INSIDE

The State of the Water Industry (SOTWI) survey provides a glimpse into the challenges and opportunities water professionals face in providing safe drinking water and discharging clean water to the environment. As in previous years, this survey investigated the perception of the health of the water industry from the perspective of utility and non-utility respondents, explored water industry challenges and concerns, identified potential impacts of those challenges and concerns, and outlined practices to help with the challenges. This year’s survey snapshot is on cybersecurity.

We thank the 2,048 respondents for taking time to share their views. These views are important and serve to not only 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.

For the second year, SOTWI respondents indicated optimism regarding the health of the water industry. Participants believed the 2019 health of the water industry was 4.85 (on a scale of 1 to 7, where 1 = not at all sound and 7 = very sound). This indicator had been on a general decline since the first SOTWI survey in 2004. The optimism, however, did not extend to respondents’ feelings about the industry’s issues and challenges, and they indicated that aging infrastructure and infrastructure funding were still the most pressing issues, and access to capital had become more difficult. Extreme weather events were a critical concern, and the survey noted that utilities are engaging in planning and preparing for all that Mother Nature might bring.

The survey also looked at water affordability and utility assistance programs amidst full-cost pricing efforts to pay for the renewal and replacement of infrastructure. A short case study on the water affordability efforts in Atlanta, Georgia, where 50% are at or below poverty, is included in this report. It is a success story of a major city taking risks for a win-win.

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 feedback. You can reach us at research@awwa.org.
EXECUTIVE SUMMARY

Since its inception in 2004, the State of the Water Industry (SOTWI) survey has focused on three primary objectives:

- To develop valuable insights regarding key water industry issues
- To identify important issues not being adequately addressed in order to raise awareness and assign a higher industry priority for these issues
- To identify and track significant industry trends

In addition to these objectives, the SOTWI survey is fundamentally focused on using the data collected to guide the industry toward greater soundness, help water professionals perform essential roles more effectively, and get the jump on emerging issues before they develop into full-blown crises.

When the survey closed in October 2018, 2,048 water professionals had shared their perspectives of the water industry. As in previous years, the individuals who responded to the SOTWI survey tended to be seasoned water professionals, with 45% reporting 20 or more years of industry experience. The largest group of respondents (55%) represented water utilities, followed by 15% of respondents representing consulting firms/consultants (i.e., firms or individuals providing technical and engineering services to the water industry). The remaining respondents were individuals associated with the industry through service providers, academia, science, and regulatory bodies, as well as retired water industry professionals.

The SOTWI survey starts by asking respondents to rate the overall health of the industry today as well as their expectations of soundness five years into the future. Water professionals responded positively, indicating they felt very good about their business now and in the future.

The issues and challenges that were reported remain similar to previous years. Aging infrastructure and how to finance the much-needed renewal and/or replacement (R&R) of infrastructure once again topped this year’s list of industry concerns, followed by access to funding for R&R. Utilities indicated that they see their access to capital has been on a decline: 46% of utilities reported their access to capital is as good as or better than any time in the past five years. This is 10% lower than reported in 2017.

Extreme weather events ranked as the most negatively impactful phenomena challenging utility risk and resilience. In good news, though, nearly 74% of responding utilities have implemented or are in the process of developing a community risk and resilience assessment (formerly termed “vulnerability assessment”). Additionally, 50% report that climate variability is a consideration in developing these assessments. The 2019 survey snapshot on cybersecurity indicated that 73% of responding utilities do not believe that they have been involved in any cybersecurity events in the past year. Industry statistics do not support these beliefs and in fact, indicate that most entities have been hacked but have not discovered the hacking.

Utilities are also concerned about nonpoint pollution and per- and polyfluoroalkyl substances (PFAS); they remain reasonably confident of current and future water supplies and show little movement toward exploring alternative water sources.

As the water industry continues its resolute focus on infrastructure improvements and financing for these capital improvements, AWWA continues to support with an advocacy priority on infrastructure funding, supporting mechanisms such as the state revolving loan fund (SRF) or, more recently, the Water Infrastructure Finance and Innovation Act (WIFIA) program to finance projects.
STATE OF THE WATER INDUSTRY

The SOTWI is AWWA’s 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 in 2004, the 2019 survey 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 sound at all" 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 state of the water industry be five years from now?

Figure 1 shows the average scores as rated by all participants to these two questions since 2004. The current health of the industry as rated by all respondents was 4.85, where it was 4.47 in 2018, marking a second year with scores on the incline. Looking forward five years, the anticipated soundness of the water industry also saw an incline from 4.43 in 2018 to 4.69 in 2019.

Although the minimum error associated with these responses cannot be estimated, it is reasonable to report that there has not been a great difference in the scores related to the water industry’s health over the past several years. Though slight, a slow decline was noted in how water professionals perceive the health of the water industry (a term that is purposefully undefined) since the SOTWI survey began. However, based on 1,999 responses to these two questions, the overall health or state of the water industry for 2019 is above the running average of 4.6.

Multiple tests were performed to ensure that the scores were not artificially inflated. Findings indicate that the reported numbers are valid. Young professionals (defined as younger than 35 years; n = 209), as well as seasoned professionals who have been in the water industry for 20+ years (n = 717) are more optimistic than average. The small contingency of Canadian respondents (n = 96) also contributed to the overall optimism.

Additional discussion on potential influencers of these data is contained in the methodology section of this report. AWWA recognizes that this is not officially a trend and will watch for influencers in future surveys. The optimism displayed in Figure 1 is encouraging and in contrast to the remaining sections of this report that focuses on water industry issues and concerns. This combination displays what AWWA has seen in the industry, positive attitudes and the ability and desire to address challenges.
In addition to asking about the overall soundness of the water industry, the 2019 SOTWI survey also 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 = 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?

The region-specific scores shown in Table 1 were higher than the general scores by the same groups in the United States and Canada. The reasons for the regional results are not immediately apparent, but one explanation is that people likely have a better understanding of the water systems in the areas in which they work, and perhaps they are working to support these very same systems, so their opinions are naturally biased. In contrast, the water-related news and information from outside of the region on which respondents focus may be predominantly negative, leading to more negative perceptions regarding the overall industry.

**Table 1.** Overall and regional perceptions of water industry soundness – total and country-specific* present (2019) and 5 years from now (2023)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Overall</th>
<th></th>
<th>Regional</th>
<th></th>
<th>Counts (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2019</td>
<td>2023</td>
<td>2019</td>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>All Respondents</td>
<td>4.85</td>
<td>4.69</td>
<td>5.39</td>
<td>5.17</td>
<td>1,999</td>
</tr>
<tr>
<td>US Respondents</td>
<td>4.83</td>
<td>4.65</td>
<td>5.37</td>
<td>5.14</td>
<td>1,899</td>
</tr>
<tr>
<td>Canadian Respondents</td>
<td>5.41</td>
<td>5.36</td>
<td>5.72</td>
<td>5.75</td>
<td>92</td>
</tr>
</tbody>
</table>

*Note: Other n = 8

*On a scale of 1 to 7, where 1 = not at all sound and 7 = very sound*
Canadian Perspective

The 2019 SOTWI survey had 96 respondents representing nearly all provinces of Canada and representing 5% of survey respondents overall. This response rate keeps with previous surveys but is too small for statistical significance. This report includes the responses from all participants in all figures and tables and breaks out the Canadian perspective, as applicable, on given topics.

**Figure 2** shows the average health or state of the industry as rated by 92 Canadian participants. The 2019 SOTWI data indicate Canadians are more optimistic of the present and future health of the water industry: they recorded 5.4 for the current and future health of the water industry on a scale of 1–7, where 1 = not at all sound and 7 = very sound.

**Figure 2. State of the water industry – Canadian respondents 2004–2019 (n = 92)**

*On a scale of 1 to 7, where 1 = not at all sound and 7 = very sound

**WATER INDUSTRY CHALLENGES**

To determine and rank the major issues currently facing the water industry, participants were asked to rate the importance of several challenges on a scale of 1 to 5, where 1 = unimportant and 5 = critically important. These issues, as ranked by 2019 SOTWI survey participants, are shown in **Table 2**. 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.

As seen in previous surveys, topics moved in 2019 compared to prior years with regard both to ranking and criticality. Three issues in particular moved up in the rankings from 2018 to 2019 and are worth mentioning:

- Groundwater management and overuse (2018: 15th/26% critical; 2019: 7th/34% critical)
- Compliance with future regulations (2018: 16th/21% critical; 2019: 13th/29% critical)
- Water conservation/efficiency (2018: 21st/25% critical; 2019: 16th/30% critical)
**Table 2.** Issues facing the water industry in 2019 as ranked by all respondents (n = 1,853)

<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>4.56</td>
<td>63</td>
</tr>
<tr>
<td>2</td>
<td>Financing for capital improvements</td>
<td>4.47</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>Long-term water supply availability</td>
<td>4.39</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>Public understanding of the value of water systems and services</td>
<td>4.16</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>Watershed/source water protection</td>
<td>4.15</td>
<td>39</td>
</tr>
<tr>
<td>6</td>
<td>Public understanding of the value of water resources</td>
<td>4.13</td>
<td>37</td>
</tr>
<tr>
<td>7</td>
<td>Groundwater management and overuse</td>
<td>4.08</td>
<td>34</td>
</tr>
<tr>
<td>8</td>
<td>Aging workforce/anticipated retirements</td>
<td>4.06</td>
<td>39</td>
</tr>
<tr>
<td>9</td>
<td>Emergency preparedness</td>
<td>4.06</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>Cost recovery (pricing water to accurately reflect the cost of service)</td>
<td>4.03</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>Governing board acceptance of future water and wastewater rate increases</td>
<td>4.00</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>Compliance with current regulations</td>
<td>3.99</td>
<td>30</td>
</tr>
<tr>
<td>13</td>
<td>Compliance with future regulations</td>
<td>3.99</td>
<td>29</td>
</tr>
<tr>
<td>14</td>
<td>Talent attraction and retention</td>
<td>3.92</td>
<td>27</td>
</tr>
<tr>
<td>15</td>
<td>Public acceptance of future water and wastewater rate increases</td>
<td>3.91</td>
<td>26</td>
</tr>
<tr>
<td>16</td>
<td>Water conservation/efficiency</td>
<td>3.89</td>
<td>30</td>
</tr>
<tr>
<td>17</td>
<td>Cybersecurity issues</td>
<td>3.88</td>
<td>28</td>
</tr>
<tr>
<td>18</td>
<td>Asset management</td>
<td>3.86</td>
<td>20</td>
</tr>
<tr>
<td>19</td>
<td>Drought or periodic water shortages</td>
<td>3.80</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>Improving customer, constituent, and community relationships</td>
<td>3.80</td>
<td>21</td>
</tr>
<tr>
<td>21</td>
<td>Data management</td>
<td>3.79</td>
<td>20</td>
</tr>
<tr>
<td>22</td>
<td>Water loss control</td>
<td>3.79</td>
<td>20</td>
</tr>
<tr>
<td>23</td>
<td>Certification and training</td>
<td>3.78</td>
<td>20</td>
</tr>
<tr>
<td>24</td>
<td>Energy use/efficiency and cost</td>
<td>3.75</td>
<td>17</td>
</tr>
<tr>
<td>25</td>
<td>Water rights</td>
<td>3.73</td>
<td>22</td>
</tr>
<tr>
<td>26</td>
<td>Water quality issues from premise plumbing systems</td>
<td>3.70</td>
<td>17</td>
</tr>
<tr>
<td>27</td>
<td>Expanding water reuse/reclamation</td>
<td>3.69</td>
<td>26</td>
</tr>
<tr>
<td>28</td>
<td>Financing for water research</td>
<td>3.63</td>
<td>18</td>
</tr>
<tr>
<td>29</td>
<td>Physical security issues</td>
<td>3.60</td>
<td>17</td>
</tr>
<tr>
<td>30</td>
<td>Climate risk and resiliency</td>
<td>3.57</td>
<td>21</td>
</tr>
</tbody>
</table>

Taking a closer look at the top 10 concerns for all respondents, **Table 3** shows R&R of aging water and wastewater infrastructure ranked as the most pressing issue facing the water industry; 2019 is the seventh year this challenge has been ranked No. 1. Financing these capital improvements has also been identified as the second most significant issue for seven years running. While the order has shifted, the top six issues have been consistent from year to year. As noted previously, “Groundwater management and overuse” made the top 10 concerns for the first time since 2016, and acceptance of rate increases by either the
public or government officials has dropped out of the top 10 concerns. In 2018, “Public acceptance of future water and wastewater rate increases” ranked eighth and “Governing board acceptance of future water and wastewater rate increases” ranked 10th.

Table 3. Top 10 issues facing the water industry as ranked by all participants, 2015–2019

<table>
<thead>
<tr>
<th>Rank</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
</tr>
<tr>
<td>2</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>
<td>Financing for capital improvements</td>
</tr>
<tr>
<td>3</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>
<td>Long-term water supply availability</td>
</tr>
<tr>
<td>4</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>
<td>Public understanding of the value of water systems and services</td>
</tr>
<tr>
<td>5</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>
<td>Watershed/source water protection</td>
</tr>
<tr>
<td>6</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>
<td>Public understanding of the value of water resources</td>
</tr>
<tr>
<td>7</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>
<td>Groundwater management and overuse</td>
</tr>
<tr>
<td>8</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>Aging workforce/anticipated retirements</td>
</tr>
<tr>
<td>9</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>
<td>Emergency preparedness</td>
</tr>
<tr>
<td>10</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</td>
<td>Cost recovery (pricing water to accurately reflect the cost of service)</td>
</tr>
</tbody>
</table>

In a closer look at water industry challenges from the utility perspective, Table 4 indicates that very large, large, and medium-sized utilities are concerned with R&R of aging infrastructure and financing those capital improvements; personnel at small utilities are finding challenges with water sources and rights to those sources. It is worth noting that all utilities are very concerned about aging workforce and anticipated retirements.
### Table 4. 2019 industry challenges as ranked by utilities

<table>
<thead>
<tr>
<th>Rank</th>
<th>Very Large Utility ((n = 246))</th>
<th>Large Utility ((n = 381))</th>
<th>Medium-Sized Utility ((n = 151))</th>
<th>Small Utility ((n = 165))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Renewal and replacement of aging water and wastewater infrastructure</td>
<td>Watershed/source water protection</td>
</tr>
<tr>
<td>2</td>
<td>Financing for capital improvements</td>
<td>Financing for capital improvements</td>
<td>Financing for capital improvements</td>
<td>Water rights</td>
</tr>
<tr>
<td>3</td>
<td>Long-term water supply availability</td>
<td>Long-term water supply availability</td>
<td>Long-term water supply availability</td>
<td>Water conservation/efficiency</td>
</tr>
<tr>
<td>4</td>
<td>Public understanding of the value of water systems and services</td>
<td>Watershed/source water protection</td>
<td>Aging workforce/anticipated retirements</td>
<td>Public understanding of the value of water systems and services</td>
</tr>
<tr>
<td>5</td>
<td>Aging workforce/anticipated retirements</td>
<td>Aging workforce/anticipated retirements</td>
<td>Public understanding of the value of water systems and services</td>
<td>Improving customer, constituent, and community relationships</td>
</tr>
<tr>
<td>6</td>
<td>Watershed/source water protection</td>
<td>Public understanding of the value of water systems and services</td>
<td>Watershed/source water protection</td>
<td>Financing for water research</td>
</tr>
<tr>
<td>7</td>
<td>Emergency preparedness</td>
<td>Public understanding of the value of water resources</td>
<td>Groundwater management and overuse</td>
<td>Financing for capital improvements</td>
</tr>
<tr>
<td>8</td>
<td>Cybersecurity issues</td>
<td>Compliance with current regulations</td>
<td>Governing board acceptance of future water and wastewater rate increases</td>
<td>Expanding water reuse/reclamation</td>
</tr>
<tr>
<td>9</td>
<td>Compliance with current regulations</td>
<td>Emergency preparedness</td>
<td>Public understanding of the value of water resources</td>
<td>Data management</td>
</tr>
<tr>
<td>10</td>
<td>Compliance with future regulations</td>
<td>Governing board acceptance of future water and wastewater rate increases</td>
<td>Cost recovery (pricing water to accurately reflect the cost of service)</td>
<td>Aging workforce/anticipated retirements</td>
</tr>
</tbody>
</table>

**Very Important but not Listed**

The 2019 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. The three most talked about issues were education, workforce, and communicating the value of water. Below are some of the comments.

**Education**

“We don't have the qualified candidates and it takes multiple years to create a qualified candidate. Without the qualified workforce, we will acquire fines and citations for regulatory compliance and we put ourselves at high risk.”

“Training elected officials & board members on the water industry.”

“Training and education will have to be the [emphasis] for all. (Employees and public)”

**Workforce**

“Attracting & preparing adequate number of candidates for the thousands of STEM [science, technology, engineering, and math] & Mid-Skills job vacancies. We need to do a much better job of recruiting & retaining the TOP talent that this industry needs.”

“We have a critical shortage of certified drinking water treatment operators in rural areas... These rural areas need to be able to “grow their own” local operators (less likely to move away as soon..."
as they become certified), and we need to find ways to support that and still get them to where they are competent operators."

"Workforce succession – retirement of aging boomers."

Stakeholder Engagement and Communication

"Customers’ lack of understanding of the safety of the water that is produced by their local municipalities."

"Utilities need marketing strategies for their water to compete with bottled water."

"Practical communications materials for the user community when individual contaminants like the PFAS's become national news."

"The industry needs to communicate better with the public to assist in restoring their trust in public water utilities following the Flint and other water quality crises."

Macro-Scale Phenomena

To understand the potential impacts of several macro-scale phenomena on the water industry, all SOTWI survey participants were asked to rank a list of issues on a scale of 1 to 5, where 1 = significant negative impact and 5 = significant positive impact. Table 5 provides a ranking of these macro-phenomena. Results show that water industry professionals believed all categories will have some degree of a negative impact on the water industry. Extreme weather events, pollution, political instability, and climate change are expected to have the most negative impacts on the water industry in 2019. Top influencers in 2018 were reported as pollution, war, and terrorism.

Table 5. Potential impact of macro-scale phenomena on the water industry ($n = 1,667$)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Phenomena</th>
<th>Mean Score</th>
<th>Rank</th>
<th>Phenomena</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Extreme weather events</td>
<td>2.07</td>
<td>10</td>
<td>War</td>
<td>2.44</td>
</tr>
<tr>
<td>2</td>
<td>Pollution</td>
<td>2.10</td>
<td>11</td>
<td>Energy costs</td>
<td>2.47</td>
</tr>
<tr>
<td>3</td>
<td>Political instability</td>
<td>2.22</td>
<td>12</td>
<td>Agriculture</td>
<td>2.56</td>
</tr>
<tr>
<td>3</td>
<td>Climate change</td>
<td>2.22</td>
<td>13</td>
<td>Urbanization</td>
<td>2.64</td>
</tr>
<tr>
<td>4</td>
<td>Chemical costs</td>
<td>2.30</td>
<td>14</td>
<td>Unemployment</td>
<td>2.68</td>
</tr>
<tr>
<td>5</td>
<td>Labor costs</td>
<td>2.34</td>
<td>15</td>
<td>Population growth</td>
<td>2.70</td>
</tr>
<tr>
<td>6</td>
<td>Inflation</td>
<td>2.37</td>
<td>16</td>
<td>Housing markets</td>
<td>2.91</td>
</tr>
<tr>
<td>7</td>
<td>Social instability</td>
<td>2.40</td>
<td>17</td>
<td>Bond markets</td>
<td>3.00</td>
</tr>
<tr>
<td>8</td>
<td>Terrorism</td>
<td>2.41</td>
<td>18</td>
<td>Stock markets</td>
<td>3.02</td>
</tr>
<tr>
<td>9</td>
<td>Wealth inequality</td>
<td>2.43</td>
<td>19</td>
<td>Business/industrial activities</td>
<td>3.18</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

Data were further refined to determine whether there were significant differences between utility and non-utility perspectives. Table 6 shows that all respondents agree that extreme weather events, pollution, climate change, and political instability are the top three concerns, where climate change and political instability are tied for third in both groups. For all respondents there were no slightly or significant positive impacts.
Table 6. Potential impacts of macro-scale phenomena on the overall water industry – utility and non-utility perspectives

<table>
<thead>
<tr>
<th>Rank</th>
<th>Phenomena</th>
<th>Mean Score</th>
<th>Rank</th>
<th>Phenomena</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Extreme weather events</td>
<td>2.07</td>
<td>1</td>
<td>Extreme weather events</td>
<td>2.02</td>
</tr>
<tr>
<td>2</td>
<td>Pollution</td>
<td>2.10</td>
<td>2</td>
<td>Pollution</td>
<td>2.12</td>
</tr>
<tr>
<td>3</td>
<td>Climate change</td>
<td>2.22</td>
<td>3</td>
<td>Climate change</td>
<td>2.14</td>
</tr>
<tr>
<td>3</td>
<td>Political instability</td>
<td>2.22</td>
<td>3</td>
<td>Political instability</td>
<td>2.14</td>
</tr>
<tr>
<td>4</td>
<td>Chemical costs</td>
<td>2.30</td>
<td>4</td>
<td>Chemical costs</td>
<td>2.37</td>
</tr>
<tr>
<td>5</td>
<td>Labor costs</td>
<td>2.34</td>
<td>4</td>
<td>Social instability</td>
<td>2.37</td>
</tr>
<tr>
<td>6</td>
<td>Inflation</td>
<td>2.37</td>
<td>5</td>
<td>Wealth inequality</td>
<td>2.38</td>
</tr>
<tr>
<td>7</td>
<td>Social instability</td>
<td>2.40</td>
<td>6</td>
<td>Inflation</td>
<td>2.41</td>
</tr>
<tr>
<td>8</td>
<td>Terrorism</td>
<td>2.41</td>
<td>7</td>
<td>Terrorism</td>
<td>2.44</td>
</tr>
<tr>
<td>9</td>
<td>Wealth inequality</td>
<td>2.43</td>
<td>8</td>
<td>War</td>
<td>2.45</td>
</tr>
<tr>
<td>10</td>
<td>War</td>
<td>2.44</td>
<td>9</td>
<td>Agriculture</td>
<td>2.47</td>
</tr>
<tr>
<td>11</td>
<td>Energy costs</td>
<td>2.47</td>
<td>10</td>
<td>Energy costs</td>
<td>2.54</td>
</tr>
<tr>
<td>12</td>
<td>Agriculture</td>
<td>2.56</td>
<td>11</td>
<td>Urbanization</td>
<td>2.60</td>
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<tr>
<td>13</td>
<td>Urbanization</td>
<td>2.64</td>
<td>12</td>
<td>Population growth</td>
<td>2.61</td>
</tr>
<tr>
<td>14</td>
<td>Unemployment</td>
<td>2.68</td>
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<td>Unemployment</td>
<td>2.71</td>
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<tr>
<td>15</td>
<td>Population growth</td>
<td>2.70</td>
<td>14</td>
<td>Labor costs</td>
<td>2.37</td>
</tr>
<tr>
<td>16</td>
<td>Housing markets</td>
<td>2.91</td>
<td>15</td>
<td>Housing markets</td>
<td>2.89</td>
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<tr>
<td>17</td>
<td>Bond markets</td>
<td>3.00</td>
<td>16</td>
<td>Stock markets</td>
<td>3.03</td>
</tr>
<tr>
<td>18</td>
<td>Stock markets</td>
<td>3.02</td>
<td>17</td>
<td>Bond markets</td>
<td>3.04</td>
</tr>
<tr>
<td>19</td>
<td>Business/industrial activities</td>
<td>3.18</td>
<td>18</td>
<td>Business/industrial activities</td>
<td>3.17</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 was a record $300 billion (NCEI 2018).

The United States also saw multiple unprecedented natural disasters in 2018, from the worst hurricane to hit the East Coast since 1969 to the deadliest wildfire in California’s history. A report from NCEI indicated that climate change played a major role in these natural disasters (NOAA NCEI 2018). In 2018 North America experienced the following:

**United States**

- During the California wildfires, the death toll reported was 85 people killed in the Camp Fire, making it the deadliest in California’s history. It is estimated that more than 150,000 acres burned and nearly 14,000 homes were destroyed.
- Hurricane Michael was the strongest storm to hit the United States since Hurricane Camille in 1969, making landfall as a Category 4 storm with maximum sustained winds of 155 mph.
• Reports after Hurricane Florence included 43 deaths, as well as massive flooding; North Carolina was hit with 36 in. of rain and South Carolina received 24 in. of rain. In addition, rivers in the Carolinas crested, surpassing records set during Hurricane Matthew in 2016.
• Montecito, Calif., saw ½-in. of rain in 5 min, which triggered mudslides in wildfire-scarred areas.
• In the historic town of Ellicott City, Mass., flash flooding caused significant damage when more than 8 in. of rain fell in just a few hours.

North America
• Severe flooding in Mexico devasted 300,000 homes
• An EF3 tornado, on the Enhanced Fujita Scale, touched down in the province of Ontario, Canada

Worldwide
Globally the world experienced destruction, as well. In September 2018 alone, the following events devasted areas of our world (Aon 2018):

• Typhoon Jebi in Japan
• Super Typhoon Mangkhut in the Philippines, Hong Kong, and China
• 7.5 magnitude earthquake and tsunami in Indonesia’s Sulawesi Island
• Earthquake on the Japanese Island of Hokkaido

The full impact of these events on water utilities is not yet known; however, utility respondents feel that extreme weather events are significant and rated this item highest on this year’s list of negatively impactful phenomena. Climate change tied with political instability for third place among the issues facing the water industry as ranked by all participants.

Utility Risk and Resilience
Similar to 2018, emergency preparedness was called out in the top 10 issues facing the water industry, ranking ninth in the 2019 SOTWI survey and with 33% of respondents indicating this is a critical concern. Physical security was much less of a concern ranking 25th on this year’s survey with 17% of respondent indicating this is a critical concern. Climate risk and resilience ranked last in the 2019 of critical issues of concern for the water industry.

When asked about programs and planning, 33% of utility respondents (n = 217) indicated they had fully implemented a community risk and resilience assessment (also known as a vulnerability assessment), and another 37% were in progress (n = 283). Nearly 65% of utility respondents indicated they included or were in the process of including potential impacts of climate variability in their risk management or planning process. Table 7 is the status of community risk and resilience assessments by respondent utility size.

<table>
<thead>
<tr>
<th>Status</th>
<th>Utility Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
</tr>
<tr>
<td>Fully implemented</td>
<td>26%</td>
</tr>
<tr>
<td>In progress</td>
<td>37%</td>
</tr>
<tr>
<td>Interested</td>
<td>37%</td>
</tr>
<tr>
<td>Counts (n)</td>
<td>222</td>
</tr>
</tbody>
</table>

The 2019 SOTWI survey closed in October 2018, coinciding with the signing of S.3021 America’s Water Infrastructure Act of 2018 (AWIA) into law. Section 2013 of AWIA acknowledges the impacts from disasters
like Harvey, Irma, and Maria and addresses community water system risk and resilience. Water utilities, as part of this legislation, will be required to complete and update risk and resilience assessments every five years and to complete and update an emergency response plan every five years. This provision also points to the use of voluntary consensus standards as a means to comply with the requirements. Future SOTWI surveys will monitor this topic (Carpenter 2019, S.3021 2018).

SYSTEM STEWARDSHIP

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 capital improvements, and ensuring 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 the need for R&R.

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 operations and maintenance (O&M) 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. Some utilities have previously kept their rates low by minimizing or ignoring R&R costs, but as the useful lives of our infrastructure systems come to an end, 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 current conditions as well as recent developments and long-term history.

Full cost pricing is in many ways a utility-specific issue defined by the community a utility services. To explore the issue at this level, utility personnel were asked the following:

- 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 & 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?

The responses are shown in Figure 3 and are not encouraging. Combining those who are not at all able and those who are slightly able, 29% of utilities are currently struggling to implement full cost pricing, as compared with 26% in 2018 and 30% in 2017. In addition, 40% of respondents think they will struggle to cover the full cost of service in the future, compared with 31% in 2018 and 37% in 2017.

Of the results in Figure 3, the most notable is that 10% of respondents felt that their utilities were currently not at all able to cover the full cost of providing service, which is up from 8% in 2018. On the other hand,
the percentage of respondents who felt their utilities were currently fully able to cover the cost of providing service through rates and fees was 19% in 2019, the same as reported in the past three surveys. Utility personnel are perhaps still expecting challenges ahead, though, as the percentage of respondents who felt that their utilities would be fully able to cover the cost of providing service in the future was 15%, down from 21% in 2018 and up from 12% noted back in 2015. As is typically the case, the SOTWI survey found a wide range of responses reflecting the variation in perceived ability to meet current and future cost requirements.

Figure 3. Utility ability to cover the full cost of providing service currently and in the future – utility respondents (n = 886)

These data are further refined by utility size, and a utility’s current ability to cover the full cost of providing services plays out by utility size with small utilities experiencing nearly double the financial challenges of medium-sized and larger utilities. Data also show an overall decline in the ability to provide full cost of service in five years, with large and medium-sized utilities predicting a significant decrease.
Renewal and Replacement

Specific to infrastructure R&R, the 2019 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 4, where 1 = unimportant and 4 = very important.

As shown in Table 8, the most important issue was infrastructure reliability, with 76% of respondents rating this issue as very important (i.e., 4 out of 4), followed by financing these improvements and access to funding.

Table 8. Renewal and replacement (R&R) challenges – all respondents (n = 1,712)

<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>3.7</td>
<td>76%</td>
</tr>
<tr>
<td>2</td>
<td>Financing renewal and replacement</td>
<td>3.7</td>
<td>70%</td>
</tr>
<tr>
<td>3</td>
<td>Access to funding</td>
<td>3.6</td>
<td>67%</td>
</tr>
<tr>
<td>3</td>
<td>Justifying R&amp;R programs to ratepayers</td>
<td>3.6</td>
<td>67%</td>
</tr>
<tr>
<td>4</td>
<td>Justifying R&amp;R programs to oversight bodies (board, council, etc.)</td>
<td>3.6</td>
<td>64%</td>
</tr>
<tr>
<td>5</td>
<td>Maintaining levels of service</td>
<td>3.6</td>
<td>59%</td>
</tr>
<tr>
<td>6</td>
<td>Emergency resilience</td>
<td>3.5</td>
<td>58%</td>
</tr>
<tr>
<td>7</td>
<td>Prioritizing R&amp;R needs</td>
<td>3.5</td>
<td>53%</td>
</tr>
<tr>
<td>8</td>
<td>Coordinating R&amp;R with other activities (e.g., road repair, redevelopment)</td>
<td>3.4</td>
<td>51%</td>
</tr>
<tr>
<td>9</td>
<td>Customer expectations</td>
<td>3.3</td>
<td>38%</td>
</tr>
<tr>
<td>10</td>
<td>Regulatory constraints</td>
<td>3.2</td>
<td>36%</td>
</tr>
</tbody>
</table>

What investment is needed?

The US Environmental Protection Agency’s 6th Drinking Water Infrastructure Needs Survey and Assessment shows $472.6 billion is needed to maintain and improve the nation’s drinking water infrastructure over the next 20 years for thousands of miles of pipe as well as thousands of treatment plants, storage tanks, and other key assets to ensure the public health, security, and economic well-being of our cities, towns, and communities (USEPA 2018).
**What is the estimated return on investment?**

The estimates exhibit a wide range, but the consensus is that public infrastructure investment yields positive returns, and investment in water and sewer infrastructure has greater returns than most other types of public infrastructure.

- A recent study estimates that $1 of water and sewer infrastructure investment increases private output (gross domestic product, or GDP) in the long term by $6.35.
- With respect to annual general revenue and spending on operating and maintaining water and sewer systems, the US Department of Commerce’s Bureau of Economic Analysis estimates that for each additional dollar of revenue (or the economic value of the output) in the water and sewer industry, the increase in revenue (economic output) that occurs in all industries is $2.62 in that year.

*The same analysis estimates that adding one job in water and sewer creates 3.68 jobs in the national economy to support that job (US Conference of Mayors 2008).*

**Lead Service Lines**

Lead in drinking water primarily from corrosion of service lines has received increased attention due to the crisis in Flint, Mich. These service lines connect a water main to a building and are the subject of many surveys and discussion. A US Governmental Accountability Office (GAO) report to congressional committees indicated that “the total number of lead service lines is unknown and while national, state, and local estimates exist, approaches used to count lead service lines vary.” This report also discusses the challenges in conducting lead service line inventory, which includes the lack of records about the locations of lead service lines (GAO 2018).

The US Environmental Protection Agency (USEPA) issued the Lead and Copper Rule (LCR) to minimize the amount of lead in drinking water. The LCR, however, does not require all water systems to develop and maintain a complete inventory of lead service lines.

The 2019 SOTWI asked participants about lead service line location using the following question:

- Has your utility documented the location of lead service lines in its service area?

Of 867 respondents, 34% indicated they had fully documented lead service lines in their service areas, and another 16% were in the process of documenting the location of lead service lines. **Table 9** is a more detailed look at full lead service line documentation by utility size.

<table>
<thead>
<tr>
<th>Sample**</th>
<th>Small Utilities</th>
<th>Medium-Sized Utilities</th>
<th>Large Utilities</th>
<th>Very large Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>US respondents</td>
<td>27%</td>
<td>29%</td>
<td>22%</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Utility participants who indicated full documentation of lead service lines.

**Of Canadian respondents (n = 94), 19% indicated full lead service line documentation.

**Access to Capital**

To help clarify the current financing environment for the water industry, utility personnel were asked the following:

- 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, 46% 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. Based on 920 responses in 2019, this value is below the running average of 53% and has been on the decline. Only 10% reported that their utility’s access to capital was as bad as or worse than at any time in the past five years.

Figure 4. Opinion of utility access to capital to fund renewal or replacement (R&R) – utility respondents (n = 920)

For historical context, the 2017 SOTWI survey was issued a few months before Congress appropriated funds for WIFIA and about eight months after the water crisis in Flint became a national discussion. At that time, 49% reported their utilities’ access to capital was as good as or better than any time in the past five years, down from 56% in 2016 and 53% in 2015. Many believed timing of the survey influenced the decline and were hopeful that funding WIFIA and stabilizing the SRF programs would create an uptick in the access-to-capital metric. Data show that that uptick did not emerge and, in fact, it is trending down.

Figure 5 trends the percent of utility personnel indicating their utility’s access to capital is as good as or better than any time in the past five years.

Figure 5. Access to capital trend: as good as or better than any time in the past five years
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 personnel were asked a series of questions about their utilities’ trends in water sales. Results regarding trends in total water sales, as shown in Figure 6, reveal that 22% of utility respondents are seeing declining total water sales (either a >10-year or <10-year trend) while 25% of respondents reported their total water sales were flat or little changed in the past 10 years.

In 2019, 33% 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 29% and 30% reported in 2018 and 2017, respectively.

Figure 6. Opinion of utility trends in total water sales – utility respondents as % of total

(n = 933)

<table>
<thead>
<tr>
<th>Trend Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10 year trend of increasing total water sales</td>
<td>17%</td>
</tr>
<tr>
<td>&lt;10 year trend of increasing total water sales</td>
<td>16%</td>
</tr>
<tr>
<td>Flat or little change in total water sales</td>
<td>25%</td>
</tr>
<tr>
<td>&lt;10 year trend of declining total water sales</td>
<td>11%</td>
</tr>
<tr>
<td>&gt;10 year trend of declining total water sales</td>
<td>11%</td>
</tr>
<tr>
<td>No specific trend</td>
<td>4%</td>
</tr>
</tbody>
</table>

Note: 16% of participants indicated “Don’t know” or “Not applicable.”

Results from utilities regarding their trends in per account water sales are shown in Figure 7. Similar to the results for total water sales, 26% 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. Twenty-two percent of utilities reported increasing per account water sales (either a >10-year or <10-year trend), which is up from 14% in 2018 and 18% in 2017.
Figure 7. Opinion of utility trends in per account water sales – utility respondents as % of total (n = 928)

Cost Recovery
Utilities were asked whether they intend to raise water and/or wastewater rates in the coming year. The majority indicated that they were, although how much they intended to raise rates varied.

Figure 8. Intention to raise water and/or wastewater rates in the coming year – utility respondents (n = 916)

As previously mentioned, declining water sales can impact a utility’s approach to cost recovery (the 10th overall issue, see Table 2). Cost recovery refers to pricing water and wastewater services to accurately reflect their true costs and then obtaining these from customers through rates. To understand how rate increases would be perceived, utility personnel were asked the following:

- In your opinion, how was your utility’s last rate increase 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 8 summarizes the responses from 2019 SOTWI utility respondents.

**Figure 9.** Opinion of how rate increases were received by various stakeholder groups – utility respondents as % of total (n = 869)

Public understanding of the value of water systems and services ranked fourth and public understanding of the value of water resources ranked sixth out of the top 10 issues facing the water industry in 2019.

**Water Affordability**

The affordability of water has become a significant issue for low-income households and a higher priority for water and wastewater utilities that struggle to reconcile the need to adequately fund infrastructure while not overburdening those who cannot afford rate increases. While water services have been historically underpriced compared with their true cost, water and wastewater rates in the United States have increased by 4.9% annually, since 1996 (AWWA 2016). This year’s SOTWI queried utility respondents to gauge the importance of water affordability at their utility by asking the following:
• Does your utility offer a program to assist low-income customers in paying their water and/or wastewater bills?

The 894 responses were evenly split with 37% reporting that they do offer assistance and 37% reporting that they do not offer assistance to low-income customers. The remaining 26% did not know whether their utility had an assistance program. Breaking this down by utility size, the data in Table 10 show the percentage of responding utilities that offer assistance to low-income customers. Data indicate 83% of large to very large utility respondents offer some assistance to low-income customers. This is a significant increase from the 60% reported in 2018.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Small Utilities</th>
<th>Medium-Sized Utilities</th>
<th>Large Utilities</th>
<th>Very Large Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility respondents that do offer assistance</td>
<td>29%</td>
<td>37%</td>
<td>34%</td>
<td>49%</td>
</tr>
</tbody>
</table>

The 2018 AWWA utility benchmarking survey benchmarks the affordability of water and wastewater services as a percentage of local median household income (MHI). For the reporting period of 2017, the median water service affordability (as a percent of MHI) is less than 1% for both water and wastewater services (AWWA 2018).

**Case Study: Atlanta, Ga.**

The city of Atlanta, Ga., currently serves 1.2 million customers, delivers 100 mgd of drinking water, and treats 188 mgd of wastewater. The fiscal year 2018 operating budget is a reported $610 million. Thirty percent of households in Atlanta fall below an annual income of $25,000 and 23.2% of households are at or below poverty. The city reported that affordability issues affect about 50% of Atlanta households, with a greater percentage of the city’s families considered “cost burdened” (i.e., paying more than 30% of their income for housing).

The average monthly water bill for a family of four is $150 vs $50/month national average. This is approximately 7.7% for households at the poverty line.

The city has taken an aggressive look at the challenges and opportunities and developed a holistic approach to providing benefits to customers. Water conservation policies have helped conserve existing resources and deferred the need to develop new water sources. Programs are in place to improve customer accessibility to the water necessary to sustain life, safety, and health, which has enhanced the city’s goodwill and brand. Lastly, the city turned its attention to sustainable infrastructure measures with a focus on reducing bad debt, reducing spills and waste, and avoiding costs of disconnection.

The city has also made an annual commitment of approximately $1.6 million in assistance programing tailored to customer needs, including bill payment assistance, leak vouchers, and plumbing repair assistance.

Source: Balla 2018

**Nonpayment of Water Bill**

Utilities reserve the right to terminate services for nonpayment. As shown in the Atlanta, Ga., case study, nonpayment of water bills leading to discontinuance of service is not cost-effective for the utility.

This year’s SOTWI survey asked the following on this subject:

• In your opinion, is nonpayment of bills a problem for your utility?
• If you can make an assessment, approximately what percentage of your total revenue do your unpaid accounts represent?

**Figure 10** shows the responses (as % of whole) regarding the extent to which nonpayment is an issue for utilities. A little more than 50% of respondents have an issue with nonpayment, with 6% indicating it is a significant issue. Those in the Northeast and Southeast United States reported the biggest challenges.

**Figure 10. Nonpayment of bills – utility respondents as % of total (n = 761)**

AWWA’s policy on discontinuance of service for nonpayment (AWWA 1978) provides the following guidance:

*AWWA recognizes the importance of the nondiscriminatory billing and collection procedures to ensure that each customer pays for the services rendered by the utility under its rates and tariffs. Failure on the part of the customer to pay a water bill for services rendered necessitates that other customers bear the costs associated with the non-payment of water service.

*AWWA recognizes that certain circumstances may require some flexibility because water service is a necessity in maintaining sanitary conditions in the home, and may be required for life-sustaining equipment, or for other critical purposes. Water service may also be a vital part of industrial and commercial operations. Discontinuance of water service for nonpayment is considered a final phase of a collection procedure and should be instituted with sufficient notification when all other reasonable alternatives, such as payment plans or specific customer assistance programs, have been exhausted.*

Public–Private Partnerships (P3s)

As water and wastewater utilities look for innovative ways to handle infrastructure issues, some are beginning to consider alternative management approaches, including P3s. Bundling infrastructure assets provides a unique approach to satisfy the varying stakeholders involved in supply, funding, construction, and operation of system assets. Exploring the topic of partnering further, utility employees were asked the following:

• Is your utility considering a public–private partnership (P3)?

The 2019 SOTWI indicates a majority of utility respondents are not considering P3s at this time. **Figure 11** shows that approximately 51% of respondents indicated that their utility is not considering a P3, while 16% indicated that their utility was considering, was planning to use, or was already involved in a P3.
In a more directed survey effort of primarily municipal water and wastewater systems, AWWA performed a joint survey with Ernst and Young to determine the extent of respondents' understating of and interest in P3s, perceived benefits and barriers, views of private financing, and the types of projects deemed most suitable for P3 delivery.

The results of the survey show that utilities have a good understanding of available P3 models and are skeptical about the general applicability of a P3 model. Justification, experience, and stakeholder support often discourage the use of P3s; however, P3 models could be an answer for those utilities lacking managerial or operational capacity to deliver complex programs.

More information can be found in the report, To P3 or Not to P3 (AWWA & EY 2019).

WATER RESOURCE MANAGEMENT

Long-term water supply availability

Participants highly rated several issues related to water resources management in the 2019 SOTWI survey (as shown in Table 2), including “Long-term water supply availability” (third most important issue), “Water conservation/efficiency” (14th most important issue, up from 21st last year), and “Drought or periodic water shortages” (19th most important issue), as well as other topics (e.g., desalination, climate change, water reuse).

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

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

The summary presented in Figure 12 shows that 14% of utility personnel responding 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 6% in 2018 and 10% in 2017.
In addition, 55% of participants indicated that their utilities are very or fully prepared, down from 67% reported in 2018 but closer to the five-year average of 59% (2015–2019). Four percent of participants indicated their utilities were not at all prepared to meet their long-term water supply needs, up from the 1% reported in 2018.

**Figure 12.** Opinion of how prepared utilities are to meet long-term water supply needs – utility respondents \((n = 862)\)

The ability to meet long-term needs were also reviewed by region as shown in **Figure 13.**

**Figure 13.** How prepared utilities are to meet long-term water supply needs – utility respondents by region \((n = 862)\)
Drought and Water Shortages
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 variability and extreme weather events moving forward.

To gauge the effects of water shortages, utility personnel were asked how many years in the past decade their utilities had implemented voluntary or mandatory water restrictions. The responses summarized in Figure 14 reveal that 53% have implemented voluntary water restrictions zero to one years in the past decade and 65% of responding utilities have instituted mandatory restrictions zero to one year 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 14.** Voluntary and mandatory water restrictions imposed in the past decade by region – utility respondents (n = 848)

Water Supply Sustainability
As communities evaluate their water shortage preparedness, there is also an opportunity to gain an improved understanding of regional water supply sustainability. In addition to reliability during water shortages, utilities and the communities they serve can also evaluate 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 found in Figure 15 show that augmentation of water supplies is not a concern for the majority of utility 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.

To understand the status of conservation planning at water utilities, the 2019 SOTWI survey asked participants whether their utility has any type of water conservation programs. The survey indicated that 42% of all utility participants have a fully developed drought management or water shortage contingency plan. Data also show that larger utilities are leading this effort.
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 854 responses, 5% reported having or developing some sort of desalination project.

The largest shift from 2018 can be seen in potable reuse. In 2018, 21% of utility participants \( (n = 685) \) indicated they were considering indirect potable reuse and 5% had fully implemented processes. One year later in 2019, the percentage of responding utilities considering indirect potable reuse decreased to 10%, and a steady 5% have fully implemented processes. Direct potable reuse consideration also saw a decrease from 13% in 2018 to 7% in 2019.

In addition to domestic wastewater reclamation, several utilities have explored capturing, treating, and reusing stormwater specifically to augment potable water supplies. Of the 854 responses collected through the 2019 SOTWI survey in this area, 6% of utilities are considering a stormwater reuse project while approximately 2% already have a stormwater reuse project implemented.

**Figure 15.** Augmenting water supplies with desalination, reuse, and/or stormwater recovery – utility respondents \( (n = 854) \)

<table>
<thead>
<tr>
<th>Augmentation of Water Supplies</th>
<th>Fully implemented</th>
<th>In development</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban stormwater recovery for nonpotable or potable reuse</td>
<td>4%</td>
<td>6%</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Direct potable reuse</td>
<td>7%</td>
<td>4%</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Indirect potable reuse</td>
<td>10%</td>
<td>6%</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Desalination of seawater</td>
<td>1%</td>
<td>1%</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Desalination of brackish groundwater</td>
<td>3%</td>
<td>2%</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>Desalination of seawater</td>
<td>1%</td>
<td>1%</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Desalination of brackish groundwater</td>
<td>3%</td>
<td>2%</td>
<td></td>
<td>3%</td>
</tr>
</tbody>
</table>
REGULATIONS
The importance of current and future regulatory compliance was rated higher in the 2019 SOTWI survey than in 2018. Referring to Table 2, “Compliance with current regulations” and “Compliance with future regulations” were rated 12th and 13th, respectively, 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 11. Scores are on a scale of 1 to 5, where 1 = not at all concerned and 5 = extremely concerned.

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

Table 11. Current regulatory concerns – all respondents (n = 1,663)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Area</th>
<th>Weighted Average</th>
<th>% Ranked Extremely Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nonpoint source pollution</td>
<td>3.30</td>
<td>17.1%</td>
</tr>
<tr>
<td>2</td>
<td>Per- and polyfluoroalkyl substances (PFAS)</td>
<td>3.22</td>
<td>15.8%</td>
</tr>
<tr>
<td>3</td>
<td>Cyanotoxins</td>
<td>3.18</td>
<td>14.6%</td>
</tr>
<tr>
<td>4</td>
<td>Chemical spills</td>
<td>3.15</td>
<td>16.0%</td>
</tr>
<tr>
<td>5</td>
<td>Point source pollution</td>
<td>3.15</td>
<td>13.5%</td>
</tr>
<tr>
<td>6</td>
<td>Combined sewer overflows</td>
<td>3.12</td>
<td>14.9%</td>
</tr>
<tr>
<td>7</td>
<td>Disinfection byproducts</td>
<td>3.11</td>
<td>12.3%</td>
</tr>
<tr>
<td>8</td>
<td>Nutrient removals</td>
<td>3.09</td>
<td>13.0%</td>
</tr>
<tr>
<td>9</td>
<td>Lead and copper</td>
<td>3.06</td>
<td>14.0%</td>
</tr>
<tr>
<td>10</td>
<td>Pathogens</td>
<td>3.05</td>
<td>14.4%</td>
</tr>
<tr>
<td>11</td>
<td>Radionuclides</td>
<td>2.84</td>
<td>10.9%</td>
</tr>
<tr>
<td>12</td>
<td>Arsenic</td>
<td>2.84</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

Perfluorinated Compounds

Perfluorinated compounds (PFCs), also referred to as perfluorinated alkyl substances (PFAS), are a large group of environmentally persistent manufactured chemicals used in industrial applications and consumer products. PFCs are very stable, slow to degrade in the environment, and can lead to potential adverse health effects in humans and wildlife.

The US Environmental Protection Agency (USEPA) has identified PFCs as an emerging contaminant because they have a pathway to enter the environment, may pose a human health or environmental risk, and do not have federal regulatory standards. In addition, individual states have begun to develop state PFC guidelines for monitoring and reducing PFCs in the environment.

For more information download USEPA’s Per- and Polyfluoroalkyl Substances (PFAS) Action Plan or visit www.awwa.org Resources.
COMMUNICATION

Results of the 2019 SOTWI survey highlight the industry’s concern over communicating with stakeholders, in particular regarding the public’s understanding of their water systems and resources (the fourth and sixth most important issues in Table 2, respectively). The need for communities to invest in their water systems, and ultimately for their customers to pay for these investments, is captured in the 10th most important issue—namely, cost recovery.

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 2019 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 Figure 16, the utility respondents believe they have above average communication efforts with regulators and ratepayers; however, the struggles indicated previously in this report related to rates and full cost recovery would indicate that communication is not successful.
The 2019 SOWTI survey also asked utilities the following question:

- How would you rate the effectiveness of the water industry to communicate the difference between cost of service and rates?

Overall utility participants \( (n = 1,830) \) believe they are doing a poor job communicating this difference (42%). A further 40% believe that they are doing an average job.

**PLANS AND PROGRAMS**

Effective utility management practices are the foundation of well-managed water systems. The planning process and associated programs ensure that water sector investments are cost-effective over their life cycle and support other relevant goals within not only the utility, but also within the communities they serve. Utilities will also realize indirect benefits from enhanced long-term technical and financial capacity.

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 12 provides a listing of those plans and programs and participant responses. Responses are ranked by percent fully implemented. The percentage of participants who are working on implementation is included for reference.
## Table 12. Utility implementation of plans and programs (n = 759)

<table>
<thead>
<tr>
<th>Plan/Program</th>
<th>Fully Implemented</th>
<th>Implementation in progress</th>
<th>Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-head protection program</td>
<td>54%</td>
<td>26%</td>
<td>20%</td>
</tr>
<tr>
<td>Capital improvement plan</td>
<td>53%</td>
<td>37%</td>
<td>9%</td>
</tr>
<tr>
<td>Financial plan</td>
<td>51%</td>
<td>37%</td>
<td>12%</td>
</tr>
<tr>
<td>Source water protection program</td>
<td>45%</td>
<td>30%</td>
<td>25%</td>
</tr>
<tr>
<td>Master plan</td>
<td>43%</td>
<td>41%</td>
<td>16%</td>
</tr>
<tr>
<td>Drought management plan/water shortage contingency plan</td>
<td>42%</td>
<td>32%</td>
<td>26%</td>
</tr>
<tr>
<td>Staff training programs</td>
<td>42%</td>
<td>38%</td>
<td>20%</td>
</tr>
<tr>
<td>Water conservation program</td>
<td>41%</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>Groundwater management plan</td>
<td>40%</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>Lead service line replacement program</td>
<td>34%</td>
<td>38%</td>
<td>28%</td>
</tr>
<tr>
<td>Water loss control program</td>
<td>34%</td>
<td>43%</td>
<td>24%</td>
</tr>
<tr>
<td>All-hazards vulnerability assessment</td>
<td>33%</td>
<td>37%</td>
<td>31%</td>
</tr>
<tr>
<td>Customer communication plan</td>
<td>31%</td>
<td>36%</td>
<td>33%</td>
</tr>
<tr>
<td>Asset management program</td>
<td>29%</td>
<td>55%</td>
<td>16%</td>
</tr>
<tr>
<td>Sewer lateral replacement program</td>
<td>22%</td>
<td>37%</td>
<td>41%</td>
</tr>
</tbody>
</table>

### Very Large Utilities

**Top three plans/programs “Fully Implemented”**

1. **Financial plan**
2. **Drought management/water shortage contingency plan**
3. **Source water protection program**

### Large Utilities

**Top three plans/programs “Fully Implemented”**

1. **Capital improvement plan**
2. **Well-head protection program**
3. **Financial plan**

### Medium Utilities

**Top three plans/programs “Fully Implemented”**

1. **Well-head protection program**
2. **Source water protection program**
3. **Financial plan**

### Small Utilities

**Top three plans/programs “Fully Implemented”**

1. **Well-head protection program**
2. **Source water protection program**
3. **Financial plan**
SNAPSHOT – Cybersecurity

A robust and tested cybersecurity program is critical to protect public health and safety, prevent service disruptions, and safeguard customer and employee personal and financial information. Inadequate cybersecurity measures and flawed responses to cybersecurity incidents carry tremendous risk. In addition to serious threats to people, property, operations, and data, cybersecurity incidents also can result in potential civil and regulatory liability, as well as reputational harm.

This year’s SOTWI took a high-level look at how utility respondents felt about cybersecurity at their utility. The 2019 survey simply asked the following:

- Has your utility experienced any cybersecurity events in the past five years?

More than 70% of respondents reported they had not experienced a cybersecurity event at their utility (Figure 17). This survey did not delve any further into this question; however, a breakout by utility size tells a different story. Small and medium-sized utilities reported the fewest instances of multiple hacks, whereas the large and very large utilities reported experiencing multiple cybersecurity events.

![Figure 17. Cybersecurity events – utility respondents (n = 556)](image)

Percentages may not add to 100% as the “Don’t know” category was excluded.

AWWA’s *Cybersecurity Risk & Responsibility in the Water Sector* (Germano 2018) provides the following:

> Cybersecurity is a top priority for the water and wastewater sector. Entities, and the senior individuals who run them, must devote considerable attention and resources to cybersecurity preparedness and response, from both a technical and governance perspective. Cyber risk is the top threat facing business and critical infrastructure in the United States. Government intelligence confirms the water and wastewater sector is under a direct threat as part of a foreign government’s multi-stage intrusion campaign, and individual criminal actors and groups threaten the security of our nation’s water and wastewater systems’ operations and data. Managing cybersecurity is a complex challenge that requires an interdisciplinary, risk-based approach, involving an organization’s business leaders, as well as their technical and legal advisors. Attacks will happen; do not be caught unprepared.
Cybersecurity important for preparing for risk

Cyberattacks are a growing and persistent threat to critical infrastructure, including drinking water and wastewater systems. America’s Water Infrastructure Act of 2018 requires the risk and resilience assessment to include cyber threats to all electronic, computer and other automated systems, including financial infrastructure, eg accounting, payroll.

Survey participants were asked to rate the importance of various challenges facing the industry. Over 88 percent of respondents said that cybersecurity was a high priority issue and nearly 30% indicated that it was critical.. Overall cybersecurity was ranked the 17th highest issue facing the water industry in 2019 and listed as the 8th highest among very large utilities.

“The threat is clear based on findings from the intelligence community and reports like Verizon’s Data Breach Investigations Report that data breaches are prevalent across all sectors and we don’t want our members to have a false sense of security,” said Kevin Morley, AWWA’s manager of federal relations. “Given this reality and the requirement to assess cyber risks under AWIA, it is essential that water systems make cybersecurity a top priority to protect against harm to public health and safety, damage from service interruptions, lost data, compromised systems, litigation, recovery costs, and reputational harm.”

What Experts See

The 2018 Verizon Data Breach Investigations Report provides an examination of cyber activity in 2018, noting that “cybercriminals are still finding success with the same tried and tested techniques, and their victims are still making the same mistakes.” Of the 53,308 security incidents the Verizon team analyzed, more than 2,200 were confirmed data breaches. Most breaches are motivated by money and attackers “do not care who they take it from.” A reported statistic worth noting is that “68% of breaches took months or longer to discover” (Verizon 2018).

DEMOGRAPHICS

The 2019 SOTWI survey asked participants a series of demographic questions. Responses were not required, and not all participants chose to provide information. All data are self-reported.

Table 13 shows the total number of participants based on the type of organization they work for. Fifty-seven percent of participants (n = 1,144) indicated they worked for a utility, while 43% (n = 880) 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 13. Number of participants indicating organization type (n = 2,024)

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water utility</td>
<td>540</td>
<td>26.7%</td>
</tr>
<tr>
<td>Combined water/wastewater utility (may include other services too)</td>
<td>509</td>
<td>25.1%</td>
</tr>
<tr>
<td>Consulting firm/consultant</td>
<td>293</td>
<td>14.5%</td>
</tr>
<tr>
<td>Manufacturer (including products, representatives, and/or distributors)</td>
<td>123</td>
<td>6.1%</td>
</tr>
<tr>
<td>Regulatory authority/regulator</td>
<td>103</td>
<td>5.1%</td>
</tr>
<tr>
<td>Non-utility government (municipal, federal, etc.)</td>
<td>89</td>
<td>4.4%</td>
</tr>
<tr>
<td>University/educational institution</td>
<td>82</td>
<td>4.1%</td>
</tr>
<tr>
<td>Wastewater utility</td>
<td>64</td>
<td>3.2%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>63</td>
<td>3.1%</td>
</tr>
<tr>
<td>Technical services/contractor</td>
<td>56</td>
<td>2.8%</td>
</tr>
<tr>
<td>Nonprofit organization</td>
<td>37</td>
<td>1.8%</td>
</tr>
<tr>
<td>Retired</td>
<td>34</td>
<td>1.7%</td>
</tr>
<tr>
<td>Water wholesaler</td>
<td>24</td>
<td>1.2%</td>
</tr>
<tr>
<td>Reuse/reclamation utility</td>
<td>5</td>
<td>0.2%</td>
</tr>
<tr>
<td>Stormwater utility</td>
<td>2</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,024</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Table 14 indicates time in the water industry. Of the 1,602 participants providing information on time in the industry, 68% had more than 10 years of experience.

**Table 14. Time in the water industry (n = 1,602)**

<table>
<thead>
<tr>
<th>Time in Industry</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>268</td>
<td>16.7%</td>
</tr>
<tr>
<td>5–10 years</td>
<td>254</td>
<td>15.9%</td>
</tr>
<tr>
<td>11–20 years</td>
<td>363</td>
<td>22.7%</td>
</tr>
<tr>
<td>20 years or more</td>
<td>717</td>
<td>44.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,602</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Utility participants were asked to indicate utility size. Breakouts by utility size closely match the trends seen in 2018. As seen in Figure 18, large utilities represent the largest group of respondents.

**Figure 18. Utility participants by utility size (n = 863)**

Participants were asked to disclose their age range. Figure 19 shows that more than half of respondents (52%) are 45–64 years old, which aligns with the age data previously reported.

**Figure 19. Participants by age group (n = 1,604)**
Table 15 breaks out utility respondents by private utilities versus public utilities. The majority of utility participants, 87%, were from publicly owned utilities.

Table 15. Private and public utility respondents (n = 939)

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privately owned</td>
<td>123</td>
<td>13%</td>
</tr>
<tr>
<td>Publicly owned</td>
<td>816</td>
<td>87%</td>
</tr>
<tr>
<td>Total</td>
<td>939</td>
<td>100%</td>
</tr>
</tbody>
</table>

METHODOLOGY

The SOTWI 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 2019 SOTWI study to anticipate and minimize errors from coverage, sampling, nonresponse, and measurement. The 2019 SOTWI sample frame consisted of a
general list of AWWA members and contacts. The survey primarily reflects water industry concerns in the United States, but participants from Canada and Mexico also contributed.

The sample for the 2019 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. 13, 2018, initial e-mail invitations were delivered to more than 134,000 e-mail addresses on the basis of the criteria described. Subsequently two follow-up e-mails were sent to this same group between Sept. 18 and Oct. 29, 2018. Links to the survey were also posted on AWWA social media. After removing wholly incomplete responses (i.e., surveys submitted with no responses at all), the total number of 2019 SOTWI survey participants was 2,048. See Appendix 1 for all the 2019 SOTWI survey questions.

A total of 2,048 participants replied for a 1.5% response rate. Of those 2,048 participants, all answered some questions but many skipped questions, meaning that not all charts will add up to 2,048. Data points such as percentages were calculated based on number of responses received for that particular question. Data were analyzed using Qualtrics statistical tools from November through December of 2018. All data points addressed on the survey were included in this report.

**Deeper Dive into Positive SOTWI Results**

The uptick in how respondents perceived the state of the water industry overall and regionally was further analyzed to see what may have driven the increase. Age, weather, news events, generational effects, and other factors were further analyzed to see what may have been the influencer(s). The 2019 SOTWI survey saw 15% of the participants were 34 years of age or younger and 40% of participants were aged 55 or over. The “happier” groups were found to be in the 18–34 age group and 55–64 (28% of participants) age group. It is noted that the number of YPs who participated in the survey more than doubled from 2018 to 2019, from 73 to 243 respondents. Further, the 55–64 age group also increased, from 276 to 455 participants.

Influence of the generational shift was also analyzed. It was noted that a subtle but important shift occurred in 2018. All Millennials are now legal adults, and many of them are in the workforce. There are now more Millennials in the workforce than Baby Boomers, who until recently comprised the majority of the workforce. Furthermore, Generation Z (i.e., those born in or after the year 2000) has just reached adulthood, with the oldest members now being 19 years old. Our middle age category (45–54) that tends to have the lowest scores are all Gen X.

**SURVEY FINDINGS**

**Demographics**

- Total number of participants in the 2019 SOTWI survey: 2,048
- Total number of participants submitting fully completed surveys: 1,626
- 87% of participants were at publicly owned utilities, up from 79% in 2018. The increased response rate from 2018 \( (n = 967) \) to 2019 \( (n = 2,048) \) may account for the difference.
- 13% of participants are young professionals (≤35 years of age); 17% of participants have been in the water industry for less than 5 years.
- More than half of participants, 67%, have been in the water industry for 11 years or more; 45% have been in the water industry for 20 years or more.
- 5% of participants were from Canada, Mexico, or Puerto Rico. 1% were from other non-US countries.
- Non-utility participants made up 43% of the total.
Health of the Industry and Issues

- Regarding the overall health of the sector, the 2019 score is 4.85, which is an uptick from 2017.
- The top five issues in 2019 are: R&R of aging infrastructure, financing for capital improvements, longer-term water supply availability, public understanding of the value of water systems and services, and watershed/source water protection.
- This is the first time in five years that the top five issues have changed. Watershed/source water protection replaced public understanding of the value of water resources.
- Groundwater management and overuse, which was ranked 15th on the top issues list in 2018, moved up to seventh place in 2019. Compliance with future regulations moved from 16th to 13th, and water conservation/efficiency moved from 21st place to 16th.

Communications

- Overall, the effectiveness of the water industry to perform communication and outreach is felt to be average to very good with the general public, customers, public officials, regulators, and business leaders.
- More than half (61%) of participants felt there was room for improvement in communication with youth, and nearly half (45%) felt there was room for improvement in communication with the media.

Issues Impacting Infrastructure R&R

- Utility participants indicated that the top five issues, in order of importance, that impact R&R are as follows:
  1. Infrastructure reliability
  2. Justifying R&R programs to ratepayers
  3. Financing renewal and replacement
  4. Access to funding
  5. Justifying R&R programs to oversight bodies

- Non-utility participants indicated the top five issues, in order of importance, that impact R&R are as follows:
  1. Infrastructure reliability
  2. Financing renewal and replacement
  3. Access to funding
  4. Justifying R&R programs to ratepayers
  5. Justifying R&R programs to oversight bodies

- All participants agreed that the same five issues are critical; there was slight disagreement in the order of the top five.

Regulatory Compliance

- Overall, most participants were moderately concerned about the industry’s ability to comply with various regulations.
- Top issue(s) of concern by group are as follows:
  - All participants: Nonpoint source pollution (43%)
  - Utilities: Chemical spills (40%)
  - Non-utilities: Nonpoint source pollution (46%)
Drinking water utilities: Chemical spills (43%)

Macro-Scale Phenomena

• The top five issues considered to have a significant or slight negative impact for all participants are as follows:
  o Pollution (77%)
  o Extreme weather events (75%)
  o Chemical costs (69%)
  o Energy costs (66%)
  o Labor costs (66%)

• The top five issues considered to have a significant or slight negative impact for utility participants are as follows:
  o Pollution (76%)
  o Extreme weather events (74%)
  o Chemical costs (73%)
  o Energy costs (69%)
  o Labor costs (67%) and inflation (67%)

• The top five issues considered to have a significant or slight negative impact for non-utility participants are as follows:
  o Extreme weather events (77%)
  o Pollution (75%)
  o Climate change (70%)
  o Political instability (68%)
  o Labor costs (65%)

Financials

• 46% of utility participants feel their access to capital is as good as or better than any time in the past five years.

• Utility participants indicated that their last rate increases were received negatively by residential customers (48%) and indifferently by nonresidential customers (32%) and the general public (38%).

• 10% of utility participants indicated that their utility was not at all able to cover the full cost of providing services, including R&R and expansion needs, through customer rates and fees. This is up slightly from the 8% reported in 2018.

• 50% of utility participants indicated that their utility was moderately or slightly able to cover the full cost of providing services, including R&R and expansion needs, through customer rates and fees.

• 40% of utility participants indicated that their utility was very able or fully able to cover the full cost of providing services, including R&R and expansion needs, through customer rates and fees.

• The most important financial issues in infrastructure R&R for all respondents are as follows:
  o Justifying R&R programs to ratepayers (99% indicated very important or important)
  o Maintaining levels of service (97% indicated very important or important)
  o Access to funding (97% indicated very important or important)
  o Infrastructure reliability (96% indicated very important or important)
  o Coordinating R&R with other activities (96% indicated very important or important)
Affordability Programs
- 37% of utility participants indicated that their utility does have a program to assist low-income customers in paying their water and/or wastewater bills; 4% indicated that they have a program in development.
- 37% of utility participants indicated that their utility does not have a program to assist low-income customers in paying their water and/or wastewater bills; 22% said they did not know whether their utility offered such a program.

Lead Documentation
- 34% of utility participants indicated that the locations of lead service lines are fully documented.
- 16% of utility participants indicated that documenting the location of lead service lines is in development but not fully implemented.
- 9% of utility participants indicated that the locations of lead service lines are not documented. A further 40% chose not applicable (n/a) or don’t know.

Programs and Planning
- More than half of utilities (54%) have a well-head protection program, while 53% indicated that they have a capital improvement plan and 51% indicated that they have a financial plan.
- 33% of utilities indicated that they are interested in implementing a customer communication plan, while 36% indicated that implementation is in progress.

Utility Risk and Resilience
- 77% of utility participants indicated that emergency preparedness is important or very important; 35% indicate that it is critical.
- 33% of utility participants indicated that they have implemented an all-hazards vulnerability assessment, while 37% indicated that an assessment was in progress. 31% indicated that they are interested.

Water Resources Planning
- When asked how prepared they are to meet long-term water supply needs, 55% of respondents indicated they were fully or very prepared; 4% indicated that they were not at all prepared.
- 65% of utility participants indicated that they have not had to implement any mandatory water restrictions in the past decade. Only 9% have implemented mandatory water restrictions for the past five or more years.
- 57% of utility participants indicated that they have not implemented any voluntary water restrictions in the past decade.
- 3% of utility participants work for utilities that have fully implemented desalination of brackish groundwater. A further 3% said that they were considering it, and 2% are in development. The majority of the utilities that are desalinating brackish ground water are in California, Florida, and Virginia.
- 3% of utility participants have fully implemented desalination of seawater. The majority of utilities that have implemented this are in California, Texas, and Virginia. 2% are considering it, and 1% are in development.
• 5% of utilities have fully implemented indirect potable reuse to augment drinking water supplies. An additional 10% are considering doing so, and 6% have a process in development.

• 2% of utilities have fully implemented direct potable reuse to augment drinking water supplies. A further 7% are considering doing so, and 4% have a process in development.

Public–Private Partnerships (P3s)
• Of all utility participants, 7% are already involved in a P3 and a further 6% indicated they are considering a P3 but are not yet committed. 51% indicated that they are not considering a P3 at this time. 7% said that their utility is partnering with other utilities to share resources. A further 27% of participants were unsure what their utility was doing regarding P3s.
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APPENDIX I

2019 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. This survey should take 10 to 20 minutes to complete. As a thank you for your time, we are raffling off twelve $25 Visa gift cards. Entering the raffle is voluntary and your entry will not be linked to your survey responses. Please send any questions or concerns to research@awwa.org.

Q2: *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.

Q3: *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)

Q4a: 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

Q4b: 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

Q5a: 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

Q5b: 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

Q6- Q8: Please rate the importance of the following industry challenges on a scale of 1 (unimportant) to 5 (critically important).

- Unimportant
- Slightly important
- Important
- Very important
- Critical
- No opinion/don't know

- Financing for capital improvements
- Improving customer, constituent, and community relationships
- Expanding water reuse/reclamation
- Aging workforce/anticipated retirements

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2019 AWWA State of the Water Industry
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
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
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
Cybersecurity issues

Q9. Are there any other industry challenges that are very important or critical that are not listed?

Q10: How would you rate the effectiveness of the water industry’s communication or outreach to the following groups?

Very poor Poor Average Good 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?

Very Poor Poor Average Very good Don’t know

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]

Unimportant Slightly important Important Very important 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 or health advisories in the following areas?
Not at all concerned Slightly concerned Moderately concerned Very concerned 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: What impact (positive or negative) do you think the following large-scale phenomena will have on the overall water industry in 2019? [page 1 of 2]
Significant negative impact Slight negative impact No impact at all Slight positive impact Significant positive impact Don’t know

Unemployment
Housing Markets
Stock Markets
Bond Markets
Business/Industrial Activities
Energy Costs
Agriculture
Political Instability
Social Instability

Extreme weather events
Climate change
Terrorism
War
Pollution
Urbanization
Chemical Costs
Labor Costs
Wealth Inequality
Other, not listed (please specify)

Q15: The following questions refer specifically to the utility you work for. Only answer if you work for a utility. Otherwise, skip to Q39.
End for non-utility career groups; the following question-sets are provided to the submitters based upon the answer to Q3.

Q16: Is the utility you work for publicly or privately owned?
Publicly owned 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 3,300
3,301 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?
Not at all able Slightly able Moderately able Very able 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?
Not at all able Slightly able Moderately able Very able 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: 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

Q23: Is your utility considering or currently involved in a public-private partnership (P3) or partnership with other utilities?
Not considering a P3 at this time
Considering a P3 but not committed
Planning to use a P3
Already involved in a P3
Partnering with other utilities to share resources
Don’t know

Q24: How would you rate the effectiveness of your utility’s communication or outreach to the following groups?
Very negatively Negatively Indifferently Positively Very positively
General Public
Residential customers
Nonresidential customers (industrial/commercial/institutional)
Public officials
Federal Regulators
State/Local Regulators
Business leaders
Media
Youth

Q25: Does your utility intend to raise water and/or wastewater rates in the coming year?
Yes
No

Q26: By what percentage?

Q27: In your opinion, how was your utility’s last rate increase received by following groups?
Very negatively Negatively Indifferently Positively Very positively
General Public
Residential customers
Nonresidential customers (industrial/commercial/institutional)
Public officials
Board
Consumer advocates
Business leaders
Media

Q28: In your opinion, is nonpayment of bills a problem for your utility?
Significant problem
Moderate problem
Not a problem
Don’t know

Q29: If you can make an assessment, approximately what percentage of your total revenue do your unpaid accounts represent?
Q30: Does your utility offer an affordability program to assist low-income customers in paying their water and/or wastewater bills?

Yes
No
In development but not implemented
Don’t know

Q31: Has your utility considered and/or implemented 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)
All-hazards vulnerability assessment
Water loss control program
Customer communication plan
Water conservation program

Source water protection program
Well-head protection program
Drought management or water shortage contingency plan
Groundwater management plan
Staff training programs
Lead service line replacement program
Sewer lateral replacement program

Q32: Has your utility documented the location of lead service lines in it’s service area?

Fully documented
Not documented
In development but not implemented
Not applicable
Don’t know

Q33: 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

Q34: 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

Q35: How many years in the last decade has your utility implemented voluntary water restrictions? Change years to 5+

0, 1 year, 2-4 years, 5+ years
Q36: How many years in the last decade has your utility implemented mandatory water restrictions?
0, 1 year, 2-4 years, 5+ years

Q37: 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 ground water
Desalination of seawater
Indirect potable reuse
Direct potable reuse
Urban stormwater recovery for nonpotable or potable reuse

Q38: Has your utility experienced any cybersecurity events in the past five years?
Once
Multiple times
Never
Don’t know

Q39: What is your age?
Younger than 25
25-34
35-44
45-54
55-64
65 and older
Prefer not to answer

Q42: What is your time in the water industry?
Less than 5 years
6 – 10 years
11 – 20 years
20 + years

Thank you for your contribution!