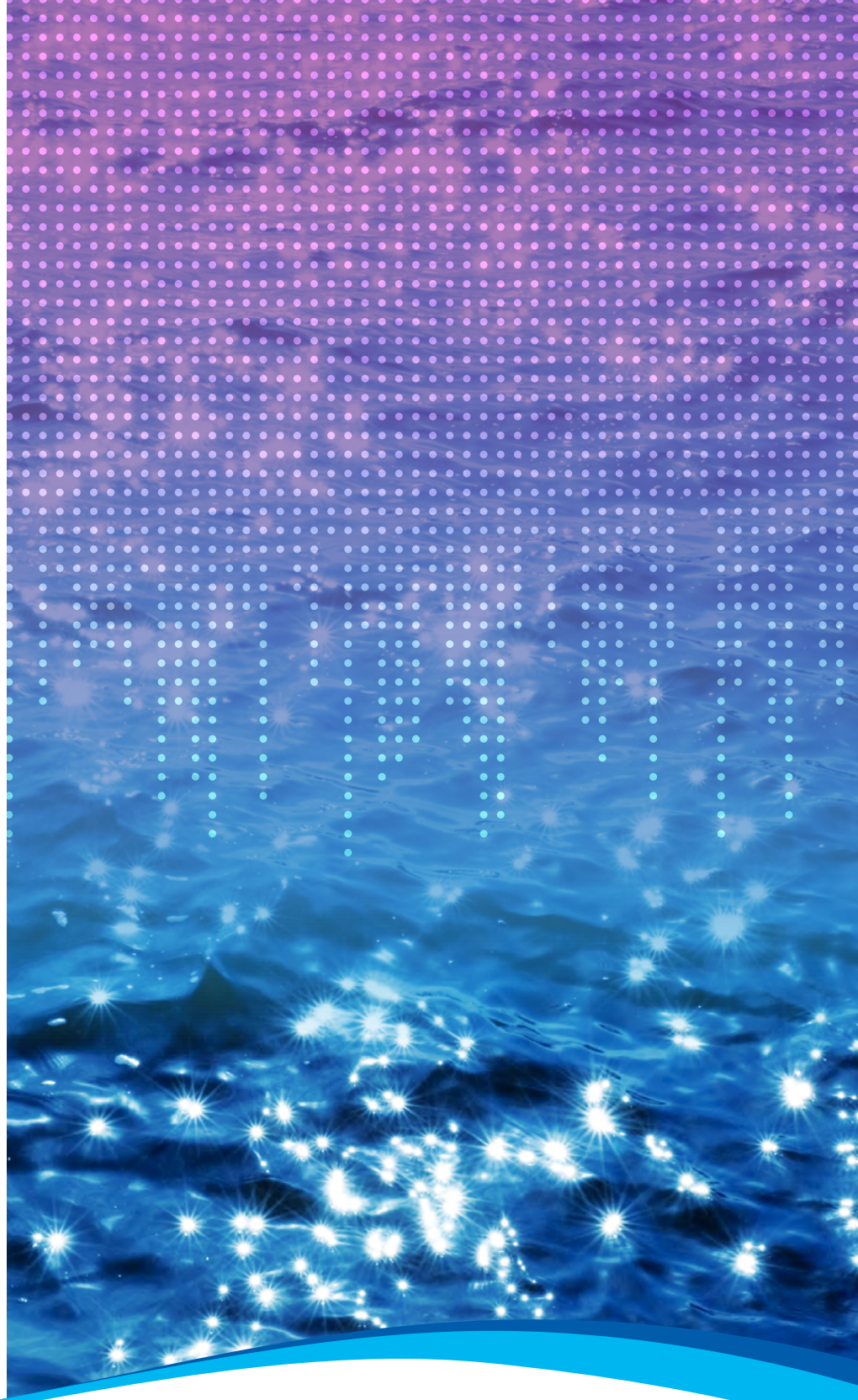




American Water Works
Association

Dedicated to the World's Most Important Resource®

State of the Water Industry



2021



Optimism



“

“The rise in optimism from water leaders doesn’t surprise me at all. The pandemic and the response to natural disasters in many regions also inspired us to shake off the ‘we have always done it that way’ mentality. In some ways we’ve leapt 10 years ahead of where we might have been. Working from home for those who can? Check. New ways of working, and new processes? Check. And as water professionals who dealt with wildfires, hurricanes, and winter storms can attest, there is nothing like a real-life disaster that needs to be addressed with funding and infrastructure so it never happens again. Check. We’ve always been resilient, but what the last year reinforced is that we are adaptable too, and that’s a pretty unbeatable combination.”

Melissa Elliott, President, AWWA

Table of Contents

Inside1

Executive Summary2

2021 State of the Water Industry Survey in Context 3

State of the Water Industry 5

System Stewardship 10

Water Resource Management 14

Regulations16

Service Provider Assessment17

The Canadian Perspective 19

Coronavirus Pandemic Impacts 20

Snapshot: COVID-19 Impacts on Small and Medium Utilities 25

Survey Respondents27

Survey Methodology 29

List of Tables 30

List of Figures 30

References31

Bibliography31

Inside

AWWA’s State of the Water Industry (SOTWI) survey is designed to identify water sector challenges and investigate possible underlying causes and drivers. In November 2020, when the survey closed, 3,021 water professionals had shared their opinions by responding to the survey.

For a fourth year in a row, water professionals responded positively, indicating they felt very good about their business now and in the future. We are once again pleased to report that the response this year (5.24 on a scale of 1 to 7) is the most optimistic in the 17 years of the SOTWI survey. Drivers for that optimism remain unquantified.

The current regional (i.e., the region where respondents work most often) health of the sector as rated by respondents is 5.57; looking forward five years, the anticipated regional soundness of the water sector is 5.38. This local optimism is likely driven by a better understanding of the water systems in the areas in which we work and perhaps we are working to support those very same systems.

The top 10 issues facing the water sector remain similar to past survey years, with infrastructure renewal and replacement topping the list of issues and finding the money to make that happen ranking second. Given the events of 2020, it was no surprise that emergency preparedness moved up in the ranking from 8 in 2020 to 4 in 2021.



“I attributed last year’s rise in optimism to an ‘accumulation effect.’ In other words, as we accumulate knowledge and experience to solve modern-day water challenges, we become more optimistic about the current and future health of the water sector. This year’s continuing upward trend—especially during a pandemic—reinforces this theory and demonstrates the growing confidence in our ability to work together on solutions. As a result, we know we can support a better world through better water.”

David LaFrance, CEO, AWWA

Of large-scale phenomena, pollution was identified as having the greatest negative impact, followed by extreme weather events, recession, and pandemic. The good news: utilities signaled that they are prepared with 93% of respondents indicating they have implemented or are in the process of implementing an emergency preparedness plan.

An important segment of water professionals—that of consultants, manufacturers, and technical contractors—weighed in on their concerns about the North American market, business abroad, and how COVID-19 was affecting them. Travel had significant impacts on business for this group.

This year’s SOTWI Snapshot is a look at COVID-19 impacts on workforce and finances at small and medium-sized utilities. These systems show much resilience and innovation.

To all water professionals: you are our water heroes. We thank you for all you do to protect public health.

AWWA thanks everyone who so generously gave of their time to participate in this year’s survey, and we look forward to continued input on future surveys. The Technical and Research Program team welcomes all readers’ 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 sector issues
- To identify important issues not being adequately addressed in order to raise awareness and assign a higher priority for these issues
- To identify and track significant water sector trends

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

In November 2020, when the survey closed, 3,021 water professionals had shared their perspectives on the water sector. As in previous years, the individuals who responded to the SOTWI survey tended to be seasoned water professionals, with 49% reporting 20 or more years of experience. The largest group of respondents (61%) represented water utilities, followed by 16% of respondents representing consulting firms/consultants (i.e., firms or individuals providing technical and engineering services to the water sector). The remaining respondents were individuals associated with the water community through service providers, academia, science, nonprofits, the legal community, and regulatory bodies, as well as retired water professionals.

Each year, the SOTWI survey asks respondents to rate the overall health of the water sector today as well as their expectations of soundness five years from now. For a fourth year in a row, water professionals responded positively, indicating they felt very good about their business now and in the future. AWWA is pleased to report that the response this year is the most optimistic it has ever been in the 17 years of the SOTWI survey. No direct cause has been determined. Still, it is worth noting that respondents continue to exhibit slight caution about the future of water.

The issues and challenges reported in the survey remain similar to previous years. Aging infrastructure and how to finance the much-needed renewal and/or replacement of infrastructure once again placed No. 1 and No. 2 on this

year's list of water sector concerns, followed by long-term water supply availability. Utilities indicated that they see their access to capital has increased slightly, with 55% of utilities reporting their access to capital is as good as or better than at any time in the past five years. Fifty-six percent of this same response group also indicate that capital improvement projects with funding before COVID-19 were still moving forward.

Of large-scale phenomena, pollution ranked as having the greatest negative impact, followed closely by extreme weather, recession, pandemic, and supply chain issues. Utilities indicate, however, that they are prepared. Overall, 93% of all utility respondents have fully implemented or are in progress of preparing an emergency preparedness plan; 80% of all utility respondents have fully implemented or are in progress with implementing a risk and resilience assessment. Utilities of all sizes indicate that any workforce and supply chain issues created by the pandemic were solvable.

Of those respondents identifying as service providers (manufacturers, distributors, distributors' representatives, technical service companies, and consultants), 46% had a formal disaster plan in place before the pandemic, and 53% have experienced coronavirus-related supply chain delays. This group ranked travel and revenue as having the first- and second-greatest impacts on their business in 2020.

All respondents are concerned about per- and polyfluoroalkyl substances (PFAS), lead and copper, and nonpoint pollution; they remain reasonably confident in current and future water supplies and indicate minor movement toward exploring alternative water sources.

This year's SOTWI survey took a close look at the impacts of COVID-19 on workforce and finances for small and medium-sized utilities. Thirty percent of respondents ($n = 553$) said they were affected by absenteeism. Sixteen percent of respondents ($n = 479$) said they have one or fewer operators; and write-in responses indicated that overtime work and finding others to fill in were viable solutions to absenteeism for their utility. All systems were affected financially; however, 86% believe they can operate a year or more under current (i.e., COVID-19) conditions.



2021 State of the Water Industry Survey in Context

Impactful Large-Scale Phenomena: Pandemic, Extreme Weather Events, Financial Concerns

AWWA issued the 2021 SOTWI survey in late September 2020, during the sixth month of the coronavirus pandemic, the second month of hurricane season, and financial challenges—specifically recession and unemployment—affecting respondents.

It is important that water and wastewater utility workers are considered essential workers in the Nation's COVID-19 response. As the population is asked to stay at home, practice social distancing, and wash their hands frequently, utility managers are tasked with keeping their essential utility workforce safe and healthy in order to comply with these directives. Those entities that directly support water utilities, such as chemical and equipment manufacturers and distributors, are affected by global shortage of goods, and those that provide services are doing so online. The water sector has developed innovative ways to maintain business continuity.

Responses from all respondents to the 2021 SOTWI survey show that water professionals believe all listed phenomena will have some degree of negative to neutral impact on the water sector. Pollution, extreme weather events, recession, the pandemic, supply chain, and climate change are clustered tightly in the top spots this year.

Focusing on extreme weather events, the National Centers for Environmental Information (NCEI 2021) reports

the United States recorded 22 weather and climate events, with losses exceeding \$1 trillion. For six consecutive years (2020 being the sixth), 10 or more billion-dollar weather and climate disaster events have hit the United States.

Drinking water utilities across the United States have experienced and continue to experience revenue and cost impacts associated with the pandemic. An analysis of the impact of COVID-19 on US drinking water utilities (Raftelis 2020) estimates a \$32.7 billion drop in economic activity and the loss of 75,000 to 90,000 private-sector jobs, due to revenue shortfalls realized by utilities as a result of reduced industrial water consumption, combined with challenges in customers' ability to pay water bills, increases in bill forgiveness, and suspended water shutoffs during this time.

SOTWI survey respondents were asked about the short- and long-term impacts on business caused by the pandemic. The details are discussed later in this document; in summary, the top three utility concerns are the supply chain of personal protective equipment, revenue generation, and CEUs for operators. Service providers see travel as the single most affected business function.





“

“The aging infrastructure of Great Lakes Water Authority continues to deteriorate, raising maintenance and repair costs. To build resiliency, we are simultaneously working to meet stringent standards for safe and clean drinking water while investing in the maintenance and renewal of critical infrastructure that is vital to our community. By prioritizing water sector financing now, we can better provide stability while continuing to protect our water quality.”

*Cheryl Porter, Chief Operating Officer,
Great Lakes Water Authority*

State of the Water Industry

AWWA's annual SOTWI survey provides an industry-wide self-assessment, gathering information to support the water community's fundamental tenets—which include safeguarding public health, supporting and strengthening communities, and protecting the environment.

As has been done since the first SOTWI survey was conducted in 2004, the 2021 survey asked participants for their opinion of the current and future health of the water sector through the following questions, using a scale of 1 to 7, where 1 = not at all sound and 7 = very sound:

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

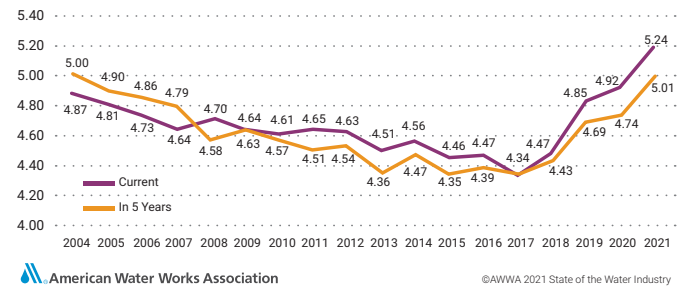
Figure 1 shows the trend of the average scores as given by all participants to these two questions since 2004. The current overall health of the water sector as rated by all respondents is 5.24, marking the most positive outlook on the state of the water industry since this survey's inception in 2004. This value is also up from a low of 4.34 in 2017, marking the fourth year with scores on the incline.

Potential drivers for this dramatic increase were investigated, with no single cause identified. Young professionals, mid-career respondents, and utility respondents account for a slight increase in optimism, although these groups were not drivers for the upward trend. Impacts related to COVID-19 and timing of the survey prior to the 2020 US election were considered, but cannot be quantified. Looking forward five years, the anticipated soundness of the water sector also saw an incline from 4.34 in 2017 to 5.01 in 2021.

Although the minimum error associated with these responses cannot be estimated, it is reasonable to report that, until 2021, there had not been a great difference in the scores related to the water industry's health over the past several years. Based on $n = 2,916$ responses to these two questions, the overall health or state of the water industry for 2021 is above the running average of 4.7.

In a year fraught with difficulties, the trending optimism displayed in Figure 1 is encouraging.

Figure 1. State of the water industry: All respondents 2004–2021 ($n = 2,916$)



In addition to asking about the overall soundness of the water sector, the 2021 SOTWI survey posed the following questions to 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 current regional health of the water sector as rated by respondents ($n = 2,914$) is 5.57; looking forward five years, the anticipated soundness of the water industry in the region where survey respondents work most often is 5.38.

The region-specific scores are typically higher than the general scores. 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 same systems, so their opinions are naturally biased.

Water Sector Challenges

To determine and rank the major issues currently facing the water sector, participants were asked to rate the importance of several challenges on a scale of 1 to 5, where 1 = unimportant and 5 = critically important. The top 20 issues, as ranked by 2021 SOTWI survey respondents, are shown in **Table 1**. In addition to the average scores, the percentage of respondents who scored an issue as critically important (i.e., 5 on a scale of 1 to 5) is included in the table.

A closer look at the top 10 concerns for all respondents, **Table 2** shows that renewal and replacement of aging water and wastewater infrastructure ranked as the most pressing issue facing the water sector; 2021 is the ninth year this challenge has been ranked No. 1. Financing these

capital improvements has also been identified as the second-most significant issue for nine years running. Emergency preparedness took on new prominence as it moved from No. 8 (2020) to the No. 4 concern facing the water sector. For the remaining issues, order has shifted slightly, but it has been relatively consistent for many years.

Very Important but Not Listed

The 2021 SOTWI survey asked respondents an open-ended question about whether there were other issues they felt ranked at least “very important” but were not listed. The 612 write-in responses reflect a broad range of sector, regional, and local issues. One recurring mention was workforce issues—specifically how to attract, train, and pay the water workforce of tomorrow.

Table 1. Issues facing the water sector in 2021 as ranked by all respondents

| 2021 Ranking | Water Sector Challenge | Weighted Average | % Ranked as Critical |
|--------------|---|------------------|----------------------|
| 1 | Renewal and replacement of aging water and wastewater | 4.58 | 65.2 |
| 2 | Financing for capital improvements | 4.46 | 57.4 |
| 3 | Long-term water supply availability | 4.32 | 52.4 |
| 4 | Emergency preparedness | 4.13 | 35.2 |
| 5 | Public understanding of the value of water systems and services | 4.13 | 38.0 |
| 6 | Watershed/source water protection | 4.08 | 36.7 |
| 7 | Public understanding of the value of water resources | 4.06 | 32.3 |
| 8 | Aging workforce/anticipated retirements | 4.03 | 38.4 |
| 9 | Compliance with current regulations | 4.00 | 29.3 |
| 10 | Groundwater management and overuse | 3.98 | 30.2 |
| 11 | Compliance with future regulations | 3.95 | 27.5 |
| 12 | Cybersecurity issues | 3.91 | 24.5 |
| 13 | Cost recovery (pricing water to accurately reflect the cost of service) | 3.89 | 28.5 |
| 14 | Talent attraction and retention | 3.87 | 24.5 |
| 15 | Asset management | 3.82 | 19.3 |
| 16 | Water conservation/efficiency | 3.80 | 25.5 |
| 17 | Drought or periodic water shortages | 3.80 | 26.9 |
| 18 | Improving customer, constituent, and community relationships | 3.79 | 20.7 |
| 19 | Data management | 3.76 | 19.6 |
| 20 | Water loss control | 3.71 | 18.1 |

Table 2. Top 10 issues facing the water sector as ranked by all respondents, 2017–2021

| 2021 | Change | 2020 | 2019 | 2018 | 2017 |
|---|--------|---|---|---|---|
| Renewal and replacement of aging water and wastewater | ↔ | Renewal and replacement of aging water and wastewater | Renewal and replacement of aging water and wastewater | Renewal and replacement of aging water and wastewater | Renewal and replacement of aging water and wastewater |
| Financing for capital improvements | ↔ | Financing for capital improvements | Financing for capital improvements | Financing for capital improvements | Financing for capital improvements |
| Long-term water supply availability | ↔ | Long-term water supply availability | Long-term water supply availability | Public understanding of the value of water systems and services | Long-term water supply availability |
| Emergency preparedness | ↑ | Public understanding of the value of water systems and services | Public understanding of the value of water systems and services | Long-term water supply availability | Public understanding of the value of water systems and services |
| Public understanding of the value of water systems and services | ↓ | Watershed/source water protection | Watershed/source water protection | Public understanding of the value of water resources | Public understanding of the value of water resources |
| Watershed/source water protection | ↓ | Public understanding of the value of water resources | Public understanding of the value of water resources | Watershed/source water protection | Watershed/source water protection |
| Public understanding of the value of water resources | ↓ | Aging workforce/ anticipated retirements | Groundwater management and overuse | Aging workforce/ anticipated retirements | Emergency preparedness |
| Aging workforce/ anticipated retirements | ↓ | Emergency preparedness | Aging workforce/ anticipated retirements | Public acceptance of future W/WW rate increases | Cost recovery (pricing water to accurately reflect the cost of service) |
| Compliance with current regulations | ↔ | Compliance with current regulations | Emergency preparedness | Emergency preparedness | Public acceptance of future W/WW rate increases |
| Groundwater management and overuse | ↔ | Groundwater management and overuse | Cost recovery (pricing water to accurately reflect the cost of service) | Governing Board acceptance of future W/WW rate increases | Water conservation/ water use efficiency |
| W/WW—water/wastewater | | | | | |

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Workforce Issues Expressed by Survey Respondents

- Retention of institutional knowledge of long-term retiring staff.
- Mentorship and building a pipeline of young talent
- Aging infrastructure as well as aging operators will leave this area in severe crisis.
- Training workforce in new technology, especially programming and data analytics
- Pay scale relevant to the criticality of the industry
- Nationwide licensing to ease hiring from other states
- Pay compensation to reflect the value of personnel and attract new employees to have the knowledge to perform the work required to maintain a utility
- Retaining operators and training and certifying young future operators. With that should result in good to excellent wages. After training operators, retention is very important.

Large-Scale Phenomena

To understand the potential impacts of several large-scale phenomena on the water sector, all SOTWI survey participants were asked to rank a list of issues on a scale from 1 to 5, where 1 = significant negative impact and 5 = significant positive impact.

Table 3 provides a ranking of these large-scale phenomena. Results show that water professionals believe all listed phenomena will have some degree of negative to neutral impact on the water sector. Pollution, extreme weather events, recession, the pandemic, supply chain, and climate change are clustered tightly in the top spots this year.

Table 3. Impact of large-scale phenomena on the water sector in 2021

| Significantly Negative (1) | Phenomenon | % Indicating Significantly Negative Impact |
|-------------------------------|--------------------------------|--|
| 2.08 | Pollution | 28 |
| 2.10 | Extreme weather | 32 |
| 2.10 | Recession | 24 |
| 2.15 | Pandemic | 27 |
| 2.18 | Supply chain | 21 |
| 2.21 | Climate change | 26 |
| 2.40 | Terrorism | 16 |
| 2.41 | Inflation | 12 |
| 2.41 | War | 19 |
| 2.45 | Labor | 9 |
| 2.52 | Unemployment | 14 |
| 2.60 | Energy costs | 11 |
| 2.68 | Agriculture | 9 |
| 2.74 | Urbanization | 9 |
| 2.88 | Stock markets | 5 |
| 2.88 | Housing | 7 |
| 2.91 | Business/industrial activities | 9 |
| 2.94 | Population growth | 10 |
| 3.03 | Bond markets | 6 |
| Significantly Positive (5) | | |

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Climate Change

When asked specifically about climate change, survey respondents are conflicted; however, when asked about the impact of large-scale phenomena on the water sector, climate change remains one of the top six phenomena. In 2021, climate change impacts are considered a negative threat.

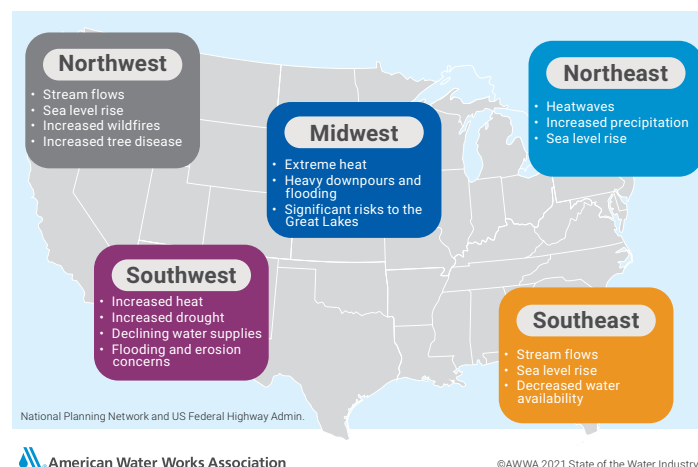
NASA (2021) states,
 “The potential future effects of global climate change include more frequent wildfires, longer periods of drought in some regions and an increase in the number, duration and intensity of tropical storms.”

Conditions affecting the water sector that are a result of climate change are accelerated sea level rise, more intense

heat waves, more droughts, and changes in precipitation patterns. Concerns for the water sector are impacts on water quality, water availability, and infrastructure.

Figure 2 shows the impacts that are currently visible throughout the United States as reported in the Third and Fourth National Climate Assessments, released by the US Global Change Research Program (n.d.).

Figure 2. Climate impacts on regions in the United States




Extreme Weather Events

NCEI tracks and evaluates climate events, in the United States and globally, that have great economic and societal impacts. Focusing on extreme weather events, NCEI reports that “the United States has sustained 285 weather and climate disasters since 1980 where overall damages/ costs for each event has reached or exceeded \$1 billion. The total cost of these 285 events exceeds \$1.87 trillion” (NCEI 2021).

In 2020, NCEI recorded 22 weather and climate events, with losses exceeding \$1 trillion (up from 14 events recorded in 2019), including one drought, 13 severe storms, seven tropical cyclones, and one wildfire event. This sets a new record for single-year events; 2020 was the sixth consecutive year in which 10 or more separate billion-dollar weather and climate disaster events affected the United States.

The US Department of Homeland Security (2020) reiterated this message in its recent Homeland Threat Assessment (October 2020), indicating that natural disasters—which refer to all types of severe weather, including floods, earthquakes, hurricanes, wildfires, and winter storms—



remain an ongoing threat to the nation. This report specifically calls out impacts of wildfires on water quality.

SOTWI survey respondents indicated, as shown in Table 3, that extreme weather events had the second-most significantly negative impact in 2020.

Assessing Risk and Uncertainty

As stewards of public health and the environment, water professionals are aware of the risks associated with securing reservoirs and wells to protect the water supply, guarding materials at their facilities from theft and sabotage, and planning for routine and extreme events. By incorporating resilience into a risk management framework, a utility can improve its response and recovery strategies, thereby mitigating the potential for loss of service.

The 2021 SOTWI survey asked utility respondents if their utility has considered and/or implemented programs and plans related to assessing risk and resilience and emergency preparedness. Overall, 93% of all utility respondents have fully implemented or are in progress of preparing

and emergency preparedness plans and 80% of all utility respondents have fully implemented or are in progress with implementing a risk and resilience assessment.

All survey respondents ranked cybersecurity the No. 12 water challenge. This is a significant move up from No. 16, as reported in 2020. Government intelligence confirms the water and wastewater sector is under a direct threat as individual criminal actors and groups threaten the security of our nation's water and wastewater systems' operations and data.

All utility participants were asked the following as part of a larger IT (information technology) needs assessment:

- Is your utility planning, revising, or assessing IT needs for any of the following?—*Cyber-intrusion*

Utility respondents ($n = 1,211$) indicate that 20% have fully implemented some form of plan for cyber-intrusion and another 20% indicate they are assessing their cyber-intrusion needs.



System Stewardship

In general, the water sector 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. They are now facing a critical need for renewal and replacement.

Infrastructure Reliability

Utilities are tasked with adopting a proactive, sustainable, solution-oriented approach to managing assets in order to help maximize the value of service delivery to customers without compromising the ability to meet the needs of future generations. Managing assets incorporates a full life-cycle approach, starting with effective planning and design, and continuing through optimized operations and

maintenance (O&M), appropriate rehabilitation, replacement, and asset disposal.

The 2021 SOTWI asked utility respondents these two questions:

- Has your utility considered and/or implemented any of the following plans or programs?—*Asset management plan*
- Has your utility considered and/or implemented any of the following plans or programs?—*Capital improvement plan*

Thirty-two percent of utility respondents ($n = 1,262$) indicated they have fully implemented an asset management plan, while another 53% indicated that implementation is in progress; 57% of utility respondents ($n = 1,298$) have a fully implemented capital improvement plan and another 35% indicated that capital improvement planning is in progress.

O&M activities contribute to infrastructure reliability. The 2021 SOTWI survey asked utility respondents if their utility had explored plans and programs related to any of the following O&M activities: water loss control, infiltration/inflow control, collection and storm overflows, and lead and lateral replacement. **Table 4** summarizes the responses.

Table 4. Operations and maintenance plans and programs contributing to infrastructure reliability

| Plan | % Fully Implemented | % Implementation in Progress | Number of Utility Respondents ($n =$) |
|---------------------------------------|---------------------|------------------------------|--|
| Water loss control program | 35.4 | 41.9 | 1,219 |
| I/I control program | 28.7 | 46.7 | 863 |
| CSO/SS overflow plan | 39.5 | 38.5 | 714 |
| Lead service line replacement program | 39.6 | 38.6 | 788 |
| Sewer lateral replacement program | 22.4 | 32.6 | 629 |

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 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 renewal and replacement costs for treatment, storage, distribution, and collection systems. Some utilities have previously kept their rates low by minimizing or ignoring renewal and replacement 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 serves. To explore the issue at this level, utility personnel who identified as executive/management and financial officers only, were asked the following:

- Prior to COVID-19, was your utility able to cover the full cost of providing service(s), including infrastructure renewal and replacement and expansion needs, through customer rates and fees?
- 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?

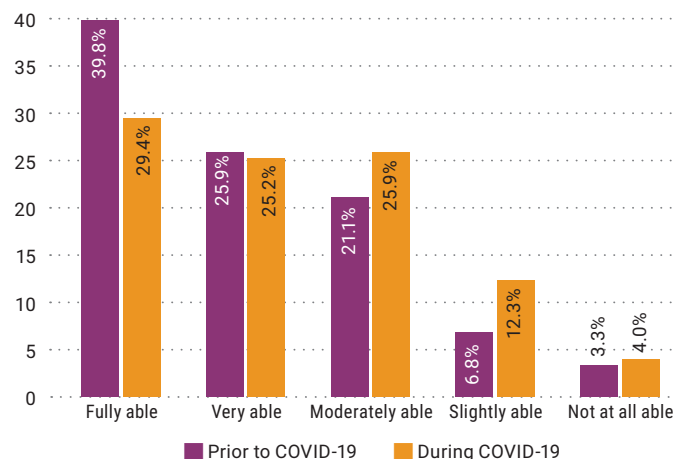
- In your opinion, how long can your utility cover the full cost of service(s) under current (COVID-19) conditions?

The responses are shown in **Figure 3**. Combining those who are not at all able and those who are slightly able to cover the full cost of providing services before the COVID-19 pandemic, 10.1% of utilities are currently struggling to implement full-cost pricing. This is a significant change from the data reported in the 2020 SOTWI survey, in which 29.3% of utilities had indicated they were slightly or not at all able to provide the full cost of services.

In addition, 39.8% of respondents in the 2021 survey believe they were fully able to cover the full cost of services before the pandemic. These values are inconsistent with previous years, in which the 2020 survey indicated that 19.1% of respondents were able to cover the full cost of providing services.

Of the results in Figure 3, the most notable is the increase in those utilities moderately able to cover the full cost of services during this pandemic. Although all utility sizes indicated an increase in ability to provide full cost of services, this number is driven by the responses from very large utilities (greater than 100,000 connections).

Figure 3. Utility ability to cover the full cost of providing services prior to COVID-19 and during COVID-19



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Taking a closer look at how utility respondents felt they could continue providing the full cost of services under COVID-19 conditions, utility personnel who identified as executive/management and financial officers only, were asked the following:

- In your opinion, how long can your utility cover the full cost of service under current (COVID-19) conditions?

An overwhelming majority, 82.4% of the 500 respondents, indicated they could provide the full cost of service under current (COVID-19) conditions for a year or more.

To explore the issue further, utility personnel who identified as executive/management and financial officers were asked the following:

- Does your utility intend to raise water and/or wastewater rates in the coming year?

Sixty-four percent of respondents indicated their utility would be raising water rates in 2021.

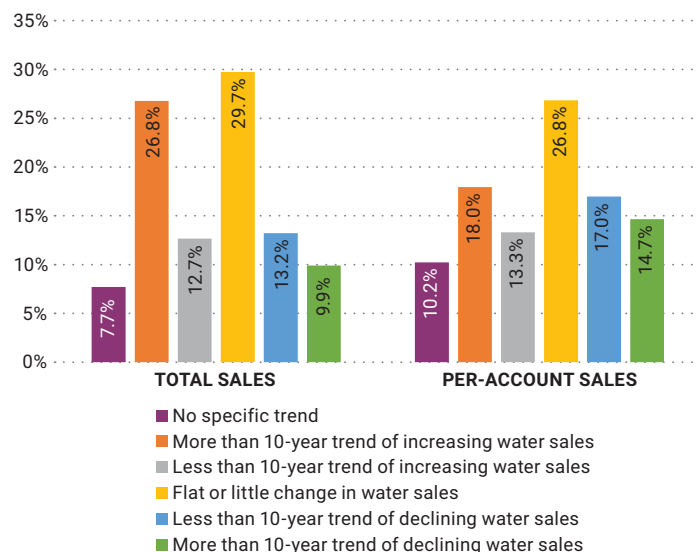
Changing Water Demands

More efficient use of water is a major goal of the water sector. However, in areas where customer growth is slow or nonexistent, declining water use, if 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 even less.

Exploring this issue, utility personnel identifying as executive/management and financial officers were asked a series of questions about their utility's trends in water sales. Results regarding trends in total water sales are shown in **Figure 4**, revealing that 23.1% of these respondents are seeing declining total water sales (either a trend of more than or less than 10 years), while 29.7% of respondents reported their total water sales were flat or little changed in the past 10 years.

In 2021, 39.5% of these respondents reported their utility saw an increasing trend in total water sales (either a trend of more than 10 years or less than 10 years), which is similar to past years.

Figure 4. Utility trends in total and per-account water sales



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Results from respondents regarding their trends in per-account water sales are also shown in Figure 4. This figure indicates that 31.7% of respondents reported their utility was experiencing declining per-account water sales (a trend of either more than 10 years or less than 10 years), while 26.8% of respondents reported flat or little change in per-account water sales. Thirty-one percent of utilities reported increasing per-account water sales (a trend of either more than or less than 10 years), which is a slight increase in per-account water sales as reported in 2020.



Funding Sources

Utilities, state, and local governments that want to invest in infrastructure can do so by either funding projects directly (spending reserves) or by financing (taking out loans or issuing bonds to obtain funds that will be repaid over time.) Financing can allow infrastructure projects to be paid for over a period that more closely matches the infrastructure's useful life and can make money available to pay for projects sooner. Financing can also add to grants and other funding for infrastructure projects. It's important to keep in mind, however, that revenues committed to paying back funds borrowed today will be unavailable for projects in the future.

Even with the most diligent planning efforts, utilities must handle the unplanned or accelerated capital projects that are due to asset failures. When asked about overall issues facing the water sector, ranked second is financing for capital improvements (Table 1). The 2021 SOTWI survey asked utility personnel who identified as executive/management and financial officers the following:

- What are your utility's capital funding sources and/or strategies?

Respondents were asked to choose all that applied. Rate increases were mentioned as the primary capital funding source followed by bonds. Operational savings, state revolving funds, reserves, and grants were also mentioned as capital funding sources in the coming year.

The 2021 SOTWI survey also asked utility personnel who identified as executive/management and financial officers the following:

- Does your utility intend to raise water and/or wastewater rates in the coming year?

Sixty-four percent of the utility executive/management and financial officer respondents indicated they planned a rate increase in 2021.

Access to Capital

To help clarify the current financing environment for the water sector, utility personnel who identified as executive/management staff and financial officers 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?

Fifty-five percent of utility personnel identifying as executive/management and financial officers reported that their utility's access to capital was as good as or better than at any time in the past five years. This value, based on 598 responses in 2021, is close to the running average of 53%. Seven percent reported that their utility's access to capital was as bad as or worse than at any time in the past five years, which is in keeping with historical trends.



Water Resource Management

Long-Term Water Supply Availability

In the 2021 SOTWI survey, all respondents highly rated several issues related to water resources management in terms of importance, including long-term water supply availability (third most important), watershed/source water protection (sixth most important), and groundwater management and overuse (10th most important) (Table 1).

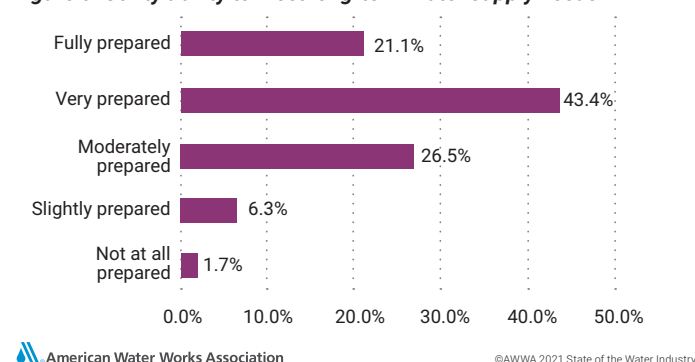
To understand the issue of long-term water supply availability, utility personnel were asked the following:

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

The summary presented in **Figure 5** shows that 8% of responding utility personnel indicated their utility will be challenged to meet anticipated long-term water supply needs (i.e., not at all or only slightly prepared), compared with 12% reported in 2020 and 2019.

Additionally, 64.5% of participants indicated that their utilities are very or fully prepared, up from 57% reported in 2020.

Figure 5. Utility ability to meet long-term water supply needs



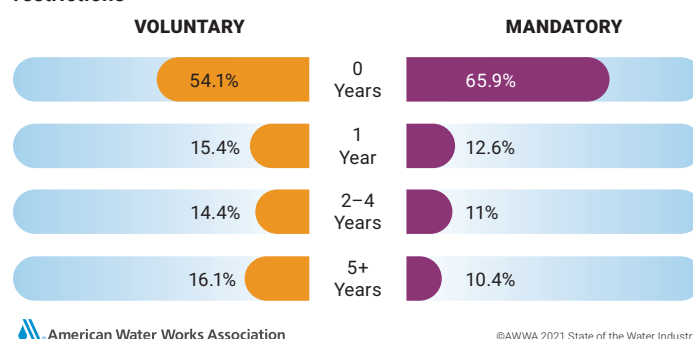
Water Shortages

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.

To gauge the effects of water shortages, utility personnel were asked how many years in the past decade their utility had implemented voluntary or mandatory water restrictions. The responses summarized in **Figure 6** reveal that

for a majority of the 1,385 utility respondents, voluntary and mandatory water restrictions were not needed. Of utility personnel responding, 16.1% indicated their utilities had five or more years of voluntary restrictions, and 10.4% had five or more years of mandatory restrictions in the past decade.

Figure 6. Utility history of implementing voluntary and mandatory water restrictions




Water Supply Sustainability

As communities evaluate their water shortage preparedness, there is also an opportunity to better understand regional water supply sustainability. In addition to reliability during water shortages, utilities and the communities they serve can 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 survey responses 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 long-term improvements in water use efficiency while maintaining quality-of-life standards.

To understand the status of conservation planning at water utilities, the 2021 SOTWI survey asked participants whether their utility has any water conservation or water-shortage-planning programs. The survey indicated that 44% of all utility participants have a fully developed drought management or water shortage contingency



plan, and 41% of utility respondents have fully implemented a water conservation program.

In addition to water conservation, another nontraditional source of water supply is seawater or brackish groundwater. Utility participants were asked whether their utility was considering desalination of either brackish groundwater or seawater to augment existing drinking water supplies. Of the 1,395 responses, 9.8% reported having or developing some type of indirect potable reuse to augment existing supplies.

Those respondents identifying as consultants, manufacturers, and technical contractors were asked what they believe holds the most potential for innovation; potable reuse was one of the top responses.

Protecting Water at the Source

Source water protection is the mitigation of potential risks to, and impacts on, drinking water supplies. It is one of the first critical barriers against drinking water contamination and other risks. A strong source water protection program can be one of the most cost-effective methods for maintaining, safeguarding, and improving the quality and quantity of source water and drinking water.

In most cases, states are responsible for implementing the regulatory requirements that affect water protection under the Safe Drinking Water Act and the Clean Water Act. States are also responsible for establishing initiatives to provide technical and financial assistance to drinking water systems that are pursuing source water protection activities.

The 2021 SOTWI survey asked utility participants the following:

- Has your utility considered and/or implemented any of the following plans or programs?—*Source water protection program*

Seventy-nine percent of utility respondents ($n = 1,095$) say their utility has fully implemented or is in progress of implementing a source water protection program. The percentage was greater for very large utility respondents, at 86% ($n = 249$).

Groundwater management and overuse rose to significance in the 2019 and 2020 SOTWI surveys as California drought and wildfires taxed groundwater resources. In the 2021 survey, groundwater management and overuse remain among the top 10 water sector concerns (Table 1).

Groundwater resources are essential; AWWA supports proper management and use of groundwater resources to protect the long-term quantity and quality of groundwater. AWWA also supports proactive planning and education efforts.

The 2021 SOTWI asked all utility respondents the following:

- Has your utility considered and/or implemented any of the following plans or programs?—*Groundwater management plan*

Seventy-seven percent of utility respondents ($n = 802$) indicated they had fully implemented a groundwater management plan or that plan implementation was in progress.



Regulations

The importance of current and future regulatory compliance remained a concern for all respondents in the 2021 SOTWI survey. Referring to Table 2, compliance with current regulations and compliance with future regulations were rated ninth and 11th (not shown in Table 2), respectively, in the current survey. It is worth noting that respondents from very large utilities rated current and future regulations as No. 5 and No. 6 concerns.

All survey participants were asked about their levels of concern regarding the water sector's ability to comply with current regulations and health advisories, and their responses are summarized in **Table 5**. Scores are on a scale of 1 to 5, where 1 = not at all concerned and 5 = extremely concerned.

Current health advisories regarding PFAS and regulations regarding lead and copper were the top two concerns. Nonpoint source pollution and PFAS were identified as the top two concerns in 2020.

Table 5. Regulatory concerns ranked by all survey respondents

| Contaminant | Weighted Average | % Extremely Concerned | All Respondents (n =) |
|---|------------------|-----------------------|------------------------|
| PFOA/PFAS | 3.14 | 17.6 | 2,136 |
| Lead and copper | 3.23 | 14.0 | 2,336 |
| Nonpoint source pollution | 3.21 | 12.5 | 2,227 |
| Point source pollution | 3.16 | 11.2 | 2,268 |
| Pathogens | 3.09 | 13.4 | 2,290 |
| Cyanotoxins | 3.09 | 10.0 | 2,105 |
| Disinfection byproducts | 3.09 | 9.1 | 2,267 |
| Nutrients | 3.08 | 10.0 | 2,201 |
| Combined sewer overflows | 3.02 | 10.6 | 2,199 |
| Perchlorate | 2.89 | 6.6 | 2,064 |
| Arsenic | 2.82 | 6.6 | 2,194 |
| Radionuclides | 2.76 | 7.4 | 2,082 |
| PFAS—per- and polyfluoroalkyl substances, PFOA—perfluorooctanoic acid | | | |

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Lead and Copper

Lead and copper enter drinking water mainly from corrosion of plumbing materials that contain lead and copper. While the use of lead in plumbing materials has been banned for more than a quarter-century, the release of lead into drinking water remains a serious concern. Lead and copper contamination appears as the No. 2 regulatory concern in Table 5.

The 2021 SOTWI survey asked utilities the following:

- Has your utility considered and/or implemented any of the following plans or programs?—*Lead service line replacement program*

Overall, 79% of utility respondents ($n = 788$) indicated their utility has fully implemented or is in progress of implementing a lead service line replacement program.

Service Provider Assessment

The SOTWI survey classifies as a utility any entity—public or private—engaged in water production or water/waste-water treatment, including water wholesalers. The service provider category consists of manufacturers, distributors, distributors’ representatives, technical service companies, and consultants—in essence, anyone supplying products and services to utilities. This is a broad group representing diverse business interests.

Global Markets

Service providers were given a list of countries or areas outside the United States and were asked about doing business in these world markets. From a global perspective, service providers were asked two questions:

- What key markets outside the United States are of interest to your company for potential water industry business development?
- Please rate the importance of the following issues to developing water-related markets outside of North America.

The map in **Figure 7** shows the key water markets identified by these respondents ($n = 546$). Key markets outside the United States consist of Canada, Mexico, Central America, Brazil, Argentina, the United Kingdom, China, India, Australia, and the European Union. Write-in responses expanded the original list (see “Single mention” and “Multiple mentions” in Figure 7), indicating that most firms are indeed global, with business in the Middle East, Pacific Islands, Latin America, and the Far East.

Figure 7. Key water sector markets for service providers

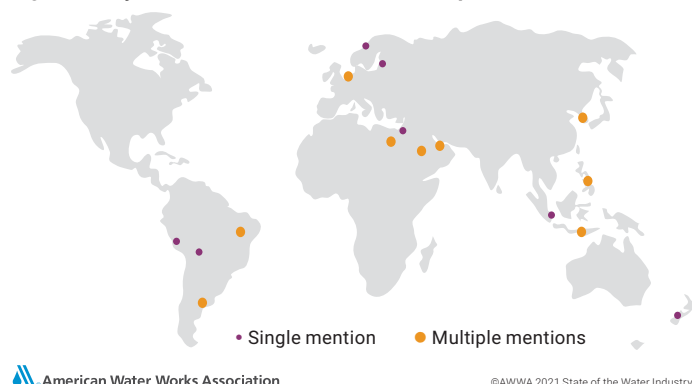


Table 6. Summary of barriers to foreign commerce

| Rank | Foreign Market Concerns | Weighted Average | % Critically Concerned |
|------|--------------------------------|------------------|------------------------|
| 1 | Financing | 3.62 | 18.9 |
| 2 | Financial concerns | 3.61 | 18.0 |
| 3 | Contract risks | 3.48 | 16.3 |
| 4 | Overall cost | 3.42 | 10.0 |
| 5 | Distribution | 3.23 | 7.9 |
| 6 | Intellectual property security | 3.22 | 12.7 |
| 7 | Divergent standards | 3.15 | 4.6 |
| 8 | Foreign exchange | 3.10 | 8.2 |
| 9 | Tied aid | 2.85 | 5.3 |
| 10 | Redundant test/compliance | 2.81 | 4.1 |
| 11 | Language | 2.80 | 5.6 |

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Service providers indicated the largest obstacles to developing business outside the United States were financing and financial concerns, followed by contract risks and overall cost. **Table 6** is a summary of the barriers to foreign commerce identified by survey respondents. Financing, financial concerns, and contract risks topped the list in 2021. Added for 2021 was intellectual property security, which was ranked at No. 6 on the list of concerns. These were the same concerns indicated by service providers in the 2020 SOTWI survey.

The North American Market

Doing business in North America presents its own set of business challenges. To better quantify what service providers are thinking, they were asked the following:

- How concerned are you with the following as they relate to water industry business development in the North American market?
- In your opinion, how important are the following to the North American water and wastewater market growth?
- What single water industry issue do you feel holds the most potential for innovation?

The survey provided a list of potential water sector development concerns about the North American markets. As shown in **Table 7**, service providers see budgetary issues faced by utilities as the greatest challenge to doing business, followed by cost/price and low-bid mentality, then federal funding.

In **Table 8**, water quality issues, water scarcity, and innovation ranked as the biggest concerns for North American water utilities, with water scarcity being ranked as more critically important.

When asked what single water sector issue they believed held the most potential for innovation, the majority of service providers selected technologies related to potable water reuse.

Table 7. North American water market challenges as indicated by water sector service providers

| Rank | Market Challenge | Weighted Average |
|------|--|------------------|
| 1 | Budgetary issues faced by utilities | 3.80 |
| 2 | Cost/price/low-bid mentality | 3.79 |
| 3 | Federal funding | 3.51 |
| 4 | Water sector attitudes toward change | 3.27 |
| 5 | Regulatory (including permitting, approvals, certifications) | 3.31 |
| 6 | Policy | 3.14 |
| 7 | Financial performance of the water sector | 3.10 |
| 8 | Venture capital or equity investments | 2.84 |
| 9 | Availability of good market data | 2.80 |
| 10 | Competition | 2.71 |
| 11 | Specifications | 2.67 |

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Table 8. Issues ranked by importance to North American water market growth

| Rank | Issues Important to North American Water Market Growth | Weighted Average | % Critically Important |
|------|--|------------------|------------------------|
| 1 | Water quality issues | 3.88 | 26.7 |
| 2 | Innovation | 3.85 | 25.9 |
| 3 | Water scarcity | 3.83 | 34.2 |
| 4 | Federal, state and provincial, or local regulations | 3.70 | 22.7 |
| 5 | Greater efficiency | 3.61 | 18.3 |
| 6 | Advanced treatment technologies | 3.58 | 18.4 |
| 7 | Secondary and tertiary wastewater treatment | 3.48 | 18.5 |
| 8 | Research | 3.43 | 13.6 |
| 9 | Smart water market | 3.31 | 15.5 |
| 10 | Solids removal technologies | 3.22 | 13.5 |

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The Canadian Perspective

The 2021 SOTWI survey had 196 respondents, or 6.5% of all survey respondents, representing nearly all provinces of Canada. This response rate is nearly a 30% increase from previous surveys; however, it remains too small for statistical significance. **Figure 8** shows the provinces from which survey responses were received.

Figure 8. Canadian response by province to the SOTWI survey

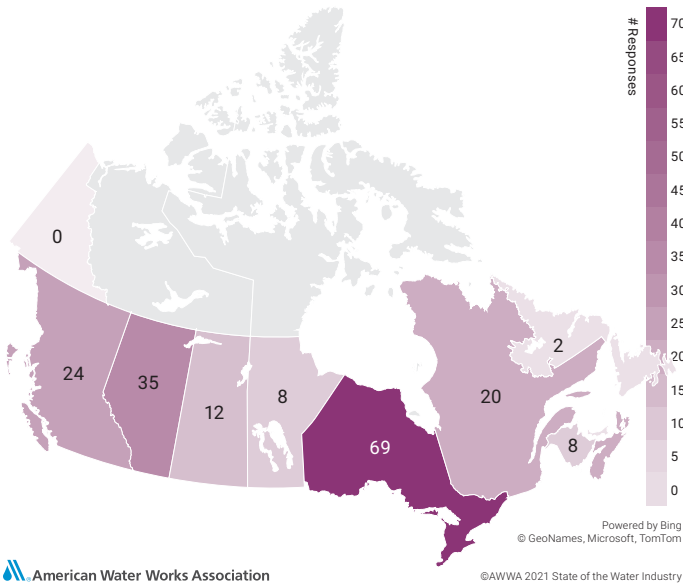
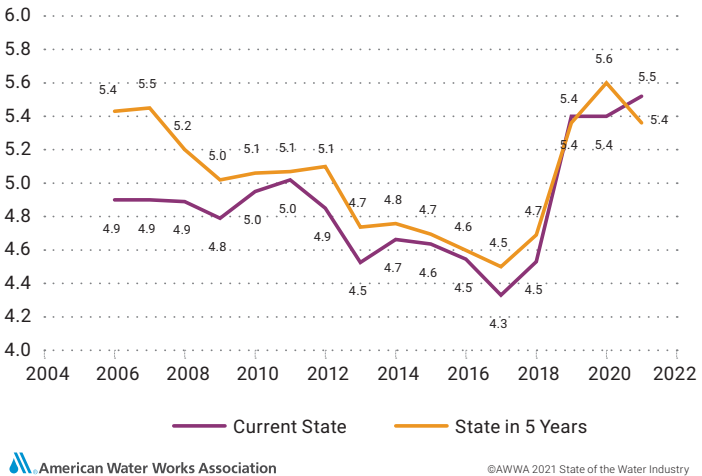


Figure 9 shows the average health of the water sector as rated by Canadian participants. The 2021 SOTWI data indicate Canadians are relatively optimistic about the present and future health of the water sector: they recorded 5.5 and 5.4 rankings, respectively, for the current and future health of the water industry on a scale of 1 to 7, where 1 = not at all sound and 7 = very sound.

Figure 9. State of the water industry: Canadian responses (2006–2021)





Coronavirus Pandemic Impacts

The SOTWI survey is designed to identify water sector challenges and to investigate the underlying causes and drivers. The survey made every effort to solicit responses that indicated conditions before and during COVID-19. Although COVID-19 did not affect water supplies, it did affect the water professionals who work in and support these systems.

The 2021 SOTWI survey looked at effects on workforce, processes, plans, and procedures of the water sector during the beginning of the COVID-19 outbreak through the third quarter (Q3) of 2020 in an attempt to identify the short- and potentially long-term impacts of a pandemic on the water sector.

Was the Water Sector Prepared?

Water and wastewater utilities and the services they provide are designated as essential services, emphasizing their importance to public health. America’s Water Infrastructure Act (AWIA) of 2018 requires that community water systems serving a population of more than 3,300 prepare a risk and resilience assessment and an emergency response plan. The risk and resilience assessment must consider threats from both malevolent acts and natural hazards that could affect the mission of the utility as a result of physical or cyber incidents. The findings of the risk and resilience assessment must then be used to inform development of an emergency response plan that considers plans and procedures that can be implemented to lessen impact on the health, safety, and supply of drinking water from malevolent acts or natural hazards.

When asked about programs and planning, nearly 80% of utility respondents (*n* = 1,159) indicated they had fully implemented or were in the process of implementing a community risk and resilience assessment; another 93.2% (*n* = 1,346) had fully developed or were in progress of developing an emergency response plan.

These numbers are in line with deadlines for complying with AWIA risk and resilience provision, as shown in **Table 9**.

Table 9. Deadlines for complying with AWIA risk and resilience provisions

| Population Served* | Estimated Number of Impacted Community Water Systems | Risk and Resilience Assessment Before COVID-19 | Emergency Response Plan |
|--------------------|--|--|-------------------------|
| ≥100,000 | 435 | Mar. 31, 2020 | Sept. 30, 2020 |
| 50,000–99,000 | 594 | Dec. 31, 2020 | June 30, 2021 |
| 3,300–49,000 | 8,295 | June 30, 2021 | Dec. 30, 2021 |

Source: Via S., March 2019. *Journal AWWA*, <https://doi.org/10.1002/awwa.1247>
AWIA—America’s Water Infrastructure Act of 2018
*Wholesale systems use total population

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The survey also asked all utility respondents if their utility was considering mutual aid or collaboration with nearby utilities. Nearly 53% (*n* = 843) of the utilities responding had these systems fully implemented before COVID-19.

Those identifying as service providers (manufacturers, distributors, distributors’ representatives, technical service companies, and consultants) were asked the following:

- Did your company have a formal disaster plan in place prior to the pandemic?

Responses were almost evenly split, with 46% of respondents (*n* = 524) having a plan in place before the COVID-19 pandemic. This number was driven by the larger companies with 500 or more employees.

What Were the Challenges? Where Are We Now?

The 2021 SOTWI survey asked utility respondents to rank a set of business operation challenges in the second quarter (Q2) of 2020 and then again in Q3. These perceptions provide a lateral view of the water sector, making it possible to ascertain how water utilities initially responded to the pandemic and determine how those same utilities are adapting as the COVID-19 crisis continues.

More than 1,000 utility respondents were asked to rank possible challenges to sustaining business operations in Q2 and Q3 2020. Table 10 shows that the top three issues—(1) disruption in the supply chain for personal protective equipment, (2) revenue generation and cash flow, and (3) lack of options for operators to get CEUs to keep

Table 10. Challenges to sustaining business operations rank for Q2 and Q3 2020

| Q2 Rank | Challenge | % Critical | Q3 Rank | Challenge | % Critical |
|---------|---|------------|---------|---|------------|
| 1 | Disruption in supply chain for personal protective equipment | 23.2 | 1 | Disruption in supply chain for personal protective equipment | 15.2 |
| 2 | Revenue generation/cash flow | 12.1 | 2 | Revenue generation/cash flow | 11.5 |
| 3 | Lack of options for operators to get CEUs to keep license current | 11.7 | 3 | Lack of options for operators to get CEUs to keep license current | 12.0 |
| 4 | Continuity of operations due to absenteeism | 15.7 | 4 | Continuity of operations due to absenteeism | 13.8 |
| 5 | Impacts on field operations (meter reading, repairs, etc.) and/or treatment operations | 10.7 | 5 | Need to separate or distance workforce from support/contract service (e.g., biosolids, laboratory, delivery of essential materials) | 8.9 |
| 6 | Need to separate or distance workforce from support/contract service (e.g., biosolids, laboratory, delivery of essential materials) | 10.9 | 6 | Impacts on field operations (meter reading, repairs, etc.) and/or treatment operations | 9.0 |
| 7 | Being able to hold required public board meetings | 7.5 | 7 | Being able to hold required public board meetings | 6.4 |
| 8 | Disruption in supply chain for other materials besides treatment chemicals | 6.1 | 8 | Disruption in supply chain for other materials besides treatment chemicals | 5.5 |
| 9 | Disruption in supply chain for treatment chemicals | 12.0 | 9 | Disruption in supply chain for treatment chemicals | 10.6 |
| 10 | Delay of mandated equipment repairs | 5.3 | 10 | Delay of mandated equipment repairs | 4.5 |
| 11 | Reduced number of certified operators to meet required staffing rules | 8.1 | 11 | Reduced number of certified operators to meet required staffing rules | 6.9 |
| 12 | Limitations of laboratory testing capacity | 4.8 | 12 | Challenges due to flushability | 4.1 |
| 13 | Challenges due to flushability | 4.3 | 13 | Limitations of laboratory testing capacity | 3.9 |

CEU—continuing education unit

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licenses current—remained the same from Q2 to Q3 2020. Data indicate criticality of challenges lessening from Q2 to Q3, with the exception of operator licensing, which saw a slight increase. The arrows in **Table 10** point out the small shift in ranking.

To understand the potential impacts of COVID-19 on the service provider business, participants identifying as service providers were asked to rank a list of issues on a scale from 1 to 5, where 1 = negative impact and 5 = positive impact.

Table 11 provides a ranking of these business factors, showing how service providers rated each area of their business as it was affected by COVID-19. Results show that respondents in this group believe all listed business functions will be negatively affected to some degree. Travel was identified by all companies ($n = 530$) as the area most affected by COVID-19.

Table 11. Business factors affected by COVID-19

| Rank | Business Impacts Due to COVID-19 | Weighted Average |
|------|----------------------------------|------------------|
| 1 | Travel | 1.71 |
| 2 | Advertising spending | 2.22 |
| 3 | Field operations | 2.25 |
| 4 | Sales | 2.36 |
| 5 | Research and development | 2.40 |
| 6 | New products | 2.41 |
| 7 | Revenue | 2.55 |
| 8 | Number of employees | 2.70 |
| 9 | Technology spending | 2.71 |

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Service providers were also asked the following:

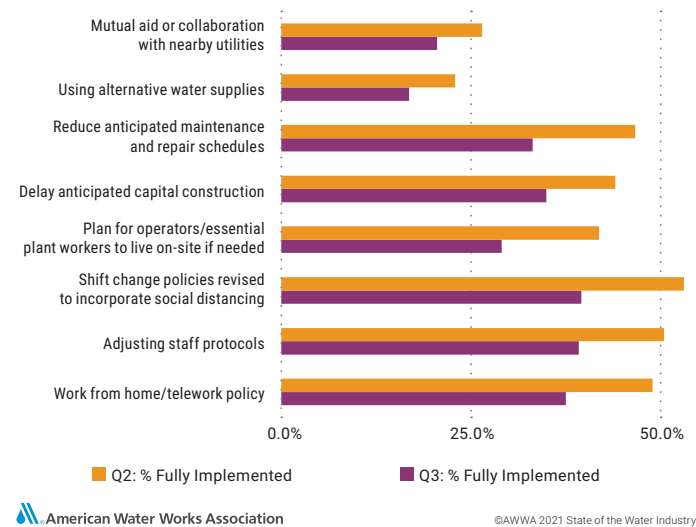
- Has your company experienced coronavirus-related supply chain delays (e.g., delays in receiving materials or products from suppliers)?

Responses were almost evenly split, with 54% ($n = 531$) replying that they had seen supply chain delays and 46% replying they were not experiencing supply chain delays.

How Did Utilities Manage Risk?

Workplace changes were required in order to manage exposure and infection while maintaining continuity of operations. To assess the level of adjustment required, utility respondents were asked to rank several policies and protocols at their utility and indicate the state of implementation in Q2 and Q3 of the pandemic. **Figure 10** shows the status of the fully implemented policies and protocols for managing risk. In all cases, utilities fully implemented processes and continued to refine them as the pandemic continued. The largest adjustment from pre-COVID to Q3 is the refinement of work-from-home policies.

Figure 10. Managing risk during COVID-19



Customer Assistance and COVID-19

To help clarify the impact of customer assistance programs, utility personnel who identified as executive/management and financial officers were asked about implementation of customer assistance plans and programs during the pandemic. **Figure 11** shows the Q2/Q3 status of these plans and programs. In all cases, utilities have

reduced the extent to which they are fully implementing nonrevenue activities and continue to support customer efforts to pay for water service. More than 76% of the responding utilities suspended customer water shut-offs in Q2 compared with 56% of those same utilities in Q3 2020.

Figure 11. Customer assistance programs during COVID-19



How Are Stakeholders Getting Information?

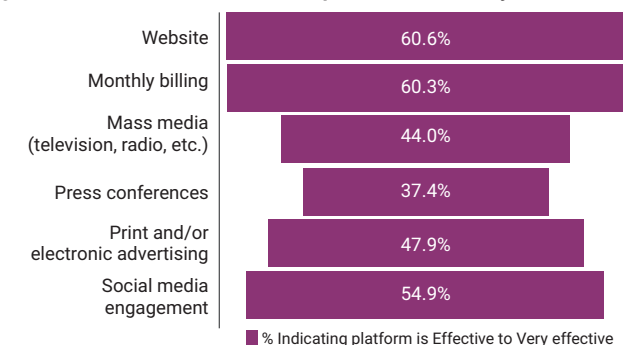
As information on the transmission of the novel coronavirus (which causes COVID-19) became available, drinking water utilities needed to get the word out about the safety of drinking water.

As seen in Figure 11, more than 60% of utilities continue to make efforts to communicate to their customers about the safety of drinking water.

To gain a better understanding of which utility messaging platform was effective for managing and messaging COVID-19 information, all SOTWI survey respondents ($n = 1,766$) were asked how they would rate the effectiveness of their utility's communication on the safety of water and the reliability of water services during the coronavirus pandemic through various media outlets. More than 60% found their utility's website and monthly billing effective to very effective for communicating information, followed by social media engagement. This was true for all utility sizes.

Figure 12 shows how the media outlets were ranked for conveying critical information about water.

Figure 12. Effectiveness of various platforms for utility communication



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The 2021 SOTWI survey provided an open-ended question asking participants other methods they found effective for communicating with stakeholders.

Responses: town meetings, Consumer Confidence Reports, direct communications with employees and employees communicating in their neighborhoods, outbound calls, emails, Facebook

The message that it was safe to drink water and wash your hands was actively communicated—but was it received?

A survey conducted by AWWA, in collaboration with Morning Consult in 2020, indicated the importance of utility communication, with people who recall having received communication from their water utility in the past year reporting higher satisfaction with their water than those who do not recall any communication. Of those recalling utility communication, 85% of respondents reported being satisfied with their tap water, 86% reported that their water is safe, and 84% reported good to excellent water quality. The message is clear that communication makes a difference in strengthening public trust.

Communication challenges existed before the pandemic, and for the past five years, public understanding of the value of water systems and services has been ranked

as one of the top five largest water sector challenges, as seen in Table 2.

What Operations and Business Practices Were Modified as a Result of COVID-19?

The 2021 SOTWI survey looked at business functions and technology to ascertain the extent of COVID-19 impacts on business continuity. All utility respondents were asked if their utility was planning, revising, or assessing IT needs in several areas of business. The data indicate that utilities are not engaged in investigating IT needs for O&M activities and are moderately investigating IT needs for business operations. Twelve percent of respondents ($n = 1,206$) indicated that COVID-19 was a driver for increased productivity tools such as email and file-sharing.

Financial Concerns

The water sector has experienced and anticipates experiencing revenue and cost impacts associated with the national, state, and local responses to the COVID-19 pandemic:

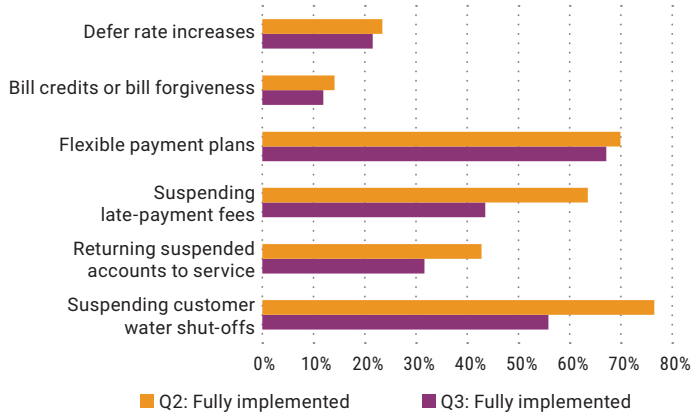
- Changing utility policies to not shut off water service to customers who have not paid their bills and providing forgiveness of late-payment fees
- Losses in revenue from nonresidential customers as a result of national and state directives for the temporary shutdown of nonessential businesses and stay-at-home orders
- Workforce safety
- Reducing, deferring, or eliminating capital expenditures

The 2021 SOTWI survey asked utility personnel identifying as executive/management and financial officers what the anticipated impact of COVID-19 would be on their utility's overall finances in 2020 and in 2021. More than 60% ($n = 594$) believed overall finances in both 2020 and 2021 would be negatively to somewhat negatively affected by COVID-19. That number rose to nearly 73% for very large utilities in 2020 and 2021.

Utility personnel identifying as executive/management and financial officers were also asked about the COVID-

related changes in utility policy from Q2 to Q3 2020. **Figure 13** summarizes the policy changes by category.

Figure 13. Percent of utilities implementing specific policies Q2–Q3 2020



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Suspending customer water shut-offs, returning accounts to service, and suspending late-payment fees were fully implemented by an average of more than 60% of drinking water utilities in Q2 2020; by Q3 2020, that number had dropped to an average of 43%. Approximately 67% of responding utilities maintained a flexible payment plan through Q3 2020. Bill credits or bill forgiveness were fully implemented in fewer than 15% of the responding utilities.

This same response group was asked if their utility offered an affordability program to assist low-income customers in paying their water and/or wastewater bill; 38% said they had a program fully implemented and another 17% said assistance was offered elsewhere.

Utility personnel identifying as executive/management and financial officers were asked about raising rates in 2021; 64% of respondents ($n = 593$) indicated they intend to raise rates in 2021, and another 22% indicated they plan to defer rate increases in the coming year.

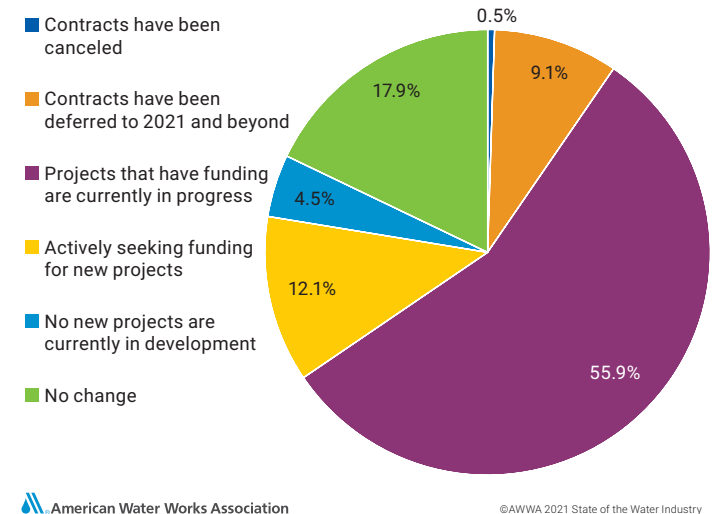
Capital Expenditures

To investigate utility spending during the pandemic, the 2021 SOTWI survey asked several questions about capital spending. The survey asked utility personnel identifying as executive/management and financial officers the following:

- What is the current status of your capital improvement projects?

Figure 14 summarizes those responses, which indicate that nearly 56% of those with funded projects will continue those projects and approximately 12% of respondents ($n = 397$) indicated they will seek funding for future projects.

Figure 14. Status of capital expenditures during COVID-19



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Snapshot: COVID-19 Impacts on Small and Medium Utilities

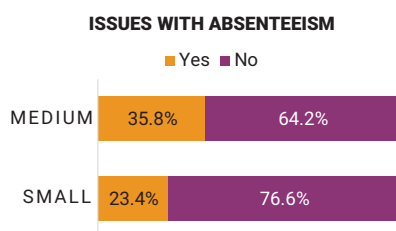
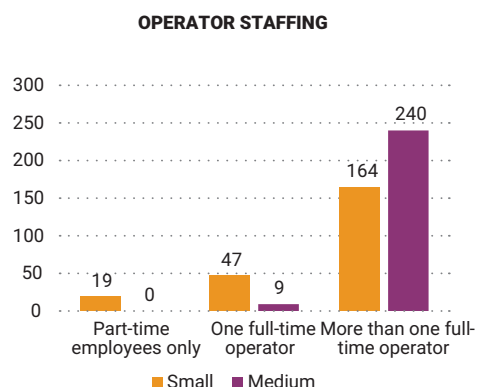
Small and medium-sized utilities often do not have adequate resources to address emergency situations. The 2021 SOTWI survey asked utilities serving 0–3,300 and 3,301–10,000 customers how they were faring during the pandemic.

To characterize these utilities, the 2021 SOTWI asked the following:

- What best describes your utility’s operator(s)?

Figure 15 summarizes the responses ($n = 479$), showing that 84% of respondents have more than one employee, and 16% have one full-time operator or part-time operators on staff.

Figure 15. COVID-19 workforce issues at small and medium-sized utilities



ABSENTEEISM SOLUTIONS

| | Small | Medium |
|---|-------|--------|
| Hired outside contractor | 0.0% | 0.0% |
| Staff fill gaps in critical functions | 91.5% | 93.2% |
| Collaborated with other organizations/utilities | 0.0% | 1.4% |
| Unable to complete critical functions due to staffing | 8.5% | 5.4% |

Survey respondents could add to or clarify their responses with a write-in option. The following comments were provided by respondents:

- We have 23 full-time staff, including 2 administrators, 5 customer service staff, 6 water operators, 2 wastewater operators, and 8 field operations staff
- Towns associated donate their operators
- We have a semi-retired operator who was our full-time operator/manager prior to retiring
- Full-Time Staff of 6 Water Operators
- We have 3 full time water operators and 4 full time wastewater operators. We cross train everyone for both utilities.
- 4 Full time employees but only 1 holds licenses
- Have 1 operator that works a few hours a day.
- I operate 18 small systems some with wastewater

Employee Absenteeism During COVID-19

The 2021 SOTWI survey asked small and medium-sized utilities what the impacts of employee absenteeism were during COVID-19:

- At any time in 2020, was your utility impacted due to employee absenteeism?
- How did you handle employee absenteeism?

Both small and medium-sized utilities felt a small impact from absenteeism indicating that in nearly all cases, staff stepped up to fill the gaps in critical functions.



Survey respondents could add to or clarify their responses with a write-in option. The following comments were provided by respondents:

- Lots of overtime
- Prioritization of services offered to meet demand
- Delayed noncritical O&M and projects

Small and Medium-Sized Utilities' Finances

The 2021 SOTWI survey asked about small and medium-sized utilities' finances:

- In your opinion, what is the current delinquency rate on water and wastewater bills for your utility?
- At any time in 2020, was your utility revenue impacted by business customer shutdown?
- In your opinion, how long can your utility operate under current (COVID-19) conditions?

Approximately 92% of the small and medium utility respondents indicated delinquency rates on water and wastewater bills of less than 20%; nearly 40% indicated that revenue was impacted by business customer shutdown; and 86% believe they can operate a year or more under current COVID-19 conditions.



Survey Respondents

The 2021 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 12 shows the total number of participants based on the type of organization they work for. Sixty percent of all participants ($n = 2,981$) indicated they worked for a utility/water provider, another 24% ($n = 703$) identified as service providers (manufacturers, distributors, distributors' representatives, technical service companies, and consultants).

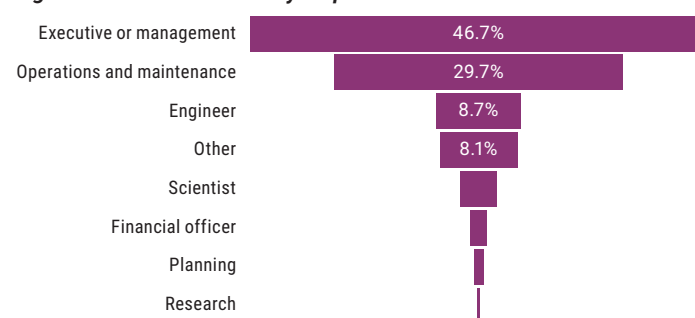
Table 12. Total number of 2021 SOTWI survey respondents by organization type

| Organization Type | % | Count (n =) |
|---|-------|--------------|
| Combined water/wastewater utility (may include other services) | 31.30 | 934 |
| Drinking water utility | 24.80 | 740 |
| Consulting firm/consultant | 15.90 | 474 |
| Manufacturer (including products, representatives, and/or distributors) | 5.20 | 154 |
| Regulatory authority/regulator | 4.00 | 120 |
| Non-utility government (municipal, provincial, federal, etc.) | 3.30 | 99 |
| Other | 3.00 | 90 |
| Wastewater utility | 2.80 | 82 |
| Technical services/contractor | 2.50 | 75 |
| University/educational institution | 2.00 | 59 |
| Nonprofit organization | 1.90 | 56 |
| Retired | 1.40 | 42 |
| Water wholesaler | 1.30 | 38 |
| Stormwater utility | 0.30 | 9 |
| Law firm/legal organization | 0.30 | 8 |
| Reuse/reclamation utility | 0.00 | 1 |

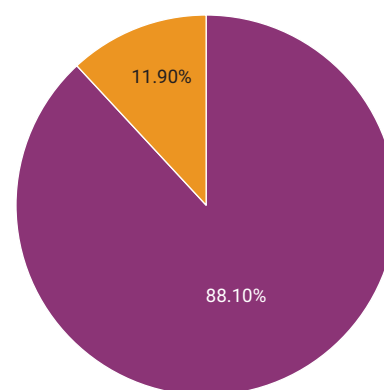
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A more detailed look at utility respondents shows that the greatest number of respondents were large utilities serving a population between 10,001 and 100,000. Nearly all responding utilities, 88.1%, were publicly owned entities; those identifying as executive/management and O&M personnel were the largest group of responders (**Figure 16**).

Figure 16. 2021 SOTWI utility respondents



| Utility Connections | % | Count (n =) |
|---------------------|-------|--------------|
| 0 to 3,000 | 19.6% | 283 |
| 3,301 to 10,000 | 19.0% | 274 |
| 10,001–100,000 | 39.8% | 575 |
| 100,001 and above | 21.6% | 312 |



Publicly owned

Privately owned

 American Water Works Association

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Figure 17. Time in the water sector, all respondents

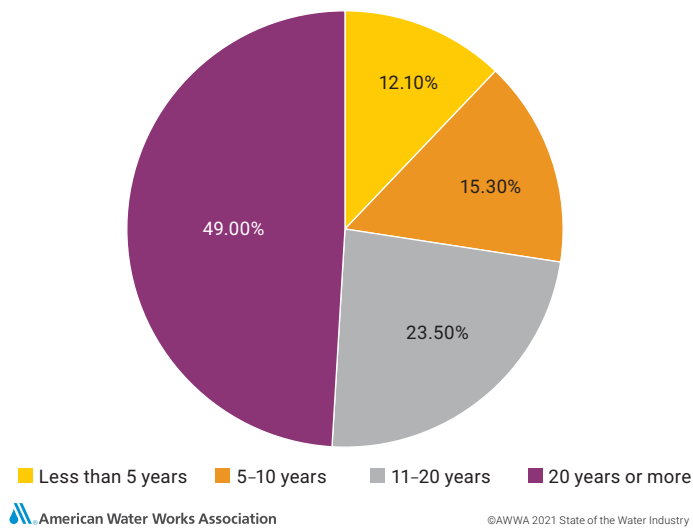
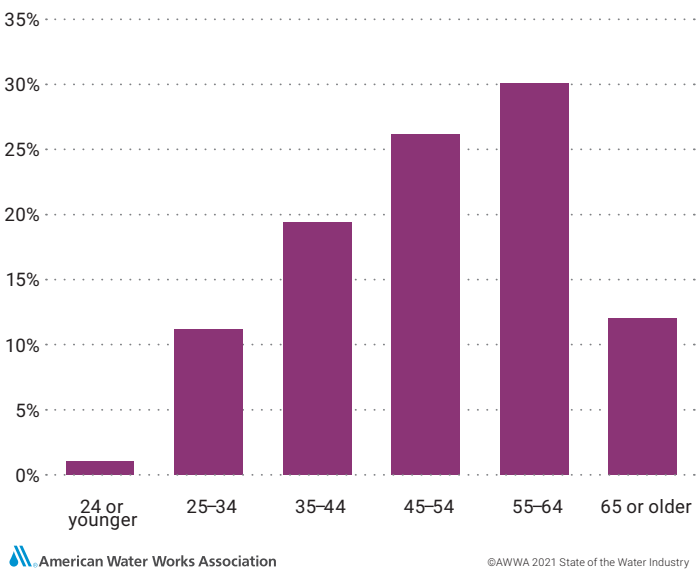


Figure 18. Age of all survey respondents





Survey Methodology

The SOWTI survey population includes all water professionals—i.e., those with a working understanding of the issues facing the entire water sector. 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)
- 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 (respondents are asked to specify)

AWWA made deliberate efforts throughout the 2021 SOTWI survey to anticipate and minimize errors from coverage, sampling, nonresponse, and measurement. The 2021 SOTWI sample frame consisted of a general list of AWWA members and nonmember contacts. The survey primarily reflects water industry concerns in the United States, but participants from Canada and Mexico also contributed their thoughts. Efforts were made to increase Canadian participation.

Initial email invitations were delivered in September 2020 to more than 150,000 email addresses on the basis of the criteria described. Subsequently, two follow-up emails were sent to this same group between October 2020 and November 2020. Links to the survey were also posted on AWWA social media. After removing wholly incomplete responses (i.e., surveys submitted with no response at all), the total number of 2021 SOTWI survey participants was 3,021.

Of the 3,021 participants, all answered some questions, but many skipped questions or were not shown certain questions, meaning that not all charts in the report add up to 3,021. Data points such as percentages were calculated on the basis of number of responses received for that particular question. Data were analyzed using Qualtrics statistical tools from December 2020 through January 2021. All data points addressed on the survey were included in this report.



List of Tables

| | | | |
|----------|--|-----------|---|
| Table 1. | Issues facing the water sector in 2021 as ranked by all respondents | Table 7. | North American water market challenges as indicated by water sector service providers |
| Table 2. | Top 10 issues facing the water sector as ranked by all participants, 2017–2021 | Table 8. | Issues ranked by importance to North American water market growth |
| Table 3. | Impact of large-scale phenomena on the water sector in 2021 | Table 9. | Deadlines for complying with AWIA risk and resilience provisions |
| Table 4. | Operations and maintenance plans and programs contributing to infrastructure reliability | Table 10. | Challenges to sustaining business operations rank for Q2 and Q3 2020 |
| Table 5. | Regulatory concerns ranked by all survey respondents | Table 11. | Business factors affected by COVID-19 |
| Table 6. | Summary of barriers to foreign commerce | Table 12. | Total number of 2021 SOTWI survey respondents by organization type |

List of Figures

| | | | |
|-----------|--|------------|--|
| Figure 1. | State of the water industry: All respondents 2004–2021 (<i>n</i> = 2,916) | Figure 9. | State of the water industry: Canadian responses (2006–2021) |
| Figure 2. | Climate impacts on regions in the United States | Figure 10. | Managing risk during COVID-19 |
| Figure 3. | Utility ability to cover full cost of providing services prior to COVID-19 and during COVID-19 | Figure 11. | Customer assistance programs during COVID-19 |
| Figure 4. | Utility trends in total and per-account water sales | Figure 12. | Effectiveness of various platforms for utility communication |
| Figure 5. | Utility ability to meet long-term water supply needs | Figure 13. | Percent of utilities implementing specific policies Q2–Q3 2020 |
| Figure 6. | Utility history of implementing voluntary and mandatory water restrictions | Figure 14. | Status of capital expenditures during COVID-19 |
| Figure 7. | Key water sector markets for service providers | Figure 15. | COVID-19 workforce issues at small and medium-sized utilities |
| Figure 8. | Canadian response by province to the SOTWI survey | Figure 16. | 2021 SOTWI utility respondents |
| | | Figure 17. | Time in the water sector, all respondents |
| | | Figure 18. | Age of all survey respondents |



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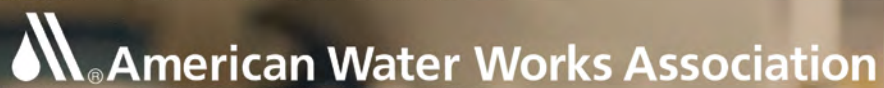
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