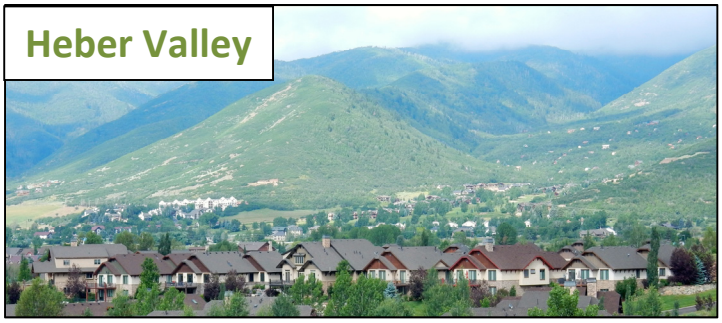
Utah's Water Future:

Perspectives on Water Issues in Utah's Wasatch Range Metropolitan Area



Utah's Water Future:
Perspectives on Water Issues in Utah's Wasatch Range Metropolitan Area

Summary Report of Overall Findings from the iUTAH 2014 Household Survey

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EXECUTIVE SUMMARY

The iUTAH[1] Household Survey was conducted in 2014 during a time when the State of Utah was initiating various activities aimed at charting a long-term strategy for securing Utah's water future. Water is currently high on the state's public policy agenda due to Utah's rapid population growth and urbanization, future water supply uncertainties related to climate change, and the political challenges of allocating increasingly limited regional water supplies. In order to provide information relevant to water policy, planning and management, the survey focused on understanding residents' water management practices, water experiences and concerns, as well as their support for various state and local water policies and programs.

The iUTAH Household Survey gathered data from over 2,300 residents in 23 different neighborhoods that represent the diverse types of urban development occurring in the Wasatch Range Metropolitan Area of Northern Utah. The survey was successful in capturing the views, experiences, and priorities of a representative cross-section of adults living in Utah's urban areas. Study neighborhoods were selected based upon development of a detailed urban neighborhood typology. Using a drop-off/pick-up method, the research team received responses from over 62% of the randomly selected households within study neighborhoods.

This report summarizes overall findings from the survey research effort, with an emphasis on comparing the four broad study locations of Salt Lake City, other parts of the Salt Lake Valley, the Cache Valley, and the Heber Valley. Our analysis presents some overarching themes that appear across our entire study area, but also highlights differences across these four locations. More specific neighborhood- and city-level findings are presented in a separate set of reports on our household survey project website (www.iutahepscor.org/hhsurvey).

The key findings and conclusions of this report revolve around the following 12 points:

1. Utah's urban residents live in diverse types of housing and neighborhood contexts that shape how they access water and their roles in making important water decisions.
2. Utah's urban residents are mobile and have diverse backgrounds, which affects their relationship to local communities and water resources.
3. Water-related amenities and risks are an integral part of northern Utah's urban water context.
4. Most Utahns' maintain traditional urban landscapes through regular and patterned watering and fertilization practices.

[1] The iUTAH project is a collaborative scientific research project funded by the National Science Foundation that involves researchers from all of Utah's major colleges and universities. The project began in 2012 and has facilitated cooperative research among scientists from many disciplines and a wide range of community partners. More information about the project can be found at our iUTAH project website (www.iutahepscor.org).

5. Basic water conservation practices are used by a significant number of Utahns.

6. Opportunities exist to expand urban water conservation, especially outdoors.

7. Concerns about water issues are widespread, but these concerns compete with concerns about other growth-related issues.

8. Respondents have mixed perceptions regarding their water supply situation.

9. Respondents generally have positive perceptions of water quality in Utah, though many are uncertain.

10. At the local level, respondents support a variety of policies and strategies that would increase reuse, conservation, and efficient use of existing urban water supplies, while strongly opposing moving water from agriculture to urban uses.

11. Top goals for state water policy are to ensure water supply and water quality. The highest support was for state spending to help replace aging urban water infrastructure, followed by support to incentivize conservation, increase storage, and protect environmental quality.

12. Most people want to meet new urban water demands without taking water from agriculture.

The overall findings suggest that as the state's population becomes increasingly urbanized, it will be important to improve our understanding of how diverse urban residents and types of residential developments will impact citizens' water perceptions and management behaviors. The findings also imply that Utahn's water management practices and decisions are quite diverse and flexible. It is reasonable to expect that people will adapt to changes in water availability, new technologies, water costs, and public policies that incentivize water conservation. Moreover, people frequently move between neighborhoods (and to and from other states), and these changes in residential settings can be expected to impact the choices people make about water use.

As a whole, there appears to be strong support for (and relatively low levels of opposition to) a wide range of local- and state-level policies and programs to address many of the water challenges Utahns are likely to face in the coming years. These include efforts to reduce consumption, improve or sustain water quality, augment supply and protect the water-based amenities and recreational activities that are important to the quality of life for many Utah residents.

The public's willingness to support and engage in policy-related changes to help meet Utah's future water sustainability challenges should be encouraging to state officials and local water managers. Involving members of the public in water decisions and collective action will need to be an important part of Utah's future water strategy.

I. OVERVIEW

iUTAH

iUTAH (innovative Urban Transitions in Aridregion Hydro-sustainability) is a five-year investment by the National Science Foundation in Utah water research infrastructure that involves multiple universities and other educational institutions throughout the state[2]. The overall iUTAH project is designed to provide information on the hydrology, ecology and human aspects of water systems in the Wasatch Range Metropolitan Area (WRMA), and to explore a range of options related to sustainable water management. iUTAH's statewide network of researchers and its wide range of capacity-building activities in water sciences are helping to meet Utah's information needs as the state charts its water future.

The 2014 Household Survey

As part of its interdisciplinary effort to understand Utah's water system, a team of social science, policy and planning researchers from Utah State University, the University of Utah, and Weber State University designed a household survey that was administered in the summer of 2014. The purpose of the survey was to document how residents in different neighborhoods across the Wasatch Range Metropolitan Area use water and think about important water issues in their city, valley and state. Questions were designed by the iUTAH Survey Team with input from municipal and state water managers and stakeholders.

The iUTAH Household Water Survey was administered in 23 urban neighborhoods across 12 cities in 3 counties (Cache, Salt Lake, and Wasatch). The three counties where the surveys were implemented account for over 42% of the total Utah population, and represent areas with very different levels of urban development. Neighborhoods were selected to represent different combinations of land use, housing types and demographic characteristics found in urban concentrations in northern Utah. Northern Utah is the most highly urbanized and fastest growing region of the state, and illustrates the water challenges involved in addressing Utah's projected future population growth and urbanization trends.

Purpose of this Report

The purpose of this report is to provide overall survey results, with particular emphasis on results that have policy relevance to state and regional water officials. This report summarizes and compares results from each of the four areas in which the survey was conducted: Cache Valley, Salt Lake City, other areas within the Salt Lake Valley, and Heber Valley.[3]

In addition to this overview report, basic survey results have been summarized in a series of reports written for each community where research was conducted. These reports present

[2] See the iUTAH website at www.iutahepscor.org
[3] Survey results and reports can be found at www.iutahepscor.org/hhsurvey

more detailed information comparing results from the neighborhoods surveyed within those communities, and provide important information for local water managers and decision makers. More complex scientific analyses and products also are being prepared to focus on particular aspects of the survey results. These products will be available through the iUTAH website.[1, 2]

Utah is currently involved in long-term water planning and in deliberating policy alternatives for meeting future water needs. As the state charts its water future, decision makers need to know what citizens think about water issues and what they are willing and able to do to help stretch limited supplies in the face of growing demands. As we show below, not all urban residents are connected to water in the same ways or feel similarly about water issues. Understanding citizen's diverse water-related situations and perspectives is important for water policy, planning and management in Utah.

II. METHODS

A. Household Survey Design

A.1. Rationale

The household survey was designed to gather information from residential households about household water management behavior and decision-making, and about people's concerns and priorities relative to water issues and water policies. A goal of the survey was to determine the drivers of residential water use behaviors and decisions, and how these drivers impact water issues related to urbanization. Survey results and area comparisons reveal key themes and neighborhood differences important to future Utah water management. The survey was scientifically designed and administered to enable comparisons across diverse neighborhood settings in the regional WRMA and to generalize to Utah's larger urbanized context.

A.2. Survey Topics

Questions included in the survey addressed household and respondent water management behaviors, attitudes about water conservation, perceptions of water supply and water quality conditions, concerns about water and non-water issues, and support for various water policies and programs. The following topics were included in the survey:

I. Household Water Uses and Perspectives
   A. Familiarity with Water Use
   B. Lawn and Outdoor Watering
   C. Water Conservation Practices
   D. Motivations to Conserve Water
   E. Secondary Water Systems

II. Water Perspectives and Experiences
   A. Perceptions of Water Supply
   B. Risk Perceptions
   C. Perceptions about Water Use and Water Quality
   D. Experience with Flooding
   E. Climate Change Perspectives

III. Water Policy and Management Perspectives
   A. Opinions about Local Water Management Strategies and Policies
   B. Opinions about State Water Strategies

IV. Additional Information
   A. Water Information Sources
   B. Experiences and Perspectives on Neighborhood and Community

B. Selection of Neighborhoods and Households to Survey

B.1. Neighborhood Typology

This survey was administered to randomly selected households in 23 residential areas representative of distinctive types of urban neighborhoods. Each individual neighborhood was chosen to represent a particular combination of land use, land cover, built environment, household structures, residential properties, sociodemographic attributes, water infrastructure, climate characteristics and policy context. Neighborhoods were characterized through a detailed analysis of neighborhood types present in the WRMA that drew upon a wide range of publicly available data aggregated to Census Block Groups (CBGs)[4].

Study neighborhoods were then selected to represent good examples of each of the most important neighborhood types found among the urbanized areas of Northern Utah.

The study neighborhoods were also selected from three different valleys (the Cache Valley, Salt Lake Valley, and Heber Valley; see Figures 1-3) that represent different degrees of the observed gradient of urbanization form and intensity. The interdisciplinary science being conducted under the iUTAH project focuses on this urbanization gradient and the ways in which it affects urban water outcomes. The social science of understanding characteristics of study neighborhoods and their residents, and the connections to water outcomes, is important for identifying the drivers of urban water use in northern Utah.

B.2. Household and Respondent Selection

Over 4,000 housing units were randomly sampled from county and city property tax rolls to participate in the survey (approximately 180 households in each of the 23 neighborhoods). Multi-unit dwellings were verified through field reconnaissance, and sample frames were constructed to allow equal probability of selection for all households regardless of the size of the housing unit.

The survey instructed an adult (18 years of age or over) with general knowledge about the household's water use and decisions to fill out the survey. Most of the questions pertained to activities of the household unit and represent household-level data. Some questions asked about opinions and perspectives on water issues and represent respondent-level data.

[4] Details of methods used to construct our typology of urban neighborhoods can be found in Jackson-Smith, D., P. Stoker, and M. Buchert. 2014. Neighborhood Socio-Ecohydrology along a Gradient of Urbanization. iUTAH Technical Report. Available at: http://repository.iutahepscor.org/dataset/development-of-a-water-relevant-typology-of-urban-neighborhoods

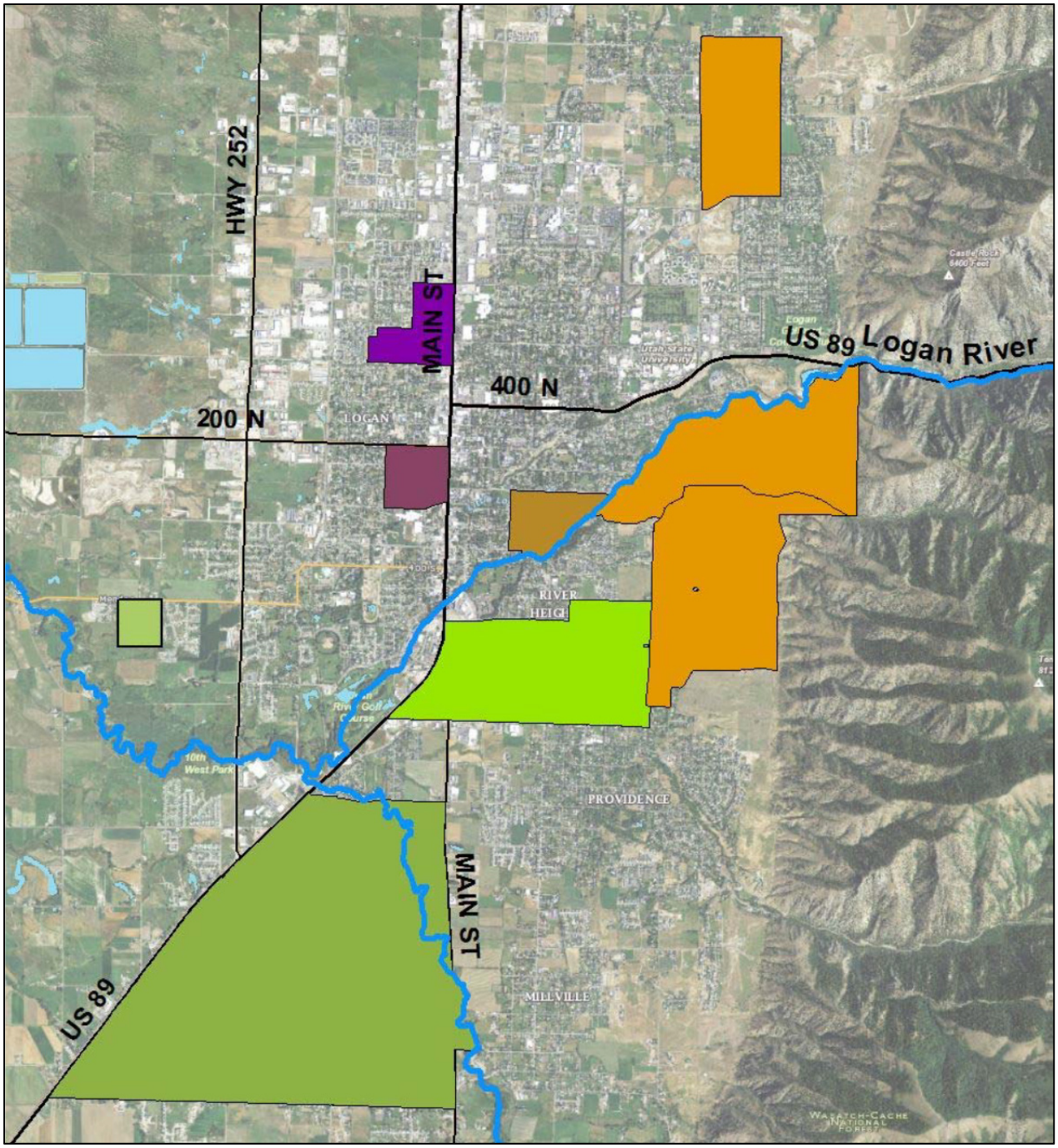

Figure 1: Map of Study Neighborhoods in Cache Valley

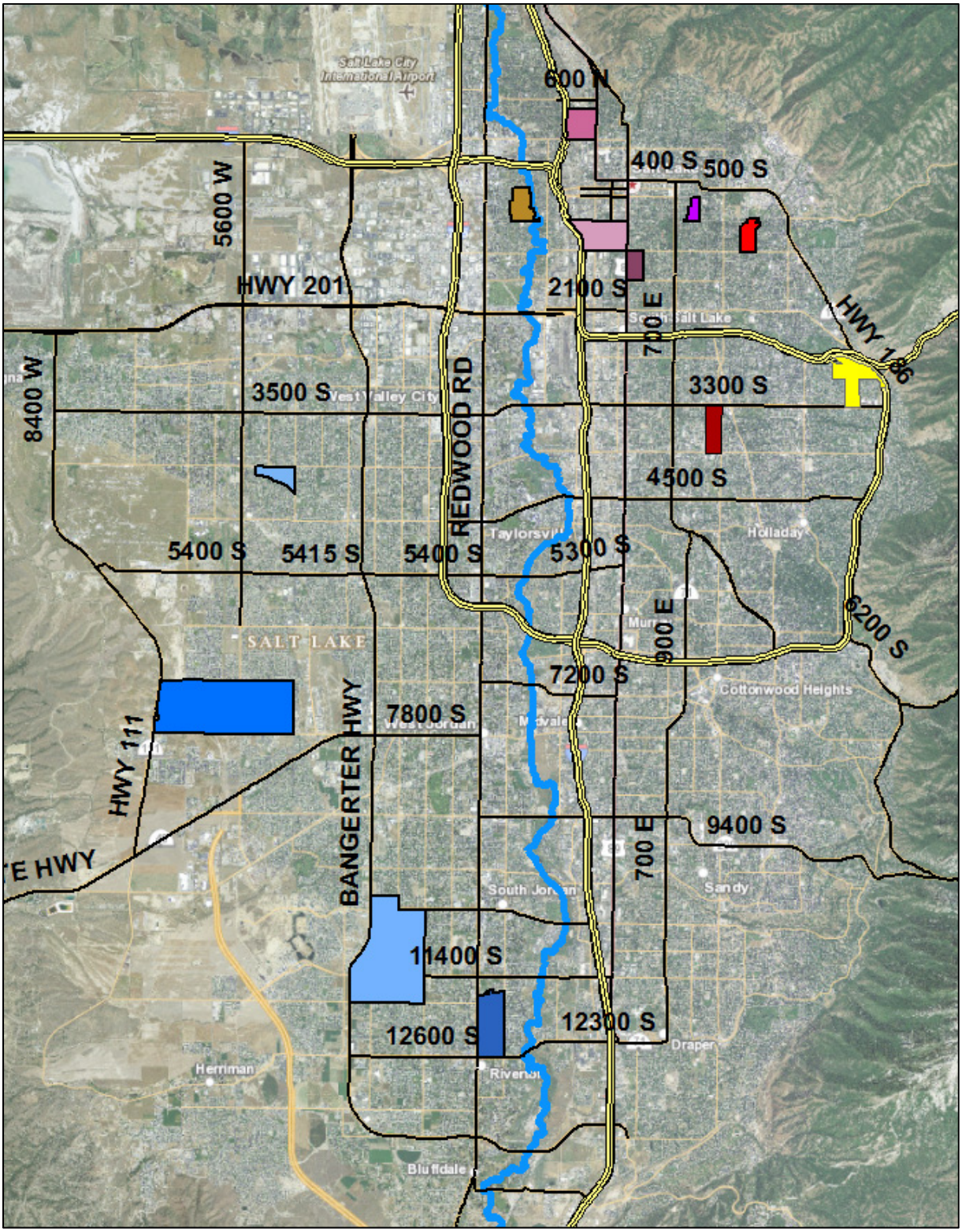

Figure 2: Map of Study Neighborhoods in Salt Lake Valley

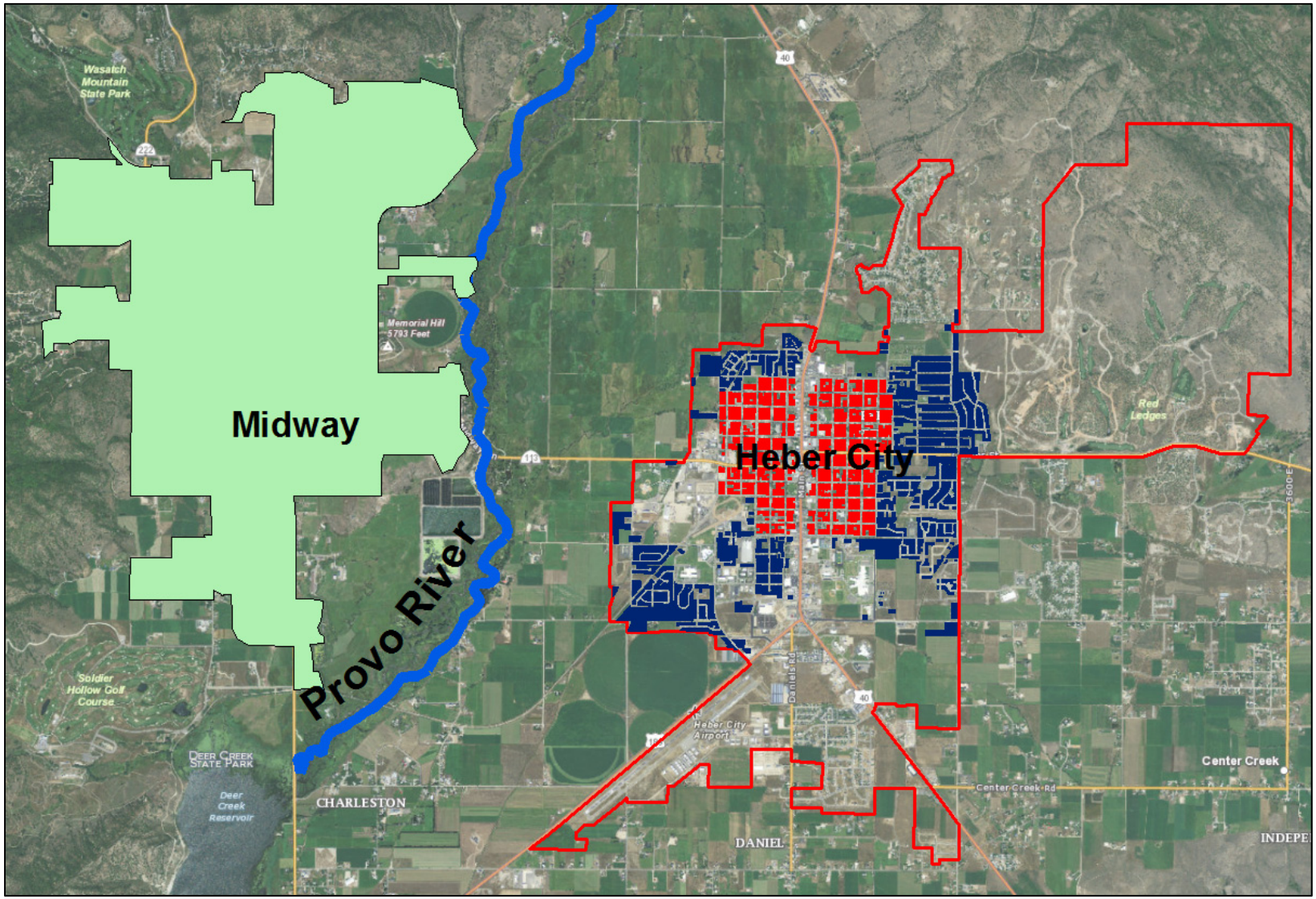

Figure 3: Map of Study Neighborhoods in Heber Valley

C. Survey Administration

C.1. Delivery Method

This survey was implemented using a Drop-Off/Pick-Up method. Field staff visited each sampled address repeatedly until they made personal contact with a qualifying adult at their door. Field staff explained the survey and, if the person agreed the household would participate, left a copy of the survey for self-completion by an adult member of the household (as mentioned previously, instructions on who should fill it out were included in the survey and also communicated at the door). Field staff also made arrangements to stop by again to pick up the completed survey within a day or two. If surveys were not ready at the agreed upon time, the staff left reminders at the door of the residence. After multiple attempts to pick up a survey, prepaid return envelopes were left at the door for the respondent to use to return their survey.

In some cases, the field staff was unable to make contact with an adult (either because no one answered the door, or because physical access to the door was not possible). In these cases, the survey was administered using a standard multi-wave mail survey method (involving mailings of three separate survey packets and several reminder postcards).

Some of the randomly-sampled housing units were found to be non-residential properties or vacant when the field staff visited. In these cases, the sampled units were dropped from the study. Through this procedure, 7.7% of the sampled housing units were deemed ineligible. No replacements for these ineligible housing units were selected.

The survey was made available in both English and Spanish, and we also deployed bilingual field staff in neighborhoods where census statistics indicated the presence of significant numbers of non-English speaking residents.

While more time and resource intensive than other survey techniques, the Drop-Off/Pick-Up method results in higher completion rates and greater validity by maximizing participation of the randomly-selected households and minimizing non-response and associated biases.

C.2. Response Rates

Survey participation rates were high. The overall response rate was 62% of the sampled occupied housing units (Table 1). This participation reflects a total of 2,343 usable respondents from a total sample frame of 3,766 eligible housing units.

Response rates varied somewhat by valley. Response rates ranged from 72.7% in Cache Valley, to 63.2% in the Heber Valley, and 55.7% in the Salt Lake Valley. Response rates also varied by individual neighborhood, but only 3 of our 23 neighborhoods had response rates below 50%, and 7 neighborhoods had response rates over 70%. Generally speaking, the most highly

urbanized neighborhoods (with more renters and large multi-unit dwellings) had the lowest response rates.

A sample of this size provides estimates of population characteristics for the three study counties with an accuracy of +/- 2%. Samples within each valley were large enough to be accurate to estimate household and adult characteristics within +/- 3.2 to 5.5% (Table 1).

In this report, we focus on the combined results for the overall sample, but also disaggregate results to highlight differences across the three valleys where the research took place, as well as distinguish between Salt Lake City and the surrounding communities in the Salt Lake Valley.

Table 1: Sample Size, Response Rates and Accuracy Estimates for Study Areas and Overall

Sample Characteristics	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*
Original Household Sample Size	1,325	1,100	1,100	560	4,085
Ineligible Household Units	96	93	64	66	319
Adjusted Household Sample Frame	1,229	1,007	1,036	494	3,766
Useable iUTAH Responses	**893**	**531**	**607**	**312**	**2,343**
iUTAH Response Rate	**72.7%**	**52.7%**	**58.6%**	**63.2%**	**62.2%**
2014 Census Population (1000s)[a]					
Households	35,375	73,642	270,447	7,602	387,066
Adults	118,343	191,100	900,642	27,714	1,237,799
Accuracy of iUTAH Estimate[b]					
Households	**+/- 3.2%**	**+/- 4.2%**	**+/- 4.0%**	**+/- 5.4%**	**+/- 2.0%**
Adults	**+/- 3.3%**	**+/- 4.3%**	**+/- 4.0%**	**+/- 5.5%**	**+/- 2.0%**

[a] *County total for Cache and Wasatch County; Salt Lake City population; SL Valley population minus SLC.*
[b] *Accuracy of estimates for population characteristics in each area based on number of respondents.*

D. Demographic Characteristics of Households and Respondents

While it was not designed to be a fully representative sample of all Utah adults, the results of the iUTAH Household Survey do appear to reflect the views of average urban residents in each of our 23 study neighborhoods (specifically) and across the three study valleys (more generally). An analysis of the demographic profile of respondents suggests that we have relatively little response bias. Respondents closely reflect the characteristics of adults and households as reported by the U.S. Census Bureau in each of our study neighborhoods[5]. Moreover, the pooled sample reflects the broader Utah adult population in most respects.

[5] See details in Valley and Neighborhood-level reports available at www.iutahepscor.org/hhsurvey

As shown in Tables 2 and 3, households from a well-distributed range of income brackets and household sizes participated in all of the study locations. Households in the parts of the Salt Lake Valley outside of Salt Lake City and in Heber Valley were more likely to have higher incomes, and those in Salt Lake City tended to have smaller household sizes. A comparison to census estimates for Utah as a whole suggests that the combined survey sample represents the state's household income and size distributions well.

Table 2: Household Income by Study Valleys and Overall

Household Income	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***U.S. Census State-level Estimate***
			Percent of respondents			
Under $25,000	19.9	23.4	7.5	11.1	16.4	**18.0**
$25,000 to $49,000	26.4	24.1	18.8	19.9	23.1	**23.7**
$50,000 to $74,999	25.0	21.2	23.8	27.1	24.1	**21.5**
$75,000 to $99,999	13.9	13.8	21.2	18.4	18.6	**14.7**
Over $100,000	14.7	17.7	28.7	23.5	23.3	**22.0**

Table 3: Household Size by Study Valleys and Overall

Number of people living in household	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***U.S. Census State-level Estimate***
			Percent of respondents			
1	14.2	21.4	7.1	11.8	13.7	**18.7**
2	30.2	36.2	27.6	32.0	31.1	**29.3**
3	17.5	19.2	19.1	13.1	17.7	**16.0**
4	15.0	12.2	20.5	15.5	15.8	**15.1**
5	10.4	5.2	11.4	11.1	9.6	**10.3**
6 or more	12.6	5.8	14.3	16.5	12.0	**10.7**

The individual respondents from the sampled households represent a wide range of ages (Table 4) and diverse levels of formal educational attainment (Table 5). The age distribution of the adults who filled out our surveys tended to be older than the adult population in each neighborhood, valley and the state as a whole. The youngest group, people in the 18-34 age category, were slightly underrepresented. This is not too surprising since households with multiple adults were likely to have an older person (who is more responsible for making household water management decisions) fill out the survey as instructed.

Similarly, we see a bias towards adults with more formal education among the survey respondents. The results presented here appear to underrepresent the experiences and views of persons with a high school diploma or less formal education, and significantly over-represent adults with graduate or professional degrees. To some degree, this may also reflect a tendency for an adult in each household with the most formal education to be the person to complete the survey.

Table 4: Age of Respondents by Study Valleys and Overall

Age of Respondent	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***U.S. Census State-level Estimate***
			Percent of respondents			
18 to 34 years old	31.4	33.2	18.8	16.8	26.6	**40.3**
35 to 49 years old	26.2	24.4	36.1	35.4	29.6	**25.7**
50 to 64 years old	23.8	24.2	27.7	23.2	24.8	**20.7**
65 and over	18.6	18.2	17.4	24.6	19.0	**13.2**

Table 5: Formal Education of Respondents by Study Valleys and Overall

What is the highest level of school you have completed?	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***U.S. Census State-level Estimate***
			Percent of respondents			
Less than high school	3.0	4.1	2.4	3.3	3.1	**9.2**
High school diploma	11.5	12.3	14.8	12.4	12.7	**23.6**
Some college	25.7	20.8	28.8	26.4	26.6	**27.6**
Vocational/technical degree	9.5	8.6	13.0	10.4	10.3	**9.4**
4-year college degree	27.8	28.2	25.4	27.1	27.2	**20.3**
Graduate degree	22.4	26.1	15.5	20.4	21.2	**9.9**

Most of the survey respondents identified as White (between 75% and 93%) with those identifying with any minority race or ethnic group participating at rates between 7% and 24%, depending on the study area (Table 6). Overall, the sample reflects the cultural diversity of Utah's population fairly well, with some underrepresentation of Hispanic residents, and overrepresentation of White residents.

Table 6: Respondent Race or Ethnicity by Study Valleys and Overall

What category best describes your race or ethnicity?	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***U.S. Census State-level Estimate***
			Percent of respondents			
Asian or Pacific Islander	2.5	5.3	4.6	0.7	3.4	**2.9**
Black or African American	0.9	2.4	0.9	0.0	1.1	**1.0**
Native American	0.9	1.6	0.9	0.0	0.9	**1.0**
Hispanic or Latino	6.3	10.6	5.3	5.7	6.9	**13.1**
White	87.0	75.4	85.4	92.6	84.8	**80.1**
Other	2.4	4.7	2.9	1.0	2.8	**3.6**

More women than men filled out the survey, particularly in the Cache and Heber valleys (Table 7). Overall, 53% of respondents were women, slightly higher than the U.S. Census state-level estimate. The majority of respondents identified their religion as LDS in Cache County (66%) and Heber Valley (57%), with religious identification as LDS or non-LDS evenly split in parts of Salt Lake Valley outside of Salt Lake City, and non-LDS representing a decided majority of respondents (75%) in Salt Lake City (Table 7). Overall, 51.5% of survey respondents self-identified as LDS (compared to a state estimate of 60% of adults according to recent Gallup poll results).

Table 7: Respondent Gender and Religion by Study Valleys and Overall

Additional Demographic Information	*Cache Valley*	*Salt Lake Valley: Salt Lake City*	*Salt Lake Valley: Other SL County*	*Heber Valley*	*Overall pooled sample*	***State-level Estimates***
Respondent Gender						
			Percent of respondents			
Female	55.0	50.5	50.3	57.8	53.1	**50.3**[a]
Male	45.0	49.5	49.7	42.2	46.9	**49.7**[a]
Respondent Religion						
			Percent of respondents			
Religion: LDS	65.7	25.8	50.0	56.9	51.5	**60.0**[b]
Religion: Non-LDS	34.3	74.2	50.0	43.1	48.5	**40.0**[b]

[a] *From U.S. Census Data*

[b] *Based on 2014 Gallup Polling data: http://www.gallup.com/poll/167120/mississippi-alabama-protestant-states.aspx*

III. RESULTS

A. Urban Residential Connections to Water

In this section, we describe how people who reside in urban areas of the WRMA generally use and are connected to water. We first present information on respondents' urban residential profile, including their current residential situation and their residential history. We then present information on how these respondents and their households access and connect with water on their properties, in their neighborhoods, and in other locations. The nature of residential neighborhoods and the types of water systems and infrastructure that maintain them are important components of the physical, ecological, and human elements of urban form that drive water use outcomes, and that the iUTAH project seeks to characterize and analyze.

A.1. Respondents' Residential Profiles

Respondents' residential profiles are important for understanding people's connections to and experience with water in a particular neighborhood context. Residential background in each study community or the State of Utah more generally can influence awareness of and responses to local and state water issues, and can shape people's water use behaviors in particular ways.

As seen in the residential history section of Table 8, a majority of the overall survey respondents were originally from Utah (about 57%). However, a little over one-third (37%) were originally from the areas where they were surveyed. Parts of the Salt Lake Valley outside of Salt Lake City had more people originally from that area than in the other study locations. Neighborhoods in the Heber Valley appear to have the most in-migrants, with about 22% of respondents originally from that area.

There is also evidence of a broader pattern of rural-to-urban migration, with many respondents retaining some connections to farming or rural areas. Significant percentages of people living in the urban study neighborhoods grew up on a farm or in a rural area or small town. More respondents from Cache Valley and Heber Valley grew up on a farm or in a rural area or small town, while more respondents in the two areas of the Salt Lake Valley grew up in a suburban or urban area. Close to one-third of the respondents in both Cache Valley and Heber Valley indicated they currently farm or have relatives in farming, and for all areas it was 27.9%.

The results also reveal a significant level of population mobility among the survey respondents. Almost equal percentages of respondents in Cache Valley, Salt Lake City, and Heber Valley lived at their residence for less than five years as have lived there for more than five years. The other Salt Lake County neighborhoods were distinct in terms of having a greater percentage of survey respondents living at their residences for more than five years. This is likely related to the observation that a higher percentage of respondents in these other Salt Lake Valley

neighborhoods are homeowners compared to respondents in the other areas. In the overall pooled sample, nearly 75% of respondents were homeowners and about 25% were renters.

Table 8: Respondents' Residential Profile by Study Valleys and Overall

Respondent Residential Background	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	Percent of respondents				
Residential history					
Originally from that area	32.2	38.6	51.2	21.5	37.0
Originally from Utah	55.6	51.2	64.3	54.7	56.7
Where respondent grew up					
On a farm	12.4	7.3	5.7	8.4	9.0
Rural area or small town	41.2	26.1	27.6	46.5	35.1
Suburban area	30.3	38.7	49.6	30.8	37.1
Urban area	14.0	26.5	15.5	12.0	16.9
Respondent currently farms or has relatives who farm					
Yes	33.5	20.3	22.9	33.7	27.9
Longevity at residence					
Less than or equal to 5 years	50.2	51.5	32.7	47.5	45.7
More than 5 years	49.8	48.5	67.3	52.5	54.3
Relation to residence					
Homeowner	70.6	62.2	88.3	79.0	74.3
Renter	29.4	37.8	11.7	21.0	25.7

A.2. Access to and Connections with Water

A.2.a. How people use and access water on their residential properties

In our study neighborhoods, people depend on water for a variety of residential uses (Table 9) and they often access water from various sources and through different delivery systems. Virtually all respondents indicated that their households use water for indoor purposes (e.g., drinking, cooking, bathing, washing, laundry, etc.). Most households (83%) also reported using water for outdoor landscaping. As we discuss in more detail below, those households with no reported outdoor water use were typically occupied by people (like renters) who do not have responsibility for outdoor watering or whose property does not have grass lawns or other related landscaping.

A relatively small percentage of respondent households, about 7% overall, used water for swimming pools or hot tubs, while less than 2% overall used water on their property for farm uses, which is not surprising since the surveyed neighborhoods are predominantly urban or suburban. Water for farming purposes is generally delivered through other types of water conveyance systems than culinary water delivered by municipalities.

Table 9: Water Uses of Households by Study Valleys and Overall

In what ways does your household regularly use water on this property?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
			Percent of respondents		
Outdoor landscaping	76.8	74.3	91.9	86.7	81.5
Swimming pool or hot tub	6.5	4.5	9.1	9.1	7.1
Farm uses	1.8	0.4	2.3	2.9	1.8

As indicated in Table 10, fewer than about 5% of respondent households obtained the water they use indoors or outdoors from private wells. A greater percentage of households (between 2% and 20%) currently owned water rights or water shares in Utah, most commonly reported by respondents in the Cache and Heber valleys.

Table 10: Households' Access to Water Sources by Study Valleys and Overall

	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
			Percent of respondents		
Does any of your household's indoor or outdoor water come from a private well?					
Yes	5.0	4.8	2.30	4.1	4.3
Do you or any members of your household currently own any water rights or water shares in Utah?					
No	76.0	96.5	89.7	77.1	84.3
Yes - for this property	19.7	1.5	7.6	17.5	12.2
Yes - for another property in Utah	5.4	2.1	3.2	8.9	4.6

A.2.b. Access to and use of secondary water systems

Secondary water systems typically deliver untreated water for outdoor irrigation uses, and are usually organized as local canal, irrigation, or water companies. Households can own shares in a secondary system that allow them to access water from a pipe or ditch/canal for use on their property. The state Division of Water Resources estimates that roughly 25% of total municipal

and industrial water use is from secondary water providers (DWRe 2010)[6]. About one in five of our survey respondents report their household has access to a 'secondary' water source, mostly residents in the areas outside of Salt Lake City (Table 11).

Households with access to 'secondary' water sources primarily used that water for lawn and yard landscaping and for vegetable gardening, with less than 10% using it for irrigating pastures or farm crops. About two-thirds of overall households obtained secondary water through pressurized pipes and one-third through open ditches or canals and other sources. In terms of forms of secondary water supply, open ditches and canals were the most common forms for respondents. The majority of respondents with access to secondary water reported being satisfied or very satisfied with their secondary systems. Just over a third of secondary water users were confident or very confident in the future security of their secondary water supply. Only about 28.8% of respondents overall had attended any meetings with their secondary water provider, with Cache Valley respondents reporting much higher levels of participation.

Table 11: Households' Access to Secondary Water

	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
			Percent of respondents		
Does your household have access to a 'secondary' water source?					
Yes	21.5	1.4	23.4	53.0	21.7
For those with access to secondary water *(follow-up questions):*					
How is it used on your property?					
Not used	12.6	*n.a.*	8.3	4.5	9.0
Lawn and yard landscaping	79.2	*n.a.*	84.8	91.0	84.5
Vegetable Garden	53.0	*n.a.*	46.2	52.6	51.1
Water pasture or crops	7.1	*n.a.*	9.8	9.0	8.4
How is your secondary water delivered to your property?					
Pressurized pipe	48.9	*n.a.*	69.2	81.5	65.5
Open ditch or canal	51.1	*n.a.*	30.8	18.5	34.5
How satisfied are you with your secondary water system?					
Unsatisfied or Very unsatisfied	22.1	*n.a.*	25.4	18.4	21.7
Satisfied or Very Satisfied	52.5	*n.a.*	55.4	67.7	58.4
How confident are you in the future security your secondary water supply?					
Confident or Very Confident	38.0	*n.a.*	31.0	34.0	34.3
Have you ever attended a meeting of your secondary water system provider?					
Yes	45.1	*n.a.*	17.2	20.3	28.8

[6] Utah Division of Water Resources. 2010. Municipal and Industrial Water Use in Utah. Available at: http://www.water.utah.gov/M&I/M&Idefault.html

A.2.c. Water-related recreational activities

An important way that people in Utah use and access water is through water-related recreational activities (Table 12). These activities can occur in a variety of locations. Being able to use or connect to water through water-related recreational activities is generally considered an environmental amenity.

Interestingly, the water-related recreational activities that most people indicated they engage in often or sometimes were gardening and walking or hiking near water bodies. Since these more "everyday" recreational activities are located at or likely near people's residential locations, it points to the importance of access to water within people's own neighborhoods.

Fishing, boating, and skiing or snowboarding are the next three water-related activities that people engaged in most often. Snowmobiling, bird watching near water bodies, and hunting waterfowl seem to appeal to more specialized recreational groups, with large percentages of respondents indicating they never or rarely engage in those recreational activities.

Levels of engagement in different forms of water-based recreation varied by study area (Figure 4). In general, respondents from the Heber Valley participated more frequently in these activities than respondents in the other study areas. By contrast, respondents from our Salt Lake City neighborhoods were least likely to engage in most of these water-related recreational activities (with the exception of walking or hiking near water, skiing, and snowboarding, where participation did occur).

Table 12: Respondents' Water-Related Recreational Activities (Pooled Sample)

How often do you participate in any of the following water-related recreational activities in Utah?	*Never*	*Rarely*	*Some-times*	*Often*	*Mean score**
	Percent of respondents				*1-4 scale*
Gardening	13.4	14.7	28.7	43.3	*3.02*
Walking or hiking near water bodies	10.5	14.4	40.5	34.5	*2.99*
Fishing	38.6	24.5	24.3	12.7	*2.11*
Boating	37.3	31.6	23.1	8.1	*2.02*
Skiing or snowboarding	49.0	17.2	18.2	15.7	*2.01*
Bird watching near water bodies	55.5	21.4	17.6	5.5	*1.73*
Snowmobiling	73.5	17.9	6.4	2.15	*1.37*
Hunting waterfowl	83.9	8.4	4.7	3.0	*1.27*

* *Responses to this question were coded on a scale of 1 to 4, with "Never" coded as 1 and "Often" coded as 4. The mean score represents the average across all respondents (or the sum of all scores divided by the number of scores).*

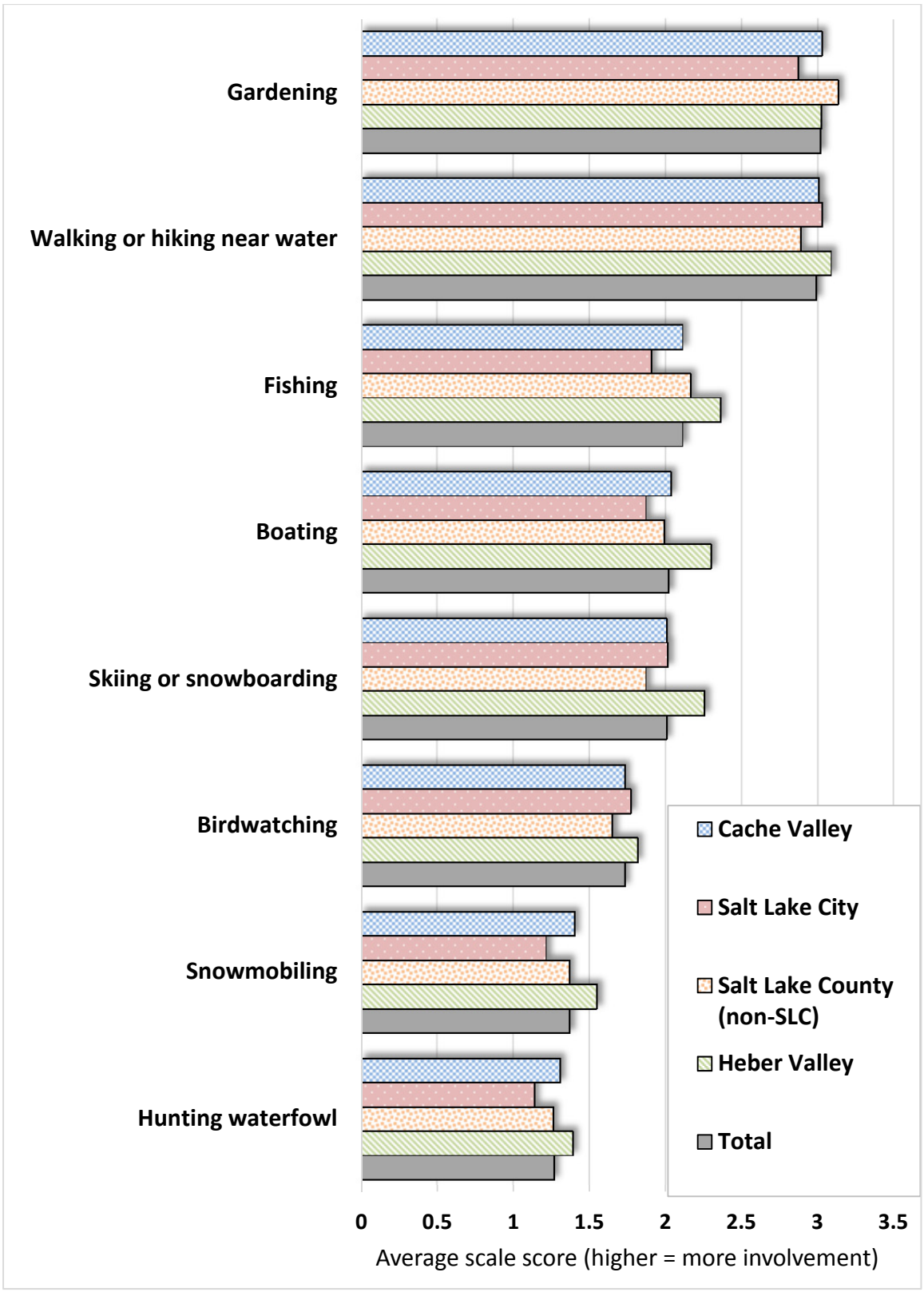

Figure 4: Participation in Different Types of Water-Based Recreation by Study Area

A.2.d. Water-related risks to households and their communities

In contrast to beneficial indoor and outdoor uses of water at people's residences and in water-related recreational activities, other ways in which people are connected to water entail risks. Overall, the results suggest that household- and community-level impacts from flooding in Utah have been common. Table 13 shows the percentages of respondents who reported impacts *to their households* from a variety of flooding and stormwater events within the last ten years, including: flooded basements, private property damage, damage to public roads and infrastructure, contaminated streams, contaminated drinking water, and loss of life or injury to a person. Table 14 shows the percent of respondents that reported being aware of instances of such impacts within their communities. Over half of respondents reported being aware of property damages from flooding at the community level. In general, awareness of impacts from flooding are higher among respondents in Cache Valley and lowest in Heber Valley.

Table 13: Flooding and Stormwater Impacts to Households by Study Valleys and Overall

Are you aware of any instances in the last 10 years where flooding and/or stormwater caused the following impacts to *your household*?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	Percent of 'yes' responses				
Flooded basements	32.1	21.8	31.2	25.9	28.7
Private property damage	27.3	23.0	26.8	25.9	26.0
Damage to public roads & infrastructure	19.3	23.1	19.5	17.4	20.0
Contaminated streams	7.3	27.6	14.7	9.4	14.0
Contaminated drinking water	8.0	14.6	16.6	16.8	12.8
Loss of life or injury to a person	11.2	8.3	6.6	4.8	8.5

Table 14: Flooding and Stormwater Impacts to Communities by Study Valleys and Overall

Are you aware of any instances in the last 10 years where flooding and/or stormwater caused the following impacts to *your community*?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	Percent of 'yes' responses				
Flooded basements	64.9	40.9	50.8	33.5	52.1
Private property damage	61.0	48.7	49.1	34.8	52.0
Damage to public roads & infrastructure	61.5	49.9	45.3	36.2	51.7
Contaminated streams	26.4	57.6	36.6	14.9	34.6
Loss of life or injury to a person	40.7	25.0	19.4	10.1	28.1
Contaminated drinking water	23.0	33.0	29.2	20.2	26.4

A.2.e. Respondents' sources of information about water issues

People's connections with water are shaped, in part, by what they know about it. The household survey asked respondents where they get their information about water issues. The results are displayed in Table 15 and show that respondents get information about water issues from a wide variety of information sources. The two sources where over half of all respondents in each study area obtain information about water were: TV or radio; and, the internet or social media. Three other sources relied on by nearly or a little more than half of respondents in each area were: conversations with friends; mailings or other contact from their water provider; and any newspaper (various newspapers were identified by name in the survey). Few respondents reported getting information about water issues from a homeowner or neighborhood association.

Table 15: Respondents' Sources of Information about Water Issues by Study Valleys and Overall

Do you get information about water issues from any of the following sources?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
			Percent of "yes" responses		
TV or radio	64.8	73.6	72.0	66.8	68.9
Internet or social media	54.3	64.6	56.7	54.9	57.4
Conversations with friends or neighbors	57.5	52.2	48.5	61.6	54.5
Mailings or other contact from water provider	46.6	46.2	57.6	47.8	49.5
Any Newspaper	50.3	48.6	41.2	56.1	48.3
Salt Lake Tribune	12.8	45.7	31.8	21.8	26.4
Deseret News	11.4	14.4	18.5	18.3	14.8
Logan Herald Journal	46.5	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Wasatch Wave	*n.a.*	*n.a.*	*n.a.*	44.3	*n.a.*
Homeowners' or Neighborhood Association	12.1	8.4	10.0	20.5	11.8

A.2.f. Amenity aspects of neighborhoods

The survey also asked people about their level of satisfaction with several other physical and social aspects of their neighborhoods. The percentages of respondents who were satisfied or very satisfied with those aspects are reported in Table 16.

In general, respondents expressed satisfaction with the overall quality of life, the quality of parks and common spaces, the appearance of homes and yards, opportunities to interact with neighbors, and the number of shade trees in their neighborhoods. Several of these elements

are directly related to maintenance of urban green space that water for irrigation helps make possible.

Respondents in the Cache and Heber valleys tended to report the highest levels of satisfaction on all five indicators. Respondents in Salt Lake City were notably less likely to be satisfied with the appearance of homes and yards and the opportunities to interact with their neighbors.

Table 16: Respondents' Satisfaction with Neighborhood Characteristics by Study Valleys and Overall

For each of the following items, please indicate your level of satisfaction with that aspect of your neighborhood.	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'satisfied' or 'very satisfied' responses**				
Overall quality of life	84.7	71.6	79.6	87.9	80.8
Quality of parks and common spaces	73.3	67.0	61.0	69.7	68.2
Appearance of homes and yards	64.7	45.8	65.0	68.1	61.0
Opportunities to interact with neighbors	64.9	44.9	62.8	67.4	60.2
Number of shade trees	63.1	57.0	56.8	58.6	59.5

** Responses to this question were on a five-point scale from 1 = "very dissatisfied" to 5 = "very satisfied." Reported in this table are the percentages of 4 and 5 responses, indicating people were satisfied or very satisfied.*

B. Urban Landscape Water Use

Total residential water use comprises approximately 70% of municipal and industrial water supplies in Utah. Roughly two-thirds of residential water use in urban areas of Utah is used to irrigate and maintain outdoor landscapes (UDWRe 2010b)[7]. Outdoor landscape water use in northern Utah is seasonal in nature, yet the need to supply large increases in water use during summer months is an important element in the design and operation of municipal water systems. As the state becomes increasingly urbanized, there is greater need to better understand the landscape component of urban water use.

Because of its important role in the urban environment, the survey asked a series of questions about outdoor use of water on residential properties. The questions were designed to characterize outdoor landscape vegetation patterns and household decision making about plants and irrigation practices on those landscapes.

[7] Utah Division of Water Resources. 2010. Residential Water Use. Available at: http://www.water.utah.gov/OtherReports/RWU_Study.pdf

B.1. Types and Maintenance of Outdoor Landscapes

As shown in Table 17, a high proportion of respondents in all study areas reported having outdoor plants or landscaping on their property (87% overall). For households that did report having outdoor landscaping, the most predominant kind of plant was lawn (turfgrass), followed by trees and then flowers or ornamental plants; between 77% and 93% of respondents in all study valleys reported having these types of plants in their yards. About half of the respondents had a vegetable garden. Approximately one-third of respondents reported having low water use or "water-wise" plants in their yard. All types of outdoor landscaping plants were least commonly found among respondents from Salt Lake City.

Table 17: Outdoor Landscaping by Study Valleys and Overall

	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
			Percent of respondents		
Do you have any outdoor plants or landscaping at all on this property?					
Yes	83.2	84.2	93.3	92.0	87.2
If so, which of the following kinds of plants do you have in your yard?					
Lawn	91.8	79.3	92.6	88.4	88.8
Trees	88.4	79.1	88.9	88.0	86.5
Flowers or ornamental plants	86.6	76.5	86.8	83.0	83.9
Vegetable garden	51.7	43.9	53.7	46.4	49.8
Low water use or 'water-wise' plants	32.8	36.6	34.8	25.0	33.0
Are you or others in your household responsible for deciding which plants are in your yard?					
Yes	86.1	77.2	90.9	83.8	85.1

Control over outdoor landscaping decisions can be affected by the type of housing units and arrangements at the locations where respondents live. Over one in five respondents in our sample lived in housing units that had more than one attached unit (e.g., duplex, triplex, condominium, or apartment building). The diversity of housing types reflects the different ways that housing stock was developed in each of the study neighborhoods. Table 18 shows the differences in outdoor landscaping practices for respondents living in different types of housing structures. It reveals that for persons living in single detached houses (the classic single family home) almost all have outdoor landscaping (including lawns, trees, and flowers and ornamental plants), and most are primarily responsible for making outdoor landscaping decisions, including the types of plants. By contrast, the respondents living in multi-unit dwellings were much less likely to report having outdoor plants and were much less likely to be responsible for planting decisions. Significant proportions of them (roughly 30%) reported not having a lawn, trees, or flowers on their property. Respondents from multi-unit dwellings also were less likely to have a vegetable garden or to have planted low-water-use or water-wise plants.

Table 18: Outdoor Landscaping by Type of Housing Unit

	Single Detached Housing Unit	*Duplex or Triplex*	*Larger Multi-Unit Building*
Type of Housing Unit			
Percent of survey respondents in housing type	77.8	14.9	7.2
Percent of housing units in Utah overall*	73.7	13.6	12.7
Do you have any outdoor plants or landscaping at all on this property?			
Percent of respondents reporting "Yes"	95.6	75.0	48.5
Follow-up questions: **If so, which of the following kinds of plants do you have in your yard?**			
	Percent of applicable respondents		
Lawn	91.9	70.0	71.5
Flowers or ornamental plants	86.3	70.0	69.9
Trees	89.6	68.3	67.5
Vegetable garden	35.2	25.0	15.6
Low water use or 'water-wise' plants	53.7	37.5	16.9
Are you or others in your household responsible for deciding which plants are in your yard?			
Yes	91.6	66.4	32.5

** Estimate based on 2009-2013 U.S. American Community Survey.*

Outdoor landscaping plant materials are chosen for a variety of reasons and purposes (Table 19). Factors influencing respondents' choices about which plants to have in their yards were, in declining prevalence of reported importance for the overall group of respondents: making the landscape look nice, providing shade, providing a place to play, growing their own food, minimizing water use, providing habitat for wildlife, and keeping neighbors happy.

The top four responses, each with overall responses of greater than 50%, indicate that people's plant choices are driven largely by amenities that residential landscapes provide to households. In the fifth next prevalent response, nearly half of the overall respondents (45.8%) reported taking minimizing water use into consideration when choosing plants. Not surprisingly, given Salt Lake City's leadership within the state in promoting water conservation, minimizing water use was reported to be a consideration by more respondents in that area.

The relatively low percentage of respondents assigning importance to keeping neighbors happy in all of the study areas is somewhat surprising given the widespread impression people have that social pressure within neighborhoods drives landscape choices. While making landscapes look nice was the most reported factor influencing people's plant choices, it may be driven more by individual motivations such as personal pride, the uses and pleasures people derive from their yards, or to maintain property values.

Table 19: Factors Influencing Households' Choices about Landscape Plants

	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
How important are the following factors in your choices about WHICH PLANTS to have in your yard?					
	*Percent of 'important' or 'very important' responses**				
Making landscape look nice	85.1	75.7	83.5	81.7	82.3
Provide shade	67.9	60.1	69.4	65.0	66.3
Provide place to play	69.7	53.9	65.1	69.2	65.2
Growing my own food	53.0	47.5	46.9	53.6	50.2
Minimize water use	41.3	55.9	46.2	42.4	45.8
Provide habitat for wildlife	23.3	31.4	21.9	23.5	24.5
Keeping neighbors happy	19.7	16.3	19.1	22.3	19.3

** Responses to this question were on a five-point scale from 1 = "not at all important" to 5 = "very important." Reported in this table are the percentages of 4 and 5 responses, indicating people thought these factors were important or very important.*

B.2. Residential Lawn Fertilization and Irrigation Practices

Since lawns are the most prevalent type of landscape plant material and the subject of much debate concerning urban landscape water use, the survey asked several questions related to residential lawns and their maintenance. As noted above, almost nine out of ten respondents reported having an outdoor lawn on the property where they live. The proportion with outdoor lawns was highest among those living in single detached housing units (Table 18 above).

Information about lawn maintenance is shown in Table 20. Most lawns in our respondents' yards were fertilized, with just 17.5% reporting no fertilization. Most lawns were fertilized by respondents' households. About one in five lawns were fertilized by a professional company.

Table 20: Fertilization of Outdoor Lawns for All Households

What statement best describes your household's usual approach to fertilizing your lawn?	*Percent of respondents who chose each response*
We fertilize ourselves, more than once a year	33.4
We fertilize ourselves, once a year or less	25.6
We have a professional company fertilize our lawn	22.4
Our lawn is not fertilized	17.5
Other fertilization approach	1.1

Not surprisingly (given Utah's dry climate), people almost always regularly water residential lawns in Utah (Table 21). The majority of respondents (73% overall) used underground sprinkler systems to water their lawns, while most of the rest used hoses. Only small percentages used flood irrigation (about 2%). Almost 70% of the respondents who watered their lawns reported use of a lawn watering system with an automatic timer. The use of underground sprinklers and automatic timers was much lower among respondents living in Salt Lake City, but highest among respondents in the parts of Salt Lake County outside of Salt Lake City.

Table 21: Households' Watering of Outdoor Lawns by Study Valleys and Overall

Among households that say they have responsibility for lawn watering on their property…	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	Percent of respondents				
Percent who say they regularly water their lawn	96.7	92.6	98.9	98.6	96.7
… irrigation system used to water most of the lawn					
Underground sprinkler system	74.4	60.1	83.3	65.8	73.3
Sprinklers attached to hose	20.8	28.3	12.4	27.0	20.5
Handheld hose	2.0	10.9	1.2	1.3	3.2
Flood irrigation	1.0	0.0	1.2	5.1	1.5
… use of automatic timer					
Percent with an automatic timer for lawn watering system	68.1	55.7	79.7	67.5	69.3

In terms of other lawn watering practices, respondents were asked how many days per week they watered their lawn on an average week in July. Responses ranged between 0 times per week to over 7 times per week. Almost 80% of respondents watered between 2 and 4.9 times a week (Figure 5). The overall average for survey respondents was 3.4 times per week. The average reported frequency of lawn watering in July was lowest for residents of the Cache Valley (3.1 days per week) and Salt Lake City (3.2 days per week), and highest for those living in the Heber Valley (3.6 days per week) and outlying cities in Salt Lake County (3.7 days per week).

The survey also asked respondents what time of day they usually watered their lawn. Based on the responses, it appears that people generally followed recommendations to limit lawn watering during the heat of the day. Figure 6 shows that about half of the respondents reported mainly watering in the morning or evening, with 46% watering mainly at night.

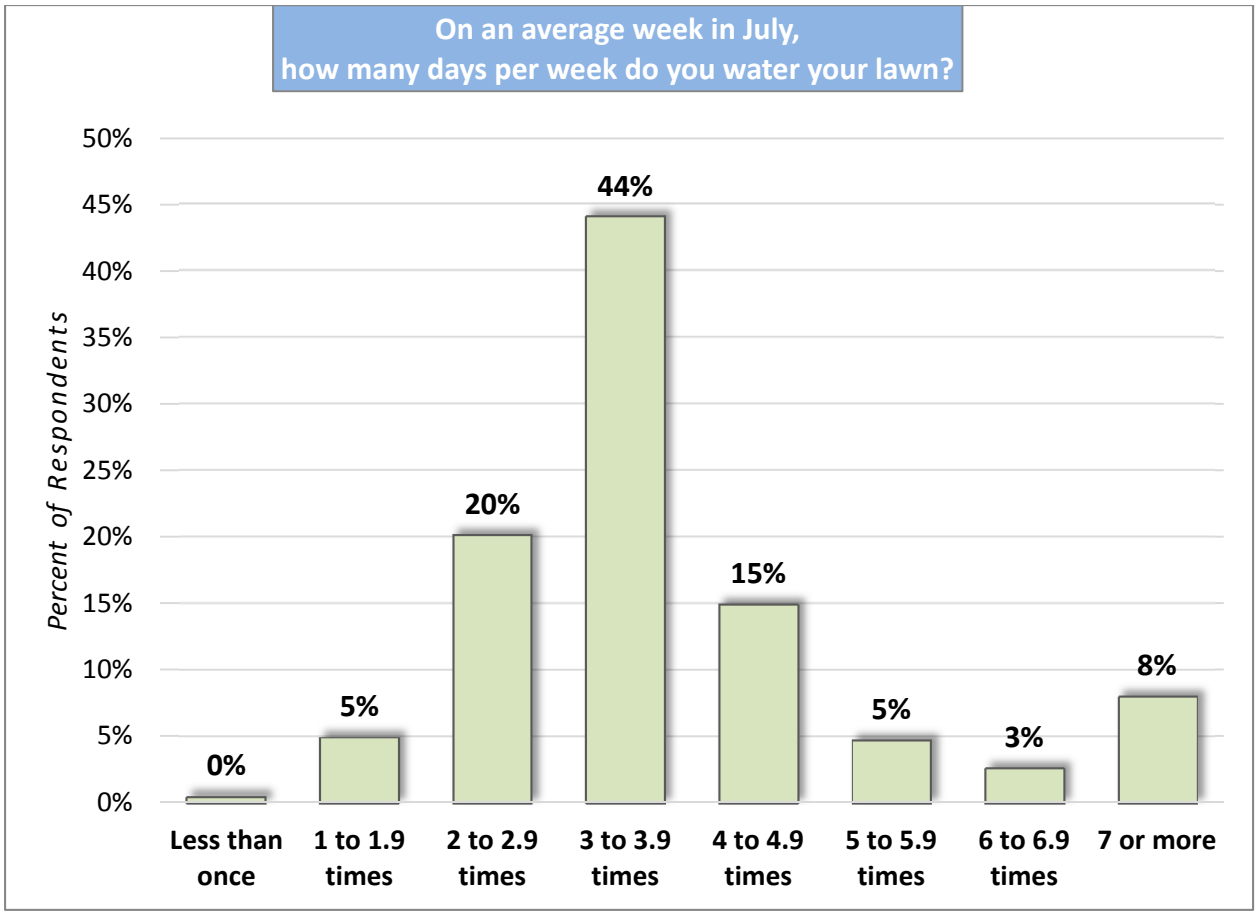

Figure 5: Lawn Watering Frequency for all Households

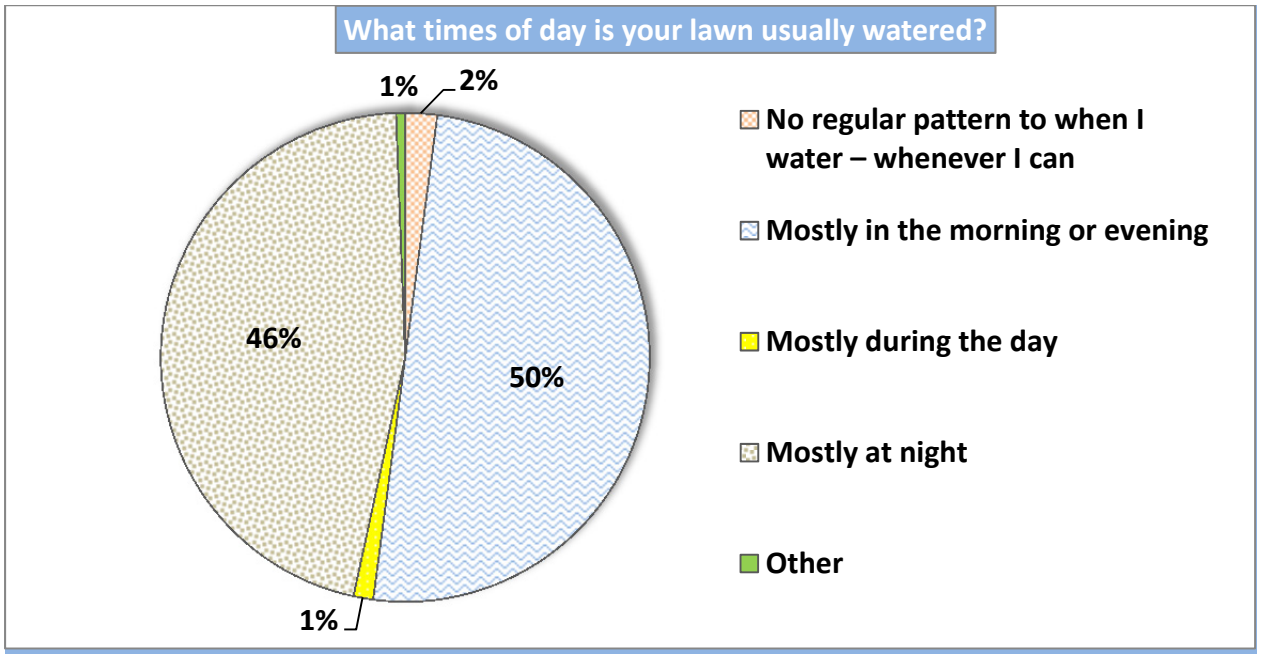

Figure 6: Lawn Watering Schedule for all Households

Decisions about when and how much to water lawns are influenced by a number of different factors according to respondents (Table 22). Results suggest that most of these urban residents vary the amount they water according to the weather and try to conserve the amount of water used. These factors were more important to most of them than maintaining their property value, preventing brown spots, keeping a regular watering schedule, or minimizing time spent watering. As with choice of plant material, keeping neighbors happy was not a very important factor in respondents' reported decisions about when and how much to water their lawns.

Table 22: Factors Affecting Household Lawn Watering Decisions by Study Valleys and Overall

How important are each of the following factors to you when making decisions about when and how much to water your lawn?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'important' or 'very important' responses**				
Vary amount based on weather	86.3	85.9	89.8	86.2	87.3
Conserve amount of water used	67.7	76.6	68.9	72.4	70.3
Maintain my property value	70.8	58.7	69.5	68.6	67.9
Prevent brown spots on lawn	73.1	52.6	63.1	64.7	65.1
Keep a regular watering schedule	60.6	55.9	67.4	62.6	62.1
Minimize time I spend watering	57.4	59.6	59.5	56.2	58.3
Keep my neighbors happy	32.1	27.1	33.3	33.0	31.7

** Responses to this question were on a five-point scale from 1 = "not at all important" to 5 = "very important." Reported in this table are the percentages of 4 and 5 responses, indicating people thought these factors were important or very important.*

C. Water Conservation Behaviors, Practices and Motivations

The State of Utah and local water purveyors have increasingly promoted residential water conservation in response to periods of drought or scarcity and also more generally to help meet growing demand for urban water. Understanding people's water conservation perceptions, behaviors, and motivations is an important avenue for designing and delivering effective conservation programs. iUTAH's household survey included water conservation questions.

C.1. Water Use Awareness and Self Perceptions

Several questions on the iUTAH household survey pertained to people's familiarity with water use and spending. Figure 7 shows that roughly 63% of respondents were familiar with how much *money their household usually spends on water* each month, but less than half that many (30%) were familiar with *the total quantity of water* their household uses each month. Unfamiliarity with amount of water used can make it difficult for households to track water conservation progress.

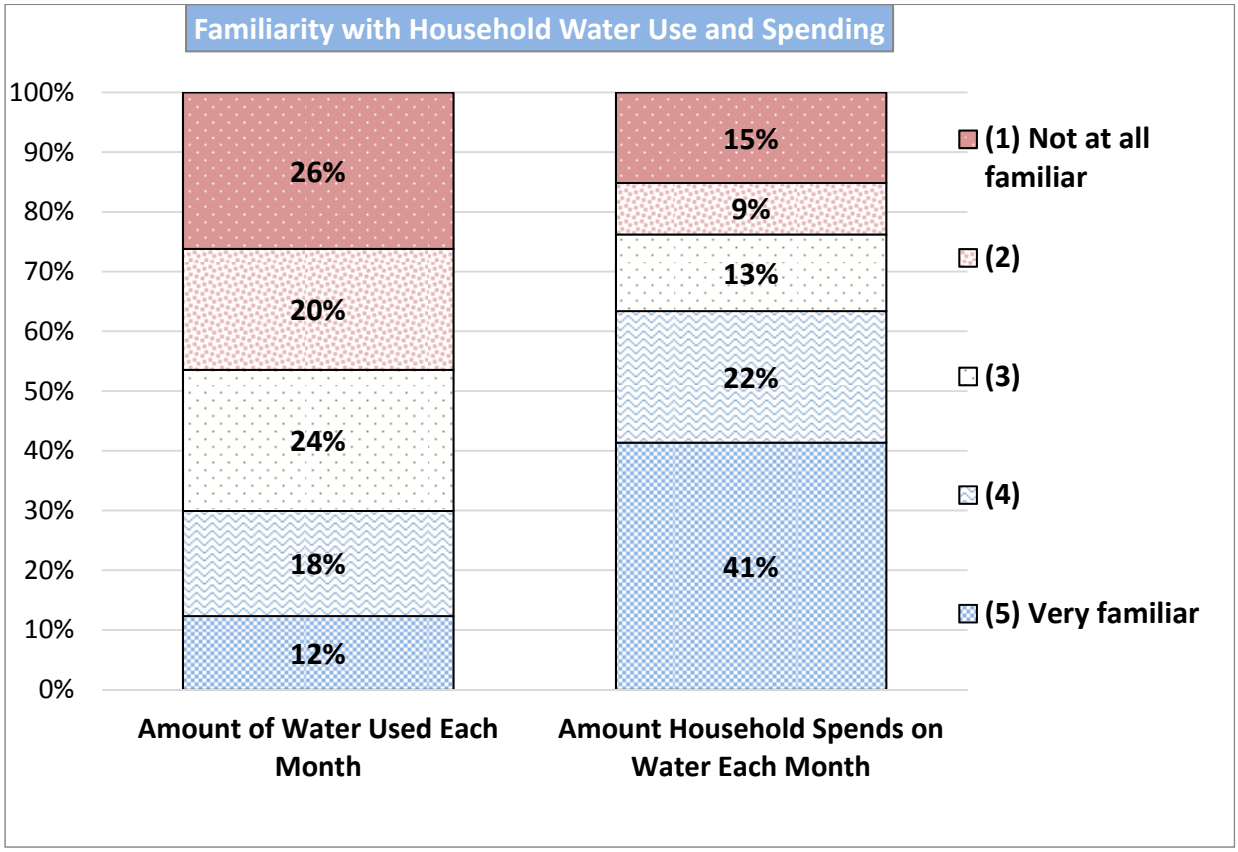

Figure 7: Respondents' Familiarity with Households' Water Use and Spending (Overall)

A comparison of respondents' levels of familiarity with household water use and spending across our study areas can be seen in Table 23. It is apparent that familiarity with the actual volumes of water their households use is universally low in each study community. Nearly twice as many respondents reported greater familiarity with household expenditures on water, but this familiarity was notably lower among Cache Valley and Salt Lake City respondents.

Table 23: Respondents' Familiarity with Their Households' Water Use and Spending, by Study Valleys and Overall

	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'familiar' or 'very familiar' responses**				
Familiarity with monthly household water USE	26.2	32.2	33.6	29.7	29.9
Familiarity with monthly household water SPENDING	58.5	55.8	75.1	67.6	63.4

** Responses to this question were on a five-point scale from 1 = "not familiar" to 5 = "very familiar." Reported in this table are the percentages of 4 and 5 responses, indicating respondents who were familiar or very familiar.*

The survey also asked respondents to indicate if they think they used more or less water than their average neighbor, with responses on a five-point scale from “much less than average” (score of 1) to “about the same” (score of 3) to “much more than average” (score of 5). The results (Figure 8) suggest that most respondents (53%) perceive of themselves as being ‘average’ in their water use. Among the rest, nearly three times as many respondents thought they use less (score of 2) or much less (score of 1) than average (total of 35%) as those who thought they use more (score of 4) or much more (score of 5) than average (total of 12%).

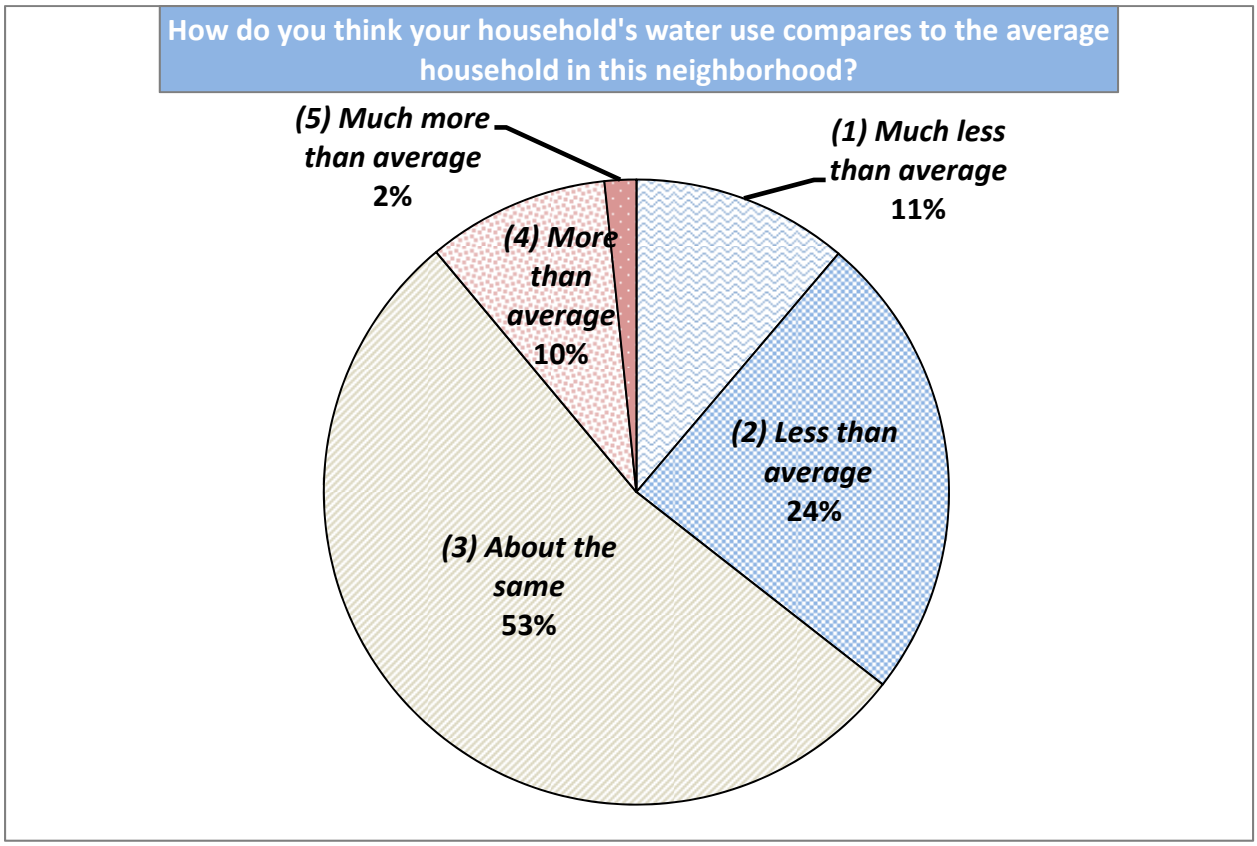

Figure 8: Perceived Level of Water Use Compared to Neighbors

C.2. Changes in Water Use

When asked how their indoor and outdoor water use had changed in the last five years, most people reported that it was about the same. Close to one fifth of the respondents reported that their household water use had decreased or decreased a lot (Figure 9), and people were slightly more likely to have decreased indoor than outdoor use.

Interestingly, a similar share of respondents (18%) said that their indoor water use had increased, and 9% suggested that they had increased their outdoor water use. Most people said that their water use stayed about the same (55%-65%) or that that they were not sure (5%-7%). As noted above, many people lack awareness of the amount of water they use, and this information is necessary for them to track changes in their own water use over time.

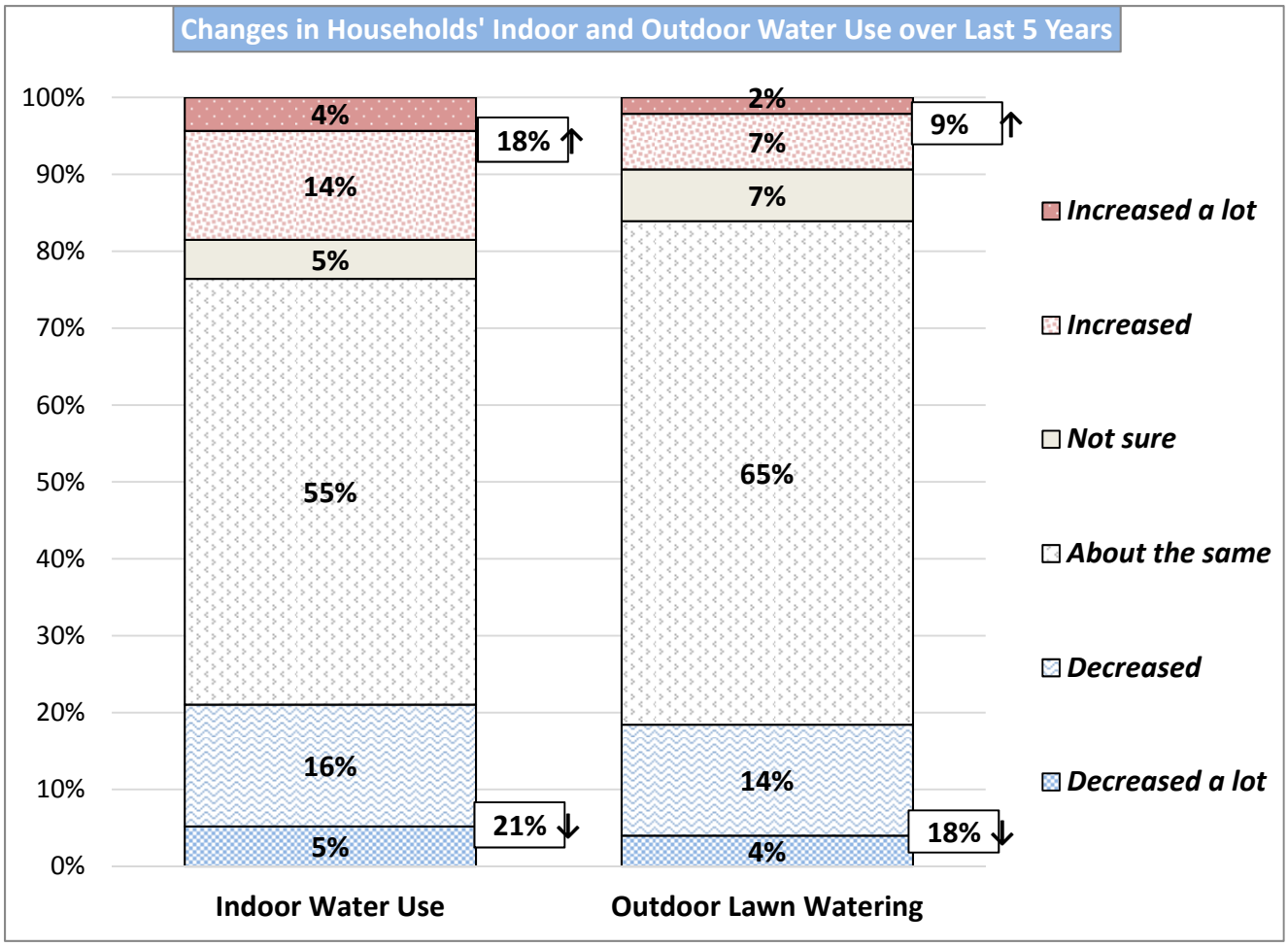

Figure 9: Self-reported Changes in Household Indoor and Outdoor Water Use Over Last 5 Years

Table 24 indicates the share of respondent households that decreased indoor and outdoor water use by study area. While there are some small differences (with greater reported reductions in water use in Salt Lake City), respondents in all of our study neighborhoods had roughly the same proportion of responses across the categories, and were slightly more likely to have decreased indoor than outdoor water use.

Table 24: Changes in Household Water Use Over Last Five Years by Study Valleys and Overall

	Cache Valley	Salt Lake City	Other SL County	Heber Valley	Overall
	*Percent of usage decrease responses**				
How has your household's INDOOR use of water (for drinking, bathing, washing, etc.) changed in the last 5 years?	20.8	22.5	19.7	22.3	21.1
How has the amount of water your household uses to water the lawn changed in the last 5 years?	17.3	23.6	18.1	16.0	18.5

** Responses to this question were on a five-point scale from 1 = "decreased a lot" to 5 = "increased a lot." Reported in this table are the percentages of 1 and 2 responses, indicating people reported their use decreased a lot or decreased.*

Despite the often inability to track changes in water use, many households reported that they had taken specific actions to reduce both their indoor (Table 25) and outdoor (Table 26) water use. A comparison of these tables shows that more people reported taking actions to reduce water use indoors than outdoors.

In terms of indoor water use (Table 25), people appear to be widely implementing some of the general recommendations that have been the focus of many public water conservation education programs. In response to a question concerning the frequency of various actions their household had taken to reduce indoor water use, respondents reported their households had 'mostly' or 'always' fixed leaky faucets and toilets (90%), only ran the dishwasher when full (89%), and turned off water when brushing teeth (71%). Less common were purchases of low water use appliances or fixture (51%) or reducing time showering (34%).

Table 25: Household Actions Taken to Reduce Indoor Water Use by Study Valleys and Overall

Overall, how often do members of your household do any of the following to reduce indoor water use?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'mostly' or 'always' responses**				
Fix leaky faucets and toilets	88.7	87.9	93.3	92.5	90.2
Only run dishwasher when full	90.3	82.5	93.5	89.5	89.4
Turn off water when brushing teeth	68.6	74.4	73.4	67.2	71.0
Buy low water use appliances and fixtures	47.2	48.3	55.8	55.6	50.8
Take fewer or shorter showers	30.9	39.6	33.6	33.8	33.9

** Responses to this question were on a five-point scale from 1 = "never" to 5 = "always." Reported in this table are the percentages of 4 and 5 responses, indicating respondents reported mostly or always engaging in these practices.*

There were slight differences in the use of these indoor water use behaviors across our study areas. Cache and Heber Valley respondents were reportedly less likely to change teeth brushing or showering behaviors. People in Heber and Salt Lake County (outside of Salt Lake City) were reportedly most likely to buy low water use appliances and fixtures and to regularly fix leaks. Some of these differences might reflect the different proportions of rental housing units in each study area (which is highest in Salt Lake City).

In terms of outdoor lawn watering system changes (Table 26), many more people have installed automatic timers for lawn watering systems (64%) than have estimated the amount of water needed by their lawn (33%), tested their sprinklers to see how much water they apply (33%), or installed a more efficient lawn watering system (39%). Given that studies have shown automatic timers may actually increase overall water use (Endter-Wada et al. 2008[8]; Kilgren et

[8] Endter-Wada, J., J. Kurtzman, S.P. Keenan, R.K. Kjelgren, and C.M.U. Neale. 2008. Situational Waste in Landscape Watering: Residential and Business Water Use in an Urban Utah Community. *Journal of the American Water Resources Association (JAWRA)* 44(4):902-920.

al. 2010[9]), these results suggest that effective efforts to address water efficiency of outdoor irrigation systems are still done by a minority of respondents. There were relatively few notable differences in use of various outdoor water conservation practices across the study valleys.

Table 26: Household Actions Taken to Reduce Outdoor Water Use by Study Valleys and Overall

	Cache Valley	Salt Lake City	Other Salt Lake County	Heber Valley	Overall
	Percent of respondents				
Since you moved in, have any of the following been done to your lawn watering system?					
Tested sprinklers to see how much water they apply	30.6	33.4	37.2	31.6	33.3
Estimated how much water is needed by the lawn	31.2	37.7	32.7	33.9	33.2
Have you ever done any of the following things to your lawn watering system?					
Installed an automatic timer for the lawn watering system	59.6	53.6	74.8	67.8	64.4
Installed more efficient lawn watering system	36.0	38.1	44.4	38.2	39.2

C.3. Perceived Ability and Willingness to Take Additional Conservation Actions

The State of Utah has established a variety of water conservation goals and Utahns are being asked to further their water conservation efforts – particularly with regard to outdoor water use (which consumes the largest amount of water by Utah's urban residents). So, in addition to asking about actions taken in the past to conserve water, the survey asked about people's perceived ability and willingness to take additional actions in the future.

Initially, we asked respondents to assess their households' ability to further conserve water (Figure 10). More than half of the respondents (54%) agreed or strongly agreed that there is more their household could do to reduce *indoor* water use. Far fewer (38%) agreed that there is more their household could do to reduce their *outdoor* water use. Similarly, more people disagreed that they could reduce outdoor (32%) than indoor (19%) water use. The finding that respondents feel less capacity to change outdoor water use is important since many water conservation experts have argued that outdoor irrigation is the type of residential water use with the greatest potential for increased efficiency and conservation. This finding suggests a need for conservation education programs to focus more on increasing public awareness of the potential for and ways to reduce outdoor water use.

[9] Kilgren, D., J. Endter-Wada, R. Kjelgren, and P.G. Johnson. 2010. Implementing Landscape Water Conservation in Public School Institutional Settings: A Case for Situational Problem Solving. *Journal of American Water Resources Association (JAWRA)* 46(6):1205-1220.

Differences in perceived ability to reduce household water use by study valley are summarized in Table 27. There does not appear to be any significant difference in perceived ability to reduce indoor use by study area, but respondents in Salt Lake County (both within and outside of Salt Lake City) were more likely to agree that they can do more to reduce outdoor water use than respondents in the Cache and Heber valleys.

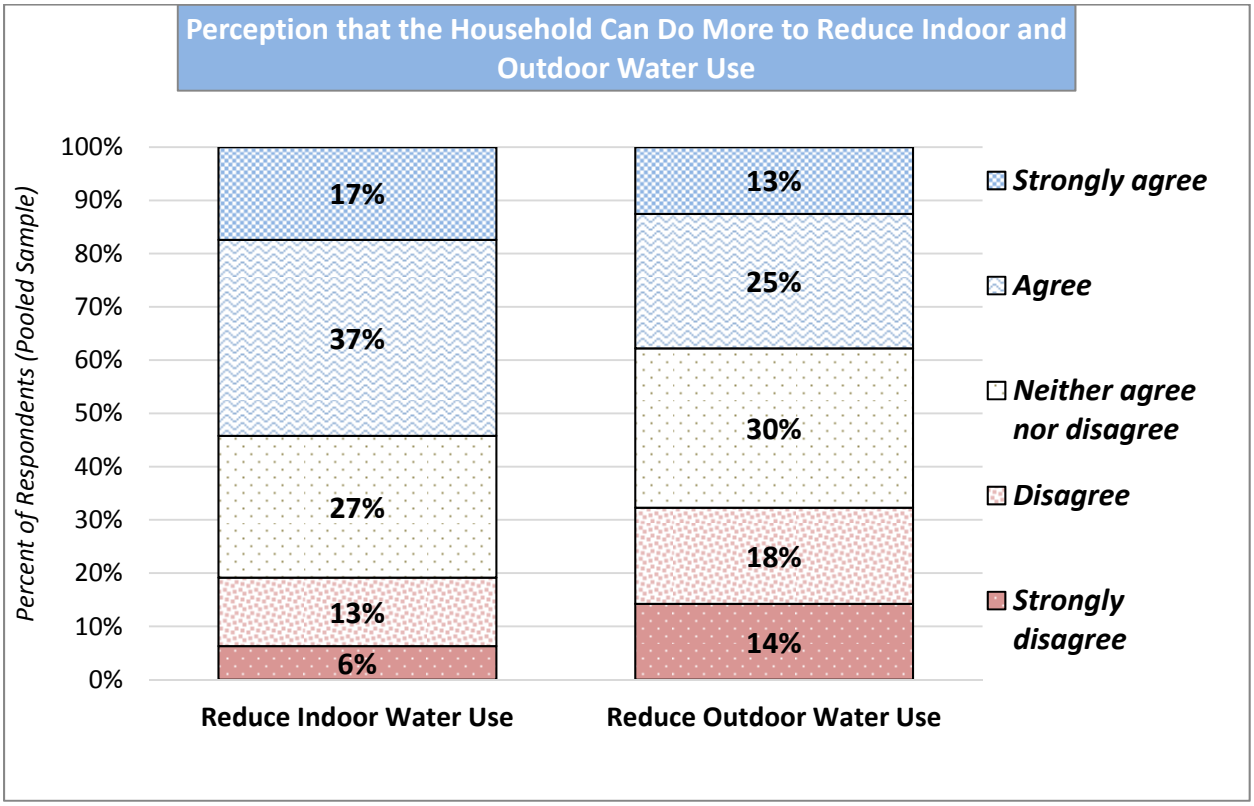

Figure 10: Perceived Ability to Reduce Household Indoor and Outdoor Water Use

Table 27: Perceived Ability to Further Conserve Water by Study Valleys and Overall

How strongly do you disagree or agree with the following statements?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'agree' and 'strongly agree' responses**				
There is more my household could do to reduce our *indoor* water use.	54.6	54.6	53.8	52.8	54.2
There is more my household could do to reduce our *outdoor* water use.	34.1	40.1	44.7	30.8	37.8

** Responses to this question were on a five-point scale from 1 = "strongly disagree" to 5 = "strongly agree." Reported in this table are the percentages of 4 and 5 responses, indicating people agreed or strongly agreed.*

Another section in the survey asked respondents about their interest in making various changes in their yard watering or landscaping practices to conserve water. Overall, respondents were

moderately interested in the three outdoor conservation options that accompanied the question (Figure 11). The most attractive option was 'installing a more efficient irrigation system' (40% checked a 4 or 5 indicating "interested" or "very interested"), with about one-third (30%-33%) interested in reducing grass area and increasing low-water use plant species. Reducing grass area had notably higher levels of dis-interest among our respondents.

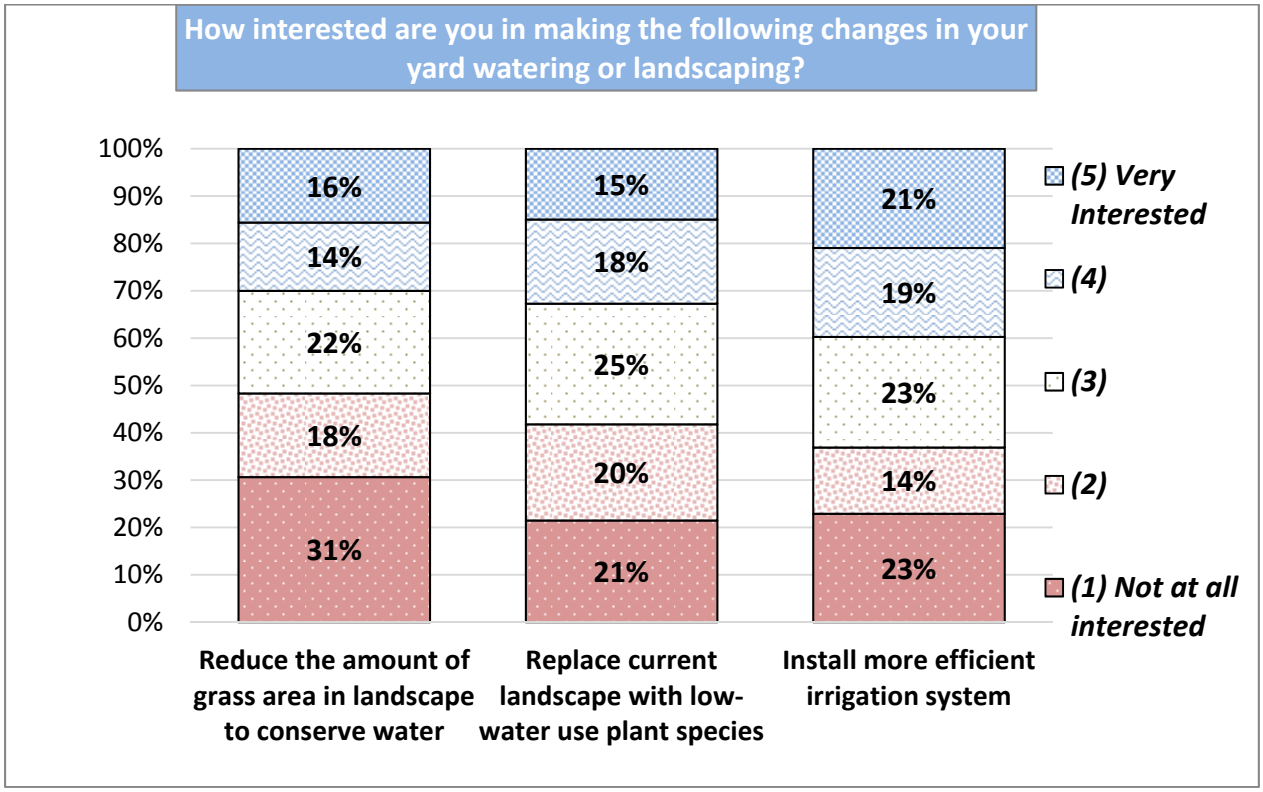

Figure 11: Interest in Various Options to Improve Outdoor Water Conservation

Table 28: Respondents' Interest in Changing Yard Watering and Landscaping by Study Valleys and Overall

How interested are you in making the following changes in your yard watering or landscaping?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'interested' or 'very interested' responses**				
Install a more efficient irrigation system	35.9	51.2	37.4	32.3	38.8
Replace my current landscape with low-water use plant species	27.2	45.5	32.0	28.4	32.4
Reduce the amount of grass area in my landscape to conserve water	23.7	44.7	32.7	18.3	29.7

** Responses to this question were on a five-point scale from 1 = "not at all interested" to 5 = "very interested." Reported in this table are the percentages of 4 and 5 responses, representing people who reported being interested or very interested.*

Differences in responses to these questions are summarized by study area in Table 28 above. Respondents from Salt Lake City neighborhoods expressed the most interest in all three landscaping practices, while residents in Cache County reported the lowest interest.

The survey also included a question designed to investigate what factors might motivate people to conserve water (results shown in Figure 12). Overall, our respondents appear most willing to reduce their water use if the savings reduced their water bill or helped ensure future supplies for their home. More than half of respondents are also willing to conserve in order to improve fish and wildlife habitat, ensure future supplies for agriculture, and improve urban parks and open space. Just under half of respondents expressed willingness to conserve water in order to improve opportunities for water recreation. The fewest percentage (only 28%) were willing to conserve water if the savings are used to increase development in their area.

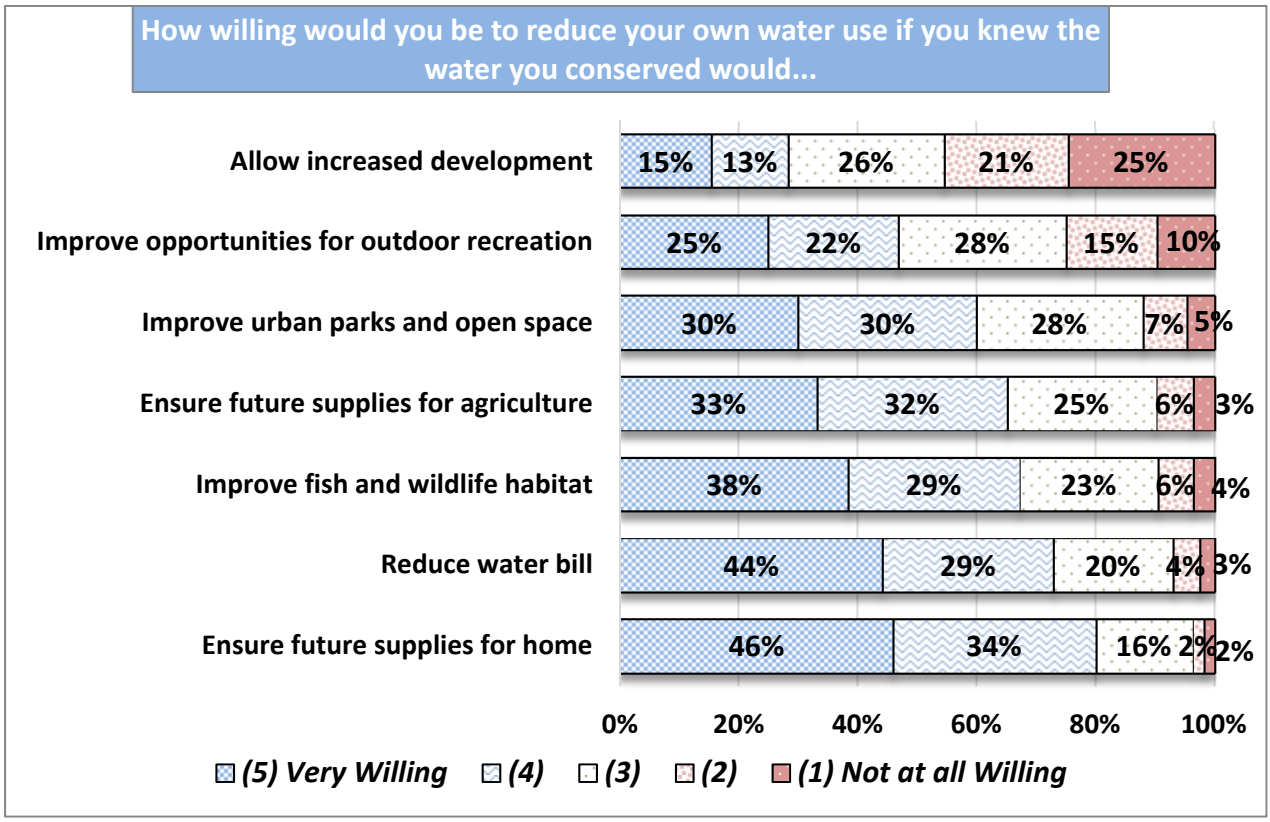

Figure 12: Willingness to Conserve Water under Various Scenarios (pooled sample)

Answers to these same questions are split out by study area in Table 29. While the overall pattern of priorities appears to be similar across all of the study valleys, some outcomes appear to resonate more or less with respondents in particular locations. For example, Heber Valley respondents were somewhat less responsive to impacts on their water bill. Salt Lake City respondents were relatively more willing to conserve to accomplish a range of environmental and recreational goals (e.g. to improve habitat, parks, and water recreation opportunities). Interestingly, ensuring a water supply for agriculture was a positive motivator for urban water conservation for respondents in all four valleys.

Table 29: Respondents' Willingness to Reduce Water Use for Various Reasons by Study Valley and Overall

How willing would you be to reduce your own water use if you knew the water you conserved would…	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of respondents reporting willingness**				
Ensure future supplies for your home	78.8	84.5	77.4	81.3	80.0
Reduce your water bill	73.3	74.9	74.3	65.9	72.9
Improve fish and wildlife habitat	64.2	78.1	62.3	67.5	67.3
Ensure future supplies for agriculture	65.6	68.2	63.6	61.8	65.2
Improve urban parks and open spaces	57.7	71.4	55.9	55.1	60.0
Improve opportunities for water recreation	45.4	50.5	43.9	50.7	46.9
Allow increased development in this area	27.0	36.1	25.6	24.1	28.3

** Responses to this question were on a five-point scale from 1 = "not at all willing" to 5 = "very willing." Reported in this table are the percentages of 4 and 5 responses, indicating people reported being willing or very willing.*

D. Water-Related Concerns

Water is an important growth-related issue confronting the State of Utah. Understanding citizen's concerns is important to policy makers as they confront the state's water challenges. In this section, information on water-related concerns is presented which reflects respondents' opinions about water in relation to other growth-related concerns as well as their views on current and future water risks. This section includes survey results from questions on water as well as non-water risks, future water supply outlooks, perceptions about water use by sector, and views on climate change.

D.1. Concerns about Water in Relation to Other Issues

The survey asked respondents to indicate their level of concern regarding various water-related risks and compares those risks to several types of non-water-related concerns. The results are shown in Figure 13 and Table 30 below. One summary conclusion from these findings is that more than half of respondents expressed high levels of concern about all of these issues except for flooding. However, in general, water issues were of less concern to respondents than some other issues mentioned in the survey. Over three quarters of respondents indicated they were concerned or very concerned about air pollution (80.3%), traffic congestion (79.9%), and loss of

open space (75.3%). It is worth special note that when the iUTAH household survey was conducted in summer 2014, many parts of northern Utah had just finished experiencing serious winter weather inversions that ranked local air quality among the worst in the nation. Thus, it is not surprising that air pollution and traffic congestion topped respondents' list of concerns.

The next highest set of concerns includes the high cost of water (70.3%) and population growth (69.4%). A majority of respondents also indicated high levels of concern regarding water shortages (63.3%), deteriorating water infrastructure (58.3%), climate change (55.9%), and poor water quality (55%). Interestingly, flooding was a concern for only 25.1% of respondents even though, as noted above, many people had personally experienced or were aware of other people in their community experiencing flood-related risks.

The intensity and ranking of concerns varies across the valleys. For all issues except population growth and flooding, Salt Lake Valley respondents (generally located in more urbanized areas) indicated higher levels of concern than respondents in the other two valleys. Heber Valley respondents were more concerned about population growth than respondents in the other two valleys. Cache Valley respondents were more concerned about flooding than respondents from the other valleys, yet flooding still received the lowest mean score.

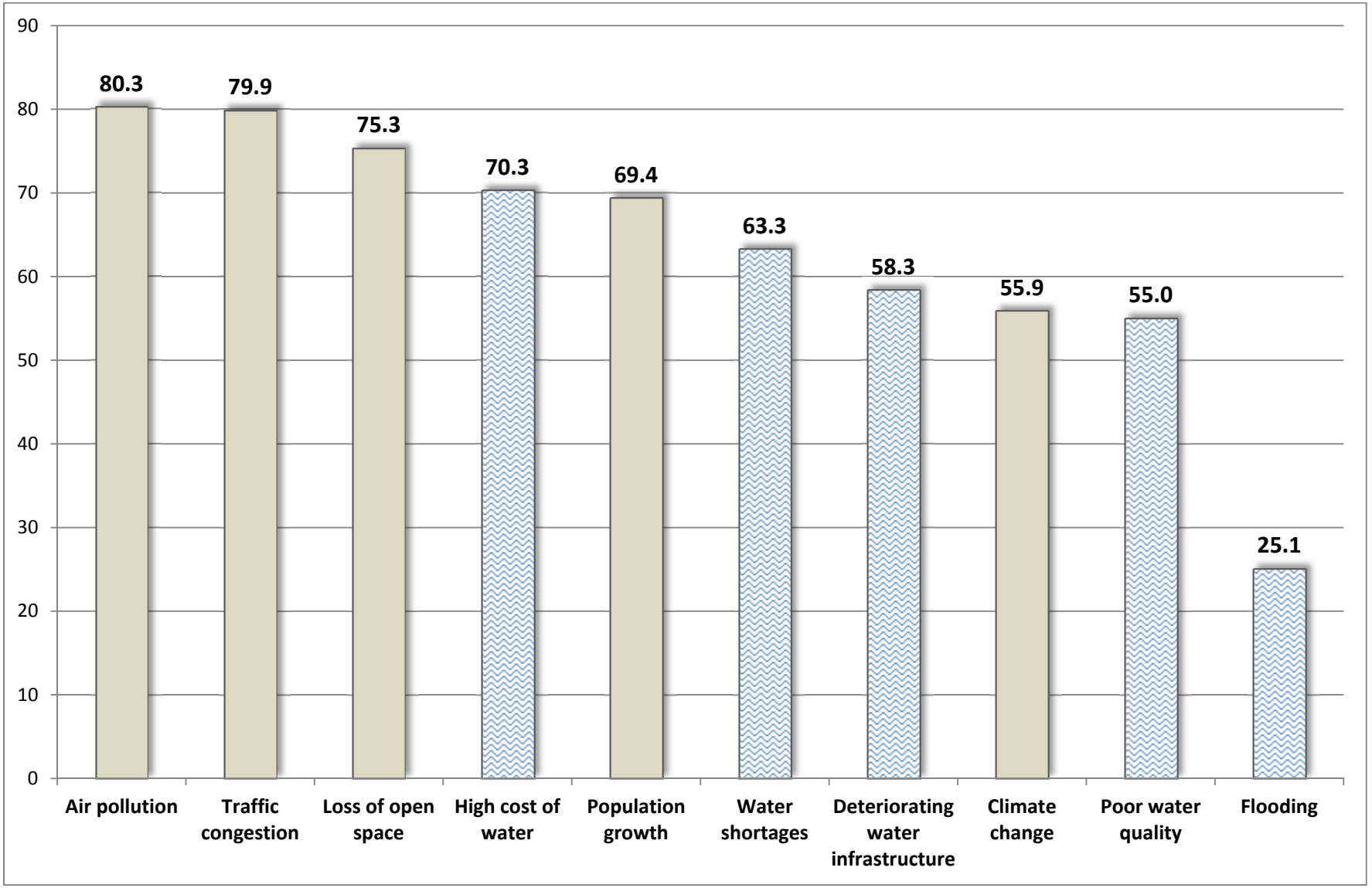

Figure 13: Percent of All Respondents Concerned or Very Concerned about Various Issues

Table 30: Respondents' Concern about Water and Non-Water Risks Overall and by Study Valleys

Thinking about the next 10 years in (this valley), how concerned are you about the following issues?

OVERALL POOLED SAMPLE	***Level of Concern***						
	Not at all concerned 1	2	3	4	*Very concerned* 5	Total	**Mean score**[1]
Type of Concern	*Percent of Respondents*						
Air pollution	2.6	4.9	12.3	25.2	55.1	100.1	**4.25**
Traffic congestion	2.5	4.4	13.2	28.6	51.3	100.0	**4.22**
Loss of open space	3.4	5.4	15.8	28.6	46.7	100.0	**4.10**
Population growth	4.2	6.2	20.2	27.5	41.9	100.0	**3.97**
High cost of water	3.2	6.0	20.4	33.9	36.4	99.9	**3.94**
Water shortages	4.2	8.6	23.9	34.3	29.0	100.0	**3.75**
Deteriorating water infrastructure	3.5	8.8	29.4	31.3	27.0	100.1	**3.69**
Climate change	12.1	10.8	21.2	20.4	35.5	100.0	**3.56**
Poor water quality	7.8	13.4	23.7	27.1	27.9	99.9	**3.54**
Flooding	15.6	28.4	31.0	15.4	9.7	100.1	**2.75**

BY VALLEY	***Mean Concern Score*** *(on 1-5 scale with 5 indicating highest level of concern)*[1]					
Type of Concern	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations*[2]
Air pollution	4.15	4.54	4.34	3.89	4.25	***
Traffic congestion	4.19	4.32	4.28	4.02	4.22	***
Loss of open space	3.98	4.25	4.13	4.14	4.10	***
Population growth	3.82	4.05	4.04	4.10	3.97	***
High cost of water	3.80	3.91	4.21	3.90	3.94	***
Water shortages	3.58	3.97	3.86	3.68	3.75	***
Deteriorating water infrastructure	3.55	3.89	3.76	3.65	3.69	***
Climate change	3.34	4.18	3.46	3.37	3.56	***
Poor water quality	3.28	3.82	3.73	3.44	3.54	***
Flooding	2.83	2.73	2.73	2.60	2.75	**

*Notes. 1) Mean scores are based on a five-point scale from 1 = "not at all concerned" to 5 = "very concerned." The mean score represents the average across all respondents (or the sum of all scores divided by the number of scores). 2) Significant differences across study locations reflect ANOVA test for difference in means. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

D.2. Concerns about Water Supply to Meet Current and Future Needs

The survey sought to assess what people think regarding water supply in their present-day situation, and to compare that to how they feel about water supply in the future. People often think more about the short term because that is the time frame in which tangible and anticipated hardships relating to water are most likely to be felt. But thinking about water for the future is an important part of current state-level planning efforts. The results presented in Figure 14 and Table 31 are from a question that asked participants to rank their opinions about the adequacy of water supply in the local area in which they live and then on a valley scale and a state scale.

Figure 14 (and the top half of Table 31 with pooled sample results) reveals that, in terms of *current water supplies*, respondents were more confident in the adequacy of current city water supplies than about the current water supply in Utah as a whole. Of all respondents, 41% agreed or strongly agreed that there is enough water to meet the current needs of their city, while only 19.9% disagreed or strongly disagreed in their assessment. The reverse is true at a state level: only 18% agreed or strongly agreed that there is enough water to meet the current needs in the state, while 41.4% disagreed or strongly disagreed in their assessment of the adequacy of the state's current water supply.

A similar trend can be seen looking at respondents' assessment of the adequacy of *future water supplies*, where respondents were more confident in local supplies than in state supplies. However, respondents were generally more concerned about future water supplies than about current water supplies. Figure 14 (and the top half of Table 31 with pooled sample results) shows that 17.9% agreed or strongly agreed that there is enough water for the future needs of their city, while 44.3 % disagreed or strongly disagreed with the adequacy of water for the future needs of their city. Just 8.5% agreed or strongly agreed that there is enough water for the future needs of the state, while 56.5% disagreed or strongly disagreed with the adequacy of the state's future water supply.

The bottom half of Table 31 presents more detailed results *by valley*. The highest percentages of people who agreed that there is enough water to meet the *current needs* of their city and valley were located in Cache and Heber valleys as compared to lower percentages in the Salt Lake areas. Respondents in all study areas were less confident in the adequacy of current state water supplies. Similar results can be seen in respondents' assessments of whether there is enough water to meet *future needs*: more Cache Valley and Heber Valley than Salt Lake area respondents agreed or strongly agreed there is enough water to meet future needs in their city and valley but, in each study area and overall, respondents were less confident in the adequacy of future water supplies.

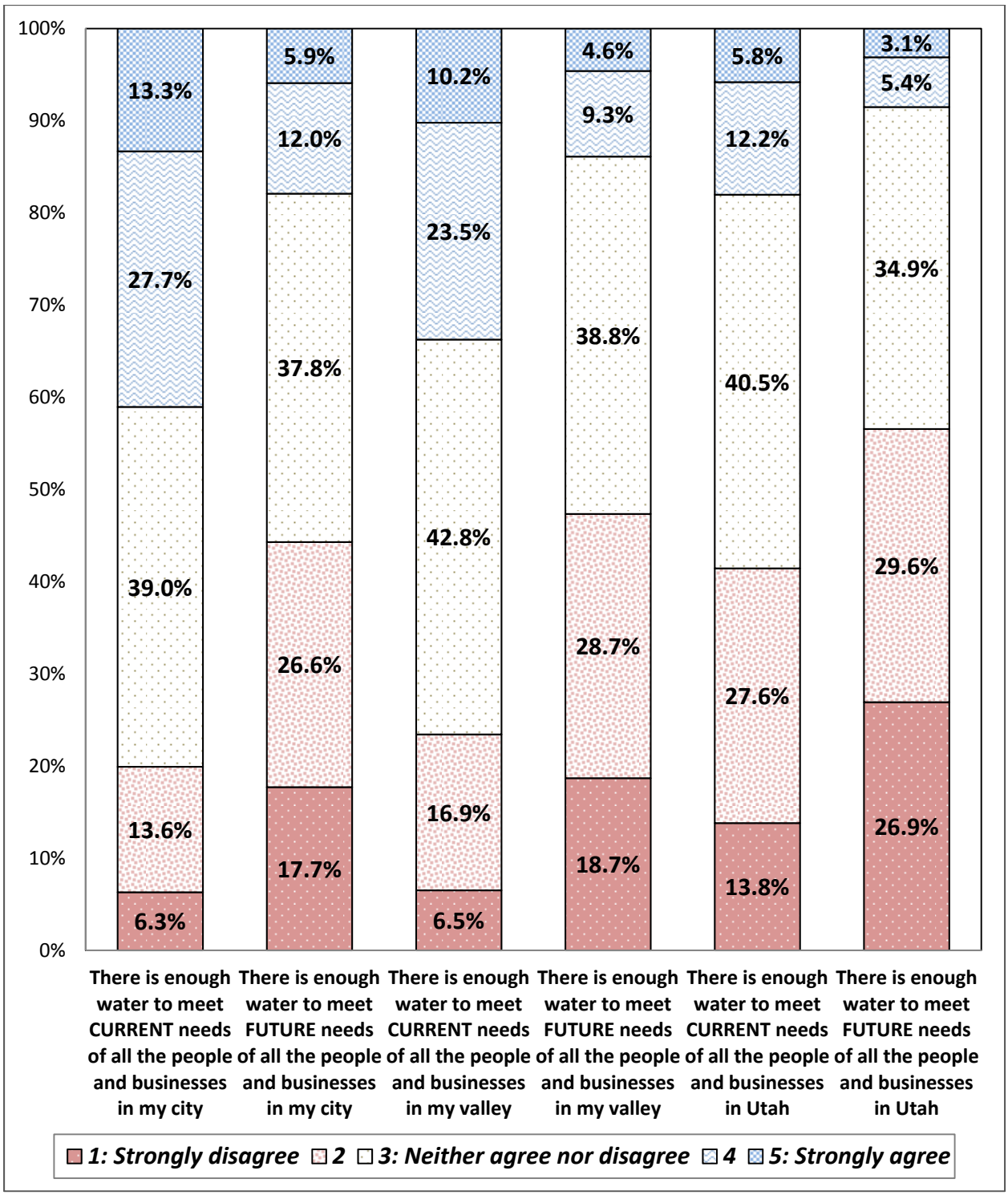

Figure 14: Respondents' Opinions about Adequacy of Water Supply

Table 31 (top half): Perceptions about the Adequacy of Water Supply

OVERALL POOLED SAMPLE	Level of Concern					
	Strongly disagree		*Neither agree nor disagree*		*Strongly agree*	
	1	2	3	4	5	Total
	Percent of respondents for each level of concern					
There is enough water to meet the CURRENT needs of all the people and businesses in:						
My city	6.3	13.6	39.0	27.7	13.3	100.0
My valley	6.5	16.9	42.8	23.5	10.2	100.0
Utah	13.8	27.6	40.5	12.2	5.8	100.0
There is enough water to meet the FUTURE needs of all the people and businesses in:						
My city	17.7	26.6	37.8	12.0	5.9	100.0
My valley	18.7	28.7	38.8	9.3	4.6	100.0
Utah	26.9	29.6	34.9	5.4	3.1	100.0

Table 31(bottom half): Perceptions about the Adequacy of Water Supply

BY VALLEY	Agreement over Adequacy of Water Supply					
	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations* [2]
	Percent of respondents who 'agree' or 'strongly agree' [1]					
Percent in agreement that there is enough water to meet needs…						
Current / My city	46.3	33.1	37.4	46.8	41.1	***
Current / My valley	38.8	27.0	27.5	42.2	33.7	***
Current / Utah	19.7	18.7	17.1	14.0	18.1	**
Future / My city	23.0	11.3	14.6	20.7	17.9	***
Future / My valley	18.1	8.0	10.5	18.2	13.9	***
Future / Utah	11.0	7.2	7.0	7.2	8.6	***

*Notes: 1) Responses to this question were on a five-point scale from 1 = "strongly disagree' to 5 = "strongly agree." Reported in this table are the percentages of 4 and 5 responses representing people who agreed or strongly agreed. 2) Significant differences across study locations reflect chi-squared test for full cross-tabulation table. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

D.3. Perceptions about Water Use by Sector within Local Areas

Prioritizing the distribution of water among different water use sectors within local areas is a key water management issue. To assess respondents' views on this issue, the survey included a question asking how strongly they disagreed or agreed with statements that "too much water is

used" for agriculture, to maintain residential lawns, by industry, and by parks and golf courses (questions appeared in that order). They were prompted to think about their valley in answering the question. Results for the overall sample and results broken down by valley are shown in Figure 15 and Table 32 below.

The results suggest that more than half of respondents overall (56%) and the highest percentage in each valley thought that too much water is used for residential lawns (bars on left for each area and overall in Figure 15). The "By Valley" section in Table 32 shows the percentage of respondents that agreed or strongly agreed with this statement was considerably higher in Salt Lake City (70.7%). Overall, 48% thought too much water is used for parks and golf courses, with over 40% of respondents in all areas expressing this view (Figure 15). Just over 30% of respondents overall thought too much water is being used for industry. Variations in opinions between study areas is widest for this use, with a much larger proportion of Salt Lake City and Valley respondents than those living in Cache or Heber valleys indicating that industry uses too much water. Interestingly, only 10% of respondents overall and the smallest percentages in each valley believed that too much water is being used for agriculture (bars on right for each area and overall in Figure 15), with less than 14% of respondents in all areas expressing this view.

These results are worth special note. Agriculture currently uses the highest proportion of developed water supplies in Utah (approximately 75%). Some political and economic forecasting assumes that Utah's future urban water needs will be supplied by transfer of water from agricultural to municipal and industrial use. However, these research results suggest that our survey respondents living in urban areas do not perceive agriculture as using too much water, but instead think that residential lawns, parks and golf courses, and industry use too much water.

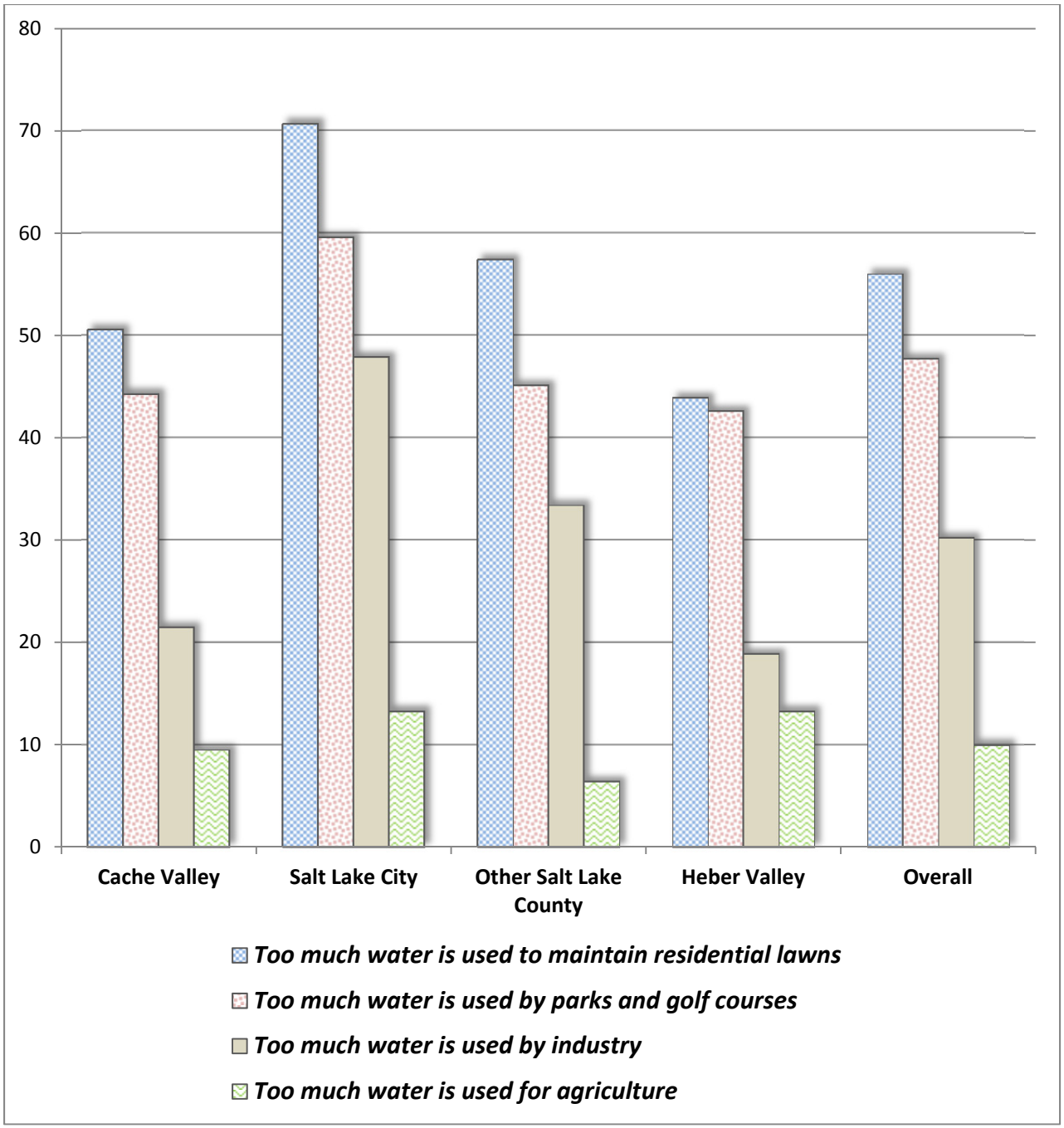

Figure 15: Percent of Respondents who Agree or Strongly Agree that Too Much Water is Used for Various Purposes

Table 32: Perceptions of Excess Water Use

Thinking of (your) Valley, how strongly do you disagree or agree with the following statements?						
OVERALL POOLED SAMPLE	**Level of Agreement**					
	Strongly disagree		*Neither agree or disagree*		*Strongly agree*	
	1	2	3	4	5	Total
	Percent of respondents					
Too much water is used to maintain residential lawns	3.1	6.1	34.8	29.5	26.5	100.0
Too much water is used by parks and golf courses	3.5	8.0	40.8	26.0	21.8	100.0
Too much water is used by industry	4.5	7.2	58.2	18.2	12.0	100.0
Too much water is used for agriculture	19.5	17.8	52.7	6.4	3.6	100.0

BY VALLEY	**Agreement that too much water is used for various purposes**					
	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations* [2]
	Percent who 'agree' or 'strongly agree' [1]					
Too much water is used to maintain residential lawns	50.6	70.7	57.4	43.9	56.0	***
Too much water is used by parks and golf courses	44.3	59.6	45.1	42.6	47.7	***
Too much water is used by industry	21.5	47.9	33.4	18.9	30.2	***
Too much water is used for agriculture	9.5	13.3	6.4	13.3	10.0	***

*Notes: 1) Responses to this question were on a five-point scale from 1 = "strongly disagree' to 5 = "strongly agree." Reported in this table are the percentages of 4 and 5 responses representing people who agreed or strongly agreed. 2) Significant differences across study locations reflect chi-squared test for full cross-tabulation table. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

D.4. Perceptions of Water Quality

While the adequacy of water supply quantities to meet current and future needs is an important water issue, the quality of water available to meet various types of needs is a closely related issue. Respondents were asked to rate the water quality of various types of water in their neighborhood as well as water found upstream and downstream of their community. The results for the pooled sample of respondents are shown in Figure 16 (below). It is apparent that most respondents thought their current drinking water supply was good or very good (70%), followed by water in upstream rivers and lakes (49%) and streams and creeks near their neighborhood (41%). By contrast, only a small minority (7% to 17%) rated any of the different types of water as poor or very poor. The types of water with the highest poor ratings were nearby irrigation canals and ditches and downstream rivers, streams, lakes and reservoirs. Relatively large subsets of respondents were not sure about water quality for many types of water – particularly for groundwater beneath their neighborhood.

Table 33 summarizes the proportion of 'good' and 'very good' (favorable) ratings for different types of water across the different study areas. For all types of water, water quality ratings by respondents in Cache Valley and Heber Valley were higher than in the two areas of the Salt Lake Valley. Drinking water was least likely to be seen as 'good' or 'very good' quality in our Salt Lake County study neighborhoods outside of Salt Lake City.

Table 33: Perceptions of Water Quality for Various Types of Water Bodies

How would you rate the water quality of the following types of water?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*
	*Percent of 'good' or 'very good' responses**				
Current Drinking Water	78.8	66.5	59.3	73.3	70.3
Upstream Rivers and Lakes	56.0	42.2	40.8	58.6	49.3
Streams and Creeks in Neighborhood	53.2	30.2	27.1	55.9	41.7
Downstream Rivers and Streams	37.9	19.9	23.4	48.0	31.4
Downstream Lakes and Reservoirs	36.2	19.7	26.0	43.2	30.8
Nearby Irrigation Ditches and Canals	40.6	13.8	15.8	41.2	28.3
Groundwater beneath Neighborhood	27.2	14.8	13.1	28.9	21.0

** Responses to this question were on a five-point scale from 1 = "very bad" to 5 = "very good." Reported in this table are the percentages of 4 and 5 responses, representing people who would rate these types of water good or very good.*

Figure 16: Respondents' Rating of Water Quality for Various Types of Water (Pooled Sample)

D.5. Climate Change Views and Concerns

Climate change is an item frequently mentioned in the news and is a high concern internationally, nationally and among many Utahns. A question on the household survey asked participants to mark which statement came closest to their view and offered several choices (see Figure 17). A strong majority of respondents (74%) indicated that they think climate change is happening compared to very few (5%) who indicated it is not. A smaller but significant group (17%) also indicated they did not know enough to say if climate change is happening. Almost half of respondents expressed that climate change is caused by mostly human activities.

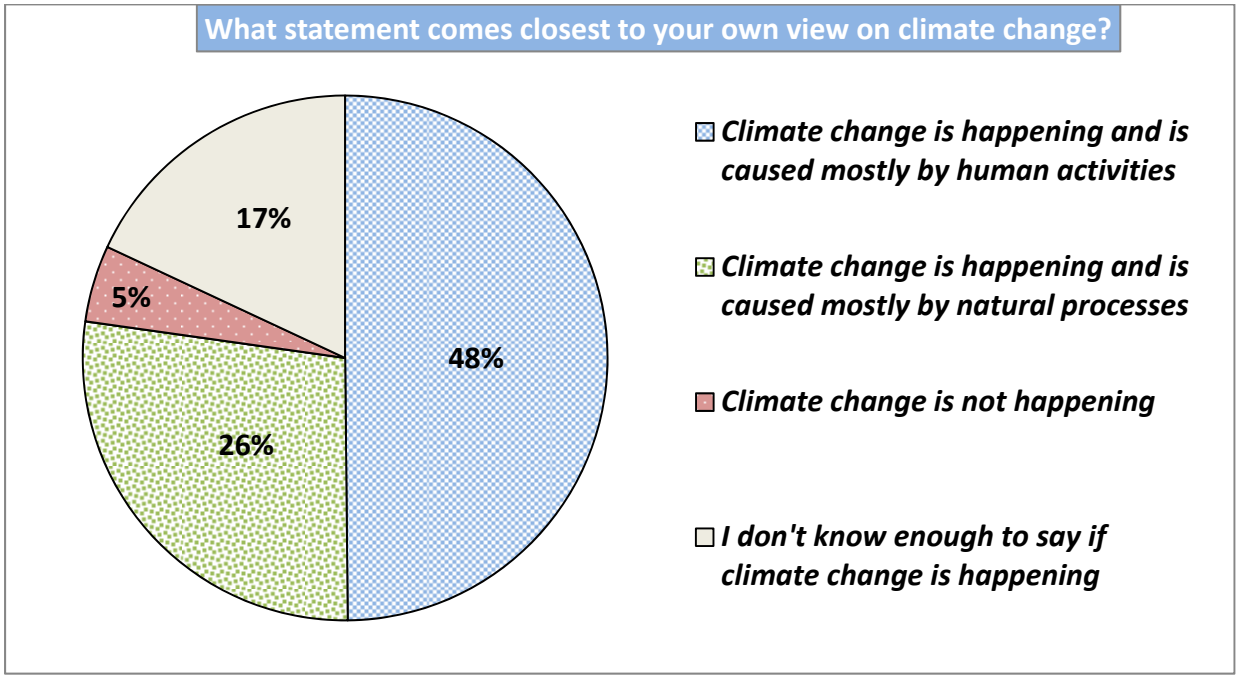

Figure 17: Characterizing Respondent Views about Climate Change (Pooled Sample)

A separate question asked how worried the respondent was about the potential impacts of climate change on local water supplies. Results by study valley and overall are summarized in Figure 18 below. Overall, roughly half of respondents in the pooled sample (46%) indicated a strong level of worry (4 or 5 on the 5-point scale) about these types of impacts, while about a quarter (24%) indicated a low level or no worry. The Salt Lake City respondents are significantly more worried about climate change impacts than respondents in any of our other three study areas. However, even in Cache Valley and Heber Valley, the percentage of respondents in the 'worried' range (responses 4-5) was greater than the percentage of respondents in the 'not worried' range (responses 1-2).

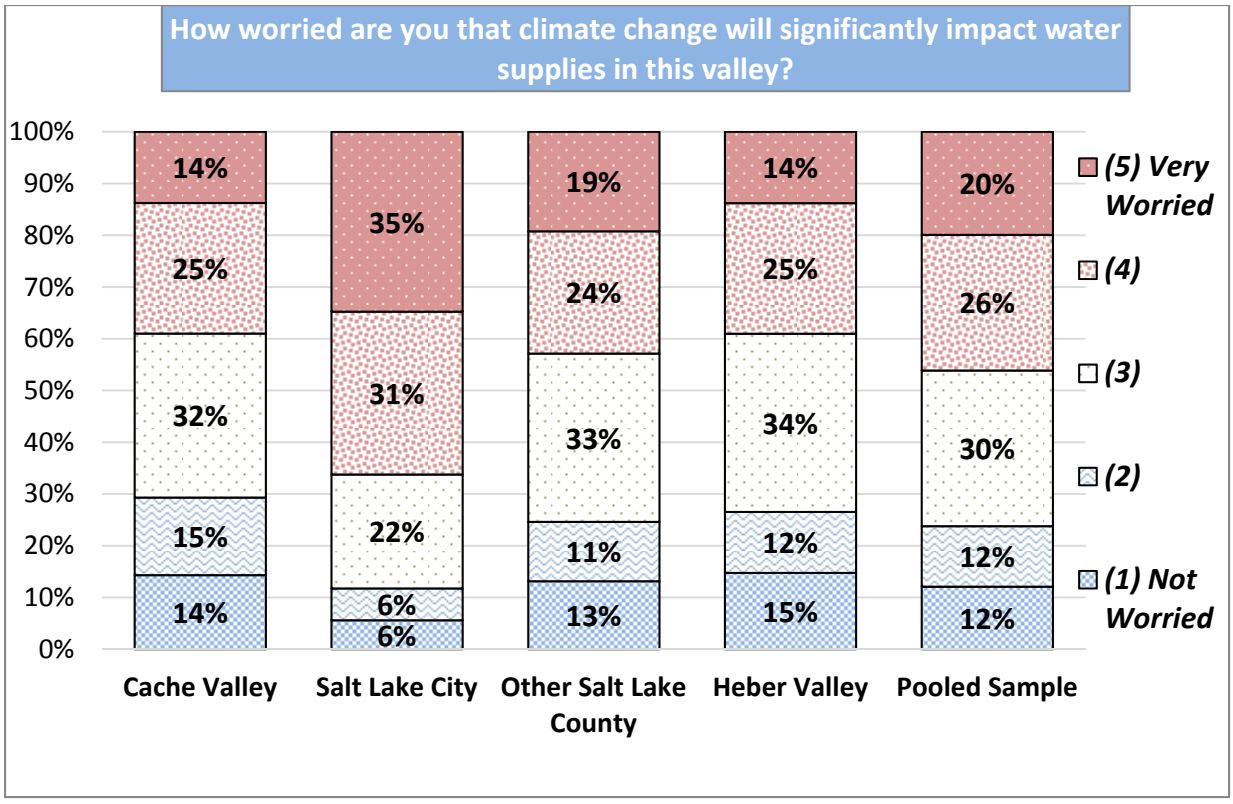

Figure 18: Percent of Respondents Worried about Climate Change Impacts on Local Water Supplies (Pooled Sample)

E. Policy Preferences and Priorities for Dealing with Water

Utah faces significant challenges in deciding its water future, and a variety of policy strategies are currently being debated to deal with those challenges. The iUTAH survey asked respondents questions about a variety of local and state level policy strategies. Responses indicate fairly wide-spread support for policy action to deal with water, which is consistent with the levels of respondent concerns about water issues reported in earlier sections of this report.

E.1. Priority Goals to Guide State Water Planning

One set of questions in the survey asked respondents to rate the level of priority that should be given to various goals for guiding state water planning. Responses were measured on a five-point scale ranging from 'not a priority' (1) to 'highest priority' (5). Detailed findings are shown in Figure 19 and Table 34 below.

The results suggest that "ensuring a supply of drinking water" was the top priority for most residents in our study neighborhoods, with "protecting water quality" ranking a close second in terms of overall priorities. Both goals were deemed the highest priority by more than two-thirds of respondents overall. The next two highest ranked goals, "ensuring water for

agriculture" and "protecting wetlands and wildlife," were listed as 'highest priorities' by approximately 40% of respondents.

There were no significant differences across the three valleys for the top two priorities and the rank order of all priorities was nearly identical for all valleys. All of the goals received mean priority scores above the mid-point of the scale, suggesting that water-related goals were important policy priorities for survey respondents.

Cache Valley and Heber Valley respondents prioritized "ensuring supplies of agricultural water" and "ensuring supply of water for economic development" somewhat higher than respondents in the Salt Lake Valley. Salt Lake City respondents prioritized "protection of wetlands and wildlife" somewhat higher but "saving taxpayer money" somewhat lower than respondents in the other three study areas. Heber Valley respondents prioritized "providing recreation opportunities" as somewhat higher than respondents in the other study areas. Despite these differences, the overall results suggest that respondents placed high management priority on maintaining adequate water quantity and quality to meet a variety of needs.

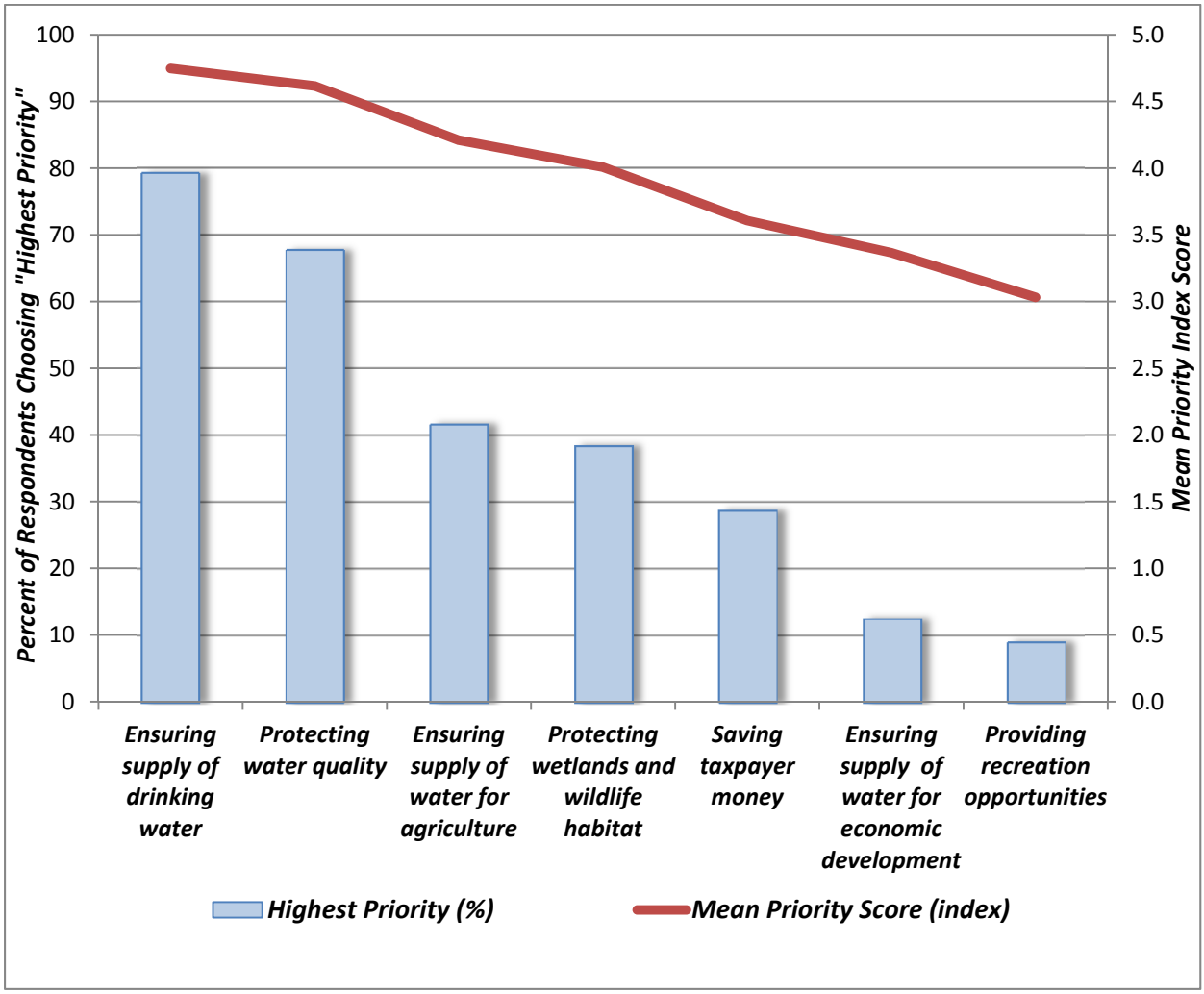

Figure 19: Priority Goals for State Water Planning (overall sample)

Table 34: Priority Goals for Managing Utah's Water Resources

How much of a priority should each of the following goals be for managing Utah's water resources?						
OVERALL POOLED SAMPLE	**Prioritization Rating**					
	Not a priority				*Highest priority*	
	1	*2*	*3*	*4*	*5*	***Mean Score***[1]
	Percent of all respondents					
Ensuring supply of drinking water	0.3	0.4	2.8	17.3	79.2	**4.75**
Protecting water quality	0.2	0.4	4.3	27.3	67.7	**4.62**
Ensuring supply of water for agriculture	0.7	2.2	13.9	41.6	41.6	**4.21**
Protecting wetlands and wildlife habitat	2.1	5.8	19.9	33.8	38.4	**4.01**
Saving taxpayer money	5.8	9.9	30.0	25.0	29.3	**3.61**
Ensuring supply of water for economic development	4.3	11.4	40.0	31.7	12.5	**3.37**
Providing recreation opportunities	8.6	19.6	40.4	22.4	9.0	**3.03**

BY VALLEY	**Mean Prioritization Score**					
	Cache Valley	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations* [2]
Ensuring supply of drinking water	4.72	4.78	4.75	4.74	4.75	n.s.
Protecting water quality	4.59	4.69	4.59	4.66	4.62	n.s.
Ensuring supply of water for agriculture	4.28	4.09	4.18	4.29	4.21	***
Protecting wetlands and wildlife habitat	3.88	4.29	3.91	4.09	4.01	***
Saving taxpayer money	3.63	3.34	3.81	3.73	3.62	*
Ensuring supply of water for economic development	3.42	3.24	3.34	3.47	3.37	**
Providing recreation opportunities	3.02	2.96	3.01	3.26	3.04	***

*Notes. 1) Mean scores are based on a five-point scale from 1 = "not a priority" to 5 = "highest priority." The mean score represents the average across all respondents (or the sum of all scores divided by the number of scores). 2) Significant differences across study locations reflect ANOVA test for difference in means. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

E.2. Priorities for Managing Short-term, Local Water Shortages

Since Utah is an arid and drought-prone state, strategies for dealing with water shortages has long been a primary water policy, planning and management concern. Current projections of the state's rapid population and economic growth along with projections of various climate change scenarios create additional uncertainty as to the nature and extent of future water shortages. Several parts of the iUTAH household survey asked respondents to indicate their levels of support for various approaches to water management by their own city. One set of questions asked survey respondents to indicate levels of support for or opposition to a variety of local policies or strategies if their city faced a short-term water shortage. Results from these questions are shown in Figure 20 and Table 35 below.

Conclusions from analysis of these results suggest that nearly all respondents (89.6%) supported or strongly supported public education about water conservation to address short-term water shortages, followed by 85.1% who supported or strongly supported encouraging voluntary reductions in outdoor water use. There was also significant support or strong support for restricting watering on parks, golf courses, and public properties (75.6%).

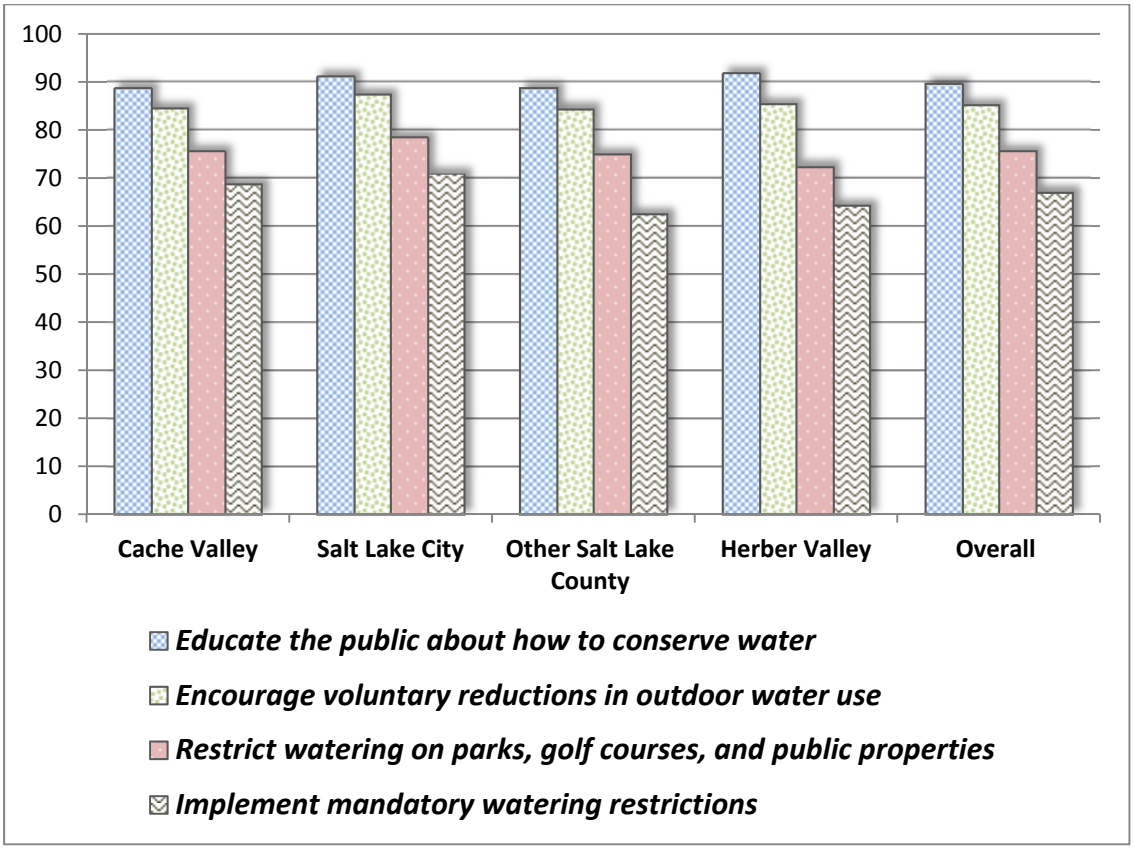

Figure 20: Support for Various Short-term Strategies for Dealing with Water Shortages

Over two thirds of all respondents (67%) were supportive of mandatory restrictions on water use to address short-term shortages, though only 37.2% strongly supported this option. Just 11.5% of respondents opposed or strongly opposed the use of mandatory restrictions on water use. Respondents from the study valleys did not differ significantly in the rank order of their support for short-term water shortage strategies, which can be seen visually in Figure 20.

Table 35: Support for Policies and Strategies to Address Local City Water Shortages Overall and By Valley

If your city faced a short-term water shortage, how much would you oppose or support each of the following local policies or strategies?						
OVERALL POOLED SAMPLE	*Strongly oppose*				*Strongly support*	
	1	*2*	*3*	*4*	*5*	Total
Educate the public about how to conserve water	0.9	1.1	8.4	20.3	69.3	100.0
Encourage voluntary reductions in outdoor water use	1.3	1.8	11.8	26.7	58.5	100.0
Restrict watering on parks, golf courses, public properties	2.4	5.0	17.1	28.3	47.3	100.0
Implement mandatory watering restrictions	4.5	7.0	21.5	29.8	37.2	100.0

BREAKOUT BY VALLEY	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations*[2]
	Percent respondents who 'support' or 'strongly support' [1]					
Educate the public about how to conserve water	88.6	91.1	88.7	91.7	89.6	*
Encourage voluntary reductions in outdoor water use	84.4	87.3	84.3	85.3	85.1	*n.s.*
Restrict watering on parks, golf courses, public properties	75.5	78.4	74.9	72.3	75.6	*
Implement mandatory watering restrictions	68.7	70.8	62.4	64.2	67.0	*

[1] *Responses to this question were on a five-point scale from 1 = "strongly oppose' to 5 = "strongly support." Reported in this table are the percentages of 4 and 5 responses representing people who supported or strongly supported.*

[2] *Significant differences across study locations reflect chi-squared test for full cross-tabulation table. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

E.3. Priorities for Longer-term Approaches to Water Policy and Management

Many water policies, plans and management strategies involve more systemic changes to water laws, management institutions, infrastructure and delivery systems, environments in which water is used, and people's water use expectations, behaviors and habits. Many of them take time to consider, approve, design and implement. Consequently, they involve longer-term approaches to water policy and management. The iUTAH survey included several question sets designed to assess participants' support for and prioritization of some longer-term water options. One question set focused on local-level approaches cities could take, while a second set focused on state-level policies, programs and strategies.

E.3.a. Local-Level, Long-term Policies and Strategies

In terms of long-term water management within their own cities, survey respondents had an opportunity to indicate their level of support or opposition for eleven types of local-level policies or strategies. Highlights are summarized in Figure 21. Detailed results are listed for the overall sample and for each of the study valleys in Tables 36 and 37 below.

Five approaches were supported or strongly supported by a majority of all respondents with little reported opposition: using treated wastewater for residential irrigation (72.8%); limiting housing development unless the developer secures water supplies (71.4%); building new water storage facilities (62%); building structures to reduce storm-water runoff (57.3%); and, subsidizing the purchase of low water use irrigation systems and appliances (53%). Four other approaches were supported or strongly supported by a little less than half of the respondents with more opposition responses: increasing budgets for stormwater management (48.7%); charging more per gallon for large water users (48.4%); encouraging housing development that uses less water per person (44.8%), and, implementing ordinances to require low-water landscaping (44.1%). Few respondents were in favor of reducing environmental protection requirements to facilitate new water projects (31.7%) with roughly equal percentages opposed or strongly opposed (28.3%) and many respondents on the fence in their opinions. The one strategy that more people opposed or strongly opposed (34.4%) than supported or strongly supported (24.4%) was buying water rights from farms for use in the city.

Table 37 reveals that there were significant differences between the study areas in respondents' responses on all policies with the exception of the same general level of support for building new water storage facilities and the same general opposition to buying water rights from farms for urban use. Salt Lake City respondents were generally more supportive of most of the other policy and management approaches than respondents in the other areas, with the exception that respondents in Heber Valley were more supportive than those in other areas of limiting future housing development unless water supplies are secured by the developer.

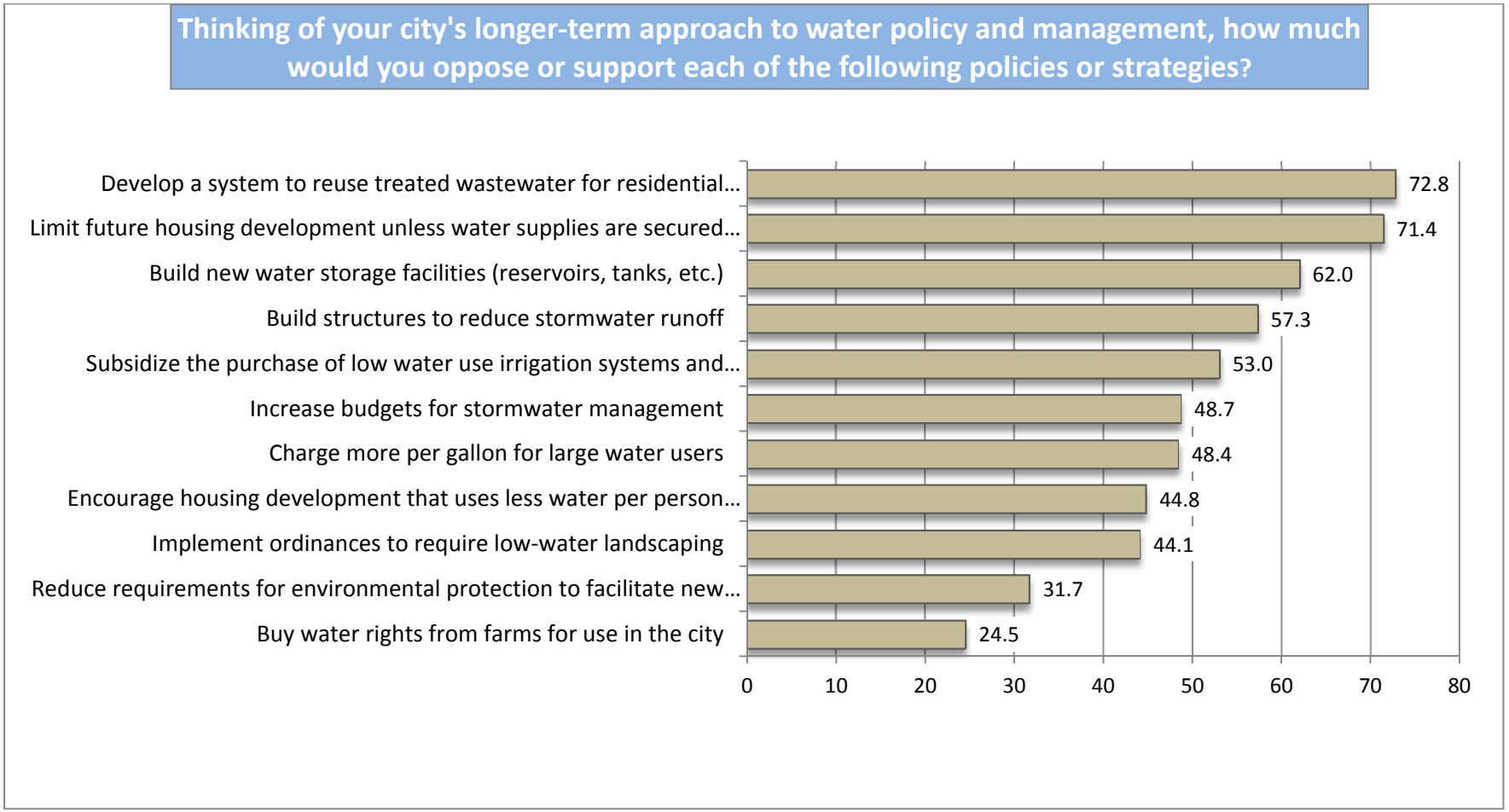

Figure 21: Percent of All Respondents who Support or Strongly Support Different Local-level, Long-term Water Policy Approaches

Table 36: Detailed Responses about Long-Term City Water Policy and Management Strategies (for overall pooled sample)

Thinking of your city's longer-term approach to water policy and management, how much would you oppose or support each of the following policies or strategies?						
	Strongly oppose				*Strongly support*	
	1	*2*	*3*	*4*	*5*	Total
	Percent in each response category					
Limit future housing development unless water supplies are secured by the developer	2.7	5.0	21.2	27.3	43.7	100.0
Develop a system to reuse treated wastewater for residential irrigation	2.7	4.6	20.0	32.2	40.5	100.0
Build new water storage facilities (reservoirs, tanks, etc.)	1.5	5.3	31.3	35.1	26.7	100.0
Subsidize the purchase of low water use irrigation systems and appliances	7.0	8.8	31.2	26.2	26.7	100.0
Build structures to reduce stormwater runoff	2.4	4.9	35.4	34.3	22.9	100.0
Encourage housing development that uses less water per person (e.g., smaller lots, townhouses)	10.3	14.8	30.1	22.4	22.3	100.0
Charge more per gallon for large water users	11.8	12.2	27.8	27.6	20.6	100.0
Implement ordinances to require low-water landscaping	9.6	14.2	31.5	23.8	21.0	100.0
Increase budgets for stormwater management	4.6	7.8	38.9	30.3	18.3	100.0
Reduce requirements for environmental protection to facilitate new water projects.	15.1	13.2	39.6	17.9	14.2	100.0
Buy water rights from farms for use in the city	16.1	18.3	41.1	15.7	8.8	100.0

Table 37: Support for Long-Term City Water Policy and Management Strategies by Study Valleys and Overall

Thinking of your city's longer-term approach to water policy and management, how much would you oppose or support each of the following policies or strategies?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences* [2]
	Percent of respondents who 'support' or 'strongly support' [1]					
Develop a system to reuse treated wastewater for residential irrigation	71.3	79.2	71.0	69.3	72.7	***
Limit future housing development unless water supplies are secured by the developer	66.7	72.0	73.4	77.1	71.0	***
Build new water storage facilities (reservoirs, tanks, etc.)	60.8	60.6	67.1	56.9	61.9	*n.s.*
Build structures to reduce stormwater runoff	54.3	69.9	57.1	44.8	57.3	***
Subsidize the purchase of low water use irrigation systems and appliances	50.2	66.2	50.6	42.7	53.0	***
Increase budgets for stormwater management	48.0	58.2	48.6	34.6	48.7	***
Charge more per gallon for large water users	43.2	64.1	43.4	44.6	48.2	***
Encourage housing development that uses less water per person (e.g., smaller lots, townhouses)	36.8	65.7	41.9	37.5	44.8	***
Implement ordinances to require low-water landscaping	40.1	62.2	38.0	41.3	44.8	***
Reduce requirements for environmental protection to facilitate new water projects.	30.9	34.6	34.5	27.1	32.1	***
Buy water rights from farms for use in the city	24.3	24.5	23.2	27.0	24.4	*n.s.*

[1] *Responses to this question were on a five-point scale from 1 = "strongly oppose' to 5 = "strongly support." Reported in this table are the percentages of 4 and 5 responses representing people who supported or strongly supported.*

[2] *Significant differences reflect chi-squared test for full cross-tabulation table. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

E.3.b. State-Level Policies, Programs or Strategies

The survey also asked respondents to indicate their levels of support or opposition to ten different types of state-level water planning and policy strategies. Detailed findings are outlined in Figure 22 and Tables 38 and 39 below. Results suggest that a majority of the respondents supported seven of the ten strategies (Figure 22). None of the strategies were opposed by more than 25% of respondents, with most having few respondents opposed or strongly opposed (Table 38).

The highest level of support by respondents overall (72.4% supporting or strongly supporting) was for using state funds to improve aging water infrastructure in cities. Another cluster of strategies received support from roughly 60% of the respondents. These strategies include, in descending order: investing in research on new water conservation technologies and practices (63.2%); setting minimum state standards for new private residential construction to reduce water use (61.5%); using state funds to build new reservoirs and other storage projects (61.2%); establishing minimum flow requirements for streams to protect fish habitat (59.1%); and, using state funds to pay for efficiency improvements in agricultural irrigation systems (58.2%). Two strategies to encourage efficiency received somewhat lower support but not much opposition: allowing people with water rights to sell water saved from using conservation practices (55.1%); and, ensuring state policy prioritizes the efficient use of water over protecting existing water rights (44.8% supportive). A minority of respondents supported using state funds to construct pipelines to bring water to urban areas (35.9%) and to facilitate transfers of water from agriculture to urban users (27.5%).

Respondents in the three valleys differed significantly in the intensity of their support for various strategies as well as in the rank order of supported strategies (Table 39). Improving aging water infrastructure was the most strongly supported strategy in each valley, with respondents in Salt Lake Valley being significantly more supportive. Facilitating transfers of water from agriculture to urban users was the least strongly supported strategy, with respondents in Cache Valley and Heber Valley significantly less supportive.

Salt Lake City was notable as having significantly more support for investing in research for new water conservation technologies and practices, setting minimum state standards for home construction, establishing minimum flow requirements for streams to protect fish, and ensuring state policy prioritizes the efficient use of water over protecting existing water rights.

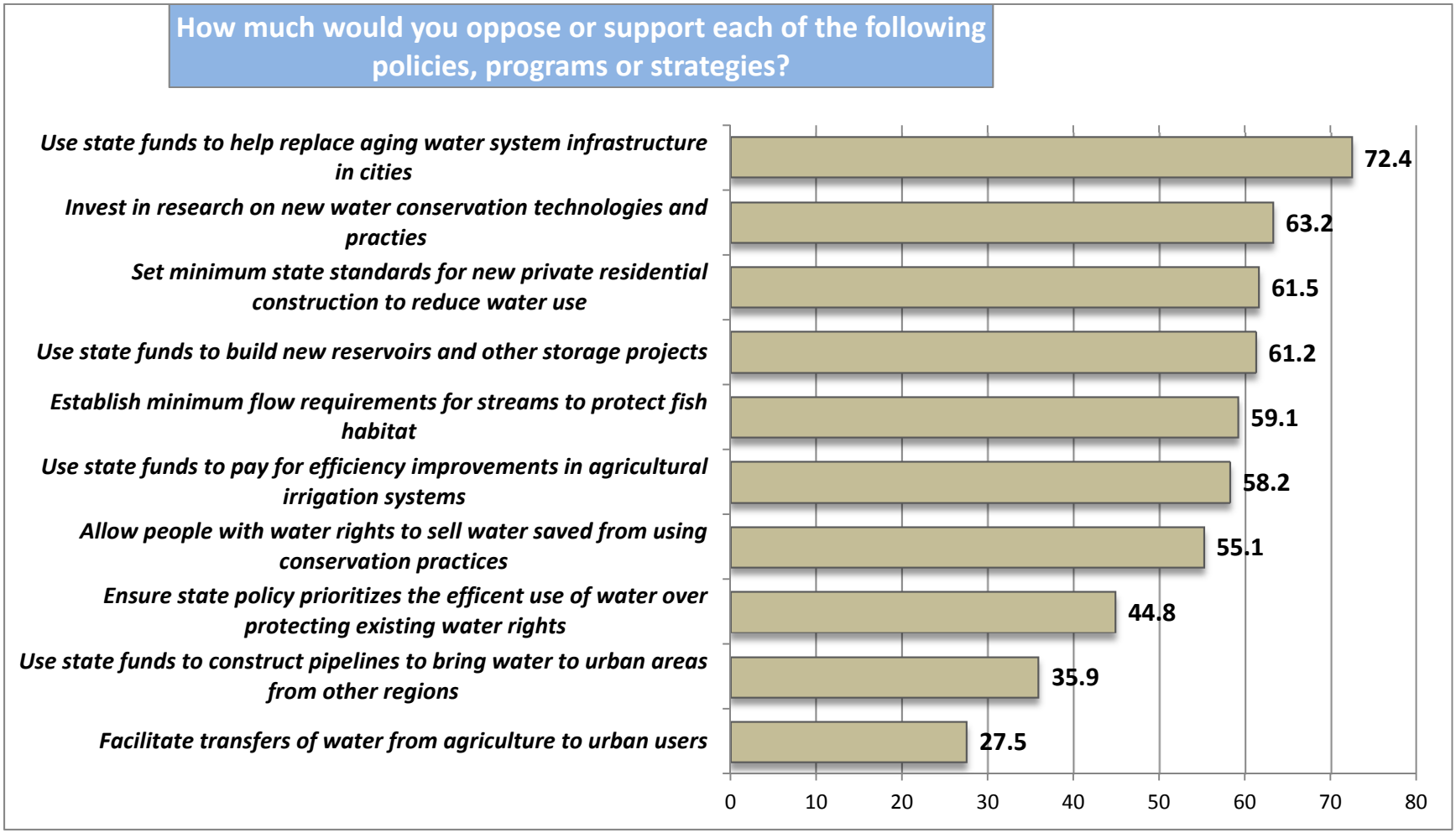

Figure 22: Percent who support or strongly support the strategy

Table 38: Support for Various Strategies to Guide State Water Policy and Planning Overall (Pooled Sample)

State officials and water managers have conducted public meetings to gather input on a state water plan. A few of the many strategies suggested are listed below. How much would you oppose or support each of the following policies, programs or strategies?						
OVERALL POOLED SAMPLE	*Strongly oppose*				*Strongly support*	
	1	2	3	4	5	Total
	Percent of respondents					
Invest in research on new water conservation technologies and practices	1.8	5.2	29.9	34.0	29.1	100.0
Establish minimum flow requirements for streams to protect fish habitat	2.5	5.7	32.9	30.6	28.4	100.0
Set minimum state standards for new private residential construction to reduce water use	2.9	5.1	30.7	33.1	28.3	100.0
Use state funds to help replace aging water system infrastructure in cities	1.5	2.4	23.8	45.0	27.3	100.0
Use state funds to build new reservoirs and other storage projects	2.1	4.6	32.1	38.8	22.4	100.0
Allow people with water rights to sell water saved from using conservation practices	3.0	4.9	37.0	33.0	21.2	100.0
Use state funds to pay for efficiency improvements in agricultural irrigation systems	2.4	5.5	33.8	38.5	19.9	100.0
Ensure state policy prioritizes the efficient use of water over protecting existing water rights	5.7	8.9	40.6	25.8	19.1	100.0
Use state funds to construct pipelines to bring water to urban areas from other regions	7.2	15.0	41.8	24.4	11.6	100.0
Facilitate transfers of water from agriculture to urban users	8.5	14.6	49.4	19.2	8.3	100.0

Table 39: Support for Various Strategies to Guide State Water Policy and Planning by Study Valleys

State officials and water managers have conducted public meetings to gather input on a state water plan. A few of the many strategies suggested are listed below. How much would you oppose or support each of the following policies, programs or strategies?	*Cache Valley*	*Salt Lake City*	*Other Salt Lake County*	*Heber Valley*	*Overall*	*Signif. differences across study locations*[2]
	Percent respondents that 'support' or 'strongly support'					
Use state funds to help replace aging water system infrastructure in cities	69.0	81.4	72.6	66.3	72.3	***
Invest in research on new water conservation technologies and practices	59.3	75.8	59.8	58.4	63.1	***
Set minimum state standards for new private residential construction to reduce water use	54.6	73.2	61.3	60.9	61.4	***
Use state funds to build new reservoirs and other storage projects	59.5	57.5	66.1	63.0	61.2	n.s.
Establish minimum flow requirements for streams to protect fish habitat	52.7	73.3	55.8	59.0	59.0	***
Use state funds to pay for efficiency improvements in agricultural irrigation systems	56.8	64.0	55.6	58.4	58.4	n.s.
Allow people with water rights to sell water saved from using conservation practices	55.0	58.0	52.5	55.2	55.1	*
Ensure state policy prioritizes the efficient use of water over protecting existing water rights	41.6	58.3	41.1	38.5	44.8	***
Use state funds to construct pipelines to bring water to urban areas from other regions	33.6	36.9	41.6	31.2	36.0	**
Facilitate transfers of water from agriculture to urban users	26.0	31.5	27.3	25.3	27.5	*

[1] *Responses to this question were on a five-point scale from 1 = "strongly oppose' to 5 = "strongly support." This table reports the percentages of 4 and 5 responses representing people who supported or strongly supported each strategy.*

[2] *Significant differences across study locations reflect chi-squared test for full cross-tabulation table. Significance levels denoted by asterisks (n.s. = not significant; * = p<0.05; ** = p<0.01; *** = p<0.001).*

IV. CONCLUSION

The iUTAH Household Survey was conducted in 2014 during a time when the State of Utah was initiating various activities aimed at charting a long-term strategy for securing Utah's water future. Water is currently high on the state's public policy agenda due to Utah's rapid population growth and urbanization, future water supply uncertainties related to climate change, and the political challenges of allocating increasingly limited regional water supplies. In order to provide information relevant to water policy, planning and management, the survey focused on understanding residents' water management practices, water experiences and concerns, as well as their support for various state and local water policies and programs.

The iUTAH Household Survey gathered data from over 2,300 residents in 23 different neighborhoods that represent the diverse types of urban development occurring in the Wasatch Range Metropolitan Area of Northern Utah. The survey was successful in capturing the views, experiences, and priorities of a representative cross-section of adults living in Utah's urban areas. Study neighborhoods were selected based upon development of a detailed urban neighborhood typology. Using a drop-off/pick-up method, the research team received responses from over 62% of the randomly selected households within the study neighborhoods.

This report summarizes overall findings from the survey research effort, with an emphasis on comparing the four broad study locations of Salt Lake City, other parts of the Salt Lake Valley, the Cache Valley, and the Heber Valley. Our analysis presents some overarching themes that appear across our entire study area, but also highlights differences across these four locations. More specific neighborhood- and city-level findings are presented in a separate set of reports on our household survey project website (www.iutahepscor.org/hhsurvey).

1. **Utah's urban residents live in diverse types of housing and neighborhood contexts that shape how they access water and their roles in making important water decisions.**

Residents in our study neighborhoods access water at their residences through a variety of conveyance systems, including municipal culinary systems that deliver water to nearly all households, but also secondary pressurized pipe and canal systems that provide water for outdoor irrigation to about 22% of our respondents' households. Secondary water in these urban neighborhoods is used primarily for watering lawns, yards, and vegetable gardens. Over half of the residents in the Heber Valley use secondary water.

Roughly 69% of our respondents live in single family detached houses that are owned by the residents. However, a significant fraction of Utah's adults live in housing situations that constrain their ability to make important landscaping and water decisions. Over 25% of our respondents live in rental housing units, and 22% live in multi-unit housing complexes (duplexes, townhouses, apartment buildings, condominiums, etc.). Renters and residents in multi-unit structures are significantly less likely to have authority to make decisions about outdoor landscaping or irrigation practices.

2. **Utah's urban residents are mobile and have diverse backgrounds, which affects their relationship to local communities and water resources.**

In general, northern Utah's urban residents are quite mobile (nearly 50% have lived in their current residence for five years or less) and most (63%) do not live in the areas where they grew up. Many of them grew up outside of Utah (about 43% overall). Most of the respondents grew up in a rural area or small town (35%) or in a suburban area (37%), and nearly 28% of our urban respondents report that they currently farm or have relatives in farming. Comparisons across study areas reveal variations in these neighborhood population dynamics suggestive of the gradient of agriculture-to-urban transition occurring in northern Utah, with urban areas of Salt Lake City and other suburban Salt Lake Valley neighborhoods being distinct from those in the less urbanized Cache and Heber valleys.

In addition to learning about water from their own backgrounds and experiences, Utah residents obtain information on water issues from a mix of traditional, official, and informal sources. TV and radio was used by 69% of respondents. More than half of them sought various other means for obtaining information, such as the internet and social media (58%) and friends and neighbors (55%). About 50% of them indicated they get information from newspapers or their water providers.

3. **Water-related amenities and risks are an integral part of northern Utah's urban water context.**

While access to a reliable supply of clean water for household use is important to all of our respondents, many also value water for other purposes. Respondents frequently engage in gardening or walking and hiking near water bodies, and significant minorities regularly participate in fishing, boating and snow sports. Local water bodies in or near their neighborhoods are highly valued as a natural amenity and location for recreational activities. Water for irrigating urban green spaces is also directly related to maintaining respondents' generally high level of satisfaction with the quality of parks and common spaces, appearance of homes and yards, and number of shade trees in their neighborhoods.

At the same time, nearly 33% of respondents indicated some type of experience with flooding or stormwater impacts to their own household, and over 50% report awareness of these types of impacts in their community, suggesting that these kinds of water-related risks are also part of their urban water experiences.

4. **Most Utahns' maintain traditional urban landscapes through regular and patterned watering and fertilization practices.**

Most respondents have traditional urban yards consisting of a lawn, flowers and ornamental plants, and trees. Maintaining these landscapes provides them with mostly personal aesthetic and lifestyle amenities (having a nice-looking landscape, shade, place to play, place to grow

food) and is less driven by promoting conservation or environmental outcomes (minimizing water use, providing habitat for wildlife) or neighborhood benefits (keeping neighbors happy). Nearly all respondents (97%) reported regularly watering and most report fertilizing (82%) to maintain these landscapes, with most households using underground sprinkler systems with automatic timers and doing the fertilization themselves.

5. Basic water conservation practices are used by a significant number of Utahns.

Most respondents were aware of basic water conservation messages that have been disseminated by state and local conservation agencies (e.g., that the state faces future water shortages, that lawns use too much water, and that they should probably use less).

In terms of indoor water conservation, large majorities of respondents report they frequently engage in efforts to fix leaky faucets and toilets, turnoff water when brushing teeth, or buy low-water use appliances and fixtures.

In terms of outdoor water conservation, over 70% say that conserving water is an important or very important consideration when making decisions about when and how much to water their lawn. Most respondents reported following general landscape watering recommendations related to lawn watering frequency (2-4 times a week), time of day to water (mornings, evenings and at night), and say they vary the amount they water their lawns based on weather conditions.

However, far fewer respondents reported taking actions to change landscaping or irrigation systems to promote greater efficiency in outdoor water use. Small percentages of respondents have tested their sprinklers to see how much water they apply (33%) or installed a more efficient lawn watering system (39%). Just under half say that minimizing water use is an important or very important consideration when choosing which plants to have in their yard, and a third report having "low water use or 'water-wise' plants" in their landscapes.

Respondents from Salt Lake City were notably more likely to report use of indoor and outdoor water conservation practices.

6. Opportunities exist to expand urban water conservation, especially outdoors.

While awareness of conservation issues is high, overall only a minority of respondents (19%-21%) report having made reductions in their outdoor or indoor water use over the last five years. Some likely had already made reductions previous to that period, while others have yet to act on their water conservation intentions. Many of the respondents recognize they can further their efforts to conserve water, with 54% indicating they could do more to conserve water indoors and 38% indicating they could do more to conserve outdoors.

Increasing households' self-awareness of their actual water use presents conservation opportunities. Respondents were nearly three times as likely to think that they use less water

than their neighbors (35%) than to think that they used more than their neighbors (12%). One contributing factor is the fact that many adults are not very aware of how much water their household actually uses. More than twice as many respondents reported being familiar with the amount of money their household spends on water (63%) than with the amount of water they use (30%).

Respondents indicated that they would be most likely to conserve more water if the savings led to reductions in their water bill or were used to secure future supplies for their household. There is also significant support for conserving water if it improves fish and wildlife habitat and/or ensures future supplies for agriculture. They were much less likely to reduce their water use if the savings were used to facilitate more rapid residential development in their community.

Interestingly, while water experts point to outdoor water use as the area with greatest potential for improvements in conservation in Utah, our survey respondents were less likely to say they believed could do more to reduce outdoor water use (38%) than indoor water use (54%). Significantly smaller percentages of respondents expressed interest in installing a more efficient irrigation system (40%), replacing landscaping with low water-use plants (33%), and reducing the amount of grass area in their landscape to conserve water (30%).

Generally speaking, there was very strong support across our study neighborhoods for programs to educate the public about how to conserve water and to use public policy to incentivize greater use of water conservation technologies and practices.

7. Concerns about water issues are widespread, but these concerns compete with concerns about other growth-related issues.

When asked how concerned they were about a range of issues facing their community over the next 10 years, the highest levels of concern (the "very concerned" response category) were expressed over air pollution (55%), traffic congestion (51%), loss of open space (47%), and population growth (42%), with less than 5% of respondents saying they were "not at all concerned" about these issues. Climate change concerns were more split with 36% indicating they were "very concerned" compared to 12% indicating they were "not at all concerned".

Several issues related to water were also of concern to respondents, with over a third (36%) indicating they were "very concerned" about the high cost of water, and just under 30% are "very concerned" about water shortages, water quality, or deteriorating water infrastructure. Flooding issues were a major concern to only 10% of the respondents.

When the categories of "concerned" and "very concerned" were combined, overwhelming majorities of respondents were concerned about all of these water and growth-related issues (except flooding), though the rank order of concerns remained unchanged. This response pattern is in contrast with some other questions on the survey where fairly large percentages of

respondents were non-committal in their opinions (putting their answers at the neutral midpoint of scaled responses or expressing no opinion at all).

8. Respondents have mixed perceptions regarding their water supply situation.

Most people recognized that water supply is going to be a challenge for Utah in future, yet relatively few (20%) said that their local city water supply is not adequate to meet current needs. Respondents were generally more confident in current local supplies than in regional or state supplies. Over 40% reported that they did not think current supplies are adequate to meet the state's needs overall.

Looking to the future, nearly half of respondents (44%) did not think there was enough water to meet the future needs of people and businesses in their city, while 18% thought supplies would be adequate. Over half (57%) believe there is not enough water to meet future needs in the entire state, with just 8% indicating supplies would be adequate.

9. Respondents generally have positive perceptions of water quality in Utah, though many are uncertain.

In separate questions about water quality, most respondents (70%) rated their drinking water quality as generally good or very good, followed by water in upstream rivers and lakes (49%) and streams and creeks near their neighborhood (41%).

By contrast, only small percentages (7% to 17%) rated any of the different types of water as poor or very poor. The types of water with the highest "poor" ratings were nearby irrigation canals and ditches and downstream rivers, streams, lakes and reservoirs.

Importantly, almost 40% of respondents were "not sure" about the quality of their groundwater, and between 18% and 24% were unsure of the quality of the other types of water bodies.

10. At the local level, respondents support a variety of policies and strategies that would increase reuse, conservation, and efficient use of existing urban water supplies, while strongly opposing moving water from agriculture to urban uses.

The survey provided examples of possible policies or programs that could be adopted by their local city government to address water challenges, and respondents were asked to indicate whether they would support or oppose each approach.

Five local approaches were supported or strongly supported by a majority of all respondents with little reported opposition: using treated wastewater for residential irrigation; limiting housing development unless the developer secures water supplies; building new water storage facilities; building structures to reduce storm-water runoff; and, subsidizing the purchase of low water use irrigation systems and appliances.

Four other approaches were supported or strongly supported by a little less than half of the respondents with somewhat higher levels of opposition: increasing budgets for stormwater management; charging more per gallon for large water users; encouraging housing development that uses less water per person, and, implementing ordinances to require low-water landscaping.

Few respondents were in favor of reducing environmental protection requirements to facilitate new water projects, with roughly equal percentages opposed or strongly opposed and many respondents non-committal in their opinions. The one strategy that more people opposed or strongly opposed than supported or strongly supported is buying water rights from farms for use in the city.

Important variations in support for different local policy options were found across the study areas.

11. Top goals for state water policy are to ensure water supply and water quality. The highest support was for state spending to help replace aging urban water infrastructure, followed by support to incentivize conservation, increase storage, and protect environmental quality.

The highest level of support by respondents overall was for using state funds to improve aging water infrastructure in cities. Another cluster of strategies received support from roughly 60% of the respondents. These strategies include, in descending order: investing in research on new water conservation technologies and practices; setting minimum state standards for new private residential construction to reduce water use; using state funds to build new reservoirs and other storage projects; establishing minimum flow requirements for streams to protect fish habitat; and, using state funds to pay for efficiency improvements in agricultural irrigation systems.

Two strategies to encourage efficiency received somewhat lower support but not much opposition: allowing people with water rights to sell water saved from using conservation practices; and, ensuring state policy prioritizes the efficient use of water over protecting existing water rights.

Only a minority of respondents supported using state funds to construct pipelines to bring water to urban areas and to facilitate transfers of water from agriculture to urban users.

12. Most people want to meet new urban water demands without taking water from agriculture.

One of the more surprising and significantly consistent themes to emerge from the survey results was the support urban residents in all study areas expressed for agriculture.

Support for agriculture was reinforced several places in the survey results. Ensuring future water supplies for agriculture was a strong motivator for many respondents' willingness to conserve water (65.2% of them overall). Respondents were far more likely to think too much water was used to maintain residential lawns, by parks and golf courses, and in industry than was used by agriculture. Ensuring a supply of water for agriculture received the fourth highest priority rating for state water planning goals. The strongest and most consistent opposition to a variety of local-level long-term water policy and management approaches was to buying water from farms for use in the city. In terms of respondents' opinions about a variety of state-level policies, programs or strategies, again the strongest and most consistent opposition was to facilitating transfers of water from agriculture to urban users.

This expressed support for agriculture through opposition to taking water it uses may be linked to the personal connections many people still retain to farming or rural areas, to agriculture being an important part of the state's cultural and economic heritage, and to its contribution to open space in areas undergoing rapid urbanization.

Implications

The overall findings in this report suggest that as the state's population becomes increasingly urbanized, it will be important to improve our understanding of how diverse urban residents and types of residential developments will impact citizens' water perceptions and management behaviors.

The findings also imply that Utahn's water management practices and decisions are quite diverse and flexible. It is reasonable to expect that people will adapt to changes in water availability, new technologies, water costs, and public policies that incentivize water conservation. Moreover, people frequently move between neighborhoods (and to and from other states), and these changes in residential settings can be expected to impact the choices people make about water use.

As a whole, there appears to be strong support for (and relatively low levels of opposition to) a wide range of local- and state-level policies and programs to address many of the water challenges Utahns are likely to face in the coming years. These include efforts to reduce consumption, improve or sustain water quality, augment supply and protect the water-based amenities and recreational activities that are important to the quality of life for many Utah residents.

The public's willingness to support and engage in policy-related changes to help meet Utah's future water sustainability challenges should be encouraging to state officials and local water managers. Involving members of the public in water decisions and collective action will need to be an important part of Utah's future water strategy.