PERCEPTIONS OF WATER
IN THE AMERICAN WEST:
A META ANALYSIS

Produced by

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EXECUTIVE SUMMARY

GlobaLocal Visions (GLV), LLC of Flagstaff, Arizona was commissioned by the University of Arizona to conduct a meta-analysis of five research reports exploring water issues and policies in Arizona and other Western states. The purpose of the meta-analysis was to highlight what is known about water issues regionally and locally and to identify gaps in knowledge related to individual attitudes, levels of awareness, and behaviors related to water issues.

- Overall, respondents were ‘very concerned’ about future water supplies, both locally and regionally. While Valley residents, on average, understand that their area is experiencing drought, half of residents in Southwestern states believe that current water supplies in their states are sufficient. Similarly, Valley respondents do not necessarily associate future water scarcity with current levels of consumption in their neighborhoods.

- The availability of clean drinking water and water for personal/household use was identified by Arizona residents as the most important water use issue.

- Regional surveys identified a general lack of knowledge regarding water pollutants. Forty percent of individuals surveyed in the Southwest do not know whether a given pollutant could affect water quality. In Arizona, 80 percent of respondents believe their home drinking water is safe; it is less clear whether Arizona residents are aware about potential pollutants in their area.

- Residential water use records demonstrate a discrepancy between perceived water use and actual water use; this includes issues related to levels of awareness and behaviors. Respondents who engage in water saving measures, such as installing low flow toilets or showerheads believe they had reduced their consumption of water. However, actual water use records indicated otherwise.
Similarly, Valley residents perceived that their indoor water use exceeded their outdoor use, when in fact, particularly during the summer months, outdoor use far exceeds indoor use.

- Results suggest that conceptions of ‘what a yard should be’ influence water use behaviors in the Valley. Individuals finding greenery more aesthetically pleasing than a desert landscape are more likely to water their lawns. Understanding these preferences and associated behaviors is crucial to developing and implementing effective water conservation programming.

- Both Southwestern and Arizona residents believe that water conservation efforts are ‘important’ and ‘impact’ their daily lives. However, many residents also feel that access to water for personal/household use is ‘a right’ and do not endorse restrictions on household water use as a short-term strategy to conserve scarce water supplies into the future. A better understanding of this tension – between the desire to conserve water and the desire to not have personal use regulated – is central to future research efforts aimed at improving water conservation programming and effectiveness.

- In general, Southwestern residents agree that the government has a role to play in water policy and management decisions; however, respondents desire a more significant voice in the decision-making process and feel that current water laws are not meeting the needs of today’s situation. Arizona residents indicate that local government has the highest degree of responsibility for protecting water quality, followed by county, city, and town officials.
INTRODUCTION

This report is a meta-analysis or survey of results from five research projects. Each of the projects investigated individual attitudes, levels of awareness, and behaviors related to water issues and policies in Arizona and other Southwestern states. The purpose of a meta-analysis is to assess the current state of knowledge within a specific policy area, highlighting what is known about a subject and identifying gaps in knowledge. Meta-analysis results are often used to construct agendas for future research in various policy arenas. A brief description of the five studies follows.

DESCRIPTION OF STUDIES

A. The Phoenix Area Social Survey (PASS), 2003

The Phoenix Area Social Survey, first conducted in 2001, is an interdisciplinary research effort designed to study “relationships between people and the natural environment.” In particular, researchers are interested in understanding “whether people’s perceptions correlate with scientifically measurable environmental conditions.”

Findings from the 2003 PASS survey reflect information gathered from interviews with 217 residents of Phoenix. Area probability sampling of housing units within designated census block groupings was employed to ensure random recruitment of participants throughout Phoenix. Interviewers recruited participants by visiting their households. Participants were offered a pair of movie tickets as an incentive to participate. Once people agreed to be interviewed, the interviews were conducted at the residence or over the phone. Interviews were conducted in both English and Spanish. The interviews were ‘nearly equally distributed’ across six neighborhoods of varying socioeconomic status in Phoenix; two ‘newer’ higher income neighborhoods (HN1, HN2), two ‘older’ middle-income neighborhoods (M1, M2), and two ‘older’ lower-income neighborhoods (L1, L2). The overall response rate was 43 percent. A majority of the participants had lived in Phoenix for ten plus years; one third had lived in Phoenix for over twenty years.
**Participant Demographics**

The median age of respondents from HN1 is 47. Eighty-four percent of those surveyed were non-Hispanic white, while 3 percent were Hispanic. In general, participants residing in HN1 are highly educated, own their homes, and have a median annual income of $118,000. The median age of respondents from HN2 is 42. Ninety-seven percent of those surveyed were non-Hispanic white. Respondents from HN2 are also highly educated, own their homes, and have a median annual income of $120,000.

The median age of respondents from MN1 is 42. Seventy-five percent of respondents were non-Hispanic white, while nineteen percent were Hispanic. The racial/ethnic makeup of this neighborhood more closely reflects Maricopa County as a whole, where 66 percent of residents were white and 25 percent were Hispanic. While the median age of respondents from this neighborhood is similar to the higher-income neighborhoods, rates of homeownership and educational attainment are lower, as is the median household income ($40,000). Compared to MN1, respondents from MN2 are slightly younger (40) and have higher rates of homeownership and educational attainment. The racial/ethnic makeup is equivalent (69% white, 22 % Hispanic) and the median household income is identical.

In LN1, respondents were younger (median age 32), less well educated (the most common level of educational attainment reported was high school), and very few respondents own their home (10%). Eighty-seven percent of respondents were Hispanic and 10 percent were white. The median household income was just $20,000. Compared to LN1, respondents from the second lower-income neighborhood were slightly older (median age 32), had far higher rates of homeownership (82%), and a higher median household income ($30,000). Rates of educational attainment were similar, as was the racial/ethnic makeup.
B. The Phoenix Area Social Survey (PASS), 2006

The 2006 PASS survey involved a larger number of participants drawn from a wider geographic area than participated in the 2003 survey. Eight hundred and eight residents from 40 neighborhoods throughout the valley participated in the 2006 study. Researchers drew neighborhood boundaries using U.S. Census maps and 40 out of a possible 100 neighborhoods were chosen for the study. Within each of the neighborhoods, 40 addresses were randomly selected as part of the general population sample. Recruitment letters were sent to the selected addresses. Researchers continued to contact the households until people from 20 households in each of the neighborhoods agreed to participate. Overall, the survey had a 51 percent response rate. Fifty-nine percent of respondents completed the survey online; 34 percent completed the survey by phone; and, 7 percent completed the survey in person. The survey was conducted in both Spanish and English.

Participant Demographics

Slightly over half of survey respondents (56 percent) were women. Sixty percent of respondents were married, and 76 percent owned their homes. All ages were represented, with the majority of respondents falling between the ages of 31-50. Seventy-three percent of respondents were white, 19 percent were Latino, 3 percent were African American, 2 percent were Native American, 2 percent were Asian, and 1 percent reported being of mixed race. All educational levels were represented, with a majority of respondents having either completed high school (26 percent) or college (28 percent). Annual household incomes ranged from less than $40,000 (35 percent) to over $85,000 (36 percent). A majority of respondents have lived in the valley between 6-25 years (49 percent). On the ideological spectrum, 41 percent of respondents self-identified as conservative, 34 percent self-identified as moderate, and 25 percent self-identified as liberal.
C. Water Issues in the Southwest, 2004

This survey was developed by the USDA-CREES Southwest States and Pacific Islands Regional Water Quality Team to “document public awareness, aptitudes, attitudes, and actions toward water quality in the Southwest States.” The survey was completed by 1,601 residents of Nevada, Arizona, and California. Survey findings are reported for each state.

Participant Demographics

A majority of respondents live in communities with less than 100,000 residents (56 percent) and just over three quarters of respondents have lived in their current state for ten years or longer (76 percent). Roughly 66 percent of respondents were male and 34 percent were female. Most participants had completed some college (31 percent) or obtained an undergraduate degree (33 percent).

D. Arizona Municipal Water Users Association (AMWUA), 2007

This study employed a mixed method approach to “test water conservation awareness, attitudes, and behaviors across nine member cities: Chandler, Gilbert, Glendale, Goodyear, Mesa, Peoria, Phoenix, Scottsdale, and Tempe.” The research took place in three stages. First, researchers conducted a series of four focus groups, with English and Spanish speaking single-family households. The information obtained from the focus groups was used to develop a survey that was then piloted to approximately 50 households. Second, a random sample of residents was drawn to participate in a telephone survey. Approximately 1,400 households were interviewed from each of the nine member cities. Third, researchers matched survey results with water use records from all participating cities, except Mesa, to “determine how awareness of water conservation programming and attitudes concerning water conservation correlates with actual water use.”
Participant Demographics

English language focus group participants were 50 percent male and 50 percent female. Spanish language participants were also 50 percent male and 50 percent female. Many participants were immigrants of varying age groups and most had never participated in a focus group.

E. Public Perceptions, Preferences, and Values for Water in the West: A Survey of Western and Colorado Residents, 2009

The Colorado Water Institute conducted an Internet survey of 6,250 individuals living in 17 Western states. The purpose of the study was to gauge public perceptions and attitudes toward “water knowledge, perceived water scarcity, strategies for easing scarcity in the short term and long run, reinvestment in rural communities that lose water as a part of their economic base, household conservation of water resources, preferences in public policies and institutions, and attitudes about wildlife and water.” Data were collected in two stages. First, three focus groups were held in “selected regions” to “identify water issues of high priority.” Second, based on insights gleaned from the focus groups, a survey was developed and administered via the Internet. An email was sent to 203,750 randomly selected households across 17 western states. Of the 6,883 people who opened the email, 6,250 elected to complete the survey, for a response rate of 91 percent. Results reflect responses from Colorado residents specifically and western residents more generally. In Arizona, 530 individuals completed the online survey.

Participant Demographics

A majority of survey participants from the West were female (74 percent) and most fell between the ages of 45-64. Nearly 70 percent of participants in the west reported owning their home and many have resided in the west for 20 years or longer. A majority of survey respondents resided in large cities (greater than 250,000). Most respondents completed some college and have an annual household income of less than $75,000.
FINDINGS AND ANALYSIS

The report findings are grouped thematically around five core issues: (1) water security; (2) water quality and pollution; (3) water use – perceptions and behaviors; (4) water conservation – awareness and behaviors; and, (5) policy preferences – governance and water issues.

A. Water Security

Water security refers to participants’ attitudes and levels of awareness related to the availability of drinking water, both at the present time and into the future. Questions probed the implications of water security at the local, state, and regional levels. Out of the five surveys, three directly asked respondents to comment on water security. In the 2003 PASS survey, slightly over half of respondents said they were ‘very concerned’ about the future water supply in the Valley. Yet, only 21 percent of respondents were ‘very concerned’ about the amount of water used by their neighbors. According to the report, “Valley residents have evidently internalized the idea that water is scarce in the desert, [but] PASS respondents do not directly associate a future shortfall with residential water consumptions in their neighborhoods.”

In the 2006 PASS survey, attitudes toward water scarcity remained similar to those reflected in the 2003 survey. A ‘vast majority’ of respondents reported being ‘very’ or ‘somewhat’ concerned about the amount of water being used by people who live in the Valley. Further, 85 percent of respondents agreed that the Valley is ‘experiencing a drought,’ and were ‘very’ or ‘somewhat’ concerned about the impacts of the drought on the Valley. Importantly, while respondents were clearly aware that the Valley is experiencing a drought and expressed concern over the amount of water being consumed, one-quarter of respondents believe that residents of the Valley have ‘the right’ to use all the water they need.
Further, the 2006 PASS survey asked respondents to comment on what they perceived to be the causes of future water shortages. Most respondents identified ‘long-term drought,’ followed by ‘people moving to the Valley,’ and ‘climate change’ as the primary causes of future water shortage in the valley. PASS researchers concluded that residents “perceive a variety of causes for complex environmental problems [but] tend to place more blame on nature and general social trends than their own actions for creating critical problems that face the Valley.” Regionally, ‘future water scarcity’ in the West was identified as a significant concern by a majority of respondents participating in the Colorado Water Institute survey (CWI). Likewise, future water scarcity in respondents’ state of residence was identified as a significant concern by a majority of those surveyed. However, half of respondents perceived that current water supplies in their states were ‘sufficient.’

**B. Water Quality and Pollution**

In the 2004 Water Issues in the Southwest (WIS) survey, the availability of clean drinking water was identified by respondents as being among the most important water use issue. More specifically, Arizona respondents ranked ‘clean drinking water’ and ‘water for household/personal use’ as extremely important issues. The WIS survey found a general lack of knowledge among respondents regarding potential water pollutants. Regionally, over 40 percent of respondents did not know whether a “given pollutant affects the water quality in their area.” Despite the lack of knowledge, a majority of Arizona respondents believe their home drinking water is safe (80 percent).

The 2003 PASS survey asked respondents to rank their concern about several physical and environmental conditions. The survey gauged responses at the neighborhood level and the Valley as a whole. ‘Drinking water safety’ was the largest concern in the neighborhoods and a significant concern for Valley residents as a whole. In addition, 9 out 10 respondents consume bottled water or filtered water in their homes. PASS Researchers noted that since recent publicized studies demonstrated the safety of
drinking water in the Valley, “it is important to explore in future surveys why many
people are concerned about the public water supply.”

**C. Water Use – Perceptions and Behaviors**

The data collected on residential water use suggests a discrepancy between perceived
water use and actual water consumption. Roughly half the respondents surveyed by the
AMWUA, report making lifestyle changes to reduce their water consumption. These
changes include: watering the lawn less frequently, running the washing machine less
frequently or only with full loads, and/or installing low-flow toilets or showerheads.

However, actual water use records demonstrate that, although respondents perceived
they had reduced water consumption, they did not use any less water when compared
to respondents who did not report employing water conservation behaviors.

Likewise, most AMWUA respondents perceived that their indoor water use exceeded
outdoor water use. However, water use records indicate that outdoor water use far
exceeds indoor use, particularly during the summer months when water use nearly
doubles; this doubling of water use is the result of activities such as watering the lawn or
maintaining outdoor pools.

A majority of the AMWUA respondents characterized themselves as ‘average’ water
consumers and most frequently identified sources other than themselves as consuming
the highest amount of water in their communities, such as golf courses, city
governments, and ‘my neighbor,’ These findings suggest a tendency for individuals to
externalize concerns about water consumption in their communities, while misperceiving
their own rates of consumption.

Findings from the 2003 PASS survey also highlight the discrepancy between perceived
water use and actual water use behaviors. This study indicates that residents from
higher socioeconomic brackets are less concerned about water use in their
neighborhoods compared with middle to lower class residents who report higher levels
of concern about water use. However, despite a lack of concern over water use in their neighborhoods, wealthier residents are responsible for “putting more pollutants in the air, soil, and groundwater than middle or lower-income households” (2003 PASS survey: pgs. 29-30) suggesting that higher income residents misperceive the impact their lifestyle choices have on the environment around them.

The AMWUA and the 2003 PASS survey indicate that outdoor watering and swimming pools constitute a ‘major component’ of water use in the Valley. Seventy percent of all PASS respondents believe that “well watered grass and trees” improve the appeal of their neighborhoods. Similarly, PASS respondents from all socioeconomic backgrounds “desire less desert and more greenery” than they presently have. When asked to elaborate on why they prefer greenery to a more natural desert landscape, respondents replied that grass and trees are more ‘attractive,’ ‘cleaner,’ and provide a ‘nicer place’ for children to play. Those who prefer desert landscaping do so because, it ‘looks natural,’ ‘conserves water,’ and is ‘low maintenance’ are motivating factors. AMWUA researchers conclude that “understanding how landscape aesthetics shape the Valley’s perceptions of what a yard ‘should be’ is key to developing effective outdoor water conservation programs.”

**D. Water Conservation – Awareness and Behaviors**

With the exception of the WIS report that focuses specifically on issues of water quality in the West, each study examines respondents’ levels of awareness and behaviors related to water conservation. Broadly speaking, most respondents living in the Southwest believe that water conservation is ‘important’ and ‘impacts’ their daily lives, but respondents stopped short of endorsing a restriction on household water use as a short-term strategy to secure scarce water supplies in the West. In fact, when asked to prioritize how water should be allocated in the short term, ‘household use’ received the highest ranking from western respondents.
A similar sentiment holds true for respondents living in the Valley. The 2003, 2006, and AMWUA surveys found that water conservation is an important issue that impacts peoples’ daily lives. However, as 2006 PASS researchers noted, there is a tension between respondents’ “positive attitudes toward conservation and their desire to have more land and water available for private household use.” For example, in 2006, 61 percent of PASS respondents report trying to reduce their water consumption, typically by installing water-saving devices such as low-flow toilets or showerheads. Conversely, half of respondents said it would be ‘almost impossible’ to reduce their home water consumption from the past year.

The AMWUA survey also tracked respondents’ awareness of “Water – Use it Wisely (WUIW),” a water conservation program used in nine cities throughout the Valley. Although very few respondents were able to name the program unaided, 84 percent, when aided, were familiar with some of the objectives of the program. Tentatively, WUIW may affect attitudes toward water conservation, as those respondents who were “aware and knowledgeable about the program were more likely to report altruistic motives for conserving water.” At the same time, when researchers analyzed the water use records of respondents who were familiar with WUIW, they did not find a statistically significant relationship between awareness of WUIW and observed water use.

**E. Policy Preferences – Governance and Water Issues**

When asked about the role government should play in water allocation and conservation, many western respondents ‘strongly agreed’ that the government is responsible for ‘managing growth,’ and that government entities ‘combine land use and water resource planning’ (CWI survey: pg. 20). Most participants also strongly agreed that public money should be used to ‘develop or acquire new water resources’ (CWI survey: pg. 22). Furthermore, respondents felt that local governments in the Southwest should ‘require residents to take steps to conserve water’ (CWI survey: pg. 22).
In general, western respondents were unsatisfied with government water management policies and practices. Respondents believe that policy-makers ‘do not understand their priorities,’ and desire a larger voice in water management policy decisions. Participants tended to strongly agree that ‘water laws need to be changed to better meet today’s situation’ (CWI survey: pg. 23). Although western survey respondents largely agreed that the government has an important role to play in water policy and management decisions, when asked to rank who should make water conservation decisions, ‘individuals/households’ received the highest ranking followed by ‘local government,’ ‘state government,’ ‘federal government,’ and ‘businesses/corporations’ (CWI survey: pg. 24).

In Arizona, 43 percent of respondents indicated that ‘local government’ has the highest degree of responsibility for “protecting water quality in their communities,” followed by ‘county, city, or town officials’ (34%), the ‘federal government’ (12%), and ‘individual citizens’ (6%) (WIS survey: pg. 3). A slightly higher percentage of Arizona respondents (38%) reported that the environment does not receive enough emphasis from local and/or state elected officials, while 31 percent indicated that the emphasis put on environmental issues by elected officials is ‘about right’ (WIS survey: pg. 3).

Importantly, the 2006 PASS survey asked respondents to indicate their level of trust in several sources of environmental information. The survey demonstrated that respondents trust ‘university scientists’ more than any other source of information about the environment, followed by utility companies, local environmental groups, and the local government. As the PASS researchers note, “Public confidence in sources of environmental information is important for convincing people to change behaviors that negatively impact the environment. The high confidence placed in university scientists suggests that the public would be receptive to more direct engagement with scientists” (2003 PASS report: pg. 37).
The CWI survey asked western respondents to indicate their policy preferences to secure water supplies and meet demand, both in the short term, and the long term. To meet demand in the short term, results suggest a preference for restricting public and private watering, followed by limiting industry use. ‘Permanent transfers’ from farms to cities was the least preferred strategy for meeting demand in the short term. To meet demand in the long term, results suggest a strong preference for ‘building reservoirs’ and ‘reusing water.’ The least popular strategy was ‘buying water from farmers.’ To fund these strategies in the long terms, respondents indicated a preference for ‘increased water rates – based on use,’ and ‘increasing fees on new housing development.’ The least popular funding strategies were increased rates on ‘all water bills’ and policies that reallocate city budget funds to water.
CONCLUSIONS

In summary, this meta-analysis suggests that Arizona residents, and Southwestern residents more broadly, are aware that water scarcity is a significant issue facing the West now and into the future. As the findings indicate, several important discrepancies exist between respondents’ awareness of water scarcity issues and their actual water use behaviors, perceptions, and preferences. For example, respondents tended to externalize their concerns about consumption; citing their neighbors, the city, or private businesses (i.e. golf courses) as the largest consumers of water, while misperceiving their own rates of consumption. Further, although a majority of respondents understand that water is a scarce resource that warrants conservation efforts, many believe they have ‘the right’ to use all the water they need. Thus, securing water for personal use now and into the future, was selected by respondents as the top ‘water use’ priority. This contradictory sentiment - the desire to conserve water, a threatened resource, and have an unlimited supply of it for personal/household use – highlights a persistent tension found throughout the reports.

This meta-analysis also suggests a misunderstanding related to how lifestyle choices can impact water consumption. For example, AMWUA respondents perceived that indoor water use exceeded outdoor use, when in fact the opposite is true. During the summer months outdoor water use, largely due to lifestyle choices, such as maintaining a swimming pool, nearly doubles. Likewise, individual conceptions of landscape aesthetic play an important role in determining how household water will be allocated. Individuals who believe, as seventy percent of PASS respondents do, that “well watered grass and trees” improve the appeal of their neighborhood, will likely use greater quantities of water than those who prefer desert landscaping.

Although tentative at best, the 2003 PASS survey indicated that socioeconomic status may affect rates of water consumption and water use behaviors. If wealthier individuals/households are indeed responsible for putting a greater share of pollutants
into the groundwater and less concerned about water use in their neighborhoods, more intensive water conservation efforts and programming may be needed in wealthier communities.

These findings provide researchers at the University of Arizona with a better understanding of individual attitudes, levels of awareness, and behaviors related to water issues and policies in Arizona and the West more broadly. However, in order to move toward a more complete picture of water use behaviors and preferences in Arizona there are some gaps in the extant research that need further exploration. These gaps are identified and discussed in the following section.
RECOMMENDATIONS FOR FUTURE STUDY

GlobaLocal Visions recommends further exploration of the following topic areas:

1) **Implement research targeting rural communities and communities of color.** The studies reviewed herein focused largely on urban areas in Arizona and a vast majority of those surveyed were white men and women. For example, how does class/race/gender/geographic location/age affect how we think about water issues?

2) **Better understand how issues involving water use are conceptualized by people.** Do people see the issue as an individual problem, a community problem, or a national problem? There is a need to better understand how people understand and think about this issue (what motivates people to conserve water?) in order to implement effective programming.

3) **What motivates people to get involved in issues involving water?** People in the West are unsatisfied with government water management policies and practices and desire a larger voice in policy decisions. Additional research in Arizona could work to better understand this sentiment and determine ways to empower residents to have a greater voice in water management decisions.

4) **How are youth understanding issues involving water?** Youth are growing up in an age of unprecedented information, use digital technology, and access to disposable income. Are youth thinking about water issues differently than previous generations?

5) **Are current water conservations programs working?** Do programs change behaviors? Are people open to learning new information and acting differently once they understand this information?
RESEARCH CITED


Center for Environmental Studies. 2003. Phoenix Area Social Survey: “Community and Environment in Desert Metropolis.” Arizona State University, Tempe, AZ.


Global Institute for Sustainability. 2006. Phoenix Area Social Survey: “Community and Environment in Desert Metropolis.” Arizona State University, Tempe, AZ.

USDA-CSREES Southwest States and Pacific Islands Regional Water Quality Program Team.

APPENDIX A

A. The Phoenix Area Social Survey (PASS), 2003

B. The Phoenix Area Social Survey (PASS), 2006

C. Water Issues in the Southwest, 2004

D. Arizona Municipal Water Users Association (AMWUA), 2007

E. Public Perceptions, Preferences, and Values for Water in the West: A Survey of Western and Colorado Residents, 2009
2006 HIGHLIGHTS

PHOENIX AREA SOCIAL SURVEY

Community and Environment in a Desert Metropolis

Central Arizona–Phoenix Long-Term Ecological Research Project
Contribution No. 4, December 2007
Global Institute of Sustainability, Arizona State University
2006 HIGHLIGHTS

PHOENIX AREA SOCIAL SURVEY

Community and Environment in a Desert Metropolis

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Arizona State University (ASU) researchers conducted the first Phoenix Area Social Survey (PASS) in 2001 to study relationships between people and the natural environment in eight neighborhoods of Phoenix, Arizona. In 2006 we conducted a larger survey of 808 households in 40 neighborhoods in the Valley, an area that stretches from Cave Creek to the north to Chandler to the south, and from Glendale in the west to Apache Junction in the east. PASS focuses on residents’ opinions about quality of life and the condition of the natural environment in their neighborhoods and in the region. Respondents answered questions about four areas of the environment:

- Land use
- Water supply
- Air quality
- Climate change

One unique feature of PASS is that social scientists are working with ecologists and other environmental scientists to understand whether people’s perceptions correlate with scientifically measured environmental conditions, such as high temperatures, the existence of long-term drought, and the abundance and variety of trees, plants, and wildlife. Another unique feature is that we draw our sample of households from a variety of different kinds of neighborhoods so that we are certain to include viewpoints from a diverse group of people.

We will repeat the survey every five years, as we aim to create a historical record of trends in the attitudes and behavior of area residents. Our goal is to answer the following questions:

- How do communities form and adapt in rapidly urbanizing regions?
- How do knowledge, perceptions, and preferences affect behaviors that change the environment?
- How do inequalities and cultural differences in neighborhoods affect the environment?
- How do changes in social and physical environments affect neighborhood quality of life and vulnerability to environmental hazards?
People with similar education and income levels and similar race/ethnicity tend to live near each other in urban and suburban areas. In turn, neighborhood environments shape residents’ personal views on quality of life and local issues.

Our survey reflects the diversity of neighborhoods, households, and people who make up the Valley. We drew the neighborhood boundaries according to US Census maps, which divide neighborhoods into areas that are about one-quarter square mile. We selected 40 neighborhoods chosen from among nearly 100 where scientists working with the Central Arizona–Phoenix Long-Term Ecological Research project are collecting ecological data on soil, temperature, vegetation, and fauna. Some of these neighborhoods are in the urban core (within 5 miles of downtown Phoenix or 1.5 miles of the 7 other large-city downtowns). Others are on the urban fringe of development, where new homes were being built from 2001-2005. A third group of neighborhoods is called suburban because they are located between the older and newer areas. The fourth group is retirement communities where the average age of residents is over 55.

We chose some neighborhoods where more than two-thirds of the residents were White/Anglo, others where more than half the residents were Hispanic/Latino, and a third group with mixed race/ethnicity. The average annual household income of neighborhoods varied from $22,000 to $120,000. Within each of the 40 chosen neighborhoods, 40 addresses were randomly selected for the survey sample. These addresses included all types of homes: single-family, multi-family, apartments, townhouses, condominiums, and mobile homes.
PASS Respondents

Surveys were conducted from April 29 through September 27, 2006 by ASU’s Institute for Social Science Research. A recruitment letter, in English and Spanish, asking for the household’s participation in the survey was sent to each of the 40 addresses. We continued contacting these households until 20 households in the neighborhood agreed. In each household, a randomly selected adult was asked to complete the survey. The study’s response rate was 51% with 808 respondents. Of these 808 people, 59% took the survey on the Internet, 34% were surveyed on the phone, and 7% were interviewed in person. Respondents had the option of taking the survey in English or Spanish. It took an average of 45 minutes to complete the phone survey.

How People Answered the Survey

- Internet, 59%
- Telephone, 34%
- In-person, 7%

Profile of Survey Respondents

The following graphs show the characteristics of the PASS respondents. Similar to most social surveys, most of the respondents were women and older white people with higher levels of education. However, PASS represents all groups of the population. For example, Latinos were 19% of all respondents, and 10% of the surveys were given in Spanish. All ages, education, and household-income levels, employment statuses, ranges of residential tenure in the Valley, political orientations, and locations were represented. Respondents were paid an incentive for completing the survey. Below and on the next page is some information on who took the survey.

- 56% Female
- 60% Married
- 39% have children under 18 living at home
- 76% own their own home
- Average number of people in household = 3.8
ASU faculty and students – now, and in years to come – will use the collected data in many studies. This report highlights the first findings that have emerged from PASS. Studies using the 2006 data include topics such as:

- Perceptions of air-quality conditions and policies to enhance air quality
- The relationship of heat-related illnesses to variations in summer temperatures
- The influence of human activities on bird populations
- The relationship of environmental values to water-conservation behavior
- Crime, fear, and neighborhoods parks
- A comparison of social bonding in different neighborhoods
- Residential-landscape preferences
- Comparison of the public’s beliefs about the causes of local environmental problems with beliefs of ASU scientists

Cactus wren photo by Eyal Shochat
***FINDINGS: COMMUNITY***

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**Migration and Residential Mobility in the Valley**

Where Do We Come From?

Most adults who live in the Phoenix metropolitan area were not born there but have migrated from other parts of the US, Mexico, and elsewhere. Only 19% of the survey respondents were native Arizonans.

According to the 2000 US Census, for metropolitan areas, Phoenix has one of the smallest percentages of residents who were born in the state of current residence. In other words, compared to most big cities, Phoenix has more people who came from somewhere else.

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Birthplaces of PASS Respondents

- Phoenix Area, 14%
- AZ, not Phoenix, 5%
- US, not AZ, 66%
- Mexico, 10%
- Other Country, 5%

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How Long Have We Been Here?

... Average time survey respondents have lived in the Valley = 18 years

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How Often Do We Move?

... Average number of residences survey respondents have lived in the Valley = 3
... Average in current home:
  - Homeowners = 6 years
  - Renters = 2 years
When Will We Move Again?

Nearly 2 of 5 respondents thought they would definitely or probably move from their present home within two years.

Two-Year Moving Plans of PASS Respondents

Where Do People Want to Move?

3 of 5 respondents said they would like to move away from their current home. In roughly equal proportions, this group would like to move elsewhere in the Valley, elsewhere in Arizona, or outside Arizona. Although most people would prefer to move out of their current home, most of them do want to stay in Arizona.

Where PASS Respondents Would Like to Live

Highlight: Relatively few adults have lived in the Valley for their entire lives. Respondents move frequently within the Valley. A large minority (38%) envisions another move within two years. The people who say they plan to move or that they would like to move have a variety of destinations in mind, suggesting that there are many different reasons for moving. Given a choice of where to live, four of five respondents would stay in Arizona, and three of five would stay in the Valley.
Where Do We Feel a Strong Sense of Belonging?

We asked respondents, *How much do you feel a sense of belonging in...* On a scale of 1 to 10, respondents rated their attachment to various places. Over 80% of respondents expressed a high sense of belonging in or attachment to the US. Not as many people were as strongly attached to the region, state, metropolitan area, city, or neighborhood. Of these places, people were most likely to strongly identify with the state of Arizona – 60%. About half the respondents saw the Valley as a place where they felt a high sense of belonging, and slightly less than half felt strongly attached to their neighborhoods. Only a minority of people – 20% or less – replied that they do not belong here at all.

Place attachment differs according to where people are from...

Native-born residents were more attached to the Valley than migrants from outside the Valley.

*Birthplace and Sense of Belonging in the Valley*
Place attachment differs significantly by length of residence in the Phoenix area and by self-described political attitudes . . .

Increasing amount of time lived in the Valley and being politically conservative were associated with a stronger sense of belonging in the Valley.

**Highlight:** Compared to the strong sense of national identity that most respondents felt, their local attachments were weaker. The Valley’s lack of deep historical roots and peoples’ frequent moves seem to impair the sense of belonging for many people, since respondents who were born here and have lived longest in the Valley also had the highest sense of belonging here. Interestingly, Mexican immigrants felt a stronger sense of belonging in the Valley than immigrants from elsewhere. However, the vast majority of people felt some degree of belonging. With Arizona generally falling into the “red state” category, respondents who identified themselves as conservatives or moderates felt a greater sense of local belonging than those with liberal political views.
Neighborhood Social Bonds

Who Has Strong Social Bonds in Valley Neighborhoods?

The strength of the social bonds among people in a community is called “social capital.” Neighborhood social capital is formed by people talking to each other and performing acts of friendship that lead to trust and good feelings among neighbors. Social capital improves the quality of life in neighborhoods and may be used to gain resources for residents or to prevent outside problems from interfering with neighborhood life. We measured respondents’ perceptions of three kinds of neighborhood social capital: *neighborliness, trust, and activism*. . .

Neighborliness differs significantly by gender, length of residence in the same neighborhood, and politics . . .

**NEIGHBORLINESS** is the amount of association or interaction that neighbors have with each other. We asked respondents, *How many neighbors were friends and how often they did favors and visited with neighbors*. On a scale of 1 to 5, the average neighborliness score for all respondents was 2.83. Men, people who had lived in the Valley longer, and people who identified themselves as politically conservative reported engaging in more neighborly behavior.

![Gender and Neighborliness Chart](image)

![Length of Neighborhood Residence and Neighborliness Chart](image)
Trust in neighbors differs significantly by length of residence in the same neighborhood, the type of neighborhood, and politics . . .

**TRUST** is the bond people feel with their neighbors and the confidence placed in neighbors to behave responsibly. We asked respondents if they could trust their neighbors; if their neighbors got along; if it was a tight-knit neighborhood; if neighbors could be depended upon to solve problems cooperatively.

On a scale of 1 to 4, the average trust score for all respondents was 3.08. People who had lived in their neighborhood longer than five years, who lived in retirement communities, and who were politically conservative reported having more trust in their neighbors.

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**Politics and Neighborliness**

![Bar chart showing self-reported political attitudes and trust](chart.png)

**Length of Neighborhood Residence and Trust**

![Bar chart showing trust by length of residence](chart.png)

**Type of Neighborhood and Trust**

![Bar chart showing trust by type of neighborhood](chart.png)
Neighborhood activism differs significantly by politics and household income . . .

**ACTIVISM** is measured by the actions people take to solve problems in their neighborhoods. We asked respondents *if they were active in attending neighborhood meetings, working on projects, or contacting government officials about neighborhood problems.*

On a scale of 1 to 5, the group average activism score for all respondents was 2.13. Politically moderate people reported engaging in the fewest neighborhood problem-solving activities. Conservatives reported engaging in the most. The level of activism increased steadily with higher household incomes. The length of time people had lived in their neighborhood did not make a big difference in how active people were.
**Highlight**: Overall, Valley residents scored just above the middle of the scale on neighborly behavior and a little higher on trusting their neighbors. People scored below the midpoint of the scale on being active neighborhood problem-solvers. All of these social bonding activities were spread unevenly over different segments of the population. Longer-term neighborhood residents had stronger bonds than recent arrivals. People in retirement communities were more trusting of their neighbors. People who identified themselves as politically conservative reported being more neighborly, trusting, and active in neighborhood affairs, perhaps because they have more like-minded neighbors. People with the lowest household incomes were much less active in solving neighborhood problems. There are many possible explanations why this might be the case, but this inactivity could lead to having more problems in their neighborhoods.
**Appreciation of the Desert Environment**

*How Do Valley Residents Feel About the Desert?*

We asked survey respondents how much they agreed with the statement, *The desert is a very special place to me.* The great majority of respondents – 80% – agreed that the desert is special and nearly half strongly agreed with that statement. In answer to a different question, only 18% thought that *the desert is an empty wasteland.*

Feeling that the desert is special does not differ according to gender, politics, or location . . .

Identical percentages of men and women, and similar percentages of people across the political spectrum and in all locations, agreed that they appreciate the uniqueness of the desert.

Feeling that the desert is special differs significantly by household income and according to how long people have lived in the Valley . . .

People in lower-income households were more likely to agree strongly that the desert is a special place, while higher-income people still agreed but felt less strongly about it. People who had lived in the Valley the longest were much more likely to agree strongly that the desert is a special place.
Highlight: A very high proportion of Valley residents agreed that the desert is a special place. In fact, about half the respondents expressed a strong identification with the Valley’s natural environment – the same number (though not necessarily the same people) who reported a strong sense of belonging in the Valley’s social environment. Appreciation of the regional natural environment appears to grow stronger the longer people live here.

Implication: With so much of the Valley’s population expressing appreciation for our desert surroundings, efforts to preserve pristine desert should be welcome. There is, however, a small but noteworthy segment of the population that feels otherwise.
Land Preservation

We asked respondents, *Do you support or oppose preserving more land for wilderness, riverbank habitats, regional parks, agriculture, and neighborhood parks?* A majority expressed high or medium support for more land preservation. The strongest support – more than 60% of respondents – was for preserving more wilderness and land along waterways. Approximately half the respondents strongly supported preserving more land for parks and agriculture.

But one-third of respondents felt that homes in their neighborhoods are spaced too close together. This view, which supports low-density residential settlement, would leave less land for conservation and public uses. People in the central city and retirement neighborhoods were less likely to feel crowded than people in suburban or fringe neighborhoods.

Homes in Own Neighborhood Are Crowded

<table>
<thead>
<tr>
<th>Type of Neighborhood</th>
<th>Feel that Homes are Spaced Too Close Together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Cities</td>
<td>27.1%</td>
</tr>
<tr>
<td>Suburban</td>
<td>35.2%</td>
</tr>
<tr>
<td>Urban Fringe</td>
<td>35.5%</td>
</tr>
<tr>
<td>Retirement Community</td>
<td>17.5%</td>
</tr>
</tbody>
</table>
Water Conservation

We asked respondents, *How concerned are you about the amount of water being used by people who live in the Valley?* The vast majority was very or somewhat concerned about the amount of water being used by people who live here. 85% agreed that we are experiencing a drought in the Valley. Almost everyone was very concerned or somewhat concerned about the impacts of drought on the Valley.

But one-quarter of respondents thought that people in the Valley have the right to use all the water they need. Conservatives were twice as likely as liberals to believe this, although most conservatives did not agree with the statement.

Although 61% of respondents had looked for ways to reduce water consumption at home in the past year, half the respondents said it would be almost impossible for them to reduce their home water consumption from the past year.
Many Valley residents – 60% – strongly favored more land conservation and were concerned about overconsumption. However, not everyone shared these concerns to the same degree or about the same issues. Even some of those who favor more conservation desired less dense residential settlement and did not believe that they could reduce their domestic water consumption.

Implication: Many people seem caught between their positive attitudes toward conservation and their desire to have more land and water available for private household use. Perhaps better information about how to conserve resources through alternative lifestyle choices could make the ideas of conservation and comfort more compatible.
Air Pollution and Climate: Health Problems

How Does the Environment Affect Us?

We asked respondents, *Do you think that air quality in the Valley is improving, staying the same, or worsening over time?* We also asked, *Do you think the temperature in the Valley is getting hotter or staying the same?* About 3 respondents of 4 saw these conditions as getting worse/hotter.

Perceptions About Trends in Valley Air Quality and Temperature

- **Air Quality**
  - 100% Worsening
  - 80% Staying the Same
  - 60% Improving
  - 40% Staying the Same
  - 20% Improving
  - 0% Worsening

- **Temperature**
  - 100% Worsening
  - 80% Staying the Same
  - 60% Improving
  - 40% Staying the Same
  - 20% Improving
  - 0% Worsening
We asked respondents whether, during the past year, *Did someone in your household experience respiratory difficulties when they did not have a cold or infection?* Although respiratory symptoms can result from chronic health conditions unrelated to air quality, they are also caused and exacerbated by poor air quality. Half the survey respondents reported that someone in their household had respiratory symptoms, and most of those had repeated problems.

**Respiratory Problems in Household**

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>Experienced Respiratory Problems at Least Once in Last 12 Months</th>
<th>Respiratory Problems Occurred More than Once in Last 12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50.4%</td>
<td>43.2%</td>
</tr>
</tbody>
</table>

Doctors had diagnosed an asthma case in 1 of 3 households. More than 1 in 10 households had an asthma diagnosis in the past year.

**Doctor Confirmed Asthma in Household**

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>Doctor Confirmed Asthma</th>
<th>Doctor Confirmed Asthma in 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31.3%</td>
<td>10.9%</td>
</tr>
</tbody>
</table>
We asked respondents whether, during the past summer, Did someone in your household experience symptoms related to heat or high temperatures such as leg cramps, dry mouth, dizziness, fatigue, fainting, rapid heart beat, or hallucinations? At least one incident of heat-related illness occurred to someone in one-quarter of the households in the sample. In those households, multiple incidents were common.

**Heat Exhaustion in Household**

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>Experienced Heat Exhaustion in Summer of 2005</th>
<th>Symptoms Occurred More than Once in Summer of 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.4%</td>
<td></td>
<td>18.8%</td>
</tr>
</tbody>
</table>

Doctors’ diagnoses of heat exhaustion were not as common as asthma diagnoses, but people may not seek medical treatment as often for heat symptoms as respiratory symptoms.

**Doctor Confirmed Heat Illness in Household**

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>Doctor Confirmed Heat Illness</th>
<th>Doctor Confirmed Heat Illness in 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1%</td>
<td></td>
<td>10.1%</td>
</tr>
</tbody>
</table>

**Highlight:** There was widespread agreement that air quality and rising summer temperatures are worsening.

**Implication:** Perhaps air quality and heat were of relatively wider concern than land and water conservation to many people because their households are directly affected by current health concerns that are related to those problems.
Population Growth

Who is Concerned about Growth in the Valley?

We asked survey respondents how much they agreed with the statement, *We are approaching the limit of the number of people the Valley can support.* Most respondents — 72% — agreed that we are approaching the limits of growth. About 40% strongly agreed and 32% somewhat agreed.

Attitudes about population growth differ only slightly by gender and politics …

Similar percentages of men, women, liberals, moderates, and conservatives strongly agreed or somewhat agreed that the Valley’s population growth is reaching its limit.

Attitudes about population growth differ significantly according to how long people have lived in the Valley, location, and household income …

The longer people have lived in the Valley, the more they agreed that the Valley is reaching the limit of growth. People who lived on the urban fringe — neighborhoods on the far edges of urban development — were less likely than others to agree that the Valley is reaching its limits. Lower-income households were more likely to agree that the limit is near.
Highlight: Most Valley residents agreed that the region is reaching the limits of population growth, although nearly 1 of 4 residents thought there is room for more growth. The people who have lived here longer were more likely to believe the Valley is reaching its limits. Higher-income households and those who live on the edge of urban development were more likely to see room for expansion.


## Impacts of Growth on the Environment

### Can Our Natural Environment Cope With the Impacts of Growth?

We asked survey respondents how much they agreed with the statement, *The balance of nature in and around the desert is strong enough to cope with the impacts of growth in the Valley.*

Only one-third of respondents – 32% – strongly or somewhat agreed that the Valley’s natural environment would be able to cope with more growth. Thus, 2 of 3 respondents do NOT think the desert can cope. Some groups expressed less confidence than others in the Valley’s ability to respond to growth.

Belief in nature’s ability to cope with growth differs only slightly by gender and where people live in the Valley…

Similar percentages of men and women believed the Valley’s natural environment can cope with the impacts of growth. Residents of urban-fringe neighborhoods were slightly less confident in nature’s capacity to handle population growth.

Belief differs significantly by income, politics, and length of time lived in the Valley…

Respondents with higher incomes were less likely to believe that the Valley’s natural environment would be able to cope with growth. Political orientation also accounted for important differences: only 22% of liberals compared to 37% of conservatives agreed that the environment could withstand more growth. Long-term Valley residents had the least confidence in the coping ability of the natural environment.

### Household Income and Belief in Nature’s Ability to Cope with Growth

- **< $40,000**: 43.0%
- **$40,000-$80,000**: 27.8%
- **> $80,000**: 25.5%

*Household Income*
Highlight: By a margin of 2 to 1, Valley residents do not believe the desert capable of coping with more population growth. There are strong differences in public opinion, however, with those with higher income, liberal political views, and longer residency expressing more concern.

Implication: Among Valley residents, high appreciation for the desert and strong sentiment that the desert environment cannot support rapidly rising numbers of people should provide a foundation of support for protecting the environment. There is, however, a substantial portion of the public that does not share this view. For this group, it might be difficult to garner political support for policies to limit population growth.
How Do Valley Residents Think about Environmental Problems?

We asked respondents, *In your judgment, how much does each of the following items contribute to . . . in the Valley?* On a scale of 1 (does not contribute at all) to 10 (contributes a great deal), respondents rated the importance of each reason for urban sprawl, water shortage, air pollution, and rising temperatures in the Valley.

Reasons arising from household behaviors are on the left side of each graph, followed by social causes in the middle and natural causes on the far right.

Most respondents rated natural and social causes of environmental problems as much more important than household activities. For example, climate conditions, such as drought and sunny days, were seen as major contributors to potential water shortages and rising temperatures, while household activities, such as yard watering and air conditioning, were seen as minor contributors. One exception to this pattern is that respondents believed people’s desire for larger homes contributes to urban sprawl.

![Perceived Causes of Urban Sprawl](image)
Highlight: The pattern of survey responses reveals that residents perceive a variety of causes for complex environmental problems. However, they tend to place more blame on nature and general social trends than on their own actions for creating critical problems that face the Valley.

Implication: The perception that individual household activities have relatively lower impact on environmental problems may pose a challenge to changing everyday behaviors that can make a difference to the environment.
Support and Opposition for Environmental Policies

How Do Valley Residents Think about Policy Solutions?

We asked respondents, *Do you support or oppose each of the following policies that have been suggested to deal with . . . in the Valley?* On a scale of 1 (strongly oppose) to 10 (strongly support), respondents rated their support for each policy approach to mitigating urban sprawl, water shortages, air pollution, and rising temperatures in the Valley.

Policy solutions pertaining to price increases are on the left side of each graph, followed by regulations, management practices, technological innovation, and public education on the far right side of each graph.

Most respondents strongly supported voluntary actions to address environmental problems in the Valley, such as public education and developing technological solutions to resolve potential water shortages, rising temperatures, and air pollution. Most respondents strongly opposed economic solutions in the forms of raising the price of water, gasoline, and electricity, or imposing fees on urban fringe development. There was also significant opposition to regulatory policies, especially restrictions on residential activities, such as outdoor water use.
**Highlight:** Public investments in research and development for technological solutions to environmental problems have significant public support. Although residents do not generally see their households as heavily contributing to environmental problems, strong support for public educational programs may indicate that they recognize the need for more information to help them, their neighbors, and their communities become better stewards of the environment.

**Implication:** Will the voluntary solutions favored by respondents be enough to improve the Valley’s environment? Although pricing and regulatory policies can be very effective in achieving natural-resource conservation and discouraging behavior that damages the environment, these kinds of policies that directly affect people through price increases or restrictions may be met with substantial opposition. Local policy-makers may need to consider adopting public-education campaigns that show how economic and regulatory frameworks provide incentives to make voluntary conservation more effective and help people to see the connections between paying more, using less, and improving the environment. Policy-makers might engage in outreach efforts to encourage environmentally friendly household behavior, with a focus on illustrating how the environmental impacts of household activities can be minimized.
Economists measure people’s desires to live in a clean and safe environment by asking them to make choices that indicate how much they would be willing to pay to improve the environmental conditions near their homes.

We asked homeowners a series of hypothetical questions about how much they would like to change the conditions near their homes. We offered them a new situation with housing and neighborhood features comparable to what they have, aside from one change. This change involved improved air quality or temperature along with increased housing costs. Their decisions indicate how much people would be willing to pay for improved air quality or cooler summer temperatures.

To provide a baseline set of conditions for these choices, respondents were first asked what they thought their own home would sell for in the current real-estate market. Then each respondent was offered the choice of purchasing a home identical to their own for more money. The price increase offered the same home and neighborhood conditions as well as an improved environmental condition around the proposed new site for their home. Respondents could either choose to buy the “new” house with the improved air quality or cooler temperatures, or not.

What Would People Pay for Improved Air Quality?

Considerably more than half of all homeowners would pay more for a house in a clean-air environment. The choices were to reduce the number of high pollution days from every day to either one in every four days or one in every two days. It appears that they would be willing to pay quite a large increase in house price. The amount respondents said they would pay for the new home did not differ for the two air-quality changes described.

![Graph showing tradeoff between house price and air pollution]

<table>
<thead>
<tr>
<th>Percent Choosing to Pay More for Reduced Air Pollution</th>
<th>Compared to 100% High Pollution Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ $5,000</td>
<td>97%</td>
</tr>
<tr>
<td>$5,001-$24,999</td>
<td>88.2%</td>
</tr>
<tr>
<td>$25,000-$99,999</td>
<td>83.2%</td>
</tr>
<tr>
<td>≥$100,000</td>
<td>86.9%</td>
</tr>
</tbody>
</table>

House Price Increase – How Much More People Would Pay

Percent of High Pollution Air Days

- 25% High Pollution Days
- 50% High Pollution Days
Most respondents stated they would pay more for a home located in a place with cooler summer temperatures, but not as many would pay as much as they would to reduce air pollution. The choices were to reduce the average Phoenix summer temperature of 105°F by either 5° or 10°. The price respondents said they would pay was clearly linked to the degree of temperature reduction – a reduction of 10° was worth quite a bit more than a reduction of 5°.
**Highlight:** People seem to understand the economic tradeoffs involved in choosing better environmental conditions. Most people are willing to pay substantially more for having cleaner air, and even a smaller improvement is worth a higher home price. The value respondents place on clean air could be related to the illnesses they experience from air pollution. Most people are also willing to purchase more expensive homes to escape the heat, but they are more discriminating. Reducing the temperature by 10° is worth more than reducing it by 5°. As summer temperatures rise in the Valley over time, the amount people are willing to pay for a cool environment may increase.

**Implication:** Deteriorating air quality and rising summer temperatures are widely recognized as negative by-products of our rapid population growth. Most respondents would be willing to pay to reduce these negatives effects on their own household’s quality of life. In contrast to the overwhelming public resistance to price increases for water, gasoline, electricity, and land, these results indicate that people will spend money for improvements in environmental amenities that are near their homes and can be described in specific terms. It may also be that environmental benefits that are priced into homes are seen as part of the home’s value that will be recovered when the home is sold, whereas money spent on water or energy is unrecoverable. One way to overcome consumer resistance to conservation measures might be to demonstrate that the increased costs would increase the availability of these resources in the future.
We asked respondents, *How much do you trust each group to provide truthful information about environmental issues in the Valley?* The percentage of respondents who strongly trusted university scientists surpassed any other group, and scientists also had the lowest distrust factor. Approximately 30% of respondents strongly trusted scientists, 58% somewhat trusted them, and only 12% distrusted them.

The public placed relatively high confidence in water utilities and moderate confidence in electric utilities, advocacy groups, and local governments. News media and local industry were at the bottom of the list, with about half the respondents distrusting their information.

A large segment of the public was somewhat skeptical about the truthfulness of information received from most sources. Most people at least somewhat trusted environmental information from several sources, but the percentages that strongly trusted were extremely low.
Strong trust in scientists differs significantly by neighborhood type, household income, and political orientation …

High confidence in scientists was more common in the central cities, in lower-income households, and among political liberals. Most of the respondents who lived in other types of communities, had middle or higher incomes, and who were moderate or conservative, “somewhat trusted” scientists for environmental information.
**Highlight:** The public trusts university scientists for truthful information about the environment above all other sources. Utilities, local environmental groups, and local governments also have reasonably high credibility. However, scientific research is often communicated to the general public through the news media, which are not highly trusted.

**Implication:** Public confidence in sources of environmental information is important for convincing people to change behaviors that negatively impact the environment. The high confidence placed in university scientists suggests that the public would be receptive to more direct engagement with scientists. Possibilities for public-science engagement include community forums, science cafes, Internet sites, and blogs. It would be interesting to examine how the public views scientific studies reported in the news media.
Today and Tomorrow

How Do Valley Residents View Their Quality of Life Today?

We asked respondents to rate the overall quality of life in the Valley today. About 6 of 10 people thought they have a fairly good quality of life today and 3 of 10 thought it is very good. Only 1 of 10 people thought their present quality of life is not good. These figures differed very little according to gender, household income, or length of residence.

Quality of Life Today

- Very Good, 34%
- Fairly Good, 56%
- Not Very Good, 9%
- Not Good At All, 1%
Perceptions of the current quality of life differ significantly by type of neighborhood …

Much higher percentages of residents in retirement neighborhoods and urban fringe neighborhoods said they have a very good quality of life today in the Valley. A greater percentage of central city and older suburban neighborhood residents rated their quality of life as not very good, although they were still a minority.

What Do Residents Predict for the Future?

We asked respondents, *In the next 10 years do you think the quality of life in the Valley will get much better, a little better, a little worse, much worse, or stay about the same?* Only 3 of 10 respondents thought the quality of life is getting better in the Valley. In fact, nearly half the respondents thought the quality of life here is getting worse.
Perceptions of the future quality of life vary significantly by type of neighborhood, years lived in the Valley, and household income …

In a striking reversal of views about the present, people in the central cities and older suburbs are much more optimistic than others about their future in the Valley. Only in the central cities do the residents who think quality of life will improve outnumber those who think it will get worse. A majority of people on the urban fringe and in retirement neighborhoods think their quality of life will actually be worse in the future.

Optimism is also significantly higher among respondents in lower-income households and among the most recent arrivals - those who moved to the Valley within the last five years. Optimists outnumber pessimists only among the lowest-income households and most recent immigrants. In contrast, majorities of the highest-income households and those living in the Valley more than 25 years think their quality of life will be worse in 10 years.

**Highlight:** A large majority appears to be fairly satisfied with today’s quality of life in the Valley but only one-third think it is very good. Nearly half the respondents are pessimistic about the future. Residential location in the Valley appears strongly influence residents’ perceptions. Central city and suburban residents, who are least likely to say their current quality of life is very good are also much more optimistic about the future. Perhaps these groups see room for improvement in their living situations, whereas those who think they already have a good life are more likely to fear that changes are working against their interests.

**Implication:** People think about many things when they assess their quality of life: basic needs for food, shelter, health and safety, opportunities for education and employment, social relations – and the built and natural environments. Further analysis of the 2006 Phoenix Area Social Survey will provide some answers about which household and community characteristics are important to Valley residents and their perceptions of the future. The next survey, scheduled for 2011, will repeat these questions, measuring changes in perceptions and actual conditions and determining whether the optimistic or pessimistic views of the Valley’s trajectory are more accurate. The information in this report could help to address issues in ways that ensure the optimistic view will prevail.
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For more information about the following ASU programs, please visit their web sites:

Global Institute for Sustainability,
http://gios.asu.edu

Central Arizona – Phoenix Long-Term Ecological Research project,
http://caplter.asu.edu

Decision Center for a Desert City,
http://dcdc.asu.edu

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Publications Related to the 2001 Phoenix Area Social Survey


**Under review for publication:**

Public Perceptions, Preferences, and Values for Water in the West

A Survey of Western and Colorado Residents

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Jennifer Thorvaldson
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Public Perceptions, Preferences, and Values for Water in the West

A Survey of Western and Colorado Residents

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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.\footnote{Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming}

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.
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.

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

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 term “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.

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

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.
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 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.
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.

<table>
<thead>
<tr>
<th>Willing to pay a fee of ...</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>proportion of those asked to pay $5 that checked yes</td>
<td>66.6%</td>
</tr>
<tr>
<td>proportion of those asked to pay $10 that checked yes</td>
<td>58.8%</td>
</tr>
<tr>
<td>proportion of those asked to pay $15 that checked yes</td>
<td>50.4%</td>
</tr>
<tr>
<td>proportion of those asked to pay $20 that checked yes</td>
<td>45.9%</td>
</tr>
<tr>
<td>proportion of those asked to pay $25 that checked yes</td>
<td>39.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Desired Fee Recipient</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct a reservoir for storage.</td>
<td>19.8%</td>
</tr>
<tr>
<td>Keep irrigated farms in production.</td>
<td>19.7%</td>
</tr>
<tr>
<td>Create a system to reuse water for public landscapes.</td>
<td>19.2%</td>
</tr>
<tr>
<td>Implement programs to reduce household water consumption.</td>
<td>16.1%</td>
</tr>
<tr>
<td>Set aside water for wildlife habitat in nearby streams.</td>
<td>13.8%</td>
</tr>
<tr>
<td>Provide subsidies for water-efficient appliances for those who cannot afford them.</td>
<td>12.3%</td>
</tr>
<tr>
<td>Make infrastructure improvements in rural communities to compensate for water being transferred from farms to cities.</td>
<td>7.2%</td>
</tr>
<tr>
<td>Set aside water for public-based recreation.</td>
<td>6.5%</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Should be able to divert</th>
<th>Disagree (%)</th>
<th>Neither (%)</th>
<th>Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>41.9</td>
<td>27.1</td>
<td>31</td>
</tr>
<tr>
<td>Colorado</td>
<td>51.6</td>
<td>22.6</td>
<td>25.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Should NOT be able to divert</th>
<th>Disagree (%)</th>
<th>Neither (%)</th>
<th>Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>24.1</td>
<td>23.8</td>
<td>47.2</td>
</tr>
<tr>
<td>Colorado</td>
<td>23</td>
<td>23.8</td>
<td>53.2</td>
</tr>
</tbody>
</table>

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 directed 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.
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.
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).
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

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>530</td>
</tr>
<tr>
<td>California</td>
<td>477</td>
</tr>
<tr>
<td>Colorado</td>
<td>535</td>
</tr>
<tr>
<td>Idaho</td>
<td>292</td>
</tr>
<tr>
<td>Kansas</td>
<td>445</td>
</tr>
<tr>
<td>Montana</td>
<td>197</td>
</tr>
<tr>
<td>Nebraska</td>
<td>308</td>
</tr>
<tr>
<td>Nevada</td>
<td>430</td>
</tr>
<tr>
<td>New Mexico</td>
<td>299</td>
</tr>
<tr>
<td>North Dakota</td>
<td>124</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>446</td>
</tr>
<tr>
<td>Oregon</td>
<td>470</td>
</tr>
<tr>
<td>South Dakota</td>
<td>149</td>
</tr>
<tr>
<td>Texas</td>
<td>467</td>
</tr>
<tr>
<td>Utah</td>
<td>368</td>
</tr>
<tr>
<td>Washington</td>
<td>569</td>
</tr>
<tr>
<td>Wyoming</td>
<td>144</td>
</tr>
<tr>
<td><strong>Entire West</strong></td>
<td><strong>6250</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Occupation</th>
<th>West</th>
<th>Colorado</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Business</td>
<td>9.7</td>
<td>8.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Professional</td>
<td>20.7</td>
<td>22.1</td>
</tr>
<tr>
<td>Ranching</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Retail</td>
<td>7.2</td>
<td>6.5</td>
</tr>
<tr>
<td>Retired</td>
<td>28.7</td>
<td>25.4</td>
</tr>
<tr>
<td>Student</td>
<td>5.2</td>
<td>5.4</td>
</tr>
<tr>
<td>Teaching</td>
<td>5.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Other</td>
<td>18.3</td>
<td>20.6</td>
</tr>
</tbody>
</table>
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.
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%.
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

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.

13.6 Community Descriptions
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


Public Attitudes and Perceptions Regarding Agricultural Water Use in the West...

We are researchers from Colorado State University and are contacting you to ask for your participation in a survey about water conservation issues in the Western United States. We are surveying residents of states throughout the Western US regarding their perceptions of how western states should plan for future water needs. With a growing western urban population, many people are concerned about how a finite water resource is to be allocated to these uses, for both now and in the future. This survey is funded by the United States Department of Agriculture (USDA) and results from this study will be provided to both policy makers in the West and in the US Congress in order to contribute to the decision-making processes concerning water policy.

Consistent with University research requirements, your participation in this study is voluntary and will remain completely confidential. If you participate in the survey, you may leave questions blank if you choose. You do not have to answer any questions that make you feel uncomfortable. Record of your participation in this study will be destroyed as soon as data collection is completed. This survey should take you no longer than 10 or 15 minutes to complete and your answers will remain completely confidential. There are no direct benefits or known risks in participating in this survey and we will never provide your e-mail address to another party.

If you have any questions about your rights as a volunteer in this research, contact Janell Barker, Senior Coordinator, at (970) 491-1655. If you have questions about the research and its uses, you may contact Alan Bright, Principle Investigator at Colorado State University, at abright@warnercnr.colostate.edu.

Dr. Alan Bright
Co-Principal Investigator
Department of Human Dimensions of Natural Resources
Colorado State University
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Co-Principal Investigator
Department of Agriculture and Resource Economics
Colorado State University
Fort Collins, Colorado

Below is a map indicating the geographic area referred to as "The West" throughout our survey. Please continue at the bottom of the page.
Attitudes toward Water Conservation

1. First, we would like to get your general perceptions about a variety of issues related to water conservation. Indicate the extent to which you agree or disagree with each of the following statements.

Please click on the box that best represents your answer.

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. Cities should be able to divert water from rural areas if the cities need more water.
5. Reallocating water for the natural environment and for human use should have the same priority.
6. We should strive for a society that emphasizes environmental protection over economic growth.
7. Cities should NOT be able to divert water from rural areas and farms even if the cities need the water.
8. In water planning, a healthy natural environment is more important than a healthy economy.
9. Water conservation is an issue I am personally concerned about.
10. I participate in water conservation strategies in my daily life.
11. I do not pay much attention to issues related to conserving water.
12. The issues related to the conservation and availability of water don't personally affect me too much.
13. Conserving water at one's home should be voluntary.
14. Household water restrictions should be voluntary rather than mandated by the government.
15. The government has a responsibility to develop policies and laws to make sure that water is conserved.
16. State and local governments should require that homeowners take steps to increase the amount of water that they use.
17. The best way to make sure there is enough water for the future is through government regulation.
### Attitudes toward Water Conservation

2. Wildlife managers will occasionally provide water for drinking and habitats in order to support healthy wildlife populations throughout the West.

**Please click on the box that best represents your answer.**

<table>
<thead>
<tr>
<th>Q1</th>
<th>In areas where the lack of water is a limiting factor for wildlife populations, drinking water for wildlife should be provided by the managers.</th>
<th>Strongly Agree</th>
<th>Moderately Agree</th>
<th>Neutral</th>
<th>Moderately Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2</td>
<td>Water should be provided for wildlife only in areas where water has historically occurred naturally.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q3</td>
<td>It is important to provide drinking water for game species (e.g., wildlife that is hunted).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q4</td>
<td>It is important to provide habitat water for migratory waterfowl (e.g., ducks and geese).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q5</td>
<td>It is important to provide drinking water for endangered species.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q6</td>
<td>Water should be provided for wildlife in and habitats, but not in other habitats.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q7</td>
<td>Wildlife managers should not artificially provide water for wildlife.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Attitudes toward Water Conservation

3. There are a number of people or groups who are in a position to make decisions about the best way to conserve water in our communities. Some of these are listed below.

Groups

A. Individuals/Households
B. Businesses and Corporations
C. Local Government (City, County, etc.)
D. State Government
E. Federal Government

Consider the 5 groups listed above. Which of the 5 groups SHOULD HAVE the 1st, 2nd, and 3rd most responsibility for making decisions about how water should be conserved in our communities?

Please check the on the box which best represents your answer based upon the list above.

Q1. Should have the 1st most responsibility
   A.   B.   C.   D.   E.

Q2. Should have the 2nd most responsibility
   A.   B.   C.   D.   E.

Q3. Should have the 3rd most responsibility
   A.   B.   C.   D.   E.
### Water Supplies in the West

4. Indicate the extent to which you believe each of the following statements is **true** or **false** regarding water supplies in your state and in the West. If you cannot say whether it is true or false, select **I Don't Know**.

*Please click on the box that best represents your answer.*

<table>
<thead>
<tr>
<th>Question</th>
<th>Definitely True</th>
<th>Probably True</th>
<th>Probably False</th>
<th>Definitely False</th>
<th>I Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 There is enough water in my state to meet the <strong>current</strong> needs of all the people and businesses in my state.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q2 There is enough water in my state to meet the <strong>future</strong> needs of all the people and businesses in my state for the <strong>next 25 years</strong>.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q3 There is enough water in the <strong>Western United States</strong> to meet the <strong>current</strong> needs of all the people and businesses in the West.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q4 There is enough water in the <strong>Western United States</strong> to meet the <strong>future</strong> needs of all the people and businesses in the West for the <strong>next 25 years</strong>.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
5. The terms found below are sometimes used to describe water and how it is used. Indicate how familiar you are with each of the following terms.

Please click on the box that best fits your answer.

<table>
<thead>
<tr>
<th>Term</th>
<th>Familiar</th>
<th>Somewhat</th>
<th>Not at All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inversion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Appropriation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Divert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Call</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumptive Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return Flows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riparian Right</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beneficial Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evapotranspiration (ET)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interstate Compact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conjunctive Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Reuse</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Water Use in My State

6. Water is used in a number of ways throughout the West. Listed below are 8 common uses of water.

Look at this list and then answer the question that immediately follows it.

Water Uses

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

Consider the 8 water uses above. Which of these three uses do you think requires the largest amount of the water available in your state?

Please click on the box that best represents your answer based upon the list above.

1. Uses the most water
   A B C D E F G H
   ○ ○ ○ ○ ○ ○ ○ ○

2. Uses the 2nd most water
   C F F F F F F

3. Uses the 3rd most water
   ○ ○ ○ ○ ○ ○ ○ ○
Water Use in Short Term Drought

7. 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 8 uses for which water might be allocated during times when water is limited.

*Look at this list and then answer the question that immediately follows it.*

**Water Use**

A. For the natural environment (e.g., as part of fish and wildlife habitat, forest health and other natural uses)
B. For natural resource management (e.g., in-stream management, fire suppression, stream banks and wetlands)
C. For household use (e.g., drinking, cooking, showers, laundry, dishwashing, and toilets)
D. For private landscaping (e.g., lawns and gardens for private homes and businesses)
E. For industrial use (e.g., commercial manufacturing, mining and power plants)
F. For irrigated farmland (e.g., food or energy crop production, livestock)
G. For municipal landscaping (e.g., community parks, and golf courses)
H. For recreation (e.g., rafting, fishing, swimming, skiing, scenic viewing)

Consider the 8 water uses above. If you had to select 3 of the above uses to allocate water to when water is limited, which 3 uses do you think should receive the 1st, 2nd and 3rd priorities?

*Please click on the box that best represents your answer based upon the list above.*
Municipal Responses to a Short Term Drought

8. During times when water availability is limited (such as during a short-term drought, lasting less than two years), a city may adopt several strategies to ensure it has enough water. Listed below are 8 possible strategies that a city might consider.

*Look at this list and then answer the question that immediately follows it.*

**Strategies for Short Term Water Shortage**

A. Restricting the amount of water that can be used on private lawns and landscapes.
B. Restricting the amount of water that can be used on public landscapes (e.g., parks and golf courses).
C. Permanently transferring water from farms to the city.
D. Temporarily renting water from farms to the city.
E. Restricting the amount of water that can be used by industry (e.g., commercial manufacturing, mining or power plants).
F. Draining reservoirs and lakes.
G. Increasing water rates (bills) paid by private households.
H. Putting a limit on water projects that help protect wildlife and fish habitat.

Consider the 8 strategies above. If you had to select 3 of the above strategies for a city to adopt in order to ensure it has enough water during a short term drought, which 3 strategies do you think are the best?

*Please click on the box that best represents your answer based upon the list above.*

Q1 1st best strategy
Q2 2nd best strategy
Q3 3rd best strategy
Municipal Responses to Long Term Water Needs

9. Increasing population in the West means that cities will need more water for the long run (more than ten years in the future). Below are 8 strategies that a city might consider to ensure adequate water supplies for the future.

Look at this list and then answer the question that immediately follows.

Strategies for Increasing Long Term Water Supplies

A. Buying water from farmers.
B. Building reservoirs and other storage projects.
C. Constructing pipelines to bring water from other regions of the country.
D. Reusing waste water on private lawns and landscapes (e.g., homes and private businesses).
E. Reusing waste water, after it is treated, for use within the home.
F. Reusing waste water on private landscapes (e.g., parks and golf courses).
G. Requiring that households take steps to conserve water (e.g., use low flow toilets and showers).
H. Limiting the growth of cities to a level that is supported by a sustainable water supply.

Consider the 8 strategies for increasing long term water supplies above. If you had to select 3 of the above strategies for a city to adopt in order to ensure it has enough water for long term needs, which 3 strategies do you think are the best?

Please click on the box that best represents your answer based upon the list above.

Q1 1st best strategy
Q2 2nd best strategy
Q3 3rd best strategy
Municipal Responses to Long Term Water Needs (continued)

10. It costs money to acquire water for long term needs. Below are 7 funding options that cities might adopt in order to acquire water for long term needs.

*Look at this list and then please answer the question that immediately follows it.*

Funding Options for Acquiring Water for Long Term Needs

A. Increase rates on all water bills.
B. Increase water rates for households that use more water.
C. Increase fees on new homes and new housing developments.
D. Increase water rates for new housing developments.
E. Issue city or municipal district bonds.
F. Re-allocate funds from other parts of the city budget to pay for water.
G. Obtain subsidies from the federal government.

Consider the 7 funding options for acquiring water for long term needs above. If you had to select 3 of the above funding options for acquiring long term water supplies for cities, which 3 strategies do you think are the best?

*Please click on the box that best represents your answer based upon the list above.*

<table>
<thead>
<tr>
<th>Question</th>
<th>1st Best Strategy</th>
<th>2nd Best Strategy</th>
<th>3rd Best Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
</tr>
<tr>
<td>2</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
</tr>
<tr>
<td>3</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
<td>⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜ ⬜</td>
</tr>
</tbody>
</table>
11. One source of a city's future water needs is water that is currently used for irrigated farming. If water is transferred from farms to cities, rural areas may shrink as they lose business. Also, cities may have fewer local food sources and less desirable open space as farmland is idled. Some water providers have worked to lessen these impacts. We would like to know more about what you think about moving water from farming to cities.

Please click on the box that best represents your answer.

If water is taken from rural areas and given to cities, then those cities should be required to...

| Q1 | ...buy and install equipment that helps conserve water on farms. | Strongly Agree | Moderately Agree | Neither | Moderately Disagree | Strongly Disagree |
| Q2 | ...financially compensate rural communities for that water. | 0 | 0 | 0 | 0 | 0 |
| Q3 | ...create short term loan programs for rural start-up businesses. | 0 | 0 | 0 | 0 | 0 |
| Q4 | ...provide job training for displaced workers in the rural community. | 0 | 0 | 0 | 0 | 0 |
| Q5 | ...invest in rural roads and schools. | 0 | 0 | 0 | 0 | 0 |
| Q6 | ...pay to restore previously irrigated farmland to native grasses. | 0 | 0 | 0 | 0 | 0 |
| Q7 | ...do nothing. | 0 | 0 | 0 | 0 | 0 |
12. Institutions and laws governing water use were developed in a time of relative water abundance. Water policy changes are now being debated at the state, regional and national levels.

Please provide your opinions about some of these issues by clicking on the box that best represents your answer.

<table>
<thead>
<tr>
<th>Q1</th>
<th>Regional land use and water resource planning is needed to manage water scarcity.</th>
<th>Strongly Agree</th>
<th>Moderately Agree</th>
<th>Neutral</th>
<th>Moderately Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2</td>
<td>Growth of cities should be limited to manage water scarcity.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q3</td>
<td>The number of permanent water transfers from farms to cities should be limited.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q4</td>
<td>Public money (i.e., tax revenues) should be used to develop or acquire new water resources.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q5</td>
<td>Some water resources should be set aside for bioenergy.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q6</td>
<td>Some water resources should be set aside to protect wildlife and fishery habitat.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q7</td>
<td>Some water should be set aside to protect river corridors and open space.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q8</td>
<td>I am satisfied with the current system of water management.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q9</td>
<td>I think the public has enough of a voice when it comes to water policy management.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q10</td>
<td>The water policymakers understand my priorities for water use.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q11</td>
<td>All stakeholder groups are equally represented when water policies are made.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q12</td>
<td>Water laws need to be changed to better meet today's situation.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q13</td>
<td>Water leases between agriculture and cities will help meet my state's future needs.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Q14</td>
<td>It is more beneficial to rural economies when agricultural water is leased to cities rather than sold to cities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
**Water Conservation Strategies**

13. Water providers might consider increasing water rates in order to find new sources of water, to pay for water conservation programs, or to help with problems that may arise as water is shifted to cities from other areas. Would you pay an additional **$5 per month** on your water bill during the summer months if the fee was divided among the following programs?

- [ ] Yes
- [X] No

14. Whether you support an additional increase on your water bill or not, if an additional fee **was added**, where would you want the money to go?

*Please indicate what percentage of the increase should go to each program or strategy listed.*

<table>
<thead>
<tr>
<th>Percentage of Fee</th>
<th>Percentage</th>
<th>Program Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>To implement programs and technology to reduce household water consumption.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To construct a reservoir for water storage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To create a system to reuse household waste water for watering public landscapes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To set aside water for wildlife habitat in and around nearby streams.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To help keep irrigated farms in production.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To make infrastructure improvements (roads, high speed internet, etc.) in rural communities to compensate for water being transferred to cities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To set aside water for public water-based recreation (fishing, kayaking, making snow).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To provide subsidies on water-efficient appliances to those who may not be able to afford at current prices.</td>
</tr>
</tbody>
</table>
Background Information About You

We would like to know a little more about your background to better understand your opinions.

Please complete the following information. This information will remain completely confidential.

What is your occupation?

☐ Other (please specify)

What is your gender?

☐ 

How old are you?


date

What type of home do you currently live in?

☐ A multiple family home  ☐ A single family home  ☐ A condominium or townhouse  ☐ An apartment

☐ Other (please specify)

Do you own or rent this home?

☐ 

How many years have you lived in the West?


date

How is your household water supplied?

☐ 

Has your city or water district had outdoor watering restrictions during the past year?

☐ 

What is the zip code of your current residence?


date

Which state do you currently live in?


date

How would you describe your current community?

☐

How would you describe the community that you grew up in (pre-18 years of age)?
If you lived in more than one community while you were growing up, describe the community with which you identify most.

☐
Which of the following best describes you?

Other (please specify)

What is the highest level of education you have achieved?

What is your approximate annual household income before taxes?
Thank you!

We sincerely appreciate the time and effort you have put into completing this survey. Your ideas and opinions are very important in helping the West meet its future water needs. If you have any additional comments about water in the West or about this survey, please type them in the space listed below:

[Blank Space for Comment]
Water Issues in the Southwest

A 37-question survey was developed by the USDA-CSREES Southwest States and Pacific Islands Regional Water Quality Program Team to document public awareness, aptitudes, attitudes, and actions toward water quality in the Southwest states: Arizona, California, and Nevada. Although the same survey was also used in Hawaii, results will be summarized in a separate report. Demographic data about survey respondents was also collected. This statistically designed survey was completed by 1601 residents in the three-state area from August of 2003 to July 2004. The collected data was analyzed using the SAS procedure at the University of Idaho. The sampling error of these survey questions was +/- 5 percent.

How Do You Feel About the Environment?

Survey respondents rated the importance of eleven water issues (Table 1). Clean drinking water was the most important issue in the Southwest – 81% or more of respondents in each of the three states ranked the issue as extremely important, while 99% of the respondents ranked clean drinking water as either extremely or very important. Over 80% of respondents considered the following water issues as either extremely or very important: 1) clean drinking water, 2) water for household/private sector, 3) clean groundwater, 4) clean rivers, and 5) water for agriculture.

Table 1. The importance of water issues in the Southwest and by state.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Extremely or Very Important in the Southwest</th>
<th>Extremely or Very Important in AZ</th>
<th>Extremely or Very Important in CA</th>
<th>Extremely or Very Important in NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean drinking water</td>
<td>99 (1)</td>
<td>99 (1)</td>
<td>99 (1)</td>
<td>99 (1)</td>
</tr>
<tr>
<td>Water for household/private sector</td>
<td>94 (2)</td>
<td>99 (2)</td>
<td>92 (4)</td>
<td>96 (2)</td>
</tr>
<tr>
<td>Clean groundwater</td>
<td>93 (3)</td>
<td>96 (3)</td>
<td>93 (2)</td>
<td>90 (4)</td>
</tr>
<tr>
<td>Clean rivers</td>
<td>92 (4)</td>
<td>90 (4)</td>
<td>93 (3)</td>
<td>92 (3)</td>
</tr>
<tr>
<td>Water for agriculture</td>
<td>84 (5)</td>
<td>84 (5)</td>
<td>85 (5)</td>
<td>83 (5)</td>
</tr>
<tr>
<td>Watershed restoration</td>
<td>73 (6)</td>
<td>72 (7)</td>
<td>73 (6)</td>
<td>72 (7)</td>
</tr>
<tr>
<td>Water for power generation</td>
<td>71 (7)</td>
<td>74 (6)</td>
<td>69 (8)</td>
<td>75 (6)</td>
</tr>
<tr>
<td>Destruction of wetlands (riparian areas)</td>
<td>67 (8)</td>
<td>64 (9)</td>
<td>69 (9)</td>
<td>64 (10)</td>
</tr>
<tr>
<td>Protection of aquatic organisms</td>
<td>66 (9)</td>
<td>59 (10)</td>
<td>70 (7)</td>
<td>64 (9)</td>
</tr>
<tr>
<td>Water for commerce/industry</td>
<td>66 (10)</td>
<td>70 (8)</td>
<td>64 (10)</td>
<td>69 (8)</td>
</tr>
<tr>
<td>Water for recreation</td>
<td>52 (11)</td>
<td>50 (11)</td>
<td>52 (11)</td>
<td>54 (11)</td>
</tr>
</tbody>
</table>
**Water Issues**

Reflective of how respondents rated various water issues, when asked to rank five water uses from most important to least important, respondents chose drinking/human use the clear choice for most important while recreation was the clear choice for least important. Other choices of irrigation, wildlife (fish, birds, wetlands), and power generation were all closely ranked in the middle.

One-fifth of the respondents (21%) felt that their home drinking water is not safe to drink (Table 2). Almost two-thirds of the respondents (63%) get their drinking water from a city water system, while 18% primarily use purchased bottled water.

Table 2. Response to the question: “Do you feel that your home drinking water is safe to drink?”

<table>
<thead>
<tr>
<th>Response</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>79</td>
<td>80</td>
<td>80</td>
<td>76</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>24</td>
</tr>
</tbody>
</table>

There exists a general lack of knowledge regarding potential pollutants. Over 40% of respondents in the region indicated they did not know if given pollutants affect the water quality in their area (Table 3). Respondents were most aware of minerals, with 49% indicating they know or suspect minerals to affect their water quality.

Table 3. Respondents that do not know if the listed conditions affect water quality in their area.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>High bacteria counts</td>
<td>53</td>
<td>58</td>
<td>52</td>
<td>48</td>
</tr>
<tr>
<td>Heavy metals (e.g., lead, arsenic)</td>
<td>50</td>
<td>59</td>
<td>49</td>
<td>39</td>
</tr>
<tr>
<td>Pesticides</td>
<td>49</td>
<td>58</td>
<td>45</td>
<td>52</td>
</tr>
<tr>
<td>Fertilizer/Nitrates</td>
<td>49</td>
<td>57</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>Minerals (e.g., calcium)</td>
<td>40</td>
<td>42</td>
<td>43</td>
<td>28</td>
</tr>
</tbody>
</table>

Not having enough water was considered a problem in the Southwest by 56% of respondents (sum of “probably” and “definitely”).

**Governance**

Almost one third of respondents (29%) felt that environmental protection receives about the right amount of emphasis from local government and elected officials while 41% felt it does not enough receive enough emphasis (Table 4). Almost three quarters of respondents (74%) believe local government, either state or county/city/town, as opposed to the federal government, should be responsible for protecting water quality (Table 5).
Table 4. Responses to the question: “In your opinion, does the environment receive the right amount of emphasis from local government and elected officials in your state?”

<table>
<thead>
<tr>
<th>Response</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>No, not enough emphasis</td>
<td>41</td>
<td>38</td>
<td>42</td>
<td>43</td>
</tr>
<tr>
<td>Yes, about right</td>
<td>29</td>
<td>31</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>No, too much emphasis</td>
<td>13</td>
<td>11</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>No opinion / don’t know</td>
<td>17</td>
<td>21</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 5. Responses to the question: “In your opinion, who should be most responsible for protecting water quality in your community?”

<table>
<thead>
<tr>
<th>Response</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal government</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>State government</td>
<td>42</td>
<td>43</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>County, city, or town</td>
<td>32</td>
<td>34</td>
<td>32</td>
<td>27</td>
</tr>
<tr>
<td>Individual citizens</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Water Quality Education**

A majority of respondents received water quality information via newspapers, television, and environmental agencies (Table 6).

Table 6. “Yes” responses to the question: “Have your received water quality information from the following sources?”

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newspaper</strong></td>
<td>76</td>
<td>73</td>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td><strong>Television</strong></td>
<td>66</td>
<td>67</td>
<td>63</td>
<td>79</td>
</tr>
<tr>
<td><strong>Environmental agencies (government)</strong></td>
<td>55</td>
<td>46</td>
<td>56</td>
<td>62</td>
</tr>
<tr>
<td><strong>Environmental groups (citizen groups)</strong></td>
<td>47</td>
<td>36</td>
<td>53</td>
<td>39</td>
</tr>
<tr>
<td><strong>Consumer Confidence Reports</strong></td>
<td>26</td>
<td>19</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td><strong>Universities</strong></td>
<td>25</td>
<td>21</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td><strong>Schools (elementary &amp; secondary)</strong></td>
<td>17</td>
<td>11</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td><strong>Extension Service</strong></td>
<td>15</td>
<td>16</td>
<td>12</td>
<td>21</td>
</tr>
</tbody>
</table>

A majority of respondents want to learn more on the topic of drinking water and human health. Also high on the list is water conservation (Table 7). When given an option of how they would most likely take advantage of learning opportunities with regard to water
quality issues, most respondents want to read printed fact sheets, bulletins, or brochures; or read a newspaper article/series or watch television coverage (Table 8).

Table 7. Response to the question: “Would you like to learn more about any of the following water quality issue areas? (Circle all that interest you.)”

<table>
<thead>
<tr>
<th>Issue</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water and Human Health</td>
<td>58</td>
<td>61</td>
<td>56</td>
<td>61</td>
</tr>
<tr>
<td>Water Conservation</td>
<td>39</td>
<td>44</td>
<td>36</td>
<td>44</td>
</tr>
<tr>
<td>Environmental Restoration</td>
<td>31</td>
<td>29</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Pollution Assessment and Prevention</td>
<td>31</td>
<td>30</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>Watershed Management</td>
<td>31</td>
<td>26</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>Water Policy and Economics</td>
<td>30</td>
<td>27</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>Nutrients &amp; Pesticide Management</td>
<td>25</td>
<td>21</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>Agricultural Water Management</td>
<td>21</td>
<td>16</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Animal Manure and Waste Management</td>
<td>18</td>
<td>15</td>
<td>21</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 8. Survey respondents learning opportunities of choice (select up to 3 items).

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Southwest</th>
<th>AZ</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read printed fact sheets, bulletins, or brochures</td>
<td>59</td>
<td>57</td>
<td>59</td>
<td>60</td>
</tr>
<tr>
<td>Read a newspaper article or series, or watch TV coverage</td>
<td>55</td>
<td>60</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>Visit a website</td>
<td>43</td>
<td>40</td>
<td>44</td>
<td>42</td>
</tr>
<tr>
<td>Look at a demo or display</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Watch a video of information</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Take part in a onetime volunteer activity to learn or do something (e.g., water monitoring)</td>
<td>15</td>
<td>12</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Attend a fair or festival</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Ask for a home, farm, or workplace water assessment</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Attend short course (weekend, evening)</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Get trained for a regular volunteer position (e.g., watershed steward, or water quality monitor)</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Take a course for credit/certification</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

Programming Priorities

Based on this survey, we have identified three important programming areas. These areas are:

- Drinking water and human health
- Water conservation
- Watershed management
Demographics

Examples of the demographics of this survey were:

- Community sizes of: >100,000, 25,000 – 100,000, 7,000 – 25,000, 3,500 – 7,000, and <3,500 represented 56, 25, 10, 5, and 5% of the respondents, respectively.

- Approximately 66% of the survey respondents were male, while 34% were female.

- The education levels of: elementary or some high school, high school graduate, some college, college graduate, or advanced college degree represented 3, 11, 31, 33, and 23% of the respondents, respectively.

- Over three quarters of the respondents (76%) have resided in their current state for at least ten years.
HOW DO YOU FEEL ABOUT THE ENVIRONMENT?

How important are each of the following water issues to you? (Circle one answer per question)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>No opinion</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q-01. Clean rivers</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-02. Clean groundwater</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-03. Clean drinking water</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td><strong>Preservation Areas</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q-04. Protection of aquatic organisms</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-05. Destruction of wetlands (riparian areas)</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-06. Watershed restoration</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td><strong>Water Availability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q-07. Water for power generation</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-08. Water for agriculture</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-09. Water for commerce/industry</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-10. Water for household/private sector</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>Q-11. Water for recreation</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>V</td>
</tr>
</tbody>
</table>

WATER ISSUES

(Circle the best answer, unless multiple answers are indicated)

Q-12. Where do you get your drinking water?
   a. Well (individual well or well that serves fewer than 15 residences)
   b. Community well system (well serving 15 or more residences, but not a city system)
   c. River, stream, pond, or lake (individual system)
   d. City water system
   e. Purchase bottled water
   f. Produce own with reverse osmosis (RO) system
   g. I don’t know

Q-13. Please all the answer(s) that apply to your home drinking water system.
   a. I have a water softener
   b. I have a water filter on my sink
   c. I regularly purchase 5 gallon containers of drinking water
   d. I often use bottled water for drinking purposes
   e. I never buy bottled water
   f. I am satisfied with my drinking water (piped in house)
   g. I am not satisfied with my current drinking water (piped in house)
   h. My drinking water is separate from my water supply system
Q-14. Do you feel that your home drinking water is safe to drink?
   a. Yes
   b. No

Q-15. In your opinion, what is the quality of groundwater (sources of well water) in your area?
   a. Good or excellent
   b. Good, and improving
   c. Good, but deteriorating
   d. Fair
   e. Poor, but improving
   f. Poor
   g. No opinion/don’t know

Q-16. In your opinion, what is the quality of surface waters (rivers, streams, lakes) where you live?
   a. Good or excellent
   b. Good, and improving
   c. Good, but deteriorating
   d. Fair
   e. Poor, but improving
   f. Poor
   g. No opinion/don’t know

Q-17. Do you regard water quantity (having enough water) as a water problem in the area where you live?
   a. No
   b. Probably not
   c. Don’t know
   d. Probably
   e. Definitely

Q-18. Rank the following water uses from most important (1) to least important (5) to you. (Use 1, 2, 3, 4, and 5 only once)
   ___ Power generation
   ___ Wildlife (fish, birds, wetlands)
   ___ Irrigation
   ___ Recreation
   ___ Drinking/Human use

Q-19. How would you rate your awareness of the following factors that affect water quality?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unaware</th>
<th>Somewhat Aware</th>
<th>Very Aware</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Agricultural Water Management</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>b. Animal Waste Management</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>c. Drinking Water &amp; Human Health</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>d. Environmental Restoration</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>e. Nutrients &amp; Pesticide Management</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>f. Pollution Prevention &amp; Assessment</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>g. Water Conservation</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>h. Water Policy &amp; Economics</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
<tr>
<td>i. Watershed Management</td>
<td>U</td>
<td>S</td>
<td>V</td>
</tr>
</tbody>
</table>
Q-20. Do you know of or suspect that any of the following conditions effect water quality in your area?

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Know</th>
<th>Suspect</th>
<th>Don't Know</th>
<th>Not a Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. High bacteria counts</td>
<td>K</td>
<td>S</td>
<td>D</td>
<td>N</td>
</tr>
<tr>
<td>b. Fertilizer/Nitrates</td>
<td>K</td>
<td>S</td>
<td>D</td>
<td>N</td>
</tr>
<tr>
<td>c. Heavy metals (e.g., lead, arsenic)</td>
<td>K</td>
<td>S</td>
<td>D</td>
<td>N</td>
</tr>
<tr>
<td>d. Minerals (e.g., calcium)</td>
<td>K</td>
<td>S</td>
<td>D</td>
<td>N</td>
</tr>
<tr>
<td>e. Pesticides</td>
<td>K</td>
<td>S</td>
<td>D</td>
<td>N</td>
</tr>
</tbody>
</table>

Q-21. In your opinion, which of the following are most responsible for the existing pollution problems in rivers and lakes in your state or territory? (Circle up to 3 answers)

a. Forestry (wood harvesting)
b. Agriculture – crop production
c. Agriculture – livestock and poultry operations
d. Erosion from roads and/or construction
e. Wastes from urban areas
f. Mining
g. Industry
h. Military bases
i. Rangeland management
j. Wild animals
k. Erosion after wildfires
l. Septic systems

Q-22. Do you know what a watershed is? (Check one box)

a. Yes
b. No

GOVERNANCE

Q-23. In your opinion, does the environment receive the right amount of emphasis from local government and elected officials? (Circle one answer)

a. No, too much emphasis is placed on environmental protection.
b. No, not enough emphasis is placed on environmental protection.
c. Yes, environmental protection receives about the right amount of emphasis.
d. No opinion/don’t know.

Q-24. In your opinion, who should be most responsible for protecting water quality in your community?

a. Federal government
b. State/Territorial government
c. Your county, city, or town
d. Individual citizens
e. Don’t know
f. Other
YOUR ENVIRONMENTAL PERSPECTIVE

Q-25. Have you ever changed your mind about an environmental issue as a result of:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. News coverage</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>b. Conversations</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>c. Attending meetings</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>d. Classes</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>e. Elected</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>f. Firsthand</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>g. Financial</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Q-26. Have you or someone in your household done any of the following as part of an individual or community effort to conserve water or preserve water quality? (Circle all that apply)

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Bought or installed a water-saving appliance</td>
</tr>
<tr>
<td>b. Changed how you use water in the house</td>
</tr>
<tr>
<td>c. Changed the way your yard is landscaped</td>
</tr>
<tr>
<td>d. Changed how you wash your vehicle</td>
</tr>
<tr>
<td>e. Changed how you deal with motor oil and other vehicle fluids</td>
</tr>
<tr>
<td>f. Chosen to dispose of household chemicals or yard waste</td>
</tr>
<tr>
<td>g. Other</td>
</tr>
</tbody>
</table>

Q-27. Please place an X on the line below to indicate how you see yourself on environmental issues:

FOR TOTAL = NATURAL RESOURCE USE AND PROTECTION OR EQUAL BALANCE = TOTAL ENVIRONMENTAL PROTECTION

Q-27. Please rate yourself on how you see yourself on environmental issues. Give a number, on a scale of 1 to 10, where 1 = total use of natural resources, 5 = equal balance between resource use and environmental protection, and 10 = total environmental protection.

_______ (Rating)
WATER QUALITY EDUCATION

Q-28. Have you received water quality information from the following sources? (Check one box per source)

<table>
<thead>
<tr>
<th>Source</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Newspapers</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Extension Service</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Universities</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Schools (elementary and secondary)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Environmental agencies (government)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Environmental groups (citizen groups)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Consumer Confidence Reports</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Q-29. Would you like to learn more about any of the following water quality issue areas? (Circle all that interest you)

<table>
<thead>
<tr>
<th>Issue Area</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Water Management</td>
<td></td>
</tr>
<tr>
<td>Animal Manure &amp; Waste Management</td>
<td></td>
</tr>
<tr>
<td>Drinking Water &amp; Human Health</td>
<td></td>
</tr>
<tr>
<td>Environmental Restoration</td>
<td></td>
</tr>
<tr>
<td>Nutrients &amp; Pesticide Management</td>
<td></td>
</tr>
<tr>
<td>Pollution Assessment &amp; Prevention</td>
<td></td>
</tr>
<tr>
<td>Water Conservation</td>
<td></td>
</tr>
<tr>
<td>Water Policy &amp; Economics</td>
<td></td>
</tr>
<tr>
<td>Watershed Management</td>
<td></td>
</tr>
</tbody>
</table>

Q-30. If you had the following kinds of learning opportunities available, which would you be most likely to take advantage of for water quality issues? (Check up to 3 items)

<table>
<thead>
<tr>
<th>Opportunity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Read printed fact sheets, bulletins, or brochures</td>
<td></td>
</tr>
<tr>
<td>Visit a web site for information and tips</td>
<td></td>
</tr>
<tr>
<td>Attend short course (weekend, evening)</td>
<td></td>
</tr>
<tr>
<td>Look at a demonstration or display</td>
<td></td>
</tr>
<tr>
<td>Read a newspaper article or series, or watch TV coverage</td>
<td></td>
</tr>
<tr>
<td>Watch a video of information</td>
<td></td>
</tr>
<tr>
<td>Take part in a onetime volunteer activity to learn or do something (for example, water monitoring, streamside restoration, or education)</td>
<td></td>
</tr>
<tr>
<td>Take a course for certification or credit</td>
<td></td>
</tr>
<tr>
<td>Get trained for a regular volunteer position (for example, as a watershed steward or a water quality monitor)</td>
<td></td>
</tr>
<tr>
<td>Ask for a home, farm, or workplace water practices assessment</td>
<td></td>
</tr>
<tr>
<td>Attend a fair or festival</td>
<td></td>
</tr>
</tbody>
</table>

PLEASE ANSWER THE FOLLOWING AS THEY PERTAIN TO YOU

Q-31. What size community do you live in?
A. More than 100,000 people
B. 25,000 to 100,000 people
C. 7,000 to 25,000 people
D. 3,500 to 7,000 people
E. Less than 3,500 people

Q-32. What is your zip code?
ZIP CODE ____________________
Q-33. How long have you lived in the Southwest or Pacific Islands (California, Arizona, Nevada, Hawaii, American Samoa, Guam, Commonwealth of the Northern Marianas)?
   a. All my life
   b. More than 10 years, but not all my life
   c. 5 to 9 years
   d. Less than 5 years

Q-34. What is your gender?
   a. Male
   b. Female

Q-35. What is your age?
   ______ years old

Q-36. What is the highest level of education you have completed?
   a. Less than high school or some high school
   b. High school graduate
   c. Some college or vocational training
   d. College graduate
   e. Advanced college degree

Q-37. What occupation category best describes you or your household?
   a. Farm / ranch / fishing / fish farming / forest products
   b. Manufacturing / construction / transportation
   c. Food service / recreation / tourism
   d. Education
   e. Technology / communication
   f. Management / retail business / sales
   g. Government
   h. Student
   i. Service sector
   j. Retired
   k. Other _________________________