

2015 AWWA State of the WATER INDUSTRY Report



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2015 AWWA State of the Water Industry Report

Established in 1881, the American Water Works Association (AWWA) is the largest nonprofit, scientific, and educational association dedicated to providing solutions to manage the world's most important resource—

water. With approximately 50,000 members and 5,000 volunteers, AWWA provides solutions to improve public health, protect the environment, strengthen the economy, and enhance our quality of life.

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Executive Summary

AWWA has been formally tracking issues and trends in the water industry since 2004 through the State of the Water Industry (SOTWI) study. AWWA continues to conduct this annual survey in order to:

- Identify and track significant challenges facing the water industry
- Provide data and analysis to support water professionals as they develop and communicate strategies to address current issues
- Discover and highlight potential problems or concerns on the water industry's horizon
- Inform decision makers and the public of the challenges faced by the industry

In September 2014, emails were randomly sent to a general list of AWWA members and contacts inviting participation in the 2015 SOTWI survey. A total of 1,747 respondents completed a majority of the survey. Because the amount of self-selection bias is unknown, no estimates of error have been calculated.

Some of the major findings of this study are:

- The current health of the industry as rated by all respondents was 4.5 on a scale of 1 to 7, down slightly from the 2014 score of 4.6; this score has fallen into a range of 4.5 to 4.9 since the survey began in 2004.
- In looking forward five years, the soundness of the water industry was expected to decline to 4.4 from the 2014 score of 4.5 (again out of 7.0); this score has fallen into a range of 4.4 to 5.0 since the survey's inception.
- The top five most important issues were identified as follows:
 1. Renewal and replacement (R&R) of aging water and wastewater infrastructure
 2. Financing for capital improvements
 3. Long-term water supply availability

4. Public understanding of the value of water systems and services
5. Public understanding of the value of water resources

- There is a gap between the financial needs of water and wastewater systems and the means to pay for these services through rates and fees. Nine percent of all respondents felt that water and wastewater utilities are not at all able to cover the full cost of providing service, including infrastructure R&R and expansion needs, through customer rates and fees. More striking, sixteen percent of all respondents are concerned that utilities will not be able to cover the full cost of providing service in the future.
- Thirty percent of utility employees responded that their utilities are currently struggling to implement full-cost pricing, up from 28 percent in 2014. In addition, 38 percent of respondents think they will struggle to cover the full cost of service in the future, up from 35 percent in 2014.
- Concerning infrastructure R&R, the most important issue was establishing and following a financial policy for capital reinvestment. Other critical concerns in this area are prioritizing R&R needs and justifying R&R programs to ratepayers and oversight bodies (board, council, etc.)
- Forty three percent of utility respondents reported declining total water sales (either a >10 year or <10 year trend) while 29 percent of respondents reported their total water sales were flat or little changed in the last 10 years. In all, this means that three-quarters of utilities are facing the issues associated with low or declining water demand that can dramatically impact cost recovery, i.e., pricing water to accurately reflect its true cost.
- The most reported cost recovery strategies from utility employees were (1) shifting more

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of the cost recovery from consumption-based fees to fixed fees within the rate structure, (2) changes in growth-related fees, (3) shifting rate design to increasing block-rate structure, and (4) increasing financial reserves.

- When asked “How prepared do you think your utility will be to meet its long-term water supply needs,” 11 percent of utility personnel indicated their utility will be challenged to meet anticipated long-term water supply needs, up from 10 percent in 2014.
- Regarding management of groundwater resources, the most important issues identified through the SOTWI Survey were (1) declining groundwater levels, (2) watershed/groundwater protection, and (3) groundwater regulations.
- Seventy two percent of respondents felt the general public has a poor or very poor understanding of water systems and services (up from 70 percent in 2014), and 61 percent felt the general public has a poor or very poor understanding of water resources (up from 59 percent in 2014). Similarly, 66 percent of respondents felt residential customers have a poor or very poor understanding of water systems and services up (up from

65 percent in 2014), while 59 percent felt the general public has a poor or very poor understanding of water resources (up from 56 percent in 2014).

- The top three current regulatory concerns were identified as (1) chemical spills, (2) point source pollution, and (3) combined sewer overflows.

The 2015 SOTWI report provides specific guidance on where the industry feels investments are most needed and where action would be most beneficial. Water professionals must work collectively to develop sound and sustainable solutions to the issues identified in this report and to then disseminate and implement them at the local and regional levels where water-related decisions are mostly made. Public input and proactive community involvement are essential to the success of this process.

AWWA provides a forum for innovation and leadership in the water industry by not only identifying and tracking important water issues but also by focusing the efforts and contributions of its dedicated volunteers and members to develop information and guidance to protect the world’s most important resource—water.

Part 1—Purpose and Methodology

Purpose

AWWA supports the water industry by providing solutions to effectively manage the world's most important resource—water. AWWA first developed the SOTWI survey and report in 2004 to

- Identify and track significant challenges facing the water industry
- Provide data and analysis to support water professionals as they develop and communicate strategies to address current issues
- Discover and highlight potential problems or concerns on the water industry's horizon
- Inform decision makers and the public of the challenges faced by the industry

AWWA's annual SOTWI survey encourages reflection on the water industry's current and future challenges and priorities, allowing participants to serve as a voice for their colleagues. This industry-wide self-assessment provides information to support many of the water community's common values including safeguarding public health, supporting and strengthening communities, and protecting the environment. Figure 1 highlights these values and how they are realized.

Methodology

The SOTWI survey population includes all water professionals, i.e., those with an understanding and appreciation of the issues facing the entire water industry. The SOTWI survey classifies participants based on which of the following categories best describes the type of organization they work:

- Drinking water utility
- Wastewater utility
- Combined water/wastewater utility (may include other services too)

- Water wholesaler reuse/reclamation utility
- Stormwater utility
- Consulting firm/consultant
- Manufacturer of products
- Manufacturer's representative
- Distributor
- Technical services/contractor
- Regulatory authority/regulator
- Nonutility government (municipal, federal, etc.)
- University/educational institution
- Laboratory
- Financial industry (ratings agency, investor/fund rep., etc.)
- Law firm/attorney
- Nonprofit organization
- Retired
- Other

Safeguard Public Health

- Safe drinking water
- Fire protection
- Water pollution control

Support and Strengthen Communities

- Adequate and reliable supplies
- Appropriate water quality
- Appropriate prices (*financial sustainability*)

Protect the Environment

- Adequate and reliable supplies
- Appropriate water quality
- Efficient use of supplies for minimum impacts (*environmental sustainability*)

Figure 1. Water Industry Values

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Throughout the SOTWI study, AWWA made deliberate efforts to anticipate and minimize errors due to coverage, sampling, nonresponse, and measurement. Coverage errors can result when members of the survey population have an *unknown* nonzero chance of being included in the sample. Sampling errors can result if data is collected from only a subset instead of all members of the sampling frame, which is the list from which a sample is to be drawn in order to represent the survey population. The 2015 SOTWI sample frame consisted of a general list of AWWA members and contacts. Because the bulk of AWWA members reside in North America, the survey primarily reflects water industry concerns in the United States, Canada, and Mexico.

A survey sample consists of all units of a population that are drawn from the sample frame for inclusion in the survey. To minimize coverage errors, the sample for the 2015 SOTWI Survey was distributed with the goal to provide uniform response from states and provinces. Individuals from the categories in the following list were randomly selected from AWWA's full contact list using a generic randomization function, and the survey was sent to them via email. To avoid bias, AWWA membership was not considered in the survey distribution, meaning it was sent to members and nonmembers alike.

1. All North American utilities (water, wastewater, combined, etc.)
2. All North American service providers
3. All North American partner agencies and institutions
4. All Canadian individual members
5. All Mexican individual members
6. All International individual members
7. U.S. individual members as by state with the goal of producing uniform response rate by state population

In September, 2014 initial email invitations were sent to 99,354 randomly selected email addresses, based on the criteria previously described. On Sept. 23, 2014, a follow-up email was sent to this same group. After removing wholly incomplete responses (i.e., surveys submitted with no responses at all), **the total number of respondents responding to the 2015 SOTWI survey was 1,747.** See Appendix A for the full 2015 SOTWI survey and Appendix B for a summary of the location specific response rates.

The data have not been weighted to reflect the demographic composition of any target population. Because the population size (i.e., water professionals in North America) is not well-defined and the amount of self-selection bias is unknown, no estimates of error have been calculated. For figures summarizing multiple survey responses, the number of respondents (n) as reported or shown in headings reflects the question that returned the lowest number of respondents of all the questions asked.

Figure 2 shows the total number of respondents based on their designated current career; all categories received responses. Approximately 53 percent of respondents (922) indicated they worked for a utility, while 47 percent (817) were not directly employed by a utility. The top 5 total responses by career type are as follows:

1. Combined water/wastewater utility: 29% (501)
2. Drinking water utility: 22% (386)
3. Consultant/consulting firm: 18% (312)
4. Government/regulatory agency: 5% (89)
5. Manufacturer of products: 5% (83)

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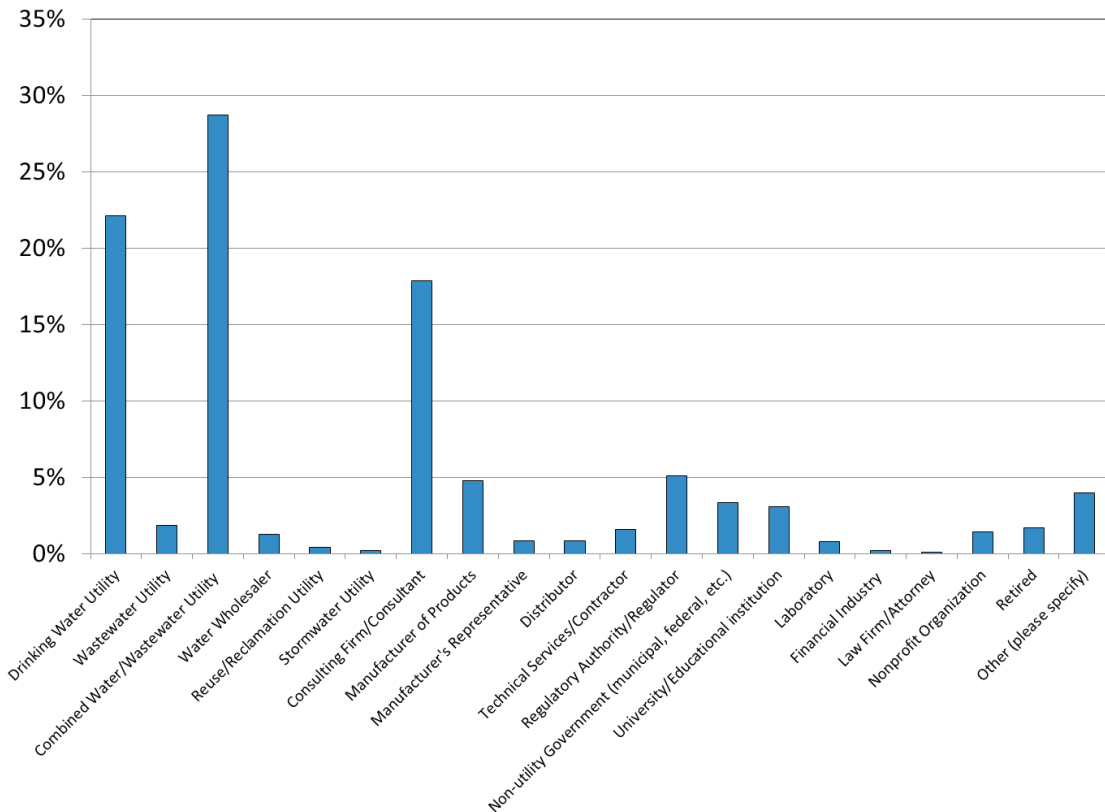


Figure 2. Number of respondents for the 2015 SOTWI survey by career category (n = 1,747)

Figure 3 shows the age distribution of the 2015 SOTWI survey respondents. The largest response was from the age range 55–64 (30 percent) while the smallest was the age range <25 (2 percent). The age distribution of respondents

was slightly skewed to those who have likely been water professionals for a longer period of time, but overall there was reasonable representation in all age range categories.

The Water Industry Sector. Industry. Community. Profession. These terms are commonly used interchangeably, but which is the most appropriate? From an economic perspective, Sectors are top-level descriptors that divide an economy into a broadly similar functions such as finance and insurance, manufacturing, construction, or utilities. Within each economic sector, there is further segmentation into industries. For example, within the utilities sector, there are electric utilities, gas utilities, and water utilities. Professionals working in the water industry ensure the safe and reliable delivery of water, wastewater, reuse, and stormwater services. These water professionals form a community of leaders that generally shares the same values of safeguarding public health, supporting and strengthening communities, and protecting the environment as described in Figure 1.

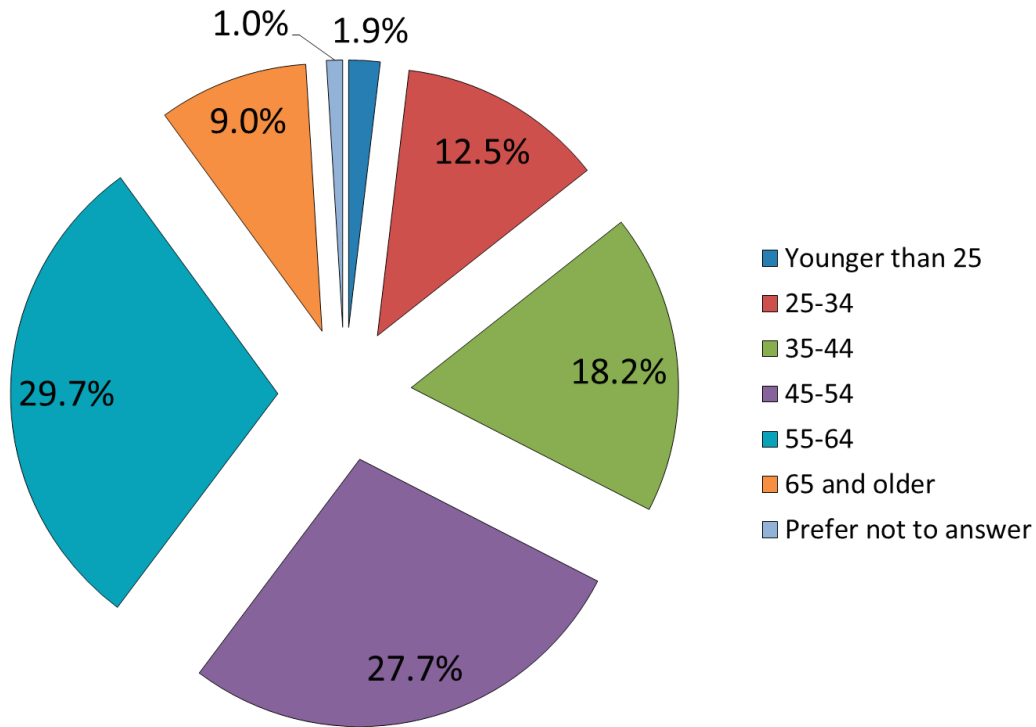


Figure 3. Number of respondents for the 2015 SOTWI survey by Age (n=1,746)

Figure 4 provides an overview of the number of water service connections or collection system connections served by the utility-career participants, of which there were 678 total responses. Those responding for combined systems were instructed to use the larger between their systems' water and wastewater connections. The population served by a water or wastewater system can be estimated by multiplying the number of connections by 3.5, i.e., there are approximately 3.5 people are served for each connection.

Utility personnel consist of the following career categories:

- Water utility
- Wastewater utility

- Combined water/wastewater utility
- Water wholesaler
- Reuse/reclamation utility
- Stormwater utility

The largest group of utility respondents served more than 150,000 connections (meaning populations greater than approximately 500,000 people), while the smallest number of respondents served between 100,001 to 150,000 connections. For this survey, small utilities are those that serve 3,000 or less connections (service populations of less than approximately 10,000 people). Ninety percent of the utility personnel who responded worked for public utilities, while 10 percent worked for private utilities.

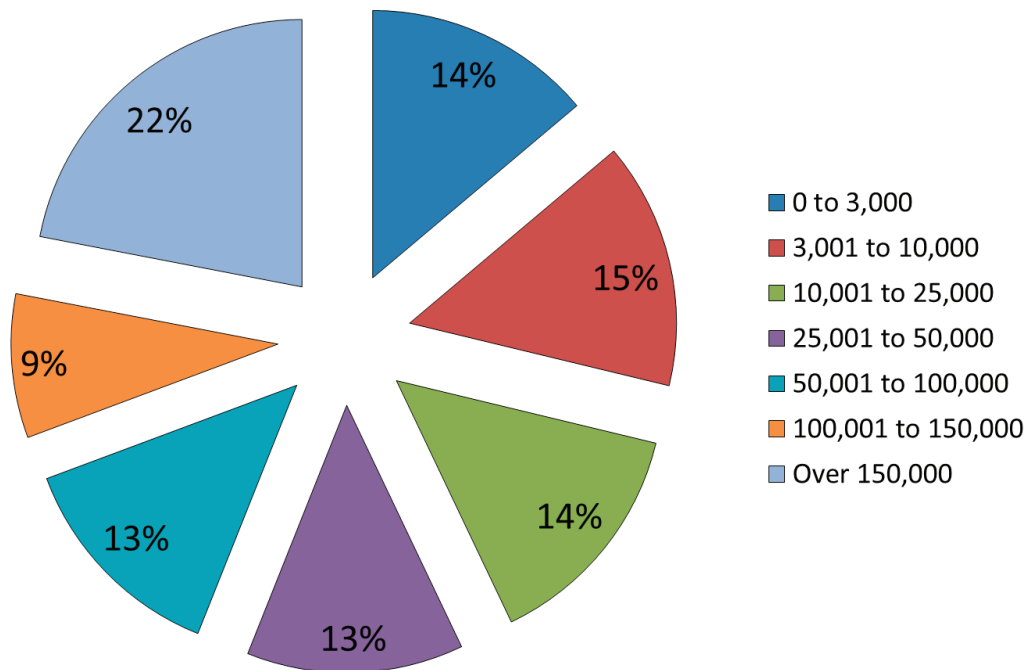


Figure 4. Summary of 2015 SOTWI respondents working for a utility by the number of service connections their utility serves (n= 678)

Any others industry challenges rating at least “very important” but not listed (please specify):

- **Access to external government funding (for small systems in Canada), affordable insurance, bulk purchasing initiatives, and affordable debt financing.**
- **Concern that increasingly stringent MCLs (for THMs, for example) will unnecessarily elevate costs (and rates).**
- **Infrastructure condition assessment and remaining life determination.**
- **We cannot under estimate the effects of drought and the importance of year-round conservation. We must diversify our industry and attract new workers to replace retiring ones. We are already competing with the oil & gas industry who typically pay more than we do.**

Excerpt from open-ended questions

Part 2—State of the Water Industry

Background

The results of the 2015 SOTWI survey are better understood against the backdrop of the “waterscape” in North America. As the report is published, the populations of the Canada, Mexico, and the United States continue to grow as shown in Figure 5 although the growth rate has been leveling off in recent years. For a view of the current North American population density, see Figure 6.

The U.S. Environmental Protection Agency (USEPA) provides drinking water system information through the federal version of its Safe Drinking Water Information System. Table 1 provides the number of U.S. community water systems in 2014 based on the size of the service population. A community water system provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people year-round.

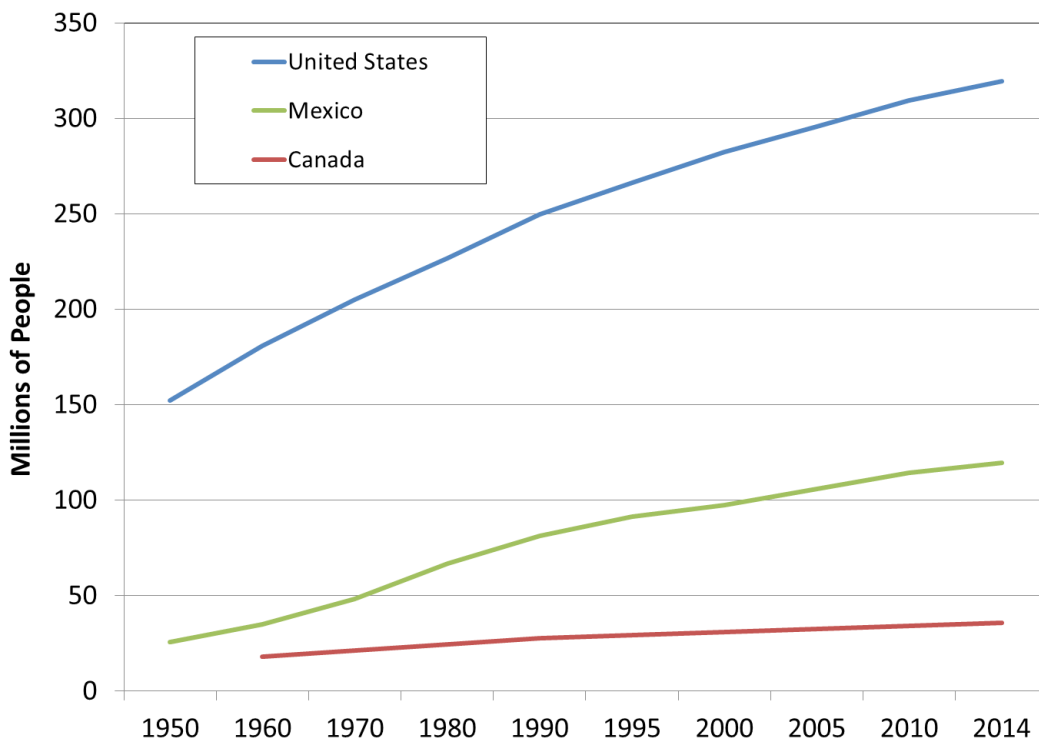


Figure 5. Populations (in millions) in North America by Year (created from Google Public Data, <http://www.census.gov/popclock/>, <http://www.statcan.gc.ca/daily-quotidien/140926/dq140926b-eng.htm?HPA>, and <http://www.statista.com/statistics/263748/total-population-of-mexico/> —accessed 12/12/14)

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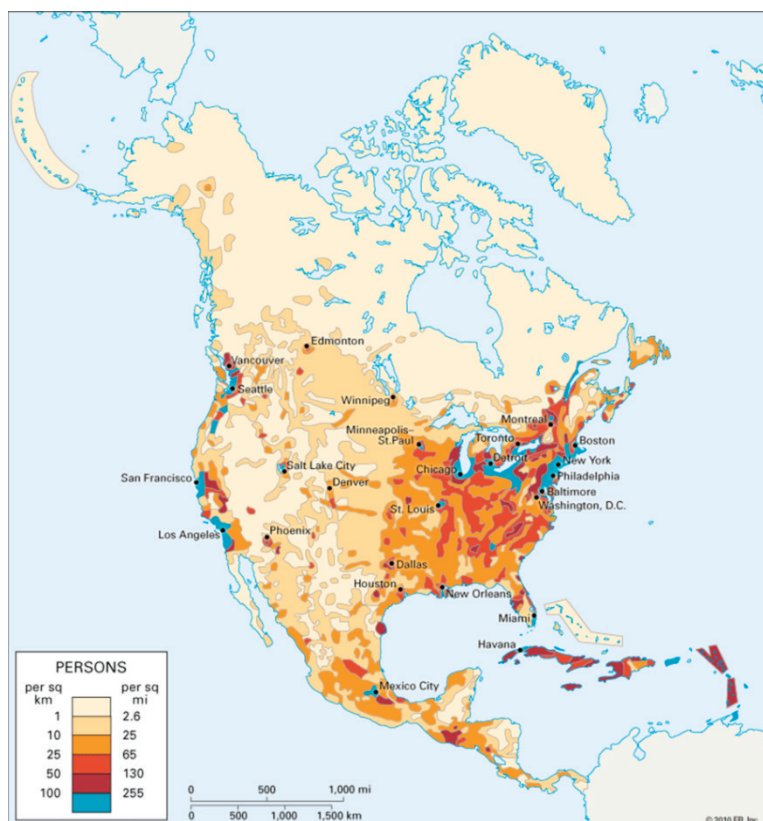


Figure 6. North American population density (Britannica Online for Kids 2015)

Table 1. U.S. community water system summary (USEPA 2015)

System Service Population	Very Small ≤500	Small 501–3,300	Medium 3,301–10,000	Large 10,001–100,000	Very Large >100,000	Total
Number of Systems	28,595	13,727	4,936	3,851	426	51,535
% Total Systems	55	27	10	7	0.8	100
Service Population	4,738,080	19,688,745	28,758,366	109,769,304	137,250,793	300,205,288
% Total Population	1.6	6.6	10	37	45.7	100
People/ System	166	1,434	5,826	28,504	322,185	5,825

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As shown in Figure 7, the total number of community water systems has decreased over the last four years by 1,338 or 2.5 percent over this time period. This change reflects an overall decrease in the number of smaller systems (Very Small and Small, see Table 1 for definitions) and an increase in the number of larger systems (Large and Very Large). These changes generally support the understanding that urbanization and regionalization are increasing.

In late 2014 the United States Geological Survey released its summary of water use in the United States through Circular 1405: Estimated Use of Water in the United States in 2010 (USGS 2014).

Figure 8 shows the amount of water withdrawals across the U.S. from 1950 to 2010. It is interesting to note that water use in the United States in 2010 was 13 percent less than in 2005 and was at the lowest level since before 1970. Most of this decrease occurred because of lower fresh surface water withdrawals. Of the water withdrawals in 2010 (355 billion gallons/day or BGD), approximately 12 percent was used for public supply (42 BGD); 32 percent was used for irrigation (115 BGD); and 45 percent was used for thermoelectric power (161 BGD). Also the USGS report stated that the average domestic per capita water use in 2010 was reported to be 88 gallons/day.

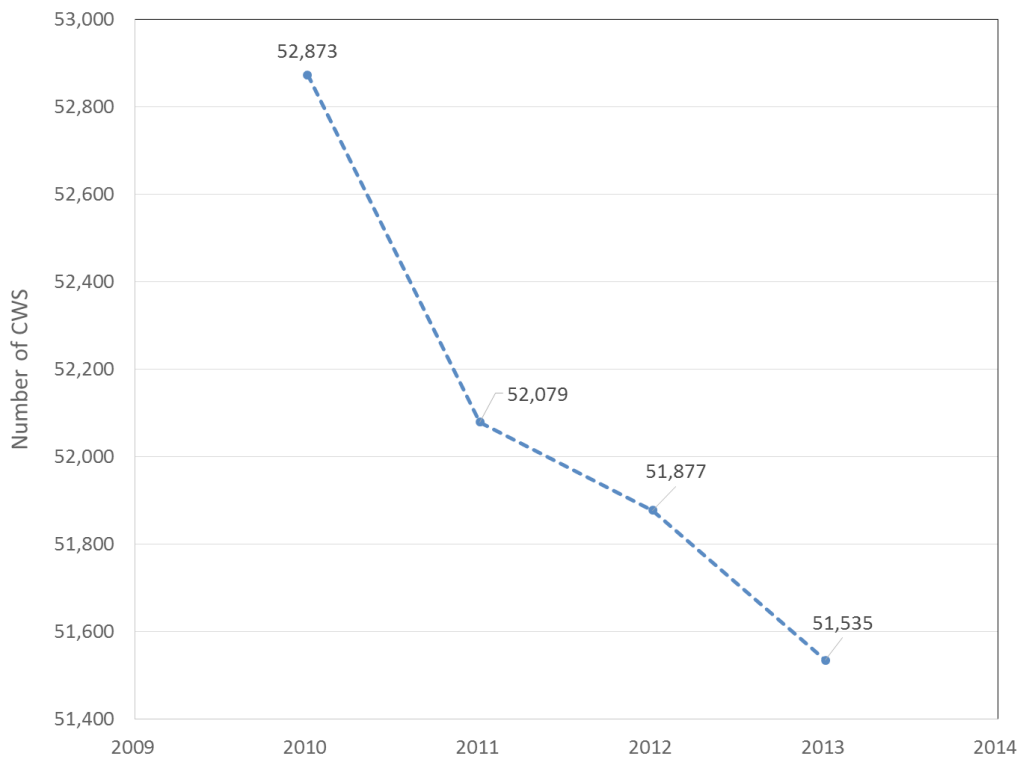


Figure 7. Number of community water systems by year (USEPA 2015)

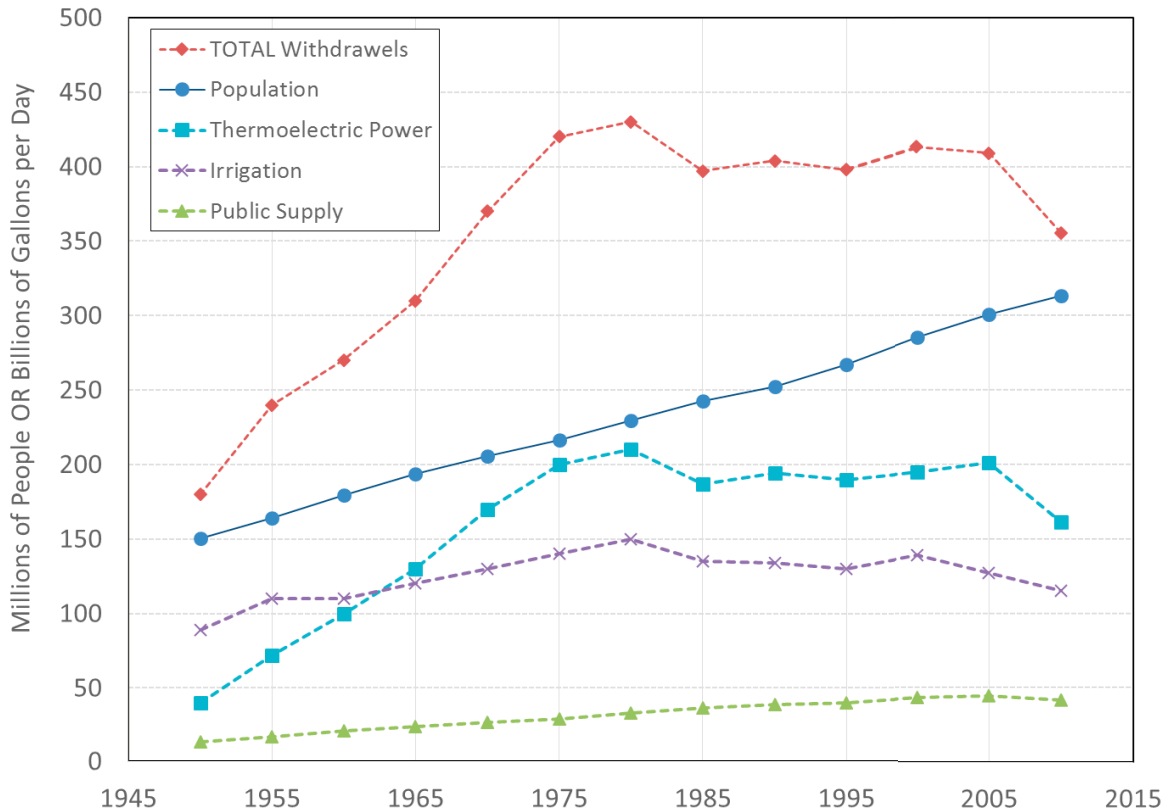


Figure 8. Water withdrawals in the United States 1950-2010, (USGS 2014)

USEPA tracks the number of operational wastewater treatment facilities every four years through its Clean Watersheds Needs Survey (CWNS). The most recent data available as published in 2008 is shown in Table 2, which provides a summary of the number of wastewater treatment facilities by flow. USEPA is expected to deliver the CWNS 2012 Report to Congress and provides data to the public via the USEPA website in early 2015.

Statistics Canada provides Canadian system information through its Human Activity and the Environment data tracking efforts. Table 3 provides a summary of drinking and wastewater plants in Canada for public facilities serving communities of 300 or more people. This summary does not include federal systems or facilities administered by Indian and Northern Affairs Canada. Table 4 presents the populations in Canadian provinces and territories served by various source waters.

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Table 2. U.S. wastewater system summary (USEPA 2008)¹

Existing flow range (MGD)	Number of facilities	Total existing flow (MGD)	Present design capacity (MGD)
0.000 to 0.100	5,703	257	490
0.101 to 1.000	5,863	2,150	3,685
1.001 to 10.000	2,690	8,538	13,082
10.001 to 100.000	480	12,847	17,267
100.001 and greater	38	8,553	10,344
Other ²	6	-	-
TOTAL	14,780	32,345	44,868

¹ Alaska, North Dakota, Rhode Island, American Samoa, and the Virgin Islands did not participate in the CWNS 2008

² Other—Flow data for these facilities were unavailable

Table 3. Canadian drinking water and wastewater system summary (Statistics Canada 2009)

Population served	Number of drinking water plants	Number of sewage treatment plants
300 to 500	364	390
501 to 5,000	1,226	1,272
5,001 to 50,000	337	366
More than 50,000	91	85
Total	2,018	2,113

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Table 4. Canadian population served by drinking water plants for various water sources (Statistics Canada 2009)

Provinces and Territories	Population Served by Water Source			Total
	Surface water	Groundwater	Groundwater under the direct influence of surface water	
Newfoundland and Labrador	379,755	28,096	—	412,091
Prince Edward Island	0	63,807	0	63,807
Nova Scotia	500,351	71,370	4,500	576,221
New Brunswick	224,393	140,923	15,604	380,920
Quebec	6,165,044	935,925	83,763	7,184,732
Ontario	9,708,702	1,288,678	234,390	11,231,770
Manitoba	841,893	110,680	13,754	966,327
Saskatchewan	658,470	139,162	10,155	807,787
Alberta	3,093,062	98,341	47,322	3,238,725
British Columbia	3,500,600	449,046	25,413	3,975,059
Yukon	-	27,096	3,500	30,596
Northwest Territories	40,511	-	0	40,511
Nunavut	-	-	-	-
Canada (TOTAL)	25,149,570	3,353,524	442,641	28,945,736

Documentation of the number of Mexican water and wastewater systems and water use was not available at the time this report was written.

State of the Water Industry

As has been done since the beginning of the SOTWI survey, the 2015 version asked participants for their opinion of the current and future health of the water industry by responding to the following questions using a scale of 1 to 7 where 1 = not at all sound and 7 = very sound.

- *In your opinion, what is the current overall state of the water industry?*
- *Looking forward, how sound will the overall water industry be five years from now?*

Figure 9 shows the average scores to these two questions from 2004 to present. The current health of the water industry as rated by all respondents was 4.5 out of 7.0, down slightly from the 2014 score of 4.6. However, this score falls into the range of 4.5 to 4.9, which has been observed since the beginning of the survey. Although the minimum error associated with these responses cannot be estimated, there is little difference in the water industry health scores over the last several years. The consistency of these scores suggests that the water and wastewater industry is resilient in the face of the local, national, and external crisis that often impact other sectors and industries.

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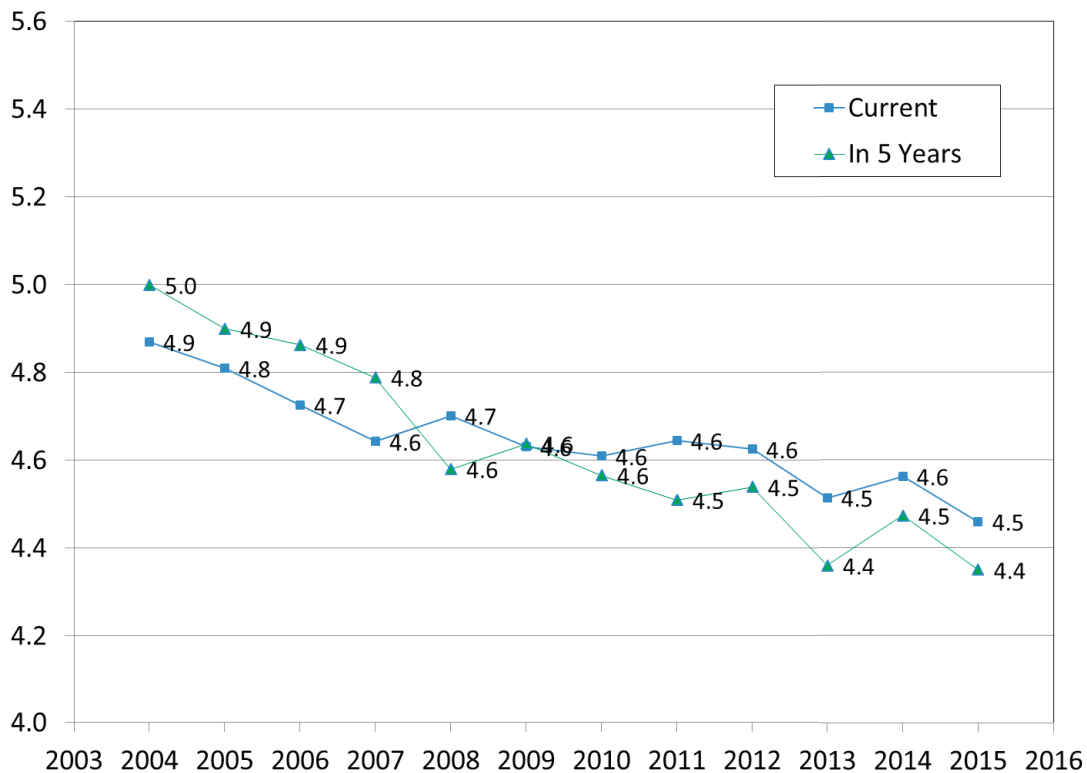


Figure 9. Health of the water industry – all respondents (rating scale: 1 to 7)

In five years, the soundness of the water industry is expected to decline to 4.4 from the 2014 score of 4.5 out of 7.0. While leaving aside potential statistical differences, the current and forward-looking trends reflect respondent attitudes that the soundness of the water industry is just a little lower than the historical averages of 4.7 for the current perception and 4.6 for the future perception.

In 2008 (during the start of the global recession), the current and forward-looking assessments of the water industry's soundness changed so that the expectation of future soundness was less than the current state (i.e., things will be slightly worse or no better in the future).

In addition to asking about the overall state of the water industry's soundness, the 2015 SOTWI survey also posed the following questions to better capture perspectives on regional soundness, again using a scale of 1 to 7 where 1 = not at all sound and 7 = very sound:

- *In your opinion, what is the current state of the water industry in the region where you work most often?*
- *Looking forward, how sound will the water industry be five years from now in the region where you work most often?*

Figures 10 and 11 show the soundness of the overall water industry as reported by those working in the United States and Canada, respectively. In terms of the current soundness, both show small decreases over last year, down to 4.5 from 4.6 for U.S. respondents and down to 4.6 from 4.7 for Canadian respondents. The United States also maintains its trend of a relatively pessimistic future outlook (in comparison to the overall sample) with an expected average soundness score of 4.4 in 2020. In contrast, Canadian participants continued their relatively optimistic outlook for the future with an average soundness score of 4.7 for 2020.

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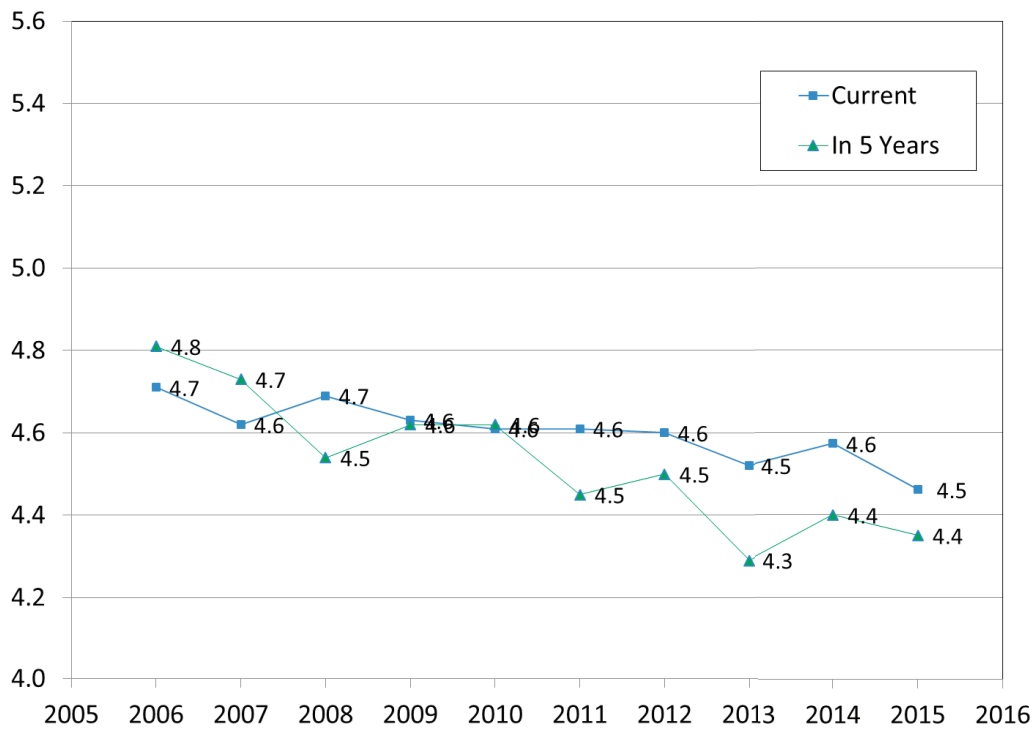


Figure 10. Health of the water industry – U.S. respondents (rating scale: 1 to 7)

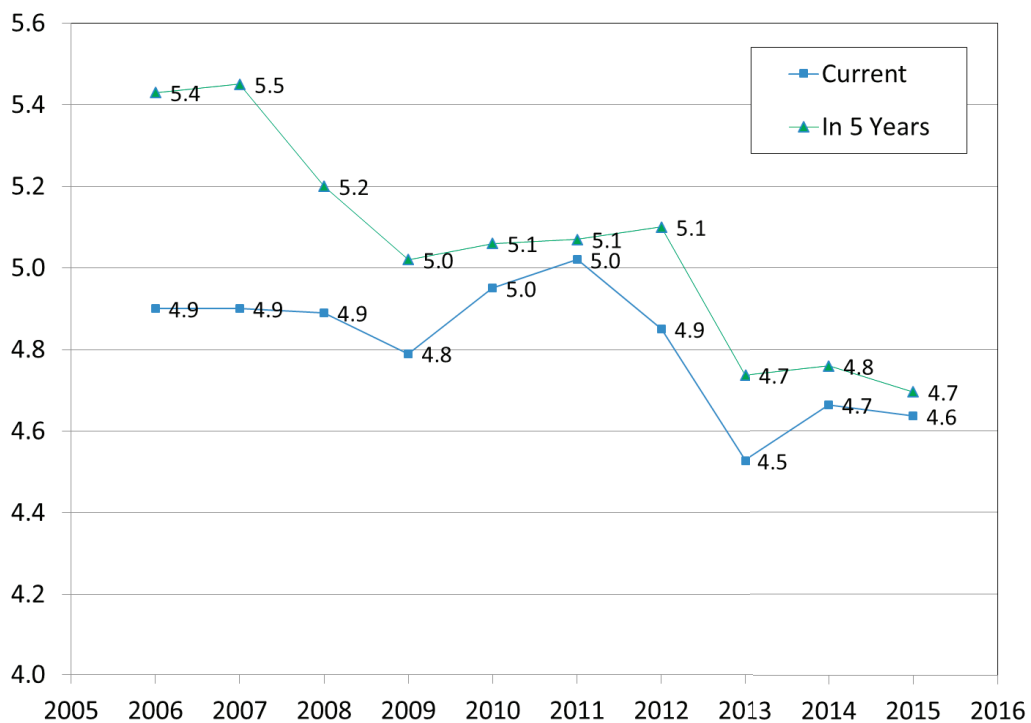


Figure 11. Health of the water industry – Canadian respondents (rating scale: 1 to 7)

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As shown in Table 5, the regional soundness scores were higher in all cases than the overall scores by the same groups. The reasons for this are not immediately apparent, but one explanation is that people may have a better understanding of the water and wastewater

systems in the areas where they work while the water-related news and information from outside of their work region is generally negative, leading to more negative perceptions regarding the overall industry.

Table 5. Overall and regional perceptions of the water industry soundness for total, U.S., and Canadian respondents (rating scale: 1 to 7); present (2015) and in 5 years (2020)

Sample	Overall		Regional		Counts
	2015	2020	2015	2020	
All respondents	4.5	4.4	4.6	4.6	1,740
U.S. respondents	4.4	4.3	4.6	4.5	1,530
Canadian respondents	4.6	4.7	5.0	5.0	173

The average scores for the health of the water industry on a scale of 1 to 7 for the present year (2015) and five years from now (2020) are provided in Table 6 for each career category. Few respondent groups indicated they thought the health of the industry would be better in five years, with most expecting a slight decrease in the soundness of the future water industry. Leaving aside issues of statistical differences, the *regional* soundness scores for most groups were higher than the corresponding *overall* scores, again most likely reflecting the negative information delivered on a broader scope from outside the region they understand the best.

The average scores for the water industry's health on a scale of 1 to 7 for the present year (2015) and in five years (2020) are broken out by respondent age in Table 7. There is little

difference in these scores, with young professionals (i.e., those in the categories "Younger than 25" and "25–34") indicating a slightly more optimistic outlook for the future. But again, the somewhat low number of responses may have led to errors from coverage, sampling, and/or nonresponse.

Appendix C presents the average scores for the health of the water industry on a scale of 1 to 7 for the present year (2015) and in five years (2020) based on the region where participants work most often. Montana and Georgia returned the same average scores as all participants (2015 = 4.6, 2020 = 4.5 as shown in Figure 7), so those with higher scores could be considered more optimistic while those with lower scores could be considered more pessimistic.

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Table 6. Overall and regional soundness of the water industry by career category (scale: 1 to 7); present (2015) and in 5 years (2020)

Career Category	Overall		Regional		Count
	2015	2020	2015	2020	
Laboratory	4.8	5.2	5.0	5.4	14
Technical services/contractor	4.8	4.7	4.7	4.9	27
Drinking water utility	4.6	4.5	4.8	4.7	383
Water wholesaler	4.6	4.3	4.8	4.4	22
Regulatory authority/regulator	4.6	4.3	4.8	4.6	89
Retired	4.5	4.4	4.4	4.4	28
Combined water/wastewater utility	4.5	4.4	4.7	4.6	500
Law firm/attorney	4.5	4.5	5.0	5.0	2
Nonutility government	4.5	4.4	4.5	4.4	58
Wastewater utility	4.4	4.4	4.2	4.3	32
Distributor	4.4	4.5	4.5	4.5	15
Manufacturer's representative	4.4	4.5	4.4	4.4	15
University/educational institution	4.4	4.4	4.4	4.4	54
Nonprofit organization	4.4	4.1	4.9	4.8	25
Consulting firm/consultant	4.3	4.2	4.4	4.4	312
Reuse/reclamation utility	4.3	4.3	4.4	5.0	7
Manufacturer of products	4.2	4.5	4.4	4.5	83
Other (please specify)	4.2	4.0	4.3	4.3	69
Financial industry	4.0	4.3	4.7	5.3	3
Stormwater utility	3.7	3.3	3.0	3.3	3

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Table 7. Health of the water industry by age category (scale: 1 to 7); present (2015) and in 5 years (2020)

Age Range	2015	2020	Count
Younger than 25	4.4	5.0	15
25-4	4.6	4.8	204
35-44	4.5	4.4	308
45-54	4.5	4.4	480
55-64	4.6	4.4	518
65 and older	4.6	4.4	144
Prefer not to answer	4.4	4.4	16

Any others rating at least “very concerned” but not listed (please specify):

- **Better regulatory protection against large scale unknown contaminant storage and spills is critically needed.**
- **Groundwater quality degradation (i.e. salt movement due to overdraft)**
- **Copper and heavy metals in stormwater runoff will be a big issue in the next 5 years**
- **The issue of wastewater reuse. It should be required in many instances, yet it is rarely discussed in certain areas of the country.**

Excerpt from open-ended questions

Part 3—Issues

To determine the issues that currently impact the water industry, respondents were asked to rate the importance of several challenges on a scale of 1 (unimportant) to 5 (critically important). These issues, as ranked by 2015 SOTWI

survey respondents, are shown in Table 8. In addition to the average scores, the percentage of respondents who scored the issue as critically important (i.e., 5 on the scale of 1 to 5) is also presented in Table 8.

Table 8. Issues facing the water industry as ranked by all respondents (n = 1,641)

Rank	Category	Score (1-5)	% Ranked Critically Important
1	Renewal and replacement of aging water and wastewater infrastructure	4.59	64
2	Financing for capital improvements	4.46	57
3	Long-term water supply availability	4.44	58
4	Public understanding of the value of water systems and services	4.37	52
5	Public understanding of the value of water resources	4.28	46
6	Watershed/source water protection	4.21	45
7	Cost recovery (pricing water to accurately reflect its true cost)	4.11	36
8	Emergency preparedness	4.05	33
9	Water conservation/efficiency	4.03	37
10	Compliance with future regulations	4.00	33
11	Groundwater management and overuse	4.00	33
12	Compliance with current regulations	3.98	31
13	Drought or periodic water shortages	3.95	34
14	Asset management	3.94	26
15	Acceptance of future water and wastewater rate increases	3.93	27
16	Water loss control	3.93	25
17	Talent attraction and retention	3.90	27
18	Energy use/efficiency and cost	3.88	20
19	Data management	3.88	26
20	Aging workforce/anticipated retirements	3.87	33
21	Improving customer, constituent, and community relationships	3.81	24

(continued)

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Table 8. Issues facing the water industry as ranked by all respondents (n = 1,641) (continued)

Rank	Category	Score (1-5)	% Ranked Critically Important
22	Certification and training	3.80	23
23	Expanding water reuse/reclamation	3.79	31
24	Cyber-security issues	3.77	26
25	Physical security issues	3.61	20
26	Wastewater resource recovery	3.56	16
27	Acceptance of current water and wastewater rates	3.55	14
28	Energy recovery/generation	3.51	14
29	Climate risk and resiliency	3.47	19
30	Price and supply of chemicals	3.44	10
31	Stormwater management and costs	3.41	11
32	Fracking/oil and gas activities	3.34	21
33	Affordability for low-income households	3.24	12
34	Workforce diversity	2.91	7

The most important issue to respondents in 2015, *renewal and replacement of aging water and wastewater infrastructure*, is the same top issue from the last several years of surveys (previously called *the state of water and sewer infrastructure*). A comparison of the top ten issues from 2014 and 2015 is presented in Table 9. New to the top ten in 2015 were *water conservation/efficiency* (current #9, prev. #15) and *compliance with future regulations* (current #10, prev. #14). Dropping out of the top ten from 2014 were groundwater

management and overuse (prev. #6, current #11) and *drought or periodic water shortages* (prev. #8, current #13).

Table 10 shows the most important issues impacting the water industry as ranked by utility and nonutility employees. There were 909 utility employee respondents and 768 nonutility employee respondents. The first six issues are the same for both groups.

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Table 9. Top 10 issues facing the water industry as ranked by all respondents in 2014 and 2015

Rank	2015	2014
1	Renewal and replacement of aging water and wastewater infrastructure	State of water and sewer infrastructure
2	Financing for capital improvements	Long-term water supply availability
3	Long-term water supply availability	Financing for capital improvements
4	Public understanding of the value of water systems and services	Public understanding of the value of water resources
5	Public understanding of the value of water resources	Public understanding of the value of water systems and services
6	Watershed/source water protection	Groundwater management and overuse
7	Cost recovery	Watershed protection
8	Emergency preparedness	Drought or periodic water shortages
9	Water conservation/efficiency	Emergency preparedness
10	Compliance with future regulations	Cost recovery

Table 10. Issues facing the water industry as ranked by utility and nonutility respondents

Rank	Utility Employees	Nonutility Employees
1	Renewal and replacement of aging water and wastewater infrastructure	Renewal and replacement of aging water and wastewater infrastructure
2	Financing for capital improvements	Financing for capital improvements
3	Long-term water supply availability	Long-term water supply availability
4	Public understanding of the value of water systems and services	Public understanding of the value of water systems and services
5	Public understanding of the value of water resources	Public understanding of the value of water resources
6	Watershed/source water protection	Watershed/source water protection
7	Cost recovery (pricing water to accurately reflect its true cost)	Water conservation/efficiency
8	Emergency preparedness	Groundwater management and overuse
9	Compliance with current regulations	Cost recovery (pricing water to accurately reflect its true cost)
10	Compliance with future regulations	Drought or periodic water shortages

System Stewardship

Of the top 10 issues facing the water industry identified in the 2015 SOTWI survey, half of them including four of the top five pertain to system stewardship or how water and wastewater systems are operated, maintained, and replaced. Renewing and replacing aging infrastructure, financing for capital improvements, and cost recovery (i.e., pricing water to accurately reflect its true cost) are important financial aspects of system stewardship and have long been a major concern in the industry. These issues continue to be important because many water and wastewater systems built and financed by previous generations are approaching or have exceeded their useful lives. Because of past budgeting approaches that may have included inadequate revenues to fully cover costs, some municipal utilities have deferred necessary maintenance and replacement. Even systems that have acted as good stewards by planning for the renewal or replacement of their assets can sometimes find it difficult to secure reasonable funding for capital projects and/or to win public support for these necessary efforts.

AWWA maintains that the public can best be provided water services by self-sustaining enterprises that are adequately financed with rates and charges based on sound accounting, engineering, financial, and economic principles. Revenues from service charges, user rates, and capital charges (e.g., impact fees and system development charges) should be sufficient to enable utilities to provide for the full cost of service including:

- Annual operation and maintenance expenses
- Capital costs (e.g., debt service and other capital outlays)
- Adequate working capital and required reserves

Full-cost pricing, i.e., charging rates and fees that reflect the full cost of providing water and/or wastewater services, should include renewal and replacement costs for treatment, storage, distribution, and collection systems. Some utilities have previously kept their rates low by minimizing or ignoring these costs; however, as the useful lives of their systems draw to a close, current managers and the communities they serve are forced to address these costs, sometimes through painful and unexpected rate increases. Issues related to equity and affordability must be considered as rates are adjusted, and each system has its own unique rate-setting challenges based on location and history.

To understand the current state of full-cost pricing for utilities, all 2015 SOTWI study participants were asked “In general, how able are water and wastewater utilities to currently cover the full cost of providing service, including infrastructure renewal and replacement and expansion needs, through customer rates and fees?” To anticipate how circumstances may change in the future, participants were also asked the following question: “Given the future infrastructure needs for system renewal and replacement and expansion, how able will water and wastewater utilities be to meet the full cost of providing service through customer rates and fees?” The responses to these questions are shown in Figure 12.

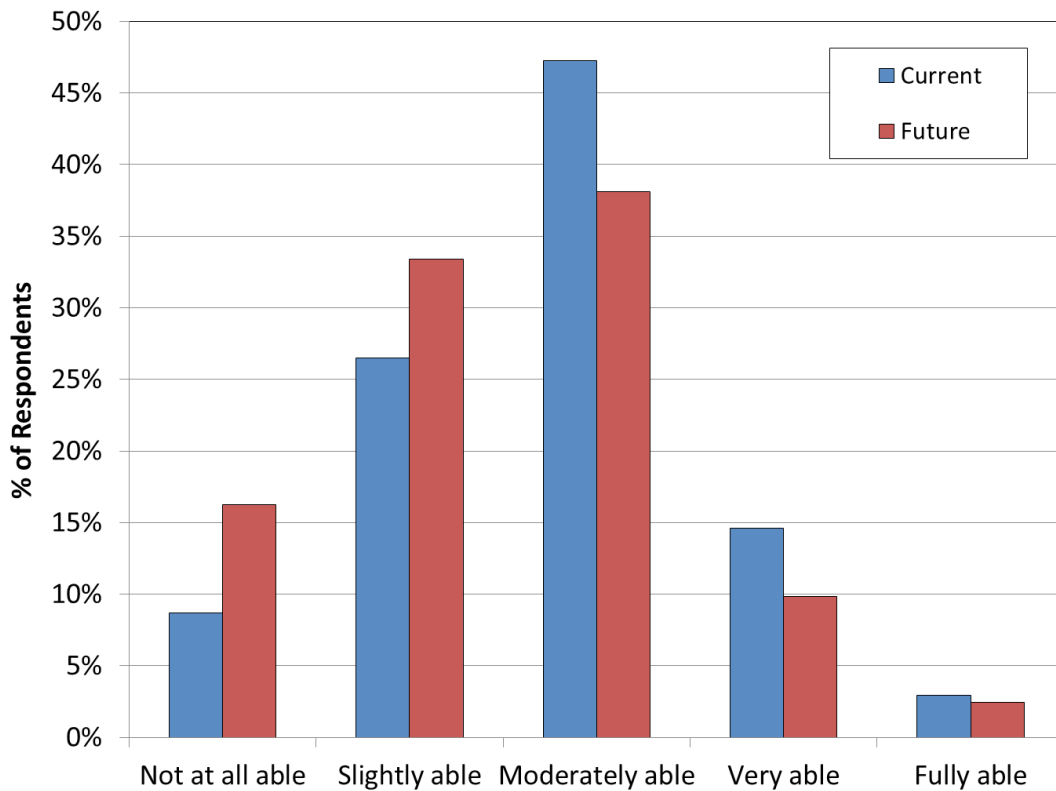


Figure 12. Responses (as % of total) from all participants regarding whether water and waste water utilities can cover the full cost of providing service (n = 1,507)

As shown in Figure 12, 9 percent of respondents (up from 8 percent in 2014) felt that water and wastewater utilities are not at all able to cover the full cost of providing service. More striking, 16 percent of respondents (up from 15 percent in 2014) are concerned that utilities will not be able to cover the full cost of providing service in the future. Only 3 percent of respondents felt that utilities are currently able to cover the full cost of providing service, and only 2 percent believed they would be able to do so in the future (both down from 4 percent and 3 percent, respectively, in 2014). Overall, respondents clearly feel that full-cost pricing is currently a challenge and one that will increase in magnitude moving forward.

Full-cost pricing is in many ways a very local issue, so to explore the issue at this level utility personnel were asked, “Is *your utility* currently able to cover the full cost of providing service(s), including infrastructure renewal and replacement and expansion needs, through customer rates and fees?” They were also asked, “Given *your utility’s* future infrastructure needs for renewal and replacement and expansion, do you think *your utility* will be able to meet the full cost of providing service(s) through customer rates and fees?” Responses are provided in Figure 13.

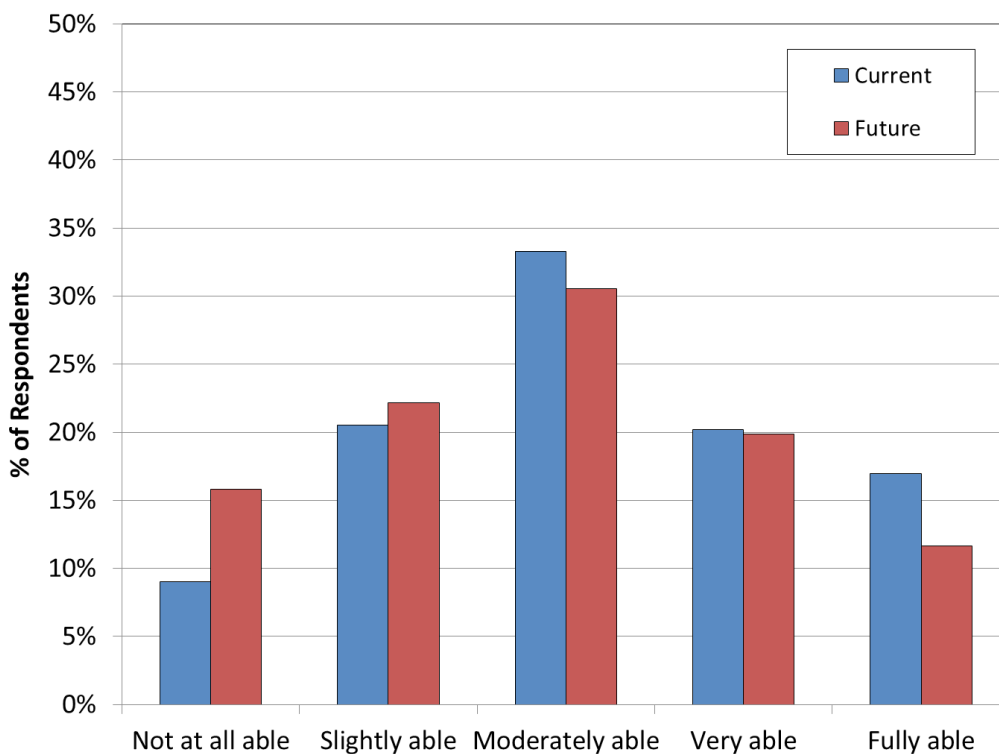


Figure 13. Responses (as % of total) from utility personnel regarding whether the utility they work for can cover the full cost of providing service (n = 644)

As shown in Figure 13, the results from utility employees is more positive for their own utility than the general perception of all utilities captured in Figure 12; however, the results are not exactly encouraging. Combining those who are not at all able and those that are slightly able, 30 percent of utilities are currently struggling to implement full-cost pricing, up from 28 percent in 2014. In addition, 38 percent of respondents think they will struggle to cover the full cost of service in the future, up from 35 percent in 2014.

From the results in Figure 13, the most notable is that 9 percent of respondents felt that their utilities were currently not at all able to cover the full cost of providing service, and that figure increases to 16 percent for the future. Only 17 percent of respondents felt that their utilities were currently fully able to cover the cost of providing service through rates and fees, a percentage expected to decrease to 12 percent

in the future. These results clearly demonstrate the industry feels there is a gap between the financial needs of water and wastewater systems and the means to pay for these services through rates and fees.

To understand the importance of the various elements that comprise infrastructure renewal and replacement challenges, all participants were asked how they would rate several options on a scale of 1 to 5. As shown in Table 11, the most important issue was “establishing and following a financial policy for capital reinvestment,” with 43 percent of respondents rating this issue as critical (i.e., 5 out of 5). There appears to be a strong grouping of the first seven categories, which were all ranked critically important by more than 30 percent of respondents. Several of these issues are centered on communication, an issue that is discussed more fully in later sections of this report.

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Table 11. R&R Challenges as ranked by 2015 SOTWI respondents (n = 1,474)

Rank	Category	Score (1-5)	% Ranked Critically Important
1	Establishing and following a financial policy for capital reinvestment	4.31	43
2	Prioritizing R&R needs	4.24	40
3	Justifying R&R programs to ratepayers	4.24	42
4	Justifying R&R programs to oversight bodies (board, council, etc.)	4.22	42
5	Establishing and maintaining specific R&R reserves	4.20	37
6	Coordinating R&R with other activities	4.12	37
7	Developing/implementing asset management programs	4.00	31
8	Defining appropriate levels of service	3.75	19
9	Obtaining R&R funding via federal, state, or territorial grants	3.73	25
10	Obtaining R&R funding via bonds	3.71	19
11	Addressing declining water sales	3.68	22
12	Obtaining R&R funding via federal, state, or territorial loans	3.61	19
13	Pay-as-you-go R&R funding	3.29	13
14	Obtaining R&R funding involving public-private partnerships	3.25	11
15	Obtaining R&R funding by taxation (e.g., property taxes)	2.95	8

To explore the current water and wastewater financing environment, utility personnel were asked “If you can make an assessment, how would you rate your utility’s current access to capital for financing infrastructure renewal/replacement projects?” As shown in Figure 14, 53 percent of respondents reported that their utility’s access to capital was as good or better than at any time in the last five years, up from 46 percent in 2014. Only 11 percent reported

that their utility’s access to capital was as bad or worse than at any time in the last five years, down from 17 percent in 2014. Because interest rates are currently low and may remain so for some time (at least in the U.S.), these results show that in general the capital markets for financing water industry projects are relatively good and trending positively in comparison to previous years.

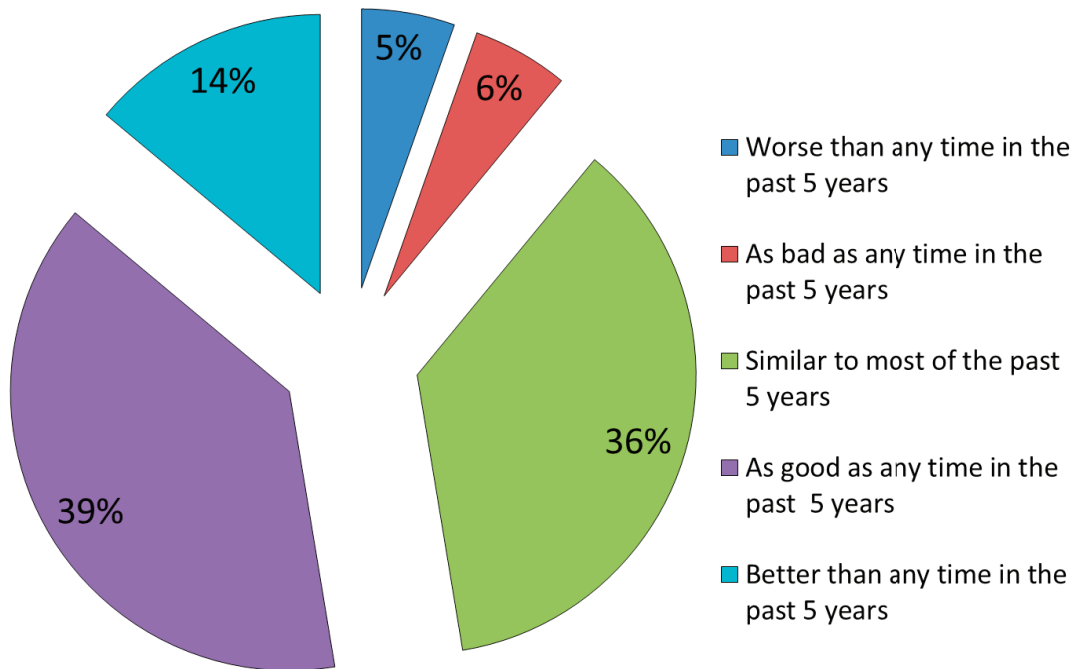


Figure 14. Responses (as % of total) from utility personnel regarding their utility's access to capital (n = 574)

As was intended with the introduction of more efficient appliances and water conservation education, residential and industrial water demands (i.e., public supply) have been declining in the United States (AWE 2012). This important accomplishment is reflected in the estimated U.S. water-use data shown in Figure 8, which shows relatively constant water withdrawals going back to 1975 while the population steadily grew over this same period. Public water supply, which made up only 12 percent of the total water used in the United States actually declined 5 percent from 2005 to 2010 to 42 billion gallons per day (BGD) of the total 355 BGD. In terms of trends, water for public supply has remained in a range of 35 to 45 BGD since 1985 even as the population has increased by approximately 70 million people during the same time period.

Although more efficient water use is a major goal of the industry, in areas where customer growth is slow or nonexistent, declining water use decreases operating revenue and impacts

how costs are recovered through rates and charges. In some cases, utilities must explain to customers that their rates must go up even as their community uses the same or less water. This is a clear example of the need for ongoing and effective communication between utilities and their customers and community members so that all can understand a system's regular operations, maintenance, and infrastructure R&R needs.

In order to explore this issue, utility staff members were asked a series of questions about their utilities' trends in water sales. Results regarding trends in *total water sales* as shown in Figure 15 reveal that 43 percent of utility respondents reported declining total water sales (either a >10 year or <10 year trend) while 29 percent of respondents reported their total water sales were flat or little changed in the last 10 years. Taken together, this means that three-quarters of utilities are facing the issues associated with low or declining water demand. Only 23 percent of utility personnel reported their utility

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saw an increasing trend in total water sales (either a >10 year or <10 year trend), while 5 percent reported no trend at all.

Results from utilities regarding their trends in *per account water sales* are shown in Figure 16. Even though the results for total water sales were dramatic, 47 percent of utility respondents reported their utility was experiencing declining per account water sales (either a

>10 year or <10 year trend) while 33 percent of respondents reported flat or little change in per account water sales. This means that 80 percent of utility respondents must address issues associated with low or declining water demand on a per account basis. Only 14 percent of utilities reported increasing per account water sales (either a >10 year or <10 year trend), while 6 percent reported no trend at all.

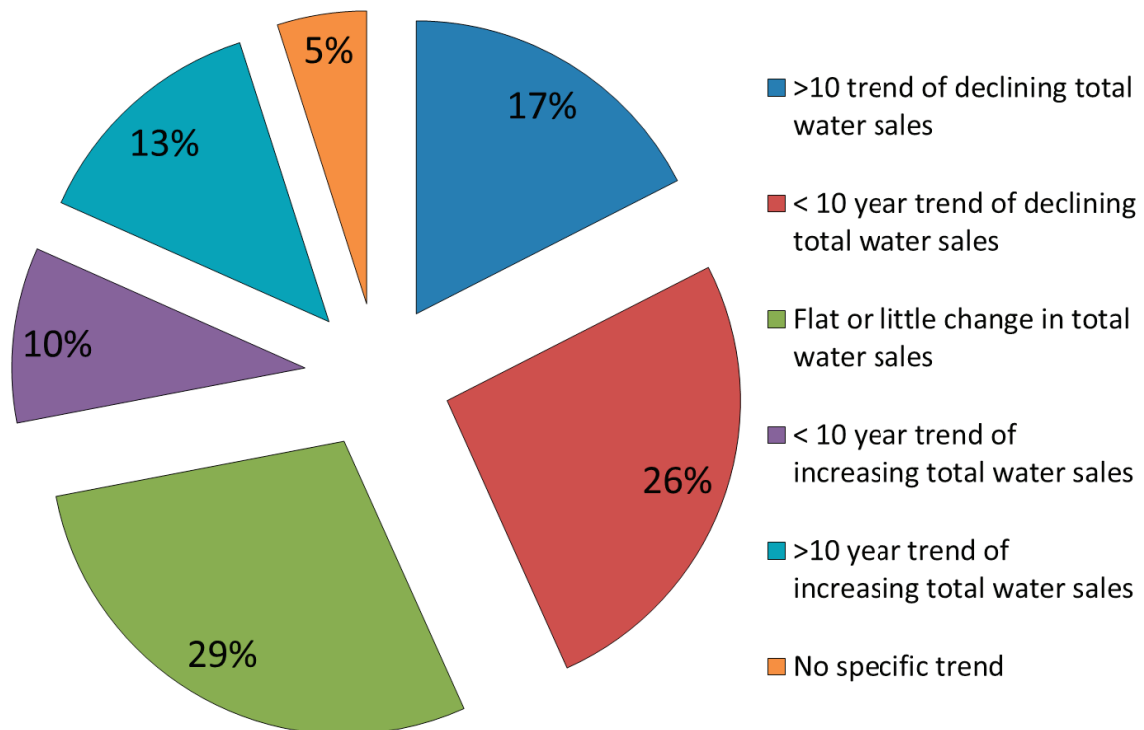


Figure 15. Responses (as % of total) from utility personnel regarding their utility's trend in total water sales (n = 589)

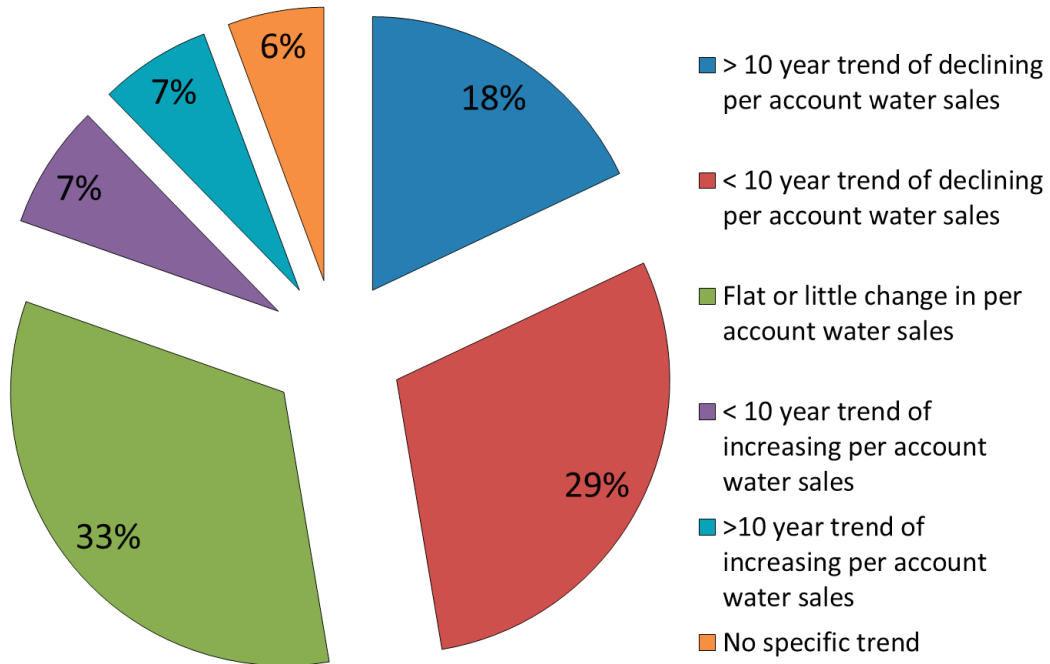


Figure 16. Responses (as % of total) from utility personnel regarding their utility's trend in per account water sales (n = 545)

As mentioned previously, declining water sales can impact a utility's approach to cost recovery (the #7 overall issue from the 2015 SOTWI survey). Cost recovery refers to pricing water and wastewater services to accurately reflect their true costs. Utility staff members were asked about how their utilities are responding to their cost recovery needs in the face of changing water sales and consumption patterns; results are shown in Figure 17. For this question, utilities could respond to multiple approaches. The most used options from this group were as follows: shifting more of the cost recovery from consumption-based fees to fixed fees within the rate structure (25 percent), changes in growth-related fees, i.e., system development charges, impact fees, or capacity charges (19 percent), shifting rate design to increasing block-rate structure (15 percent), and increasing financial reserves (13 percent). Only 9 percent of the total responses indicated no changes were needed.

As water and wastewater utilities deal with system stewardship issues, some are beginning to consider alternative management approaches including public-private partnerships (P3), consolidation, and privatization. Figure 18 shows the results from utility employees regarding whether their utilities are considering or implementing any of these options. More than 80 percent of utility staff members reported their utilities are not considering any of these options; however, 20 percent of utility respondents reported their utilities are considering, planning to use, or are already involved with P3s. Also shown in Figure 18, 19 percent of utility respondents reported their utilities are considering, planning to use or are already involved with consolidation while 12 percent are exploring or have already implemented privatization.

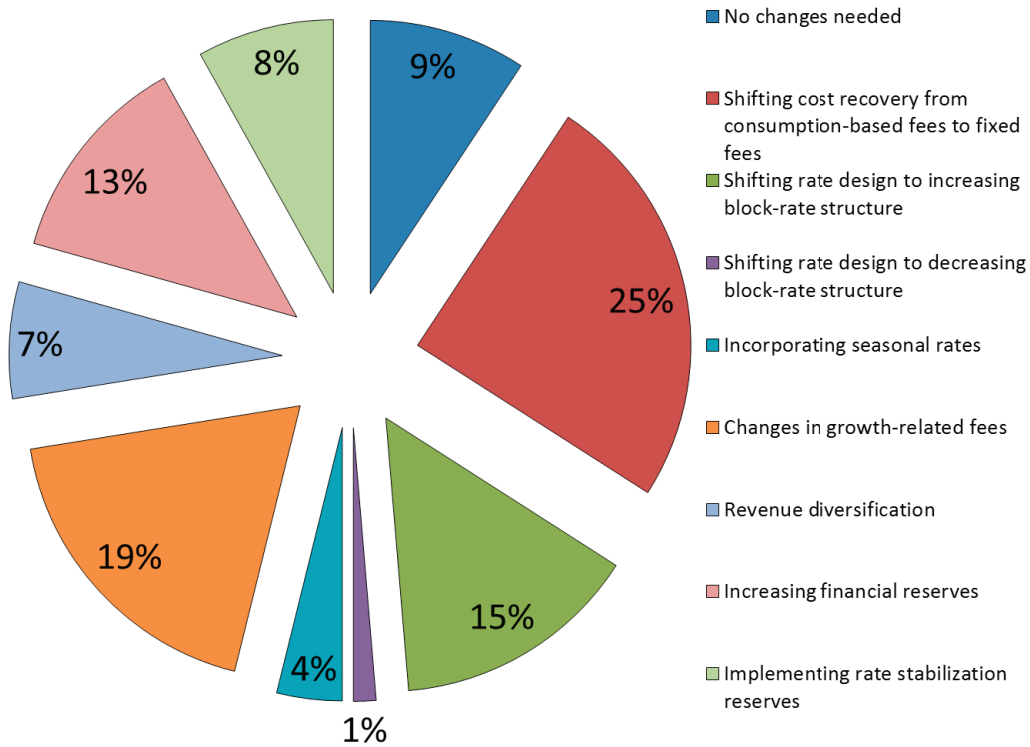


Figure 17. Responses (as % of total) from utility personnel regarding how their utilities are responding cost recovery needs (n = 828 total responses)

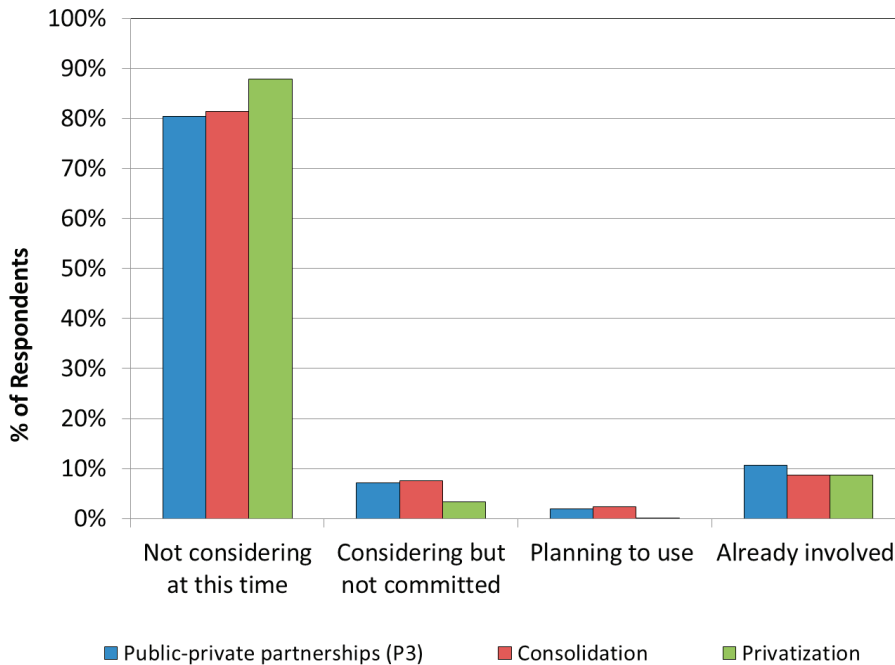


Figure 18. Responses (as % of total) from utility personnel regarding how their utilities are approaching public-private partnerships, consolidation, and privatization (n = 519)

Water and wastewater system managers and other community leaders face the challenge of optimizing water and wastewater infrastructure investments, balancing system upgrades to maintain service life goals and meet regulatory requirements, and trying to anticipate new technologies and forthcoming regulations. This requires significant planning and coordination from all areas of the utility, with financial professionals and engineers hopefully working together during the process. Buy-in and participation from local government and community stakeholders where needed are important to include.

Systems designed for past water quality and water availability conditions need to consider and plan for future conditions that include greater uncertainty. Many previous infrastructure projects received external subsidies that are not available in the current political environment. Because of the long-term nature of the necessary investments, utilities need to adopt a forward-looking and holistic approach to system stewardship.

As water infrastructure is renewed or replaced, mutually beneficial opportunities may arise to introduce environment-enhancing solutions. In conjunction with traditionally engineered solutions, the use of green infrastructure, i.e., systems that employ natural hydrologic features, can potentially provide additional environmental and community advantages, especially in the area of stormwater mitigation.

Water Resources Management

Respondents highly rated several issues related to water resources management in the 2015 SOTWI survey, including long-term water supply availability (#3 most important issue, see Table 8), watershed/source water protection (#6 most important issue), water conservation/efficiency (#9 most important issue), groundwater management and overuse (#11 most important issue), and drought or periodic water shortages (#13 most important issue).

Long-Term Water Supply Availability

The current main challenge of water resource management, namely long-term water supply availability, is the result of the full allocation, and in some cases over-allocation, of local water resources in areas with growing populations. Communities need to establish how much water they have, how much water they need, and how they will meet these future needs. Some areas are reaching the limits of their current supply options and are seeking additional water wherever it can be found, e.g., conservation, desalination, and reuse. In addition, some already water-limited areas may also be susceptible to further water stress from climate change.

In an attempt to quantify the issue of long-term water supply availability, utility personnel were asked the question “How prepared do you think your utility will be to meet its long-term water supply needs?” The summary presented in Figure 19 shows that 11 percent of utility personnel indicated their utility will be challenged to meet anticipated long-term water supply needs (i.e., not-at-all or only-slightly prepared), up from 10 percent in 2014. In addition, 57 percent of respondents indicated that their utilities are very or fully prepared, down from 59 percent in 2014.

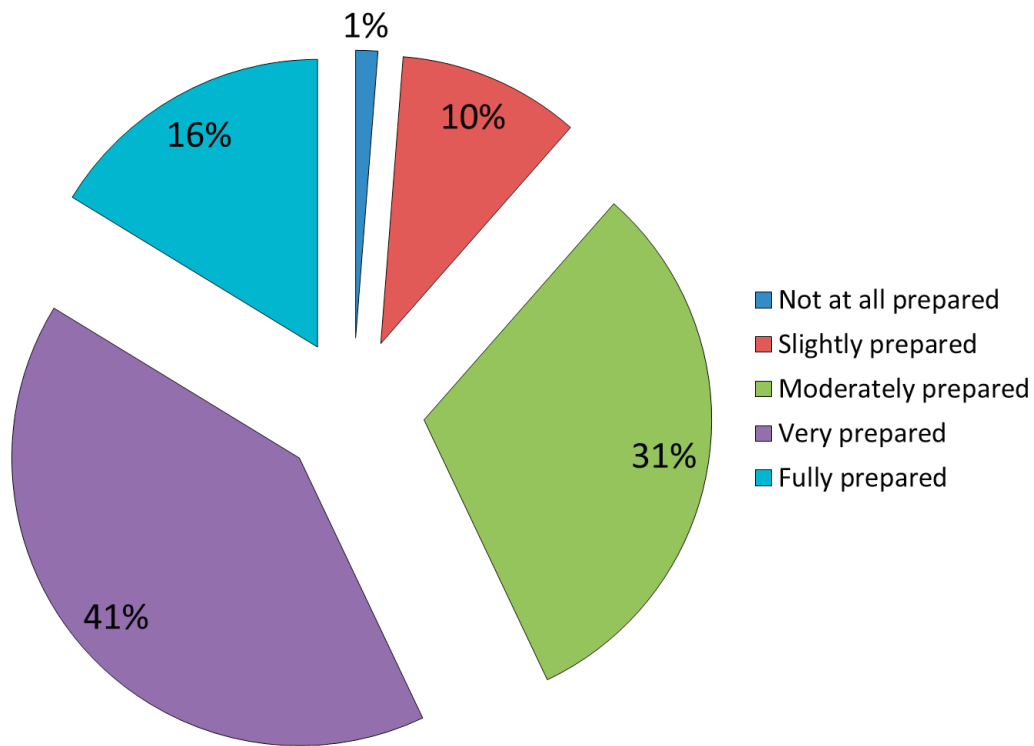


Figure 19. Responses from utility employees regarding how prepared their utility is to meet its long-term water supply needs (n = 645)

Drought/Water Shortages

In contrast to long-term water supply, which over time can be impacted by climate change, near-term water supply needs can be dramatically affected by water shortages resulting from drought. Following several dry years, many areas in North America may again face drought conditions in 2015. This is likely why “drought or periodic water shortages” was the #13 most important issue identified by the 2015 SOTWI survey. To gauge the extent of water shortages, utility personnel were asked the following questions:

- *How many years in the last decade has your utility implemented voluntary water restrictions?*
- *How many years in the last decade has your utility implemented mandatory water restrictions?*

Responses from utility staff members summarized in Figure 20 reveal that the majority of respondents’ utilities have had either 0 or 1 period of voluntary restrictions (58 percent), and either 0 or 1 period of mandatory restrictions (77 percent). Surprisingly, 9 percent of respondents reported their utility has had voluntary restrictions in each of the last 10 years, and 7 percent reported their utility has had mandatory restrictions in each of the last 10 years.

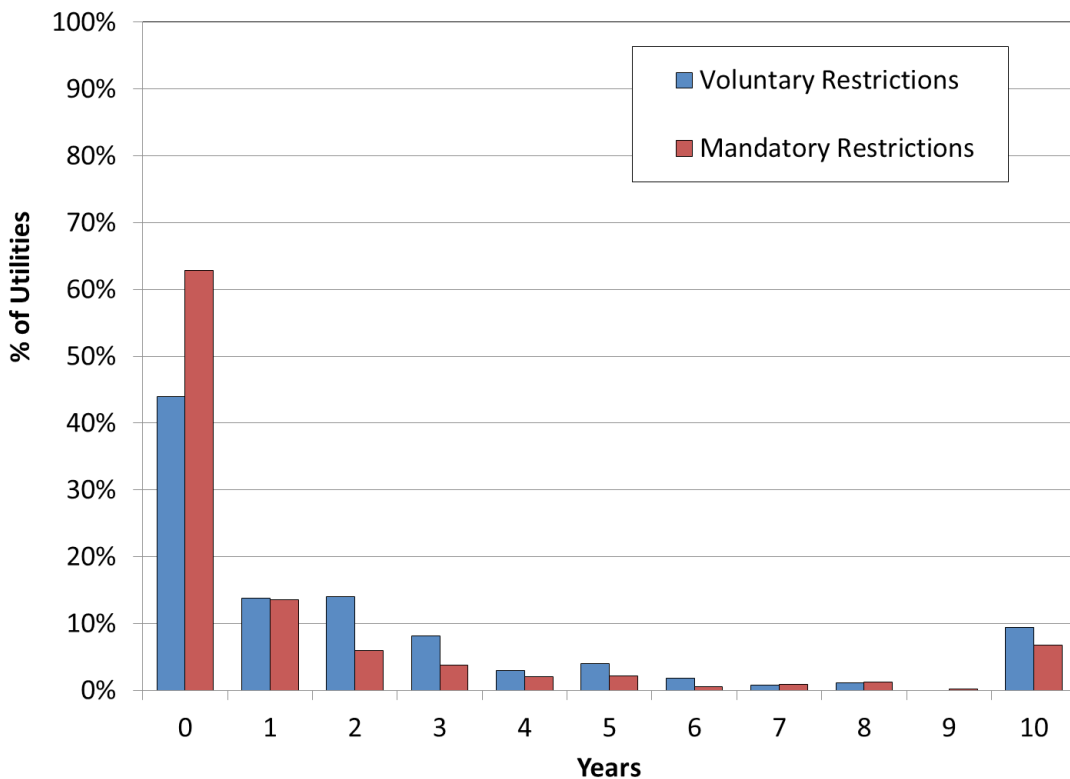


Figure 20. Responses from utility employees regarding how prepared their utility is to meet its long-term water supply needs (n = 543)

To understand the state of water shortage preparedness amongst utilities, staff members were asked “Does your utility have a drought management or water shortage contingency plan?” The responses summarized in Figure 21 reveal that 80 percent of utility respondents indicated their utility had such a plan or that one was in development.

Surprisingly, 20 percent of respondents reported their utility did not have a drought management or water shortage contingency plan, up from 15 percent in 2014. Communities typically do not consider the potential impacts of a water shortage until one seems likely to occur. In addition to water supply issues, drought can

also affect water quality when drought (where impacts can develop) is followed by flooding (where those impacts are realized).

As communities evaluate their water shortage preparedness, a better understanding of a regions sustainable water supply can be evaluated. In addition to reliability during water shortages, utilities and the communities they serve can also evaluate and/or determine their policies and practices for water conservation and alternative water supplies such as desalination of brackish groundwater or seawater, non-potable reuse, potable reuse, and stormwater capture and reuse.

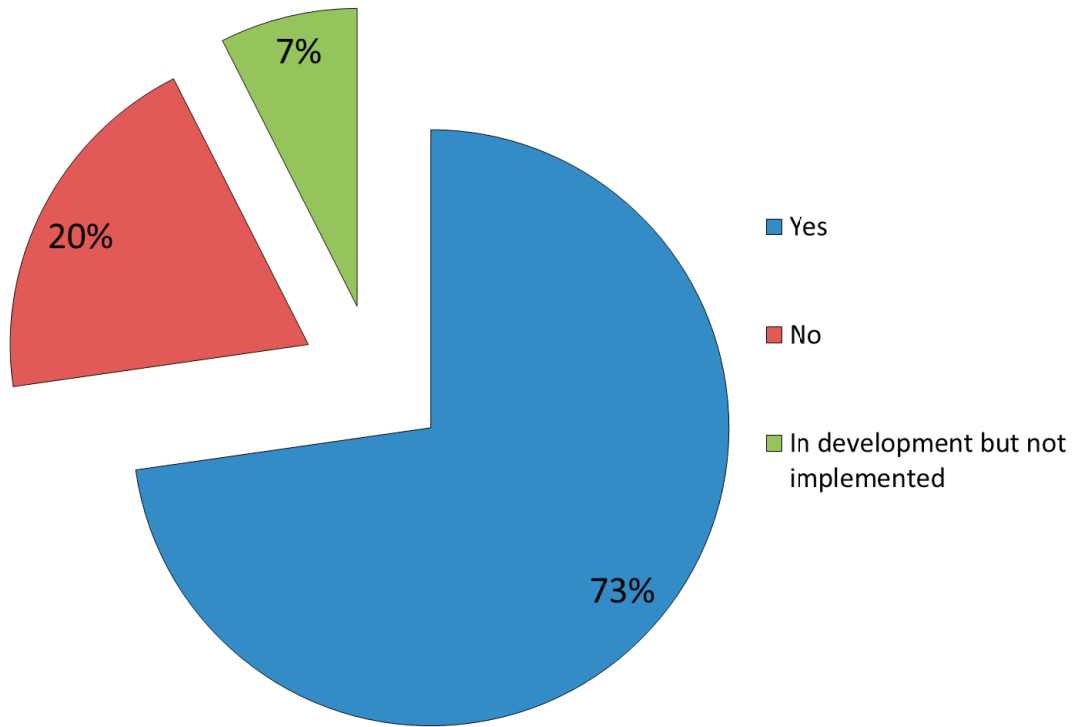


Figure 21. Responses from utility personnel regarding whether their utility has a drought management or water shortage contingency plan (n = 576)

Water Conservation

A common public perception is that water conservation means restricting or curtailing customer use as a temporary response to drought. Though water use restrictions are a useful short-term drought management tool, most utility-sponsored water conservation programs emphasize lasting long-term improvements in water use efficiency while maintaining quality of life standards. Water conservation, very simply, is doing more with less, not doing without (AWWA 2006).

To understand the status of conservation planning amongst utilities, staff members were asked if their utilities have water conservation programs. The responses summarized in Figure 22 show that the majority of respondents' utilities have a water conservation program (72 percent), with an additional 8 percent reporting their plans are in development. Only 20 percent of respondents reported their utility did not have a water conservation program.

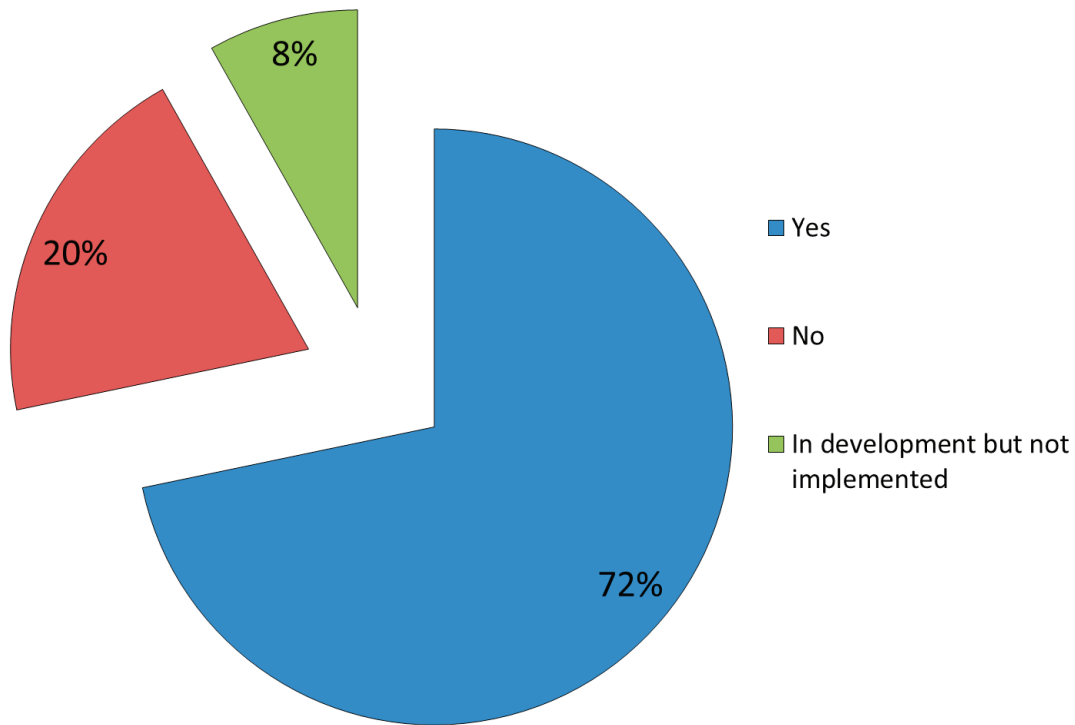


Figure 22. Responses from utility personnel regarding whether their utility has a water conservation program (n = 626)

Desalination

In addition to water conservation, another non-traditional source of water supply is seawater or brackish groundwater. Utility participants were asked if their utilities were considering desalination of either brackish groundwater or seawater to augment existing drinking water supplies. Of the 510 responses, 10 percent responded that their utility is considering some sort of desalination project while 2.5 percent responded that their utility currently has something in development.

Groundwater Management

Groundwater management and overuse was identified as the #11 most important issue in the 2015 SOTWI survey (see Table 8). As a result of potentially diminishing levels of recharge, more use of groundwater in response to

drought and surface water shortages, and the varying regulatory requirements for groundwater use, groundwater management issues are expected to become more significant in the immediate future.

To understand which aspects are the most important, all participants were asked to rate the importance of several groundwater management issues on a scale of 1 (unimportant) to 5 (critically important). The results shown in Table 12 reveal that, of the options presented, declining water levels were the greatest concern with 41 percent of respondents who considered this water supply issue critical. The next most important issue, watershed/groundwater protection, addresses concerns with water quality. The remaining groundwater management issues presented in Table 12 revolve around the policies and practices that impact groundwater supplies.

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Table 12. Groundwater management challenges as ranked by 2015 SOTWI respondents (n = 1,382)

Rank	Category	Score	% Ranked Critically Important
1	Declining groundwater levels	4.09	41
2	Watershed/groundwater protection	4.01	34
3	Groundwater regulations	3.82	26
4	Agricultural use of groundwater	3.79	27
5	Monitoring and reporting groundwater withdrawals	3.75	23
6	Restrictions on groundwater pumping	3.72	24
7	Oil and gas activities	3.63	28
8	Reclaimed water for groundwater recharge	3.55	17
9	Groundwater pricing	3.35	11

Utility personnel were asked “Is your utility currently facing any issues related to oil and gas activities including fracking (select all that apply)?” The results shown in Figure 23 show that the vast majority of respondents reported no issues at their utilities (78 percent). The two of

the most significant issues associated with oil and gas activities are concerned with water quality protection, specifically groundwater contamination (7 percent) and surface water contamination.

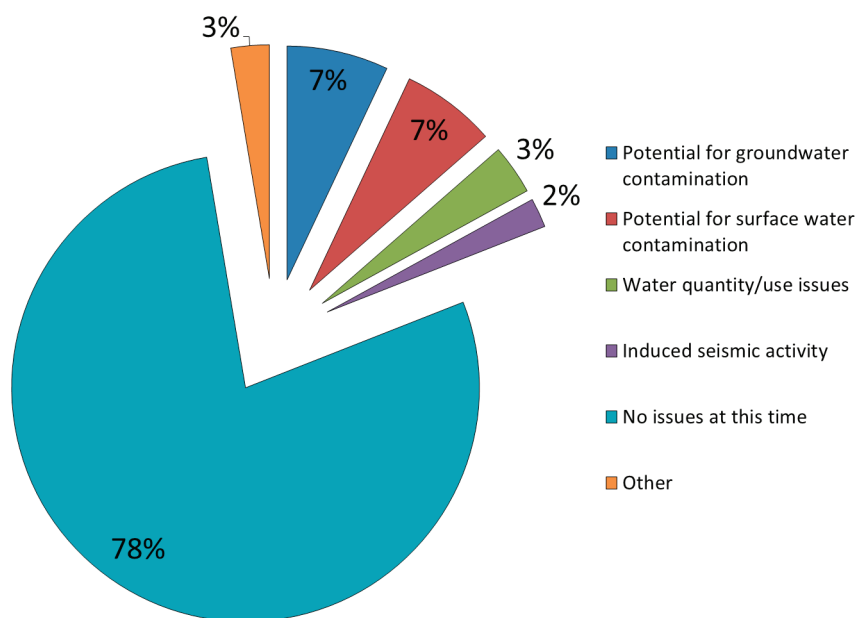


Figure 23. Responses from utility SOWTI survey participants regarding whether their utility is currently facing any issues related to oil and gas activities including fracking (n = 446)

Climate Change

For the water industry, potential outcomes of climate change include increasing temperatures/increasing evaporation, changing precipitation patterns (frequency, duration, and intensity), changing patterns of extreme weather events, and rising sea levels. Taken separately or in combination, these phenomena can result in the following challenges for the water industry:

- Degraded water quality and subsequent treatment challenges
- Reduced snowpack and groundwater recharge
- Stormwater management challenges
- Coastal flooding from increased sea level and/or storm surges
- Saltwater intrusion into coastal aquifers
- Increased frequency, duration, and extent of floods, droughts, and wildfires
- Loss of wetlands and coastal ecosystems
- Increased risk to infrastructure (at the surface and underground)

All 2015 SOTWI survey participants were asked the following question: “Overall, how prepared do you think the water sector is to address any impacts associated with potential climate variability?” As shown in Figure 24, the greatest number of respondents thought the water industry is moderately prepared to address climate change (44 percent). Somewhat troubling, 47 percent thought the industry is not at all or only slightly prepared to address climate change impacts, while only 1 percent thought the water industry is fully prepared.

To better understand the cascading consequences of potential climate change outcomes, water managers will need an expanded information base. They must be properly prepared to make informed decisions under uncertain conditions to reduce vulnerabilities. The development of contingency and energy management plans can address a wide range of climate scenarios, and such comprehensive planning efforts can lead to recommendations on water supply scenarios and related pricing strategies (WUCA 2010). However, managers also need better approaches that incorporate downscaled global climate model results into regional and local water utility planning.

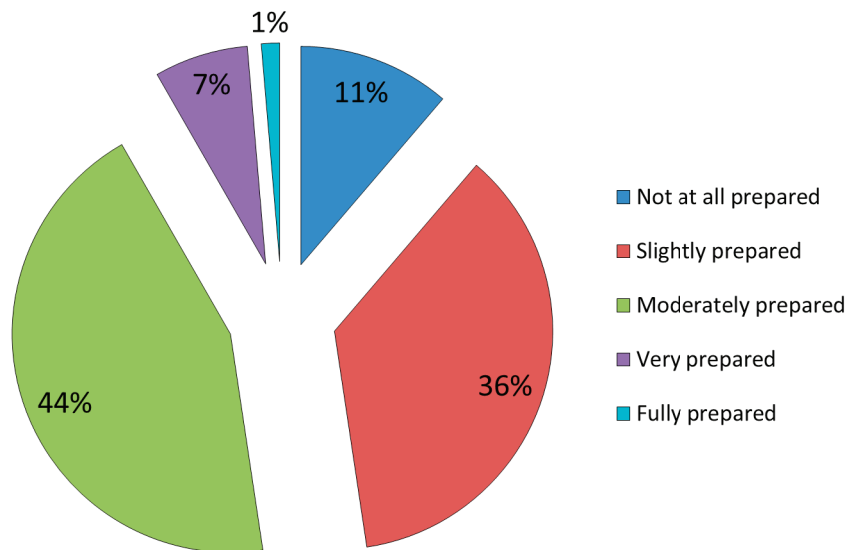


Figure 24. Responses from all SOTWI survey participants regarding how prepared the water sector is to address any impacts associated with potential climate variability (n = 1,411)

Utility personnel were asked “Does your utility include potential impacts from climate variability in your risk management or planning processes?” Responses are shown in Figure 25. The majority of utility personnel (54 percent) responded that their utilities do not include potential impacts from climate variability in their risk management or planning processes. However, 46 percent responded that their utility does include climate change in their planning processes (up from 25 percent in 2014).

Water Reuse

As water supplies become more strained and water-scarce areas look to meet the demands of development, shortages from droughts, or ecological imperatives, utilities may consider demand-side options such as increased conservation efforts, restrictions, or improving water loss control. On the supply side, the use of reclaimed water can significantly reduce the demands placed on limited conventional water

supplies. The value of high-quality reclaimed water, properly treated to appropriate standards, can serve as a sustainable supplement to a region’s water supply portfolio. Reclaiming water from wastewater effluent for indirect potable uses such as replenishing drinking water sources, maintaining aquifer levels or increasing stream flow may be viable options with appropriate levels of treatment and safeguards to protect public health. A small but increasing number of utilities are considering direct potable reuse.

Many rivers have changed over the years as upstream discharges of wastewater effluent have resulted in *unplanned* indirect potable reuse for downstream users, many of whom rely on conventional filtration and disinfection for public health protection. Discharge permits intended to make rivers and streams “fishable and swimmable” do not typically account for downstream potable water treatment requirements.

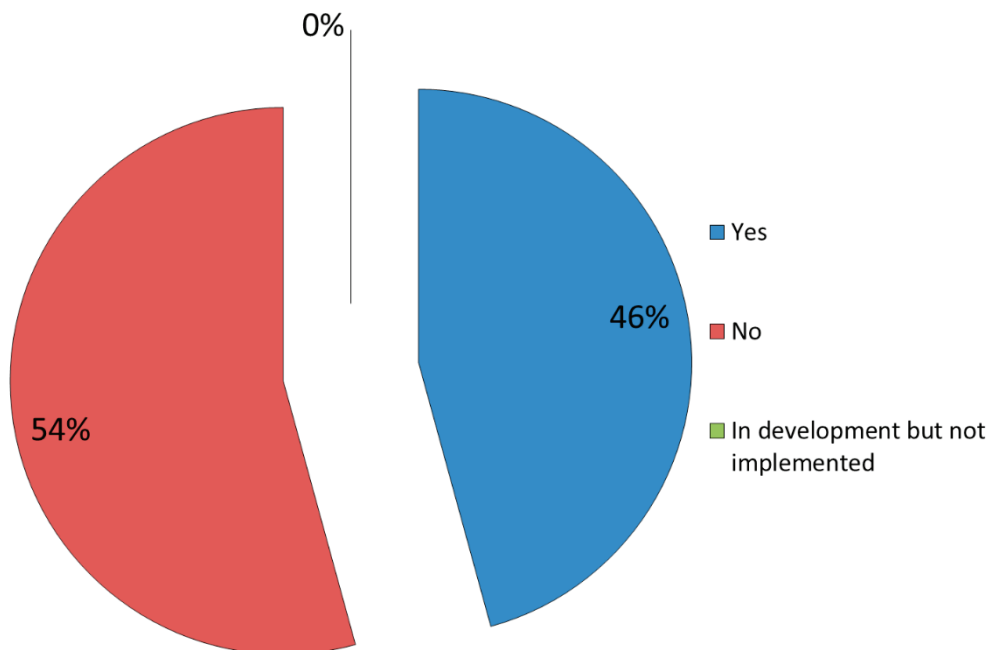


Figure 25. Responses from utility SOWTI survey participants regarding whether their utility includes potential impacts from climate variability in risk management or planning processes (n = 446)

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To better understand the current status of water reuse in North America, utility staff members were asked if their utilities are considering any forms of reuse; the specific questions were as follows:

- *Is your utility considering nonpotable reuse to augment existing irrigation water supplies?*
- *Is your utility considering indirect potable reuse to augment existing drinking water supplies?*
- *Is your utility considering direct potable reuse to augment existing drinking water supplies?*

A summary of the responses is shown in Figure 26.

Figure 26 shows that the majority of utility personnel responded that their utilities are not considering any form of reuse. Of these reuse options, nonpotable reuse to augment irrigation was the most popular option with 19 percent of utility respondents reporting their utility was

considering it, and 5 percent reporting plans were already in development. Thirteen percent of utility respondents reported their utility was considering indirect potable reuse, and 3.2 percent reported plans were already in development. For direct potable reuse, 7 percent of utility respondents reported their utility was considering it, and 2.6 percent reporting plans were already in development.

In addition to reclamation of wastewater, several utilities have explored capturing, treating, and reusing stormwater specifically to augment potable water supplies. Utility participants were asked if their utilities were considering desalination of either brackish groundwater or seawater to augment existing drinking water supplies. Of the 527 responses, 7.6 percent responded that their utility is considering a stormwater reuse project while 2.7 percent responded that their utility currently has something in development.

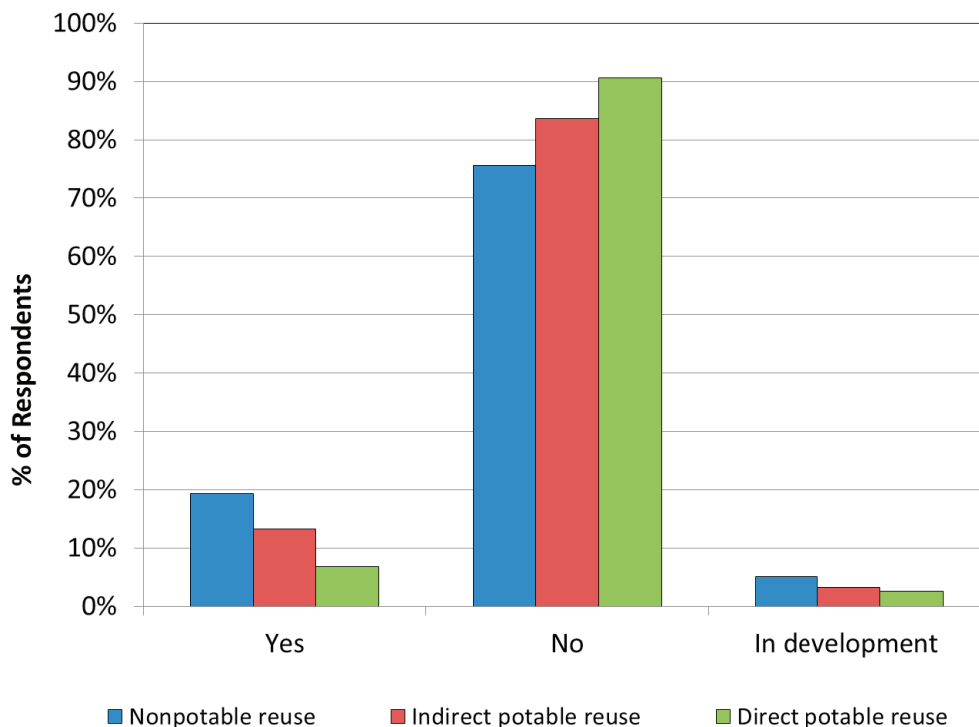


Figure 26. Responses from utility employees regarding whether their utility is considering nonpotable reuse, indirect potable reuse, or direct potable reuse to augment existing water supplies (n = 492-544)

Value of Water (Resources/ Systems and Services)

Results of the 2015 SOTWI survey highlight the industry's concern over the public's understanding of water systems and resources (the #4 and #5 most important issues in 2015, respectively). The water industry has acted collectively to inform the public of the value of water services and resources for decades. However, while the concepts of safeguarding public health, ensuring customer satisfaction, and protecting the environment are popular, the public (or a vocal minority) frequently does not support the required levels of funding to support safe and reliable water service. Effectively communicating infrastructure challenges to customers and key decision makers is vital, yet the industry has historically struggled in this area.

To better understand the lack of understanding of the value of water resources and systems from various subgroups, the 2015 SOTWI survey asked all study participants to rate the understanding of the following groups on a scale of 1 (very poor) to 5 (very good):

- General public
- Residential customers
- Nonresidential customers (industrial/commercial/institutional)
- Public officials
- Media

The specific questions asked were:

- *How would you rate the following group's understanding of the value of water resources (i.e., the various forms of water and its sources)?*
- *How would you rate the following group's understanding of the value of water systems and services (i.e., the physical infrastructure and the various activities required to provide water and wastewater services)?*

The results presented in Figure 27 (systems and services) and Figure 28 (water resources) reveal that water professionals thought each of the five groups had a worse understanding of water systems and services in comparison to their understanding of water resources. Respondents felt that public officials had the best overall understanding of both systems and services and resources while nonresidential customers (industrial/commercial/institutional) had the second best grasp of these issues. Media was third. Respondents felt that the general public had the worst understanding of water systems and services and resources with residential customers close behind.

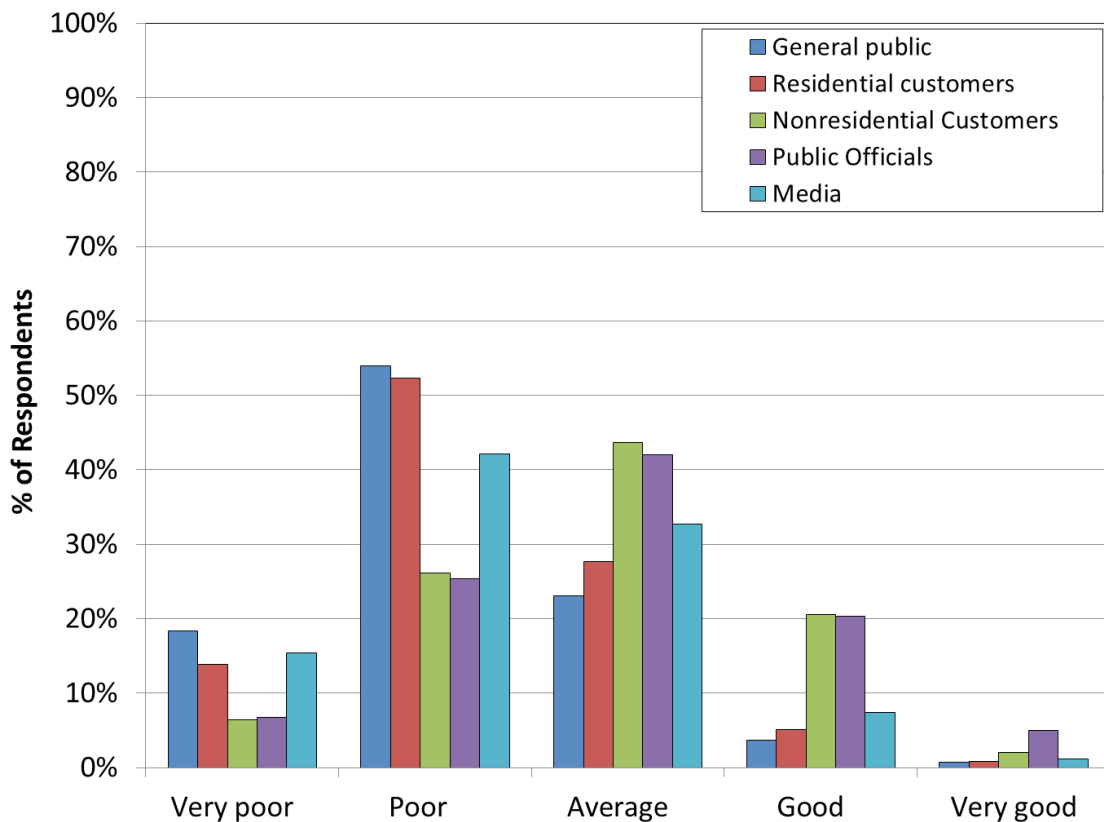


Figure 27. Water industry professionals' perceptions of various groups understanding of the value of water systems and services (n=1,621)

Based on these findings, 72 percent of respondents felt the general public has a poor or very poor understanding of water systems and services (up from 70 percent in 2014), and 61 percent felt the general public has a poor or very poor understanding of water resources (up from 59 percent in 2014). Similarly, 66 percent of respondents felt residential customers have a poor or very poor understanding of water systems and services (up from 65 percent in 2014), while 59 percent felt the general public has a poor or very poor understanding of water resources (up from 56 percent in 2014).

None of these results or short-term trends is positive for water utilities, which need public support to effectively manage systems and resources. Utility leaders often face a difficult communication challenge as they explain their systems' needs, the associated costs, and the way these costs are balanced equitably through rate structures and financing plans. If the general public is unaware of the value of water systems and the cost of maintaining them, public officials may be less willing to support necessary investments – and associated rate increases – for fear of losing constituent support.

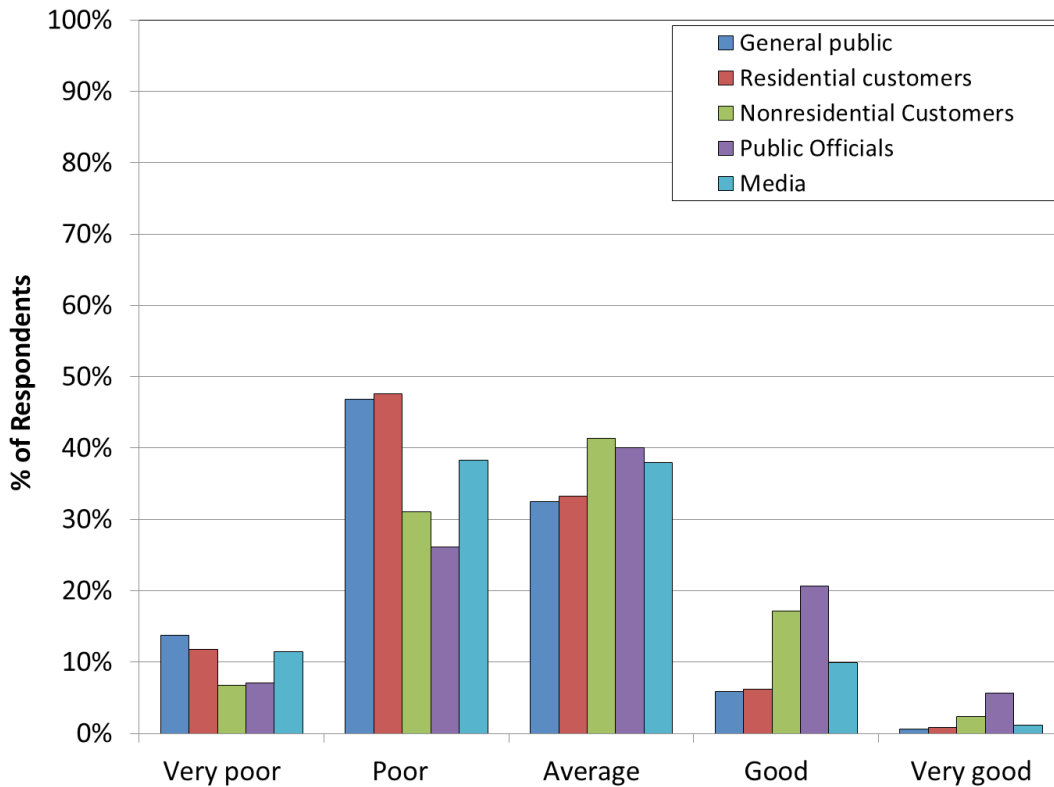


Figure 28. Water industry professionals' perceptions of the various groups understanding of the value of water resources (n=1,621)

Opportunities for input and involvement are essential to public understanding and acceptance of utility programs and projects. The format and depth of involvement will vary according to individual utilities, communities, and issues. Opportunities for involvement must, however, be meaningful, inclusive, and clearly linked to the decision-making process.

Regulations

Current and future regulatory compliance were both highly rated issues in the 2015 SOTWI survey, coming in as the #10 most important issue (future compliance) and #12 most important issue (current compliance). Addressing required changes to ongoing and future

planning, treatment, and monitoring often results in increased operation and maintenance costs and capital needs.

All survey participants were asked about their levels of concern regarding the water industry's ability to comply with current regulations; responses are summarized in Table 13. Scores were on a scale of 1 (not at all concerned) to 5 (extremely concerned). Current regulations regarding chemical spills, point source pollution, and combined sewer overflows were the top three areas of concern identified in the 2015 SOTWI survey. Concern over chemical spills likely increased due to a number of recent high-profile incidents in North America.

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Table 13. Current Regulatory Concerns of the Water Industry (n = 1,446)

Rank	Current Regulatory Concern	Score	% Ranked Extremely Concerned
1	Chemical spills	2.97	14
2	Point source pollution	2.89	12
3	Combined sewer overflows	2.81	12
4	Disinfection by-products	2.75	10
5	Arsenic	2.32	6
6	Radionuclides	2.25	6
7	Lead and copper	2.22	4
8	Perfluorinated compounds such as perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS)	2.21	5

In addition, all survey participants were asked about their concern over the water industry's ability to comply with potential future regulations, and their responses are summarized in Table 14. Scores are on a scale of 1 (not at all concerned) to 5 (extremely concerned). Future

regulations regarding pharmaceuticals and hormones, security and preparedness, and non-point source pollution were the top three areas of future regulatory concern.

What do you think the water sector could do to improve the overall understanding of the value of water systems, services, and resources?

- ***Transparency in finances and treatment systems costs.***
- ***Allocate resources educating the elected officials and public at large as high priority***
- ***Need of better board members, proactive residents, and news media needs to feature water related stories from time to time. To keep it in front of the public.***
- ***I think residents understand where their water comes from locally, but have no concept of what's involved to maintain distribution and transmission systems. Public education is critical to accept costs that reflect this effort. Perhaps drought in many parts of the country will force the public to confront this issue.***

Excerpt from open-ended questions

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Table 14. Future regulatory concerns of the water industry (n = 1,393)

Rank	Future Regulatory Concern	Score	% Ranked Extremely Concerned
1	Pharmaceuticals and hormones	3.05	18
2	Security and preparedness	3.04	14
3	Nonpoint source pollution	2.95	14
4	Disinfection by-products	2.82	11
5	Point source pollution	2.80	11
6	Unknown chemical or hydrocarbon spills	2.79	14
7	Combined sewer overflows	2.70	11
8	Chemical storage tanks	2.66	11
9	Algal Toxins	2.64	11
10	Volatile organic compounds (VOCs)	2.64	9
11	Chloramines	2.49	8
12	Hexavalent Chromium	2.40	8
13	Perfluorinated compounds such as PFOA and PFOS	2.40	9
14	Arsenic	2.39	8
15	Lead and copper	2.34	6
16	Perchlorate	2.32	6
17	Fluoride	2.28	7
18	Legionella	2.24	7
19	Radionuclides	2.22	6
20	Manganese	2.15	5
21	Nitrosodimethylamine (NDMA) and other nitrosamines	2.09	6
22	Chlorate	2.04	5
23	Selenium	2.00	5
24	Molybdenum	1.90	5
25	Vanadium	1.89	5
26	<i>Naegleria fowleri</i>	1.83	7
27	Strontium	1.77	4

Workforce Issues

Workforce issues continue to be concerns for the water industry with talent attraction and retention rated as the #17 most important issue (down from #12 in 2014), aging workforce/anticipated retirements rated as the #20 most important issue (down from #17 in 2014), and certification and training as the #22 most important issue (down from #18 in 2014). The water industry seems to continuously face difficulty in recruiting, training, and retaining skilled employees, especially for small systems. Likewise, a large number of water industry employees are nearing or currently eligible for retirement; this group represents a significant amount of institutional knowledge that could be lost without proper succession planning and process documentation.

All 2015 SOTWI participants were asked, "Overall, how prepared do you think the water sector is to address issues related to talent attraction and retention in the next five years?" Responses are provided in Figure 29. Only 1 percent of 2015

SOTWI respondents indicated that the water industry was fully prepared to address issues related to talent attraction and retention in the next five years, the same percentage as in 2014. The challenge of talent attraction and retention is highlighted by the 14 percent of respondents who thought the industry is not at all prepared (compared to 15 percent in 2014) and the 40 percent who thought it was only slightly prepared (compared to 35 percent in 2014). In summary, more than half of respondents have a negative perception of the water industry's preparation for talent attraction and retention.

All 2015 SOTWI participants were also asked "Overall, how prepared do you think the water sector is to cope with any expected retirements in the next five years?" The summary of responses provided in Figure 30 reveals that just 2 percent of 2015 SOTWI respondents indicated that the water industry was fully prepared to cope with any expected retirements in the next five years while 10 percent thought the industry not at all prepared and 32 percent thought it was only slightly prepared.

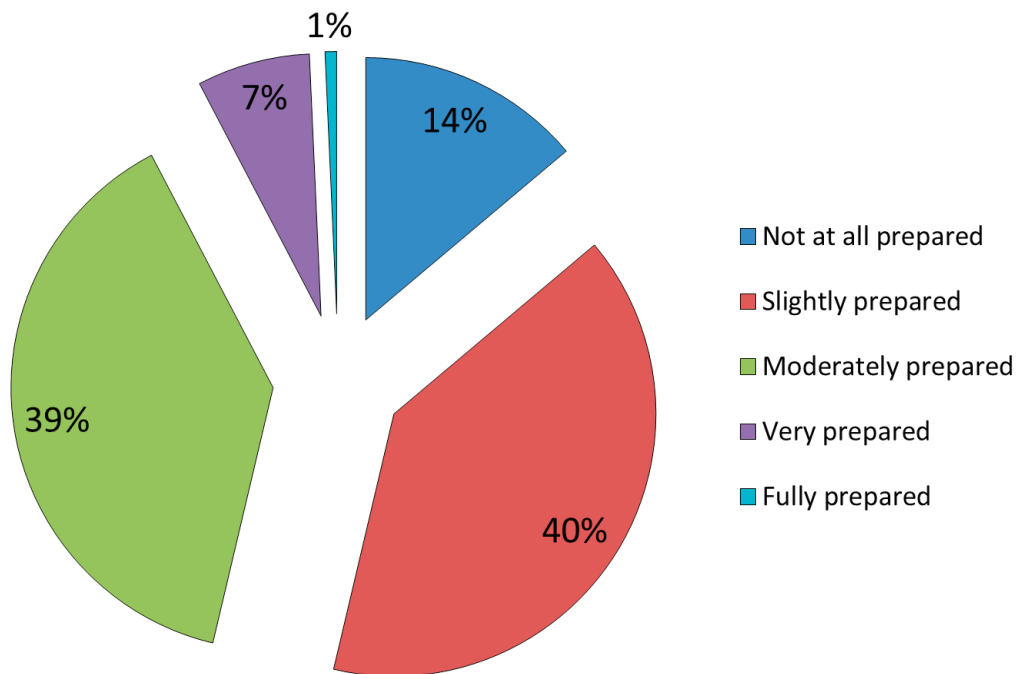


Figure 29. Responses from all SOTWI survey participants regarding how prepared the water sector is to address issues related to talent attraction and retention in the next five years (n =1,406)

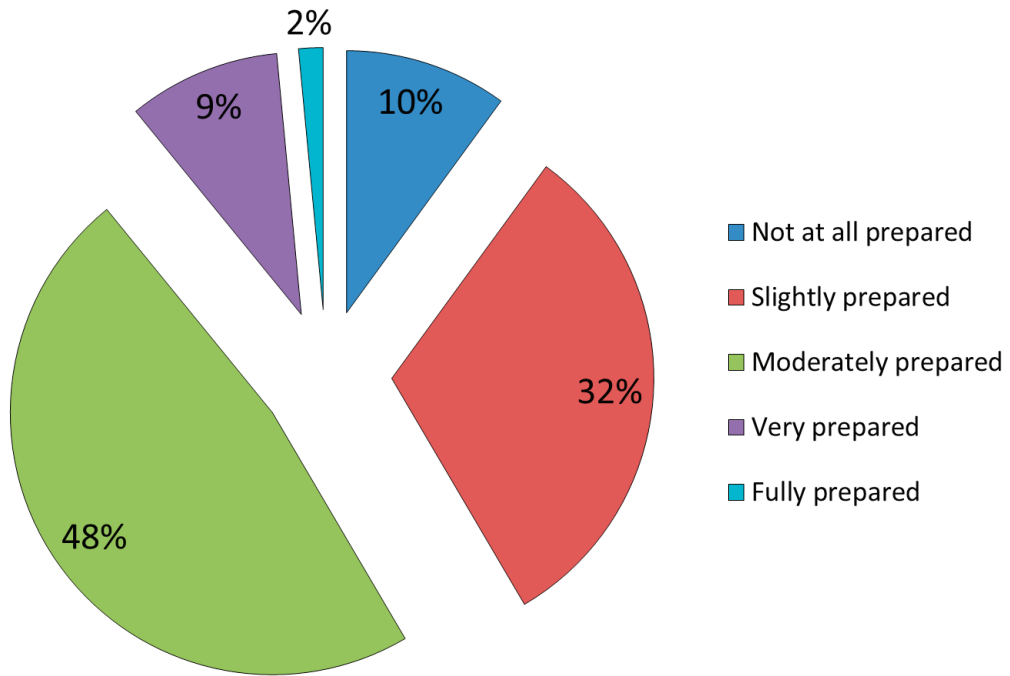


Figure 30. Responses from all SOWTI survey participants regarding how prepared the water sector is to cope with any expected retirements in the next five years (n =1,396)

Finally, all 2015 SOTWI participants were asked “Overall, how prepared do you think the water sector is to address issues related to certification and training in the next five years?” Responses are provided in Figure 31. The majority of 2015 SOTWI respondents (82 percent) indicated that the water industry was at least moderately

prepared to address issues related to certification and training in the next five years, although this is down from 82 percent who responded this way in 2014. Only 4 percent thought the water industry is not at all prepared and 17 percent thought it was only slightly prepared.

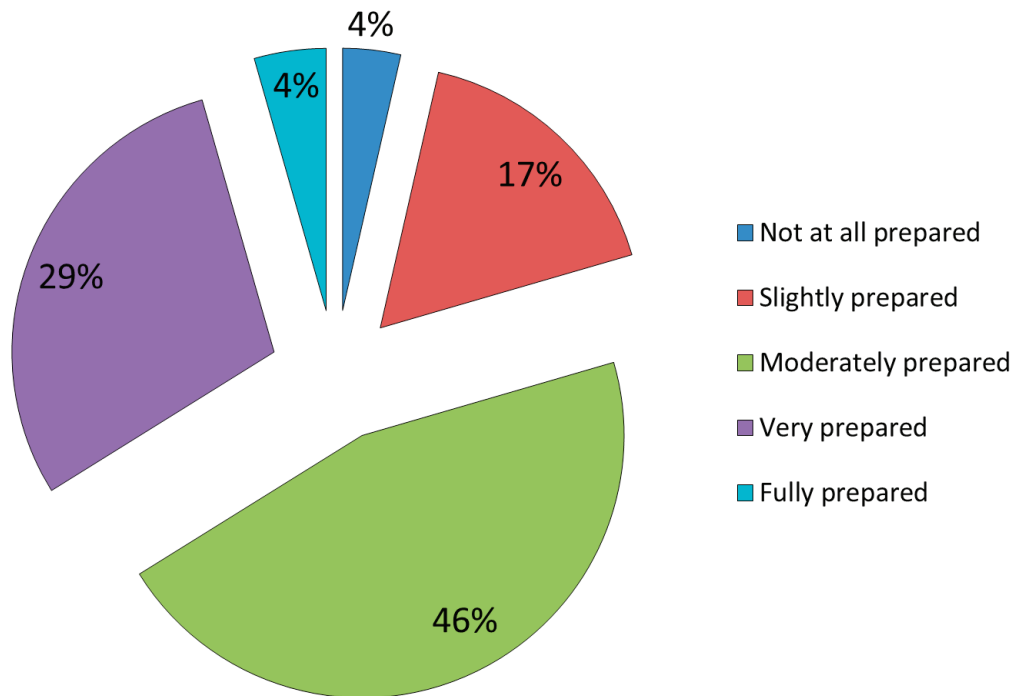


Figure 31. Responses from all SOWTI survey participants regarding how prepared the water sector is to address issues related to certification and training in the next five years (n = 1,471)

Other Issues

Big Data

As the era of “big data” progresses, water and wastewater utilities have the ability to collect and analyze large quantities of information about their systems and customers. Utility staff members were asked about their utilities’ big data strategies, and a summary of the results is provided in Figure 32. The majority of respondents indicated their utility does not have a big data strategy (52 percent). However, the other 48 percent are in various stages of exploration, implementation, or operation. Of the groups reporting their utility has a big data strategy,

26 percent reported that it was well communicated to them, 11 percent reported it was poorly communicated, and 11 percent reported it had not been communicated at all.

To understand where big data strategies and associated data mining were taking root, utility staff members were asked the following questions. Results are shown in Figure 33.

- *Is your utility using data mining techniques to better understand its customers?*
- *Is your utility using data mining techniques to better understand its water and/or wastewater system?*

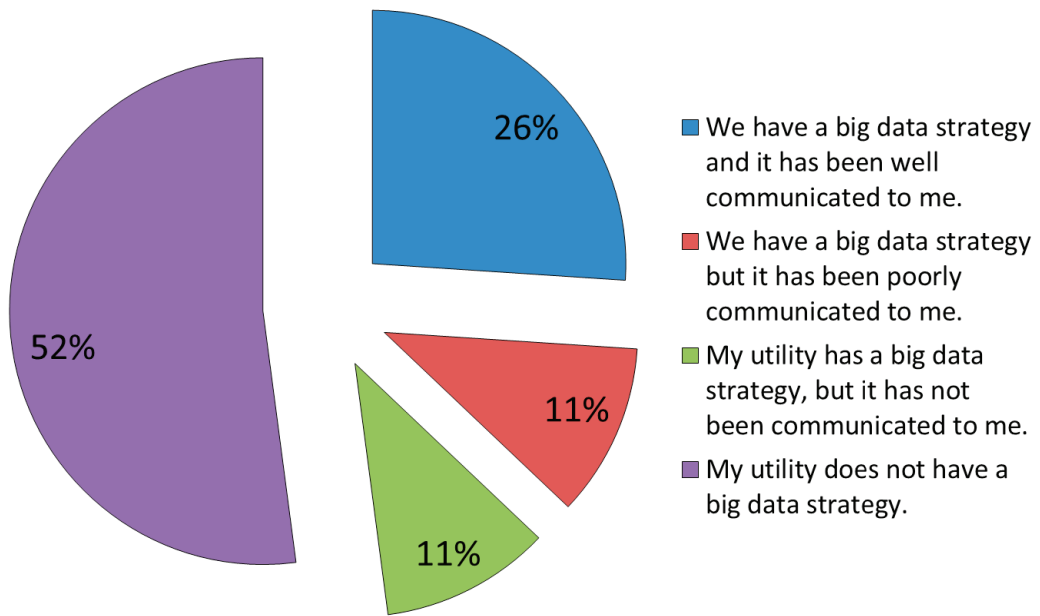


Figure 32. Responses from utility employees regarding whether their utility has a big data strategy (n = 480)

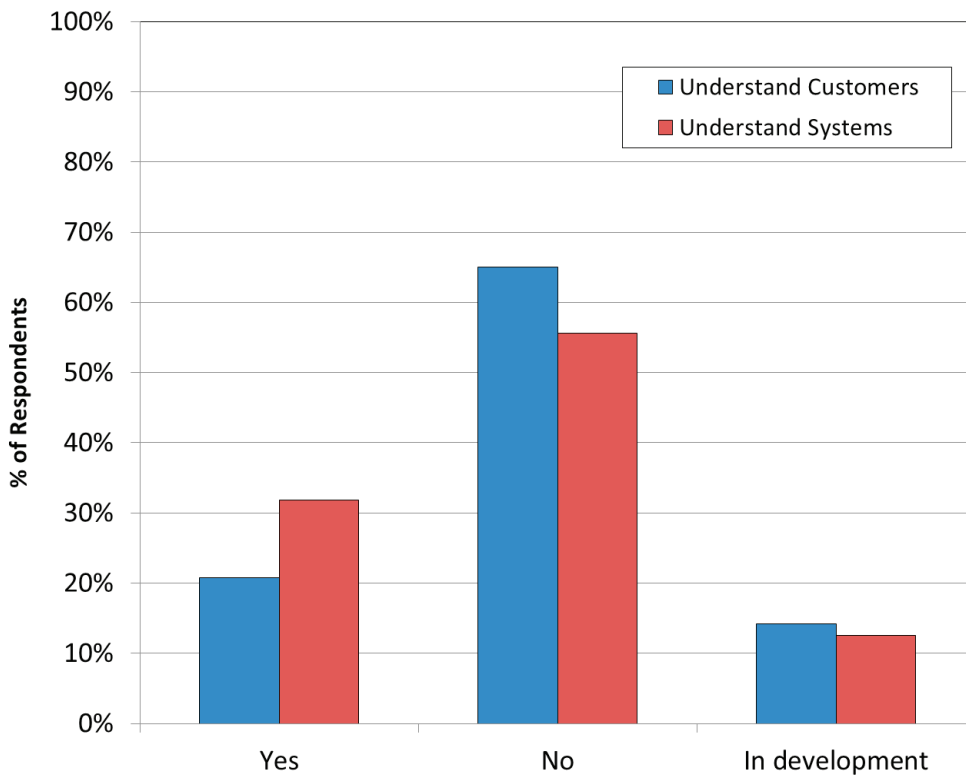


Figure 33. Responses from utility employees regarding how their utility was using data mining (n = 466)

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As Figure 33 shows, more utilities currently appear to be using their big data strategies/ data mining techniques to better understand their water and/or wastewater system (32 percent) in comparison to those using data mining techniques to better understand their customers (21 percent). With regards to development, an almost equal percentage of respondents reported their utilities would be developing data mining techniques to better understand their water and/or wastewater system (13 percent) as those who plan to use data mining techniques to better understand their customers (14 percent).

Large-Scale Phenomena

To understand the potential impacts of several large-scale phenomena on the industry, all 2015 SOTWI participants were asked to rank them using the following scale:

1. Significant negative impact
2. Slight negative impact
3. No impact at all
4. Slight positive impact
5. Significant positive impact

Table 15 provides a ranking of the large-scale phenomena provided to participants and a differential, which is the average score minus 3, which is the median potential score reflecting no impact. These results show that water industry professionals think that housing markets, bond markets, and business/industrial activities will have a slight positive impact on the industry. However, inflation, terrorism, and pollution are expected to have more significant negative impacts.

Table 15. Potential impacts to water industry from large-scale phenomena (n = 1,446)

Rank	Category	Differential*
1	Housing markets	0.04
2	Bond markets	0.04
3	Business/industrial activities	0.04
4	Stock markets	-0.05
5	Energy production	-0.13
6	Urbanization	-0.29
7	Unemployment	-0.33
8	Population growth	-0.37
9	Agriculture	-0.41
10	Social instability	-0.44
11	Wealth inequality	-0.54
12	Political instability	-0.61
13	Inflation	-0.64
14	Terrorism	-0.71
15	Pollution	-0.87

* A positive differential means a positive impact, a differential of 0 means no impact, and a negative differential means a negative impact

Part 4—Conclusions

Water is a vital component for all societies, and access to safe and sufficient drinking-water is a primary characteristic that distinguishes developed and undeveloped countries. For more than a century, North America's water industry, which includes potable water, wastewater, reuse, and stormwater, has increased its technical, managerial, and financial proficiency while improving public health and environmental protection. While some systems still struggle to meet the expectation of continuous safe drinking water and clean water discharges, the majority of water systems in North America are dealing with issues of system and resource stewardship along with effectively communicating the wide-range of needs in these two areas.

The overall successes of water professionals should continue to be a source of pride and inspiration; however, the current State of the Water Industry survey highlights several important challenges including the costs of system stewardship, water resource development and protection, and effective stakeholder communication. In addition to facing these mostly long-term problems, shorter-term water shortages related to drought and localized source water protection issues such as chemical spills continue to plague watersheds across North America, and the impacts that these events will ultimately have on awareness of water issues could be significant. As communities recognize their limited and precious supplies, water will become ever more important in shaping our communities as they adapt and grow.

It is difficult to specifically account for the relatively stagnant perceptions of the industry's soundness as identified in this report, however, water leaders should take these trends as a call to action. As they address today's important issues and prepare to tackle those on the horizon, water industry professionals should promote their successes and transfer newly created knowledge to their peers to reinforce an atmosphere of continuous improvement. On the path toward financial

sustainability, water providers should strive to implement fair rates and fees that reflect the total cost of water services including infrastructure renewal and replacement. Regarding environmental sustainability, the water industry continues to minimize its footprint through the efficient use of supplies and resources. Indeed, water professionals ongoing commitment to these values unites the water community as a vital component of modern society in developed nations.

The 2015 AWWA State of the Water Industry Report is intended to serve as a foundation for action and further discovery. Water professionals continue to meet society's expectations for safe and clean water by developing and implementing solutions that solve new and ongoing challenges. The quality of water services in Canada, Mexico, and the United States remains consistently high, but the larger message that is repeated consistently throughout this report is that communities must address the water infrastructure and resource management challenges, otherwise the reliability and resiliency of water systems, the health of the environment, the prosperity of the economy, and the safety of water will be increasingly at risk.

The continued credibility of the water profession requires open and ongoing communication that establishes relationships and creates a framework for understanding, trust, and cooperation. AWWA will continue to serve as a bridge organization, uniting the worlds of science and research, policy, and practice to address the issues identified in this report. With more than 50,000 members and more than 3,000 volunteers, AWWA is the community for water professionals to create and exchange knowledge to solve these challenges.

If you participated in the 2015 State of the Water Industry survey, the Association thanks you, and if you wish to participate in the 2016 survey scheduled to occur in September, 2015, please be sure your contact information is current or create an AWWA login at www.awwa.org.

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Appendix A—2015 State of the Water Industry Survey

2015 AWWA State of the Water Industry

AWWA annually surveys water professionals to gauge their perceptions of the industry and to identify and track significant trends. This survey should take 10 to 20 minutes to complete. Individual responses are held strictly confidential.

Thanks in advance for your contribution to this collective effort and for supporting AWWA's mission to provide solutions to effectively manage the world's most important resource.

Q: In which one of the following states or territories do you work most often (grouped by country: Canada, U.S., Mexico)? If outside of North America please enter the country in the space provided?

- Law Firm/Attorney
- Nonprofit Organization
- Retired
- Other (please specify)

Q: In your opinion, what is the current overall state of the water industry?

1 = Not at all sound 2 3 4 5 6 7 = Very sound

Q: Looking forward, how sound will the overall water industry be five years from now?

1 = Not at all sound 2 3 4 5 6 7 = Very sound

Q: In your opinion, what is the current state of the water industry in the region where you work most often?

1 = Not at all sound 2 3 4 5 6 7 = Very sound

Q: Looking forward, how sound will the water industry be five years from now in the region where you work most often?

1 = Not at all sound 2 3 4 5 6 7 = Very sound

Q: Please rate the importance of the following industry challenges on a scale of 1 (unimportant) to 5 (critically important).

1 = Unimportant 2 = Slightly important
3 = Important 4 = Very important 5 = Critical Don't know

- Financing for capital improvements
- Improving customer, constituent, and community relationships
- Expanding water reuse/reclamation
- Aging workforce/anticipated retirements
- Public understanding of the value of water systems and services
- Watershed/source water protection
- Data management
- Water conservation/efficiency
- Affordability for low-income households

Q: What is your age?

- Younger than 25
- 25-34
- 35-44
- 45-54
- 55-64
- 65 and older
- Prefer not to answer

Q: Which one of the following best describes the type of organization you work for?

- Drinking Water Utility
- Wastewater Utility
- Combined Water/Wastewater Utility (may include other services too)
- Water Wholesaler
- Reuse/Reclamation Utility
- Stormwater Utility
- Consulting Firm/Consultant
- Manufacturer of Products
- Manufacturer's Representative
- Distributor
- Technical Services/Contractor
- Regulatory Authority/Regulator
- Nonutility Government (municipal, federal, etc.)
- University/Educational Institution
- Laboratory
- Financial Industry (ratings agency, investor/fund rep., etc.)

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- Long-term water supply availability
- Public understanding of the value of water resources
- Groundwater management and overuse
- Workforce diversity
- Renewal & replacement of aging water and wastewater infrastructure
- Emergency preparedness
- Asset management
- Climate risk and resiliency
- Fracking/oil and gas activities
- Drought or periodic water shortages
- Stormwater management and costs
- Acceptance of current water and wastewater rates
- Acceptance of future water and wastewater rate increases
- Cost recovery (pricing water to accurately reflect its true cost)
- Compliance with current regulations
- Compliance with future regulations
- Physical security issues
- Cyber-security issues
- Price and supply of chemicals
- Energy use/efficiency and cost
- Energy recovery/generation
- Water loss control
- Wastewater resource recovery
- Talent attraction and retention
- Certification and training

Any others rating at least “very important” but not listed (please specify):

Q: How would you rate the following group’s understanding of the value of water systems and services (i.e., the physical infrastructure and the various activities required to provide water and wastewater services)?

1 = Very poor 2 = Poor 3 = Average 4 = Good
5 = Very good Don’t know

- General public
- Residential customers
- Nonresidential customers (industrial/commercial/institutional)
- Public officials
- Media

Q: How would you rate the following group’s understanding of the value of water resources (i.e., the various forms of water and its sources)?

1 = Very poor 2 = Poor 3 = Average 4 = Good
5 = Very good Don’t know

- General public
- Residential customers
- Nonresidential customers (industrial/commercial/institutional)
- Public officials
- Media

What do you think the water sector could do to improve the overall understanding of the value of water systems, services, and resources?

Q: In general, how able are water and wastewater utilities to currently cover the full cost of providing service, including infrastructure renewal & replacement and expansion needs, through customer rates and fees?

1 = Not at all able 2 = Slightly able 3 = Moderately able
4 = Very able 5 = Fully able No opinion/don’t know

Q: Given the future infrastructure needs for system renewal and replacement (R&R) and expansion, how able will water and wastewater utilities be to meet the full cost of providing service through customer rates and fees?

1=Not at all able 2 = Slightly able 3 = Moderately able
4 = Very able 5 = Fully able No opinion/don’t know

Q: Infrastructure R&R encompasses several issues; how would you rate the importance of the following areas with regards to the challenge of renewing or replacing aging water and wastewater infrastructure?

1 = Unimportant 2 = Slightly important
3 = Important 4 = Very important 5 = Critical Don’t know

- Justifying R&R programs to oversight bodies (board, council, etc.)
- Justifying R&R programs to ratepayers
- Obtaining R&R funding via bonds
- Obtaining R&R funding involving public-private partnerships
- Obtaining R&R funding via federal, state, or territorial loans
- Obtaining R&R funding via federal, state, or territorial grants
- Obtaining R&R funding by taxation (e.g., property taxes)
- Pay-as-you-go R&R funding
- Establishing and following a financial policy for capital reinvestment

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- Establishing and maintaining specific R&R reserves
- Addressing declining water sales
- Developing/implementing asset management programs
- Defining appropriate levels of service
- Prioritizing R&R needs
- Coordinating R&R with other activities (e.g., road repair, redevelopment, etc.)

Any others rating at least “very important” but not listed (please specify):

Q: Overall, how prepared do you think the water sector is to address any impacts associated with potential climate variability?

1 = Not at all prepared 2 = Slightly prepared
3 = Moderately prepared 4 = Very prepared
5 = Fully prepared No opinion/don't know

Q: Overall, how prepared do you think the water sector is to address issues related to certification and training in the next five years?

1 = Not at all prepared 2 = Slightly prepared
3 = Moderately prepared 4 = Very prepared
5 = Fully prepared No opinion/don't know

Q: Overall, how prepared do you think the water sector is to cope with any expected retirements in the next five years?

1 = Not at all prepared 2 = Slightly prepared
3 = Moderately prepared 4 = Very prepared
5 = Fully prepared No opinion/don't know

Q: Overall, how prepared do you think the water sector is to address issues related to talent attraction and retention in the next five years?

1 = Not at all prepared 2 = Slightly prepared
3 = Moderately prepared 4 = Very prepared
5 = Fully prepared No opinion/don't know

Q: How concerned are you over the ability of the water sector to comply with current regulations in the following areas?

1 = Not at all prepared 2 = Slightly prepared
3 = Moderately prepared 4 = Very prepared
5 = Fully prepared No opinion/don't know

- Lead and copper
- Perfluorinated compounds such as PFOA and PFOS
- Arsenic
- Disinfection by-products
- Radionuclides
- Combined sewer overflows
- Point source pollution
- Chemical spills

Any others rating at least “very concerned” but not listed (please specify):

Q: How concerned are you about future water sector regulations in the following areas?

1 = Not at all concerned 2 = Slightly concerned
3 = Moderately concerned 4 = Very concerned
5 = Extremely concerned No opinion/don't know

- Lead and copper
- Perchlorate
- Hexavalent chromium
- Chloramines
- Fluoride
- Pharmaceuticals and hormones
- Perfluorinated compounds such as PFOA and PFOS
- Arsenic
- *Naegleria fowleri*
- Disinfection byproducts
- Volatile organic compounds (VOCs)
- Security and preparedness (cyber, physical, and emergency response)
- Radionuclides
- Vanadium
- Molybdenum
- Selenium
- Manganese
- Algal toxins
- Strontium
- Chlorate
- NDMA and other nitrosamines
- Combined sewer overflows
- Legionella
- Point source pollution
- Nonpoint source pollution
- Chemical storage tanks
- Unknown chemical or hydrocarbon spills

Any others rating at least “very concerned” but not listed (please specify):

Q: Please rate the importance of the following groundwater management issues.

1 = Unimportant 2 = Slightly important 3 = Important
4 = Very important 5 = Critically important Don't know

- Monitoring and reporting groundwater withdrawals
- Groundwater pricing
- Reclaimed water for groundwater recharge
- Restrictions on groundwater pumping
- Declining groundwater levels

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- Agricultural use of groundwater
- Groundwater regulations
- Watershed/groundwater protection
- Oil and gas activities

Any others rating at least “very important” but not listed (please specify):

Q: What impact (positive or negative) do you think the following large-scale phenomena will have on the overall water industry in 2015? [page 1 of 2]

- 1 = Significant negative impact
2 = Slight negative impact 3 = No impact at all
4 = Slight positive impact
5 = Significant positive impact Don't know

- Unemployment
- Housing markets
- Stock markets
- Bond markets
- Business/industrial activities
- Energy production
- Agriculture
- Political instability
- Social instability
- Inflation
- Population growth
- Terrorism
- Pollution
- Wealth inequality
- Urbanization

Any others with significant impact but not listed (please specify):

End for nonutility career groups; the following question sets are provided to the utility personnel based on previous answers.

The following questions refer specifically to the utility you work for.

Q: Is the utility you work for publicly or privately owned?

- 1 = Publicly owned 2 = Privately/investor owned

Q: Please select your utility's number of water service connections or collection system connections. If your utility provides both services, use the greater number of connections (water vs. wastewater). The number of connections can be estimated by (population served) divided by 3.5. If possible, please include an estimate of the number of connections in areas receiving wholesale water service in this count.

- 0 to 3,000
- 3,001 to 10,000
- 10,001 to 25,000
- 25,001 to 50,000
- 50,001 to 100,000
- 100,001 to 150,000
- Over 150,000

Q: Is your utility currently able to cover the full cost of providing service(s), including infrastructure R&R (sic) and expansion needs, through customer rates and fees?

- 1 = Not at all able 2 = Slightly able 3 = Moderately able
4 = Very able 5 = Fully able No opinion/don't know

Q: Given your utility's future infrastructure needs for R&R and expansion, do you think your utility will be able to meet the full cost of providing service(s) through customer rates and fees?

- 1 = Not at all able 2 = Slightly able 3 = Moderately able
4 = Very able 5 = Fully able No opinion/don't know

Q: Which of the following best describes any trend in your utility's total water sales?

- >10 year trend of declining total water sales
- <10 year trend of declining total water sales
- Flat or little change in total water sales
- <10 year trend of increasing total water sales
- >10 year trend of increasing total water sales
- No specific trend
- Not applicable

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Q: Which of the following best describes your utility's trend in per account water sales?

- >10 year trend of declining per account water sales
- <10 year trend of declining per account water sales
- Flat or little change in per account water sales
- <10 year trend of increasing per account water sales
- >10 year trend of increasing per account water sales
- No specific trend
- Not applicable
- Don't know

Q: How is your utility responding to its cost recovery needs in the face of changing water sales/consumption patterns? (choose all that apply)

- No changes needed
- Shifting more of the cost recovery from consumption-based fees to fixed fees within the rate structure
- Shifting rate design to increasing block-rate structure
- Shifting rate design to decreasing block-rate structure
- Incorporating seasonal rates
- Changes in growth-related fees (i.e., system development charges, impact fees, or capacity charges)
- Revenue diversification
- Increasing financial reserves
- Implementing rate stabilization reserves
- Not applicable
- Don't know
- Other (please specify)

Q: Is your utility considering or currently involved in a public-private partnerships (P3)?

- Not considering a P3 at this time
- Considering a P3 but not committed
- Planning to use a P3
- Already involved in a P3
- Don't know

Q: Is your utility considering or currently involved in consolidation with another utility?

- Not considering consolidation at this time
- Considering consolidation but not committed
- Planning to consolidate
- Already consolidated
- Don't know

Q: If your utility is publically owned, is it considering privatization?

- Not considering privatization at this time
- Considering privatization but not committed
- Planning to privatize
- Already private
- Don't know

Q: If you can make an assessment, how would you rate your utility's current access to capital?

- Worse than any time in the past 5 years
- As bad as any time in the past 5 years
- Similar to most of the past 5 years
- As good as any time in the past 5 years
- Better than any time in the past 5 years
- Can't assess/don't know

Q: Does your utility include potential impacts from climate variability in your risk management or planning processes?

- Yes
- No
- In development but not implemented
- Don't know

Q: How prepared do you think your utility will be to meet its long-term water supply needs?

- Not at all prepared
- Slightly prepared
- Moderately prepared
- Very prepared
- Fully prepared
- Don't know
- Not applicable

Q: Does your utility have a water conservation program?

- Yes
- No
- In development but not implemented
- Don't know
- Not applicable

Q: Does your utility have a drought management or water shortage contingency plan?

- Yes
- No
- In development but not implemented
- Don't know
- Not applicable

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Q: How many years in the last decade has your utility implemented voluntary water restrictions?

Drop down: 0 to 10

Q: How many years in the last decade has your utility implemented mandatory water restrictions?

Drop down: 0 to 10

Q: Is your utility considering desalination of either brackish groundwater or seawater to augment existing drinking water supplies?

- Yes
- No
- In development but not implemented
- Already implemented
- Not possible (no brackish groundwater or seawater options)
- Don't know
- Not applicable

Q: Is your utility considering nonpotable reuse to augment existing irrigation water supplies?

- Yes
- No
- In development but not implemented
- Already implemented
- Don't know
- Not applicable

Q: Is your utility considering indirect potable reuse to augment existing drinking water supplies?

- Yes
- No
- In development but not implemented
- Already implemented
- Don't know
- Not applicable

Q: Is your utility considering direct potable reuse to augment existing drinking water supplies?

- Yes
- No
- In development but not implemented
- Already implemented
- Don't know
- Not applicable

Q: Is your utility considering urban stormwater recovery for nonpotable or potable reuse?

- Yes
- No
- In development but not implemented
- Already implemented
- Don't know
- Not applicable

Q: Water and wastewater utilities have the ability to collect and analyze large quantities of information about their systems and customers. Which of the following best describes your utility's "big data" strategy?

- We have a big data strategy and it has been well communicated to me.
- We have a big data strategy but it has been poorly communicated to me.
- My utility has a big data strategy, but it has not been communicated to me.
- My utility does not have a big data strategy.
- I don't know whether or not my utility has a big data strategy.

Q: Is your utility using data mining techniques to better understand its customers?

- Yes
- No
- In development but not implemented
- Don't know

Q: Is your utility using data mining techniques to better understand its water and/or wastewater system?

- Yes
- No
- In development but not implemented
- Don't know

Q: Is your utility currently facing any issues related to oil and gas activities including fracking (select all that apply)?

- Potential for groundwater contamination
- Potential for surface water contamination
- Water quantity/use issues (such as timing)
- Induced seismic activity
- No issues at this time
- Don't know
- Other (please specify)

**Thank you for participating in the
2015 State of the Water Industry Survey.**

Appendix B—2015 SOTWI Survey Responses by Location

Below are the number of responses from states and territories. The question they responded to was, “In which one of the following states or territories do you work most often (grouped by country: Canada, U.S., Mexico)? If outside of North America please enter the country in the space provided.”

State, Territory, or Other	Respondents	State, Territory, or Other	Respondents
Canada		DC	9
AB	33	FL	75
BC	21	GA	26
MB	7	HI	8
NB	7	ID	11
NL	1	IL	55
NS	9	IN	37
NT	0	IA	28
NU	0	KS	20
ON	76	KY	18
PE	1	LA	13
QC	9	ME	14
SK	10	MD	35
YT	0	MA	28
United States of America		MI	46
AL	20	MN	37
AK	3	MS	9
AZ	45	MO	25
AR	13	MT	8
CA	211	NE	14
CO	37	NV	18
CT	13	NH	10
DE	3	NJ	43

(continued)

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State, Territory, or Other	Respondents
NM	15
NY	58
NC	49
ND	4
OH	50
OK	17
OR	40
PA	37
PR	8
RI	7
SC	20
SD	5
TN	23
TX	119
UT	17
VT	6
VI	1
VA	52
WA	38
WV	4
WI	34
WY	8

Mexico

AG	0
BN	1
BS	0
CM	0
CP	0
CH	0
COA	0

State, Territory, or Other	Respondents
CL	0
DU	0
DF	0
GT	0
GR	0
JA	0
MX	2
MC	0
MR	0
NA	0
OA	0
PU	0
QE	0
QR	0
SL	0
SI	0
SO	1
TB	0
TM	0
TL	0
VE	0
YU	0
ZA	0

Total respondents reporting their location with these options = 1,723

Appendix C—2015 Health of the Industry Responses by Location

On the following page are the responses by states and territories to the questions below regarding the overall and regional health of the water industry using a scale of 1 to 7, where 1 = not at all sound and 7 = very sound for the present year (2015) and five years from now (2020):

- In your opinion, what is the current overall state of the water industry?
- Looking forward, how sound will the overall water industry be in five years?

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Location	Overall		Regional		Location	Overall		Regional	
	2015	2020	2015	2020		2015	2020	2015	2020
United States					United States (continued)				
HI	5.4	5.1	5.5	5.5	PA	4.4	4.4	4.6	4.6
MS	5.0	4.9	5.0	4.9	SD	4.4	4.4	4.8	4.8
CO	4.9	4.4	5.1	4.6	WA	4.4	4.2	4.9	4.7
RI	4.9	4.6	5.0	4.9	WI	4.4	4.2	5.0	4.9
AL	4.9	4.7	4.7	4.5	NY	4.3	4.3	4.7	4.6
CT	4.8	4.8	5.3	5.1	DC	4.3	4.1	4.6	4.7
AR	4.8	4.5	5.2	5.1	AZ	4.3	4.2	4.4	4.2
UT	4.8	4.4	5.5	5.5	OK	4.3	4.1	4.1	3.9
WY	4.8	4.6	4.8	4.8	CA	4.3	4.3	4.3	4.3
OH	4.7	4.5	4.7	4.7	OR	4.3	4.2	4.8	4.8
TN	4.7	4.8	4.8	4.7	WV	4.3	3.8	4.5	3.8
NE	4.7	4.6	5.3	5.2	NJ	4.2	4.2	4.2	4.3
LA	4.7	4.3	4.8	4.7	MA	4.2	4.3	4.8	4.8
NC	4.7	4.6	4.9	4.8	IN	4.0	3.9	4.2	4.2
DE	4.7	5.0	5.3	5.7	MO	4.0	3.9	4.3	4.2
MT*	4.6	4.5	4.5	4.9	ME	3.9	3.9	4.6	4.1
GA*	4.6	4.5	4.6	4.5	PR	3.8	4.3	3.5	4.0
VA	4.6	4.4	4.9	4.6	NM	3.7	3.9	3.5	3.9
NV	4.6	4.4	4.4	4.3	Canada				
MN	4.6	4.4	4.9	4.8	MB	5.3	5.4	5.4	5.7
MD	4.6	4.7	4.5	4.6	AB	4.8	4.7	5.0	4.9
FL	4.6	4.4	4.6	4.5	ON	4.7	4.8	5.1	5.1
KS	4.6	4.3	4.6	4.4	QC	4.6	5.1	4.4	4.4
SC	4.6	4.4	4.8	4.9	SK	4.6	4.2	4.8	4.6
ID	4.5	4.1	5.0	5.0	NS	4.6	5.1	5.0	5.0
NH	4.5	4.2	4.8	4.6	NB	4.4	4.4	5.0	5.3
ND	4.5	4.5	4.3	4.3	BC	4.2	4.4	4.8	4.9
MI	4.5	4.2	4.5	4.5					
IA	4.5	4.1	4.9	4.5					
IL	4.5	4.2	4.6	4.6					
KY	4.4	4.2	4.8	4.9					
TX	4.4	4.1	4.4	4.3					

* Average overall scores for the entire sample: 2015 = 4.6, 2020 = 4.5