Agricultural Water Users' Preferences for Water Conservation Programs in the Middle Rio Grande Basin

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Disclaimer: The survey was designed to provide broad geographic coverage of agricultural water users within the Middle Rio Grande Conservancy District (MRGCD), excluding Pueblo lands. Pueblo communities were not included because data sovereignty considerations and project resource constraints limited the scope of data collection. As a result, the findings presented in this report do not reflect the perspectives of Pueblo agricultural water users or Pueblo governments.

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Executive Summary

Water scarcity is increasingly a defining challenge for agriculture in the Middle Rio Grande Basin (MRGB). Recurring droughts, declining surface water supplies, growing competition among agricultural, environmental, and urban water uses, and legal obligations related to interstate compact deliveries and endangered species management are placing unprecedented pressure on water management in the basin. To better understand how agricultural water users view these challenges and potential conservation responses, a survey of agricultural water users within the Middle Rio Grande Conservancy District (MRGCD) was conducted primarily between January and March 2026. The survey received 2,067 responses, representing a 43% response rate. The findings provide an important snapshot of agricultural water users' experiences, concerns, and preferences as water managers and policymakers consider future water management strategies.

Key Findings

Agricultural water users remain strongly committed to irrigation and crop production despite growing water challenges. Surface water remains the dominant irrigation source, and more than half of respondents indicated that continuing to grow crops and irrigate their fields is extremely important to them. Although agriculture represents a relatively small share of the region's total gross domestic product (GDP), respondents' responses highlight its continuing historical, cultural, and lifestyle importance.

Drought and reduced surface water availability are the most significant challenges facing agricultural water users. Respondents identified insufficient surface water, uncertainty about water-delivery timing, and difficulty maintaining desired operations as major disruptions. These results suggest that water scarcity in the MRGCD is not only a hydrologic problem, but also a management and coordination challenge involving infrastructure, delivery reliability, institutional responsiveness, and communication.

Local infrastructure investment is a clear priority. When asked how available investment dollars should be spent, respondents consistently ranked local water infrastructure improvements as their highest priority. Federal water infrastructure improvements and irrigation-efficiency programs were also highly ranked. This indicates strong support for investments that improve the reliability and effectiveness of existing water infrastructure and irrigation systems.

Participation in the Environmental Water Leasing Program (EWLP) was limited but has potential for growth. Only about 7% of respondents reported having previously participated in the program. Among these participants, the most commonly cited motivation was helping the MRGCD manage water demand during drought conditions, followed by receiving financial compensation and helping other farmers who need water. These findings suggest that participation decisions are largely influenced by both financial incentives and a willingness to support collective water management and the broader agricultural community.

Concerns about water rights are the largest barrier to participation in conservation programs. Among respondents who had not participated in the EWLP, concern about losing

water rights was the most commonly cited reason for non-participation. Other barriers included unfamiliarity with the program, difficulty or cost of revitalizing fields after fallowing, insufficient compensation, and concerns about agricultural tax status. These responses point to the importance of aligning water conservation initiatives with existing legal, tax, and land use policies that affect agricultural water users.

Agricultural water users strongly prefer management approaches that keep water within agriculture and within the MRGCD. Support for temporary transfers was generally greater than support for permanent transfers. However, substantial opposition existed to transferring agricultural water rights out of the MRGCD, particularly to urban users. These findings suggest that agricultural water users are more likely to support management strategies that keep water tied to agriculture and maintain local control.

Trust varies substantially across information sources. Local water entities, such as the MRGCD, were the most trusted sources of information on water management. Friends and family were also viewed favorably. Local media and elected officials received the lowest trust ratings. These findings suggest that successful water management strategies will also depend on trusted local institutions and effective communication.

Many agricultural water users are interested in adaptation but face practical barriers. Respondents expressed interest in infrastructure improvements, more efficient irrigation technologies, groundwater wells, water storage, crop changes, and soil improvement practices. However, they also identified financial costs, technical requirements, limited information, administrative barriers, and legal concerns as obstacles to adopting these changes.

Implications for Policy and Water Management

The survey results suggest that agricultural water users recognize the need to adapt to increasing water scarcity, but their support for conservation depends heavily on program design and implementation. Respondents' concerns point to the need for conservation programs that protect agricultural water rights, maintain agricultural viability, and provide clear assurances about participation risks. Conservation initiatives that appear misaligned with water rights rules, agricultural tax policies, or long-term land productivity may face significant barriers to participation.

The findings also indicate that water management strategies should aim to address both physical water shortages and institutional coordination challenges. Improving infrastructure, delivery reliability, effective communication, and institutional responsiveness may be as important as creating new conservation incentives. Conservation strategies that combine financial incentives with trusted information, technical support, and clear legal protections are likely to be more successful and receive broader support among agricultural water users in the MRGB.

Section 1. Agriculture and Water Use in the Middle Rio Grande Basin

Surface water supplies in the Rio Grande Basin are increasingly stressed. Shortages are frequent, as below-average snowpack and accelerating spring snowmelt reduce the volume and timing of runoff (National Integrated Drought Information System, 2026). The impact of this hydrological stress is exacerbated by a growing urban sector and the intensifying competition for water among agricultural production, in-stream environmental demands, and urban water use. This increases the pressure on water management as water consumption in the basin is said to be on an unsustainable path (Richter et al., 2025).

Balancing the intersectoral water demands in the management of water from the Rio Grande, which is the main source of surface irrigation water in the Rio Grande Basin, is also shaped by legal constraints. New Mexico (NM) is obligated to deliver water downstream to Texas and Mexico under two major agreements and to support Silvery Minnow habitat under the federal United States (U.S.) Endangered Species Act. The *Rio Grande Compact* divides Rio Grande water annually between three states—Colorado, New Mexico, and Texas—based on how much water is in the river, and NM is required to deliver water downstream to Texas to meet its obligations. An international treaty between the U.S. and Mexico, the 1906 Convention, requires the U.S. to deliver water annually to Mexico, with proportional reductions to its obligation in drought years.

Agriculture is an important part of the basin's cultural and historical landscape. Today, it continues to support Native American Pueblo and non-Pueblo communities and sustain the traditional acequia systems as a way of life. Within the Middle Rio Grande Basin (MRGB), these traditional water users and irrigators along the valley floor are part of the larger Middle Rio Grande Conservancy District (MRGCD); the MRGCD is a 100-year-old state public corporation, and the largest water allocator in the MRGB.[1] Running along the valley floor, the boundaries of the MRGCD include parts in four NM counties, which include (running north to south): Sandoval, Bernalillo, Valencia, and Socorro (Figure 1). The basin is home to the Albuquerque Metropolitan Statistical Area, centered in Bernalillo County. Also overlapping with the service areas of the MRGCD, within the larger MRGB, are six Pueblos, with *Prior and Paramount* water rights, created under federal authority dating closely to the creation of the MRGCD in the 1920s.[2]

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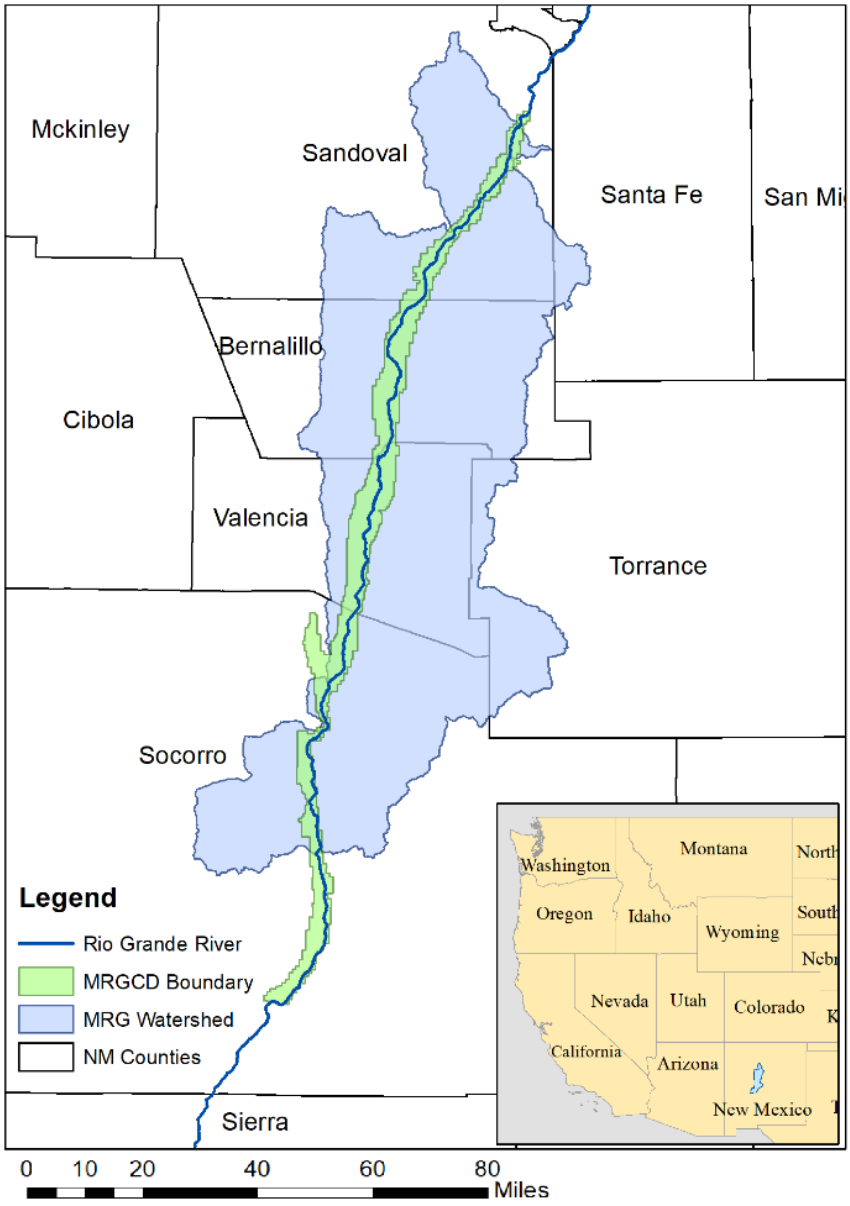
[1] MRGCD owns most post-1930s water rights and nearly all major irrigation conveyance infrastructure in the basin and determines irrigation schedules and allocations to users in its service area. In times of water scarcity, although New Mexico grants priority to water rights with use pre-dating the state's 1907 Constitution over rights permitted after that date, water for these rights is delivered via shortage sharing by the MRGCD and has not historically been administered by priority, except for Pueblo water.

[2] Parts of each of the Pueblos are within or immediately adjacent to the MRGCD boundaries. Running north to south, the six Pueblos of the Middle Rio Grande Valley are: (i) *Cochiti;* (ii) *Santo Domingo (Kewa)*; (iii) *San Felipe*; (iv) *Santa Ana* (*Tamaya*); (v) *Sandia*; and (vi) *Isleta*. These six Pueblos have 8,847 acres of Prior and Paramount lands with priority water rights, and then co-equal claim on additional reclaimed lands (which together can total over 20,000 acres). See: Chestnut (1999) and MRGCD (2012). Prior and Paramount water rights for the six Pueblos mean that they receive water preferentially over all other MRGCD lands.

Figure 1: A map of the Middle Rio Grande (MRG) watershed and the Middle Rio Grande Conservancy District (MRGCD) boundary in New Mexico (NM).



Source: Hasenbeck et al. (2025)

While important culturally, politically and socially, the agricultural sector's share of total gross domestic product (GDP) across the four MRGB counties is quite small (roughly 0.12% in 2024, with livestock grazing accounting for more than half of this 0.12%). However, the agricultural share of county GDP is much more significant in the southernmost county of Socorro (over 6.5%) than the others, and especially relative to Bernalillo County (where the share is roughly 0.03%), which dominates the share of total regional GDP (over 86%).[3] Agriculture also provides

[3] Economic figures are taken from: (i) NM EDD – December 2024 Quarterly Economic Summary, Bernalillo County (BEA CAGDP2 data); (ii) NM EDD – December 2024 Quarterly Economic Summary, Sandoval County;

a host of ecosystem goods and services, including supporting the region's biodiversity, wildlife habitat, cooling and other aesthetic amenities whose values are not fully captured economically. Accounting for approximately 69% of total water withdrawals (Olofinsao et al, 2026), irrigated agriculture is the largest water user by sector in the basin and thus plays a critical role in water management.

Photo by Jingjing Wang. A ditch within the MRGCD.

The MRGCD and the New Mexico Office of the State Engineer (NMOSE) are concerned about future water shortages and considering where conservation is possible. This report presents findings from survey-based research (2025-2026) that sought to understand the preferences that agricultural water users have towards water management strategies in the basin. The survey asks about challenges facing the agricultural water users, their level of support for various water conservation and water management strategies, and the kinds of support that they would need related to any changes required by these strategies. The aim of this report is to add the perspective of the agricultural water users to the policy and water management decisions taking space, as choices are made on how best to balance water resources with demand for the sustenance of the region.

Section 2. Research Approach

This research relied on a primary survey of agricultural water users in the MRGCD conducted during the 2026 pre-irrigation season between November 2025 and March 2026. The survey was intended to provide full geographical coverage of agricultural water users in the MRGCD excluding the Pueblo areas. Pueblos were restricted due to data sovereignty and budgetary restrictions that limited what could be done within the time limits of the project.

Considering how the agricultural community and water use are structured in the MRGCD, it was determined that using a list of agricultural water users who had paid their 2024 water service charge to the MRGCD would provide a good sample of active water users, and the ability to reach them via mail was helpful for survey administration. The list was compiled by first excluding all records with a missing customer ID from MRGCD's ISOLOG records. In case an ID was associated with more than one parcel, all parcels recorded to that ID were aggregated. Only the IDs associated with acreage that was irrigated in 2024 were included in the survey sample. This process led to 4,858 agricultural water users who were initially contacted as potential survey respondents through their associated billing address.

(iii) NM EDD – December 2024 Quarterly Economic Summary, Valencia County; (iv) NM EDD – December 2024 Quarterly Economic Summary, Socorro County; and (v) BEA GDP by County (CAGDP2) | FRED series: GDPALL35001, GDPALL35043, GDPALL35061, GDPALL35053.

Excluding addresses associated with either undelivered survey mail due to incomplete or not up-to-date addresses, or that had requested to be excluded from the sample, produced a final survey sample consisting of 4,773 agricultural water users. This sample consists of agricultural water users with properties in the MRGCD service area that received surface water from the MRGCD for irrigation in 2024. As shown in Table 1, about 44% of the sample covers properties in Valencia County, followed by Bernalillo County at 31%. Agricultural water users with operations in Socorro and Sandoval counties accounted for 14% and 11% of the sample, respectively.

Table 1: Geographic distribution of surveys mailed and received across counties

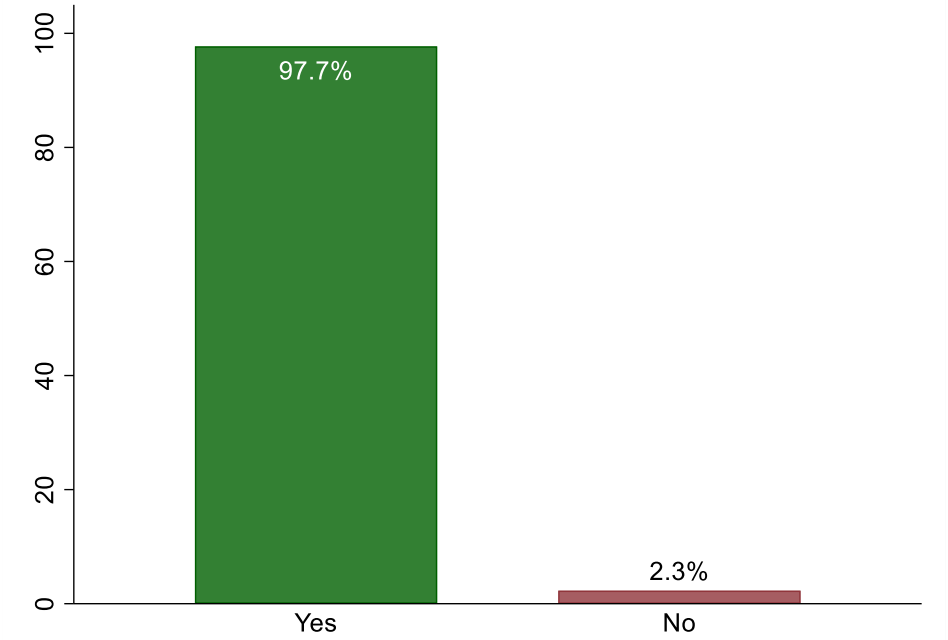
County	Surveys Mailed	Share of Mailed Surveys (%)	Completed Surveys	Response Rate (%)
Valencia	2085	43.68	828	39.71
Bernalillo	1469	30.78	679	46.22
Socorro	670	14.04	277	41.34
Sandoval	530	11.10	276	52.08
Unknown county*	19	0.40	7	36.84
Total	4,773		2,067	43

Notes: Share of mailed surveys calculated relative to all surveys mailed across counties. Response rate calculated relative to surveys mailed within each county.
**These properties could not be matched to a county based on the raw data.*

Any survey responses that could not be successfully linked to the sample or were deemed unusable were discarded. For example, incomplete responses or responses missing identifying information (randomly assigned IDs or return contact information) were unusable. A total of 2,067 responses were received, representing a 43% response rate. By county, response rates ranged from 40% in Valencia County to 52% in Sandoval County, as shown in Table 1. About 77% (1,591) of the responses were received by mail and the rest by online submissions.

The survey respondents also varied by whether they had irrigated their operated land in the past five years or not. Figure 2 shows that about 2% of agricultural water users who responded to the survey did not irrigate their property in the past five years despite paying their water service charge in 2024. These “inactive irrigators” mostly indicated that their properties were residential, vacant, inherited or recently purchased, or were not being used for agricultural purposes. Another reason cited for not irrigating related to concerns with limited and unreliable water availability which presented a barrier to agricultural production. Personal circumstances such as health, age, lack of labor, residing away from the property and either loss of water rights or participating in water banks were also cited as reasons why they had not irrigated.

Figure 2: Distribution of active vs. inactive irrigators



Note: Responses to the question: Has any of the land you own or manage been irrigated (using surface water or groundwater) for agricultural purposes in the past 5 years?

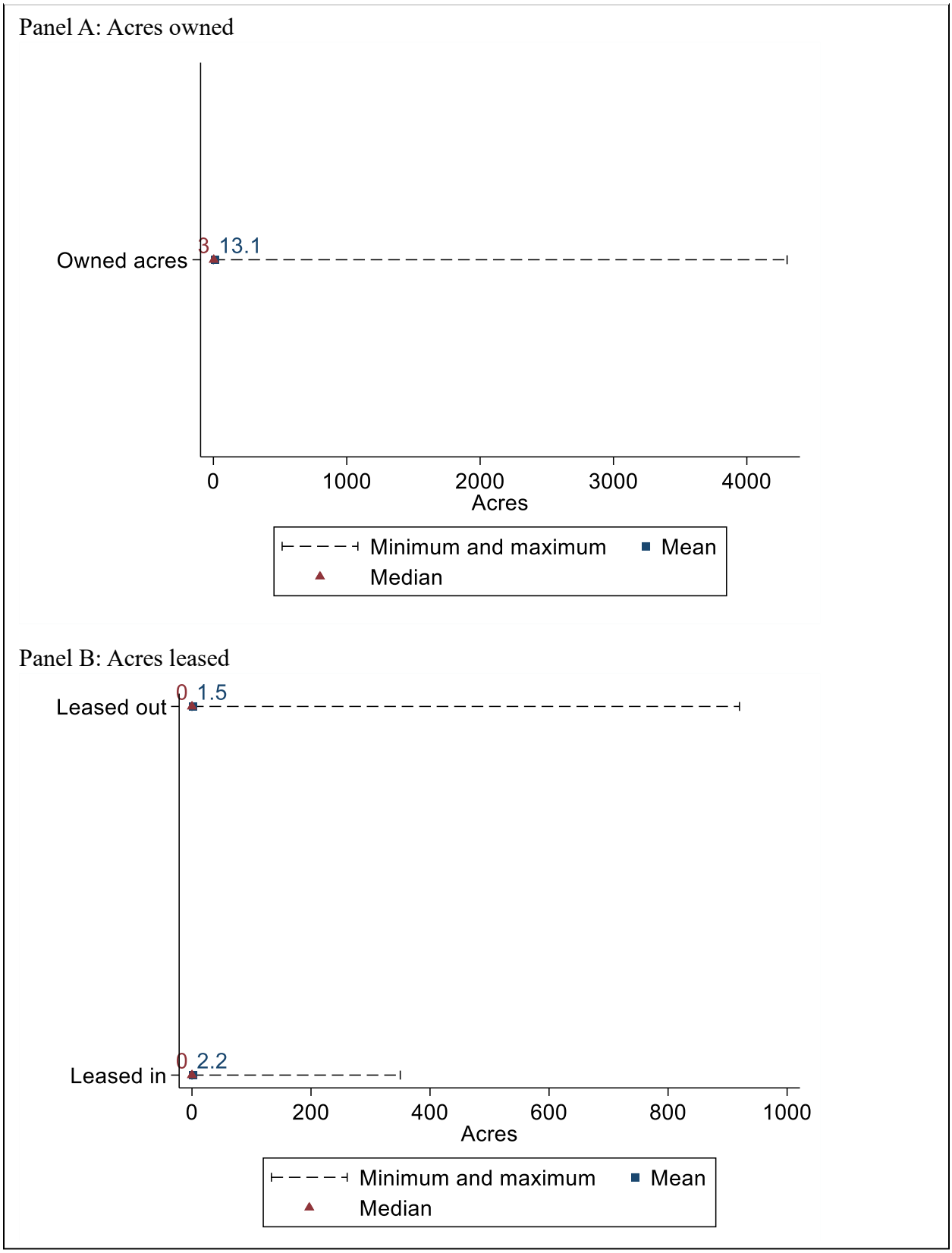
Of those who did not irrigate in the past five years, 18% (8 respondents) indicated that they plan to put their land back into production in the next five years, 46% (20 respondents) said they did not intend to do so, and 36% (16 respondents) said they did not know (see Figure A1 in Appendix A). Since the questionnaire largely sought to understand perceptions related to water use, supply, and management decisions in recent years, the rest of the report focuses on respondents who indicated that they had irrigated in the past five years. These are also referred to as "irrigators" or "irrigator respondents" in the report.

Respondents could skip questions as they were not required to provide an answer to each question. This resulted in a different number of respondents for each question. Table A1 in Appendix A reports the number of respondents by question.

Section 3: Characteristics of Irrigator Respondents

Agricultural operations in the MRGCD are concentrated among small properties. For land ownership, while the irrigator respondents reported owning an average of 13 acres, more than half reported owning 3 acres or less, as indicated by the mean and median values in Panel A of Figure 3. The smallest reported owned property is 0.2 acres whereas the largest is 4,302 acres. This indicates that a few irrigators who own large properties were pulling the average owned acreage up.

Figure 3: Total land operated the past 5 years by ownership and leasing category

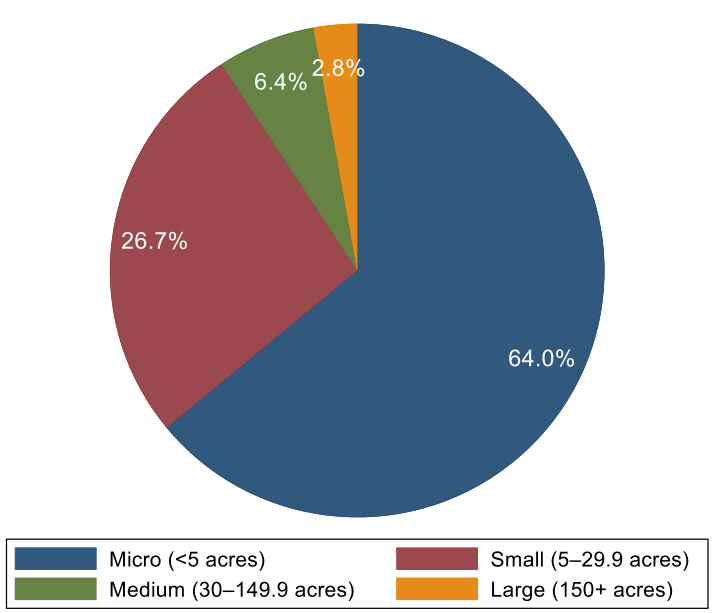


Reported participation in the land leasing market was low at 14% of respondents. However, for those who participated, the average number of acres leased from others ("leased in") was 1.5 while on average 2.2 acres were leased to others ("leased out"), as shown in Panel B of Figure 3. Similar to the case of land ownership, a few respondents reported large leasing operations that pull the mean above the median of no (zero) acres leased in or out. It should be noted that although a questionnaire was sent to an address associated with a customer ID, where an irrigator operates more than one property, they could consolidate them in one survey response, which could result in pushing the distribution of acres a little higher than might have been shown in previous studies in the MRGCD.

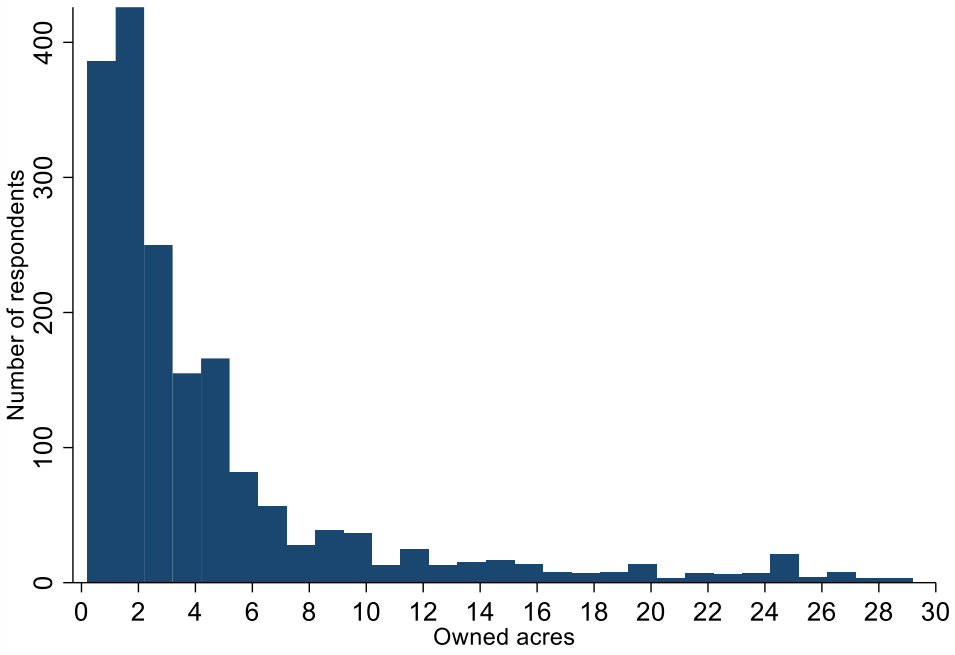
The agricultural operations are categorized by size based on total operated land. The US Department of Agriculture defines total operated land as the difference between the sum of agricultural land owned and land leased from others, and land leased to others (MacDonald et al., 2013). Panel A of Figure 4 presents the distribution of survey responses by size of farm operations based on classifications of farm size employed by other regional and US agricultural studies (Olofinsao et al, 2026). As shown, 64% of irrigator respondents operate micro farms (less than 5 acres), 27% operate small farms (between 5 and 29.9 acres), 6% operate medium farms (between 30 and 149.9 acres), and 3% operate large farms (150 acres and over). Of the 1,822 respondents who operate micro and small farms (30 acres and below), 20.1% operate 1 acre or less as indicated in Panel B of Figure 4.

Figure 4: Distribution of irrigator respondents by size of farm operations

A: Distribution of all irrigator respondents by size of operations



B: Distribution of irrigator respondents with under 30 acres (micro and small) by acreage



Although agriculture helps support families in the MRGCD and connects them to agricultural lifestyles, culture and customs, only a small percentage of irrigators indicated that it is their primary source of income. As Figure 5 shows, only about 1 in every 15 respondents (6.5 percent) reported that income from agriculture is the main source for their household.

Figure 5: Whether farming is primary household income source

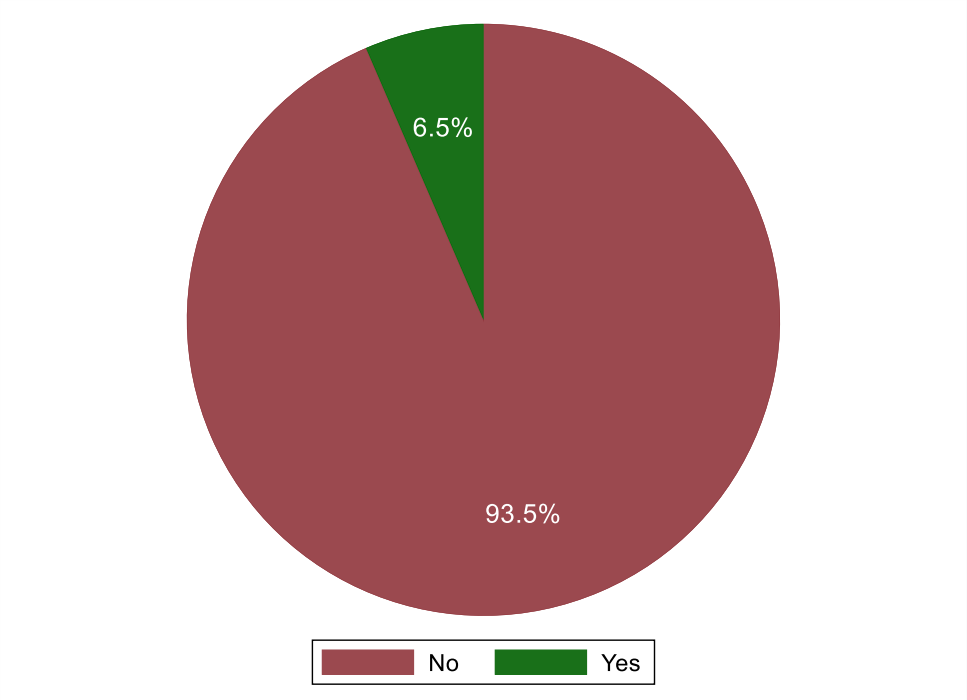


Table 2: Whether farming is primary household income source by farm size

	Farming **is** primary income source		Farming **is not** primary income source	
Farm size category	Number of respondents	Share of respondents %	Number of respondents	Share of respondents %
Micro (<5 acres)	49	38.58	1221	66.94
Small (5–29.9 acres)	37	29.13	490	26.86
Medium (30–149.9 acres)	26	20.47	102	5.59
Large (150+ acres)	15	11.81	11	0.60
Total	127		1824	

Notes: Pearson's chi-square = 166.89, p = 0.000

Distribution of farms by size differs by how households rely on agricultural income. Respondents for whom agriculture is the main source of household income tend to operate significantly larger farms (32.28 % of which operate medium and large farms) as Table 2 and Table A3 in Appendix A show. On the other hand, respondents for whom farming is not a primary source of income have predominantly micro and small operations (6.1% of these

respondents operate medium and large farms). Despite a few very large owners amongst respondents for whom farming is not a primary source of income, Tables 3 shows that on average those for whom farming is a primary source of income owned and leased more land (40.7 acres compared to 10 acres for those who for whom it is not). Participation in the land leasing market (leasing in from other people and leasing out to other people) and in the Environmental water leasing program is high for respondents for whom agriculture is primary source of household income as shown in Table A4 in Appendix A. For instance, 16% of respondents for whom agriculture is primary source of income had previously participated in the Environmental water leasing program, a significantly higher share compared with 5% for those for whom farming is not a primary source of income.

Table 3: Distribution of respondents by land ownership and primary household income source

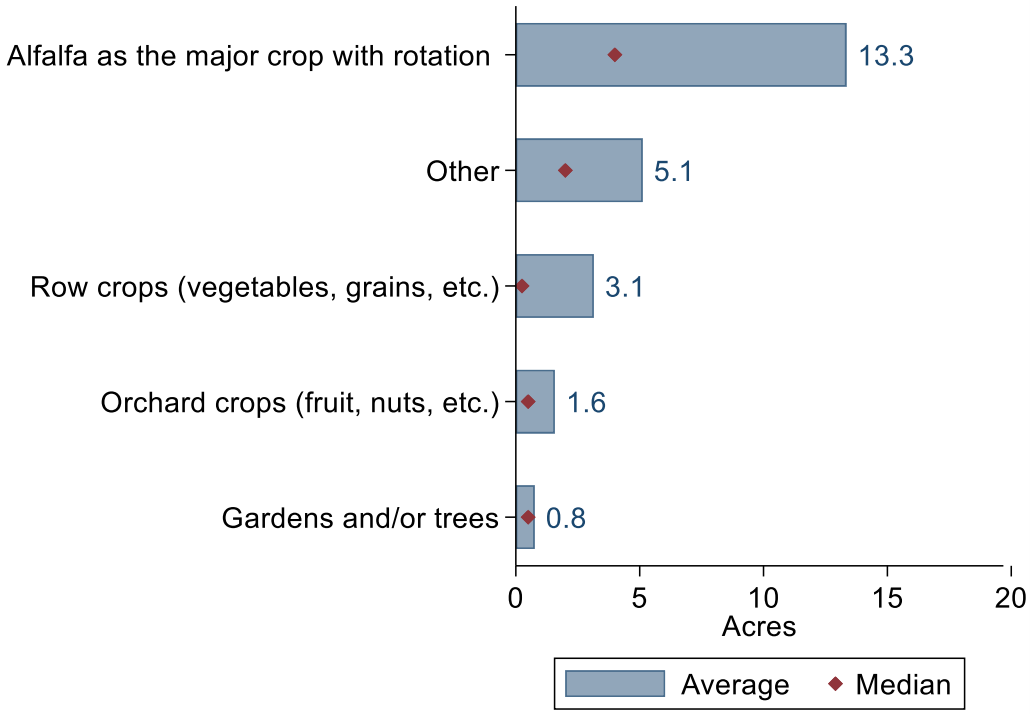
Panel A: farming **is** primary income source						
Variable	Number of respondents	Mean	Standard deviation	Median	Minimum	Maximum
Acres owned	125	40.70	70.17	10.00	0.25	350.00
Acres leased in	125	18.36	57.89	0.00	0.00	350.00
Acres leased out	126	5.88	33.98	0.00	0.00	316.00
Panel B: farming is **not** primary income source						
Variable	Number of respondents	Mean	Standard deviation	Median	Minimum	Maximum
Acres owned	1808	9.95	102.17	3.00	0.20	4302.00
Acres leased in	1812	1.06	9.10	0.00	0.00	280.00
Acres leased out	1820	0.77	5.66	0.00	0.00	128.00

In terms of agricultural activity, acreage is used predominately for growing alfalfa with other rotation crops. Average alfalfa cropping is reported at 13 acres, although half of all who provided a response reported four acres or less as shown by the median value in Figure 6, indicating the influence of a small number of respondents with large alfalfa operations in increasing the average. However, the alfalfa average and median acreages are higher when compared to their counterparts for row crops, orchards crops and other crops. As Figure 6 shows, each activity still has the distribution of the acres influenced by a small number of respondents with

Photo by John Fleck. An alfalfa farm within the MRGCD service area.

large operations, which increase the average even though half of the respondents report acres way below that mean. An exception is garden crops which are generally cultivated in small plots with small variations shown across respondents. A similar pattern is observed when the respondents are disaggregated by whether agriculture is the primary household income source in Figures A2 and A3 in Appendix A, with those for whom agriculture is primary income reporting more acres for each agricultural activity. Table A5 in Appendix A shows more details on the respondent distribution across agricultural activities.

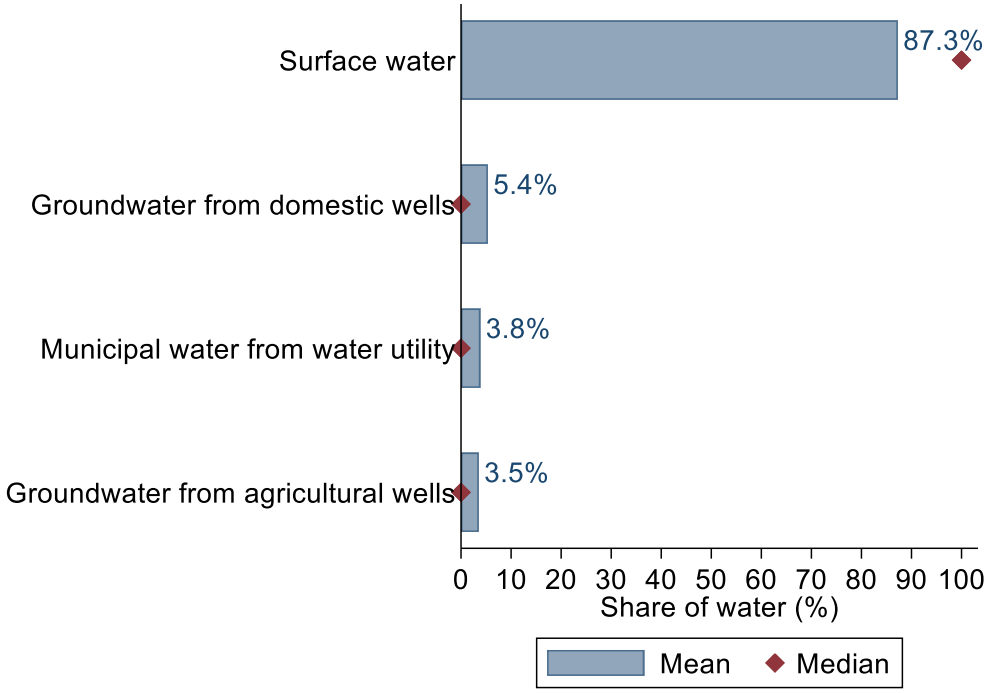
Figure 6: Types of agricultural activities on land operated for agriculture



Across all respondents, surface water was reported as the primary source of irrigation water, as shown in Figure 7. On average, surface water accounted for 87.3% of irrigation supplies. Groundwater from agricultural and domestic wells and municipal water each represented substantially smaller shares, accounting for 5.4%, 3.5% and 3.8%, respectively. Median values provide additional insight into respondents' reliance on different water sources (see Table A6 in Appendix A). The median share of surface water was 100%, indicating that at least half of respondents who reported their irrigation water sources relied exclusively on surface water. In contrast, median shares for groundwater and municipal water are zero, suggesting that at least half of respondents did not use these sources for their irrigation water needs. Refer to Table A6 in Appendix A for more details on how the respondents are distributed across water sources.

Photo by Jingjing Wang. A ditch within the MRGCD serving cropland on the left.

Figure 7: Share of total irrigation water from each water source



When the respondents are disaggregated by whether agriculture is the primary source of household income, surface water dominates for both groups. However, as Tables 4 shows, surface water is significantly more important for those for whom agriculture is the primary source of household income (94% of water used on average) than those for whom it is not (87% of water used on average). No significant difference exists for the use of groundwater from agricultural wells but farms for which agriculture is not the primary source of household income supplement surface water with domestic well and municipal sources significantly more (16% and 13.7% vs 1.7% and 1.2%).

Table 4: Tests of differences in mean shares of water from sources by whether farming is primary income source

Characteristic	Farming **is** primary income source		Farming **not** primary income source		
	Mean share (%)	SD	Mean share (%)	SD	Significance
Surface water	93.99	14.40	86.90	23.16	***
Groundwater from agricultural wells	3.08	11.42	3.48	12.75	
Groundwater from domestic wells	1.71	5.84	5.65	16.08	***
Municipal water from water utility	1.22	6.02	3.97	13.70	***

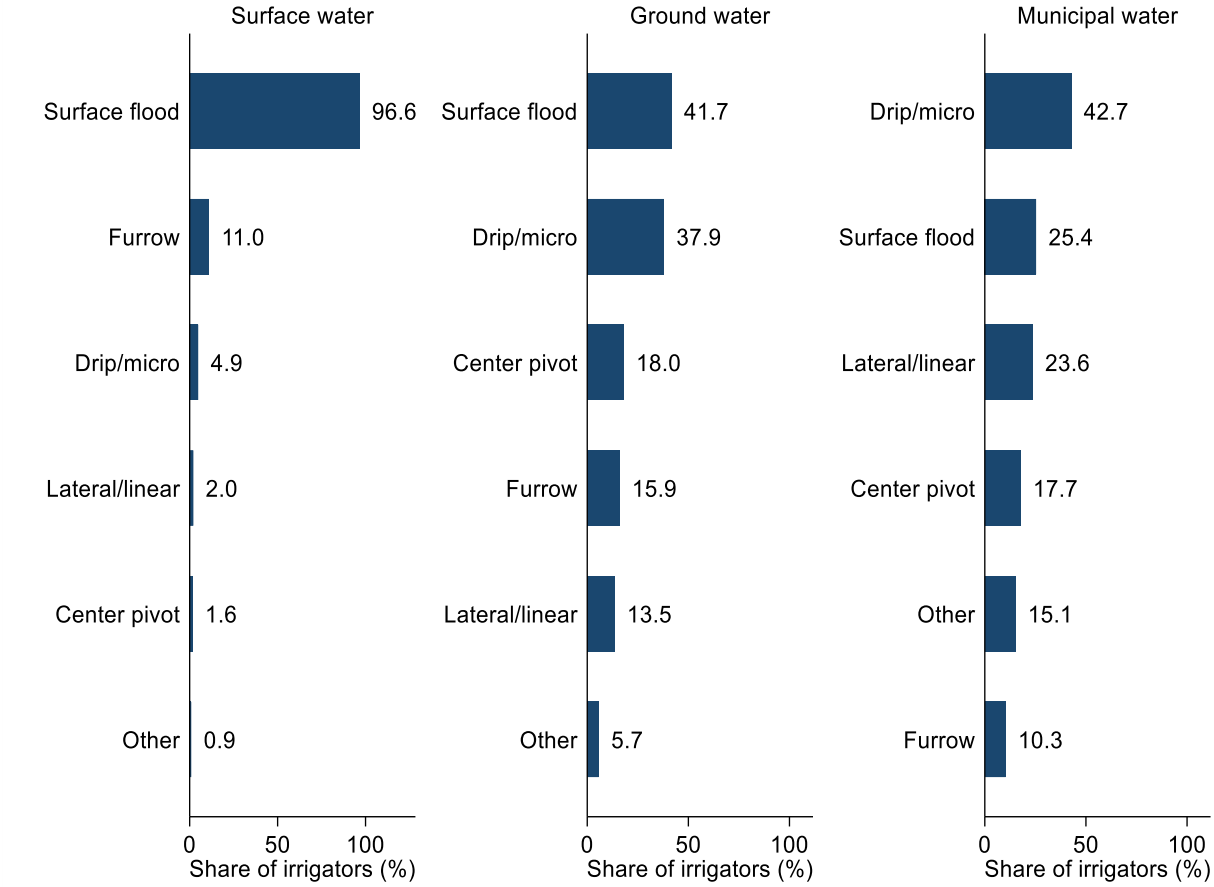
Notes: Table reports statistical tests comparing the average values of variables between respondents for whom farming is the primary household income source and those for whom it is not. Significance is based on Welch's two-sample t-tests.
****$p < 0.01$, **$p < 0.05$, *$p < 0.10$.*

Figure 8 presents existing irrigation methods by water source. Surface flood irrigation is the most common irrigation method in the MRGCD. About 97% of those respondents who use surface water reported using flood irrigation while the shares who reported the other methods are very small. About 42% of those respondents who use groundwater (from either agricultural or domestic wells) also reported using flood irrigation. Considering that at least half of respondents who reported their irrigation water sources relied exclusively on surface water (Figure 7), surface flood irrigation is dominant in the MRGCD.

Photo by Jingjing Wang. Drip irrigation of strawberries.

Drip/micro irrigation was the highest reported irrigation method among respondents who use municipal water (42%), followed by flood irrigation at 25%. Municipal-water use was frequently reported as supplementary, with respondents indicating reliance on multiple water sources. For example, among respondents who reported using flood irrigation with municipal water, only 3% reported municipal water as their sole water source, while 24% reported using both municipal and surface water, and 70% reported using a combination of municipal, surface and groundwater. Consequently, the reported irrigation methods should be interpreted as mixed-methods practices and not exclusive.

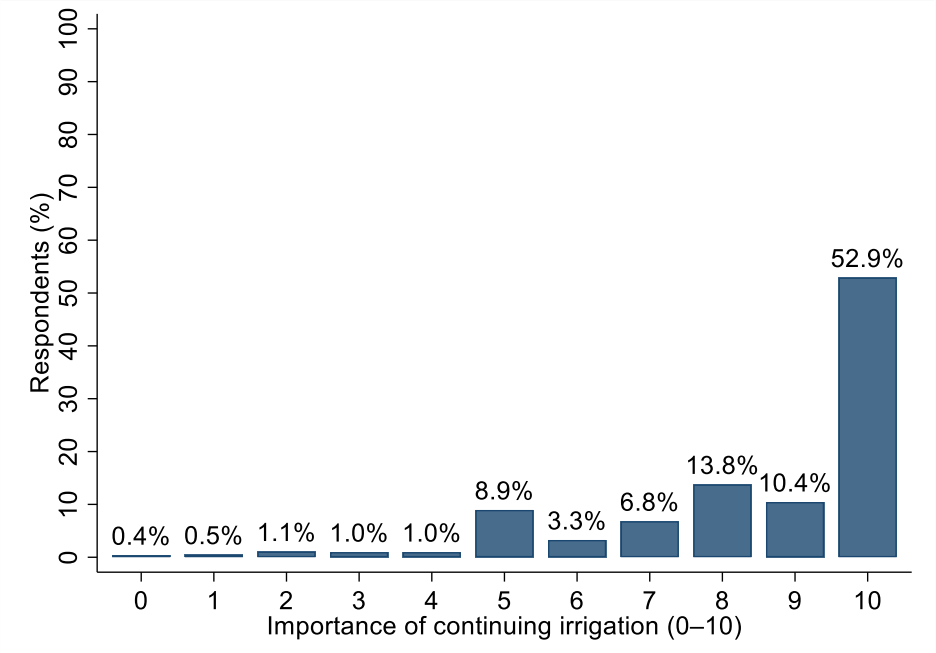
Figure 8: Irrigation methods by water source



Notes: Bars show the share of irrigators using each irrigation method within each water source. Respondents could select multiple irrigation methods, so percentages do not sum to 100%.

Respondents were also asked to indicate on a scale of 0-10 how important it is for them to continue growing crops and irrigating their fields given today's water challenges, with 0 being not important at all and 10 being extremely important. Generally, continuing irrigating is considered extremely important by most respondents, as Figure 9 shows. Only about 13% of the respondents chose a value below 6 (indicating that continuing irrigating is less important to them), whereas 53% rated it as extremely important.

Figure 9: Reported importance of continuing growing crops and irrigating fields



Note: Responses to the question: How important is it to continue growing crops and irrigating your fields, given today's water challenges?

The respondents mostly identified as White or Caucasian (46%) or Latino or Hispanic (35%). Nine percent described themselves as mixed race, with shares of those who identify as Native American, Asian, and Black/African American being very small, as shown in Table 5.

Table 5: Demographics: race and gender

Characteristic	Category	Share of respondents (%)
Race	White/Caucasian	45.5
	Latino/Hispanic	34.8
	Mixed race	8.9
	Prefer not to say	7.4
	Other	2.1
	Native American / Indigenous	0.6
	Asian	0.5
	Black/African American	0.2
Gender	Male	65.4
	Female	29.8
	Other/unspecified	4.7

Figure 10: Distribution of respondents by age

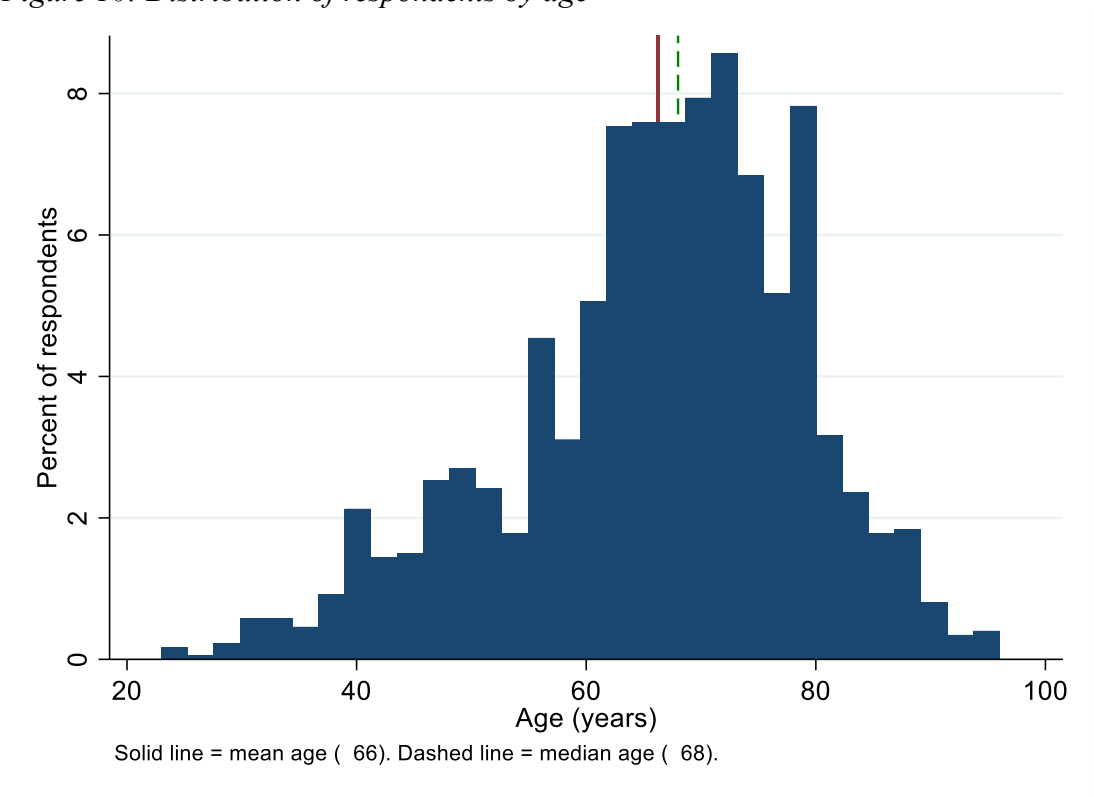
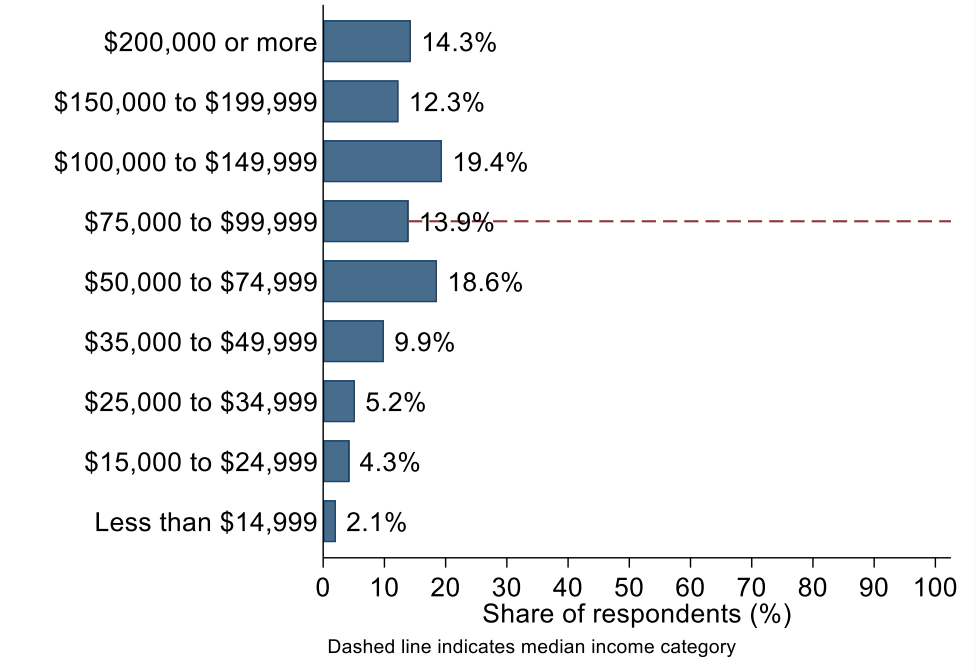


Figure 11: Distribution of respondents by total household income before taxes in 2025



The respondents were also older, with a reported average of 60 years old, and half of the respondents reported being over 68 years old (Figure 10). Broadly, respondents appear to be connected to above average income households. Half of the respondents reported household incomes of at least $100,000 (Figure 11).[4]

Section 4: Water Management and Delivery Issues

The survey asked respondents to indicate the degree to which various local issues disrupted their surface water delivery in the previous five years, on a scale of 1 (not a problem at all) to 5 (a very serious problem). Having insufficient surface water for desired operations, not knowing when might be their turn for water delivery, and inability to schedule deliveries for when water is needed were the issues commonly reported as moderate problems on average. As Table 6 shows, these two issues were ranked as at least serious by 46%, 41% and 41% of the respondents, respectively. Too little water to flood fields and feeling that others are receiving more than their water share were also identified as moderate problems on average, with 36% and 32% of the respondents reporting them as serious or very serious problems, respectively. MRGCD infrastructure problems were perceived as slight problems on average. Beyond the predefined list of local issues shown in Table 6, 31% of respondents indicated other issues were a very serious problem for them.

Table 6: Degree to which local issues have caused disruption to surface water delivery

Issue	Average degree (1-5)	% of respondents rating an issue as serious or very serious (≥4)
Not receiving enough surface water to maintain my desired operations	3.25	45.75
Not being able to know when it might be my turn for water delivery	3.07	41.35
Being unable to schedule my deliveries for when I need water	3.06	40.57
The amount of water delivered was too little to flood my fields	2.95	35.98
Feeling that others are receiving more than their share of water, leaving not enough for me	2.67	32.02
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	2.33	22.56

Notes: For the percentages, the denominator is the number of respondents who indicated an answer for a particular issue. For the average rating, 1 is not a problem at all, 5 is a very serious problem.

[4] For context, the median household income for the four counties involved were: Sandoval, $86,637: Bernalillo, $69,437; Valencia, $58,933; and Socorro, $36,570. See: U.S. Census Bureau QuickFacts, ACS 2020–2024 5-year estimates — Bernalillo | Sandoval | Valencia | Socorro. Thus, the two northern counties were above the state of NM median household income ($64,059), while the two southern counties were below. See: U.S. Census Bureau QuickFacts — New Mexico.

Insufficient surface water for desired operations was the highest rated local issue across counties and was considered as at least a serious disruption by most respondents. However, Table 7 shows that some differences exist across counties. For instance, too little water to flood fields was the second-highest rated issue causing surface water delivery disruptions in Sandoval and Socorro counties. MRGCD infrastructure problems were also rated highly in Sandoval County, with problems with the Corrales Siphon being commonly cited. In contrast, not knowing when their turn for water delivery might be received the highest mean rating and the highest share of respondents reporting it as at least a serious problem in Valencia County. Additionally, 50% of respondents in Bernalillo county and 49 % in Sandoval county indicated other issues are very serious problems as opposed to 29% of the respondents in Socorro County. In general, the ratings are lower in Socorro County.

Table 7: Degree to which local issues have caused disruption to surface water delivery by county

Panel A: Average degree rating (1-5)

Issue	Bernalillo	Sandoval	Socorro	Valencia
Not receiving enough surface water to maintain my desired operations	3.46	3.68	2.89	3.06
Not being able to know when it might be my turn for water delivery	3.27	2.98	2.56	3.10
Being unable to schedule my deliveries for when I need water	3.21	3.28	2.62	3.02
The amount of water delivered was too little to flood my fields	3.10	3.43	2.69	2.77
Feeling that others are receiving more than their share of water, leaving not enough for me	2.77	2.67	2.33	2.71
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	2.14	3.21	2.18	2.24

Panel B: percentage of respondents who rate a local issue as causing serious or very serious disruption

Issue	Bernalillo	Sandoval	Socorro	Valencia
Not receiving enough surface water to maintain my desired operations	51.83	62.35	34.29	39.28
Not being able to know when it might be my turn for water delivery	46.31	43.33	25.10	42.15
Being unable to schedule my deliveries for when I need water	46.21	50.63	26.72	37.62
The amount of water delivered was too little to flood my fields	39.64	53.23	28.40	29.87

Feeling that others are receiving more than their share of water, leaving not enough for me	32.65	31.00	23.46	34.72
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	16.49	47.74	16.33	20.93

Notes: For the average rating, 1 is not a problem at all while 5 is a very serious problem. For the percentages, the denominator is the number of respondents who indicated an answer for a particular issue.

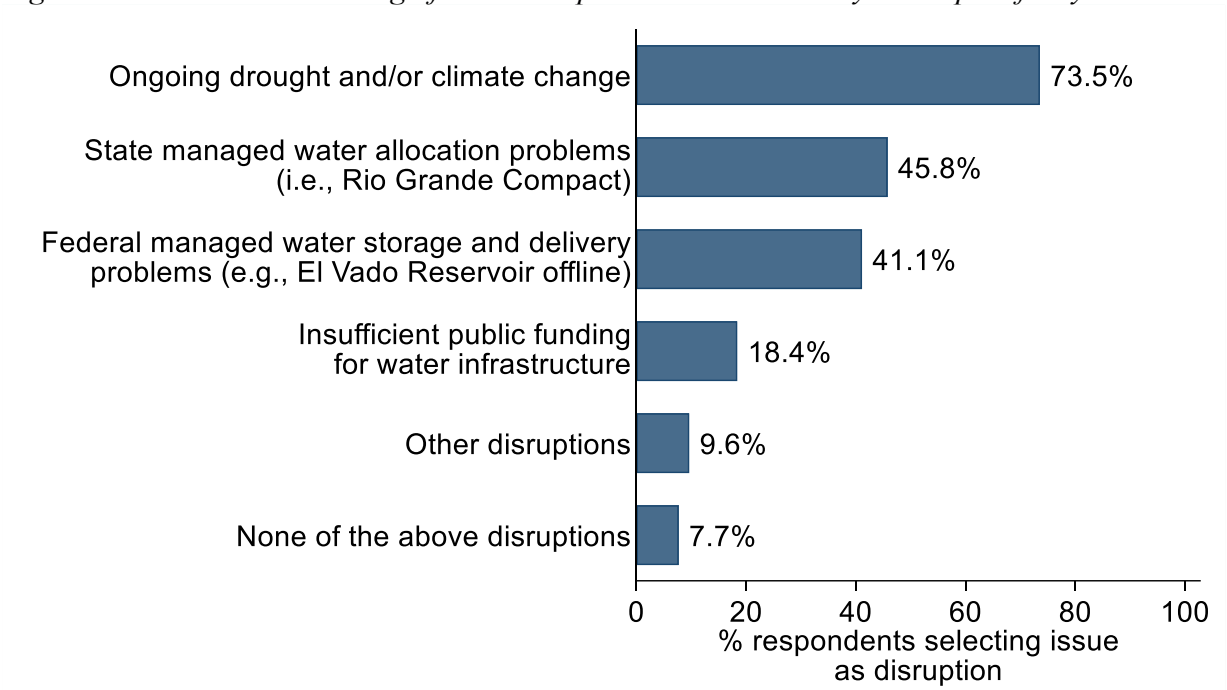
By size of operations, differences in thinking about disruptions are observed between micro and small-size operations versus medium and large operations. On average, medium and large operators reported insufficient surface water for desired operations as a serious or very serious problem, compared to moderate problems for the micro and small operations. The numerical values are generally higher for the medium and large operators on each issue. However, with the exception of too little water to flood fields, which was perceived as a serious problem by more than half of respondents operating large farms, the ordering of what is the highest to least degree of disruption is broadly similar across operation sizes. See Table A8 in Appendix A for more details on the distribution by farm operation size.

The ordering of the issues by highest to lowest degree water delivery of disruption is broadly similar whether agriculture is the primary source of household income or not though the issues were reportedly more disruptive for those primarily relying on agriculture for income. As table A9 in Appendix A shows, having insufficient surface water for desired operations and inability to schedule deliveries for when water is needed are major issues (with 3.7 and 3.5 average disruption degree ratings) as opposed to moderate ratings for those for whom agriculture was not their primary income source (3.2 and 3.0). Issues capturing insufficiency of water to flood fields and to maintain desired operations, inability to schedule, and uncertainty of water deliveries are rated as serious or very serious by over 50% of respondents with agriculture as primary income source, but at most 45% of those with non-agricultural primary sources of income rates as such in Table A9.

Respondents were also asked if any of listed issues led to significant disruption of their water delivery in the past 5 years. Most agricultural water users identified ongoing drought and/or climate change issues as the major issue that significantly disrupted their water delivery. As Figure 12 shows, 3 in 4 respondents to the question share that perception. State managed water allocation problems (i.e., the *Rio Grande Compact*) and federal managed water storage and

delivery problems (e.g., El Vado Reservoir offline)[5] are reported as causing significant disruptions by about 5 and 4 out of every 10 respondents, respectively.[6]

Figure 12: Issue has caused significant disruption to water delivery in the past five years



Notes: Percentages represent the share of respondents who answered the question and selected each issue as a disruption. Respondents could select multiple issues; therefore, percentages may sum to more than 100%.

There is less heterogeneity at the county level with how the issues, which are more regional in nature, were ranked. However, with about 7 of every 8 respondents with operations in Bernalillo County reporting drought as causing significant disruption, the perception of drought as causing disruptions seems to be relatively higher there than in the other counties where the highest proportion was 8 in 10 respondents in Sandoval County. State managed water allocation problems (i.e., the *Rio Grande Compact*) were largely reported as a significant disruption in Sandoval County (60% of the respondents with operations there) with a relatively lower rating

[5] The El Vado Dam was built in the 1930s on the Rio Chama in northern New Mexico by the MRGCD. Before it went out of service in 2022 because of leaks, the reservoir was used to store water from the Rio Grande during spring runoff and release it gradually during the summer months to support MRGCD irrigation deliveries (and river flows). The U.S. Bureau of Reclamation has been considering alternative approaches to repair the dam. It is unclear how many years it will take before the dam can be returned to service. An agreement has been reached among the Bureau of Reclamation, the Albuquerque Bernalillo County Water Utility Authority, and the MRGCD to allow the storage of up to 100,000 acre-feet of combined native Rio Grande Prior and Paramount water for the six Middle Rio Grande Pueblos, Rio Grande Compact debit water, and MRGCD usable irrigation water in Abiquiu Reservoir for up to 10 years. This arrangement allows the MRGCD to store water during the spring while the Bureau of Reclamation moves forward with improvements to El Vado Dam. For the current status of the El Vado Dam and Reservoir , see https://www.usbr.gov/uc/albuq/water/SanJuanChama/Reservoirs/elvado_indx.html.

[6] A separate qualitative analysis is being conducted to examine responses to the "Other (please specify)" items (Questions 5–8 and 12–13) as well as the open-ended questions (Questions 9, 16, and 25) in the survey questionnaire.

amongst respondents with operations in Socorro County at 44%. See Table A10 in Appendix A for a complete comparison.

By size of operations, less than half of respondents with micro operations (less than 5 acres) reported state managed water allocation problems and federal managed water storage and delivery problems as causing significant water delivery disruptions. This contrasts with medium (between 30 and 149.9 acres) and large (150 acres and over) property operator respondents of whom at least 56% indicated the two issues as significant disruptions. Small operation (between 5 and 29.9 acres) respondents are in between these two regarding their perceptions of disruption. See Table A11 in Appendix A for more details.

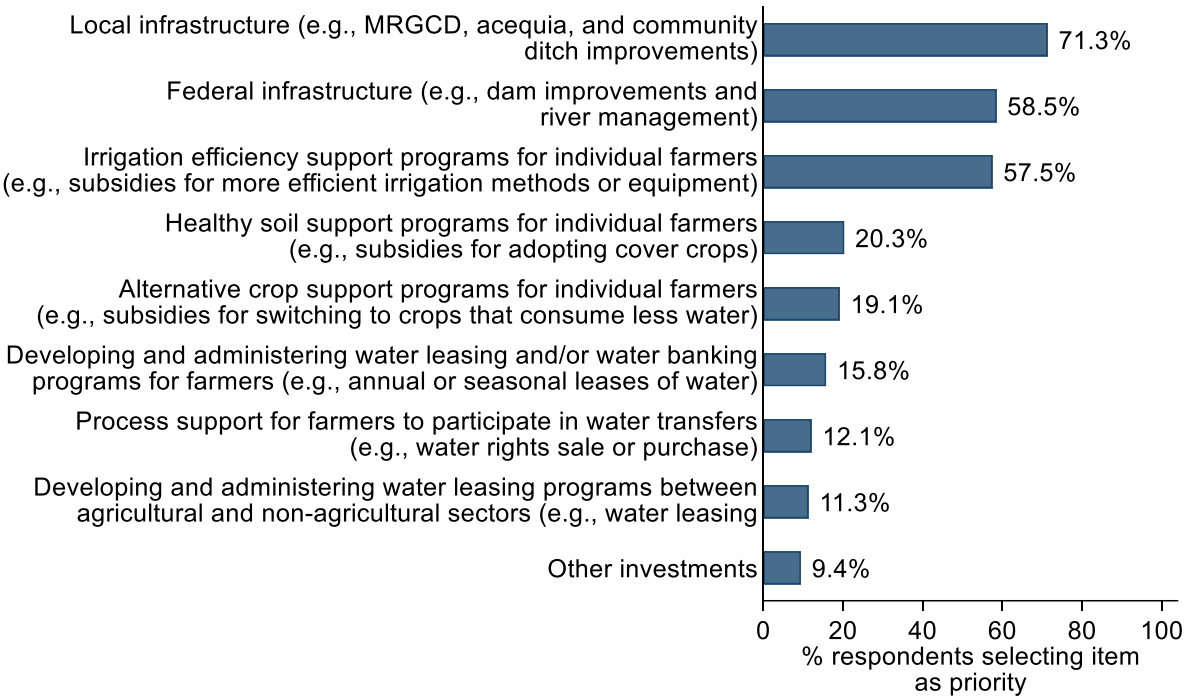
Differences also exist in respondents' perception on the issue that significantly disrupted water delivery by whether agriculture is the primary source of household income or not. Although drought was the leading reported cause of disruption by both groups, a larger proportion of respondents with primary income outside of agriculture (81%) reported drought than those for whom agriculture was the primary income (71%). Federal managed water storage and delivery as well as state managed water allocation problems were also reported as significant disruptions more among those who primarily rely on agricultural income (62% and 60% of respondents, respectively) compared to those who do not (44% and 49% of respondents, respectively). See Table A12 in Appendix A for more details.

Section 5: Priorities for Investments

Respondents were asked about what their top three priorities would be for spending investment dollars. Seventy-one percent of respondents reported that local infrastructure, such as MRGCD, acequia, and community ditch improvements, would be their top-most priority, as shown in Figure 13. Federal infrastructure (e.g., dam improvements and river management) and irrigation efficiency support programs for individual farmers (e.g., subsidies for more efficient irrigation methods or equipment) are the other priorities in the top three that were selected by 59% and 58% of the respondents, respectively. It is of interest to note that even though MRGCD infrastructure problems (e.g., clogged ditches, malfunctioning turnout, pumps not working) were perceived as the least disruptive local issue to water delivery among the list of local issues in all

but Sandoval County (as shown in Tables 6 and 7), the respondents generally agreed that prioritizing any available investment dollars for local infrastructure would be worthwhile.

Figure 13: Priorities for how investment dollars would be best spent



Notes: Percentages represent the share of respondents who answered the question and selected each item as one of their top priorities. Respondents could select top three priorities; therefore, percentages may sum to more than 100%.

Respondents could also specify other priorities for investments when they selected "other" as Figure 13 shows. Investments in irrigation and water infrastructure i.e. fixing water storage dams (e.g. El Vado), increasing storage and repairing diversion structures and funding reliable delivery structures was the most common priority theme. Respondents also indicated investments in keeping irrigated agriculture viable would be a priority. This includes help for producers to adapt to drought, preventing loss of farmland, and improved irrigation systems. Another prominent priority theme was investments in better governance, regulation and accountability. This includes strengthening institutional capacity of the MRGCD for monitoring "misuse" of water, ensuring accountability, and equitable allocation and use of water resources and of the NMOSE to adjudicate and enforce water rights. Respondents also frequently raised concerns about the Rio Grande Compact and interstate water allocations indicating desire for policies that better reflect current water conditions while supporting local agricultural water needs. They also indicated a need for education programs to support irrigation and farm management practices as well as

policy and incentive programs that expand management options e.g. measures to reduce competing urban water demand and water leasing programs.

Of note, the share of respondents who reported that local infrastructure is a priority for investment dollars was higher in Valencia and Sandoval Counties (at 74% and 75%, respectively), compared to 65% to 70% in the rest of the counties. Irrigation efficiency support programs for individual farmers, (unlike local infrastructure) are a priority in Socorro County, whereas federal infrastructure are priority among medium and large farm operations, and amongst respondents for whom agriculture is the primary source of income. Maybe less surprisingly, a lower share of respondents with large operations selected each of the listed priorities for investment dollars compared with those with micro to medium operations, suggesting that they may have made investments themselves in these issues relatively more than smaller operations or their priorities differed. See Tables A13 and A14 in Appendix A for more details on how investment priorities were ranked by county and size of operation, respectively, and Tables A15 for whether agriculture is a primary source of income.

Section 6: Conservation Program Case Study: Environmental Water Leasing Program

The survey also sought to understand agricultural water users' knowledge, perceptions, historical participation, and future willingness to participate in the Environmental Water Leasing Program (EWLP). Beginning in 2020, the program has offered landowners the opportunity to be compensated to lease water back to MRGCD, in return for fallowing. It works by incentivizing irrigators to voluntarily forgo their water use during an irrigation season and fallow, thereby leasing their water back to MRGCD. The purpose of the program is to reduce overall water demand, increase the flexibility of MRGCD's water resources, and help balance multiple water management objectives in the Middle Rio Grande Basin, such as irrigation delivery, New Mexico's Rio Grande Compact deliveries, and supporting endangered species. The incentive payments have varied over the years (2020 to 2025) ranging between $150–$400 per acre for partial-season contracts (typically May–August) and $275–$700 for full-season contracts (typically March–October). Both payment levels and eligibility requirements vary over the years.

As shown in Table 8, only a small proportion of the respondents, about 7%, reported ever participating in the EWLP.

Table 8: Previous participation in the Environmental Water Leasing Program

Participation	Number of respondents	Share of respondents (%)
Yes	131	6.8
No	1789	93.2

Looking at reported acres that have been enrolled into the program by those who indicated previous participation, it suggests that acreage enrollment into the EWLP generally increased

with payment levels both in the partial- and full-season contracts. Although little change is observed in reported number of participants over time (Column 3 of Table 9), the general substantial increase in acreage with increased payment suggests generous incentives were associated with larger acreage being enrolled. Nevertheless, this relationship does not hold uniformly across years. For example, both reported acreage and participant numbers increased under the 2025 full-season contract even though the payment rate was lower than in 2024. In contrast, the 2023 partial-season contract exhibited the opposite pattern, with enrollment declining despite a higher payment rate. This suggest that there may be other factors apart from payment that could also be influencing participation into the program.

Table 9: Reported acres enrolled in the Environmental Water Leasing Program

Panel A: Partial-Season Contracts

Year	Payment ($/acre)	Respondents who participated	Total acres reported	Range of acres reported (minimum – maximum)
2020	150	26	176.99	0.25–109.00
2021	175	20	139.49	0.25–77.00
2023	200	18	72.49	0.25–17.00
2024	400	17	379.60	0.25–236.25
2025	300	14	276.39	0.25–235.37

Panel B: Full-Season Contracts

Year	Payment ($/acre)	Respondents who participated	Total acres reported	Range of acres reported (minimum – maximum)
2021	275	30	123.49	0.25–30.00
2022	425	37	184.36	0.25–30.00
2023	320	36	145.33	0.25–30.50
2024	700	37	706.00	0.25–516.54
2025	600	43	1009.52	0.25–806.60

Notes: Except from the payment data, the table records self-reported survey responses, not necessarily the program's actual enrollment records.

Table 10 summarizes the primary crops fallowed by the respondents who reported participating in the EWLP in the past. Perennial hay was the most commonly reported crop type, representing 69% of full-season participants and 49% of partial-season participants. Other crops were the second most frequently reported category. Annual hay was reported less frequently, while row crops represented only a small share of participants. The results indicate that EWLP participation was concentrated among irrigators who grow perennial hay crops (alfalfa, etc.), particularly those enrolled in full-season contracts.

Table 10: Primary crops fallowed by participants in the Environmental Water Leasing Program

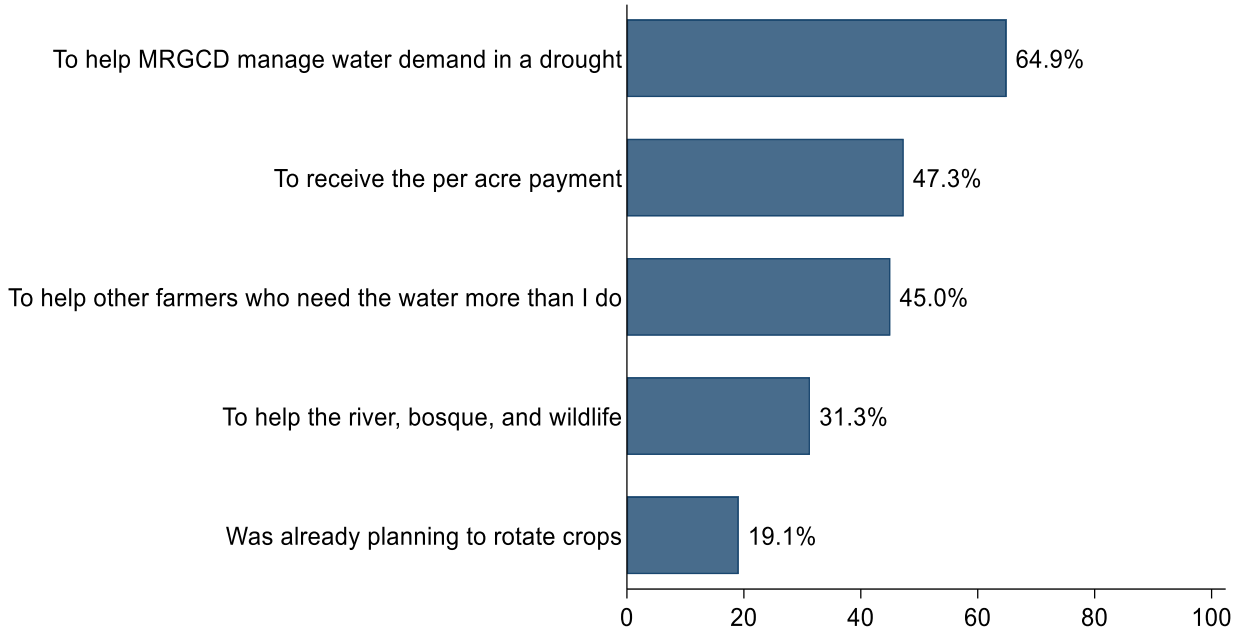
	Full Season		Partial	
	Number of respondents	Share of respondents (%)	Number of respondents	Share of respondents (%)
Perennial hay (alfalfa, etc.)	126	69	47	49
Annual hay (sorghum, etc.)	18	10	17	18
Row crops (veg., grains, etc.)	5	3	7	7
Other crops	42	23	28	29

Note: Percentages represent the share of reported full- and partial-season participation across all survey years in which a crop type was reported. Respondents could report multiple crop types for a participation episode; therefore, percentages may sum to more than 100%.

The most cited reason for participation, among the respondents with previous EWLP participation, was to help the MRGCD manage water demand in a drought. As Figure 14 shows, it was selected by 65% of these respondents. Further analysis indicates that this reason was cited alone by 10% and the rest in combination with other factors (see Table A16 in Appendix A).[7] Financial compensation was also an important factor, with 47% participating to receive the per-acre payment. Many respondents who had participated in EWLP identified broader agricultural community and environmental benefits as motivations, including helping other farmers who need water more (45%) and supporting the river, bosque, and wildlife (31%). Relatively few (19%) indicated that they were already planning to rotate crops. This pattern suggests that participation decisions were driven by multiple factors.

[7] The most common combination was motivation by helping MRGCD manage water demand during drought conditions, the per acre payment, environmental benefits, and helping other farmers (11%), with other common combinations such as motivation by helping MRGCD and payment (7%).

Figure 14: Reasons for participating in the Environmental Water Leasing Program



Notes: Percentages represent the share of respondents who had participated in the EWLP before and selected each reason. Respondents could select multiple reasons for participation; therefore, percentages may sum to more than 100%.

Across counties, helping MRGCD manage water demand during drought conditions was also highly cited, although motivation to receive payment was an equally highly cited reason for respondents with operations in Socorro County. These county-level results, presented in Table A17 in Appendix A, should be interpreted as only suggestive considering the small participation numbers in the program at the county level.

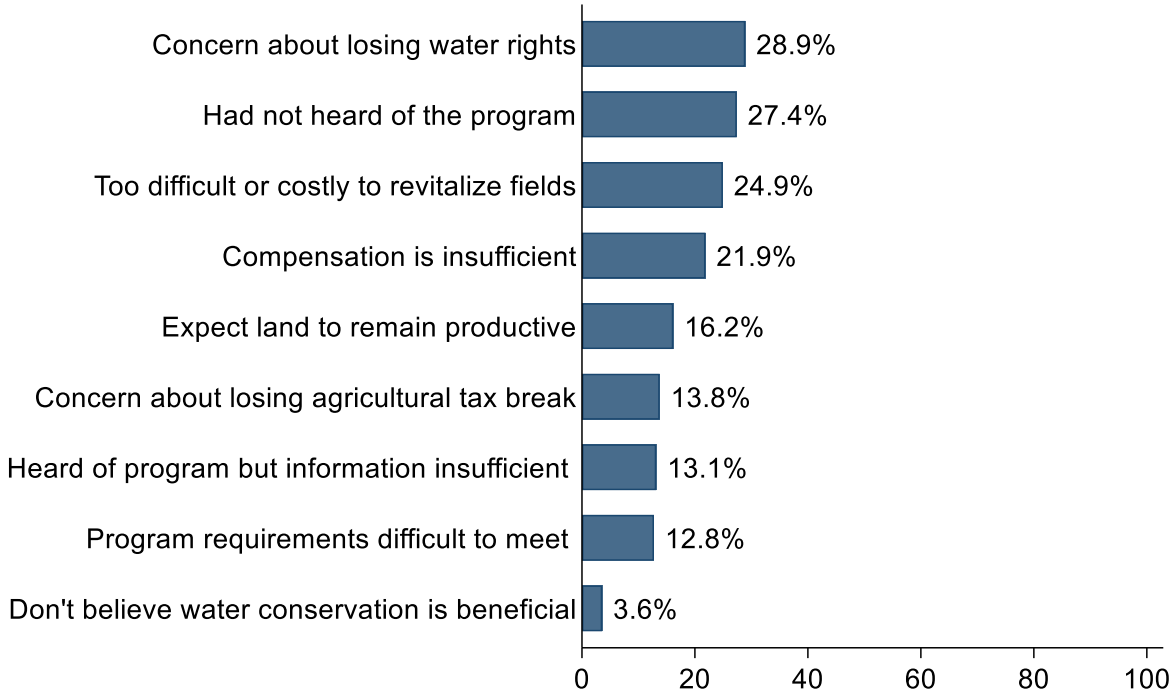
When considering responses by operation size, helping the MRGCD manage water demand during drought conditions was the most frequently cited reason by respondents operating micro and small farms, whereas those with large operations (often commercial farms) most frequently cited receipt of payment and helping other farmers who need water more as the reasons. Table A18 in Appendix A shows how the frequency of cited participation reasons varies by operation size.[8]

Less heterogeneity is observed in the reasons for participating in EWLP when respondents are disaggregated by whether agriculture is the primary source of income or not. A notable exception is that 35% of those for whom farming is not a primary source of income reported helping the river, bosque or wildlife as reason for participation as opposed to none (zero) for those for whom it is a primary income source. See Table A19 in Appendix A on a comparison of the reasons for participation by whether farming is the primary source of income or not.

[8] A separate quantitative analysis is being conducted to examine agricultural water users' future willingness to participate in the MRGCD's Environmental Water Leasing Program, using responses to Question 14 in the survey questionnaire.

Among respondents who had not participated in the EWLP program, the most cited reasons for choosing not to participate were concerns about losing their water rights (29%), unfamiliarity with the program (27%), the difficulty or cost of revitalizing fields after fallowing (25%), and insufficient compensation (22%), as shown in Figure 15. Concerns about potential impacts on water rights point to broader issues of policy alignment and their implications for regional water conservation efforts. The next three most cited reasons, including limited awareness of the program, challenges associated with returning fallowed land to production, and perceptions of inadequate compensation, suggest opportunities to improve program outreach, refine program design, and provide agricultural water users with better information to support planning decisions.

Figure 15: Reasons for not participating in Environmental Water Leasing Program



Notes: Percentages represent the share of respondents who had not participated and selected each reason for choosing not to participate. Respondents could select multiple reasons; therefore, percentages may sum to more than 100%.

The reasons indicated differ somewhat by county although losing water rights was a common concern. In Bernalillo, 37% of the respondents indicated that they had not heard about the program, and 16% indicated that the information they had heard was insufficient. Concern about losing water rights was the top cited reason in Sandoval and Valencia Counties (33% and 31% of respondents, respectively) whereas in Socorro, the difficulty and cost of revitalizing fields after fallowing was cited by the highest share of respondents (32%). They also cited expectations that land should be productive than in the other counties (25% compared to 11% to 20% in the other counties). Table A20 in Appendix A presents differences across counties in the frequency of reasons cited by respondents.

Across size of operations, concern about losing water rights was a reason for non-participation, and the share of respondents who selected it increased with size of operation, rising from 28% for those with micro-operations to 42% for those with large operations. As Table A21 in Appendix A shows, the difficulty and cost of revitalizing land after fallowing and the expectation that land would be productive were each selected by 38% of respondents with large operations, which exceed the percentages reported for the other operation size categories. In contrast, concerns that compensation was insufficient were reported more frequently by respondents operating medium, small, and micro farms (30%, 23% and 21% respectively) than those operating large farms (12%).

Differences are also noticed in how the reasons for not participating in the EWLP are ranked when respondents are disaggregated by whether farming is a primary source of household income or not. The top three reasons cited by those for whom income is the primary source of income were the difficulty and cost to revitalize fields after fallowing (36%), concern about losing water rights (34%), and compensation that was insufficient to justify participation (28%). On the other hand, respondents for whom farming was not the primary source of income cited concern about losing water rights (29%), had not heard of the program (28%), and the difficulty and cost to revitalize fields after fallowing (24%) ranked in the order. See Table A22 in Appendix A for more details on how the reasons for not participating compare by whether farming is a primary source of household income.

When asked what other support they would need to participate in the EWLP in addition to money, respondents identified a range of both financial and non-financial needs. The most frequently cited needs were financial in nature, including higher payment rates, assurances that participation would not jeopardize agricultural tax status, and assistance with re-establishing crops or pastures following a fallow period. Respondents also emphasized the need for assured protections against no-use claims to ensure that enrollment in the EWLP would not affect their water rights. In addition, some respondents expressed a need for clearer information regarding program rules and eligibility requirements. Others raised concerns about the potential impacts of EWLP on agricultural production and called for additional research on the benefits and drawbacks of fallowing land for extended periods. Finally, many respondents indicated that no additional support was needed because they did not intend to participate in the program, citing reasons such as lack of interest, existing long-term land leases or agricultural easements, or plans to leave farming. The quotations below provide representative examples of the support respondents indicated they would need to participate in the EWLP, as well as reasons for choosing not to participate:

Respondent 1: "It is always about the money. Pay high rates – have MRGCD programs buy direct – eliminate those brokers making money off sale. Make sale TAX FREE – at least no state income taxes."

Respondent 2: "My income tax depreciation is dependent on farming. This must be addressed"

Respondent 3: "Water rights protections against no-use claims. Grants to revitalize after fallow period. Price is too low to compete with crop sales."

Respondent 4: "…like I mentioned before, not interested in participating in the environmental water leasing program. I worked too hard to get my field to produce what I'm producing, then let it turn to weeds and dried dirt."

Section 7. Support for Water Markets and Water Rights Transfers

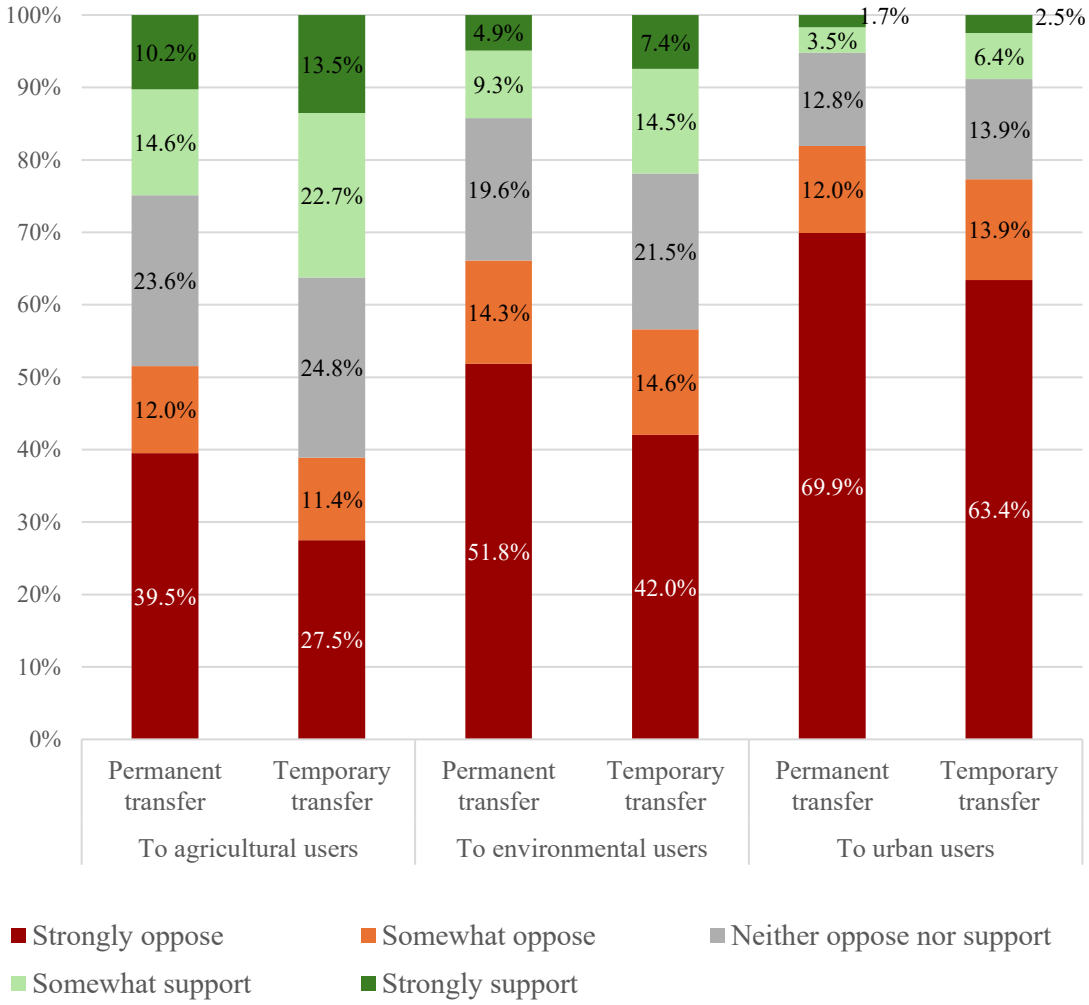
Respondents were generally opposed to most transfers of agricultural water rights to other sectors. Differences existed between transferring agricultural water rights within the MRGCD area and out of the MRGCD area, and between temporary (1–3 years) and permanent transfers. Respondent support was relatively higher for transfers within the MRGCD area and temporary transfers.

Transferring Agricultural Water Rights Within the MRGCD

Opinions on temporary transfers (1–3 years) of agricultural water rights to other agricultural users within the MRGCD area were mixed. As shown in Figure 15, 39.0% of respondents opposed such transfers (combining "strongly oppose" and "somewhat oppose" responses), while 36.2% expressed support them (combining "strongly support" and "somewhat support" responses). The remaining respondents were neutral.

Opposition was stronger for permanent transfers of agricultural water rights within the MRGCD area, with more than half of respondents opposing such transfers to either other agricultural users or environmental users. Specifically, about 21.9% of respondents expressed support for temporary transfers to environmental users, while 14.2% expressed support for permanent transfers. Transfers to environmental uses are generally non-consumptive uses and therefore are beneficial for *Rio Grande Compact* accounting and compliance. The greatest opposition was directed toward any transfer of agricultural water rights to urban users.

Figure 16: Levels of support for transferring agricultural water rights within the MRGCD

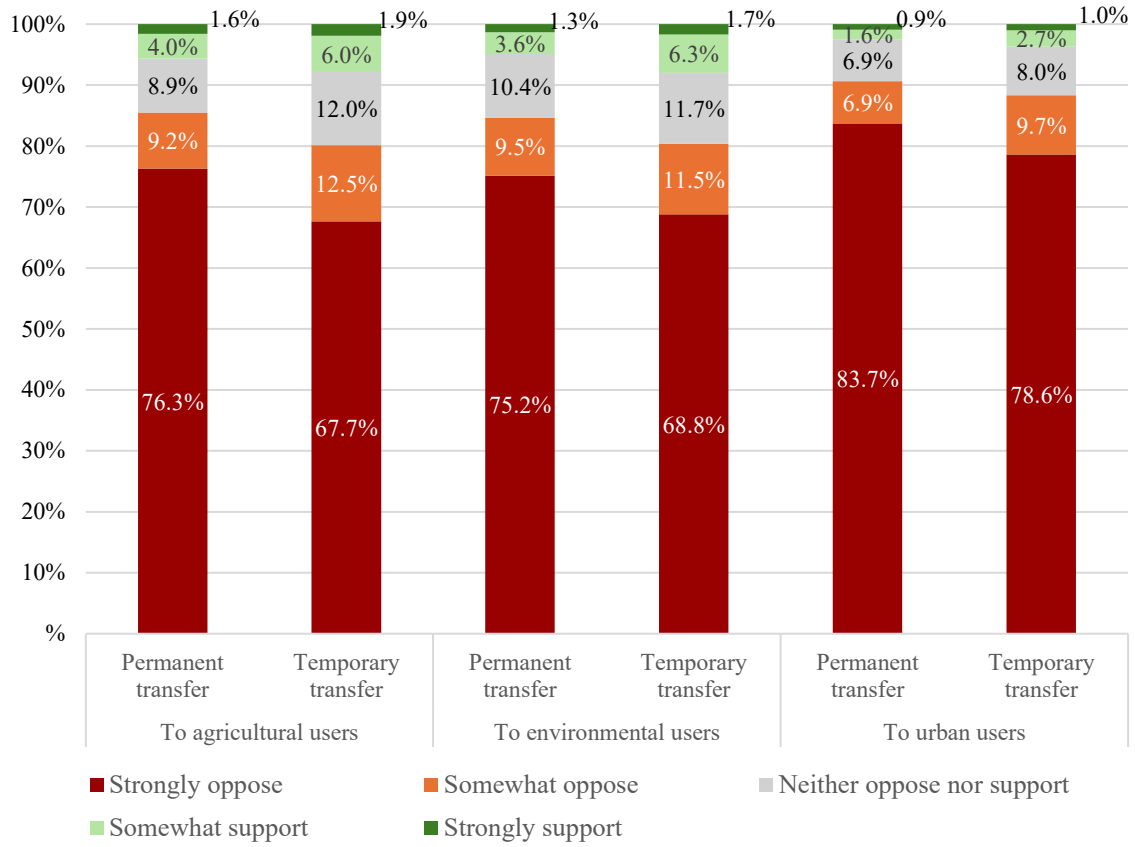


Note: Percentages calculated from respondents for each transfer option

Transferring Agricultural Water Rights Out of the MRGCD

Respondents expressed strong opposition to transferring agricultural water rights out of the MRGCD service area, regardless of the recipient. As shown in Figure 16, roughly three-quarters or more of respondents strongly opposed permanent transfers to agricultural, environmental, or urban users, with opposition highest for transfers to urban users. While views were less negative towards temporary transfers, support remained limited. Only about 8% of respondents expressed support for temporary transfers to other agricultural or environmental users, and fewer than 4% supported transfers to urban users. These findings indicate broad resistance to transferring agricultural water rights outside the MRGCD, even on a temporary basis.

Figure 17: Levels of support for transferring agricultural water rights out of the MRGCD

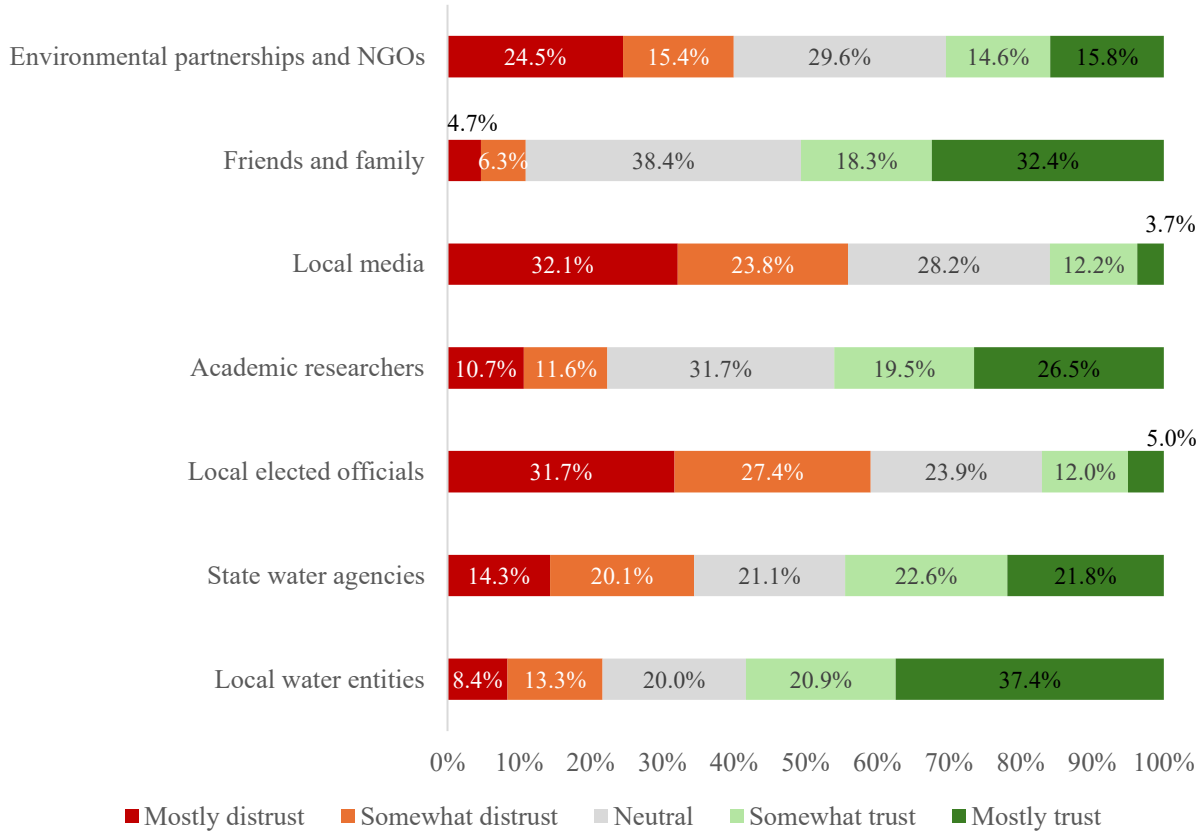


Notes: Percentages calculated from respondents for each transfer option

Section 8. Local Governance and Trust

Respondents were also asked how much they would trust different entities to provide them with information on water management in the MRGB. Trust is one of the important factors that affects how accepting people are of a policy (Wilson et al., 2025). As shown in Figure 17, local water entities, such as the MRGCD, were among the most trusted sources of information, with 58% of respondents indicating that they mostly or somewhat trust them. Friends and family were also viewed favorably, with 51% of respondents expressing at least some level of trust. State water agencies and academic researchers received more mixed evaluations, although trust exceeded distrust for both groups. Specifically, 44% of respondents reported trusting state water agencies while 46% reported trusting academic researchers. Environmental partnerships and non-governmental organizations (NGOs) elicited more divided opinions, with levels of trust and distrust that were more evenly balanced. The least trusted sources were local elected officials and local media. Majorities of respondents reported mostly or somewhat distrusting local elected officials (59%) and local media (56%). Responses to the question about trust definitely produced a mixed bag, but local water entities fared well in comparative terms.

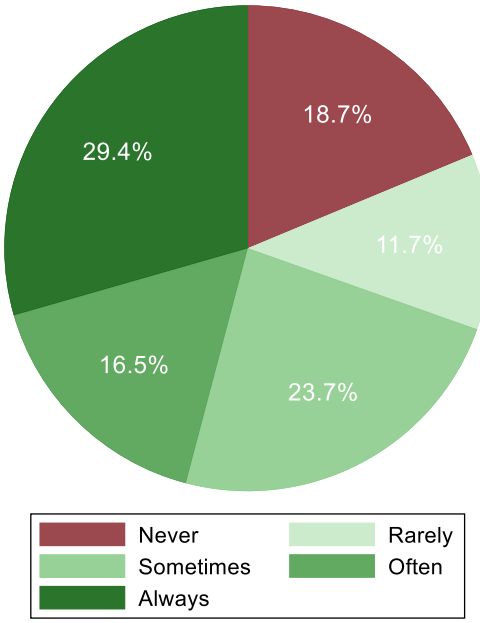
Figure 18: Levels of trust in different entities



Notes: Percentages calculated from number of respondents for each entity

To capture the level to which respondents participate in the election of MRGCD Board seats, the survey also asked respondents if they vote in MRGCD elections. Generally, respondents indicated that they vote (46% vote at least often), as shown in Figure 18.[9] It should be noted that people who take the time to respond to a survey also might be more likely to vote, so the results shown in Figure 18 might not be representative of the total population of MRGCD agricultural water users.

Figure 19: Reported voting participation in MRGCD elections



Section 9: The Way Forward

To understand how respondents consider the challenges facing the basin and their plan for irrigation methods or improvements, they were asked what other future irrigation methods or improvements they wished to adopt but had not, and what resources or support they would need to adopt them. Respondents most frequently indicated desiring improvements to irrigation

[9] The implication would be that irrigators have relatively strong MRGCD election participation. For empirical context, only a very small percentage of eligible MRGCD constituents typically vote in Board elections (e.g., less than a few percent). Most starkly, the certified MRGCD Board election results from October 2025 showed that for four open Board positions only 259 total votes were received: Position 3 Bernalillo County (74 votes); Position 4 Bernalillo County (74 votes); Position 6 Socorro County (67 votes); and Position 7 Sandoval County (43 votes). See: https://www.mrgcd.com/wp-content/uploads/2025/10/2025-MRGCD-Official-Election-Results_Certification.pdf. Recent prior elections have had total vote counts in the low thousands. Only listed property owners (thus, not restricted to irrigators) within MRGCD boundaries are eligible to vote in MRGCD Board elections. Recent estimates of the total count of eligible voters are greater than 64,000 (Wentworh, 2025), but this total would only apply to at-large seats. County-specific seats would only have respective shares. If both spouses are listed as owners of a property, then both are eligible to vote. The MRGCD elections page reports more than 100,000 properties that are served in the four counties, which would include flood control, drainage etc., in addition to irrigation-related services. See: https://www.mrgcd.com/wp-content/uploads/2025/10/2025-MRGCD-Official-Election-Results_Certification.pdf

infrastructure and water delivery systems. Commonly reported desires included improving ditches and canals, particularly lining with concrete or converting to underground piping, improving water control structures, as well as maintaining existing infrastructure that would enable reliable water deliveries. Many respondents described the current irrigation system as inefficient, leading to loss of water through seepages for example, which was emphasized by some. As examples, two of the respondents had this to say about the irrigation improvements they would like to make:

Respondent 1: "To improve my irrigation methods I would like to make improvements to my concrete ditch. And in another area a pipeline would improve irrigation. In seasons of drought and water shortages a well would help to irrigate my fields. The resources I would need to adopt, the help would come from USDA Grants through federal funding."

Respondent 2: "Pipeline from main canal instead of ditches. Approvals & finances. Had previously applied to AFCS for cost sharing. Didn't receive approval as surveyor didn't submit plan in time. I had no input & it wasn't a plan I agreed with. Drip irrigation - require knowledge & training how to set up."

Respondents also expressed interest in adopting more efficient irrigation technologies and expanding their sources of irrigation water. Frequently mentioned improvements included drip and micro-irrigation systems, and sprinkler systems. Exploring or expanding the use of groundwater wells was also frequently mentioned while others indicated interest in having water storage infrastructure such as storage pond or dam. These technologies were viewed as improving water efficiency while groundwater was seen as more reliable when surface water deliveries were unreliable. However, respondents often noted that financial constraints, technical requirements, and limited access to water supplies hindered adoption. Some respondents mentioned their desire for systems to harvest and store rainwater and reuse household wastewater to water their trees. A smaller but notable group of respondents indicated the desire for broader adaptation strategies such as switching to drought-tolerant or more profitable crops and adapting practices that improve soil conditions such as the use of mulch. In considering modifying land use, some even said they were considering converting their property from agricultural to residential. Representative examples of comments related to improvements that respondents wish to adopt are as follows:

Respondent 3: "Drip system with storage tanks for storing river water"

Respondent 4: "Techniques that use less water would help save water. Infrastructure (wells, drip irrigation etc. [sic]"

With respect to the kind of support that they would need, financial support for the desired improvements was the most cited. Requests for grants, subsidies, cost-share programs, equipment and or material assistance, and direct funding were common. In addition to financial support, respondents frequently emphasized the need for technical assistance, training, and access to information. Many expressed a desire for guidance on system design, irrigation management, seed selection, technology selection, and how to implement them. Below are

examples of comments related to the need for financial, training, and technical support that respondents made:

Respondent 5: "Resources & education/ support about installing drip-line irrigation and rebates or subsidies to fund…"

Respondent 6: "Looking at requesting to get educated on well development in hopes to deter ongoing issues with lack of water via (drought, maintenance, neglected acequias, private waterways) hoping state engineers office can offer help."

Respondent 7: "The country of Israel actually exports water to neighbors because they recognize 75 years ago this made them highly vulnerable. Large food irrigators like pecans need to convert to drip like almond farmers in California. There are many ways to make watering more efficient. Support these efforts by making infrastructure conversion money and education to farmers. The City of Albuquerque could recycle 90% of its water if they had the infrastructure and will to do it"

Respondents also highlighted the need for stronger institutional and water-management support. Common themes included clearer communication regarding water deliveries and program requirements, more reliable and predictable water allocations, improved maintenance of irrigation infrastructure, and more responsive administration. Below are examples of comments

Respondent 8: "Online irrigation network status webpage a) Show where water is currently flowing and what fields are being irrigated b) History of dates and time a field was irrigated c) What is the next scheduled date and time to irrigate a field? d) Support program to convert dirt ditches to concrete ditches"

Respondent 9: "Acequias that are cemented or underground piping would save water lost through absorption. ditching would save water lost through absorptive ditching. Education for rules and atiquette of community water use for new comers. Consideration of ground water absorption in landscaping rules (less cement and asphalt). Consideration of population size in farming community. Repair of siphon used for 60+ years should be considered over costly new systems"

Respondent 10: "Don't look at pointing fingers at the users, the MRGD has a very Laissez faire attitude model of management that no longer works and just punishes the users unjustly when water is tight. There is need to manage weeds and help minimize invasive plants along or near the ditches to help conserve water. Plus supplement with credits or money incentives when users use approved seeds to plant and grow crops that are recommended by the water authorities to help use less water. A more pro active approach is needed not just sitting back and "hoping" it will be a good water year. And MUCH better communication is also needed from them"

Section 10: Conclusions and Next Steps

The specter of diminishing water supply is a significant problem facing agricultural water users in the MRGCD. This survey finds that drought and reduced surface water deliveries have caused wide disruptions to irrigators' operations in the MRGCD. At the same time, it highlights some

problems that relate to institutional and operational issues in water management, including concerns about the reliability and timing of water delivery, infrastructure maintenance, communication with users, and water management. These suggest that the water scarcity issues are not only hydrologic but also related to coordination challenges in management, which should be included in strategies going forward.

The survey also points out some possible misalignment between state and county policies and some of the water management initiatives in the MRGCD. Respondents frequently cited concerns about losing water rights, losing the agricultural tax status of their land and its associated tax break, and the viability of agricultural land during and beyond participating in conservations programs like the Environmental Water Leasing Program. These concerns suggest that when perceived to not be aligned to other existing policies, particularly ones that have economic implications, conservation initiatives may face barriers. This calls for coordination across policies and the various agencies of government.

The study also finds that agricultural water users in the region reported adopting or considering changes aimed at improving their irrigation efficiency and increasing resilience. Apart from looking to adopt technologies such as sprinklers and drip systems, other potential considerations included adopting water storage, more use of groundwater wells, and other adaptation strategies. However, adaptation is hindered by financial, technical, institutional, and legal challenges. The study highlights the need to make training, information, and technical support accessible for agricultural water users who are eager to take it. Research organizations and universities, extension programs, and water management agencies can play an important role in helping agricultural water users adopt the changes that improve irrigation efficiency and increase resilience.

Several next steps will build on the findings of this study. First, a series of outreach and engagement activities will be conducted to share the survey results and discuss their implications for future agricultural water management. A key component of this effort will be a half-day stakeholder workshop in early fall of 2026, which is intended to bring together representatives from federal and state agencies, local water entities, conservation organizations, community organizations, and agricultural stakeholders. The workshop will focus on discussing survey findings, identifying opportunities to improve water management strategies, and developing priorities for future action. Additional outreach, including presentations to producer organizations and MRGCD farmers and irrigators meetings, will help ensure broader engagement with agricultural water users.

Second, two follow-up studies based on the survey results are underway. A qualitative analysis will examine responses provided in the survey's open-ended and "Other (please specify)" questions, while a quantitative analysis will evaluate agricultural water users' future willingness to participate in the MRGCD's Environmental Water Leasing Program. Together, these efforts will provide a deeper understanding of agricultural water users' perspectives and help inform future water management and outreach strategies in the basin.

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Appendices

Appendix A: Additional Findings

Table A1: Number of responses received for each question

Question	Number of responses
Q1. Land operated	1982
Q2. Farming is primary income source or not	1959
Q3. Irrigated acres by activity	1751
Q4. Water sources	1843
Q5. Water delivery issues	1931
Q6. Significant disruptions	1896
Q7. Investment priorities	1891
Q8. Irrigation methods and sources	2067
Q9. Future irrigation methods/improvements	810
Q10. Previous EWLP participation	1919
Q11. EWLP participation history	120
Q12. Reasons for participating in EWLP	131
Q13. Reasons for not participating in EWLP	1788
Q14 a. Future willingness: full season	1750
Q14 b. Future willingness: partial season	1692
Q16. Other support needed for EWLP participation	600
Q17. Importance of continuing irrigation	1867
Q18. Water-rights transfer attitudes	1829
Q19. Trust in information sources	1834
Q20. Voting frequency	1853
Q21. Race or ethnicity	1900
Q22. Gender	1890
Q23. Age	1738
Q24. Household income	1732
Q25. Additional comments	906

Table A2: Acres of land operated for agriculture for the last 5 years

Variable	N	Mean	SD	Median	Min	Max
Owned acres	1965	13.1	106.2	3.0	0.2	4302.0
Acres leased from others	266	15.9	45.2	1.0	0.0	350.0
Acres leased to others	233	13.2	66.1	0.0	0.0	920.0

Table A3: Tests of differences in means for land tenure by whether farming is primary income source

Characteristic	Farming **is** primary income source		Farming **not** primary income source		Significance
	Mean	SD	Mean	SD	
Owned acres	40.70	70.17	9.95	102.17	***
Acres leased from other landowners	18.36	57.89	1.06	9.10	***
Acres leased to other landowners	5.88	33.98	0.77	5.66	*

Notes: Table reports statistical tests comparing the average values of variables between respondents for whom farming is the primary household income source and those for whom it is not. Significance is based on Welch's two-sample t-tests.
$***p < 0.01$, $**p < 0.05$, $*p < 0.10$.

Table A4: Tests of differences in participation rates in land leasing and environmental water leasing program by whether farming is primary income source

Participation	Farming is primary income		Farming is not primary income		
	Number of respondents	Share of respondents %	Number of respondents	Share of respondents %	Significance
Leases land from others	28	22.40	115	6.35	***
Leases land to others	13	10.32	94	5.16	**
Ever participated in EWLP	20	15.75	97	5.29	***

Notes: Table reports statistical tests comparing participation rates between respondents for whom farming is the primary household income source and those for whom it is not. Significance is based on Pearson's chi-square tests of independence
$***p < 0.01$, $**p < 0.05$, $*p < 0.10$.

Table A5: Irrigated acreage by agricultural activity (acres)

	N	Mean	SD	Median	Min	Max
Alfalfa	730	13.34	36.81	4.00	0.00	440.00
Row crops	252	3.15	31.72	0.25	0.00	500.00
Orchard	493	1.57	18.01	0.50	0.00	400.00
Garden/ trees	660	0.76	0.92	0.50	0.00	14.00
Other	655	5.12	11.72	2.00	0.00	127.00

Table A6: Share of total irrigation water from water sources (% of total use)

Source	N	Mean	SD	Median	Min	Max
Surface water	1843	87.27	22.91	100.00	0.00	100.00
Groundwater from agricultural wells	1843	3.54	12.85	0.00	0.00	100.00
Groundwater from domestic wells	1843	5.35	15.57	0.00	0.00	100.00
Municipal water from water utility	1843	3.85	13.57	0.00	0.00	100.00

Table A7: Combinations of water sources among respondents who reported flood irrigating using municipal water

Water Source	Number of respondents	Percent
Flooding with municipal water only + surface water + groundwater	62	70
Flooding with municipal water only + surface water	21	24
Flooding with municipal water only + groundwater	3	3
Flooding with municipal water only	3	3

Notes: Table reports only respondents whose reported share of municipal water was greater than zero

Table A8: Degree to which local issues have caused disruption to surface water delivery by size of farm operations

Panel A: Average rating (1-5)

Issue	Micro	Small	Medium	Large
Not receiving enough surface water to maintain my desired operations	3.15	3.39	3.52	3.67
Not being able to know when it might be my turn for water delivery	3.01	3.15	3.20	3.34
Being unable to schedule my deliveries for when I need water	3.00	3.14	3.17	3.54
The amount of water delivered was too little to flood my fields	2.84	3.13	3.22	3.43
Feeling that others are receiving more than their share of water, leaving not enough for me	2.55	2.90	2.85	2.79
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	2.25	2.47	2.49	2.93

Panel B: % of respondents rating local issues as causing serious or very serious disruption to surface water delivery by size of operation

Issue	Micro	Small	Medium	Large
Not receiving enough surface water to maintain my desired operations	42	51	55	63
Not being able to know when it might be my turn for water delivery	40	43	47	52
Being unable to schedule my deliveries for when I need water	39	43	44	57
The amount of water delivered was too little to flood my fields	32	42	42	53
Feeling that others are receiving more than their share of water, leaving not enough for me	29	38	37	38
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	21	25	29	37

Table A9: Degree to which local issues have caused disruption to surface water delivery by whether agriculture is primary income

Panel A: Average rating (1-5)

Issue	Agriculture is primary income	Agriculture is not primary income
Not receiving enough surface water to maintain my desired operations	3.69	3.22
Being unable to schedule my deliveries for when I need water	3.46	3.03
Not being able to know when it might be my turn for water delivery	3.41	3.05
The amount of water delivered was too little to flood my fields	3.38	2.93
Feeling that others are receiving more than their share of water, leaving not enough for me	3.16	2.64
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	2.64	2.31
Other water delivery issues	3.07	3.08

Panel B: % of respondents rating local issues as causing serious or very serious disruption to surface water delivery by whether agriculture is primary income

Issue	Agriculture is primary income	Agriculture is not primary income
Not receiving enough surface water to maintain my desired operations	59.17	44.81
Being unable to schedule my deliveries for when I need water	55.74	39.56
Not being able to know when it might be my turn for water delivery	54.62	40.62
The amount of water delivered was too little to flood my fields	51.22	35.08
Feeling that others are receiving more than their share of water, leaving not enough for me	46.67	31.03
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)	31.36	21.92
Other water delivery issues	42.86	47.93

Table A10: % respondents reporting issue as causing significant water delivery disruptions by county

Issue	Bernalillo	Sandoval	Socorro	Valencia
Ongoing drought and/or climate change	87.58	80.16	74.90	76.70
State managed water allocation problems (i.e., Rio Grande Compact)	49.84	59.14	43.43	49.21
Federal managed water storage and delivery problems (e.g., El Vado Reservoir off	47.55	47.08	40.24	43.85
Insufficient public funding for water infrastructure	19.93	27.63	15.94	19.24
Other disruptions	10.62	16.34	7.17	9.55
None of the above disruptions	5.72	5.06	10.36	10.86

Table A11: % respondents reporting issue as causing significant water delivery disruptions by size of agricultural operation

Issue	Micro	Small	Medium	Large
Ongoing drought and/or climate change	77.91	84.02	85.71	77.78
State managed water allocation problems (i.e., Rio Grande Compact)	45.99	56.53	59.52	55.56
Federal managed water storage and delivery problems (e.g., El Vado Reservoir offline)	38.38	53.41	66.67	66.67
Insufficient public funding for water infrastructure	18.33	23.59	20.63	25.93
None of the above disruptions	10.56	3.90	5.56	11.11
Other disruptions	9.33	13.06	11.11	14.81

Table A11: % respondents reporting issue as causing significant water delivery disruptions by whether agriculture is primary income

Issue	Agriculture is primary income	Agriculture is not primary income
Ongoing drought and/or climate change	70.73	81.08
Federal managed water storage and delivery problems (e.g., El Vado Reservoir offline)	61.79	43.53
State managed water allocation problems (i.e., Rio Grande Compact)	60.16	49.11
Insufficient public funding for water infrastructure	20.33	19.90
None of the above disruptions	7.32	8.40
Other disruptions	17.07	10.01

Table A13: % respondents selecting priorities for investment dollars by county

Investment priority	Bernalillo	Sandoval	Socorro	Valencia
Local infrastructure (e.g., MRGCD, acequia, and community ditch improvements)	69.61	75.10	64.54	73.56
Federal infrastructure (e.g., dam improvements and river management)	59.31	60.70	52.99	59.03
Irrigation efficiency support programs for individual farmers (e.g., subsidies	55.56	57.59	64.94	56.68
Healthy soil support programs for individual farmers (e.g., subsidies for adopti	22.71	15.56	20.32	20.16
Alternative crop support programs for individual farmers (e.g., subsidies for sw	20.75	15.56	17.93	19.63
Developing and administering water leasing and/or water banking programs for far	12.25	13.62	25.10	16.23
Developing and administering water leasing programs between agricultural and non	12.09	11.67	13.94	9.69
Process support for farmers to participate in water transfers (e.g., water right	8.01	12.06	18.73	12.96
Other investment priority	9.64	10.12	7.97	9.55

Table A14: % respondents selecting priorities for investment dollars by size of farm operation

Investment priority	Micro	Small	Medium	Large
Local infrastructure (e.g., MRGCD, acequia, and community ditch improvements)	69.80	64.13	60.47	35.09
Irrigation efficiency support programs for individual farmers (e.g., subsidies for more efficient irrigation methods or equipment)	54.04	55.95	55.04	26.32
Federal infrastructure (e.g., dam improvements and river management)	53.26	56.69	68.99	36.84
Healthy soil support programs for individual farmers (e.g., subsidies for adopting cover crops)	20.34	18.59	13.95	5.26
Alternative crop support programs for individual farmers (e.g., subsidies for switching to crops that consume less water)	18.25	19.14	15.50	7.02
Developing and administering water leasing and/or water banking programs for farmers (e.g., annual or seasonal leases of water)	13.43	16.54	19.38	17.54
Developing and administering water leasing programs between agricultural and non-agricultural sectors (e.g., water leasing for environmental flows in the Rio Grande)	11.41	8.55	13.18	7.02
Process support for farmers to participate in water transfers (e.g., water right sale or purchase)	10.40	12.64	15.50	10.53
Other investment priority	7.30	11.90	11.63	1.75

Table A15: % respondents selecting priorities for investment dollars by whether agriculture is primary income

Investment priority	Farming is primary income	Farming not primary income
Federal infrastructure (e.g., dam improvements and river management)	62.99	55.02
Local infrastructure (e.g., MRGCD, acequia, and community ditch improvements)	59.06	68.18
Irrigation efficiency support programs for individual farmers (e.g., subsidies for more efficient irrigation methods or equipment)	59.06	54.09
Developing and administering water leasing and/or water banking programs for farmers (e.g., annual or seasonal leases of water)	17.32	14.57
Alternative crop support programs for individual farmers (e.g., subsidies for switching to crops that consume less water)	16.54	17.96
Process support for farmers to participate in water transfers (e.g., water right sale or purchase)	14.96	10.97
Healthy soil support programs for individual farmers (e.g., subsidies for adopting cover crops)	11.02	19.71
Developing and administering water leasing programs between agricultural and non-agricultural sectors (e.g., water leasing for environmental flows in the Rio Grande)	10.24	10.75
Other investment priority	13.39	8.62

Table A16: How the reasons for participating in Environmental water leasing program were combined

Reason	Number of observations	Percent respondents
No reason selected	16	12
Compensation + Water management + Environmental benefit + Other farm benefit	14	11
Water management	13	10
Compensation	11	8
Water management + Environmental benefit + To benefit other farmers	10	8
Compensation + Water management + To benefit other farmers	9	7
Compensation + Water management	9	7
Water management + To benefit other farmers	8	6
Crop rotation	8	6
Water management + Environmental benefit	6	5
Other farm benefit	5	4
Compensation + Water management + Environmental benefit	4	3
Compensation + Crop rotation	3	2
Compensation + Water management + Environmental benefit + Other farm benefit + Crop rotation	3	2
Compensation + To benefit other farmers	2	2
Compensation + To benefit other farmers + Crop rotation	2	2
Compensation + Water management + Crop rotation	2	2
Water management + Crop rotation	2	2
Water management + Environmental benefit + Other farm benefit + Crop rotation	1	1
Other farm benefit + Crop rotation	1	1
Water management + To benefit other farmers + Crop rotation	1	1
Environmental benefit	1	1

Table A17: Reasons for participating in Environmental water leasing program by County (percent of prior participants)

Reason	Bernalillo	Sandoval	Socorro	Valencia
To help MRGCD manage water demand in a drought	60.00	100.00	58.33	58.62
To help other farmers who need the water more than I do	36.00	66.67	47.22	37.93
To receive the per acre payment	36.00	50.00	58.33	39.66
To help the river, bosque, and wildlife	28.00	33.33	27.78	31.03
Was already planning to rotate crops	20.00	0.00	22.22	17.24

Notes: % calculated as the share of respondents who select a reason in a county from all respondents with prior participation in that county

Table A18: Reasons for participating in Environmental water leasing program by size of operations (percent of prior participants)

Reason	Micro	Small	Medium	Large
To help MRGCD manage water demand in a drought	72	62	44	50
To help other farmers who need the water more than I do	55	44	19	75
To receive the per acre payment	49	46	30	75
To help the river, bosque, and wildlife	32	34	19	0
Was already planning to rotate crops	6	22	33	0

Notes: % calculated as the share of respondents who select a reason in a size category from all respondents who report prior participation in that category

Table A1129: Reasons for participating in Environmental water leasing program by whether agriculture is primary source of income (percent of prior participants)

Reason	Farming is primary income	Farming not primary income
To help MRGCD manage water demand in a drought	45.45	66.04
To receive the per acre payment	36.36	46.23
To help other farmers who need the water more than I do	18.18	47.17
Was already planning to rotate crops	9.09	18.87
To help the river, bosque, and wildlife	0.00	35.85

Notes: % calculated as the share of respondents who select a reason by whether agriculture is the primary source of income who report prior participation in that category

Table A20: Reasons for not participating in Environmental water leasing program by County (percent of prior nonparticipants)

Reason	Bernalillo	Sandoval	Socorro	Valencia
Had not heard of the program	36.68	23.67	23.39	21.91
Concerned about losing my water rights	26.63	33.06	22.94	31.35
Compensation insufficient to justify participation	19.26	26.53	17.43	23.86
Too difficult or costly to revitalize fields after fallowing	18.76	24.49	31.19	28.43
Heard of the program but lacks sufficient information	16.42	11.43	8.72	12.48
Program requirements difficult to meet or incompatible with operations	13.40	16.33	14.22	10.54
Concerned about losing agricultural tax break	13.07	17.14	5.96	15.40
Expect land to remain productive and do not believe fallowing is appropriate	10.55	11.43	25.23	19.83
Do not believe water conservation provides clear benefits	2.85	4.08	4.13	3.88

Notes: % calculated as the share of respondents who select a reason in a county from all respondents with no prior participation in that county

Table A21: Reasons for not participating in Environmental water leasing program by size of operations (percent of prior nonparticipants)

Reason	Micro	Small	Medium	Large
Had not heard of the program	30	23	16	19
Concerned about losing my water rights	28	30	31	42
Compensation insufficient to justify participation	21	23	30	12
Too difficult or costly to revitalize fields after fallowing	21	34	28	38
Heard of the program but lacks sufficient information	14	12	6	12
Concerned about losing agricultural tax break	14	15	8	15
Expect land to remain productive and do not believe fallowing is appropriate	12	23	27	38
Program requirements difficult to meet or incompatible with operations	12	12	22	12
Do not believe water conservation provides clear benefits	2	5	10	12

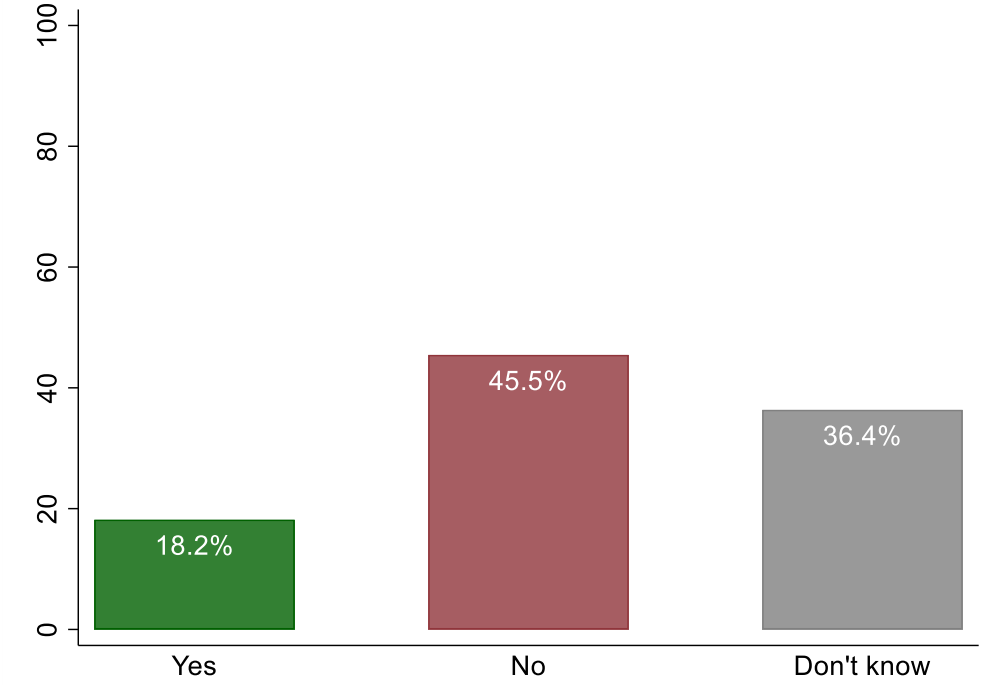
Notes: % calculated as the share of respondents who select a reason in a size category from all respondents who report no prior participation in that category

Table A22: Reasons for not participating in Environmental water leasing program by whether agriculture is primary source of income (percent of prior nonparticipants)

Reason	Farming is primary income	Farming not primary income
Too difficult or costly to revitalize fields after fallowing	36.27	24.39
Concern about losing my water rights	34.31	28.93
Compensation is insufficient to justify participation	28.43	21.67
Expect land to remain productive and do not believe fallowing is appropriate	27.45	15.44
Had not heard of the program	17.65	28.09
Program requirements difficult to meet or incompatible with operations	16.67	12.65
Concern about losing agricultural tax break	9.80	14.23
Heard of program but information insufficient	8.82	13.38
Do not believe water conservation provides clear benefits	1.96	3.75

Notes: % calculated as the share of respondents who select a reason by whether agriculture is the primary source of income who report no prior participation in that category

Figure A1: Plans to return land to production for inactive irrigators



Notes: The percentages are calculated for respondents who had not irrigated their operated land in the previous 5 years

Figure A2: Types of agricultural activities on land operated for agriculture for those with agriculture as primary income

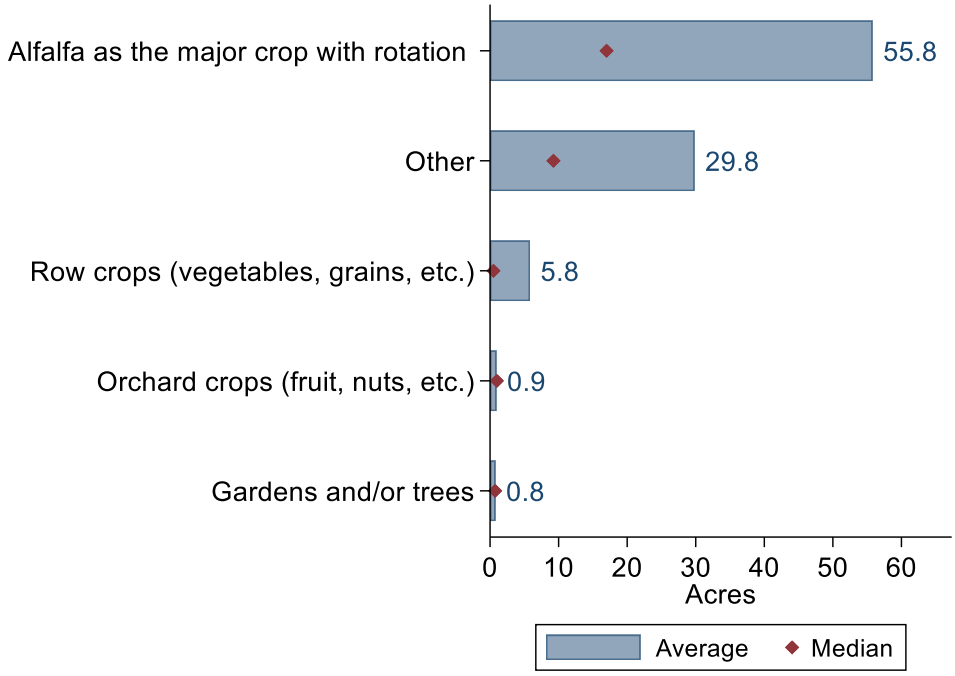
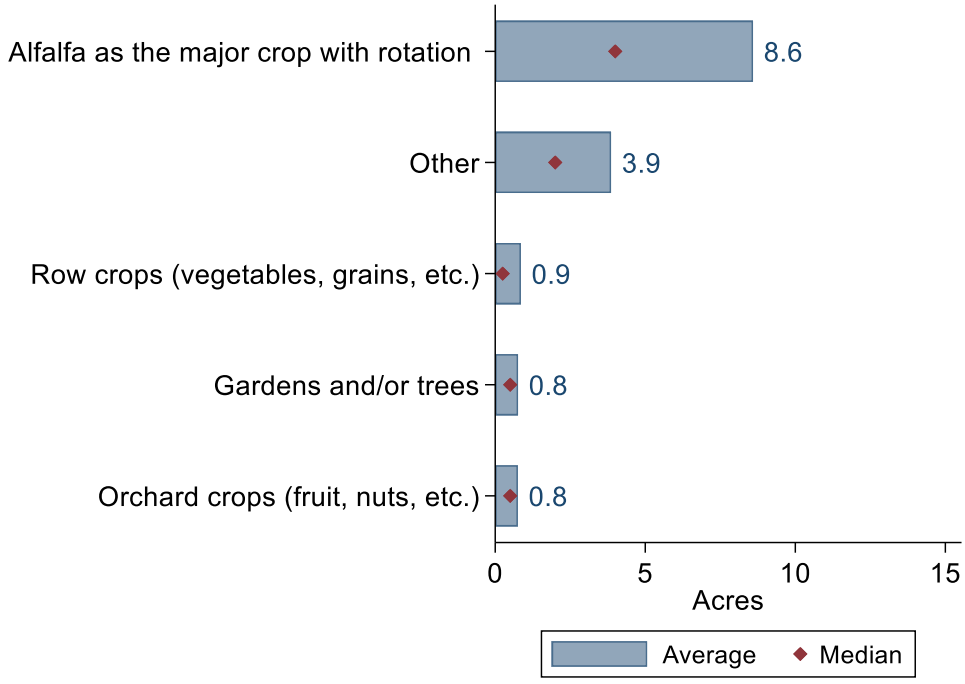


Figure A3: Types of agricultural activities on land operated for agriculture for those with agriculture as primary income



Appendix B: Research Approach

The study protocol received approval from the University of New Mexico Institutional Review Board. The survey questionnaire was developed through an iterative process involving stakeholder input, focus groups, and one-on-one interviews with agricultural water users.

Survey development

Survey development started by adapting questions from a survey of agricultural water users in the Colorado River Basin employed by Bennet et al. (2023) and from a survey of water utility customers in Albuquerque on water scarcity and potable reuse by Distler & Scruggs (2020). Then we worked with a team of experts in water management, including experts from the MRGCD, the Thornburg Foundation, the New Mexico Office of the State Engineer Interstate Stream Commission, and the World Wildlife Fund, to streamline the issues relevant for the MRGB. The draft was then reviewed by an advisory board composed of experts across the agricultural water use landscape, by focus (e.g., water law, hydrology, farming) and by geography. It was after these iterations that a draft used for the focus groups was developed.

Focus groups

Two focus group discussions with a total of 24 agricultural water users were conducted in the MRGCD. The first focus group was with 17 agricultural water users at Raymond G Sanchez Community Center in Albuquerque on October 10, 2025, and the second one was with 7 agricultural water users at New Mexico Tech University campus in Socorro on October 29, 2025. The focus groups lasted about 2 hours each and were facilitated by Dr. Caroline Scruggs and Dr Jingjing Wang. During each focus group, the facilitation team presented a draft survey questionnaire to guide the conversation and asked participants for feedback on whether questions were clear and captured issues relevant to the region. The conversations were purposely not recorded to allow participants to give feedback freely, but notes were taken to help aid revisions to the survey questionnaire.

Interviews

Semi-structured interviews were conducted with four agricultural water users within the MRGCD between November 3 and November 8, 2025. The interviews were to help gauge anticipated survey completion time and the issues that might come up as a respondent completes the survey. The interviews lasted between 20 minutes and 2 hours.

Pretest

Before rolling out the main survey, a pretest involving 46 participants was conducted. The pretest involved sending the survey to the pretest participants using the planned survey administration procedures. This was a test run of the survey implementation plan and to understand any challenges that could come up with either the questionnaire or the process.

For the pretest survey process, five contacts were made: (i) a survey pre-notice advance letter signed by a representative of the MRGCD, mailed out on November 12, 2025; (ii) the first survey packet, mailed out on November 21, 2025; (iii) a post-card reminder, mailed out on

December 2, 2025; (iv) a second survey packet, mailed out on December 22, 2025; and (v) a third survey packet, mailed out on February 2, 2026. The survey process was developed in accordance with the best practices established in the survey research literature. A $2 bill was included with the first survey packet as an incentive to encourage responses as has been shown to be effective in the literature. Participants could complete the questionnaire online via Qualtrics by scanning a QR code included in the survey packet or by returning a hard copy using a postage paid envelope. Implementation timelines were constrained by the operating schedule and reservation requirements of the UNM Department of Mailing, Shipping and Receiving.

Survey

For the mail survey process, four contacts were made: (i) a survey pre-notice advance letter signed by a representative of the MRGCD, mailed out on December 23, 2025; (ii) the first survey packet, mailed out on January 12, 2026; (iii) a post-card reminder, mailed out on February 4, 2026; and (iv) a second survey packet, mailed out on February 16, 2026. A $2 bill was included with the first survey packet. Participants could complete the questionnaire online via Qualtrics by scanning a QR code included in the survey packet or by returning a hard copy using a postage paid envelope. Implementation timelines were constrained by the operating schedule and reservation requirements of the UNM Department of Mailing, Shipping and Receiving. As a result, the third survey packet used in the pretest was not included in the final survey administration because of mailing and delivery limitations.

Appendix C: Survey Questionnaire

Middle Rio Grande Conservancy District
Agricultural Water Users Survey

Informed Consent

Dr. Jingjing Wang, from the University of New Mexico (UNM) Department of Economics, is conducting a research project. The purpose of the research is to survey agricultural water users in the Middle Rio Grande Conservancy District (MRGCD) to understand their preferences for alternative water conservation programs. You are being asked to participate because you are an MRGCD constituent and an agricultural water user.

Your participation will involve completing the survey. The survey should take about 15-20 minutes to complete. Participation is voluntary, and you may stop at any time. If you choose not to return the completed survey, your responses will not be included in the research. You will not receive payment for participation; however, a $2 cash token of appreciation is provided to thank you for your time.

There are no known risks in this research, but some individuals may experience discomfort or loss of privacy when answering questions. Your survey responses will be collected confidentially. No identifying information will be linked to your responses, and results will only be reported in aggregate. Only the UNM research team will have access to the survey data.

All identifiable information (e.g., your address) will be removed from the information collected in this project. After we remove all identifiers, the information may be used for future research or shared with other researchers without your additional informed consent.

The findings of this project are intended to help MRGCD and New Mexico water managers improve MRGCD constituent experiences and develop future water policy that considers agricultural water users' perspectives and experiences.

If you have any questions, concerns, or complaints about the research, please feel free to call Dr. Jingjing Wang at (505) 456-0638. If you have questions regarding your rights as a research participant, or about what you should do in case of any harm to you, or if you want to obtain information or offer input, please contact the UNM Office of the Institutional Review Board (OIRB) at (505) 277-2644 or irb.unm.edu.

Are you 18 years of age or older? (Please check what applies to you.)

☐ Yes ….. **Please continue with the survey**

☐ No …… **Thank you. If there is an adult (18+) in your household, please have them complete the survey. If not, please return the survey in the enclosed postage-paid envelope**.

Has any of the land you own or manage been irrigated (using surface water or groundwater) for agricultural purposes (e.g., crop farming, ranching, gardening, etc.) in the past 5 years? (Please check the box that applies to you and follow the instructions shown.)

☐ Yes ….. **Please continue to Question 1 (next page)**

☐ No …… **Please answer the two questions below (a and b), then stop and return the survey in the enclosed postage-paid envelope.**

a. If you answered no, why have you not irrigated in the past 5 years?

b. Do you plan to put your land back into production in the next 5 years?

☐ Yes

☐ No

☐ I don't know

1. Over the past 5 years (on average), of the total acres of land you operate for agriculture, please fill in the number of acres for each category below:
   I own _____ acres,
   I lease _____ acres *from* other landowners, and
   I lease _____ acres *to* others.

2. Is farming (or other agricultural activity) the primary income source for your household?
   ☐ Yes
   ☐ No

3. For the past 5 years (on average), what types of agricultural activities do you have on the land you operate for agriculture? Please approximate the number of irrigated acres for each activity. (Please fill in all boxes that apply and leave blank the boxes that do not apply.)

Agricultural activity	**My average number of irrigated acres**
Alfalfa as the major crop with rotation crops	
Row crops (vegetables, grains, etc.)	
Orchard crops (fruit, nuts, etc.)	
Gardens and/or trees	
Other (please specify):	

4. For the past 5 years (on average), approximately what share of your total irrigation water comes from each source below? (Please fill in all boxes that apply and leave blank the boxes that do not apply.)

Source of water	**Share of your total irrigation water from this source (%)**
MRGCD (surface water)	
Groundwater from agricultural wells	
Groundwater from domestic wells	
Municipal water from your water utility	

5. For the past 5 years (on average), to what degree have the following local issues caused disruption to your *surface water* delivery? (Please check the appropriate answer for each.)

Water delivery issue	**Not a problem at all**	**Slight problem**	**Moderate problem**	**Serious problem**	**Very serious problem**
The amount of water delivered was too little to flood my fields					
Not receiving enough surface water to maintain my desired operations					
Being unable to schedule my deliveries for when I need water					
Not being able to know when it might be my turn for water delivery					
Feeling that others are receiving more than their share of water, leaving not enough for me					
MRGCD infrastructure problems (e.g. clogged ditches, malfunctioning turnout, pumps not working)					
Other (please specify):					

6. Aside from the local issues listed in the previous table (Question 5), have any of the following led to *significant* disruption of your water delivery in the past 5 years? (Please select all that apply.)

☐ State managed water allocation problems (i.e., Rio Grande Compact)

☐ Federal managed water storage and delivery problems (e.g., El Vado Reservoir offline)

☐ Ongoing drought and/or climate change

☐ Insufficient public funding for water infrastructure

☐ None of the above

☐ Other: _____

7. Please check your top *three* priorities for how you think investment dollars would be best spent.

- ☐ Local infrastructure (e.g., MRGCD, acequia, and community ditch improvements)
- ☐ Federal infrastructure (e.g., dam improvements and river management)
- ☐ Irrigation efficiency support programs for individual farmers (e.g., subsidies for more efficient irrigation methods or equipment)
- ☐ Alternative crop support programs for individual farmers (e.g., subsidies for switching to crops that consume less water)
- ☐ Healthy soil support programs for individual farmers (e.g., subsidies for adopting cover crops)
- ☐ Developing and administering water leasing and/or water banking programs for farmers (e.g., annual or seasonal leases of water)
- ☐ Developing and administering water leasing programs between agricultural and non-agricultural sectors (e.g., water leasing for environmental flows in the Rio Grande)
- ☐ Process support for farmers to participate in water transfers (e.g., water rights sale or purchase)
- ☐ Other:

_____

8. Which irrigation methods do you currently use? (Please select all that apply.)

Surface water	**Groundwater**	**Municipal water**
☐ Surface flood	☐ Surface flood	☐ Surface flood
☐ Furrow irrigation	☐ Furrow irrigation	☐ Furrow irrigation
☐ Drip or micro irrigation	☐ Drip or micro irrigation	☐ Drip or micro irrigation
☐ Lateral/linear sprinkler	☐ Lateral/linear sprinkler	☐ Lateral/linear sprinkler
☐ Center pivot sprinkler	☐ Center pivot sprinkler	☐ Center pivot sprinkler
☐ Other (please specify): _____	☐ Other (please specify): _____	☐ Other (please specify): _____

9. What other future irrigation methods or improvements do you wish to adopt but have not, and what resources or support would you need to adopt them?

10. MRGCD's Environmental Water Leasing Program has offered landowners the opportunity to lease water back to MRGCD since 2020. Participants are paid certain amounts per acre by MRGCD to fallow enrolled acreage with two options: a full season lease and a partial season lease. After the fallowing period is over, participants may once again irrigate those lands. The purpose of the program is to reduce overall water demand, increase the flexibility of MRGCD's water resources, and help balance multiple water management objectives (irrigation delivery, New Mexico's Rio Grande Compact deliveries, and supporting endangered species) in the Middle Rio Grande Basin. Have you participated in the program for either a partial or full season in any year?

☐ Yes …… **Please continue to Question 11**

☐ No …… **Please continue to Question 13**

11. Given your participation in the Environmental Water Leasing Program, please select all that apply and indicate the number of acres that you enrolled and the primary crop(s) that you chose to fallow.

Year	**Participation options in the program**	**# Acres enrolled**	**Primary crop fallowed**
2020	☐ Partial season (at $150/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
2021	☐ Full season (at $275/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
	☐ Partial season (at $175/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
2022	☐ Full season (at $425/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
2023	☐ Full season (at ($320/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
	☐ Partial season (at $200/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____

2024	☐ Full season (at $700/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
	☐ Partial season (at $400/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
2025	☐ Full season (at $600/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____
	☐ Partial season (at $300/acre)		☐ Perennial hay crops (alfalfa, etc.) ☐ Annual hay crops (sorghum, etc.) ☐ Row crops (vegetables, grains, etc.) ☐ Other (Please specify): _____

12. Given your participation in the Environmental Water Leasing Program, why did you choose to participate in this program? (Please select all that apply.)

☐ To receive the per acre payment

☐ To help the MRGCD manage water demand in a drought

☐ To help the river, bosque, and wildlife

☐ To help other farmers who need the water more than I do

☐ I was already planning to rotate crops

☐ Other (please specify): _____

Please continue to Question 14.

13. Since you have not participated in the Environmental Water Leasing Program, why did you choose not to participate? (Please select all that apply.)

☐ The compensation value has been insufficient to justify my participation

☐ The program's requirements are difficult to meet or do not fit my current operations

☐ It is too difficult and/or expensive to revitalize a field after fallowing

☐ I have not heard of this program

☐ I have heard of this program but do not have enough information about it or its benefits

☐ I do not believe conserving water provides any clear benefit to me or my community

☐ I expect land to be productive and do not believe fallowing is appropriate

☐ I am concerned that I might lose the agricultural tax break/reduction on my land

☐ I am concerned that I might lose my water rights

☐ Other (please specify): _____

14. In the future, would you be willing to enroll your land at the payment amounts shown below if they were offered by the Environmental Water Leasing Program? There are two parts to this question: full season lease in Part I, and partial season lease in Part II. Please think about each **part** independently, as if it were the only opportunity available. Each **part of the question (I and II)** provides a per acre payment that has been randomly assigned from a set of possible amounts, as available funds may vary from year to year.

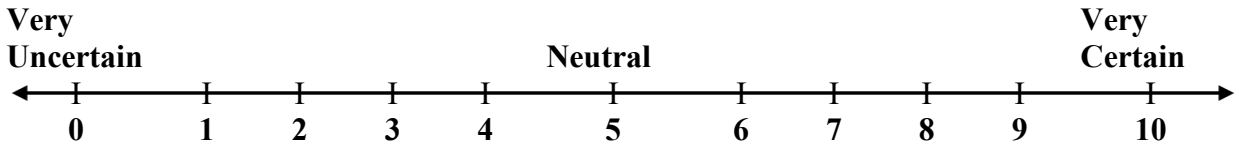
Part I

	Per Acre Payment	**Would you be willing to enroll?**	**Approximately how many acres would you be willing to enroll?**
Full season lease	$	☐ Yes ☐ No	

Part II

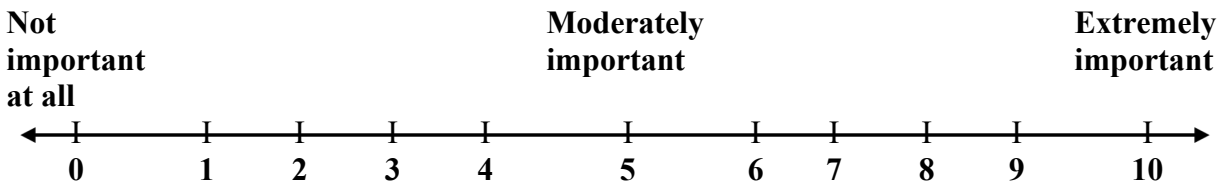
	Per Acre Payment	**Would you be willing to enroll?**	**Approximately how many acres would you be willing to enroll?**
Partial season lease	$	☐ Yes ☐ No	

15. On a scale from 0 to 10, where 0 is "Very Uncertain" and 10 is "Very Certain", how certain are you of your answers to the previous question (Question 14)? (Please circle one number in the scale below.)



16. In addition to money, is there other support that you would need to participate in the Environmental Water Leasing Program? (If so, please describe.)

17. How important is it to you to continue growing crops and irrigating your fields, given today's water challenges? (Please circle one number in the scale below.)



18. Given historic dry conditions in the Middle Rio Grande Basin, some water users have pursued permanent or temporary transfers of water rights. A permanent transfer of a water right is the permanent transfer from one user to another. A temporary transfer, or lease, of a water right allows for a water right holder to allow someone else to use the water for a specified time while retaining their ownership of the right for future use. What is the extent to which you oppose or support the following options for transferring agricultural water rights? (Circle the appropriate answer for each.)

Transferring water rights WITHIN the MRGCD area					
Permanent transfers of agricultural water rights **to other agricultural users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to other agricultural users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Permanent transfers of agricultural water rights **to environmental users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to environmental users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Permanent transfers of agricultural water rights **to urban users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to urban users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Transferring water rights OUT OF the MRGCD area					
Permanent transfers of agricultural water rights **to other agricultural users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to other agricultural users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Permanent transfers of agricultural water rights **to environmental users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to environmental users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Permanent transfers of agricultural water rights **to urban users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Temporary transfers (1-3 years) of agricultural water rights **to urban users**	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support

19. Please indicate how much you would trust each of the following entities to provide you with information on water management in the Middle Rio Grande Basin. (Circle the appropriate answer for each.)

Local water entities (e.g., MRGCD)	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
State water agencies (e.g., New Mexico Office of the State Engineer (OSE)/ Interstate Stream Commission (ISC))	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
Local elected officials	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
Academic researchers (e.g., UNM Professors)	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
Local media	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
Friends and family	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know
Environmental partnerships and nonprofit organizations (e.g., Middle Rio Grande Endangered Species Collaborative Program, World Wildlife Fund)	Mostly distrust	Somewhat distrust	Neutral	Somewhat trust	Mostly trust	I don't know

20. Do you vote in MRGCD elections? (Please check the box that best applies to you.)

☐ Never

☐ Rarely

☐ Sometimes

☐ Often

☐ Always

About You and Your Household

Only a fraction of MRGCD constituents were selected to receive this survey. Thus, we would like to know how similar you and other survey respondents are to MRGCD constituents in general. Your answers to the following questions will help us to do this. All the information collected in this survey will be kept completely confidential. No individual results will be reported.

21. What is your race/ethnicity?

☐ White/Caucasian
☐ Black/African American
☐ Asian
☐ Latino/Hispanic
☐ Native American/Indigenous
☐ Mixed race
☐ Other (please specify): _____
☐ Prefer not to say

22. What is your gender?

☐ Male ☐ Female ☐ Other ☐ Prefer not to say

23. What is your age?

_____

24. Which range best describes your total household income before taxes in 2024? (Please select one.)

☐ Less than $14,999
☐ $15,000 to $24,999
☐ $25,000 to $34,999
☐ $35,000 to $49,999
☐ $50,000 to $74,999
☐ $75,000 to $99,999
☐ $100,000 to $149,999
☐ $150,000 to $199,999
☐ $200,000 or more

25. Do you have any additional concerns, comments, or information that you would like to share about any of the topics addressed in this survey?

Thank you for your response!
Please place the completed survey in the enclosed, postage-paid envelope and mail it back to us.

Learn More About This Research
If you'd like to learn more about this research or explore related water resources initiatives, please scan the QR code below to visit our project website. There you'll find additional information about this research, as well as links to resources such as the New Mexico 50-Year Water Plan, the New Mexico Interstate Stream Commission's regional water planning efforts, and MRGCD conservation programs.