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1.0 Executive Summary

Irrigated agriculture is a primary water user in the western United States, but rapid population growth is driving a reallocation to urban areas. By 2030, an estimated 33 million additional people are projected to be living in the West, requiring approximately 30 billion more gallons of water for consumption (Western Governors' Association, 2006). Water continues to move from farms to cities, with expected and sometimes unexpected results. The social, economic ,and environmental results of these water transfers are important yet are sometimes not well understood. Growth and subsequent water conflicts are often focused in agricultural areas where key water resources are fragile and scarce, as pointed out in the Bureau of Reclamation's Water 2025 Report.

The purpose of this study is to benchmark the public's view of water reallocation issues with particular focus on households. An internet survey is used to gauge the public's perceptions in the areas of water knowledge, perceived water scarcity, strategies for easing scarcity in the short and long run, re-investment in rural communities that lose water as part of their economic base, household conservation of water resources, preferences in public policies and institutions, and attitudes about wildlife and water.

Survey responses from 6,250 individuals in the West (17 states) provide several water-related themes. First, respondents generally believe that water is scarce in the West, conditions are more difficult outside of their home state rather than within it and that scarcity will increase in the future. In the short term, respondents prioritize household and agricultural water use over landscape watering. When addressing long-term scarcity, respondents prefer reservoir construction and reuse systems over other acquisitions and, in particular, are not in favor of water transfers from agriculture. In order to pay for capital investments, respondents target increased fees for the heaviest water users and increased fees for new development. Respondents are not averse to limiting growth and joining water and land use planning in order to address long-term scarcity.

A majority of respondents are willing to pay additional fees on their summer watering bill to fund water related programs. The willingness to pay for pursuing different long- and short-term water management strategies is calculated. The least popular programs include increasing household water efficiency by subsidizing efficient water appliances. Respondents are in favor of household conservation, but are split on whether these programs should be voluntary or mandatory. Survey results suggest a preference for local control of household conservation standards; yet, respondents do not feel they are well represented in water policy and institutions. A vast majority support changes in current water law.

A number of other issues, including rural reinvestment options, the tradeoffs between the economy and environment, and water for wildlife are considered in the study.

Demographics of the respondents are also reported at the study's end. Responses are adjusted where appropriate to be representative of the western U.S. (or Colorado) population using census data. It should be noted that this report provides a summary of survey findings but does not contain a comprehensive statistical analysis of the data.

2.0 Overview

The purpose of this study is to benchmark the public's view of water reallocation issues with particular focus on households. Irrigated agriculture is a primary water user in the western United States, but rapid population growth is driving a reallocation to household use. By 2030, an estimated 33 million additional people are projected to be living in the West, requiring approximately 30 billion more gallons of water for consumption (Western Governors' Association, 2006). The social, economic, and environmental results of these water transfers are important yet are sometimes not well understood. Issues that arise from water transfers include the impacts to third parties, water conservation initiatives, dwindling supplies of surface and groundwater, growing demands for environmental and recreational uses, and increased needs for water in energy development. Water conflicts are occurring in agricultural areas where key water resources are often fragile and scarce, as pointed out in the Bureau of Reclamation's Water 2025 Report.

As an example, Colorado's population could grow about 65 percent in the next 26 years (Colorado Water Conservation Board, 2004). In Colorado, most of this growth is occurring in the corridor from Fort Collins to Pueblo, an area called the "Front Range" of the Rocky Mountains. As Colorado's population grows, water will shift from agriculture to municipal and industrial (M&I) uses. Should this happen, conservative estimates indicate more than 400,000 acres of irrigated farmland could be dried up to meet future needs if new water supply strategies are not developed (Colorado Water Conservation Board, 2004). In addition, evolving case law and unsustainable ground water depletions are significantly decreasing available irrigation water. Although domestic water providers are interested in reducing future urban water demand with tiered pricing and increasing conservation, these efforts may not be sufficient to meet future demands without new policy initiatives, technological innovation, collaboration among jurisdictions, efficient use, and increased supply.

In the West, water reallocation is the rule rather than the exception. Reallocation strategies are controversial and emotionally contentious; so much so that policies focused on water use/reuse, water/food security, and water markets top the policy agenda for numerous state and federal legislative bills. Both public and private sectors have invested heavily in irrigated agriculture in the West during the last 70 years, yet water transfers are almost entirely market driven and taking place with little public dialogue or input as to whether this is wise or sustainable and what balance of urban and rural water uses is desirable over the long term. Current proposals for meeting water needs include new storage projects, long distance transfer of new source water, interruptible supply strategies that share water with agriculture, desalination, reuse of municipal wastewater, conservation and growth management, and others. Water issues are complex and little data have been gathered regarding public understanding of water issues, knowledge gaps, and current perceptions regarding the options mentioned above.

An internet survey is used to gauge respondents' perceptions in the areas of: water knowledge, perceived water scarcity, strategies for easing scarcity in the short and long run, re-investment in rural communities that lose water as part of their economic base, household conservation of water resources, preferences in public policies and institutions/attitudes about wildlife and water. This report provides a summary of survey findings but does not contain a comprehensive statistical analysis of the data. Discussions of survey responses follow an overview of the methodology. The demographics of

respondents are found at the study's end. Summary values have been adjusted according to U.S. Census data to be representative of the West's (or Colorado's) population.

3.0 Methodology

This study's approach was to survey a statistically representative sample of western households to learn about their preferences for water acquisition and use and to reveal how respondents value water in its various uses. This information will improve the ability of states and other agencies to effectively meet growing M&I water needs while remaining sensitive to public attitudes toward agricultural water use, rural communities, water re-use and conservation, and water pricing. This study focuses on the 17 westernmost states of the continental U.S.[1]

The broad survey scope affords a wider perspective on Western water issues. Issues of one state may coincide with those of other states, and one state's actions may have short- and long- term effects on other states. Region-wide research can allow for a more accurate generalization of results across states within a region. Furthermore, inclusion of a broader constituency ensures that both traditional and non-traditional stakeholders are included in the process.

Data were collected in two stages: in the first, focus groups were conducted in selected regions of the study area to identify water issues of high priorities and to assist in the design of the household survey that would follow. In the second stage, a questionnaire was developed and administered via the Internet. The questionnaire sought to uncover western households' water knowledge and their views on water use and re-use, water sharing, rural regional economies, wildlife, recreation, and policy.

3.1 Focus Group

Three focus groups were conducted as a part of this study: two technical focus groups and one non-technical focus group. Participants in the technical focus groups were stakeholders focused on water administration, supply, conveyance and planning (e.g., representatives of the agricultural industry and policymakers related to agriculture and water). One important outcome of the focus group process was the identification and prioritization of key issues related to water use, reuse, and security in the West. This information can contribute to planning and visioning for the future. A second important outcome was developing and refining an Internet survey based on focus group insights.

Participants in the non-technical focus group were members of the general public. The public's specific beliefs concerning the key areas identified by technical focus groups assisted in the design of the Internet questionnaire.

A Colorado Institute of Public Policy report entitled, "Water in 2025: Beliefs and Values as a Means for Cooperation," which uses a Q-survey methodology to uncover the full range and beliefs and values for Colorado water stakeholders, was also used in the survey design. This report notes areas in which seemingly disparate groups overlap in their values and beliefs.

[1] Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming

3.2 Internet Survey

The survey questionnaire was developed by scientists at Colorado State University and administered by Survey Sampling International (SSI). An e-mail was sent to 203,750 randomly selected households throughout the 17 western states, and the email included an invitation to participate in the survey and a link to the webpage on which the survey could be found, completed, and submitted. Of the 6,883 people who opened the e-mail, 6,250 completed the survey, for a response rate of 91%. Respondents came from all 17 states in the study area. Demographic information was collected from survey respondents and compared to U.S. Census data for their state. For each of the 17 states and the western region as a whole, survey results were weighted according to gender, income, and population to reflect current demographics. The demographics of survey respondents are found on page 27.

4.0 Water Knowledge

Asking respondents about their water knowledge is one means of benchmarking awareness of water resource issues. The questionnaire gauged water knowledge in two different ways: first, respondents were asked to indicate their familiarity with water terms, and then respondents were asked their perceptions of what entities use the most water. Subsequent sections consider perceptions of water use and scarcity.

4.1 Water Terminology

Water terminology is often idiosyncratic, but it is very important when discussing and communicating water resource issues. Familiarity with water resource terminology may indicate the limits of water knowledge among survey respondents and suggest opportunities for outreach education. The questionnaire asked respondents to indicate if they were very familiar, somewhat familiar, or not at all familiar with the water terms listed in Table 1.

Table 1. Water terminology and all respondents' familiarity with the terms.

	Very Familiar (%)	Somewhat Familiar (%)	Not at All Familiar (%)
Ground Water	47.4	42.4	10.2
Surface Water	38.2	43.2	18.6
Water Reuse	24.5	48.1	27.4
Consumptive Use	23.9	42.9	33.2
Diversion	23.7	44.1	32.2
Beneficial Use	15.3	39.6	45.1
Return Flows	11.8	32.1	56.1
Evapotranspiration (ET)	10.3	22.5	67.2
Prior Appropriation	9.9	25.3	64.7
Interstate Compact	8.7	24.3	67.0
Riparian Right	7.3	18.2	74.5
Water Decree	7.2	23.3	69.5
Conjunctive Use	5.1	18.4	76.5
River Call	5.0	18.9	76.1

Table 1 presents the percentage of western respondents who categorized their familiarity of water terminology. As an example, 47.4 % of respondents indicated they were familiar with the term "ground water," while 42.4% were somewhat familiar with this term, and 10.2% were not familiar with this term. Results suggest ground water is a familiar term -- not a surprise considering that ground water sources are important and frequently reviewed by media outlets. The tem "river call" has a relatively low familiarity rating (only 23.9% are very or somewhat familiar) across the West (last row in Table 1), but this varies by state. For example, "river call" is very or somewhat familiar to nearly 70% of Colorado respondents as indicated in Table 2.

Table 2. Water terminology and Colorado respondents' familiarity with terms.

Colorado	Very Familiar (%)	Somewhat Familiar (%)	Not at All Familiar (%)
Ground Water	42.7	46.3	11.0
Surface Water	38.9	45.6	15.6
Consumptive Use	24.7	46.3	29.0
Diversion	23.8	45.7	30.5
River Call	23.8	45.7	30.5
Water Reuse	18.6	52.9	28.5
Beneficial Use	14.1	35.6	50.3
Return Flows	12.0	31.3	56.7
Prior Appropriation	10.1	26.5	63.4
Evapotranspiration (ET)	9.1	24.4	66.4
Interstate Compact	8.7	24.3	67.0
Water Decree	6.9	28.2	64.9
Riparian Right	6.0	14.9	79.1
Conjunctive Use	3.6	20.0	76.4

Colorado has several major river systems with fully appropriated (allocated) water rights. River calls are frequent in Colorado and recent droughts increased awareness of this term. Surprisingly, the term "interstate compact" has a low familiarity rating in Colorado in spite of recent media coverage of litigation between Colorado and downstream states. Given that ground water and surface water are commonly used terms for describing water sources, it appears that 11-15% of respondents had very little background in water resources. Conversely, 14 % of respondents were very familiar with the technical terms such as beneficial use. Perhaps all respondents' water knowledge may then be represented by a familiar "bell shaped" normal probability density function. At each tail are individuals with little water knowledge and sophisticated water knowledge respectively, but the mass of respondents lie in between these extremes.

4.2 Perceptions of Water Use

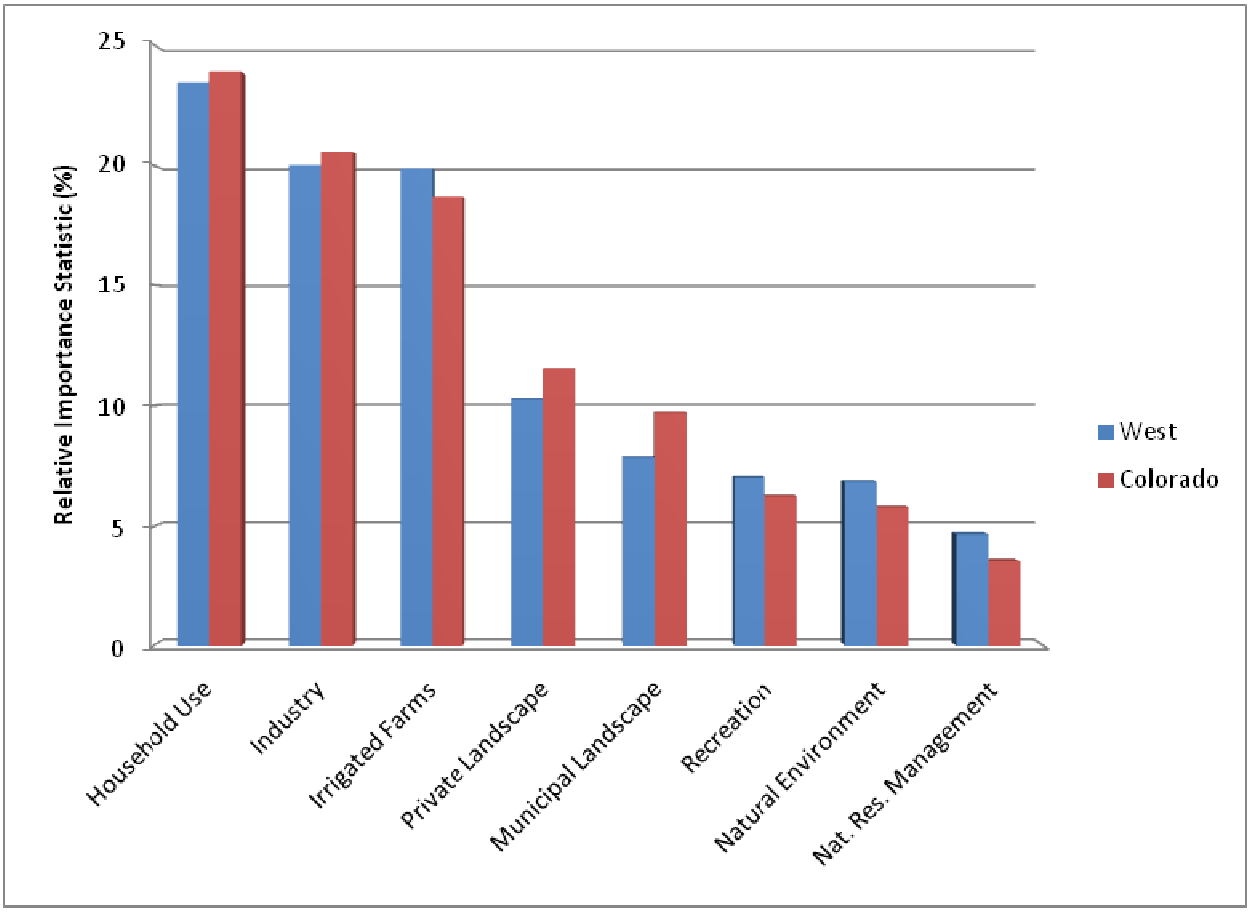
Who are perceived to be the greatest water users? The next section of the survey considers this question by asking respondents to rank the top 3 water users from largest to smallest according to the use categories: *natural environment, natural resource management, household use, private landscapes, industry, irrigated farms, municipal landscapes,* and *recreation*. Figure 1 summarizes a relative ranking of water uses by survey respondents both in Colorado and the respondents representing the entire West.

In this ranking question, if a respondent chooses a category as the top water user, it is given a weight of 3, the second most water user a 2, the third most a 1, and if unranked the use category receives a 0. The weights given by all respondents to a particular category are summed. The sum is divided by the sum of total weights from all categories. The result is a percentage, and the percentage represents the proportion of total weights that a category has received. The percentage is called the relative importance statistic.

The relative importance statistic is measured as a percentage on the vertical axis, while the water use categories are column bars whose labels appear on the horizontal axis. In Figure 1, it is clear that western respondents believe that households use the most water, receiving nearly twice the relative ranking as private landscapes (household water use receives 23% percent of the total possible weights compared to the 10% of private landscapes). Note that relative importance rankings are such that all categories sum to 100% (i.e., the sum of the blue bars is 100%, similarly for the red bars).

In contrast to the perceptions illustrated in Figure 1, irrigated agriculture is the greatest water use category in the West. The difference between the actual use and perceived use indicates that survey respondents may not be well informed about who uses water in the West.

Figure 1. Perceived water use rankings for the western U.S. and Colorado respondents.



5.0 Respondents' Perceptions of Water Scarcity

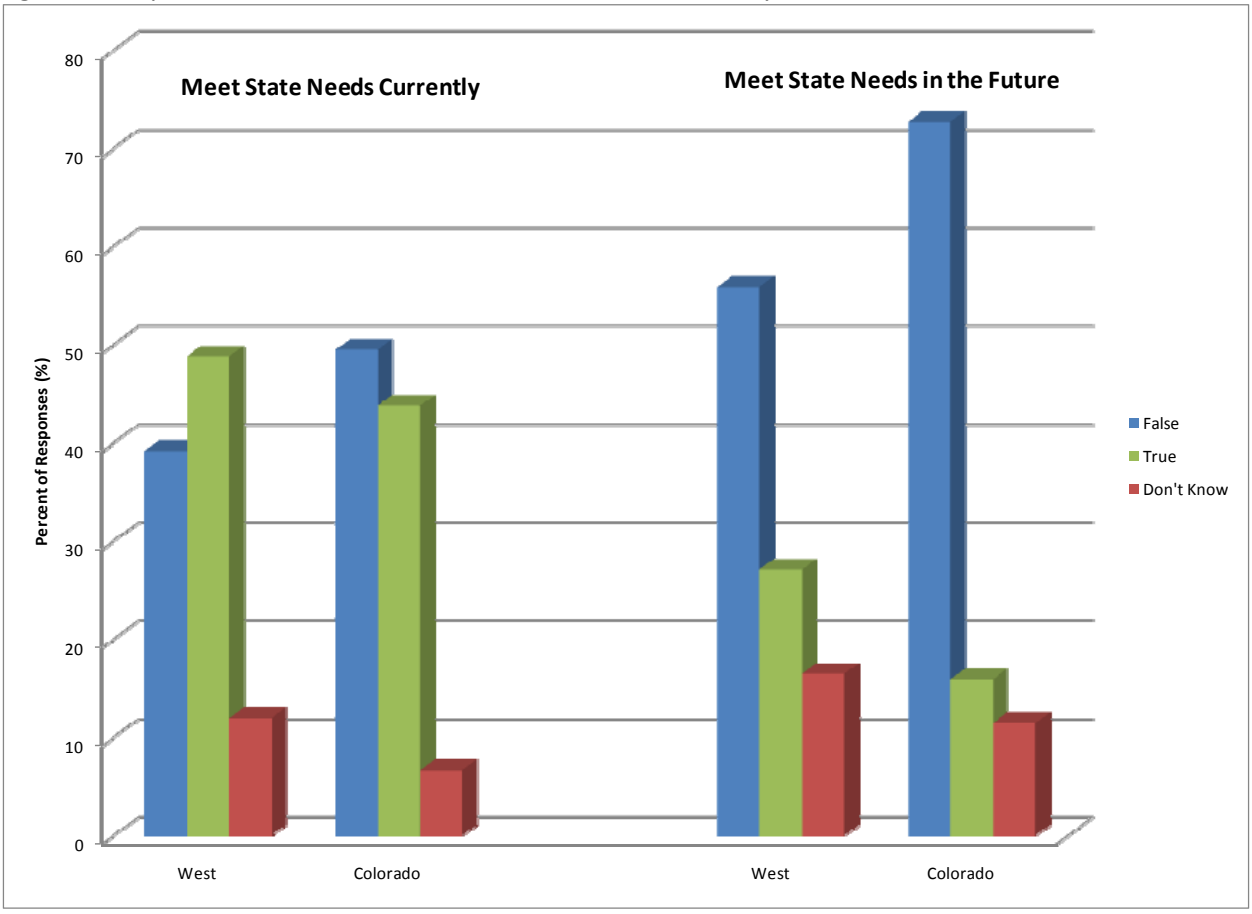
Previous sections of the survey sought to gauge water knowledge among survey respondents. In the subsequent section, respondents' perceptions of water scarcity in their state and across the West are considered. Moreover, respondents are asked to reflect on current scarcity versus the likelihood of short water supplies into the future.

A series of statements were used to gauge perceptions of scarcity (i.e., my state*)*. In particular, respondents were asked to indicate the extent to which they believed the following statements to be true or false. If respondents could not say whether the statement was true or false, they were asked to select "I don't know."

1. There is enough water in my state to meet the current needs of all the people and businesses in my state.
2. There is enough water in my state to meet the future needs of all the people and businesses in my state for the next 25 years.
3. There is enough water in the western United States to meet the current needs of all the people and businesses in the West.
4. There is enough water in the western United States to meet the future needs of all the people and businesses in the West for the next 25 years.

Figure 2 illustrates the respondents' views of local scarcity by summarizing the true, false, and don't know responses for statements 1 and 2.

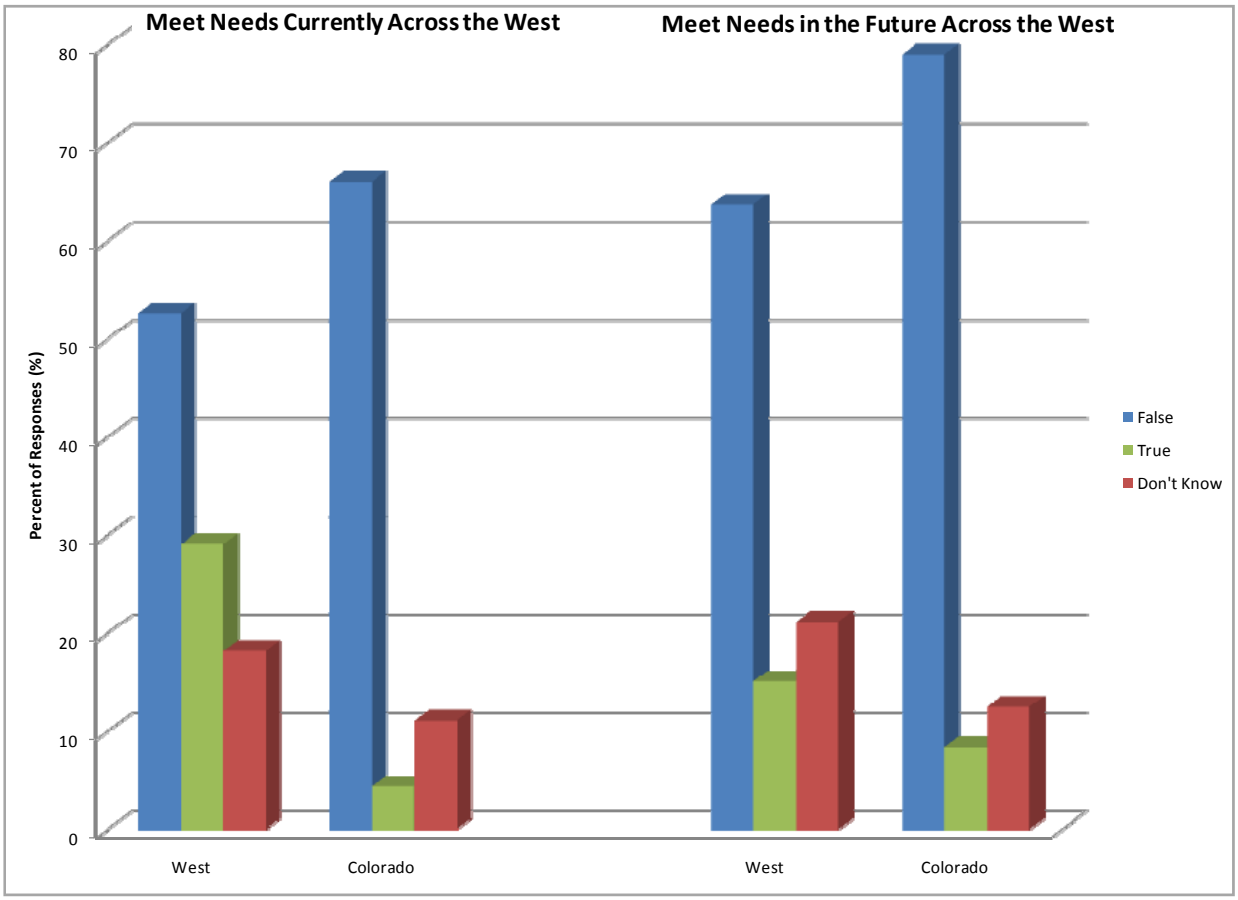
Figure 2. Respondents' views of current and future water scarcity in their state.



In the West, some respondents believe sufficient water supplies exist to meet current needs – nearly 50% find statement 1 to be true (left hand corner, green bar of Figure 2). In Colorado, perceptions are different, as nearly 50% find this statement to be false (left hand corner, blue bar above the heading "Colorado"). In both Colorado and the West, future scarcity is a concern. In Colorado, more than 70% of respondents find statement 2 to be false (blue bar, right hand side of Figure 2) suggesting they believe future water will be scarce.

While Figure 2 summarizes the perceptions of state scarcity, Figure 3 widens the perspectives of respondents by considering water scarcity in the entire West rather than in their state alone. Figure 3's focus is on statements 3 and 4, in which scarcity is perceived both currently and in the future.

Figure 3. Respondents' perceptions of water scarcity across the western U.S.



Without question, a majority of respondents believe western water resources are scarce and will become more so in the future.

6.0 Strategies for Securing Water Supplies

A number of alternatives are available for addressing limited water supplies, both in the short and long term. Subsequent discussions focus on the relative rankings that survey respondents gave strategies meant to ease scarcity.

6.1 Short-Term Scarcity

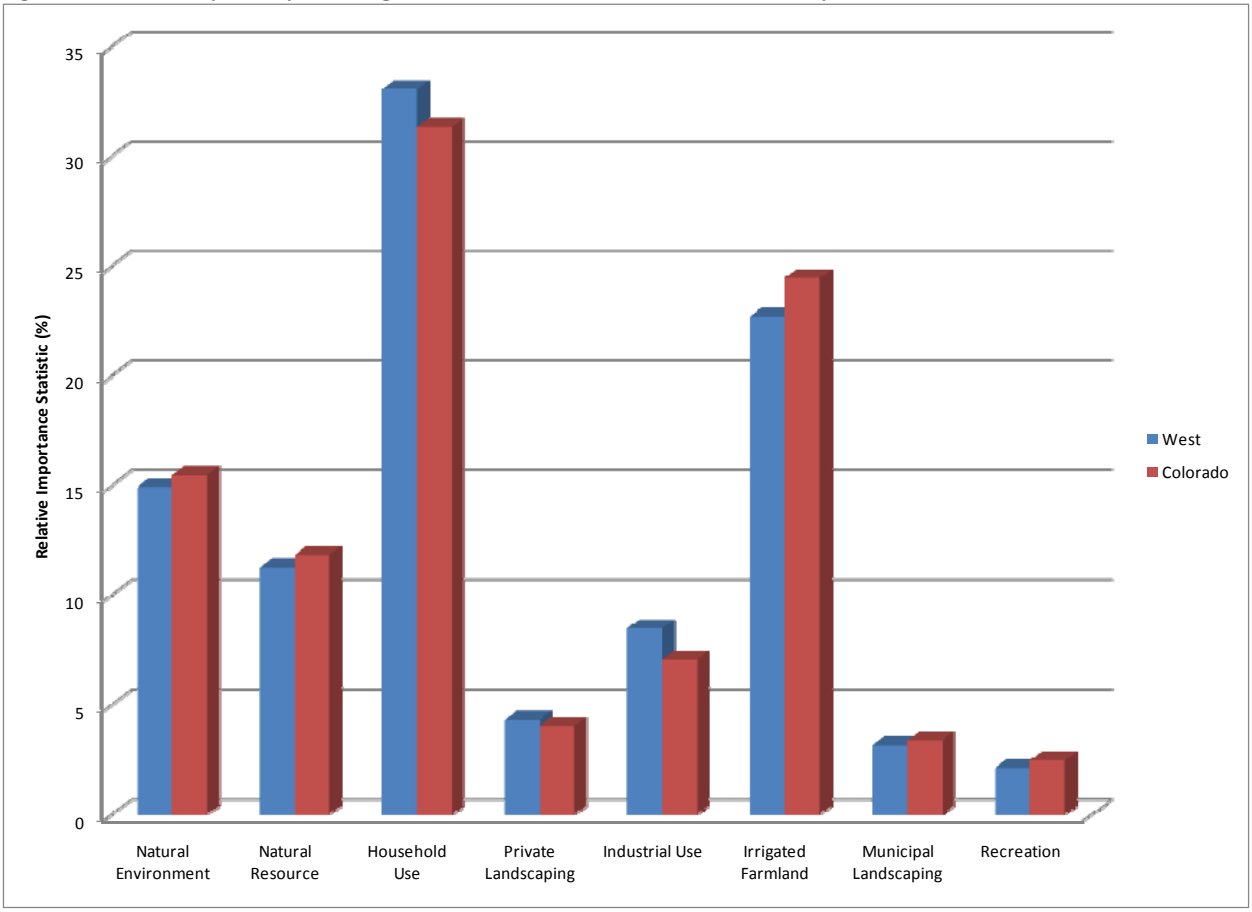
At times, the states in the West have experienced temporary (less than 2 years) water shortages for a variety of reasons, such as drought or over-allocation to certain uses. During these times, there may not be enough water to adequately provide for all water uses. Listed below are eight uses for which water might be allocated during times when water is limited.

1. For the natural environment (e.g., as part of fish and wildlife habitat, forest health, and other natural uses)
2. For natural resource management (e.g., in-stream management, fire suppression, stream banks, and wetland management)
3. For household use (e.g., drinking, cooking, showers, laundry, dishwashing, and toilets)
4. For private landscaping (e.g., lawns and gardens for private homes and businesses)
5. For industrial use (e.g., commercial manufacturing, mining, and power plants)
6. For irrigated farmland (e.g., food or energy crop production, livestock)
7. For municipal landscaping (e.g., community parks, golf courses)
8. For recreation (e.g., rafting, fishing, swimming, skiing, scenic viewing)

Respondents were asked to indicate which of these eight water uses should receive the 1st, 2nd, and 3rd highest priorities for allocation when water is limited. In this ranking question, if a respondent chooses a category as the top priority, it is given a weight of 3, the second most water priority a 2, the third priority a 1, and if unranked the use category receives a 0. The weights given by all respondents to a particular category are summed. The sum is divided by the sum of total weights from all categories. The result is a percentage, and the percentage represents the proportion of total weights that a category has received. The percentage is called the relative importance statistic. Figure 4 summarizes these relative rankings.

Household use and irrigated farmland garner the highest priorities among the eight categories. (Note that the column bars sum to 100 percent, so the priority of one use may be measured relative to another). The lowest priorities are found for municipal landscaping and for recreation. Colorado responses (red column bars) favor irrigated farmland and the natural environment relative to the West, but the overall ordering is consistent with that found among western respondents.

Figure 4. Relative priority rankings for water use in short-term scarcity.

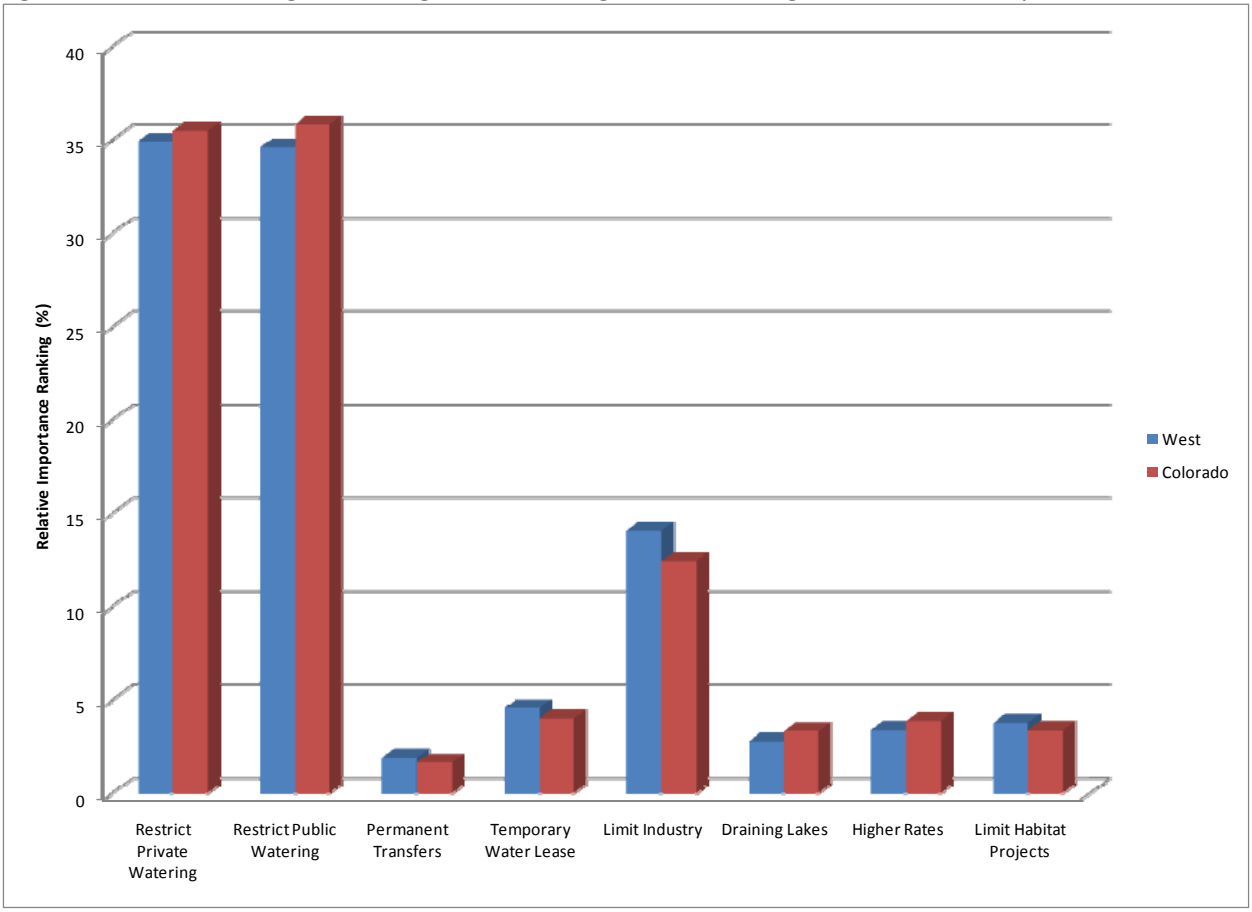


If facing short-term scarcity, municipal water providers have several options for acquiring or stretching water supplies. These options include:

1. Restricting the amount of water that can be used on private lawns and landscapes.
2. Restricting the amount of water that can be used on public landscapes (e.g., parks and golf courses).
3. Permanently transferring water from farms to the city.
4. Temporarily renting water from farms to the city.
5. Restricting the amount of water that can be used by industry (e.g., commercial manufacturing, mining, or power plants).
6. Draining reservoirs and lakes.
7. Increasing water rates (bills) paid by private households.
8. Putting a limit on water projects that help protect wildlife and fish habitat.

Respondents' were asked to rank these strategies as the 1st, 2nd, and 3rd best strategy, and these response are summarized in Figure 5 using the relative importance statistic.

Figure 5. Relative rankings of strategies for meeting demand during short-term scarcity.



Restricting outdoor watering is the preferred short-term strategy, as indicated by the left hand side of Figure 5. Permanent water transfers from farms to cities are the lowest ranked strategy, along with draining lakes, charging higher water rates, and limiting habitat projects.

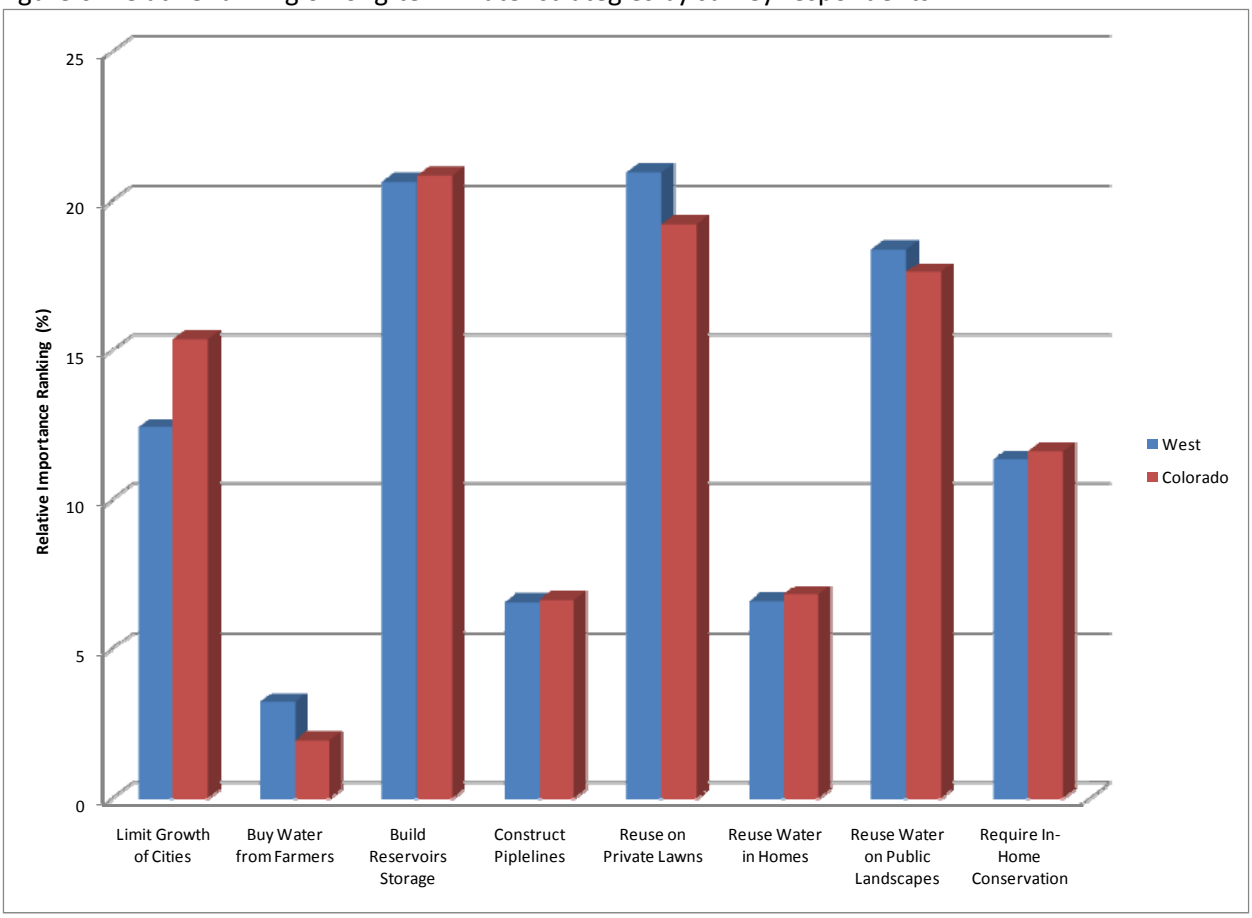
6.2 Long-Term Water Scarcity

As mentioned previously, respondents are keenly aware of the potential for long term water scarcity. In contrast to short-term water strategies, the opportunities to develop water for long term use are more capital and construction intensive and require long-term planning. Opportunities for meeting long-term scarcity include:

1. Reusing waste water on private lawns and landscapes (e.g., homes and private businesses).
2. Reusing waste water on public landscapes (e.g., parks and golf courses).
3. Building reservoirs and other storage projects.
4. Limiting the growth of cities to a level that is supported by a sustainable water supply.
5. Requiring that households take steps to conserve water (e.g., use low flow toilets).
6. Constructing pipelines.
7. Reusing waste water, after it is treated, for use within the home.
8. Buying water from farmers.

The 1st, 2nd, and 3rd best option for meeting long-term water needs were ranked by survey respondents as indicated by Figure 6.

Figure 6. Relative ranking of long-term water strategies by survey respondents.



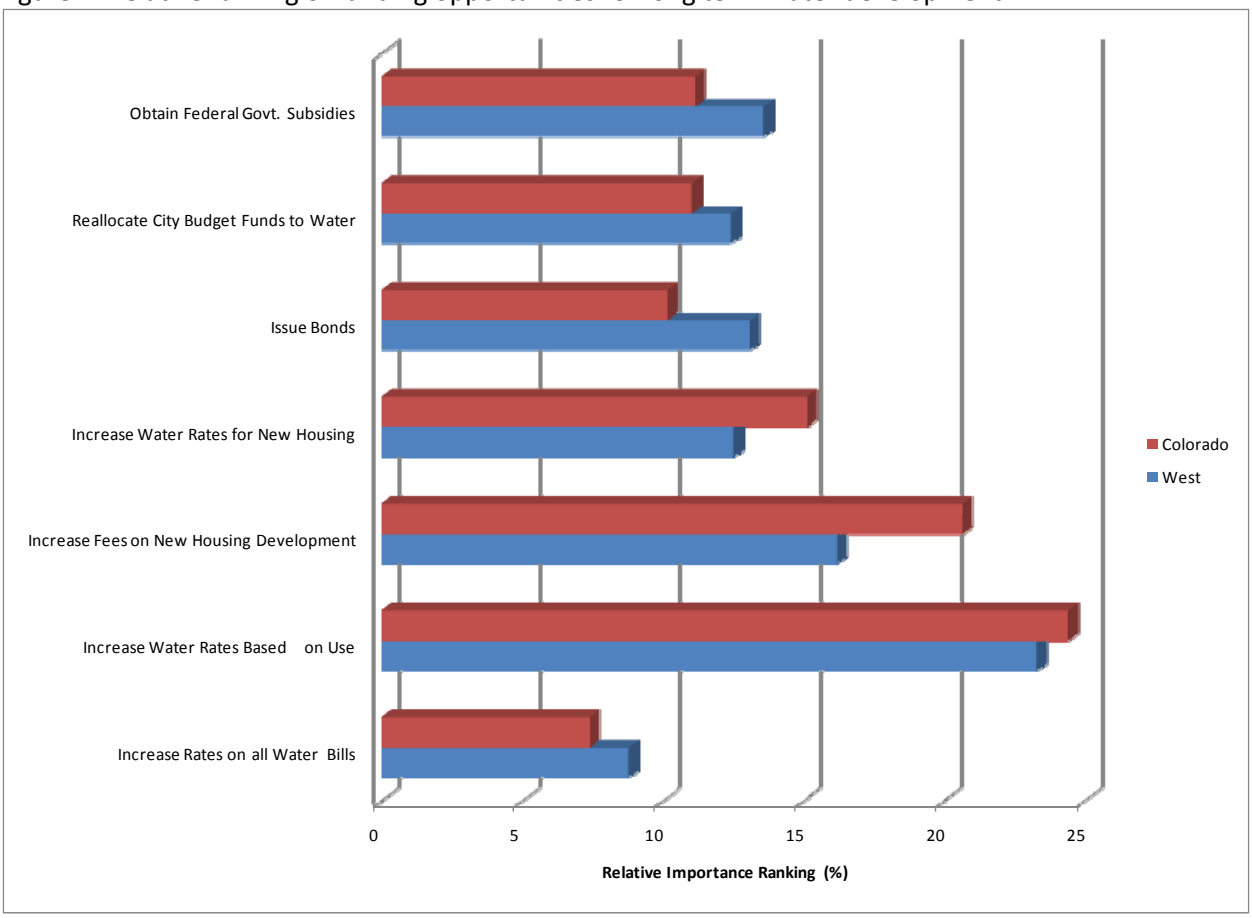
Among western respondents, the most popular strategies for meeting long-term needs are to build reservoirs (relative ranking of 20%) and reuse water whether it is on private lawns (20%) or public landscapes (18%). The least popular alternative is to buy water from farmers (3.2%). Colorado responses are presented in the red columns and mirror the opinions of those in the West, although there is relatively more support for limiting growth and relatively less support for buying water from farmers.

Each of the options listed in Figure 6 will require capital expenditures, and municipal water providers will be charged with acquiring funds. Opportunities for funding include:

1. Increase rates on all water bills.
2. Increase water rates for households that use more water.
3. Increase fees on new homes and new housing developments.
4. Increase water rates for new housing developments.
5. Issue city or municipal district bonds.
6. Re-allocate funds from other parts of the city budget to pay for water.
7. Obtain subsidies from the federal government.

Respondents were asked to rank the 1st, 2nd, and 3rd best options among these funding alternatives. The relative importance rank of each alternative is presented in Figure 7.

Figure 7. Relative ranking of funding opportunities for long term water development.



Respondents ranked "Increase water rates for households that use more water" as the highest ranked alternative (second from the bottom of Figure 7) for funding long-term water acquisition. Increasing fees and water rates on new housing are also highly ranked. In Colorado, adding debt by issuing bonds and increasing all water rates were among the least popular alternatives.

7.0 Willingness to Pay for Acquisition Strategies and Compensation

Water providers might consider increasing water rates in order to fund new sources of water. Respondents were asked if they would be willing to pay an additional fee each month on their water on their water bill in support of the following programs:

1. Implement programs to reduce household water consumption.
2. Construct a reservoir for storage.
3. Create a system to reuse water for public landscapes.

4. Set aside water for wildlife habitat in nearby streams.
5. Make infrastructure improvements in rural communities to compensate for water being transferred from farms to cities.
6. Set aside water for public based recreation.
7. Provide subsidies for water efficient appliances for those that cannot afford them.

Respondents were not presented with the same fee amounts. Rather, respondents were randomly assigned one fee from a set that included $5, $10, $15, $20 or $25. The proportion that would be willing to pay at each fee is listed in Table 3.

Additionally, respondents were asked to allocate a proportion of the fee (between 0 and 100%) to any of the seven programs they wished *even if they did not support the fee*. Table 3 lists the average proportion that survey respondents allocated to each option.

Table 3. Willingness to pay and the average proportion of the fee allocated to each option.

	West
Willing to pay a fee of …	
proportion of those asked to pay $ 5 that checked yes	66.6%
proportion of those asked to pay $10 that checked yes	58.8%
proportion of those asked to pay $15 that checked yes	50.4%
proportion of those asked to pay $20 that checked yes	45.9%
proportion of those asked to pay $25 that checked yes	39.6%
Desired Fee Recipient	
Construct a reservoir for storage.	19.8%
Keep irrigated farms in production.	19.7%
Create a system to reuse water for public landscapes.	19.2%
Implement programs to reduce household water consumption.	16.1%
Set aside water for wildlife habitat in nearby streams.	13.8%
Provide subsidies for water-efficient appliances for those who cannot afford them.	12.3%
Make infrastructure improvements in rural communities to compensate for water being transferred from farms to cities.	7.2%
Set aside water for public-based recreation.	6.5%

Information from Table 3 suggests preferences that individuals have for providing funds to water initiatives. The highest average fee allocation was for reservoirs (19.8%) and keeping irrigated farms in production (19.7%), as well as creating a system to reuse water for public landscapes. Programs that support water efficient appliances and recreation set asides were least popular.

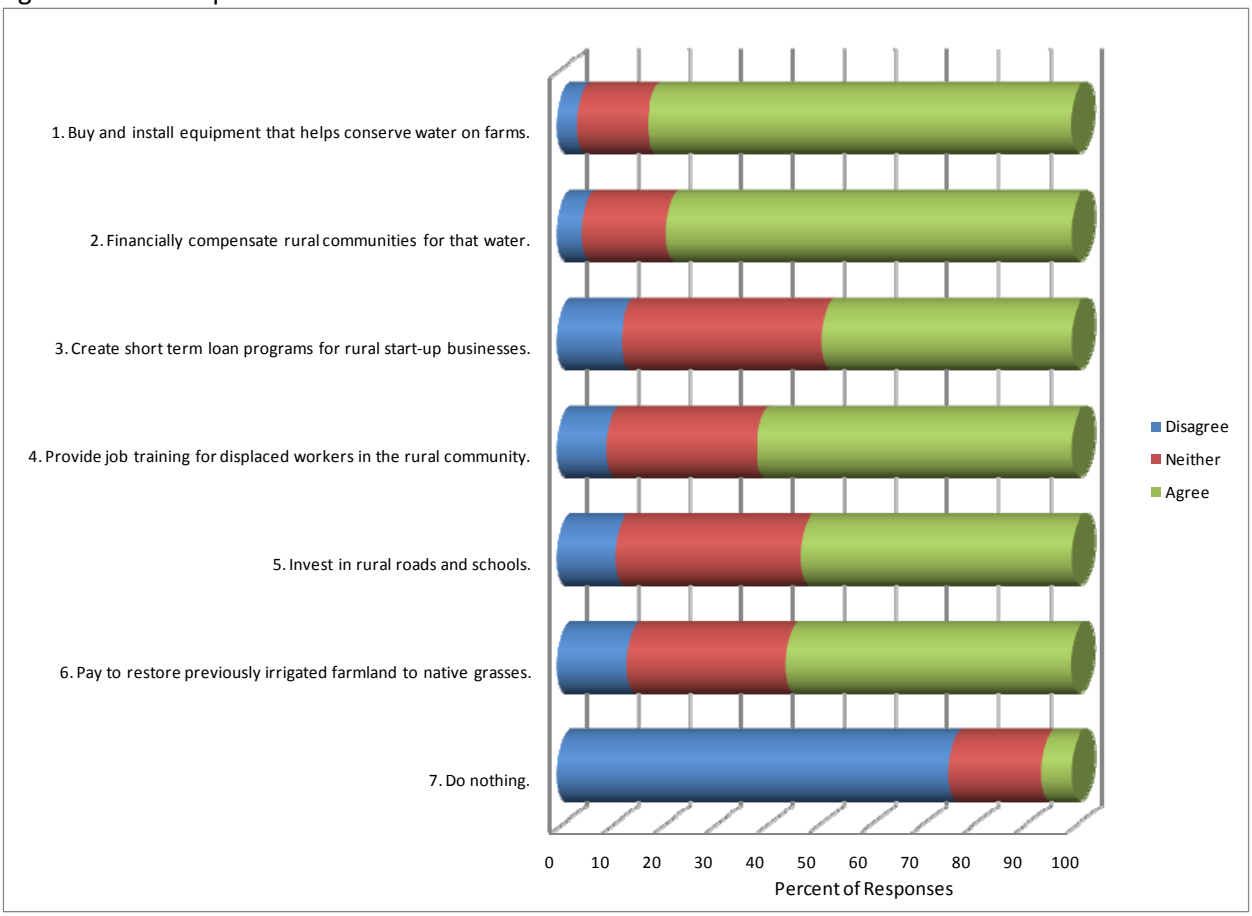
8.0 Preferences for Investing in Rural Communities

Table 3 indicates that respondents have some proclivity for investing in rural infrastructure if water is transferred from farms to cities. Infrastructure investments differ by type, and respondents were asked whether they agree with taking the following actions:

1. Buy and install equipment that helps conserve water on farms.
2. Financially compensate rural communities for that water.
3. Create short term loan programs for rural start-up businesses.
4. Provide job training for displaced workers in the rural community.
5. Invest in rural roads and schools.
6. Pay to restore previously irrigated farmland to native grasses.
7. Do nothing.

Figure 8 indicates if respondents in the West tended to agree, disagree, or were uncertain with each of the seven choices. The actions generating the greatest agreement (green portions of the column bars) are to buy and install equipment that will conserve water on farms and to financially compensate communities. The alternative generating the greatest disagreement is to do nothing. Colorado responses mirror the same level of agreement found in Figure 8.

Figure 8. West responses to rural investment alternatives.



Diverting water from farms to cities can create contentious, emotionally charged debates. In this context, respondents were asked if cities should be able to divert water as needed, or if these transfers should be prohibited. The agreement and disagreement with these statements is listed in Table 4. The upper portion of the table asks for agreement/disagreement with the statement "Cities should be able to divert water from rural areas if the cities need more water." In the West, less than one-third of respondents agree that cities should be able to divert (last column, second row of Table 4), and this proportion is nearly matched by those who neither agree nor disagree. In Colorado, a slight majority disagree with cities ability to divert.

The second half of Table 4 provides the alternative statement "Cities should NOT be able to divert water from rural areas and farms even if the cities need the water." In Colorado, a majority agree with this statement, while 47.2% agree with the statement across all West respondents (last column).

Table 4. Respondents' agreement with cities diverting water from farms as needed.

Should be able to divert			
	Disagree (%)	Neither (%)	Agree (%)
West	41.9	27.1	31
Colorado	51.6	22.6	25.7
Should NOT be able to divert			
	Disagree (%)	Neither (%)	Agree (%)
West	24.1	23.8	47.2
Colorado	23	23.8	53.2

9.0 Respondents' Attitudes about Household Conservation

Household conservation may be one strategy to reduce the demand on water. With this topic in mind, respondents were asked to provide their level of agreement with the following conservation specific statements:

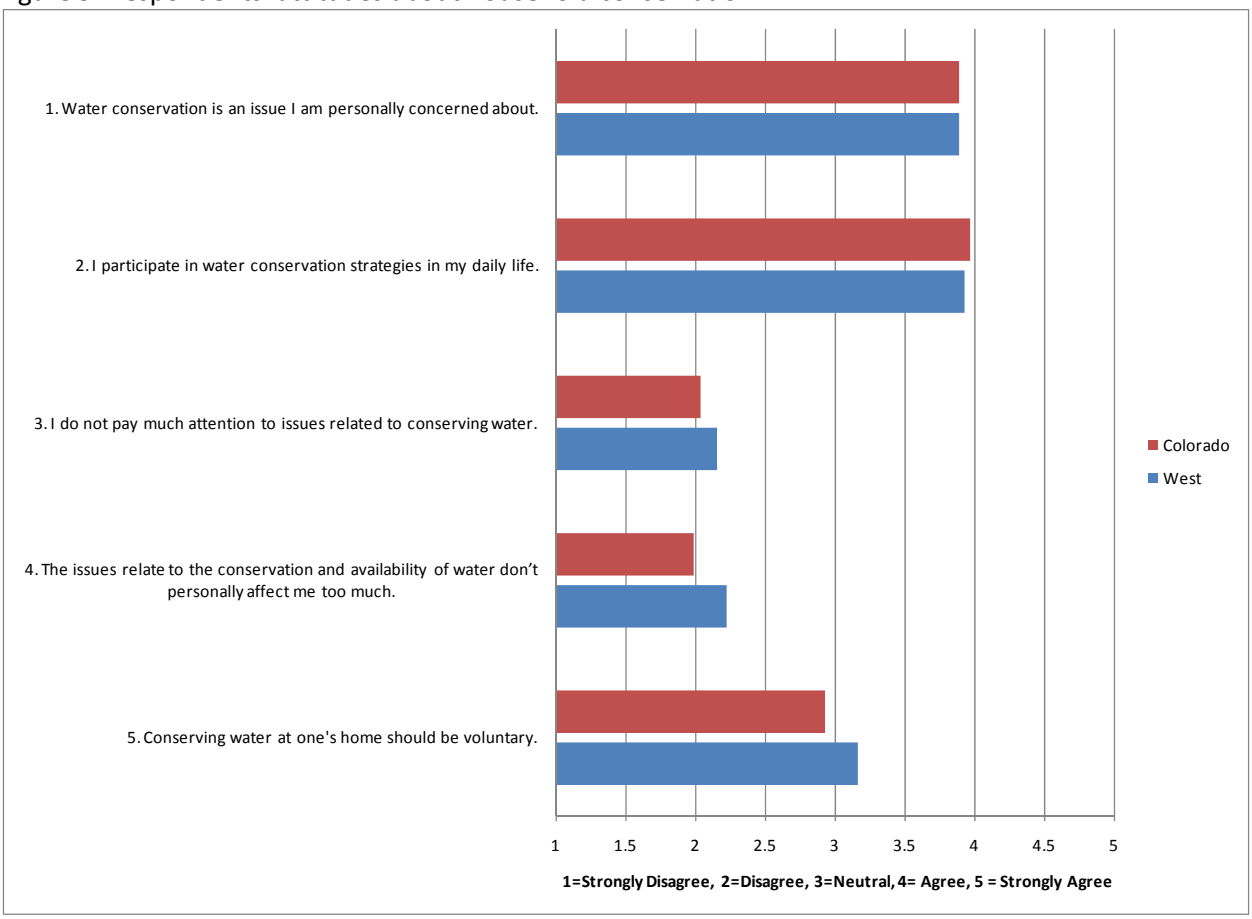
1. Water conservation is an issue I am personally concerned about.
2. I participate in water conservation strategies in my daily life.
3. I do not pay much attention to issues related to conserving water.
4. The issues that relate to the conservation and availability of water don't personally affect me too much.
5. Conserving water at one's home should be voluntary.

Strongly agree was a given a weight of 5, agree was given a 4, neither was 3, disagree was given a 2, and strongly disagree was weighted 1.

Figure 9 summarizes the level of agreement for these statements both in Colorado and the West. In general, water conservation is important to respondents and impacts their personal lives. Interestingly, Colorado respondents slightly disagree with the statement that water conservation should be voluntary

(average value of 2.93), while the West slightly agrees with the statement (value of 3.07) found at the bottom of Figure 9.

Figure 9. Respondents' attitudes about household conservation.

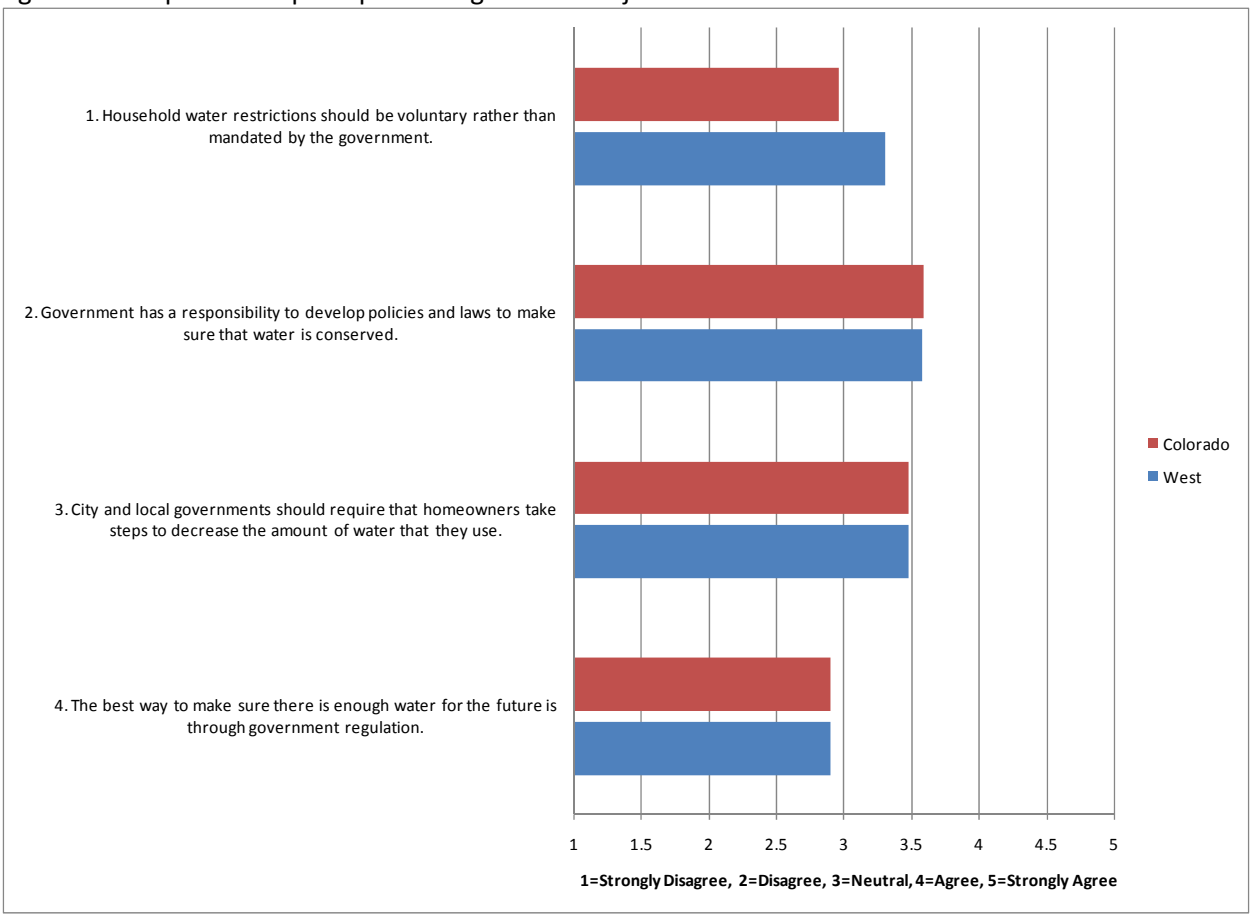


10.0 Government Jurisdiction, Mandates and Perceived Responsiveness

Largely because of impacts felt by third parties, public debate surrounds water resource planning and reallocation. Portions of the survey sought to gain household's perceptions of the role of government in water allocation and conservation. Specific attention is direct at issues of jurisdiction, mandates, and responsiveness. Respondents were asked to provide their level of agreement with the following statements that reflect the role of government in water resource allocation:

1. Household water restrictions should be voluntary rather than mandated by the government.
2. Government has a responsibility to develop policies and laws to make sure that water is conserved.
3. City and local governments should require that homeowners take steps to decrease the amount of water that they use.
4. The best way to make sure there is enough water for the future is through government regulation.

Figure 10. Respondents' perceptions of government jurisdiction in water allocation.

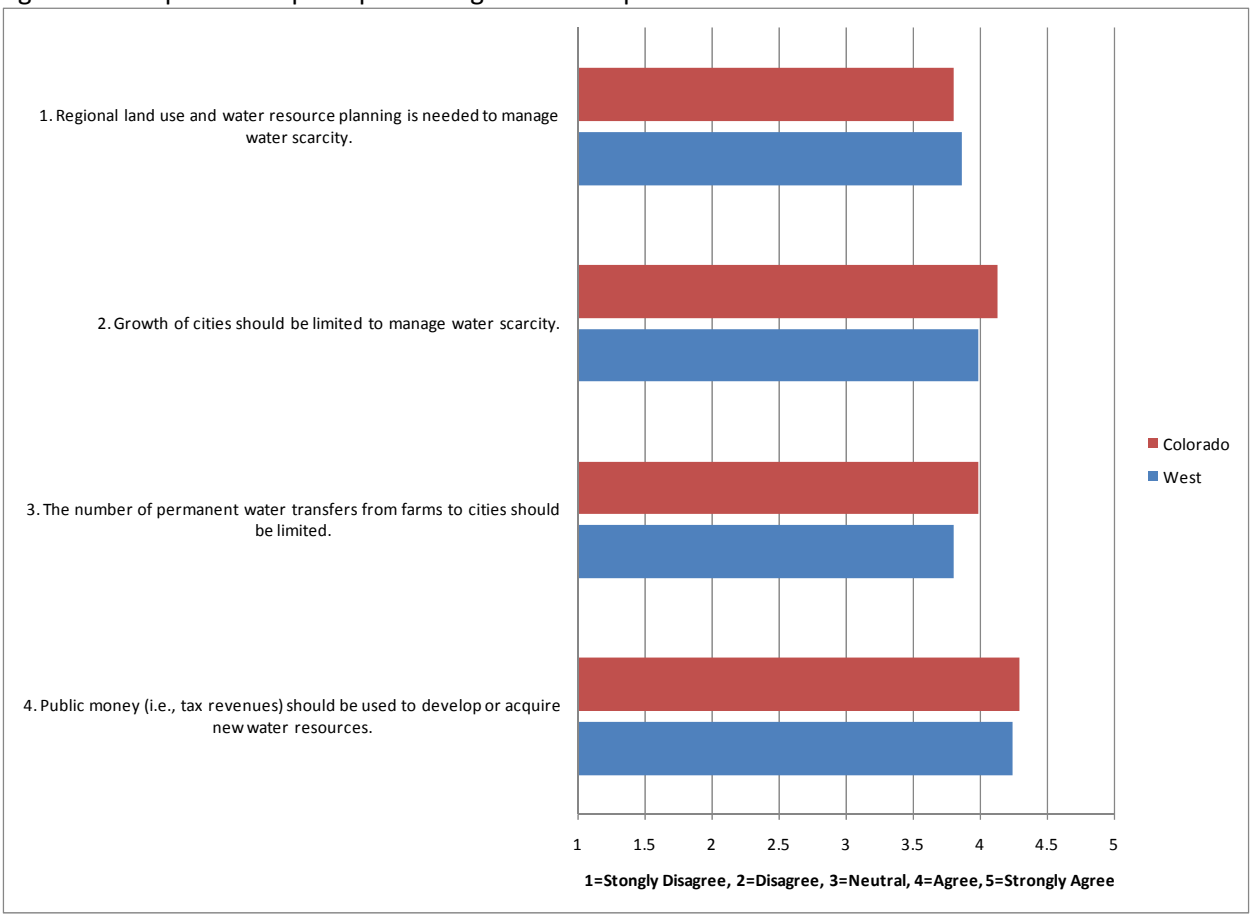


Average agreement levels are reported in Figure 10. Respondents tend to agree with statements 2 and 3 suggesting a role for government in water policy and conservation. However, respondents are not certain that regulation is the best way to ensure future water supplies (statement 4), and the voluntary household water restrictions receives mixed opinions when Colorado is compared to the rest of the West (statement 1).

Several policy alternatives exist for managing water resources and water scarcity. Respondents were asked to rank their level of agreement with the following water policy roles of government. These statements include:

1. Regional land use and water resource planning are needed to manage water scarcity.
2. Growth of cities should be limited to manage water scarcity.
3. The number of permanent water transfers from farms to cities should be limited.
4. Public money (i.e., tax revenues) should be used to develop or acquire new water resources.

Figure 11. Respondents' perceptions of government policies.



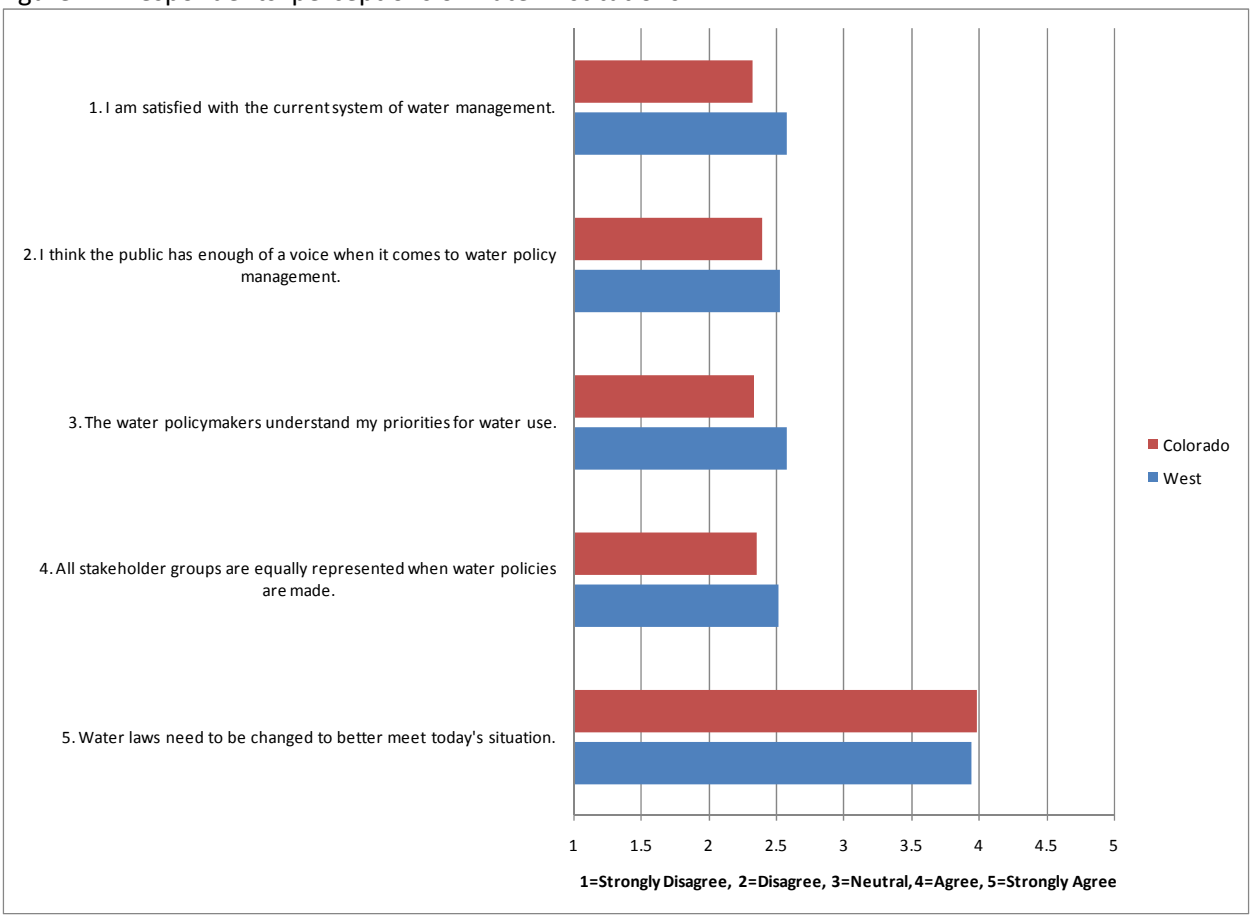
In Figure 11, the level of agreement measured on the horizontal axis stretches beyond 3.0, so all of the statements were, on average, agreed with. Respondents tend to strongly agree that public funds be used to acquire and develop water resources (statement 4), that government entities manage growth (statement 2), and that these entities combine land use and water resource planning (statement 1). Irrigated agriculture is often a source of water for growing urban populations; respondents believe that the number of permanent water transfers should be limited (statement 3).

Respondents have varying perceptions about the institutions that govern water resource allocation and the role that respondents play when influencing these institutions. In order to better gauge their confidence in institutions, respondents' were asked to indicate the level of agreement that they had for the following statements:

1. I am satisfied with the current system of water management.
2. I think the public has enough of a voice when it comes to water policy management.
3. The water policymakers understand my priorities for water use.
4. All stakeholder groups are equally represented when water policies are made.
5. Water laws need to be changed to better meet today's situation.

The level of agreement is summarized in Figure 12. In general, these respondents are not satisfied with manner in which institutions function – statements 1-4 average rating is below 3.0 on the agreement scale. These respondents are not satisfied with water management, do not believe they have enough of a voice, and do not believe policy makers understand their priorities. Moreover, respondents believe water laws need to be changed.

Figure 12. Respondents' perceptions of water institutions .

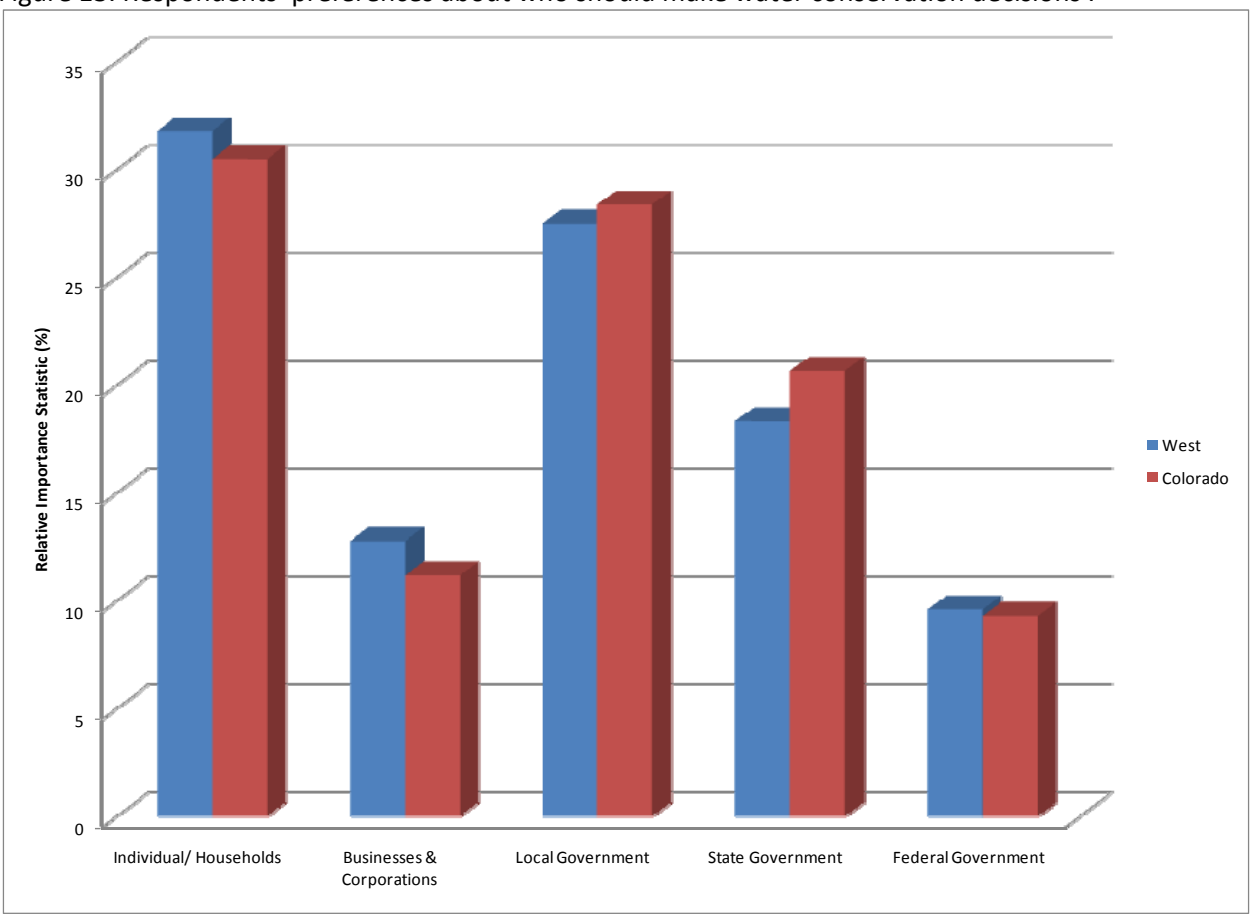


A number of people or groups are in a position to make decisions about the best way to conserve water in communities including:

1. Individuals/Households
2. Businesses and Corporations
3. Local Government (City, County, etc)
4. State Government
5. Federal Government

Respondents were asked to rank which of the five groups should have the 1st, 2nd, and 3rd most responsibility for making decisions about how water should be conserved in our communities. Results of the relative ranking are found in Figure 13.

Figure 13. Respondents' preferences about who should make water conservation decisions .



As indicated in Figure 13, respondents in both Colorado and the West believe that households should make conservation decisions (30% and 32% respectively), especially when measured relative to businesses and corporations. Local decisions are preferred to state decisions, which are preferred to federal decisions in turn.

11.0 The Natural Environment and the Economy: Respondents' Attitudes

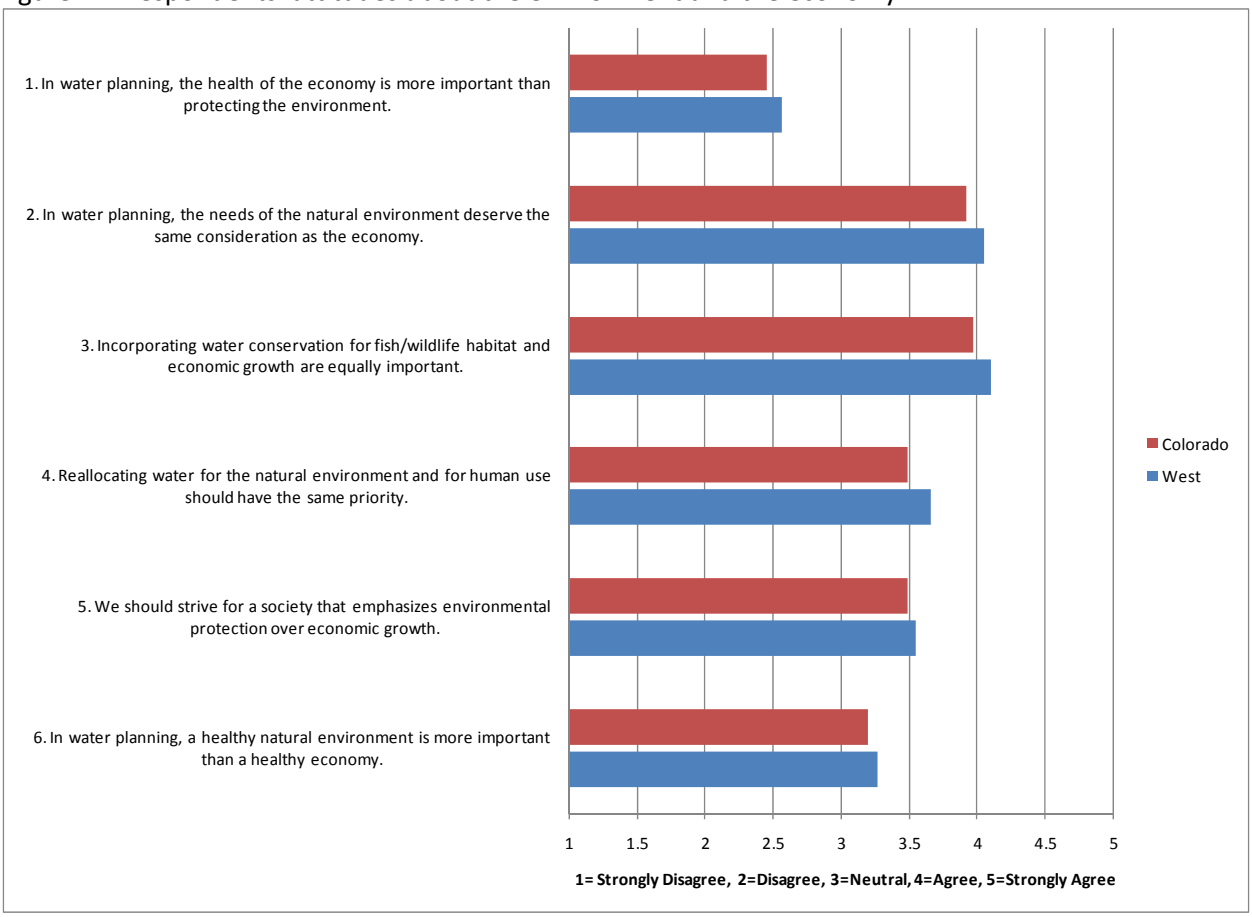
Water resource allocation decisions may involve tradeoffs between agricultural interests, household use, industry and municipal uses, the natural environment, and recreation. In a portion of the survey, respondents were asked to express their opinions related to trading off the natural environment and the economy. In this section, respondents' were asked to indicate if they strongly agreed, agreed, were neutral, disagreed, or strongly disagreed with particular statements including:

1. In water planning, the health of the economy is more important than protecting the environment.
2. In water planning the needs of the natural environment deserve the same consideration as the economy.

3. Incorporating water conservation for fish/wildlife habitat and economic growth are equally important.
4. Reallocating water for the natural environment and for human use should have the same priority.
5. We should strive for a society that emphasizes environmental protection over economic growth.
6. In water planning, a healthy natural environment is more important than a healthy economy.

Responses were given a numerical value; that is, strongly agree responses were valued as a 5, agree responses as a 4, neither as a 3, disagree as a 2, and strongly disagree as a 1. The values are adjusted to be representative of the western U.S. (or Colorado) population and then averaged. The averaged responses for the West and Colorado are summarized in Figure 14.

Figure 14. Respondents' attitudes about the environment and the economy .



If a statement receives an average ranking of 3.0 or more, as measured on the horizontal axis of Figure 14, then on average respondents agree with the statement. General agreement existed for all statements except for Statement 1 that appears at the top of the figure. In this case, respondents tended to disagree that the health of the economy is more important than protecting the environment. Generally speaking, respondents sought to give equal standing to the economy and the environment and Colorado responses were similar to those of the West.

12.0 Attitudes About Water and Wildlife

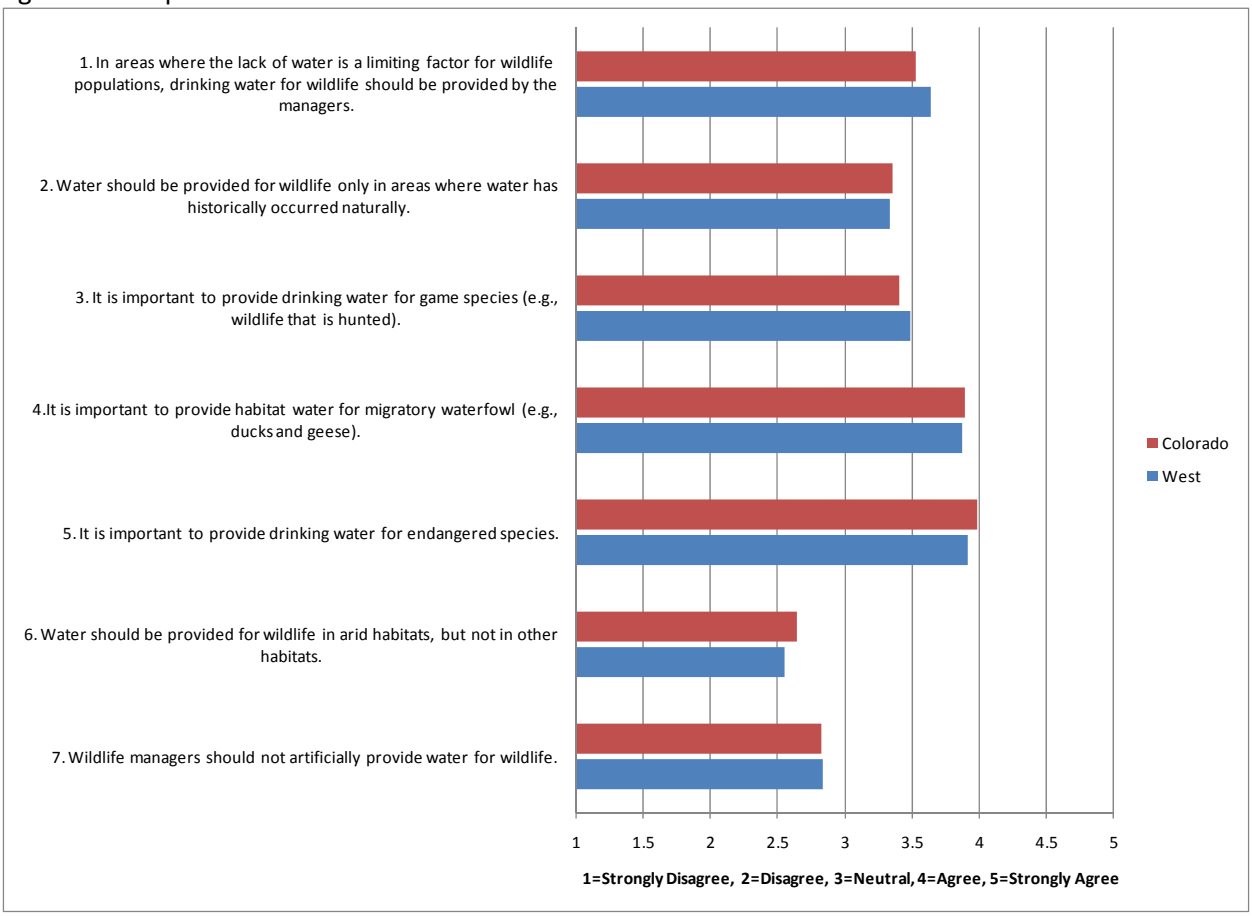
Water is a necessary resource for wildlife and wildlife habitat. As the competition for water increases, fewer resources may be available to support wildlife populations, and stakeholders may need to make decisions regarding the provision of water for wildlife populations. To better understand respondents' preferences for providing water resources to wildlife, they were asked their level of agreement with the following statements:

1. In areas where the lack of water is a limiting factor for wildlife populations, drinking water for wildlife should be provided by the managers.
2. Water should be provided for wildlife only in areas where water has historically occurred naturally.
3. It is important to provide drinking water for game species (e.g., wildlife that is hunted).
4. It is important to provide habitat water for migratory waterfowl (e.g., ducks and geese).
5. It is important to provide drinking water for endangered species.
6. Water should be provided for wildlife in arid habitats, but not in other habitats.
7. Wildlife managers should not artificially provide water for wildlife.

Figure 15 summarizes the mean agreement level in which strongly agree was given a score of 5, agree was given a score of 4, neutral a score of 3, disagree a score of 2, and strongly disagree a score of 1.

As illustrated by Figure 15, respondents are in favor of providing water to wildlife. The first five statements garner agreement on average (mean ranking values greater than 3.0), and the last two statements are disagreed with on average (mean rankings less than 3.0). Respondents' greatest agreement is with providing water to endangered species and waterfowl (statements 4 and 5).

Figure 15. Respondents' attitudes about water and wildlife.



13.0 Demographic Information

As mentioned in the methodology section of this report, the survey was posted on an internet site, and individuals provided with an e-mail link to the survey URL. Respondents came from all of the 17 survey states (Table 5) and totaled 6,250. Demographic information was collected from survey respondents and compared to U.S. Census Data for the state. For responses reported as the West, survey data were weighted according to gender, income, and state population to reflect the current population in the West. For responses attributed to Colorado, survey data were weighted according to gender and income to reflect Colorado's population. In the following sections, demographic information of survey respondents is reported.

Table 5. Responses by State

State	Number of Respondents
Arizona	530
California	477
Colorado	535
Idaho	292
Kansas	445
Montana	197
Nebraska	308
Nevada	430
New Mexico	299
North Dakota	124
Oklahoma	446
Oregon	470
South Dakota	149
Texas	467
Utah	368
Washington	569
Wyoming	144
Entire West	**6250**

13. 1 Occupation

Respondents were asked to select their occupation from a dropdown list shown in Table 6. The proportion of each employment category is shown within the table, with the largest share being retired and professional individuals.

Table 6. Respondents' Occupations – by percent

Occupation	West	Colorado
Agriculture	1.3	1.7
Business	9.7	8.8
Manufacturing	2.8	2.8
Professional	20.7	22.1
Ranching	1.1	0.9
Retail	7.2	6.5
Retired	28.7	25.4
Student	5.2	5.4
Teaching	5.2	5.8
Other	18.3	20.6

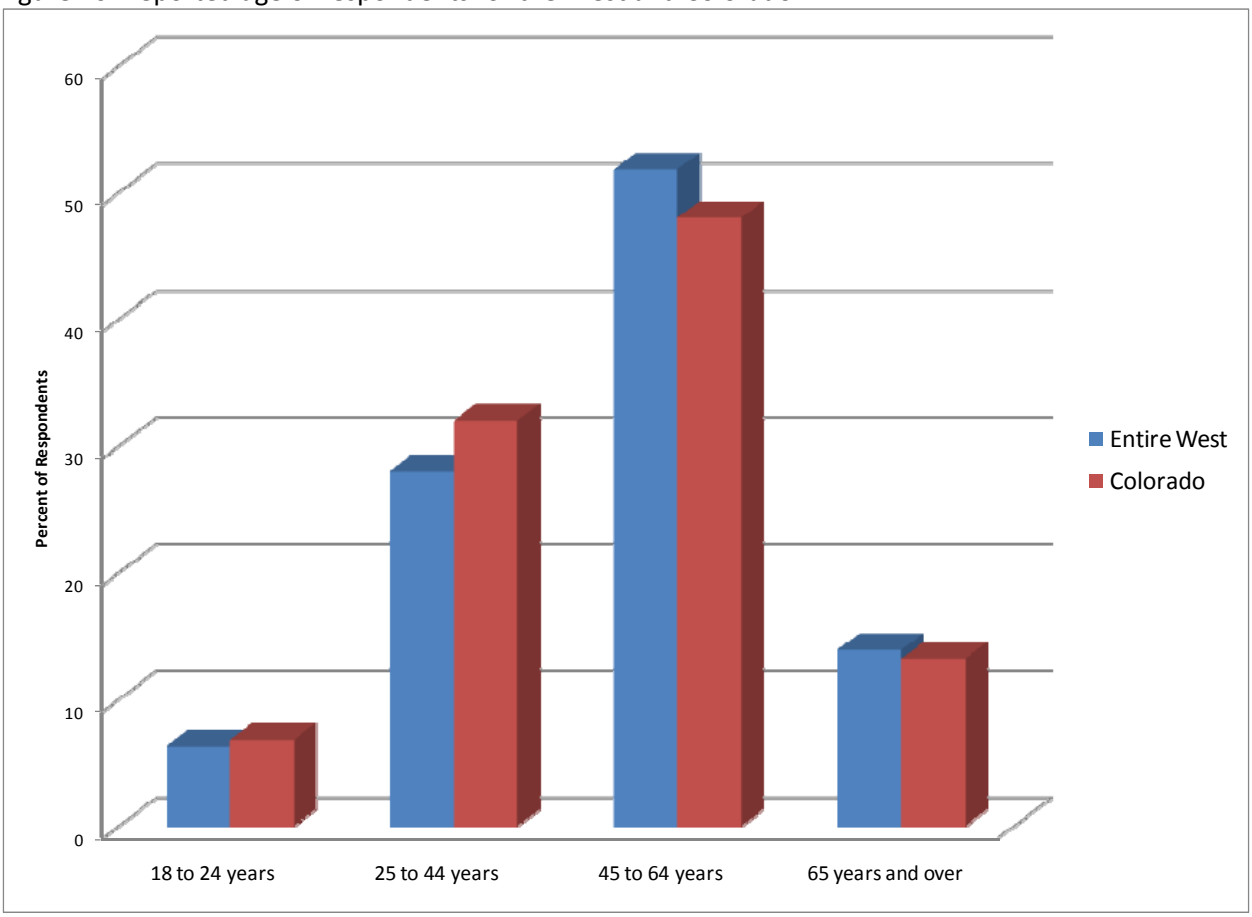
13.2 Gender

Respondents' were heavily weighted toward female. Among all western respondents, 73.5% reported their gender as female, while in Colorado 71.5% of respondents were female.

13.3 Age

Figure 16 is a histogram of age response for the West and Colorado. Respondents were asked to report their age with specific categories, and most respondents fell within the age range of 45 to 64 years. The vast majority of respondents were 64 years or younger.

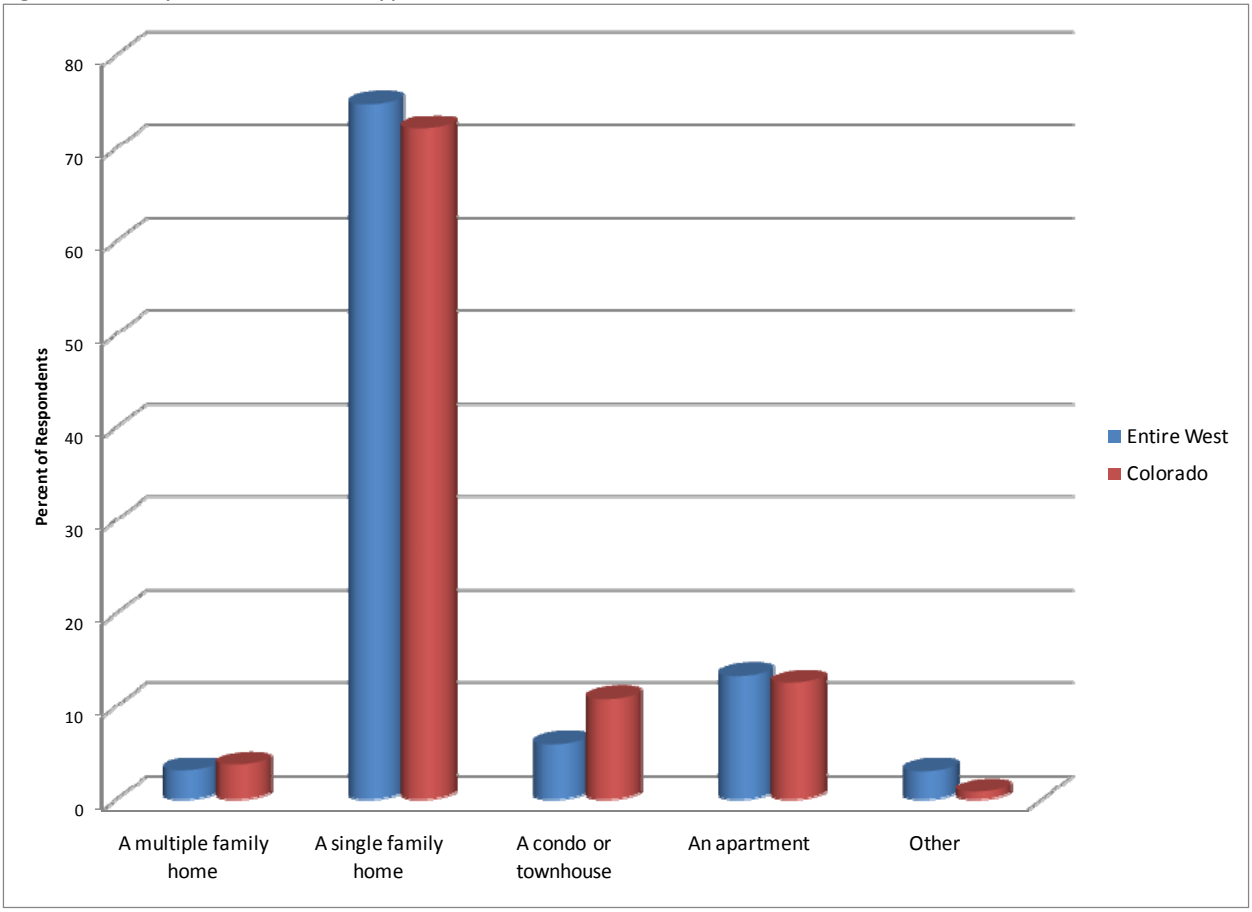
Figure 16. Reported age of respondents for the West and Colorado.



13.4 Home Ownership

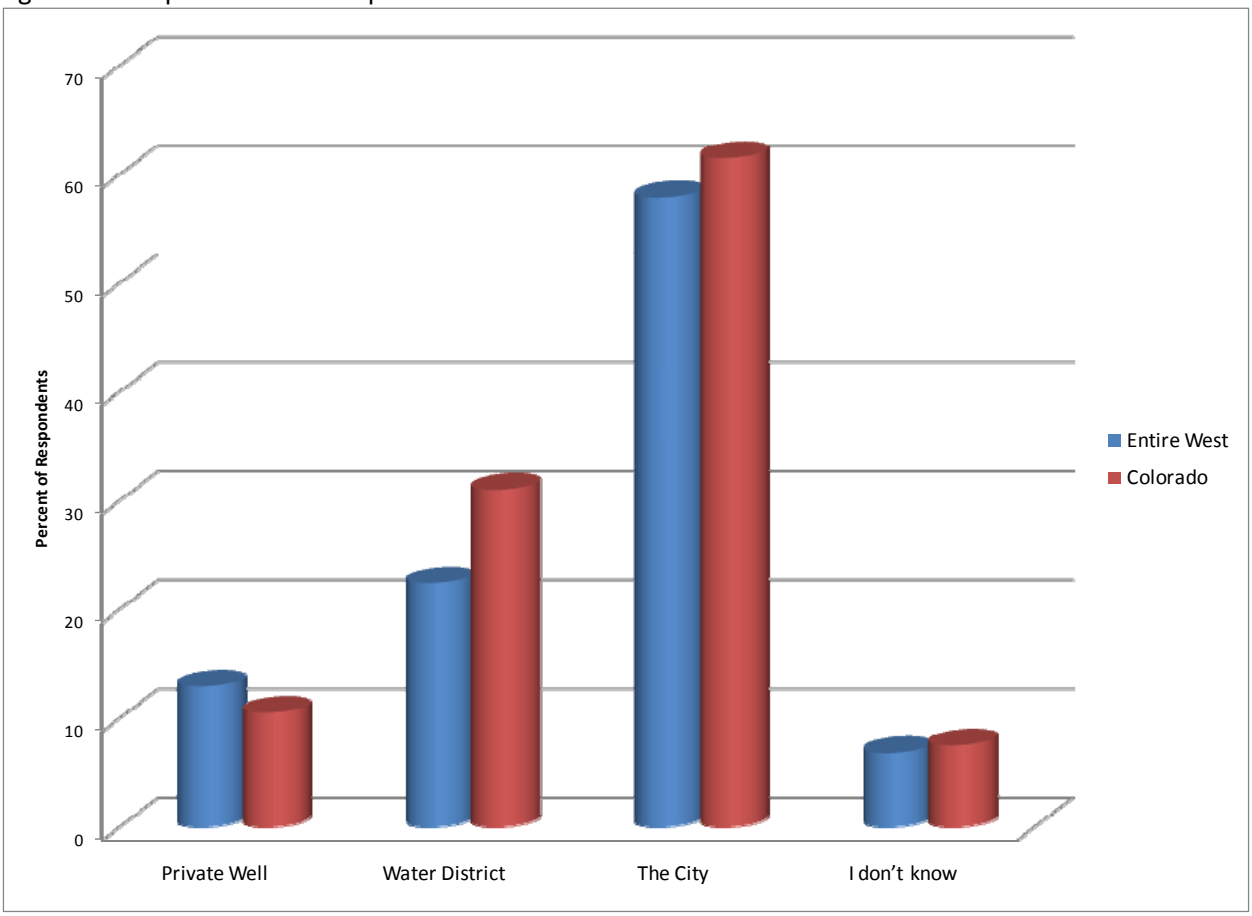
The type of home in which homeowners reside might influence perceptions of water use. For this reason, respondents were asked to indicate the type of home that they live in among the several categories shown in Figure 17. As is illustrated, the vast majority of respondents live in single family homes.

Figure 17. Respondents' home type.



When queried, 68.6% of western respondents indicated that they owned their home, and in Colorado 73.8% reported owning their home. These individuals receive most of their water from the city or from a water district (Figure 18). In addition, only 36% of western respondents indicate they have faced watering restriction during the last year. In Colorado, the proportion that faced watering restrictions is 53.6%.

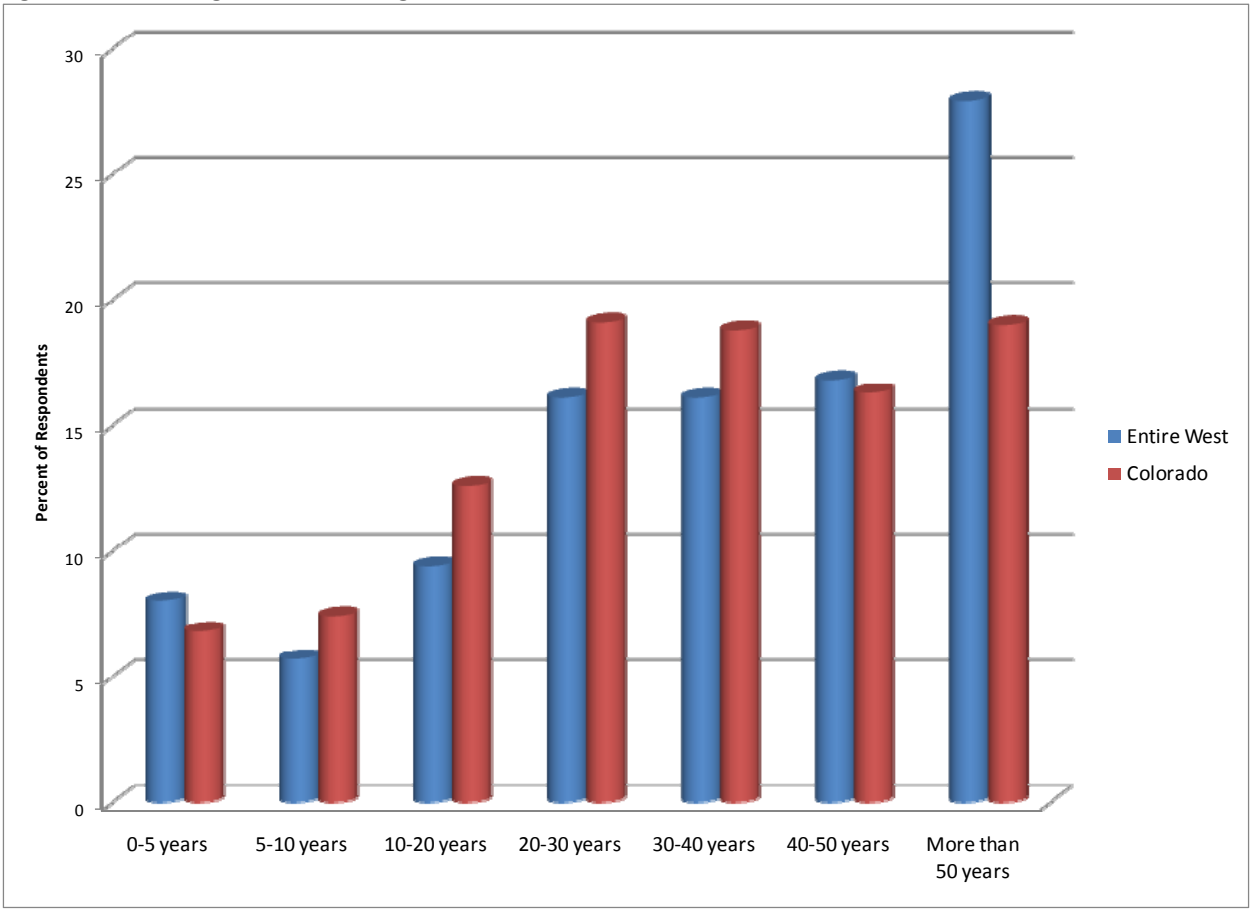
Figure 18. Respondents' water provider.



13.5 Tenure in the West

Semi-arid conditions exist through much of the 17 states surveyed in the West but not necessarily throughout the United States. Therefore, survey responses may differ according to the time in which respondents live in the West. When asked about their tenure, a surprising number of respondents reported living in the West more than 20 years (Figure 19).

Figure 19. The length of time living in the West



13.6 Community Descriptions

The relative size of the respondents' current city, and the city in which they grew up, might influence their decisions about water resources and the allocation of water among uses. The largest share of survey responses came from individuals living in large cities (greater than 250,000 residents), as indicated by Figure 20. In Figure 21, the largest share of respondents also grew up in large cities.

Figure 20. Respondents' description of their current community.

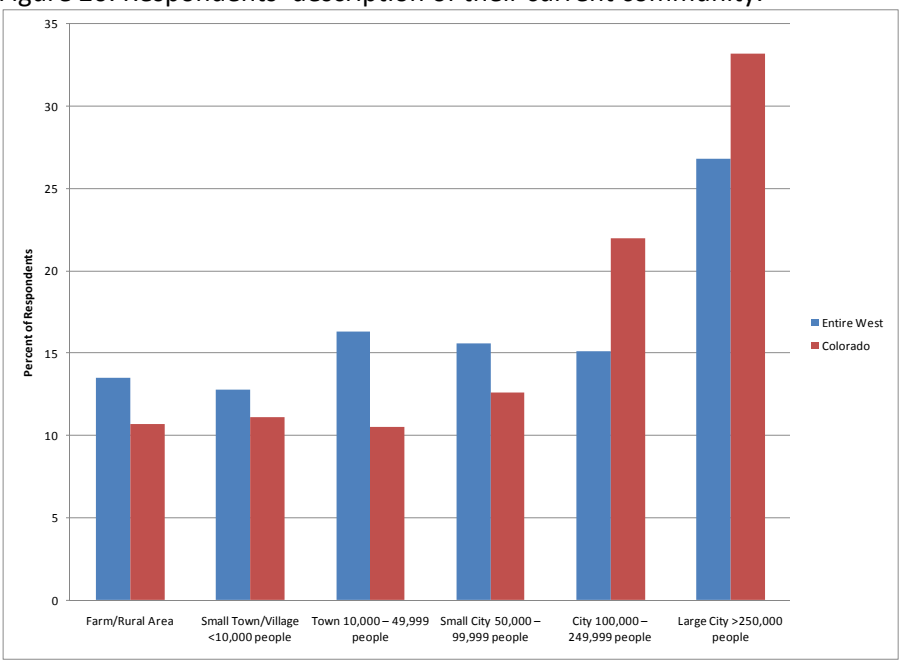
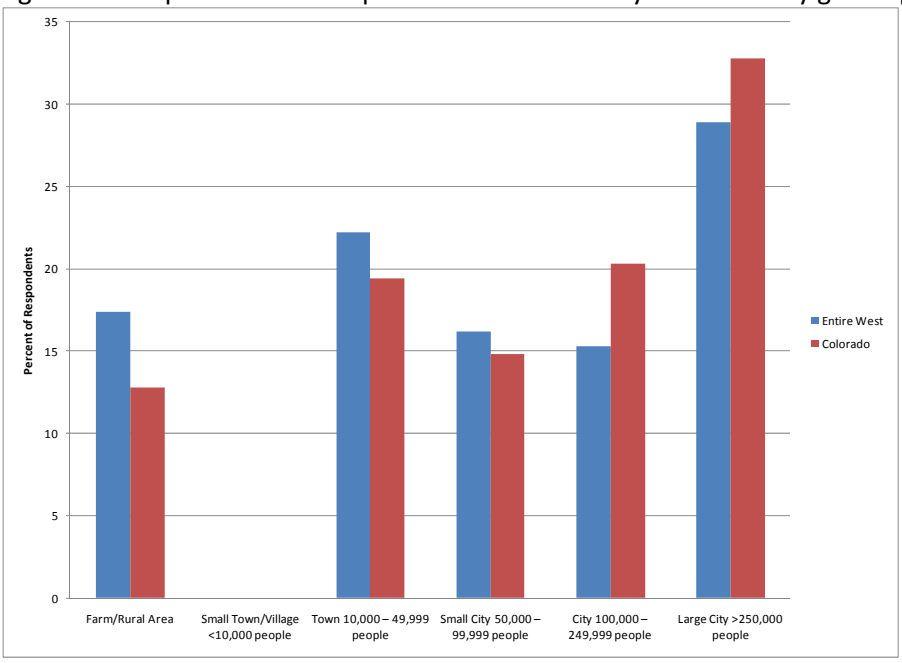


Figure 21. Respondents' description of the community in which they grew up.



13.7 Education and Income

Education and income are often important characteristics when describing the policy positions and choices of individuals. The respondents to this water resource survey tended to have some educational

training beyond the high school level (Figure 22), and their annual household income tended to be less than $75,000 each year (Figure 23).

Figure 22. Respondents' reported education level by category.

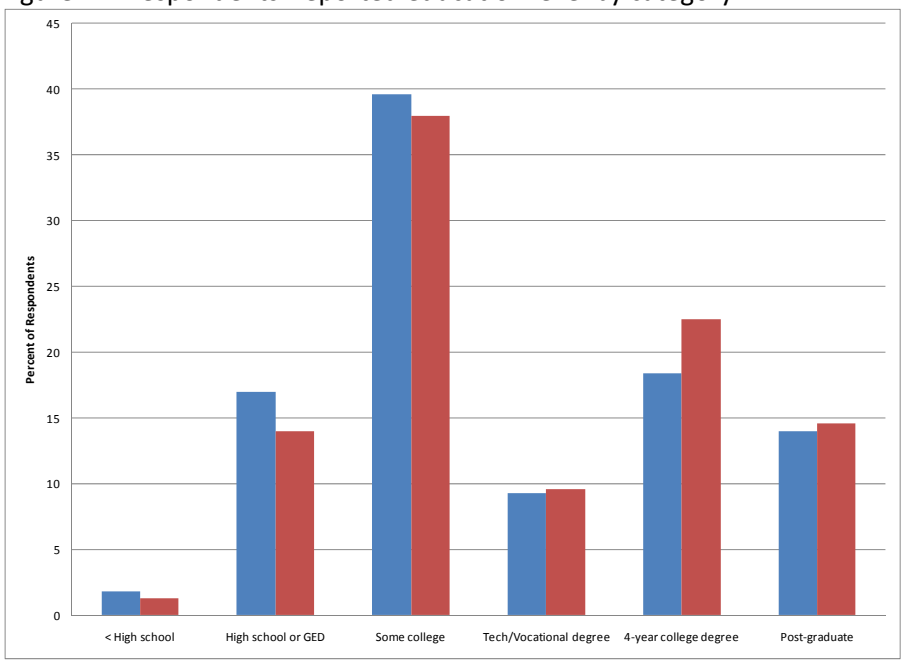
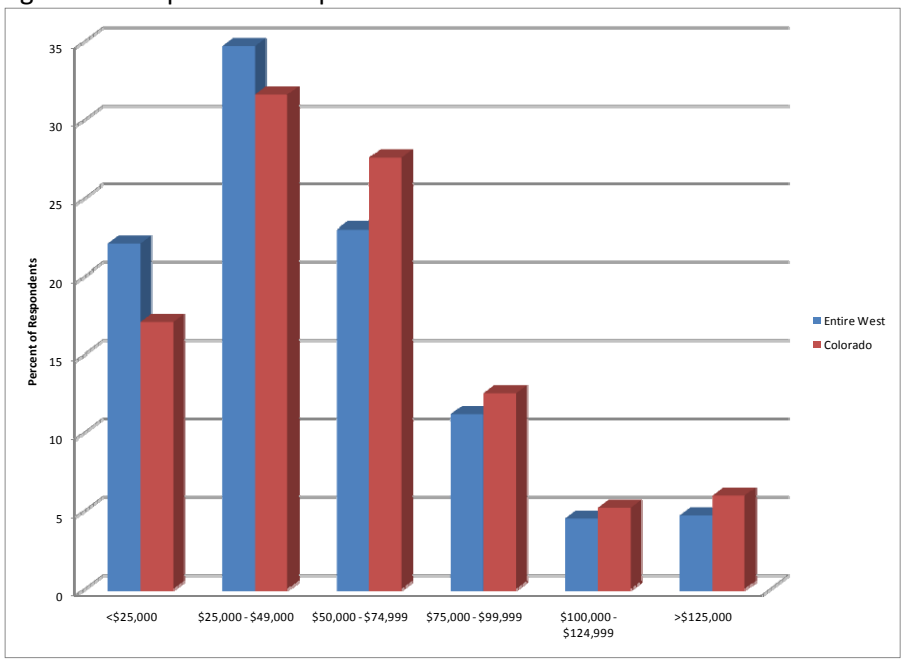


Figure 23. Respondents' reported annual household income.



Works Cited

Colorado Institute of Public Policy. 2006. Water in 2025: Beliefs and values as a means for cooperation. Living in the Rocky Mountain West, 2025. Fort Collins, CO: Colorado State University, Colorado Institute of Public Policy.

Colorado Water Conservation Board. 2004. Statewide Water Supply Initiative. Denver, CO. http://cwcb.state.co.us/IWMD/General.htm

United States. 2005. Water 2025 Preventing crises and conflict in the West. Washington, D.C. U.S. Dept. of the Interior, Bureau of Reclamation. http://purl.access.gpo.gov/GPO/LPS77383.

Western Governors' Association. 2006. Annual Report: Building a Sustainable West. Denver, CO. http://www.westgov.org/wga/publicat/annrpt06.pdf