This year is AWWA’s 15th year producing the State of the Water Industry (SOTWI) report. Since the first SOTWI report in 2004, more than 25,000 respondents have weighed in with their views and comments on issues facing the water sector. These views not only serve to provide insights on trends, significant challenges, and opportunities facing the water industry, but also to inform decision-makers and support water professionals as they develop, implement, and communicate strategies to stakeholders.

In 2004 we reported that the water industry was “more sound than not” with a soundness rating of 4.9 (where “soundness” is rated on a scale of 1 to 7, with 1 being not at all sound and 7 being very sound). Also in 2004, the top five issues deemed most critical facing the water profession were regulatory factors (compliance, number of regulations), security (general security issues, terrorism), business factors (funds to meet new regulations, financing of repairs, replacements and upgrades), source water supply (sufficiency of supply, source water protection, future supplies), and water storage/distribution (including infrastructure).

Fast-forward 15 years, the 2018 SOTWI results look surprisingly similar. Survey respondents weighed in and indicated an industry soundness of 4.5, and the top five issues in order of importance are renewal and replacement (R&R) of aging infrastructure, financing for capital improvements, public understanding of the value of water systems and services, long-term water supply availability, and public understanding of the value of water.

In addition to questions indicating the industry’s health and identifying influencers on the water sector, this year’s survey took a closer look at resource management, planning and programs, data management, emergency preparedness, and how innovation is viewed by utilities.

The overarching conclusions of this year’s report indicate that R&R tops the list of concerns coupled with communicating the need for these replacements and how to fund them. The soundness of the industry today and five years from now is looking up by a tick, and the value of innovation and technology remains unproven.

AWWA thanks everyone who participated in this year’s survey. We look forward to your input next year. The Technical and Research Program team welcomes your questions and comments on this report and the 2018 survey. You can reach us at research@awwa.org.
Table of Contents

Executive Summary 4

State of the Water Industry 5

Water Industry Challenges 7

Large Scale Phenomena 9

System Stewardship 11

Full-Cost Pricing 11

Access to Capital 14

Changing Water Demands 15

Cost Recovery 17

Rate Increases 17

Affordability 19

Water Resource Management 20

Long-Term Water Supply Availability 20

Near-Term Water Supply 21

Drought and Water Storage 21

Water Supply Sustainability 23

Utility Management Practices 25

Regulations 25

Communications 26

Plans and Programs 27

Technology Implementation and Data Management 29

SNAPSHOT – Innovations 31

Conclusions 31

Demographics 32

Methodology 36

List of Figures 41

List of Tables 42

2018 State of the Water Industry Survey 43
EXECUTIVE SUMMARY

The 2018 SOTWI report shows the general directions in which the North American water industry continues to move as well as provides specific insights on the critical areas the industry feels need investment. AWWA provides a forum for innovation and leadership in the water industry by not only identifying and tracking important water issues, but by focusing the efforts and contributions of its dedicated members and volunteers to address the challenges identified in the SOTWI survey.

The 2018 SOTWI survey was issued in the fall of 2017 at the beginning of the Atlantic hurricane season in the east and wildfires in the west. Despite the nationwide emergencies, 967 responded to this survey.

The overall health of the water industry, or “soundness,” saw a small uptick in respondents’ opinions this year; however, the general decline in the past 15 years is evident. This single data point of optimism, carried through to how survey respondents felt the health of the water industry would be five years from now. The top 10 challenges facing the water industry remain consistent and include how to finance desperately needed infrastructure R&R when stakeholders are not on board with rate increases, how to manage current and future water resources, and how to create a resilient utility.

The business of water was surveyed, and from the responses, we learned that utilities are not overly concerned with current or future regulations; they have made significant increases in offering bill payment assistance to low-income customers; they recognize the usefulness of plans and programs; and they are all-in with supervisory control and data acquisition (SCADA) but remain unconvinced about the long-term promise of information technology and big data. Innovation was this year’s snapshot topic, revealing that to be innovative requires not only a culture of innovation but also financing.

The water industry concerns from 2004 still look familiar, as respondents expressed much the same concerns in 2018. The water industry continues to focus on infrastructure and financing for infrastructure improvements, and source water supply issues remain a top concern 15 years later. It is a testament to the complexity of these issues that they remain an industry concern.
STATE OF THE WATER INDUSTRY

The SOTWI survey is an annual survey that provides an industry-wide self-assessment, gathering information to support the water community’s major tenets, which include safeguarding public health, supporting and strengthening communities, and protecting the environment.

As has been done since the beginning of the SOTWI survey, the 2018 version asked participants for their opinion of the current and future health of the water industry through the following questions, using a scale of 1 to 7, where 1 is “not at all sound” and 7 is “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 1 shows the average scores as rated by all respondents to these two questions in the past 15 years. The current health of the industry (i.e., soundness) as rated by all respondents was 4.5, where it was 4.3 in 2017; this score has been in a range of 4.3 to 4.9 since the survey began in 2004 and has seen a steady decline since 2004 with a leveling off at a running average of 4.5 the past six years (2013–2018). Looking forward five years, the soundness of the water industry also saw a small uptick to 4.4, from 4.3 in 2017, also shown in Figure 1.

Figure 1. Opinion of all respondents on the overall state of the water industry 2004–2018 (n = 967)
In addition to asking about the overall soundness of the water industry, the 2018 SOTWI survey posed the following questions to better capture perspectives on regional soundness (focusing on the region in which respondents work most often), again using a scale of 1 to 7 where 1 is “not at all sound” and 7 is “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?

Survey respondents weighed in with a slightly more positive view about the water industry in their area. The “soundness” of the water industry in the region where the respondent resides was rated above average, or 4.7 today (n = 967), and above average, or 5.0 (n = 966), five years from now.
WATER INDUSTRY CHALLENGES

To determine the major issues currently facing the water industry, respondents were asked to rate the importance of several challenges on a scale of 1 to 5, where 1 is “unimportant” and 5 is “critically important.” These issues, as ranked by 2018 SOTWI survey respondents, are shown in Table 1. 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.

Table 1. Issues facing the water industry in 2018 as ranked by all respondents (n = 821)

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Category</th>
<th>Weighted Average</th>
<th>% Ranked Critically Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>4.59</td>
<td>64</td>
</tr>
<tr>
<td>2</td>
<td>Financing for capital improvements</td>
<td>4.44</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>Public understanding of the value of water systems and services</td>
<td>4.37</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Long-term water supply availability</td>
<td>4.30</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Public understanding of the value of water</td>
<td>4.26</td>
<td>44</td>
</tr>
<tr>
<td>6</td>
<td>Watershed/source water protection</td>
<td>4.17</td>
<td>41</td>
</tr>
<tr>
<td>7</td>
<td>Aging workforce/anticipated retirements</td>
<td>4.16</td>
<td>43</td>
</tr>
<tr>
<td>8</td>
<td>Long-term water supply availability</td>
<td>4.12</td>
<td>35</td>
</tr>
<tr>
<td>9</td>
<td>Emergency preparedness</td>
<td>4.10</td>
<td>34</td>
</tr>
<tr>
<td>10</td>
<td>Governing board acceptance of future water and wastewater rate increases</td>
<td>4.09</td>
<td>35</td>
</tr>
<tr>
<td>11</td>
<td>Cost recovery (pricing water to accurately reflect its true cost)</td>
<td>4.09</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>Talent attraction and retention</td>
<td>4.08</td>
<td>33</td>
</tr>
<tr>
<td>13</td>
<td>Asset management</td>
<td>3.98</td>
<td>27</td>
</tr>
<tr>
<td>14</td>
<td>Cybersecurity issues</td>
<td>3.92</td>
<td>27</td>
</tr>
<tr>
<td>15</td>
<td>Data management</td>
<td>3.92</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>Improving customer, constituent, and community relationships</td>
<td>3.91</td>
<td>26</td>
</tr>
<tr>
<td>17</td>
<td>Compliance with current regulations</td>
<td>3.91</td>
<td>25</td>
</tr>
<tr>
<td>18</td>
<td>Groundwater management and overuse</td>
<td>3.88</td>
<td>26</td>
</tr>
<tr>
<td>19</td>
<td>Compliance with future regulations</td>
<td>3.86</td>
<td>21</td>
</tr>
<tr>
<td>20</td>
<td>Certification and training</td>
<td>3.84</td>
<td>22</td>
</tr>
<tr>
<td>21</td>
<td>Water rights</td>
<td>3.77</td>
<td>27</td>
</tr>
<tr>
<td>22</td>
<td>Drought or periodic water shortages</td>
<td>3.74</td>
<td>23</td>
</tr>
<tr>
<td>23</td>
<td>Water loss control</td>
<td>3.73</td>
<td>17</td>
</tr>
<tr>
<td>24</td>
<td>Water conservation/efficiency</td>
<td>3.72</td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td>Energy use/efficiency and cost</td>
<td>3.70</td>
<td>16</td>
</tr>
<tr>
<td>26</td>
<td>Physical security issues</td>
<td>3.58</td>
<td>15</td>
</tr>
<tr>
<td>27</td>
<td>Water quality issues from premise plumbing systems</td>
<td>3.56</td>
<td>12</td>
</tr>
<tr>
<td>28</td>
<td>Expanding water reuse/reclamation</td>
<td>3.46</td>
<td>18</td>
</tr>
<tr>
<td>29</td>
<td>Climate risk and resiliency</td>
<td>3.43</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td>Financing for water research</td>
<td>3.40</td>
<td>12</td>
</tr>
</tbody>
</table>
The most important issue to respondents in 2018, “Renewal and replacement of aging water and wastewater infrastructure,” has consistently been the most important issue identified for several years (previously called “State of water and sewer infrastructure”). A comparison of the top 10 issues from this year and the past four years is presented in Table 2. While the order of issues may change slightly, the most important issues are strikingly consistent year to year, aligning well with survey results prior to 2014 as well.

Table 2. Top 10 issues facing the water industry as ranked by all respondents, 2014–2018

<table>
<thead>
<tr>
<th>Rank</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State of water and sewer infrastructure</td>
<td>Renewal &amp; replacement of aging water and wastewater infrastructure</td>
<td>Renewal &amp; replacement of aging water and wastewater infrastructure</td>
<td>Renewal &amp; replacement of aging water and wastewater infrastructure</td>
<td>Renewal &amp; replacement of aging water and wastewater infrastructure</td>
</tr>
<tr>
<td>2</td>
<td>Long-term water supply availability</td>
<td>Financing for capital improvements</td>
<td>Financing for capital improvements</td>
<td>Financing for capital improvements</td>
<td>Financing for capital improvements</td>
</tr>
<tr>
<td>3</td>
<td>Financing for capital improvements</td>
<td>Long-term water supply availability</td>
<td>Public understanding of the value of water systems and services</td>
<td>Long-term water supply availability</td>
<td>Public understanding of the value of water systems and services</td>
</tr>
<tr>
<td>4</td>
<td>Public understanding of the value of water resources</td>
<td>Public understanding of the value of water systems and services</td>
<td>Long-term water supply availability</td>
<td>Public understanding of the value of water systems and services</td>
<td>Long-term water supply availability</td>
</tr>
<tr>
<td>5</td>
<td>Public understanding of the value of water systems and services</td>
<td>Public understanding of the value of water resources</td>
<td>Public understanding of the value of water resources</td>
<td>Public understanding of the value of water resources</td>
<td>Public understanding of the value of water resources</td>
</tr>
<tr>
<td>6</td>
<td>Groundwater management and overuse</td>
<td>Watershed/source water protection</td>
<td>Watershed/source water protection</td>
<td>Watershed/source water protection</td>
<td>Watershed/source water protection</td>
</tr>
<tr>
<td>7</td>
<td>Watershed protection</td>
<td>Cost recovery (pricing water to accurately reflect its true cost)</td>
<td>Public acceptance of future water and wastewater rate increases</td>
<td>Emergency preparedness</td>
<td>Aging workforce / anticipated retirements</td>
</tr>
<tr>
<td>8</td>
<td>Drought or periodic water shortages</td>
<td>Emergency preparedness</td>
<td>Water conservation/efficiency</td>
<td>Cost recovery (pricing water to accurately reflect its true cost)</td>
<td>Public acceptance of future water and wastewater rate increases</td>
</tr>
<tr>
<td>9</td>
<td>Emergency preparedness</td>
<td>Water conservation/efficiency</td>
<td>Cost recovery (pricing water to accurately reflect its true cost)</td>
<td>Public acceptance of future water and wastewater rate increases</td>
<td>Emergency preparedness</td>
</tr>
<tr>
<td>10</td>
<td>Cost recovery</td>
<td>Compliance with future regulations</td>
<td>Groundwater management and overuse</td>
<td>Water Conservation/efficiency</td>
<td>Governing board acceptance of future water and wastewater rate increases and Cost recovery (pricing water to accurately reflect its true cost)</td>
</tr>
</tbody>
</table>
Beyond the top five issues, “Aging workforce/anticipated retirements” and “Governing board acceptance of future water and wastewater rate increases” are new to the top 10. In both cases approximately ⅓ of respondents felt these are critical issues. Whereas “Cost recovery (pricing water to accurately reflect its true cost)” dropped only slightly (from eighth in rank in 2017 to 10th in 2018), “Water conservation/efficiency” moved significantly from a top-10 concern to 21st.

The 2018 SOTWI survey provided an open-ended question asking participants whether there were any other issues they felt rated at least “very important” but were not listed. Respondents replied with the following comments on workforce issues.

- Talent attraction and retention
- Workforce diversity
- Operator pay rates need to be increased.
- The loss of trained and experienced employees due to retirements and the shortage of qualified replacements
- Preparing qualified candidates and partnering with educational institutions for candidate development; this takes multiple years.
- Certification and training are important.

In 2004, AWWA reported “Aging storage and distribution infrastructure is increasingly problematic and requires significant investment,” with 23% of responding utilities indicating this was a near-term issue and 31% indicating it would be a future issue. It was also reported in 2004 (all respondents), that regulatory factors and security issues were most urgent, but were being adequately addressed and had declining in concern in the future. Business factors, source water, and water storage and distribution are less critical now (2004) but are of higher future concern and less adequately being addressed.

To understand the potential impacts of several large-scale phenomena on the water industry, all SOTWI survey participants were asked to rank a list of macro-issues 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

### 2004: Reported Critical Issues

<table>
<thead>
<tr>
<th>Issue</th>
<th>Near Term</th>
<th>Future</th>
<th>Inadequately Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>33%</td>
<td>19%</td>
<td>12%</td>
</tr>
<tr>
<td>Source water supply</td>
<td>30%</td>
<td>40%</td>
<td>26%</td>
</tr>
<tr>
<td>Regulatory factors</td>
<td>29%</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>Business factors</td>
<td>27%</td>
<td>28%</td>
<td>21%</td>
</tr>
<tr>
<td>Water storage and distribution (includes aging infrastructure)</td>
<td>23%</td>
<td>31%</td>
<td>25%</td>
</tr>
</tbody>
</table>
Table 3 provides a ranking of these phenomena. Results show that water industry professionals believed all categories will have some degree of a negative impact on the water industry. Political instability, climate change/extreme weather events, terrorism and war, and pollution are expected to have the most negative impacts. Similar responses were seen in 2017 and 2016.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Phenomena</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pollution</td>
<td>1.98</td>
</tr>
<tr>
<td>2</td>
<td>War</td>
<td>2.02</td>
</tr>
<tr>
<td>2</td>
<td>Terrorism</td>
<td>2.02</td>
</tr>
<tr>
<td>3</td>
<td>Climate change / extreme weather events</td>
<td>2.03</td>
</tr>
<tr>
<td>4</td>
<td>Political instability</td>
<td>2.08</td>
</tr>
<tr>
<td>5</td>
<td>Chemical costs</td>
<td>2.14</td>
</tr>
<tr>
<td>6</td>
<td>Inflation</td>
<td>2.18</td>
</tr>
<tr>
<td>7</td>
<td>Wealth inequality</td>
<td>2.19</td>
</tr>
<tr>
<td>8</td>
<td>Labor costs</td>
<td>2.20</td>
</tr>
<tr>
<td>9</td>
<td>Social instability</td>
<td>2.21</td>
</tr>
<tr>
<td>10</td>
<td>Energy costs</td>
<td>2.31</td>
</tr>
<tr>
<td>11</td>
<td>Agriculture</td>
<td>2.38</td>
</tr>
<tr>
<td>12</td>
<td>Unemployment</td>
<td>2.48</td>
</tr>
<tr>
<td>13</td>
<td>Bond markets</td>
<td>2.50</td>
</tr>
<tr>
<td>14</td>
<td>Stock markets</td>
<td>2.61</td>
</tr>
<tr>
<td>15</td>
<td>Urbanization</td>
<td>2.69</td>
</tr>
<tr>
<td>16</td>
<td>Population growth</td>
<td>2.73</td>
</tr>
<tr>
<td>17</td>
<td>Business / industrial activities</td>
<td>2.79</td>
</tr>
<tr>
<td>18</td>
<td>Housing markets</td>
<td>2.86</td>
</tr>
</tbody>
</table>

Scale: 1 = Significant negative impact, 2 = Slight negative impact, 3 = No impact at all, 4 = Slight positive impact, 5 = Significant positive impact

The National Centers for Environmental Information (NCEI) reported that 2017 was a year of historical weather and climate disasters, reporting 16 separate weather and climate disaster events with losses exceeding $1 billion each across the United States (NCEI 2018). The cumulative cost is a record $300 billion. The full impact of these events on water utilities is not yet in the books; however, utility respondents feel that climate change/extreme weather events are significant and rated this item third on this year’s list of negatively impactful phenomena.

When asked about programs and planning, including emergency preparedness, 54% of responding utilities reported that they have emergency preparedness plans (see Table 8 on page 28 to follow); 47% have completed a vulnerability assessment in the last five years, and utility respondents (n = 685) are evenly divided (34%) on the inclusion of climate variability in risk management planning.
In general, the water industry plans, builds, operates, maintains, and replaces the typically large and expensive assets that provide water services including potable water, wastewater, stormwater, and reuse. System stewardship is how water and wastewater systems are operated, maintained, and replaced.

Viewing system stewardship from the more traditional view of asset and financial management, specific issues identified regularly through the SOTWI surveys include renewing and replacing aging infrastructure, financing for capital improvements, and cost recovery (i.e., pricing water to accurately reflect its true cost). 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 and are now facing R&R. Water system R&R can be challenging even for well-performing utilities because of capital funding restraints and limited public support for these efforts (AWWA 2012).

Full Cost Pricing

AWWA holds 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, system development charges) should be sufficient to enable utilities to provide for the full cost of service, including the following:

- annual operation and maintenance expenses
- capital costs (e.g., debt service, 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 R&R costs for treatment, storage, distribution, and collection systems. Issues related to equity and affordability must also be considered as rates are adjusted.

Full-cost pricing is a utility-specific issue defined by the specific community a utility services, so to explore the issue at this level, utility personnel were asked the following questions. Responses are provided in Figure 2.

- 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?
- 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?
Of the results in Figure 2, 8% of all respondents felt that their utilities were currently unable to cover the full cost of providing service. On a positive note, this is down from 12% in 2017, 11% in 2016, and 9% in 2015. The percentage of respondents who felt their utilities were currently fully able to cover the cost of providing services through rates and fees was 21%, which is the same reported in 2017 and 2016.

Utility personnel are perhaps still expecting challenges ahead, as the percentage of respondents who felt that their utilities would be fully able to cover the future cost of providing service was 16%, slightly down from 17% in 2017.

These data are further refined by utility size and the results can be found in Figure 3. Personnel at small and medium-sized utilities had similar responses in that both believe that 27% and 29%, respectively, are fully to very able to cover the full cost of providing services, 55% are moderately to slightly able, and 15% are not able at all to cover the full cost of providing services.
Specific to infrastructure R&R, the 2018 SOTWI survey asked all participants to rate the importance of specific R&R challenges currently facing the water industry on a scale of 1 to 5. As shown in Table 4, the most important R&R issue was “Infrastructure reliability,” with 50% of respondents rating this issue as critical (i.e., 5 on a scale of 1 to 5) followed by “Justifying R&R programs to ratepayers,” with 42% of respondents rating this issue as critical; “Justifying R&R programs to ratepayers” was also the most important R&R issue identified in the 2017 SOTWI survey.

Non-utility respondents (n = 104) felt that “Establishing and following financial policy for renewal and replacement” was the most critically important issue, followed closely by “Infrastructure reliability.”
Table 4. Renewal and replacement (R&R) challenges as ranked by all respondents (n = 865)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category</th>
<th>Score (1-5)</th>
<th>% Ranked Critically Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infrastructure reliability</td>
<td>4.4</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Justifying R&amp;R programs to ratepayers</td>
<td>4.2</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>Access to funding</td>
<td>4.2</td>
<td>42</td>
</tr>
<tr>
<td>3</td>
<td>Justifying R&amp;R programs to oversight bodies (board, council, etc.)</td>
<td>4.1</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>Emergency resilience</td>
<td>4.1</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Establishing and following financial policy for renewal and replacement</td>
<td>4.0</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Prioritizing R&amp;R needs</td>
<td>4.0</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Coordinating R&amp;R with other activities (e.g., road repair, redevelopment, etc.)</td>
<td>3.9</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>Defining and maintaining appropriate levels of service</td>
<td>3.9</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>Customer expectations</td>
<td>3.7</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>Regulatory constraints</td>
<td>3.6</td>
<td>16</td>
</tr>
</tbody>
</table>

Access to Capital

To help clarify the current financing environment for the water industry, 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 4, 52% of respondents reported that their utility’s access to capital was as good as or better than at any time in the past five years. Only 8% reported that their utility’s access to capital was as bad or worse than at any time in the past five years.

2014 | 46%
2015 | 53%
2016 | 56%
2017 | 56%

Respondents reporting that their utility’s access to capital was as good as or better than at any time in the past five years.
Figure 4. Responses (as % of total) from utility personnel regarding their opinion of their utility’s access to capital (n = 731)

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

Note: 12% of respondents indicated ‘did not know’

Changing Water Demands

Although more efficient use of water is a major goal of the industry, in areas where customer growth is slow or nonexistent, declining water use left unaddressed can decrease operating revenue and affect 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 amount of water or less water.

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 5, reveal that 32% of utility respondents reported declining total water sales (either a >10-year or <10-year trend) while 23% of respondents reported their total water sales were flat or little changed in the last 10 years.

In 2018, 29% of utility personnel reported their utility saw an increasing trend in total water sales (either a >10-year or <10-year trend), which is similar to the 30% reported in 2017 and up from 26% in 2016 and 23% in 2015.

38%

Utility respondents reporting declining per account water sales, up from 29% in 2017
Figure 5. Responses (as % of total) from utility personnel regarding their opinion of their utility’s trends in total water sales ($n = 741$)

Results from utilities regarding their trends in per account water sales are shown in Figure 6. Similar to the results for total water sales, 38% of utility respondents reported their utility was experiencing declining per account water sales (either a >10-year or <10-year trend), while 25% of respondents reported flat or little change in per account water sales. Taken together, this means that nearly 80% of utility respondents must potentially address issues associated with low or declining water demand, at least on a per account basis. Fourteen percent of utilities reported increasing per account water sales (either a >10-year or <10-year trend), which is down from 18% in 2017 and 15% in 2016.

Figure 6. Responses (as % of total) from utility personnel regarding their opinion of their utility’s trends in per account water sales ($n = 741$)

Note: 20% of utility respondents indicated ‘did not know’
Cost Recovery

Cost recovery, or the pricing of water and wastewater services to reflect their true costs and then obtaining these costs from customers, was one of two issues tied for 10th in the ranking of water industry challenges (See Table 1). To understand this more, utility staff members were asked how their utilities are responding to their cost recovery needs in the face of changing water sales and consumption patterns; results are shown in Table 5. For this question, utilities could respond to multiple approaches.

Ranking the cost recovery options, the most popular response was to shift more of the cost recovery from consumption-based fees to fixed fees within the rate structure; this was also the most popular response in 2017 and 2016. Eleven percent of the total responses indicated no changes were needed, up from 7% in 2017 and 8% in 2016.

Table 5. Responses (as % of total) from utility personnel regarding how their utilities are responding to cost recovery needs (n = 706)

<table>
<thead>
<tr>
<th>Rank (based on number of responses)</th>
<th>Category</th>
<th>Response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Shifting more of the cost recovery from consumption-based fees to fixed fees within the rate structure</td>
<td>33</td>
</tr>
<tr>
<td>2.0</td>
<td>Changes in growth-related fees (i.e., system development charges, impact fees, or capacity charges)</td>
<td>25</td>
</tr>
<tr>
<td>3.0</td>
<td>Shifting rate design to increasing-block rate structure</td>
<td>16</td>
</tr>
<tr>
<td>4.0</td>
<td>Increasing financial reserves</td>
<td>14</td>
</tr>
<tr>
<td>5.0</td>
<td>No changes needed</td>
<td>11</td>
</tr>
<tr>
<td>5.0</td>
<td>Implementing rate stabilization reserves</td>
<td>11</td>
</tr>
<tr>
<td>6.0</td>
<td>Revenue diversification</td>
<td>6</td>
</tr>
<tr>
<td>7.0</td>
<td>Incorporating seasonal rates</td>
<td>5</td>
</tr>
<tr>
<td>8.0</td>
<td>Shifting rate design to decreasing-block rate structure</td>
<td>2</td>
</tr>
</tbody>
</table>

Rate Increases

Faced with increasing capital needs and potential funding shortfalls, many utilities must increase the rates they charge for water services in the immediate future. To understand how rate increases would be perceived, utility personnel were asked, “If your utility was to consider a rate increase in the coming year, how do you think it would be received by the following groups?” The groups presented were the general public, residential customers, nonresidential customers (industrial/commercial/institutional), public officials, business leaders, and the media. Response options were very negatively, negatively, indifferently, positively, and very positively. Figure 7 summarizes the responses from 2018 SOTWI survey respondents.
Figure 7. Responses (as % of total) from utility personnel regarding their opinion of how various groups would perceive a rate increase in the coming year (n = 716)

<table>
<thead>
<tr>
<th>Rate Increase</th>
<th>General public</th>
<th>Residential customers</th>
<th>Nonresidential customers</th>
<th>Public officials</th>
<th>Business leaders</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very negatively</td>
<td>10%</td>
<td>5%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Negatively</td>
<td>20%</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Indifferently</td>
<td>40%</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Positively</td>
<td>30%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
<td>20%</td>
<td>1%</td>
</tr>
<tr>
<td>Very positively</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Above Average

How all survey respondents rated the effectiveness of the water industry’s communication or outreach to residential customers

Value of Water Systems

Public understanding of the value of water systems and services ranked 3rd on the issues facing the water industry in 2018.

68%

utility survey respondents who believe residential customers would react negatively or very negatively to a rate increase
Affordability

As water utilities consider changes to their rates and fees, it is important they keep in mind low-income consumers who may find themselves choosing between paying their water bills or buying food or paying rent.

To understand the extent of water/wastewater assistance programs, the 2018 SOTWI survey asked utility personnel whether their utility offers an affordability program to assist low-income customers pay their water and/or wastewater bills; responses are presented in Figure 8. Forty-eight percent of respondents indicated their utilities provide some form of bill assistance to low-income customers. This is up from 39% in 2017.

**Figure 8.** Responses of utility personnel on availability of payment assistance programs at their utility (n = 709)

![Affordability Programs Pie Chart]

- 30% Short-term / long term payment plan options
- 25% Low income program
- 14% Non-profits
- 7% Payment plans
- 2% In development but not implemented
- 3% No program

Note: 19% of utility respondents indicated ‘did not know’
WATER RESOURCE MANAGEMENT

Respondents highly rated several issues related to water resources management in the 2018 SOTWI survey (as shown in Table 2), including “Long-term water supply availability” (fourth most important issue), “Drought or periodic water shortages” (19th most important issue), and “Water conservation/efficiency” (21st most important issue), as well as other topics (e.g., desalination, climate change, water reuse). The following sections explore these and other areas in greater detail.

Long-Term Water Supply Availability

To understand the issue of long-term water supply availability, utility personnel were asked,

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

The summary presented in Figure 9 shows that 6% 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), down from 10% in 2017, and 7% in 2016. In addition, 67% of respondents indicated that their utilities are very or fully prepared, up from 57% and 58% in 2017 and 2016, respectively. One percent of respondents indicated their utilities were not at all prepared to meet their long-term water supply needs.

The ability to meet long-term needs (i.e., respondents who are very or fully prepared) were also reviewed by region as shown in Figure 10.

Figure 9. Responses from utility personnel regarding their opinion of how prepared their utility is to meet long-term water supply needs (n = 689)

![Pie chart showing the distribution of responses to the question: How prepared do you think your utility will be to meet its long-term water supply needs?]

Note: 1% of respondents indicated ‘did not know’
Figure 10. Responses by region from utility personnel regarding how very to fully prepared their utility is to meet long-term water supply needs (n = 689)

Near-Term Water Supply

Shifting from long-term to near-term water supply, water systems are dramatically affected by shortages resulting from drought, the severity of which will likely be influenced by climate change moving forward.

Drought and Water Shortages

To gauge the extent of water shortages, utility personnel were asked how many years in the last decade their utilities had implemented voluntary or mandatory water restrictions. The responses summarized in Figure 11 reveal that 65% of responding utilities have instituted mandatory restrictions zero to one years in the past decade, and 53% have implemented voluntary water restrictions zero to one years in the past decade. Thirteen percent of utility personnel responding indicated their utilities had five or more years of voluntary restrictions and 10% had five or more years of mandatory restrictions in the past decade. Figure 12 shows the states having imposed mandatory water restriction 5 or more years in the last decade.

Figure 11. Mandatory and voluntary water restrictions imposed in the past decade (n = 686)
Figure 12. Mandatory water restrictions imposed in the past decade by state/region.
As communities evaluate their water shortage preparedness, it is also an opportunity to gain an overall better understanding of regional water supply sustainability. 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, nonpotable reuse, potable reuse, and stormwater capture and reuse. The responses are found in Figure 13, which shows that augmentation of water supplies is not a concern for the majority of respondents.

Although water restrictions can be a useful short-term management tool, most utility-sponsored water conservation programs emphasize lasting long-term improvements in water use efficiency while maintaining quality of life standards.

In order to understand the status of conservation planning at water utilities, the 2018 SOTWI survey asked respondents whether their utility has any type of water conservation programs. The survey indicated that 49% of all utility respondents have a fully developed drought management or water shortage contingency plan. Data show large and very large utilities in the northwest, southwest, and southeast are leading in this effort (n = 695).

In addition to water conservation, another nontraditional source of water supply is seawater or brackish groundwater. Utility participants were asked whether their utilities were considering desalination of either brackish groundwater or seawater to augment existing drinking water supplies. Of the 686 responses, 12% responded that their utility is considering some sort of desalination project, while 7% responded that their utility currently already has something implemented.

The largest shift from 2017 can be seen in potable reuse. In 2017, 12% of utility respondents (n = 698) indicated they were considering indirect potable reuse and 5% had fully implemented processes. In 2018, the percent considering indirect potable reuse increased to 21%, and 5% have fully implemented processes.

Direct potable reuse consideration also saw an increase from 8% to 13% between 2017 and 2018 (n = 699 and n = 683, respectively).

In addition to domestic wastewater reclamation, several utilities have explored capturing, treating, and reusing stormwater specifically to augment potable water supplies. Of the 686 responses collected through the 2018 SOTWI survey in this area, 10% of utilities are considering a stormwater reuse project while approximately 1% already have something implemented.
Figure 13. Responses from utility personnel regarding whether their utilities are considering augmenting water supplies with desalination, reuse, and/or stormwater recovery (n = 685)

Note: Percentages reflect utilities considering augmentation method only if applicable.
The importance of current and future regulatory compliance was rated higher in the 2018 SOTWI survey than in 2017. Referring to Table 1, “Compliance with current regulations” was rated 14th in importance and “Compliance with future regulations” was rated 16th in the current survey.

All survey participants were asked about their levels of concern regarding the water industry’s ability to comply with current regulations, and their responses are summarized in Table 6. Scores are on a scale of 1 to 5, where 1 is “not at all concerned” and 5 is “extremely concerned.”

Current regulations regarding nonpoint source pollution and disinfection byproducts were the top two concerns identified in 2018.

**Table 6. Current regulatory concerns of the water industry (n = 855)**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Current Regulatory Concern</th>
<th>Weighted Average</th>
<th>% Ranked Extremely Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nonpoint source pollution</td>
<td>3.05</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Disinfection byproducts</td>
<td>2.94</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Chemical spills</td>
<td>2.90</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Point source pollution</td>
<td>2.88</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Lead and copper</td>
<td>2.83</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Nutrient removals</td>
<td>2.81</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>Pathogens</td>
<td>2.80</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Combined sewer overflows</td>
<td>2.64</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>Per- and polyfluoroalkyl substances such as PFOA and PFOS</td>
<td>2.49</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Arsenic</td>
<td>2.48</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>Radionuclides</td>
<td>2.33</td>
<td>12</td>
</tr>
</tbody>
</table>

**Drinking Water Utilities**

Top five concerns rated very to extremely concerned (n = 387):

1. Nonpoint source pollution
2. Chemical spills
3. Disinfection byproducts
4. Point source pollution
5. Pathogens

**Combined Utilities**

Top five concerns rated very to extremely concerned (n = 446):

1. Nonpoint source pollution
2. Nutrient removals
3. Combined sewer overflows
4. Disinfection byproducts
5. Chemical spills
Communications

Effectively communicating infrastructure and water supply challenges to customers and key decision-makers is vital, and the water industry has tried collectively to inform the public of the value of water services and resources for decades.

To explore the perceptions of communication with various groups, the 2018 SOTWI survey asked utility and non-utility personnel the following:

- How would you rate the effectiveness of the water industry’s/ your utility’s communication or outreach to the following groups?

These data were broken out by utility and non-utility respondents with little difference. As shown in Table 7, the water industry believes they have an above average effectiveness with communication efforts with regulators and ratepayers; however, the struggles indicated previously in this report related to rates and full cost recovery would indicate otherwise.

Table 7. Opinion of all respondents on the effectiveness of communication efforts to select groups (n = 904)

<table>
<thead>
<tr>
<th>Group</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>General public</td>
<td>Below Average</td>
</tr>
<tr>
<td>Residential customers</td>
<td>Average</td>
</tr>
<tr>
<td>Nonresidential customers</td>
<td>Average</td>
</tr>
<tr>
<td>Public officials</td>
<td>Above Average</td>
</tr>
<tr>
<td>Federal regulators</td>
<td>Above Average</td>
</tr>
<tr>
<td>State/local regulators</td>
<td>Above Average</td>
</tr>
<tr>
<td>Business leaders</td>
<td>Above Average</td>
</tr>
<tr>
<td>Media</td>
<td>Above Average</td>
</tr>
<tr>
<td>Youth</td>
<td>Below Average</td>
</tr>
</tbody>
</table>

Public Outreach

Ranking of water industry issues (See Table 2)

#3 – Public understanding of the value of water systems and services
#5 – Public understanding of the value of water
#8 – Public acceptance of future water and wastewater rate increases
The 2018 SOWTI survey also asked utilities “How would you rate the effectiveness of the water industry to communicate the difference between cost of service and rates?” Overall utility respondents (n = 729) believe they are doing a poor job communicating this difference.

Respondents also provided insight on communication and stakeholder involvement issues when asked if there were any other industry challenges rating at least “very important” but were not listed. The following are relevant responses from this open-ended question:

- Upper management understanding utility needs and being supportive of decisions that have to be met due to state or federal government mandates
- Communication skills of utility directors to educate, inform, and develop consensus to support our infrastructure locally and nationally
- Customer perception of tap water quality
- Customer understanding of risk (risk communications)
- It’s critical that the boards and councils understand there is not another service you can deliver to someone’s door 24/7 without fail for pennies but it costs almost nothing.

### Plans and Programs

All utility participants were asked whether their utility had not considered, considered, partially implemented, or fully implemented the plans and/or programs for improved utility performance. Table 8 is a listing of those plans and programs and participant responses. Responses are ranked by percent fully implemented. Percent of respondents working on implementation are included for reference.

The challenge of infrastructure R&R is shown in Table 8 and further echoes throughout this report. Regarding the role of asset management planning, as indicated in this survey, 30% of respondents have fully implemented an asset management plan; however, this number increases to 48% of responding utilities that are in progress of implementing a program.

Emergency preparedness is ranked second, with 54% of utilities reporting they have fully implemented an emergency response plan. When asked the following,

- Has your utility completed a vulnerability assessment?
- Does your utility include potential impacts from climate variability in your risk management or planning processes?

47% said they have completed a vulnerability assessment in the last one to five years, and utility respondents (n = 685) are evenly divided (34%) on the inclusion of climate variability in risk management planning.
Table 8. Utility implementation of plans and programs (n = 700)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Plan/Program</th>
<th>% of Respondents with Fully Implemented Plans/Programs</th>
<th>% of Respondents Indicating Implementation Is in Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capital improvement plan</td>
<td>62</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>Emergency preparedness plan</td>
<td>54</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>Financial plan</td>
<td>50</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Water conservation program</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>Drought management / water shortage contingency plan</td>
<td>49</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>Master plan</td>
<td>47</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>Groundwater management plan</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>Water loss control program</td>
<td>35</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>CSO / SSO plans</td>
<td>33</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>Asset management plan</td>
<td>30</td>
<td>48</td>
</tr>
<tr>
<td>10</td>
<td>I/I plan</td>
<td>26</td>
<td>31</td>
</tr>
</tbody>
</table>

CSO—collection system overflow, I/I—inflow and infiltration, SSO—sanitary sewer overflow

46% Utility respondents reporting they do not have a lateral replacement program in place (n = 408)

37% Utility respondents reporting they do not have a lead service line replacement program in place (n = 456)

“Public portion of lateral is replaced by utility. Private portion replaced by customer. There is no program to assist customers. Public portion of lateral is replaced when problems are found or as part of our continuous sewer renewal and replacement program, which has been ongoing for many years and will continue for the foreseeable future.” —2018 SOTWI Respondent
Technology Implementation and Data Management

Cloud, SCADA, Internet of Things (IoT), and enterprise systems are informational and process technologies that are available to better understand operations and maintenance activities. The cost–benefit of these technologies is not always understood. To gauge the level of investment the water industry has made in both process and informational technologies, the 2018 SOTWI survey asked whether utilities were planning, revising, or assessing information technology (IT) needs for 17 categories. Findings are summarized in Table 9.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Technology</th>
<th>% of Utilities Fully Implemented</th>
<th>% of Utilities With Implementation in Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCADA</td>
<td>79</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>GIS</td>
<td>64</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Hydraulic models</td>
<td>53</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>Billing services</td>
<td>46</td>
<td>31</td>
</tr>
<tr>
<td>5</td>
<td>Maintenance management system</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>AMR</td>
<td>37</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>Productivity (e.g., email, file sharing)</td>
<td>37</td>
<td>33</td>
</tr>
<tr>
<td>7</td>
<td>Treatment plant</td>
<td>34</td>
<td>43</td>
</tr>
<tr>
<td>8</td>
<td>Customer information systems</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td>9</td>
<td>Cyber intrusion</td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>Enterprise management software</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>Mobile-based applications</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>11</td>
<td>Meter reading</td>
<td>29</td>
<td>47</td>
</tr>
<tr>
<td>12</td>
<td>Data management</td>
<td>22</td>
<td>49</td>
</tr>
<tr>
<td>13</td>
<td>Distribution / collection system operation and optimization</td>
<td>21</td>
<td>43</td>
</tr>
<tr>
<td>14</td>
<td>AMI</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>Cloud-based applications</td>
<td>17</td>
<td>30</td>
</tr>
</tbody>
</table>

AMI—advanced metering infrastructure, AMR—automatic meter reading, GIS—geographic information system, SCADA—supervisory control and data acquisition

% of Small Utilities with full implementation (n = 66):

- 55% SCADA
- 48% billing services
- 35% meter reading

% of Medium Utilities with full implementation (n = 125):

- 71% SCADA
- 52% billing services
- 48% GIS

% of Large Utilities with full implementation (n = 336):

- 82% SCADA
- 67% GIS
- 57% hydraulic models

% of Very Large Utilities with full implementation (n = 217):

- 87% SCADA
- 79% GIS
- 65% hydraulic models
As we progress further into the era of “big data” or IoT, water and wastewater utilities can collect and analyze large quantities of information about their systems and customers. 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 14.

- 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 14.** Utility use of data mining techniques for improved customer and system operations and maintenance (O&M) understanding (n = 676)
This year’s SOTWI took a high-level look at how utility respondents felt about innovation at their utility. The survey asked,

- In your opinion, what are the barriers to innovation at your utility? Choose all that apply.

More than half of respondents believe that economics is the largest barrier to innovation at their utility. Figure 15 shows how utility personnel responded.

Figure 15. Opinion of utility personnel on barriers to innovation (n = 679)

Other (please specify) – Culture of Innovation

When asked if there were any barriers to innovation not listed, a large number responded with the following:

“Innovation is not actively encouraged.”
“Lack of innovative thinking.”
“Need more openness to new ideas from new employees and other agencies.”
“[Our] utility is innovative and incorporates that mindset into the utility culture.”
“Limited resources (personnel/time) to pursue innovation.”
DEMOGRAPHICS

Table 10 shows the total number of respondents based on their designated current career. The “Technical services” and “Reuse utility” categories did not receive any responses. Eighty-nine percent of respondents \((n = 863)\) indicated they worked for a utility, while 11% \((n = 104)\) were not directly employed by a utility. Utility workers consist of the following career categories: drinking water utility, wastewater utility, combined water/wastewater utility, water wholesaler, reuse/reclamation utility, and stormwater utility.

<table>
<thead>
<tr>
<th>Career Category</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined water/wastewater utility</td>
<td>446</td>
</tr>
<tr>
<td>Drinking water utility</td>
<td>387</td>
</tr>
<tr>
<td>Consultant</td>
<td>43</td>
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<tr>
<td>Water wholesaler</td>
<td>15</td>
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<tr>
<td>Retired</td>
<td>14</td>
</tr>
<tr>
<td>Wastewater utility</td>
<td>13</td>
</tr>
<tr>
<td>Non-utility government</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
</tr>
<tr>
<td>Contractor</td>
<td>7</td>
</tr>
<tr>
<td>Regulator</td>
<td>5</td>
</tr>
<tr>
<td>Educational institution</td>
<td>5</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>4</td>
</tr>
<tr>
<td>Stormwater utility</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 16. Respondents by gender \((n = 761)\)

Survey respondents who are young professionals less than 35 years of age and/or with less than five years in the water industry.
Figure 17. Demographics: age and time in the water industry ($n = 758$)

Figure 18. Demographics: utility respondents by utility size ($n = 863$)
Figure 19. Demographics: respondents by region (n = 967)
REFERENCES


METHODOLOGY

The SOWTI survey population includes all water professionals—i.e., those with a working understanding of the issues facing the entire water industry. The SOTWI survey classifies participants on the basis of which of the following 15 categories best describes the type of organization for which 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 (including products, representatives, and/or distributors)
- Technical services/contractor
- Regulatory authority/regulator
- Non-utility government (e.g., municipal, federal)
- University/educational institution
- Nonprofit organization
- Retired
- Other (please specify)

AWWA made deliberate efforts throughout the 2018 SOTWI study to anticipate and minimize errors from coverage, sampling, nonresponse, and measurement. The 2018 SOTWI sample frame consisted of a general list of AWWA members and contacts. The survey primarily reflects water industry concerns in the United States, Canada, and Mexico.

The sample for the 2018 SOTWI survey was distributed with the goal of providing uniform responses from states and provinces. To avoid bias, AWWA membership was not considered in the survey distribution. The survey was sent to members and nonmembers alike.

On Sept. 18, 2017, initial e-mail invitations were delivered to more than 27,000 e-mail addresses (excluding bounces), on the basis of the criteria described. Subsequently six follow-up e-mails were sent to this same group between September 18 and November 18, 2018. After removing wholly incomplete responses (i.e., surveys submitted with no responses at all), the total number of 2018 SOTWI survey respondents was 967. See Appendix 1 for all the 2018 SOTWI survey questions.
SURVEY FINDINGS

Demographics
1. Total number of surveys received: 1,053 (86 surveys with no responses)
2. Total number of respondents submitting partially and fully completed surveys: 967
3. 79% of respondents were at publicly owned utilities
4. Utility respondents: 8% small / 15% medium / 38% large / 25% very large as defined by the US Environmental Protection Agency
5. Male/female ratio 3.4:1
6. 21% young professionals as defined by <5 years in the water industry and <35 years of age
7. Experienced sample set, with 53% of respondents having ≥20 years in the water sector and 78% of respondents having ≥11 years in the water sector
8. Small non-United States sample, with <2% respondents from Canada/Mexico/Puerto Rico; information was not broken out in this report
9. Non-utility respondents \( n = 104 \), 11% of total

Health of the industry and issues
1. Regarding overall health of the sector, the 2018 score is 4.47, which is a slight uptick from 2017; there is still an overall decline over 15 years of the SOTWI survey.
2. The top five issues in 2018 are: R&R of aging infrastructure, financing for capital improvements, public understanding of the value of water systems and services, long-term water supply availability, and public understanding of the value of water.
3. This is the fifth year in a row where the top five issues being reported remain the same.
4. Taking into account the numerous extreme weather events in 2017, it was surprising that emergency preparedness dropped as a concern; however, 54% of utility respondents have an emergency preparedness plan.

Communications
1. Overall, the effectiveness of the water industry to perform outreach and communication is felt to be average to slightly above average with the public, customers, public officials, and regulators.
2. No utility respondents felt the industry was not doing well communicating with federal regulators.
3. All respondents agreed there is room for improvement with business leaders, media, and youth.

Issues impacting R&R
1. Utility respondents indicated the top five issues in order of importance and criticality that affect R&R are infrastructure reliability, justifying R&R programs to ratepayers, access to funding, justifying R&R programs to oversight bodies, and emergency resilience.
2. Non-utility respondents indicated the top five issues in order of importance and criticality that affect R&R are establishing and following financial policy for R&R, infrastructure reliability, justifying programs to ratepayers, access to funding, and justifying R&R programs to oversight bodies such as boards or councils.
3. Combined utility and non-utility respondents agree that reliability, justifying programs, and access to funding are critical.

Regulatory compliance
1. Utility and non-utility respondents are overall not worried about the industry’s ability to comply with current regulations.
2. The top 5 issues of all respondents are as follows:
a. All respondents: nonpoint source pollution  
b. Utilities only: nonpoint source pollution  
c. Non-utilities: nonpoint source pollution  
d. Drinking water utilities only: nonpoint source pollution  
e. Wastewater utilities only: pathogens  

Macro socio factors  
1. All factors presented were considered to have a negative impact.  
2. The top five responses considered to have a slightly to significantly negative impact were pollution, terrorism, war, climate change/extreme weather events, and political instability.  
3. Utilities’ top five factors considered to have a slightly to significantly negative impact were pollution, terrorism, war, climate change/extreme weather events, and political instability.  
4. Non-utilities’ top five factors considered to have a slightly to significantly negative impact were wealth inequality, political instability, pollution, war, and climate change/extreme weather events.  

Financials  
1. 52% of respondents (n = 731) feel their access to capital is as good or better than any time in the past five years, up slightly from 49% reported in 2017 and comparable to 56% in 2016 and 53% in 2015.  
2. Respondents agreed that a rate increase would be negatively received by all stakeholders.  
3. Although all respondents believe they are doing an average to above average job of communicating to stakeholders, they also indicate that stakeholders would not look favorably on a rate increase.  
4. 54% of utility personnel reported their utilities are currently moderately or completely unable to cover the full cost of providing services, including R&R and expansion needs, through customer rates and fees. This increased slightly to 58% when respondents considered the full cost of service in the future. Notably, 8% of respondents felt that their utilities were currently not at all able to cover the full cost of providing service. These levels are very similar to those observed in recent years.  
5. The most important issue in infrastructure R&R was “Justifying R&R programs to ratepayers,” with 39% of respondents rating this as a critical issue. Other important R&R issues included establishing and following a financial policy for capital reinvestment, prioritizing R&R needs, and justifying R&R programs to oversight bodies such as a board or council.  

Affordability programs  
1. 48% (n = 709) of utility respondents offer a type of affordability program to assist low-income customers pay their water and/or wastewater bills.  
2. In aggregate, 30% (n = 709) of utility respondents offer no affordability program to assist low-income customers pay their water and/or wastewater bills.  
3. A further breakdown of this item shows that many utilities have no programs: of utility respondents (n = 709) small (67%), medium (51%), large (30%), very large (10%).  

Lead and lateral replacement programs  
1. 46% of utility respondents (n = 408) indicate have no sewer lateral replacement program in place.  
2. 51% of utility respondents (n = 408) have some type of sewer lateral replacement policy with 23% of these respondents indicating it is the responsibility of homeowners.  
3. 37% of utility respondents (n = 456) have no lead service line program in place.  
4. 54% (n = 456) have some type of lead replacement program. Breaking this group down further, 19% of these respondents support a utility-funded replacement program and 17% indicating it is the responsibility of homeowners.
Programs and planning
1. The top 10 ranking in order of the percentage of respondents reporting they have a fully implemented program are capital improvement plan, emergency preparedness and response, financial plan, water conservation plan, drought management plan, master plan, groundwater management plan, water loss control plan, combined sewer overflow/sanitary sewer overflow plan, and asset management plan.

Emergency preparedness and response
1. 55% of utility respondents \((n = 635)\) have performed a vulnerability assessment (VA) in the last five years, with 8% having completed a VA in the last year. Those same respondents are evenly split on whether to include or not include climate variability in their assessment efforts.
2. 54% \((n = 700)\) have a fully implemented emergency preparedness and response plan.

Water resources planning
1. When asked how prepared they are to meet long-term water supply needs, 67% of responding utilities \((n = 689)\) stated they are very to fully prepared and 1% felt they were not prepared to meet long-term supply needs.
2. In the last decade, 54% of responding utilities \((n = 686)\) have not had to implement mandatory water restrictions, while 10% have implemented mandatory restrictions five or more years.
3. Of utility respondents \((n = 686)\), 6% are considering desalination of brackish groundwater to augment existing drinking water supplies. Five percent of those utility respondent have fully implemented desalination of brackish groundwater. The majority of those utilities with full implementation are located in Florida and California, with several in Georgia, Kansas, North Carolina, South Carolina, Texas, and Virginia.
4. Of utility respondents \((n = 685)\), 6% are considering desalination of seawater to augment existing drinking water supplies. Two percent of those utility respondent have fully implemented desalination of seawater; those utilities with full implementation are located in Florida, Pennsylvania, Canada, and California.
5. The 2018 SOTWI noted an increase in utilities considering indirect potable reuse to augment drinking water supplies. Utility respondents \((n = 685)\) indicated that 21% are considering indirect potable reuse to augment existing drinking water supplies and 5% have a fully implemented process. In 2017, 12% of utility respondents \((n = 698)\) indicated they were considering indirect potable reuse and 5% had fully implemented processes.
6. Direct potable reuse consideration also saw an increase from 8% to 13% from 2017 to 2018 \((n = 699\) and \(n = 683\), respectively).
7. The survey indicated that 49% of all utility respondents have a fully developed drought management or water shortage contingency plan. Data show large and very large utilities in the northwest, southwest, and southeast are leading in this effort \((n = 695)\).
8. Of the 686 responses collected through the 2018 SOTWI survey in this area, 10% responded that their utilities are considering a stormwater reuse project while approximately 1% responded that their utilities already have something implemented.

Innovation
1. 62% of respondents \((n = 679)\) felt economics was the largest barrier to innovation at their utility, followed by regulatory constraints (37%) and risk concerns (37%).
2. Interestingly, 16% felt there were other reasons; a culture of innovation was the most popular reason cited.

Data management
1. 79% of utility respondents \((n = 679)\) have fully implemented SCADA with an additional 17% in progress of implementation. SCADA is top priority for utilities of all sizes.
2. Other top priorities in this category include fully implemented GIS (64%) and hydraulic modeling (53%).
3. Taking into account all utility respondents, advanced metering infrastructure (AMI) (17%, \( n = 656 \)) and cloud-based applications (17%, \( n = 665 \)) were a low priority.

4. 49% of utility respondents (\( n = 673 \)) are in the process of implementing data management capabilities.

5. Both small utilities (\( n = 66 \)) and medium utilities (\( n = 125 \)) indicated that SCADA and customer billing were the top two areas of technology commitment. The bottom is rounded out by AMI and cloud-based applications.

6. Both large utilities (\( n = 336 \)) and very large utilities (\( n = 217 \)) responding have indicated fully implemented SCADA and GIS. Both sizes of utilities have indicated that AMI and cloud-based applications are at the bottom of their priorities.

7. Of those responding from very large utilities (\( n = 217 \)), fully implemented data management fell at the very bottom of the list of priorities with only 17% having implemented any data management practices. The responses also indicated that a large number (65%) are in progress of implementing data management capabilities.

8. Overall, data mining techniques are not used to better understand customers or water and/or wastewater systems.
LIST OF FIGURES

Figure 1. Opinion of all respondents on the overall state of the water industry 2004–2018 (n = 967)

Figure 2. Assessment by utility respondents of their utility’s ability to cover the full cost of providing services and in the future (n = 746)

Figure 3. Assessment by utility respondents of their utility’s current ability to cover the full cost of providing services by utility size (n = 746)

Figure 4. Responses (as % of total) from utility personnel regarding their opinion of their utility’s access to capital (n = 731)

Figure 5. Responses (as % of total) from utility personnel regarding their opinion of their utility’s trends in total water sales (n = 741)

Figure 6. Responses (as % of total) from utility personnel regarding their opinion of their utility’s trends in per account water sales (n = 741)

Figure 7. Responses (as % of total) from utility personnel regarding their opinion of how various groups would perceive a rate increase in the coming year (n = 716)

Figure 8. Responses of utility personnel on availability of payment assistance programs at their utility (n = 709)

Figure 9. Responses from utility personnel regarding their opinion of how prepared their utility is to meet long-term water supply needs (n = 689)

Figure 10. Responses by region from utility personnel regarding how very to fully prepared their utility is to meet long-term water supply needs (n = 689)

Figure 11. Mandatory and voluntary water restrictions imposed in the past decade (n = 686)

Figure 12. Mandatory water restrictions imposed in the past decade by state/region

Figure 13. Responses from utility personnel regarding whether their utilities are considering augmenting water supplies with desalination, reuse, and/or stormwater recovery (n = 685)

Figure 14. Utility use of data mining techniques for improved customer and system operations and maintenance (O&M) understanding (n = 676)

Figure 15. Opinion of utility personnel on barriers to innovation (n = 679)

Figure 16. Respondents by gender (n = 761)

Figure 17. Demographics: age and time in the water industry (n = 758)

Figure 18. Demographics: utility respondents by utility size (n = 863)

Figure 19. Demographics: respondents by region (n = 967)
LIST OF TABLES

Table 1. Issues facing the water industry in 2018 as ranked by all respondents (n = 821)
Table 2. Top 10 issues facing the water industry as ranked by all respondents, 2014–2018
Table 3. Potential impacts of macro-scale phenomena on water industry (n = 840)
Table 4. Renewal and replacement (R&R) challenges as ranked by all respondents (n = 865)
Table 5. Responses (as % of total) from utility personnel regarding how their utilities are responding to cost recovery needs (n = 706)
Table 6. Current regulatory concerns of the water industry (n = 855)
Table 7. Opinion of all respondents on the effectiveness of communication efforts to select groups (n = 904)
Table 8. Utility implementation of plans and programs (n = 700)
Table 9. Utilities reporting fully implemented technologies and/or implementation is in progress (n = 676)
Table 10. Number of respondents by career category (n = 967)
APPENDIX 1
2018 AWWA State of the Water Industry Survey

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 water, the world's most important resource.

Q1: *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.

Outside of North America - please specify:

Q2: *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 (including Products, Representatives, and/or Distributors)
- Technical Services/Contractor
- Regulatory Authority/Regulator
- Non-utility Government (municipal, federal, etc.)
- University/Educational institution
- Nonprofit Organization
- Retired
- Other (please specify)

Q3: 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

Q4: 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

Q5: 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

Q6: 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
Q7- Q9: Please rate the importance of the following industry challenges on a scale of 1 (unimportant) to 5 (critically important). [page 1 of 3]

1 = Unimportant 2 = Slightly important 3 = Important 4 = Very important 5 = Critical No opinion/don't know

PAGE 1
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
Water rights
Financing for water research

PAGE 2
Long-term water supply availability
Public understanding of the value of water resources
Groundwater management and overuse
Energy use/efficiency and cost
Renewal & replacement of aging water and wastewater infrastructure
Emergency preparedness
Asset management
Climate risk and resiliency
Water loss control
Water quality issues from premise plumbing systems

PAGE 3
Drought or periodic water shortages
Talent attraction and retention
Certification and training
Public acceptance of future water and wastewater rate increases
Governing board acceptance of future water and wastewater rate increases
Cost recovery (pricing water to accurately reflect the cost of service)
Compliance with current regulations
Compliance with future regulations
Physical security issues
Cyber-security issues

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

Q10: How would you rate the effectiveness of the water industry’s communication or outreach to the following groups?
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
Federal Regulators
State/Local Regulators
Business leaders
Media
Youth

Q11: How would you rate the effectiveness of the water industry to communicate the difference between cost of service and rates?
Q12: Infrastructure renewal and replacement (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? [page 1 of 2]

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
Financing renewal and replacement
Access to funding
Regulatory constraints
Customer expectations
Infrastructure reliability
Emergency resilience
Maintaining 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):

Q13: How concerned are you over the ability of the water sector to comply with current regulations in the following areas?

1 = Not at all concerned, 2 = Slightly concerned, 3 = Moderately concerned, 4 = Very concerned, 5 = Extremely concerned Don’t know

Lead and copper
Per- and polyfluoroalkyl substances such as PFOA and PFOS
Arsenic
Disinfection byproducts
Pathogens
Combined sewer overflows
Point source pollution
Chemical spills
Radionuclides
Nutrient removals
Non-point source pollution

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

Q14 – Q16: What impact (positive or negative) do you think the following large-scale phenomena will have on the overall water industry in 2018? [page 1 of 2]

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 Costs
Agriculture
Political Instability
Social Instability

Inflation
Climate change/Extreme weather events
Population growth
Terrorism
War
Pollution
Urbanization
Chemical costs
Labor costs
Wealth inequality

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

Q53: What is your age?
Younger than 25
25-34
35-44
45-54
55-64
65 and older
Prefer not to answer

Q54: What is your gender?
Male
Female

Q55: What is your time in the water industry?
Less than 5 years
6 – 10 years
11 – 20 years
20 + years

End for non-utility career groups; the following question-sets are provided to the submitters based upon the answer to Q2.

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

Q16: Is the utility you work for publicly or privately owned?
1 = Publicly owned 2 = Privately/investor owned

Q17: Please select your utility’s number of connections (drinking water OR collection system). If your utility provides both water and wastewater services, use the service with the greater number of connections (drinking water OR collection system)
The number of connections can be estimated by (population served)/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

Q18: Is your utility currently able to cover the full cost of providing service(s), 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

Q19: Given your utility’s future infrastructure needs for renewal & 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?  
1 = Not at all able  2 = Slightly able  3 = Moderately able  4 = Very able 5=Fully able  No opinion/don’t know

Q20: Which of the following best describes any trend in your utility’s total water sales?  
Not applicable  
- >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  
Don’t know

Q21: Which of the following best describes your utility’s trend in per account water sales?  
Not applicable  
- >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  
Don’t know

Q22: How is your utility responding to its cost recovery needs in the face of changing water sales/consumption patterns? (choose all that apply)  
Not applicable  
- 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  
Don’t know  
Other (please specify)

Q23: If you can make an assessment, how would you rate your utility’s current access to financial 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

Q24: How would you rate the effectiveness of your utility’s communication or outreach to the following groups?  
1 = Very poor/none  2 = Poor  3 = Average  4 = Good  5 = Very good  Don’t know  
General Public  
Residential customers  
Nonresidential customers (industrial/commercial/institutional)  
Public officials  
Federal Regulators  
State/Local Regulators  
Business leaders  
Media  
Youth

Q25: If your utility was to consider a rate increase in the coming year, how do you think it would be received by following groups?  
1 = Very negatively  2 = Negatively  3 = Indifferently  4 = Positively  5 = Very Positively
General Public
Residential customers
Nonresidential customers (industrial/commercial/institutional)
Public officials
Business leaders
Media

Q26: Does your utility offer an affordability program to assist low-income customers pay their water and/or wastewater bills?
- Not applicable
- Short-term / long-term payment plan options
- Low income program
- Non-profits
- Payment plans
- In development but not implemented
- No program
- Don’t know

Q27: Does your utility have a sewer lateral replacement program?
Drop down:
- Other (Please specify):

Q28: Does your utility have a lead service line replacement program?
Drop down:
- Other (Please specify):

Q29: Has your utility considered and/or implemented any of the following plans or programs?
- Fully implemented
- Implementation in progress
- Interested
- Not applicable
- Don’t know
- Master plan
- Financial plan
- Asset management program
- Capital improvement plan (CIP)
- Emergency preparedness and response plan
- Water loss control program
- I/I control program
- Water conservation program
- CSO / SSO plans
- Drought management or water shortage contingency plan
- Groundwater management plan

Q30: Has your utility completed a vulnerability assessment?
Dropdown: 0 Years, 1-5 years, 6-10 years

Q31: Does your utility include potential impacts from climate variability in your risk management or planning processes?
Dropdown: Yes, No, In development but not implemented, Don’t know

Q32: 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

Q33: How many years in the last decade has your utility implemented voluntary water restrictions? Change years to 5+
Q34: How many years in the last decade has your utility implemented mandatory water restrictions?
Drop down: 0, 1 year, 2-4 years, >5 years

Q35: Is your utility considering any of the following to augment existing drinking water supplies?
Not applicable Yes No In development but not implemented Fully implemented Don’t know
- Desalination of brackish groundwater
- Desalination of seawater
- Indirect potable reuse
- Direct potable reuse
- Urban stormwater recovery for nonpotable or potable reuse

Q36: In your opinion, what are the barriers to innovation at your utility? Choose all that apply.
- Economics
- Regulatory constraints
- Risk concerns
- Limited performance data
- More research is needed
- Utility is not interested
- Don’t know
- Other (please specify)

Q37: Is your utility planning, revising, or assessing IT needs for the following:
Fully implemented Implementation in progress Interested Not applicable Don’t know
- Treatment plant
- Meter reading
- Distribution / collection system operation and optimization
- Data management
- Billing services
- Customer information systems
- Productivity (e.g. email, file sharing)
- Cyber intrusion

Q38: Does your utility currently use or have plans to implement the following technology?
Fully implemented Implementation in progress Interested Not applicable Don’t know
- Hydraulic models
- Enterprise management software
- SCADA
- Maintenance management systems
- Mobile-based applications
- AMR
- AMI
- Cloud-based applications

Q39: Is your utility using data mining techniques to better understand its customers?
- Yes
- No
- In development but not implemented
- Don’t know

Q40: 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
Thank you for participating in the 2017 State of the Water Industry Survey. Your answers will be submitted to AWWA by clicking the submit button below. To see past results go to awwa.org and search for State of the Water Industry.

Results and analysis will be available online in Spring of 2016, as well as in the June 2018 edition of the Journal - American Water Works Association.

Thanks again for your time and responses,

Dawn M. Flancher, PE
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American Water Works Association