots do not become too crowded with newcomers, or as long as they continue having good experiences on vacation (Ungvarsky, 2021; Knapp, 2020). Longtime residents of areas like Gunnison River’s Blue Mesa Reservoir may consider tourists or migrants with disdain, while business owners rely

on economic benefits from visitors, including patronization of retail shops, restaurants, lodging, recreational equipment rentals, and guide services (Clayton & Manning, 2018). Both sets of dynamics impact sense of place; aversion to outsiders and financial security elicit emotional feedback that helps us understand social-ecological systems and further develop adaptive strategies to preserve sense of place (Knapp, 2020).

Climate stress on communities' sense of place potentially leads to slow, inefficient responses to hazards, resistance to change, and avoidance; or, maladaptation, which can manifest into temporary environmental manipulation rather than communities identifying and countering root causes (Grothmann & Patt, 2005; Knapp, 2020). For example, Blue Mesa's water supports several multi-generational ranches and farms whose owners hold senior water rights; changing watering methods places them at risk of losing the amount they conserve when they don't use their full allocated amount each year (Walcher, 2021). Drought-related threats to their sense of place and livelihoods may cause them to respond slowly to community water scarcity or resist changes to their existing operations, because they cannot risk jeopardizing their ways of life. Drawing correlations between ecological changes and individual senses of place help us understand how we relate to our social systems and how we cope with disturbances to our environments (Clayton & Manning, 2018; Hunter, 2008; Knapp, 2020).

Adaptive Capacity

Communities demonstrate adaptive capacity through their responses to environmental hazards. Within social sciences, adaptation describes individuals' and societies' reactions to risks and hazards; within the scope of this work, adaptation refers specifically to adjustments humans make to cope with vulnerabilities to climate change-related drought (Smit & Wandel, 2006; Grothmann & Patt, 2005). Adjustments include mitigation of climate change's effects—either anticipatory or reactive—and cognitive awareness of potential challenges to lifestyles and landscapes (Grothmann & Patt, 2005; Hunter, 2008). Adaptive capacity describes a system's ability to withstand or recover from such challenges; a type of resilience that social, economic, and political factors can determine and strengthen (Grothmann & Patt, 2005; Smit & Wandel, 2006).

Necessary responses to climate hazards rely on the support capacity of larger driving influences, such as federal policies and funding, but exposure, risk, and adaptation reach salience

at the local level (Smit & Wandel, 2006). Communities’ resilience—their ability to recover, or “bounce back” from negative impacts—remains under-studied in the context of climate change (Clayton & Manning, 2018). Considering this gap in existing research, the few investigations into this link have reached a consensus that climate disasters disrupt individuals’ sense of place, economic security, and mental health; studied communities’ inhabitants reported psychological distress, disorientation, identity dispossession, immediate revenue loss, residence displacement (Bauman et al., 2013; Clayton & Manning, 2018; Cox & Perry, 2011; Hunter, 2008; Knapp, 2020; Neely et al., 2011). Social dynamics can increase or decrease adaptive capacity; building social cohesion within disaster-stricken areas strengthens resilience, reducing the negative effects of hazards on these societies (Grothmann & Patt, 2005; Smit & Wandel, 2006).

Understanding individuals’ cognitive and emotional attachments to a place is vital to uncovering their willingness to adapt to unwanted change (Quinn, Bousquet, & Guerbois, 2019). Measures to protect their places from climate hazards must fall into their adaptive capacity boundaries if they are to support policies and action from outside their communities (Grothmann & Patt, 2005). Adaptation measures from outside actors must accordingly account for the social, economic, and institutional intricacies of communities that will experience those measures’ impacts (Grothmann & Patt, 2005; Smit & Wandel, 2006).

Colorado River

Policy History

The seven states in the Colorado River Basin—Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming—signed 1922’s Colorado River Compact under the false assumption that the amount of water available to each state would remain unchanged in the following years (Kuhn & Fleck, 2022; McCoy et al., 2022; Turley, Bréthaut, & Pflieger, 2022). The Compact allocated 17 million acre-feet divided among the states without accounting for natural inconsistencies and potential weather impacts (McCoy et al., 2022). Water management in the Western United States uses the principle of prior appropriation, which stipulates that the first person to have used a quantity of water from a particular source maintains the right to that same quantity until they sell or bequeath their “senior rights” to another user (Turley, Bréthaut, & Pflieger, 2022). The Compact further complicated inter-state water management when its drafters

failed to account for natural variations in streamflow and precipitation, thus over-allocating each state's share of the River's water (Kuhn & Fleck, 2022).

The Compact created provisions for the United States Bureau of Reclamation (USBR) to create the Colorado River Storage Project (CRSP), authorizing reservoirs to store water and produce hydroelectric power for Upper Basin states (Redmond, 2000). CRSP dams are subject to satisfying Compact "calls" in dry years: Upper Basin users who gained water rights after 1922 must relinquish their shares to more senior rights holders downstream, either by releasing large volumes from reservoirs or simply letting water pass by instead of storing it (Turley, Bréthaut, & Pflieger, 2022). Prior appropriation policies in Colorado are managed and executed by outside actors once senior rights holders contact their water division's federal water commissioner. Each division contains its own water court, which arbitrates conflicts and manages sales, purchases, and leases of rights within its jurisdiction (Turley, Bréthaut, & Pflieger, 2022).

Contentious issues arising from management pervade sociopolitical dynamics in Basin states, particularly during dry years when Compact calls deprive junior rights holders of water resources (Frank, 2003; Reclamation, 2021). Basin residents, social scientists, and policy makers have long proposed renegotiating the Compact to reflect equitable allocation, water conservation standards, and modifying dam and reservoir operations, to no avail (Turley, Bréthaut, & Pflieger, 2022; Walcher, 2021). Water rights and allocation disputes persist because the survival of states, cities, and communities in the Basin relies on effective planning and distribution, a reality exemplified in the words of Congressman Wayne Aspinall, who quipped "In the West, when you touch water you touch everything" (Walcher, 2021, p. 5). Provisional policies have offered only temporary solutions that fail to appease all seven Basin states and their stakeholders (Kuhn & Fleck, 2022).

2000-2023 Megadrought

Since the early 2000s, the Basin's average temperatures have steadily increased in an already arid landscape (Yang et al., 2020). The headwaters of the Colorado River contribute 85% of the total Basin's annual streamflow through runoff from mountain peaks, meadows, and forests (McCoy et al., 2022). Precipitation patterns in the Basin have remained unchanged since the 1970s, confirming that the current decreased streamflow directly correlates to increasing surface temperatures (Yang et al., 2020). Warmer temperatures and drier soil increase runoff

evaporation rates, meaning less water reaches streams before evaporating, depleting the natural storage volume flowing into natural and manmade reservoirs (Kuhn & Fleck, 2022; McCoy et al., 2022). Precipitation deficits, heat waves, and warming ground temperatures compounded Colorado River Basin megadrought conditions beginning in 2000, culminating in record-breaking heat from 2020 to 2022 (McCoy et al., 2022). Recent drought models project drastic yet predictable impacts of continuing warming and aridity, which will likely result in concurrent extreme events in the watersheds surrounding Blue Mesa (Bennett, Talsma, & Boero, 2021; Kopytkovskiy, Geza, & McCray, 2015).

Population growth in Basin states has stretched water resources even further. Basin states Nevada, Arizona, Utah, and Colorado are among the fastest-growing in the U.S. (Walcher, 2021). Congress authorized the Colorado River Drought Contingency Plan in 2019 to ensure downstream Lake Powell maintained enough water volume to operate hydroelectric power turbines at Glen Canyon Dam (McCoy et al., 2022; Reclamation, 2023). Subsequent water releases from Blue Mesa and other upstream reservoirs fueled frustration around Colorado River distribution (Walcher, 2021). Residents of Colorado and other Upper Basin states, outraged that the Upper Basin appears to bear the majority of drought burdens, have argued over the necessity of downstream releases (Kuhn & Fleck, 2022). Coloradans living on the Western Slope, which supplies 80% of the state's water, find their municipal and recreational water sources shrinking as it flows to the Front Range and desert states, furthering the Compact controversy that has magnified in the past three years (Kuhn & Fleck, 2022; Turley, Bréthaut, & Pflieger, 2022; Walcher, 2021). These factors have compounded drought difficulties and increased resentment toward government decision makers and other states' residents (Turley, Bréthaut, & Pflieger, 2022; Yang et al., 2020).

Gunnison River Basin

Long before Colorado was incorporated into the United States as a territory in 1861, northern Ute tribes populated the land (Walcher, 2021). The Ute defined themselves and their understanding of the universe through the basin in what we may consider a true, fundamental sense of place (Frank, 2003). Settler colonists discovering silver and gold and attempted religious assimilation of indigenous inhabitants resulted in multiple conflicts, culminating in the Meeker Incident in 1879 (Frank, 2003). The Utes were expelled from the Tomichi (Gunnison)

and Uncompahgre Rivers and forced to relocate to Utah, leaving the area clear for white homesteading and agriculture (Frank, 2003).

The West experienced water scarcity even then, and when Colorado was recognized as a state in 1876, it became necessary to allocate water rights (Walcher, 2021). The settlers constructed dams, ditches, and a conversion tunnel in the Black Canyon of the Gunnison to transform the valley into an agricultural oasis (Frank, 2003). Despite efforts to convert the basin's ecosystem, water managers fell short of irrigation needs in the hottest months, and US federal agencies stepped in with plans to engineer water storage systems, passing the CRSP to support the basin's growing population (Frank, 2003). Since the Curecanti Unit's completion, the Gunnison River Basin has attracted tourism and recreation, which make up about a quarter of the area's economy due to its estimated two million visitors each year (Gunnison River Basin, 2023; Neely et al., 2011).

Blue Mesa

Twenty miles long, with a maximum capacity of 940,800 acre-feet and a surface area of 9,180 acres, the Blue Mesa Reservoir is the largest body of water in Colorado (Reclamation, 2021). The USBR oversaw completion of the Curecanti Unit—the system comprising Blue Mesa, Morrow Point, and Crystal dams—in 1966, and it was renamed the Wayne Aspinall Unit in 1980 to recognize the congressman's support of the CRSP (Frank, 2003; Redmond, 2000).



Figure 3. Blue Mesa Dam.

Blue Mesa's construction displaced 190,000 cubic yards of soil in the Gunnison River Basin upstream of its Black Canyon (Frank, 2003). Among some 60 hydroelectric systems in Colorado, the Aspinall Unit contributes approximately one-fourth of the state's hydropower (Walcher, 2021). The Blue Mesa Dam (Figure 3) lies on the Gunnison River, 30 miles downstream from the river's namesake city, and uses the river's energy to currently generate 86.4 megawatts of electricity (Reclamation 2021; Redmond, 2000). Blue Mesa's hydroelectric power plant uses

two generators which require a reservoir water level of at least 360 feet in order for its two 41.55-horsepower turbines to operate (Reclamation, 2021). If Compact call releases into Lower Basin states deplete the reservoir below its turbines' operational levels, Coloradans would lose the renewable energy the plant produces each year (Kopytkovskiy, Geza, & McCray, 2015).

Blue Mesa offers fishing, boating, and other recreational activities to both tourists and businesses (Walcher, 2021). Colorado Parks and Wildlife stocks the reservoir yearly with trout and salmon, drawing anglers from everywhere (Brauch, 2023). Blue Mesa falls within the Curecanti National Recreation Area (Figure 4) and contains two major marinas on its 96 miles of shoreline, Elk Creek and Lake Fork, along with numerous campgrounds managed by multiple federal agencies (NPS, 2023). The West Elk Mountains to the north and Uncompahgre Wilderness Area to the south host countless hiking and mountain biking trails, big game hunting, and spectacular views from peaks and ridgelines. Popular hikes close to the reservoir range from difficult and steep to relatively short and flat:



Figure 4. East entrance to Curecanti National Recreation Area.

Hermit's Rest trail plunges 1700 feet down the the water in under three miles, while the Dillon Pinnacles trail gently meanders near the shore to an escarpment of volcanic spires two miles from the trailhead. Panoramic sights, ample fishing, and diverse landscapes crowning the expanse of Colorado's largest body of water epitomize the wilderness that draws hundreds of thousands of visitors each year (NPS, 2023). Blue Mesa's status as a recreation hub in an idyllic setting invites profound relationships between the region and its visitors, who forge strong emotional attachments to the reservoir. This deep human connection to the reservoir provides a setting for sense of place research, which has become increasingly consequential amidst a Colorado River megadrought.

METHODS

Research design

Identifying effects on sense of place for individuals connected to the Blue Mesa reservoir required that our research team conduct qualitative interviews using questions that explored participants' personal ties to Blue Mesa; what makes it special to them, and their personal history in the area. This study sought to explore the under-researched concepts of sense of place and adaptive capacity, specifically in the context of climate impacts. At the suggestion of a journalist acquaintance, I first established contact with a stakeholder in Gunnison to ask for suggestions for appropriate interview candidates and to gain insight on the social dynamics of Blue Mesa. This led me to focus on other stakeholders in recreational businesses, water management, local government, and conservation organizations. Interviews provided firsthand accounts from stakeholders to answer my research questions. Two methods that were previously unfamiliar to me—thematic coding and qualitative analysis—allowed me to identify and group responses into distinct categories. I intended to compile case studies of drought impacts to sense of place in Blue Mesa into usable knowledge for policy making, future social science pursuits into reservoir community dynamics, and discourse directed at reducing the fractious polarization surrounding climate issues.

Study Area

Thirty years of temperature-related water shortages and a 22-year megadrought have reduced the Colorado River's streamflow, and a burgeoning Western Water Assessment (WWA) project studying sense of place in Colorado River reservoir communities attracted my interest for Honors Thesis research beginning in 2022 (McCoy et al., 2022). I was given the choice of focusing my individual research on the reservoirs at either Flaming Gorge, Lake Powell, or Blue Mesa (Figure 5). I chose the latter because



Figure 5. Map of Blue Mesa Reservoir (Google).

I recognized that I would be able to travel to that study area more frequently than the others, allowing me to develop a more comprehensive relationship and understanding of its community and geography. Additionally, under the recently-enacted 2019 Colorado River Basin Drought Contingency Plan, Blue Mesa had released 41,000 acre-feet downstream in 2021 to meet obligations set by the Colorado River Compact, compelling the need for focused research in this region (McCoy et al., 2022; Reclamation, 2021; Reclamation, 2023). Grim prospects for storage units prompted lawmakers to call for Basin-wide action to prevent reservoirs from falling below critical levels, magnifying societal concerns regarding drought, which have snowballed since 2020 (Interior, 2022; Kuhn & Fleck, 2022).

Funding & Research Approvals

Prior to data collection, WWA's project members and research assistants, including myself, developed interview questions and protocol to submit to the University of Colorado's Institutional Research Board (IRB) for approval, which we received in June 2022, Protocol # 22-0268. Shortly after joining the WWA research team, I applied for individual IRB approval and funding from the Undergraduate Research Opportunities Program (UROP), both of which I received in Spring 2022. I received additional UROP funding to continue my research during the summer of 2023.

Data Collection

Our research team collaborated to create a script of questions to identify how changing reservoir levels affected interviewees' senses of place (Appendix A). Throughout these interviews we hoped to gain insight into how water shortages and drier conditions had emotionally impacted community members' thoughts, beliefs, and emotional wellbeing, and what actions they took in response. Questions also explored interviewee participants' stakes in Blue Mesa, including local management, historical connections, financial dependencies, and how recent changes in the reservoir have affected their work, routines, or incomes.

To recruit interview participants, we sought to contact similar numbers of stakeholders in each category we thought best encompassed a representation of key community members: management, recreation user, recreation livelihood, political decision maker, or special interest group affiliate. After identifying potential research participants from these criteria, we added

their names, business or agency affiliations, and job title or agency position to a spreadsheet to track correspondences from our research team. We reached out to approximately 40 stakeholders, using email addresses and telephone numbers listed as contact information on websites for organizations, companies, and agencies in and around Blue Mesa. Thirteen of the people we contacted agreed to participate. Several confirmed participants fit into overlapping stakeholder categories, which I identified as: civil employee, recreation livelihood, ranching affiliation, non-recreation business owner, recreation interest group, scientific fields, and educator (Table 1). Civil employees included participants in various government positions; for example, the Bureau of Land Management. Participants in recreation livelihoods held jobs such as fishing guide or marina employee, while recreation interest group members served in unpaid roles. I noted that two participants had ranching experience, but neither currently worked as a rancher. Participants categorized in scientific fields either currently or formerly specialized in earth sciences, such as geology and hydrology.

Beginning in Summer 2022, I assisted in conducting semi-structured Zoom interviews with the thirteen Blue Mesa-area participants to identify if and how they experienced adverse emotional reactions to declining water levels. Interviews lasted between 45 and 75 minutes and were recorded and stored as encrypted files to protect confidentiality. During Zoom calls, we asked participants questions from our prepared script; each participant was asked at minimum the questions in bold, with other questions supplementing as needed in order to streamline conversation (Appendix A). When I traveled to Blue Mesa and Gunnison in the summers of 2022 and 2023, I had informal conversations with residents and other visitors and acquired a sense of place of my own that gave me context for conducting and interpreting the interviews. These visits enhanced my understanding of the cultural, social, and recreational elements of the region and provided the ability to connect with interview participants on shared experiences.

Data Analysis

The results of thirteen Blue Mesa interviews were analyzed and documented in the results section of this study. Interviews were transcribed and uploaded to NVivo, a software program that allows us to organize and analyze qualitative data through thematic coding. After reading transcripts, we noted which concepts and topics recurred during interviews and compiled them into a collection of “codes” under which to assign as themes in the software (Appendix B). After

the larger WWA project's preliminary 26 interviews with stakeholders in three reservoir communities (Lake Powell in Arizona and Utah, Flaming Gorge in Utah and Wyoming, and Blue Mesa), we identified additional themes, and organized them into initial codes for NVivo (Appendix B). Each team member was assigned overlapping interviews to code so that we could compare individual criteria and reasons for categorizing responses; this also served to develop coding consistency among project members. WWA project members continued analyzing data from the remaining interviews—six in Flaming Gorge and seven in Lake Powell—which, along with Blue Mesa data, will become the groundwork for a manuscript detailing how social and ecological changes influence sense of place.

Our initial codes, shaped by a deductive approach to emphasize drought effects on sense of place, proved either too broad or specific; some were ambiguous, and many overlapped (Braun & Clarke, 2006). For the focus of my individual research interest, I narrowed Blue Mesa's interview themes to major categories, integrating overlapping codes with commonalities but relevant distinctions. Our research team sought input from our participants regarding specific topics related to the goals of this study; additionally, our interviewees introduced previously unidentified issues in conversations. From interview data we had already collected, I developed an inductive set of parameters in which to link themes, allowing the data to lead my analysis of sense of place interactions (Braun & Clarke, 2006). I narrowed our broad groupings into more descriptive themes, refining and condensing each as redundancies appeared and tying themes into common elements relating to sense of place and adaptation.

Recurring topics related to sense of place, community engagement, and drought concerns emerged through further research and interview analysis. Using the thematic analysis approach outlined by Braun and Clarke (2006), I once again grouped interview responses into more specific themes formulated both from my research questions and noteworthy issues that participants raised regularly. I outlined and reported my findings in the table below (Table 2).

RESULTS

In total, we completed thirteen interviews with thirteen stakeholders (Table 1). We received participation interest from community members enrolled in a variety of professions, but most belonged to similar demographics and educational backgrounds, as reflected in population statistics of the area (Census, 2022). Confirmed participants were involved in local government, education, guide services, and volunteer organizations representing community and recreational interests of the area’s residents (Table 1).

Table 1: Interview Participants’ Stakeholder Categories. Sum exceeds total number of participants because several identified with multiple categories. For example, one participant worked as a water manager and also owned an unrelated business.

Category	Participants in each category (listed by identification number)
Civil Employees	
<i>Elected official</i>	1, 12
<i>Water management organization</i>	2, 4, 8, 12
<i>Government worker, other</i>	5, 6, 10
Recreation livelihoods	3, 5, 7
Ranching affiliation	2, 12
Non-recreation business owner	2, 7 12
Recreation interest group	2, 5, 7, 10
Scientific fields	3, 4, 9, 10, 11, 12, 13
Educator	1, 3, 9, 11, 13
Total number of participants	13

The themes and findings I identified from these interviews are organized into the table below (Table 2). Themes 1 and 2 address my first research question: How has a changing landscape impacted sense of place for Colorado River reservoir communities? Theme 3

principally focuses on my second research question: How are reservoir-dependent community members adapting to climate hazards in Blue Mesa? Themes 4 and 5 link sociopolitical components of the study to examine my third question: How can local policymakers work with Blue Mesa’s community to support drought resilience while preserving unique identity?

Table 2: Interview themes and findings

Theme	Findings
1. Sense of Place	Participants hold strong emotional connections to the area’s distinct geographical features and waterscape, which offer a variety of natural beauty and recreational opportunities to which they attach their identities
	Participants integrate the area’s small-town feel into their senses of place and self-identities, which increases their desires for its protection
2. Competition	Lowered water levels, increased tourism, and migration exacerbate water scarcity and congestion on Blue Mesa, diminishing locals’ senses of place and resource security
3. Community Adaptation	Participants take pride in their community’s toughness and resilience, expressing their intentions and abilities to respond to compound environmental hazards
	Community members willingly modify individual behavior to adopt water restrictions and conservation methods, doing so to preserve their senses of place
4. Decision Makers, Management, Policy, and Politics	Area residents largely commend local management, expressing faith in their commitment to crafting concrete solutions to drought issues
	Most participants question management decisions and intentions of federal and state governments and agencies, agreeing that they must initiate more robust measures to protect water resources and recreation economies
5. Knowledge	Residents and stakeholders believe that childhood and community educational programs organized by decision makers will provide better cooperation and understanding of mitigation measures

Identified Themes

Theme 1: Sense of Place

Participants hold strong emotional connections to the area's distinct geographical features and waterscape, which offer a variety of natural beauty and recreational opportunities to which they attach their identities

Participants who relayed reverence for the landscape agree that “the ability to walk outside of your house and be in wilderness within about fifteen minutes is pretty impressive,” pointing out that the proximity of the Curecanti National Recreation Area to Gunnison and other nearby towns facilitates their ability to enjoy it more frequently (Interview 5). Return visitors to outdoor features shared the deep sense of wellbeing they achieved from visiting the reservoir and its surrounding wilderness. A lifelong Gunnison resident believes that “happiness is related directly back to the environment, the health of the environment, and the health of the reservoir,” identifying that their personal wellbeing benefits from “having someplace that [you] want to go back and sit by and enjoy and let your dog get into the water” (Interview 12). Personal events lead to “place-making,” where we develop emotional memories into a context tied to sense of place, assigning meaningful characteristics to locations (Knapp, 2020). One participant who finds the reservoir “an easy way to connect” with the area’s features expressed joy upon “just seeing [the Tomichi River] meandering and just being so natural, and not having a lot of industry around it [...] That gives you that connection to nature that really is unique” (Interview 12). Visuals and experiences such as these link to emotions that shape how people relate to the region’s topography and build the underpinnings of their senses of place (Clayton & Manning, 2018; Frank, 2003).

Most participants expressed respect for the innate wilderness aspect of local activities. “The outdoors is a big part of just about everybody’s life,” noted one recreation enthusiast, “we’re fortunate enough to actually be in the mountains all the time” (Interview 5). Blue Mesa’s proximity to nearby towns affords residents quick access to the reservoir and Gunnison National Forest. Several current residents visited Blue Mesa years prior to moving to the area and decided to migrate because they “love the seasons and all the things you can do” (Interview 13). Detailing Blue Mesa’s importance to them as a retreat, participants described memories of and current uses for fishing, hiking, trail running, boating, swimming, camping, and “wild” ice skating when temperatures drop. “For me, it feels like skating in the sky,” marveled one ice

skater (Interview 11). This participant finds the distinct skating locale “kind of magical, because you’re in the sky, and on the water and looking at the sky all at the same time” (Interview 11). Another expressed that a declining reservoir left ice skaters “kind of worried,” about future winter skating conditions on the reservoir (Interview 3). This participant’s attachment to wild skating displays a deep connection to its place on Blue Mesa as irreplaceable, adding “there is a new ice rink in town too, that is indoor. So that fulfills the needs of *some* people” (Interview 3). Almost every interview participant as well as people I encountered during my visits characterized their time on the reservoir as grounding, and recalled how it beckoned them back while they were away. One participant named Blue Mesa as “one of the things that makes me happy” because their “primary form of entertainment and catharsis is being outdoors, so anywhere I’m around water is usually where I’m the most [relaxed]” (Interview 5). Participants consistently expressing that they were “here because of the recreation” highlights their outdoor activities’ foundations for their senses of place (Interview 13).

Blue Mesa attracts anglers from across the country, who have the opportunity to “bag” up to five fish from the hundreds of thousands of stocked trout and Kokanee salmon (Brauch, 2023). From informal conversations I experienced while fishing the reservoir, I met anglers—from as near as Gunnison and Denver to as far away as Switzerland—who return frequently for the fishing experience. Notably, during my last trip, several anglers and marina employees were reeling over the recent record-breaking 73 pound lake trout that a father and son caught and released; the marinas overflowed with regulars and newcomers hoping to catch the same or similar trout. Each interview participant who fishes at Blue Mesa experienced mild to distressing changes in sense of place due to drought and warming. Anglers and guides worry about how the “dramatic dropping” in water levels “that has changed fishing dramatically” will impact their enjoyment and livelihoods (Interview 4). When beloved landscapes change, we can feel loss, bewilderment, grief, and a sense of surrealness, which several participants conveyed when describing how worsening fishing conditions had rendered their familiar spots vulnerable (Cox & Perry, 2011). One participant lamented that a favorite fishing spot was “high and dry now” and that the receding water trapped fish in bays, meaning that “they’re not going to get any relief, they’re gonna die” (Interview 4). Another angler sharing fishing concerns stated that “just about every fish that we handle and process has gill lice. And we do know that that can deteriorate the condition of the fish to the point where they’re not surviving as long” (Interview 10). Drought

has transformed the waters from their early conditions described by a fishing guide who told us that “when I moved to Gunnison, there was just so much closely accessible water [...] from a fisherman or even an outdoor enthusiast point of view, you’re just right in the heart of so many fun outdoor activities” (Interview 7). These stakeholders felt concerned with environmental changes and deprived of their usual enjoyment at the reservoir, demonstrating how harm to ecological services and wildlife in special places can evoke emotional discord (Ungvarsky, 2023).

A few of our participants remained indifferent to protecting Blue Mesa with regards to their senses of place. One views the reservoir as “ugly” because it “really did a number on the habitat,” (Interview 8), invoking environmentalists and Colorado’s Bureau of Sport Fisheries and Wildlife who protested the passage of the CRSP in 1957, fearing the dams’ impacts on the Gunnison River’s fishery (Frank, 2003). One participant shared “I’m not a fan of major reservoirs [...] I don’t think they’re a very good idea [...] they’re just not natural” but pointed out that although dams impact the environment and wildlife, “right now we have a water crisis. So what do you do?” (Interview 3). This participant favored small-scale water retention projects over damming rivers, but also highlighted Blue Mesa’s resource value and emotional significance to many in the region, admitting “I’m kind of two-faced because I like to skate on the reservoir” (Interview 3). Despite valid disapproval from some participants, most recognize the reservoir as a necessary water management fixture and choose to take advantage of its presence through its dual purpose as a lake. Interview participants who treasure Blue Mesa view



Figure 6. Dillon Pinnacles.

it as a symbol of their experiences in the area. One participant described the aesthetic of Blue Mesa as “stunning”; an “impressive feature” starkly contrasting with surrounding geological features such as Dillon Pinnacles (Figure 6), “cliffy rock outcropping areas associated with Curecanti Recreation Area [...] you’ve got this dark blue water and then you’ve got the surrounding different hues of browns, rocks” (Interview 10). The reservoir lends an element of personal culture to locals, who blend their

attachment to the area to their identities (Clayton & Manning, 2018; Knapp, 2020). Driving toward the reservoir on Highway 50 during return visits, I, too, felt grounded by the anticipation of the water and sights yet unseen, understanding the excitement in our interviewee's voices when they discussed their connections to Blue Mesa.

Participants integrate the area's small-town feel into their senses of place and self-identities, which increases their desires for its protection

Almost every resident placed significant personal importance on Gunnison's small-town dynamics, citing this aspect of sense of place as motivation to move and remain there. A long-time resident who frequents Blue Mesa states that Gunnison's distinct place quality "maintains the small town feel with a predominant focus on the surrounding environment" (Interview 5). Stakeholders own, work for, and support local small businesses, mentioning that proposals for "big box stores" failed because "some of us spoke up to oppose that" (Interview 11) and that "a lot of the corporate type mentality doesn't really fit here" (Interview 13). Others appreciate that Gunnison and nearby Crested Butte depart from the tourist-oriented profit-seeking of a "typical high dollar resort town" like Breckenridge (Interview 2). One resident, who, like most participants, lived in the area for several decades and "retired here for Western Slope lifestyle, an unaffected town, a beautiful place with a simple lifestyle" (Interview 4). Another resident shared requisites for living in the area, including that "you really have to love the outdoors, because you don't have malls or shopping centers or anything like that" and participating in "the slowness of life around here [...] the appreciation of nature [...] the community, the culture" (Interview 12). Long-time residents understand why the area appeals to newcomers; that "there's a vibration here that people are attracted to," and often students and employees "come to Western [Colorado University] and never leave" (Interview 13).

Blue Mesa community members' strong senses of place elicit their protective feelings towards the reservoir, motivating them to develop active strategies to adjust to changes in climate and environment (Knapp, 2020; Quinn, Bousquet, & Guerbois, 2019). A local conservationist detailed the scientific community's work with wet meadow systems, which "can help us adapt to a changing climate in the future and be better prepared and again, create this idea of resiliency" (Interview 10). Participants listed other successful community-driven projects, such as environmental clean-ups, cold water conservation for fish, stream work, and riparian habitat

improvement. Most participants advocated for or had engaged in at least one organized conservation or protection effort, and several brought up projects of other stakeholders we had contacted. One resident described developing a “sense that everybody knows each other [...] what they’re going through or what they’re dealing with,” a sense that accompanies “protecting the water and protecting our way of life here” (Interview 6). Communities of like-minded people benefit from the element of similar beliefs and affinity for their shared place, which engages them in efforts to preserve its essence (Clayton & Manning, 2018).

Holding tightly to the feeling of home that the physical environment lends to its community, participants shared how they strive to preserve its small mountain town quality in the face of population expansion and residential development. Water scarcity issues place residents in the position of choosing between upholding their current small town culture and welcoming economic contributions from new businesses and tourist revenue. Expressions of animosity towards outside economic benefits arose when participants discussed the influences of Front Range migration to the area or affluent mountain towns like Crested Butte. A local business owner conceded that “there’s always pros and cons to anything, [...] from a business standpoint, people that have money and want to reside in the valley, you know, it’s going to benefit us economically” (Interview 7). This individual further shared that “on the other hand, I feel like there’s almost more drama [...] maybe it’s the locals not getting along with the new people [...] there’s always ‘us versus them’ in anything, so people tend to subscribe to one or another tribe [...] there’s just a little more animosity than there used to be” (Interview 7). Even facing outside conflicts, “everybody’s very easy going” within the community, and members feel that “your opinion matters [...] that’s what’s great about Blue Mesa is the fishermen and the boaters, and the people that are out there, doing their thing, they all let you kind of have your space” (Interview 6). Community perspectives shape individual outlooks and ideals; the small town bonds between Blue Mesa’s stakeholders lends them agency to respond to obstacles that endanger their local culture (Clayton & Manning, 2018).

Theme 2: Competition

Lowered water levels, increased tourism, and migration exacerbate water scarcity and congestion on Blue Mesa, diminishing locals’ senses of place and resource security

Replies to questions relating to the Colorado River Compact and other water management

policies were mostly met with frustration and annoyance, even when participants expressed that they fully understood why policies were in place. According to a local decision maker, “we all have our limits of how far we can go with dwindling resources” and every Blue Mesa stakeholder suffers with the “domino effect” of limited water (Interview 1). Longtime Blue Mesa community members experienced strong outgroup opposition when they perceived competition for water resources. Several participants discussed animosity towards Lower Basin states regarding water releases and scarcity, stating similarly to one who opined that “the downstream users [...] think, ‘we got plenty of water above us. All we gotta do is turn the faucet on, and it works.’ [...] When you’re not paying for it, or you don’t think you’re paying for it, it’s a little easier to abuse it” (Interview 5). Participants felt they could effect little change to federal decisions, believing that “these water compacts have been written in stone [...] and they’re not planning on changing” (Interview 6). Considering the multitude of current water laws, compacts, and policies authorized and upheld by the Colorado Constitution, local, state, and federal governments and agencies, and state and federal courts, participants may have correctly assumed that overturning the “Law of the River” would be highly improbable at this time (Kuhn & Fleck, 2022; Reclamation, 2021; Turley, Bréthaut, & Pflieger, 2022; Walcher, 2021). Resource competition, particularly in the drought-stricken Colorado River “Basin of Contention,” carries psychological impacts to the people living in the affected area, including negative influences to sense of place (Clayton & Manning, 2018; Kuhn & Fleck, 2022, p. 1). One participant summarized the local dialogue concerning the community’s various demands for water:

So it’s not just the [water] level, but it’s all of it: it affects the fish—at one point I read in the newspaper that the streams were too warm, and please don’t fish because the fish are stressed. And then the rafting is a big scene, but if you don’t have enough water, then you can’t. Your whole season is shortened. So it’s really affected a lot of people, let alone the ranchers who are needing the water for hay. (Interview 13)

Several participants also identified crowding at Blue Mesa coupled with migration to nearby Gunnison as conflicts to water availability, recreation, and economic activities. Many of the participants expressed irritation with outsiders moving to the area and the influx of visitors during both summers and the COVID-19 pandemic, citing lack of housing in Gunnison, ignorance of recreation etiquette, and diminishing resource access as reasons. Residents such as

one who expressed that “that development, east of town just breaks my heart” feared that real estate development would alter the qualities that drew them to the region (Interview 12). “In terms of the changes, I’m a NIMBY just like anybody else,” shared a Gunnison resident who dislikes crowds at the reservoir (Interview 4). This participant worried that the proposed Gunnison Rising expansion may create difficulties meeting the city’s water needs. One participant remarked, in the context of city water management, that the project seems problematic for water competition, but they trust that the municipal government will properly disperse resources:

When somebody comes up with some random idea, [I say] ‘we don’t have the water.’ But no, the government’s not that dumb. It’s not in the plans, you know. We do stupid things, but we’re not that dumb. Look at Gunnison Rising, a good example of that; where they go, ‘Well, where are these people going to get water from?’ Our water table is relatively low anyway; how are we gonna sustain all these houses that you want to build, you know, without water? But I’m pretty optimistic that they’re not just doing things just to do things [...] I don’t see it being as bad. (Interview 6)

Another participant agreed that local government held the responsibility of maintaining the community’s current structure, because “if you don’t manage that then the whole thing mushes together and then you just have one long strip of development, and it really causes problems [...] and then the communities lose their identity as well” (Interview 2). Most of the other participants who discussed migration to Gunnison expressed support for constructing more dwellings because they did not perceive affordable housing as a significant threat to the town’s culture. “In the last 10 years, we’ve had this housing development go in there, which initially seemed completely ridiculous [...] given the alternative of a warehouse parking lot, or a nice new neighborhood that’s provided housing, we’ve welcomed that change (Interview 11). The community’s housing dilemma—how to develop for immediate needs without disrupting resource balance and individuals’ sense of place—proved a social and economic contradiction for participants, who agree that the problem’s complexity offers no clear solutions.

Regarding increased activity at Blue Mesa, however, participants largely felt frustrated or stressed about competition for peaceful recreation, fishing and boating services, and financial security for guides. “Those changes have definitely affected my way of recreating just because

it's harder to get out on the lake, on a boat, because the water is so low and you've got to be a lot more careful" (Interview 6). Climate researchers focusing on the economic impacts of Colorado River drought over the past 20 years have documented immediate and long term revenue losses in Basin states (Bauman, Pritchett, & McFadden, 2013; McCot et al., 2022; Neely et al., 2011; Silver & Grek-Martin, 2015). Sense of place loss manifested from financial insecurity compounded feelings of despair for interviewees struggling to support themselves and their families. One fishing guide stated, "Everybody's kind of cutthroat. I don't think there's as much enjoyment on the water. It seems like there's a lot of frustration between guides because everybody's sweating where the next dollar's coming from" (Interview 5). Another participant expressed concern for water recreation livelihoods, commenting that "we're not going to be able to just continue to boat, have a million commercial people and a million others. We're going to have to figure out how to minimize those impacts on this community" (Interview 12). Competition for economic opportunities could invite the need for corporate conglomerates into the area, which could signal the end of the area's beloved familiarity and emotional feel (Hunter, 2008).

The importance of maintaining water in Blue Mesa and the Gunnison River manifested highly in participants' senses of place; however, participants' comments about ranching usage as competition reached a wide range of opinions. Of each issue we discussed, community members' beliefs and cooperation appear the least compatible regarding how decision makers should manage agricultural water use. One conservationist offered that ranchers change methods:

The retail business is based on agriculture, so we need to start paying attention to the way that we do agriculture in the valley. [...] We have two organizations that are predominantly regenerative ranching and the rest of the ranching has done open range, open forage, open pasture. And it shows when you drive by those ranch properties, the difference is inescapable. [...] That's one of the places I'd like to see some regulation—if you're going to raise cattle, or you're going to raise crops, you need to pay attention to best practice, not just it's not just the way your family has done it for 200 years. It's got to be science-based and best practice-based. (Interview 5)

Conversely, another participant saw such limitations as unfair, acknowledging that locals who place the burden of water conservation on ranchers fail to consider "the bigger picture of what's

going on with farming and ranching, and food supplies, not just in this county in this state in this country” (Interview 1). This issue arose despite falling outside the scope of our interview questions, drawing attention to its controversy within the region. Despite internal conflicts in this area, Blue Mesa participants react to most water resource competition primarily concerning how it impacts their senses of place, a quality they share and have developed together. One participant who supports working together to protect everyone’s interests added, “I think we have really come a long way in our valley, we’ve had to. We had to come together” (Interview 13).

Theme 3: Community Adaptation

Participants take pride in their community’s toughness and resilience, expressing their intentions and abilities to respond to compound environmental hazards

All but one participant discussed—unprompted—the extremely cold winters they face living near Blue Mesa. Average high temperatures in the Curecanti National Recreation Area fall below freezing, with single-digit Fahrenheit lows, from December to February (NPS, 2023). One lifelong resident who describes the area as “what’s left of Colorado” remarked on the hardiness of fellow locals versus outsiders: “It keeps folks from sometimes deciding to move here; they prefer to visit. Because they experience one winter and they say ‘forget it!’” (Interview 2). A recreational business owner links residents’ physical toughness to their community compatibility, observing that “everybody who’s lived here for a little while knows and kind of builds an endurance up for the Gunnison winters [...] It takes a special kind of person to endure those for a while. I think a lot of the people who live here share that” (Interview 7). One participant even mentioned that if future drought and warming left Blue Mesa unfit for fishing, “I can adapt to other things” (Interview 6). Participants’ willingness to tough it out through extreme cold, environmental hazards, and other harsh conditions stems from their love of the region.

Community stability in resource-dependent regions depends on their shared importance of the place (Clayton & Manning, 2018). While extreme climatic impacts can impair sense of place, Blue Mesa’s area residents in this study demonstrated a high degree of adaptive capacity and cooperation. Like one participant who applauded local cooperation, many shared that the community has “a lot of committees and groups now of people working together” (Interview 13). Participants responded to questions about adaptation with explanations of formal and informal agreements to protect resources, such as limitations to fishing catch, an effort that “has helped

the salmon in these low water years that we're dealing with gill lice [...] I think that was a good adaptation" (Interview 7). One water manager discussed that success with local river projects set a good example for other communities, expressing, "when I see that segment come back alive with the fishery and everything, that makes me feel really good. And that makes me feel optimistic about what we're accomplishing locally. I think if everybody, every community takes that same approach, then globally we'll make a difference" (Interview 12). Strong social relationships like those in Blue Mesa increase adaptive capacity by providing solidarity in projects, resources, and emotional support (Smit & Wandel, 2006). One participant who believes that the residents epitomize this type of cooperation described Gunnison as "a rare place on earth where the community of disparate people who live here and their different ideas have a great probability of compromise" (Interview 12).

Community members willingly modify individual behavior to adopt water restrictions and conservation methods, doing so to preserve their senses of place

Many of Blue Mesa's stakeholders reside in Gunnison, where, which most participants commended, decision makers and residents have instituted water conservation systems, recycling programs, and incentives for installing solar panels. One participant referenced the town's informal initiatives, observing that "there is a movement in town, there's kind of a current if you wish, no pun intended, that we should be using less water. Even though we really have plenty, because we're at the headwaters" (Interview 3). Although the city of Gunnison holds senior water rights, meaning that drought poses less of an immediate drain on their municipal needs, area residents take measures to conserve water and implement renewable energy sources to support downstream communities' water needs and mitigate climate change. While people frequently misjudge climate risks' effects on their personal lives, Blue Mesa's social discourse appears to influence individuals' readiness to address future potential hazards (Grothmann & Patt, 2005). A participant who has lived in Gunnison for over 50 years observed the shifting awareness of the drought's impacts since 2000, stating that "this community now is very proactive, we've really changed a lot [...] It's not the same as it used to be" (Interview 3). Changing sociopolitical discourse may have influenced collective risk perceptions in the area, but while most locals fit into this description, some Gunnison residents remain unchanged by the drought, displaying avoidant reactions or denial of threats to their senses of place (Grothmann &

Patt, 2005). As the same participant noted “you’ll still get a bunch of crusty old people who don’t believe in anything, but I’ve learned there’s no point in trying to argue with them; their minds are set” (Interview 3).

Several participants endorsed waterscape preservation’s importance to the community’s sense of place. A local conservation group leader shared existing organizational efforts to improve conditions:

For us, that’s the Gunnison basin, realizing that water is essential to life, every life and pretty much every type of recreation and lifestyle requires water in some form or another [...] It’s a pretty big deal. So we’re always looking for opportunities to make, specifically, our riparian and water habitat better, [...] participating in either fighting for or against different environmental impact-type things, such as dams, or mines, or cleanups. (Interview 5)

In addition to conservationist participants, one water manager agreed that the county’s actions are “making a difference [...] that feels really good to me, that connection with my community” (Interview 12). Approximately 75% of participants relayed deep, personal impacts to which they have adapted in attempts to lessen the drought’s blows on the landscape and their recreational uses of Blue Mesa. Adjustments that interviewees have made because of lowered water levels include changing recreational habits to adapt to conditions, seeking different recreation spots to avoid visiting the reservoir when water levels decline, generating less waste, and supporting recycling and solar energy infrastructure at home. While local residents had either chosen or been forced to change behaviors in order to adapt, most had previously voluntarily engaged in environmentally conscious practices. One participant’s transition to solar energy to power their house and electric vehicle, as well as encouraging Leave No Trace practices in the Curecanti Recreation Area demonstrates their belief that “we’ve got to learn to live differently, and hope that having a small community where maybe we’re building up instead of out will increase our resiliency” (Interview 12).

An angler who stays vigilant to fishing conditions shared that witnessing water levels drop “makes me more aware and I pay attention to water, you know, like not letting the sink run [...] not watering the yard for hours on end trying to maintain a green lawn. We’re just going to tolerate some brown this year” (Interview 5). A rancher who said that nearby families have

become “accustomed to variations in hydrology, whether they’re climate related or just patterns that happen” has adapted to difficulties in hay production because of earlier spring runoff (Interview 2). This rancher relies on decision makers who have thus far done “some really good work” aiding ranching water needs, but current adaptive methods feel temporary and ranchers themselves “are getting more active with other ranchers and other folks to think about our legal rights and our ability to defend the ranch [...to] lawyer up and make sure that we have used and establish the relationships with other folks to see if we can use water that they’re storing” (Interview 2). Several other participants proposed individual and community actions, such as “thinking about digging up my lawn” (Interview 11) and proactive community strategies, as suggested by a participant who believes that “people want to get out and do something. They don’t want to wait around for just government policy to change” (Interview 10).

Necessary adaptations have become stressors for many participants in spite of their willingness to make changes for the common good. “We are a civilization that’s known to adapt and overcome, but adapting to *what* is kind of hard to make sure,” shared one Gunnison resident who felt uncertain about the reservoir’s future (Interview 6). This participant considered moving away from the area if drought conditions continue, citing a feeling of hopelessness over the situation because they “can’t do anything” about the situation and losing Blue Mesa “would impact my way of life” (Interview 6). Most participants shared that while they understood the need for adaptation and willingly comply, they “don’t think things are happening quite fast enough [...] sometimes [addressing watershed changes] can be so expensive, and they take so long. We need to find ways to streamline those efforts” (Interview 12). The community’s desire to preserve their collective senses of place coupled with their high adaptive capacity demonstrates quick, effective responses to environmental change, which can become essential to their capability of reducing economic, psychological, and social vulnerabilities as their exposure to climate hazards increases (Smit & Wandel, 2006).

Theme 4: Decision Makers, Management, Policy, and Politics

Most participants question management decisions and intentions of federal and state governments and agencies, agreeing that they must initiate more robust measures to protect water resources and recreation economies

Over 60% of participants mentioned their overall lack of faith regarding decisions made by federal officials and agencies. Most of these doubts stemmed from actions carried out under the Colorado River Compact, with several interviewees weighing the positive and negative aspects of Compact calls. One person expressed that Blue Mesa users and locals were angry with the USBR's Contingency Plan, and that it seemed "like they are acting without thinking about what the economic impacts are on the community" (Interview 12). No participant conveyed feeling immediate threats to Gunnison water availability, but also explained that while the city managed its water effectively, they feared that water laws in Colorado could create a crisis due to a use-or-lose incentive for agricultural rights-holders (Walcher, 2021, p. 22).

While very few people mentioned drastic decisions like overturning the Compact or removing Blue Mesa's dam, some believe that local governments should advocate more heavily for regency of the reservoir's water. One participant expressed skepticism that Blue Mesa would thrive without far-reaching action:

I feel like our county commissioners and our people in positions of power should be doing more to protect and advocate for maintaining a certain [reservoir] level [...] we can't go below this volume, otherwise, we're gonna see economic impacts [...] They're trying to put on Band-Aids and do some last minute solutions, but it's probably too late, or too little too late. (Interview 7)

Another participant describing that "people really have been struggling in the summer with the water levels being as low as they were" relayed criticisms from various other community members who questioned "Why are we giving water to Powell and Lake Mead?" [...] and, you know, 'they built Las Vegas in the desert, they don't need my water.'" (Interview 6). This participant also shared the frustrations that locals, particularly within fishing and boating communities "are really getting more vocal about that" because the Compact and other water legislation were passed before recent memory" (Interview 6).

Participants expressed desires for greater focus from federal government agencies on manageable pursuits in the Blue Mesa region. A local decision maker mentioned that while the community appreciated that the U.S. Forest Service had assisted with habitat improvements and water retention projects, "we got more projects that could happen, and willing landowners and public lands. But where's the funding? [...] How do we link actually the available opportunity in

these small rural communities to doing things that could make a difference?” (Interview 1). This participant listed several more areas where federal management could improve its efforts for small-scale benefits. A water manager echoed criticism of federal managers’ lack of urgency, and that although grateful for a U.S. senator’s assistance securing funding, “we all need to get on board if we're gonna save this world. Even within the United States, when we had the wildfires, Congress in Washington wasn't really focused on that until they saw smoke coming from those areas” (Interview 12). Even with strong local engagement, communities’ adaptive capacities rely on funding and management resources to build effective responses to environmental risks and vulnerability (Smit & Wandel, 2006). Participants cited examples of politicians campaigning on solving water issues, but acknowledged the low rate of such claims’ realization. One participant challenged lawmakers to fulfill vague promises to protect water: “Put that into words, make that actionable. That’s where the rubber hits the road” (Interview 1).

Area residents largely commend local management, expressing faith in their commitment to crafting concrete solutions to drought issues

Those who hold Blue Mesa at high value hastened to add their willingness to change policies and habits to preserve the landscape, noting its essence in their happiness. When asked whether they could imagine the area without the reservoir, participants responded similarly to one resident who believes “if you don’t have [Blue Mesa], you’re not gonna have anything” (Interview 6). Participants credited their receptiveness to change to the effectiveness of regional decision makers, whom one local described as “big picture people” who fairly take into account the entire community’s perspectives when drafting decisions (Interview 13).

Two participants felt that local decision makers largely failed the community, both citing that greater action to protect Blue Mesa’s water resources falls out of local jurisdiction, therefore rendering local managers ineffective. One of these two provided thoughts on what caused upstream managers’ helplessness to enforce effective actions:

They’re on such a high federal level, that it’s nothing a local can do to say, ‘We don’t want our water going to California anymore [...] we want to save our water and then send it later on’ [...] One of the big hurdles is the fact that it’s truly federal, these decisions were made way before [...] Nobody can do anything other than writing a letter to your state rep or your U.S. congressman or senator. (Interview 6).

Comparing local decision makers, participants felt that “there are some really thoughtful people who are smart in being leaders,” and would succeed as long as they kept focus of “a vision of how to care for the land before we care for the people, because we can’t care for the people if we’re gonna trash the land” (Interview 9). Another participant mentioned that they also observed that local leadership, “whether it’s city council or county commissioners, people are good-hearted [...] and they do listen, instead of coming into something with an agenda” (Interview 12).

Theme 5: Knowledge

Residents and stakeholders believe that childhood and community educational programs organized by decision makers will provide better cooperation and understanding of mitigation measures

Suggestions for addressing ranching water use or improving attitudes toward drought management usually accompanied participants’ proposals for community education. An educator believes in the importance of informed local stakeholders, “for people to understand what’s going on downstream, but [also] understand the upstream piece of how water is distributed,” and that if people can achieve water literacy, then “from there, we can take those next steps [...] and changes of behavior” (Interview 1). A local water manager illustrated the importance of water literacy by pointing out the risk of depending on Blue Mesa for recreational revenue when the reservoir was built as a storage unit:

I think people are not clear on what its purpose is and are pretty upset that the lake has been drawn down, even though nothing has been done that’s inappropriate—that’s what it was for. But it’s a shock when you build your business, your camping business, your restaurant or your boating business around having it at levels that we’re accustomed to, and then all of a sudden, those levels aren’t there for a minute. So that is how reservoirs work. But we just hadn’t seen that in recent history. And there’s so many newcomers that they were pretty astounded at the changes in the water elevations. (Interview 2)

Multiple participants also criticized federal agencies’ timing and effectiveness of downstream releases: “Some of these releases should be done in low evaporation periods rather than in the summertime when evaporation is peak [...] the volume of water that evaporates out of Lake

Powell every year is a full Blue Mesa. I think there's some inefficiencies" (Interview 7). These participants expressed mistrust of federal water management when they perceived personal impacts to sense of place from Compact calls. This participant, whose income relies on the fishing industry, added, "[Lake] Powell is going down anyways, and we might as well save some of the upstream communities and economies," suggesting that Blue Mesa should be left full to minimize "impacts to the fishery and water quality" rather than fulfill downstream obligations.

Conversely, other participants held more diplomatic views of Blue Mesa's purpose. "Well, of course, it's drying up," reasoned one participant, "because there never actually was that much water in the system anyway" (Interview 11). A participant who similarly interpreted the reservoir dilemma advocates for water literacy to serve as "a two-by-four to our foreheads to wake us up [...] we need to do a lot more to save the earth because we're at the headwaters" (Interview 9). This participant believes that grasping the intricacies of water politics would motivate better water stewardship at home, as did another participant who optimistically observed a slow but steady move away from hostility toward the Lower Basin. "It's just a trickle right now rather than a river, but I think it's coming" (Interview 3).

When participants discussed what they considered the best methods of encouraging individuals' greater understanding of reservoir functions and water policies, all pointed to the same necessity. "It's data, it's information, it's models—it's education," revealed one participant who found shortcomings in the federal procedures preventing municipal governments from developing their own water infrastructure (Interview 12). This participant, like many others, stressed the importance of federal transparency and community education to keep residents informed and give input on policies that affect the area. This person spoke of the need for community inclusion, stating, "if we had these land managers like the Forest Service and BLM out there doing specific things, for instance [...] What can we as a Conservancy District do behind that to support those efforts?" (Interview 12). Some participants felt that inclusion would additionally improve individuals' attitudes towards disagreeable policies, "letting people understand the complexities without getting overwhelmed" so that the community could "continue to engage in a way that's meaningful for results, not meaningful for 'I win, you lose'" (Interview 1).

One participant brought up community ability to hold one another accountable, which they believed indicated a willingness to learn and cooperate. Speaking on the local culture, this

person explained, “if you come and live here, [...] you need to adopt it,” asserting that upholding values was imperative, and “just because you have a lot of money doesn't mean you should be irrigating inefficiently or without being aware of the impact that has on the community” (Interview 12). This participant reasoned that data-driven adaptation practices would “support the things that we’re seeing” regarding environmental change, and allow residents to “work with the Forest Service and the BLM and our producers in our community to tell that story” (Interview 12). As one person expressed, “water doesn’t get to shake down to a winner–loser kind of battle. We’re all being impacted by what’s going on” (Interview 1). Current knowledge gaps and the tendency for individuals to focus on recovering sense of place in disaster areas, misunderstandings of Blue Mesa’s storage purpose lead to disgruntled community members (Cox & Perry, 2001). However, education and water literacy can bring about informed policy proposals to effect changes in reservoir management that benefit local stakeholders (Turley, Bréthaut, & Pflieger, 2022).

Research Experience

I traveled to Blue Mesa during the summers of 2022 and 2023 to develop a sense of place of my own, which gave me a frame of reference for the area and helped me relate to the people we would interview. During my 2022 visits, I was able to camp, hike, trail run, and interact with



Figure 7. My first catch, a brown trout.

locals who guided me to potential interviewees and organizations that would later become valuable contacts for this project.

When I revisited the area in May, 2023, the reservoir had filled to just two feet below capacity. After purchasing my first fishing license, I invited a guide friend to accompany me and two others to the Elk Creek Marina so that I could rent a small boat and familiarize myself with the hobby that most of our research team’s participants had mentioned: trout fishing on Blue Mesa. Not only did I catch and cook a fish for the first time (Figure 7), but my companions and I instantly understood the appeal that draws anglers back to the reservoir. Conversations with now-fellow anglers at the

marina shed light on the importance of the reservoir's water to the fishing community and local businesses. Recreationists at Blue Mesa who had experienced impaired place attachment during prior years cautiously enjoyed the respite that a high snow year had brought to the disorientation they felt and changes in landscape they lamented since the beginning of the drought (Cox & Perry, 2011; Clayton & Manning, 2018).

DISCUSSION

Responses to questions identifying participants' senses of place further highlighted the variety of social-ecological values that individuals associate with Blue Mesa. Understanding individuals' connections to the area's biophysical qualities explained not only their personal perceptions but also their understanding of potential climate change outcomes (Knapp, 2020). The community's emphasis on outdoor recreation permeates local identities and establishes Blue Mesa not only as a favorite fishing and hiking destination, but also the embodiment of the Curecanti National Recreation Area. Participants' descriptions of the terrain's striking features accompanied by their concerns for Blue Mesa's future indicated that they valued the reservoir as an integral part of their identities, and would ideally preserve the area to retain their strong attachments to its character. A professor at Gunnison's Western Colorado University who favors maintaining the existing environment over economic development values the "combination of clean air, multiple livelihoods coexisting, and a community that's at least talking about how to make it a sustainable place for the future generations" (Interview 11). This professor also explained that while "some people are wanting to focus on economic growth versus mitigating climate change" that the community largely supports the latter as "an important value to try to maintain and build on, because we've also seen the alternatives" (Interview 11). Affinities for Blue Mesa's unique topography foster values that align compatibly to the landscape's protection. A civic leader with multiple outdoor interests described the relationship between Blue Mesa's human and nonhuman elements:

I think really what makes this place interesting is it is one of the larger intact ecosystems in the state of Colorado, for wildlife, for habitat, for species of concerns, or species that are maybe threatened or being reintroduced on the landscape. The landscape dominates people, people here don't dominate the landscape. That's something that really defines this place. (Interview 1)

Our participants repeatedly emphasized the importance of protecting ecosystem services and water-based recreation to upholding stakeholders' and residents' emotional and economic stabilities. The overlapping themes I identified in their responses revealed the complex interconnection of sense of place, adaptation, and community in Blue Mesa.

How has a changing landscape impacted sense of place for Colorado River reservoir communities?

Interview participants identified three major aspects of Blue Mesa—its natural landscape surroundings, recreational reservoir access, and the area’s small-town feel—as the key contributors to their senses of place. Participants’ descriptions of Blue Mesa and its environs emphasized the physical environment’s role in the happiness they derive from the reservoir. Several mentioned their love for the area’s natural beauty and biodiversity, an appreciation which builds on individual meanings and attachments to place (Knapp, 2020). Degradation of the Curecanti wilderness, deteriorating stream health, and the shrinking reservoir have inflicted anxiety and distress on participants, revealing the extent to which ecological robustness connects to their senses of place (Ungvarsky, 2021). Participants reported that the reservoir’s warming water and declining levels contributes to algal blooms, decreased wildlife activity, persistent landscape dryness, and fish health concerns. Like many people in post-disaster areas who have suffered losses in their physical environments, Blue Mesa’s community members reported loss of routine and place familiarity when witnessing the reservoir’s declining levels and dry surroundings (Cox & Perry, 2011). One participant lamented that viewing historic water lows “becomes a little nerve racking” (Interview 5).

Each participant uses the Curecanti Recreation Area regularly, and reported that the drought upset their enjoyment of activities on and around Blue Mesa. Participants listed access to the reservoir’s recreational opportunities as main components of their decisions to migrate to or remain in the area, establishing Blue Mesa as a cornerstone for their senses of place. Primary activities like fishing, swimming, boating, and wild ice skating became essential to participants’ experiences that formed their connections to the area’s physical elements, but changing landscapes have undermined the meanings participants assigned to their emotional ties (Silver & Grek-Martin, 2015). Participants find the condition of the water “depressing” and have felt discouraged from overburdening the increasingly threatened ecosystem (Interview 12). Given the number of both locals and tourists who use the area for leisure, entertainment, exercise, and overall wellness, inability to enjoy the reservoir in their usual traditions and frequency places stress on its visitors (Clayton & Manning, 2018).

The value of the region’s cooperative small-town character completes residents’ senses of place. They actively prevent large scale commercial development that would undermine the

simplicity of life that the area offers. Participants whose livelihoods require functional water levels shared concerns that as more residents struggle financially, the need for outside investments will attract businesses with antithetical values. Neely et al. (2011) found that lack of diversified income causes greater hardship when climate factors detract from business; several Blue Mesa business owners consequently suffered greatly as closed marinas drove away boaters and fishers. Participants also expressed anxiety from population growth, which threatens to dilute the small-town aspect that participants associate with their senses of place. Several also cited water releases to Lower Basin states as unwelcome competition for water, namely when a low water elevation created difficulties using the reservoir for recreation. Inability to enjoy Blue Mesa in its full capacity left participants full of loss and worry for the future, undermining their sense of place constructs (Silver & Grek-Martin, 2015).

Changes to certain characteristics of sense of place for the region's residents have become necessary for adjusting to drought conditions, a circumstance that alarms many of our participants. Blue Mesa's stakeholders rely on reservoir stability for physical and psychological wellness, economic benefits, and water resource security. Access to the reservoir promotes a sense of relaxation and happiness among participants, while experiencing the impacts of persistent drought and aridification have upset these emotional benefits and participants' ability to thrive (Clayton & Manning, 2018). These findings underscore the importance for stakeholders of perpetuating the cultural and emotional significance of Blue Mesa.

How are reservoir-dependent community members adapting to climate hazards in Blue Mesa?

My analysis of sense of place-oriented literature uncovered an insufficient amount of research demonstrating uses of sense of place to support adaptation to climate change. Based on our interviews, participants demonstrated significant adaptive capacity for drought challenges. Adaptive strategies can provide incentives for communities to plan for ongoing and future drought, secure their families' futures, and strike nonpartisan resolutions to ensure the protection of their cherished places (Clayton & Manning, 2018; Walcher, 2021). Residents near Blue Mesa bond over their ability and willingness to withstand the extremely cold winters and their mutual beliefs in protecting their environmental resources, strengthening their shared senses of place. Stakeholders actively engage together in conservation and protection efforts, developing social

and environmental projects that inhibit excessive urban development, support watersheds, restore wetlands, and maintain local culture and values.

Reservoir community members in the region demonstrated the desire to take charge of efforts to preserve their areas—informed by their senses of place—by creating autonomous adaptation strategies to prevail through the current drought and rising average temperatures. For example, an angler who remarked that “when the lake is low, you hate to see it” supported regulations to protect fish populations from warmer water-induced gill lice infestation, overfishing, and competitive crowding when water levels decline, and a number of other participants advocated for similar regulations (Interview 7). Residents’ strong willingness to adapt current behaviors in order to sustain the area’s small town feel demonstrates that they may not hesitate to implement larger cooperative measures, as some explicitly mentioned. Blue Mesa’s glue of social consciousness and knowledge suggests that local stakeholders possess increased adaptive capacity and resilience to environmental changes (Grothmann & Patt, 2005). “I do remain optimistic that the people that live here share enough appreciation for the landscape that they can agree to measures to help protect it,” shared one participant, who agrees that even while “recent political discourse has challenged that ability to get along,” with regard to Blue Mesa “if the topic is the place, I think there’s enough shared values to make it work” (Interview 11). Participants demonstrated individual beliefs and capabilities that welcome policies to reduce the impacts of climate change and water scarcity, suggesting a high level of cooperation in reducing the drought’s effects (Grothmann & Patt, 2005).

Studies of residents in regions prone to climate hazards found a positive correlation between risk perception and motivation to act in the form of avoidant maladaptation (Grothmann & Patt, 2005). However, despite changes in area politics over the last several decades, Blue Mesa’s community has displayed flexibility and agreement on salient issues rather than increased polarization, a mark of compromise that reflects well on the adaptive capacity of the community as a whole (Smit & Wandel, 2006). Residents in the region feel compelled to adapt both their community and environment to drought, requiring them to understand the nuances of individuals’ adaptive capacities and identify commonalities that will lead to adaptive strategies that works for everyone (Quinn, Bousquet, & Guerbois, 2019). Given the proactive nature of this study’s participants and their willingness to modify habits to protect natural resources, adaptive

strategies in Blue Mesa will succeed if a large majority of remaining area stakeholders share these participants' goals and ideologies.

How can local policymakers work with Blue Mesa's community to support drought resilience while preserving unique identity?

A number of participants expressed anger or frustration at downstream releases, which threaten their conception of the reservoir as a medium for outdoor activities. Viewing Blue Mesa as a recreational lake places it in the forefront of sense of place for the region's visitors. Participants working in management and education fields suggested that highlighting its purpose as a storage unit could force them to seek different recreation and revenue sources in order to divest from reliance on reservoir water levels, reminding locals that they are "living on borrowed water" from the Lower Basin (Interview 1). While all participants listed the negative impacts of Compact calls on their emotional attachments to the reservoir, most articulated their understanding of Compact policies and the necessity to release water to the Lower Basin. Still, several participants believed that better community understanding of the Compact and the difficulties decision makers face would assuage frustrations directed at local water managers or downstream states.

Participants indicated disappointment that federal decisions failed to include their input or consider the complexity of their needs in both historic and present water policies. Many reported feelings of helplessness and pessimism surrounding upper-level water management, while others reported modest successes with interagency projects. When local and federal decision makers collaborated, participants felt hopeful that they could find solutions to water issues and environmental restoration. Participants expressed greater optimism that local decision makers supported community interests and used good judgment. Of participants who worked outside of decision-making positions, several mentioned that local managers could improve the community's autonomy by speaking out on contentious water policies and designing solutions for Gunnison's housing shortage. Many decision makers as well as educators suggested that community education programs would create a systematic foundation for addressing specific issues related to water scarcity.

These suggestions and comments reveal participants' thoughts on how best to proceed to meet the community's needs. Participants would change several aspects of water policies, but

without the influence to overturn interstate agreements, locals rely on their local elected officials to introduce resolutions at higher management levels. One participant argued that “maintaining the vitality of a community is important regardless” of partisanship, and expressed optimism that local officials “have maintained good working relationships” with their federal counterparts (Interview 1). Participants task local decision makers, who “have the whole valley in mind and how everything affects everything,” which has “been really helpful,” with continuing to advocate for the region, but also intensifying appeals to high-level government (Interview 13). Participants’ positive cooperation with past policies requiring adapting behaviors in order to preserve the community’s culture and water infrastructure suggest that they would react favorably to similar future policies, provided that decision makers included their input and that policies allowed residents to maintain their ways of life. Securing the region’s culture, environment, and water will guard residents from threats to their senses of place.

Limitations of Study

Most of our participants lauded Gunnison and Blue Mesa’s community dynamics and adaptability; others had nothing bad to say. This sample population may not proportionately represent the prevailing sentiments of stakeholders or residents outside of the region. Most of our interviewees expressed moderate or liberal-leaning political ideals and several held advanced degrees in earth sciences or worked in water management fields. A larger participant pool could have yielded different or more comprehensive information. Results may have been skewed based on participant demographics, the study area, and reliance only on information from participants who agreed to take part in the interviews. While two of our participants came from ranching backgrounds, our requests for interviews were turned down by current key stakeholders in the ranching community, leaving out an important perspective in water management. Additionally, approaching the community as an outsider, I may have failed to capture the true dynamics, beliefs, and values that I sought to understand. Despite these limitations, this exploratory study provides input from stakeholders who represent a relevant sample of the Blue Mesa community. These findings accordingly draw attention to the impacts of changing water levels on sense of place in Blue Mesa.

Conclusion & Recommendations for Future Research

The results of my research demonstrate the ways in which a reservoir-dependent community on the Colorado River have been personally impacted—emotionally, culturally, financially, and politically—by drought. The community members’ senses of place, which are intrinsically linked to their uses of the reservoir, serve as a metric for their intentions to adapt to the reservoir’s changes and their beliefs regarding how climate hazards should be managed by decision makers. I represented participants’ concerns regarding emotional, cultural, and financial security within the themes of sense of place, competition, and community adaptation. I shared participants’ trust or mistrust of, as well as their suggestions for future initiatives and cooperation with, government decision makers with the discussion of my other two themes, decision makers, management, policy, and politics, and knowledge.

Further research of this nature could build on what I have presented with this thesis. This study could be adopted to different reservoir or recreation communities, or other regions where individuals’ senses of place or adaptive capacity have been impacted by climate hazards. Considering next steps, I would investigate the possibility of presenting a summary of this research to my prior interview participants or other Blue Mesa community members, and possibly engaging with water management organizations in the area, such as the Gunnison Basin Roundtable, the Upper Gunnison River Water Conservancy District, or the Colorado Water Conservation Board. I approached this project with the belief that presenting the data I gathered could possibly aid stakeholders and decision makers in formulating solutions for adaptation, policy development, or community support.

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APPENDIX A

Interview Guide

- **Text in Bold are the minimum questions we want you to ask no matter what.**
 - Probing questions should be asked if not covered, at your discretion
- Text with no formatting are important questions that should be asked if there's time but are not prioritized over questions in bold
- *Text in italics are fully optional questions that we suggest you only ask if you know you have sufficient time.*

Introduction, personal background/connection, sense of place

- 1. Tell me a little bit about yourself and how you are connected to [place]**
 - a. Probe: Where do you live?
 - b. Probe: When you visit how do you spend your time?
 - c. Probe: how do you use or interact with the environment/natural resources?
 - d. Probe: how long have you lived/been visiting/working here?
 - e. Probe: (if not born or always visiting) what led you to move there or start visiting?
 - f. Probe: does your family/others in your family also live in/visit [place]?
- 2. What makes [place] feel like [place]? How would you describe [place] to a newcomer?**
 - a. Probe: what feels most important or special about it?
 - b. Probe: what feels unique about it or different from other communities?
 - i. How is it different from [nearby place] or [nearby place] or other communities in your state?
 - c. Probe: are there certain views or visuals you think of when you think of [place]? If so, can you describe what they look like?
 - d. Probe: What is a particularly memorable or enjoyable aspect of [place]?

Changes to place and the reservoir, hazards and place

- 1. What changes have you experienced in [place]? How do these changes affect you, your family, your livelihood, or other activities?**
 - e. Probe: were these changes good? Bad? Why?
 - a. Probe: how has this change impacted your community?
 - b. Probe: describe how you or others are impacted by changing reservoir levels**
- 2. What have you (or others in your community) done previously when reservoir levels have changed?**
 - a. Probe: did it resolve the problem/decrease issues?
 - b. Probe: do you think these responses/adjustments/changes will (continue to) work in the future?
 - c. Probe: What ideas do you have of actions that you (or others) could take but haven't taken yet? Why aren't they being done?

3. How else has [place] changed over time?
 - f. Probe: how has the landscape/environment changed?
 - a. Probe: what do you think are the main drivers of the changing reservoir?
 - b. Probe: are these changes normal/natural? Are they new to you?
 - c. Probe: how has the community– the people here– changed?
 - d. Probe: how has the reservoir changed? (if not answered above)
 - e. Probe: what do you think are the main drivers of the changing reservoir?
4. *Can you reflect on how these changes have impacted your thinking?*
 - a. *Probe: about climate change, reservoir, needed response, economics, identity, etc.*
 - b. *Probe: has it changed your feelings about this place?*

Future Uses of place

1. **When you think about the future of this place, what elements, aspects or characteristics feel most important to protect/focus on/support?**
2. (if not answered above) How do you think this place will change in the future?
 - a. Probe: how do you think the reservoir will change?
 - b. Probe: how do you feel about those future changes?
 - c. Probe: how might future changes impact other aspects of your community or livelihood? What if changes become larger/more extreme?
3. How do you think the use of water/the reservoir might/should change in the future?
 - a. Probe: What uses/activities related to water/the reservoir are important for the future of this community?
4. *Can you imagine a future in which you couldn't or wouldn't use/enjoy/recreate/live/work in this place as you do today? What would have to happen? What factors would influence this change?*

Decisions/actions

1. **How are the changes we've discussed changing your future decisions and actions (if at all)?**
 - a. Probe: or, how do you expect it to change in the future?
2. (if not answered above) What do you think you or your community– or community leaders– should do, if anything, about changes to place/impacts from reservoir levels?
 - a. Probe: why?
 - b. Probe: Who needs to be doing this? Needs to be involved?
 - c. Probe: what would it take for this to happen?
 - d. Probe: what happens without this type of action? Will it change place?
3. *Is there a specific point (a reservoir level, a certain impact) that feels like it would change your thoughts or your decisions?*
 - a. *Probe: is there a specific point or change that you think would significantly change this place or community?*

APPENDIX B

NVivo Codebook

Parent Code	Code	Definition
Sense of place	Meanings	Expressions about the importance of the place linked to personal experiences (inclusive of symbols)
Sense of place	Beliefs	What the place is, in a more abstract sense than a description of the landscape
Sense of place	Values	Ascribing worth or importance to a place, preferences and priorities about a place
Sense of place	Feelings	Expressions of emotions or personal sentiments about the place
Sense of place	Connections	Appreciation for the location, a desire to continue experiencing it, potentially expressions about identity and the place
History	Experiential history	A person's experiences, pathways, uses, activities, with the reservoir and the surrounding community/area
Environment	Landscape	Descriptions of the landscape
Environment	Natural beauty	Expressions for beauty, appreciation of the landscape
Environment	General change	Changes in the environment unrelated to the reservoir
Environment	Change with the reservoir	Changes in the environment directly related to or with the reservoir
Environment	Ecosystem services	Benefits, challenges, opportunities, threats to/for ecosystem services
Environment	Focal point	Discussion or mention of a particular aspect of the environment that is important, stands out, or is the epitome of a place
	Commitment/ Anticipated use	How a person anticipates their use of the reservoir or surrounding area in the future
Adaptation	Current	What the person and/or their community is doing in response to change
Adaptation	Future	What the person and/or their community should be doing in response to change
Competition	Interests	The different interests/uses that compete for water resources, including during change
Decision makers, management, and politics	Trust/Mistrust	Whether a person agrees/disagrees, trusts/distrusts, decision makers, management decisions, or politics around an issue

Decision makers, management, and politics	General	General commentary on decision makers, management, management decisions, or the politics around an issue
Economy	Livelihoods	How the person or people in the community make their money, or day to day economic activities
Economy	Tourism	Discussion of the role of tourism in the local economy
Economy	Development/ Growth	Discussion of change in the growth, development of the area
	Recreation	Recreational activities
Thinking about the future	General	Thoughts or feelings about the future
Thinking about the future	Fear	Thoughts or feelings about what they don't want to happen or fear of happening
	Family	Discussion of strong ties to or considerations of family
Knowledge	Place history	The person's knowledge of the history of the reservoir and the surrounding area
Knowledge	Reservoirs	The person's knowledge of what is happening with the reservoirs, current happenings with them
Knowledge	Policy	The person's knowledge of what policy around water, reservoirs, or natural resource management
Knowledge	Gap	A person's acknowledgement that they may not be fully informed on a subject or area including what others know or don't know
	Good quotes	Use to identify helpful, succinct, and descriptive quotes within the transcripts
Community dynamics	Internal	The interactions, dynamics, and histories between people within the case study community
Community dynamics	External	The interactions, dynamics, and histories between the people of the case study community and other communities or actors
	Misc	Is important but doesn't fit into a different category, or unsure how to code it