



American Water Works
Association

Dedicated to the World's Most Important Resource®

State of the Water Industry '22



David LaFrance,
AWWA CEO

“My view is that water professionals’ accomplishments were miraculous this past year, especially given the extraordinary challenges they faced. I have great confidence in the water community, and I think this is just a one-year dip in the optimism curve. I only see a positive water future.”



Melissa Elliott,
AWWA Past President

“We know water customers are more supportive of what utility professionals do every day when we help them appreciate the wonder that is high-quality, safe drinking water that flows on demand from their tap. They trust us more when we proactively and strategically communicate with them and engage with the community as we develop solutions to infrastructure and funding challenges.”

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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 investigates perceptions of the health of the water industry from the perspective of utility and non-utility respondents, explores water industry challenges and concerns and identifies their potential impacts, and outlines practices to help water professionals address those challenges and concerns.

AWWA thanks the record number of respondents—3,778—for taking time to share their views. These survey responses are important and serve not only to provide insights on trends, significant challenges, and opportunities facing the water sector, but also to inform decision makers and support water professionals as they develop, implement, and communicate strategies to stakeholders.

- SOTWI survey respondents indicate current optimism regarding the health of the water sector and have concerns about its future health.
- Top concerns include aging infrastructure, infrastructure financing, long-term water availability, and—new to the top five—an aging water workforce.
- Optimism did not extend to respondents’ feelings concerning supply chain, contaminants of concern—namely PFAS—and covering the cost of service. Utility respondents indicate an uptick in the availability of funding. In this report are the aggregate results of the water community’s view on funding and financing.

AWWA thanks everyone who participated in this year’s survey. We look forward to your input on our 20th anniversary, 2023 SOTWI survey, to be distributed in late 2022. 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 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 sector toward greater soundness, help water professionals perform essential roles more effectively, and proactively address emerging issues before they develop into full-blown crises.

The 2022 SOTWI survey was issued in October 2021, closing in December 2021. The survey straddled the Biden administration's signing of the Infrastructure Investment and Jobs Act on November 15, 2021, and the SARS-coV-2 (COVID-19) omicron variant surge. It is impossible to know if either event had an impact on survey responses.

When the survey closed in December 2021, 3,778 water professionals had shared their perspectives. As in previous years, the individuals who responded to the SOTWI survey tended to be seasoned water professionals, with 48% reporting 20 or more years of water sector experience. The largest group of respondents (67%) represented water utilities, followed by 11% 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 water through service providers, academia, science, and regulatory bodies, as well as retired water professionals.

The SOTWI survey started by asking respondents to rate the overall health of the water sector 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; however, current and future trends indicate a slight decline in optimism.

The issues and challenges reported remain similar to previous years. Aging infrastructure and how to finance the much-needed renewal and/or replacement once again topped this year's list of industry concerns, followed by access to funding for renewal and replacement. Fifty-seven percent of responding utility CEOs/CFOs indicate that they see their access to capital as good as or better than in the past five years and plan on raising rates to meet costs of utility operations.

Utility executives are perhaps still expecting challenges ahead, as the percentage of respondents who felt that their utilities would be fully able to cover the cost of providing service in the future decreased 28%.

The sector expressed concern about contaminants of concern—namely per- and polyfluoroalkyl substances (PFAS)—and covering the full cost of service.

Supply chain issues ranked as the most negatively impactful phenomena challenging water sector professionals. Both service providers and utilities indicated supply chain issues are having a serious impact on business.

Although COVID-19 was not directly addressed in this year's survey, impacts of the pandemic are apparent. Supply chain issues are real and no longer a future concern; utilities report increases in per-account water sales; and utility water shutoffs are down significantly from pre-pandemic reports.

State of the Water Industry

AWWA’s annual SOTWI survey provides a sector-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 2022 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 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. State of the Water Industry 2004–2022
Based on a scale of 1 to 7; 1 = not sound at all, 7 = very sound

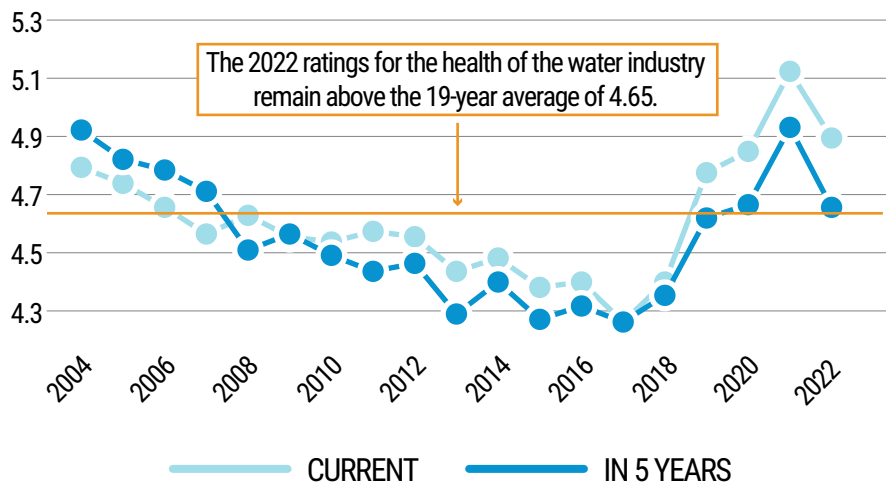


Figure 1 depicts the average scores as rated by all participants to these two questions since 2004. The current health of the sector as rated by all respondents is 4.97, marking a slight decline from the previous year. Looking forward five years, the anticipated soundness of the water industry also saw a decline from 5.01 in 2021 to 4.73 in 2022.

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. Though slight, a slow decline was noted in how water professionals perceive the health of the water industry (a term that is intentionally undefined) since the SOTWI survey began, countered by an uptick in positive perceptions over the last several years. However, on the basis of 3,778 responses to these two questions, the overall health or state of the water industry for 2022 is above the 19-year average of 4.65.

Water Sector Challenges

OVERVIEW

To determine and rank the major issues currently facing the water sector, all survey participants were asked to rank the importance of sector challenges on a scale from 1 to 5, where 1 = unimportant and 5 = critically important.

Table 1 ranks these issues on the basis of weighted averages.

A closer look at the top 10 concerns for all respondents shows that renewal and replacement of aging water and wastewater infrastructure ranked as the most pressing issue facing water utilities.

- 2022 is the 10th year renewal and replacement and financing for capital improvements have been ranked #1 and #2, respectively.
- *New!* Aging workforce/anticipated retirements took on new prominence as this concern moved from #8 in 2021 to #4 in 2022.
- Drought or periodic water shortages also moved from #17 in 2021 to #13 in 2022.
- All utilities agreed on the rankings of the top three issues.

Table 1.
Ranking of Issues Facing the Water Sector in 2022

1 Renewal and replacement of aging water infrastructure	11 Talent attraction and retention
2 Financing for capital improvement	12 Compliance with current regulations
3 Long-term drinking water supply availability	13 Drought or periodic water shortages
4 Aging workforce/anticipated retirements	14 Cost recovery
5 Public understanding of the value of water systems/services	15 Compliance with future regulations
6 Emergency preparedness	16 Water conservation/efficiency
7 Watershed/source water protection	17 Asset management
8 Public understanding of the value of water resources	18 Data management
9 Groundwater	19 Energy use/efficiency and cost
10 Cybersecurity issues	20 Improving customer, constituent, and community relationships

n = 3436; all respondents

Water Sector Challenges (continued)

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 = significantly negative impact and 5 = significantly positive impact.

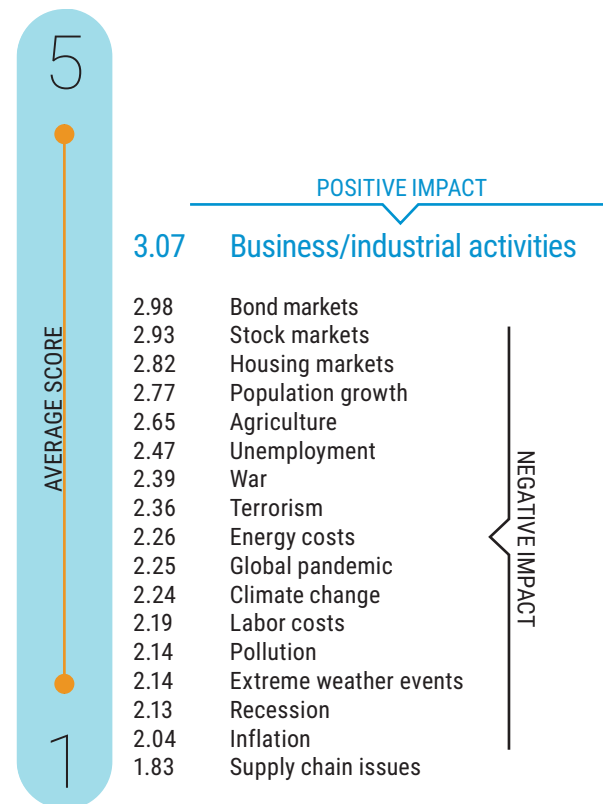
Survey respondents agreed that supply chain issues ranked the most problematic of the issues presented. It is worth noting that all issues, with the exception of business activities, were considered to have a negative impact on the water sector in 2022, as illustrated in **Figure 2**.

Supply Chain Issues

The water sector faces high demand and global manufacturing delays for the chemicals, goods, and services needed to effectively operate. COVID-19, extreme weather events, and the economy added to an already challenging environment.

In February 2021, a winter storm slammed Texas, affecting more than 170 million Americans. Across Texas during that one-week period, more than 2,200 boil water notices were issued, affecting more than 9 million people. Failures resulted from statewide loss of power; frozen pipes, chemicals, and pumps; and excessive breaks. There was an estimated \$20.4 billion in damages, making it the costliest winter storm on record in the United States.

Figure 2. Ranking of Impacts of Large-Scale Phenomena





Marcela Navarrete,
El Paso Water Utilities
Vice President,
Strategic, Financial and
Management Services



"In 1991, El Paso Water Utilities implemented an inclining rate structure where the unit price increases as water consumption does. This structure has been adjusted over the years but has always provided for full cost recovery. This has allowed us to maintain a high bond rating (AA+) while continuing to provide services at a satisfactory level. Affordability is becoming a challenge as costs increase, capital improvement needs grow and our infrastructure ages. We've been very proactive and successful in obtaining grants and subsidized low-interest loans to help keep our rates affordable. We've also partnered with a non-profit agency to provide more than \$2 million in financial assistance to our vulnerable customers. During the pandemic, we ceased disconnections for more than a year and worked with struggling customers by allowing extended payment arrangements."

Water Sector Challenges (continued)

CONTAMINANTS OF CONCERN

The importance of current and future regulatory compliance remains a worry for all respondents in the 2022 SOTWI survey.

All survey participants were asked about their level of concern regarding the water sector's ability to comply with current regulations surrounding a list of contaminants.

Table 2 ranks the weighted average responses, where 1 = not at all concerned and 5 = extremely concerned.

Taking a closer look at the data:

- Small drinking water systems serving fewer than 3,300 customers ranked per- and polyfluoroalkyl substances (PFAS) and point source pollution #1 and #2, respectively ($n = 490$).
- Wastewater-only utilities ranked microplastics and PFAS #1 and #2, respectively ($n = 138$).
- When asked what they believed held the greatest promise of innovation, service providers responded, "technology and treatment of contaminants of concern."

Table 2.
Ranked Concerns About Current Utility Contaminant Compliance

1 PFAS	7 Pathogens
2 Lead and copper	8 Cyanotoxins
3 Microplastics	9 Nutrient removal
4 Point source pollution	10 Combined sewer overflows
5 Nonpoint source pollution	11 Perchlorates
6 Disinfection byproducts	12 Arsenic

$n = 2782$; all respondents

Ability to comply with **current regulations** ranked **12th** while ability to comply with **future regulations** ranked **15th** in top issues facing the water sector in 2022.

Water Supply

LONG-TERM WATER SUPPLIES

All survey respondents rated several issues related to water resource management highly in the 2022 SOTWI survey. From Table 1 we see the following ranking:

No. 3	Long-term water supply availability
No. 7	Watershed/source water protection
No. 8	Public understanding of the value of water resources
No. 9	Groundwater management and overuse
No. 13	Drought or periodic water shortages
No. 16	Water conservation/efficiency

To understand the issue of long-term water supply availability, utility personnel were asked how prepared their utility will be to meet its long-term water supply needs.

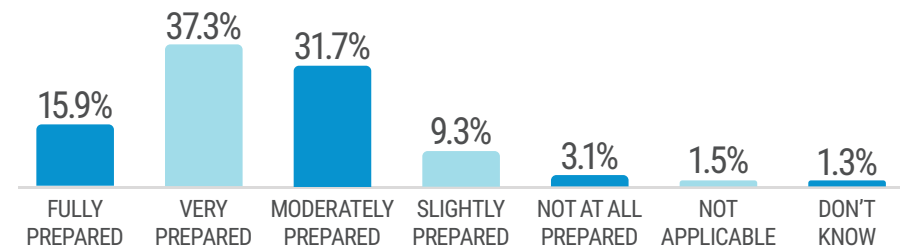
Figure 3 shows that 12.4% of utility personnel responding indicated their utility will be challenged to meet anticipated long-term water supply needs (i.e., not at all or only slightly prepared). This is similar to the numbers reported in 2021 and 2020.

Additionally, 53.2% of participants indicated that their utilities are very or fully prepared, down from 64.5% and 57% reported in 2021 and 2020, respectively.

Investigating the “Slightly prepared” to “Not at all prepared” responses by utility size, we find the following:

- Small system 16.2%
- Medium system 11.7%
- Large systems 11.3%
- Very large systems 12%

Figure 3. Prepared to Meet Long-Term Supply Needs
(n = 1905; all utility respondents)



Water Supply (continued)

SHORT-TERM WATER SUPPLIES

Shifting from long-term to near-term water supply, water systems are dramatically affected by shortages resulting from drought, the severity of which is influenced by climate variability and extreme weather events.

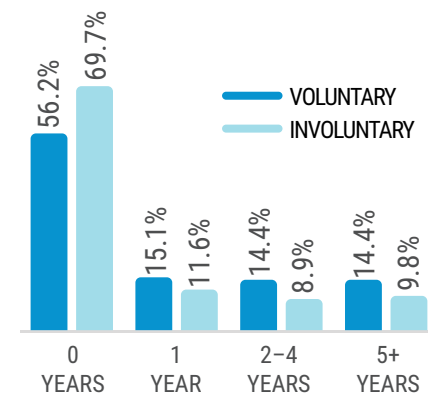
To gauge the effects of water shortages, **utility personnel** were asked how many years in the past decade their utilities had implemented voluntary or mandatory water restrictions. The responses summarized in **Figure 4** reveal that for most utility respondents, voluntary and involuntary water restrictions were not needed at their utility.

Breaking these data down by regions—the South, Northeast, Midwest, and West—we see the following trends:

- The West's active implementation of water restrictions in the last decade trends 7% higher than the averages shown in Figure 4.
- States trending higher in **voluntary use restrictions** for five or more years are California, Colorado, Florida, Georgia, Hawaii, Massachusetts, Nevada, New Hampshire, New Mexico, Rhode Island, Texas, Utah, and Wyoming.
- States implementing higher-than-average **involuntary use restrictions** for five or more years are California, Colorado, Florida, Georgia, Hawaii, Massachusetts, Nevada, Oklahoma, Rhode Island, and Texas.

Figure 4. Voluntary and Involuntary Water Restrictions

(n = 1865; all utility respondents)



Water Supply (continued)

WATER SUPPLY SUSTAINABILITY

As communities evaluate their water shortage preparedness, there is also an opportunity to improve understanding of 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 for reuse.

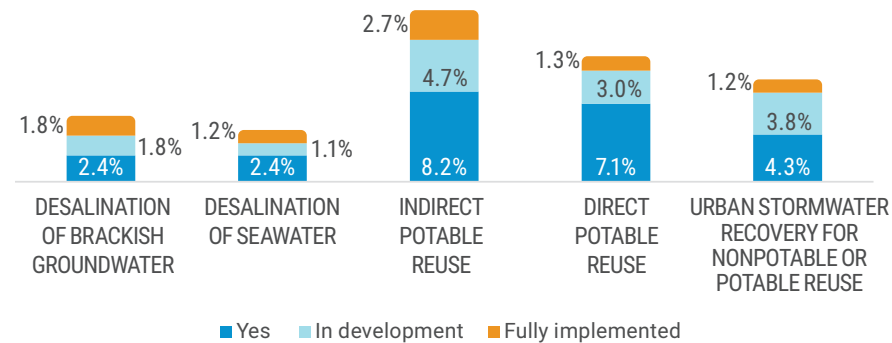
Utility survey participants were asked whether their utilities were implementing or considering augmentation of existing water supplies. **Figure 5** shows that there is

currently little investment in developing alternative water supplies. These results are consistent with past years.

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

In a separate question, survey results indicate that 41% of responding utility participants ($n = 1758$) have a fully developed drought management or water shortage contingency plan, and 34% of these utility respondents indicate they have fully implemented a water conservation program.

Figure 5. Augmentation of Existing Water Supplies
($n = 1875$; all utility respondents)



Water Supply (continued)

PROTECTING WATER AT THE SOURCE

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

In most cases, states are responsible for implementing the regulatory requirements that affect water protection under the Safe Drinking Water Act and the Clean

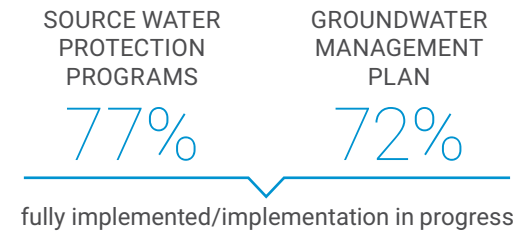
Water Act. States are also responsible for establishing initiatives to provide technical and financial assistance to drinking water systems pursuing source water protection activities.

Groundwater management and overuse rose to significance in the 2019–2021 SOTWI surveys as California drought and wildfires taxed these resources.

In the 2022 survey, watershed/protecting source waters and groundwater management and overuse remain in the top 10 of overall cited water sector concerns (**Figure 6**).

Figure 6. Status of Utility Source Water Protection Programs

(n = 1758; all utility respondents)





System Stewardship

OVERVIEW

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 and are now facing a critical need for renewal and replacement.

System Stewardship (continued)

RENEWAL AND REPLACEMENT

Specific to infrastructure renewal and replacement, the 2022 SOTWI survey asked all survey participants to rate the importance of specific renewal and replacement challenges currently facing the water industry on a scale of 1 to 4, where 1 = unimportant and 4 = very important. The weighted averages of these responses are displayed in **Table 3**.

Wastewater-only utility respondents ($n = 148$) viewed this list of topics slightly differently, ranking the top four in order of importance:

- No. 1 Infrastructure reliability
- No. 2 Maintaining levels of service
- No. 3 Access to funding
- No. 4 Financing renewal and replacement

Table 3.
Renewal and Replacement (R&R) Challenges

- 1 Infrastructure reliability
- 2 Financing renewal and replacements
- 3 Access to funding
- 4 Maintaining levels of service
- 5 Justifying R&R programs to oversight bodies
- 6 Justifying R&R programs to ratepayers
- 7 Prioritizing R&R needs
- 8 Coordinating with other R&R activities
- 9 Regulatory constraints
- 10 Customer expectations

$n = 2986$; all respondents; ranked by weighted averages

System Stewardship (continued)

INFRASTRUCTURE RELIABILITY

Utilities are tasked with adopting a proactive, sustainable, solution-oriented approach to manage assets and 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 operation and maintenance, appropriate rehabilitation, replacement, and asset disposal.

The 2022 SOTWI survey asked utility respondents about the status of plans and programs at their utility. **Table 4** summarizes these responses.

As anticipated, large and very large utilities indicate they are above the averages shown in Table 4, while small systems fall below these averages in all categories.

Operations and Maintenance Activities

Operations and maintenance (O&M) activities contribute to infrastructure reliability. The 2022 SOTWI survey asked utility respondents if their utility had explored plans and programs related any of the following O&M activities: water loss control, collection, and storm overflows; infiltration and inflow (I/I) control; and lead and lateral replacement. The percentage of utility implementation is indicated in Table 4.

The results are similar to past years.

Table 4.
Plans and Program Implementation
Related to Infrastructure Reliability

Program/plan	Fully implemented/ implementation in progress
Master plan	84%
Financial plan	86%
Asset management plan	84%
Capital improvement plan	88%
Water loss control program	78%
I/I control program	75%
CSO/SSO plan	72%
Lead service line replacement program	75%
Sewer lateral replacement program	61%

n = 1758; all utility respondents

System Stewardship (continued)

CHANGING WATER DEMANDS

Although more efficient use of water is a major goal of the water sector, 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 identifying with job titles of **executive/management and financial officer**

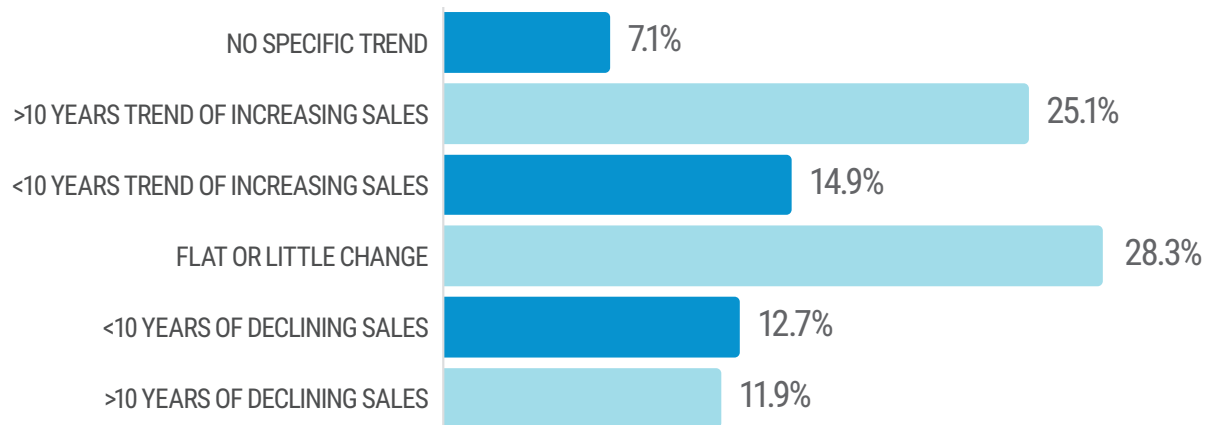
were asked about their utilities' trends in per-account water sales.

Results from respondents regarding their trends in per-account water sales are also shown in **Figure 7**.

- 21.3% of respondents reported their utility was experiencing declining per-account water sales (either a trend of more than 10 years or less than 10 years) **This is trending lower compared with the pre-pandemic value of 36% reported in 2020.**

- 24.5% of respondents reported flat or little change in per-account water sales.
- 34.8% of utilities reported increasing per-account water sales (either a trend of more than 10 years or less than 10 years). **This is trending higher compared with the pre-pandemic value of 28% reported in 2020.**

Figure 7. Utility Trends in Per-Account Water Sales
(n = 727; utility executives/management and financial officers)





Chi Ho Sham,
AWWA President

“AWWA and its members are taking a leading role in bringing collaborators together to proactively protect and manage our precious and limited water resources. It will take all of us to develop solutions to such challenges as climate change, extreme drought, land development, emerging contaminants, and increasing demand. It’s important that we educate the public and policy makers about where their drinking water originates and how to keep it clean, available and affordable.”

System Stewardship (continued)

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 annual O&M expenses, capital costs (e.g., debt service, other capital outlays), and adequate working capital and required reserves.

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 officer only** were asked the following:

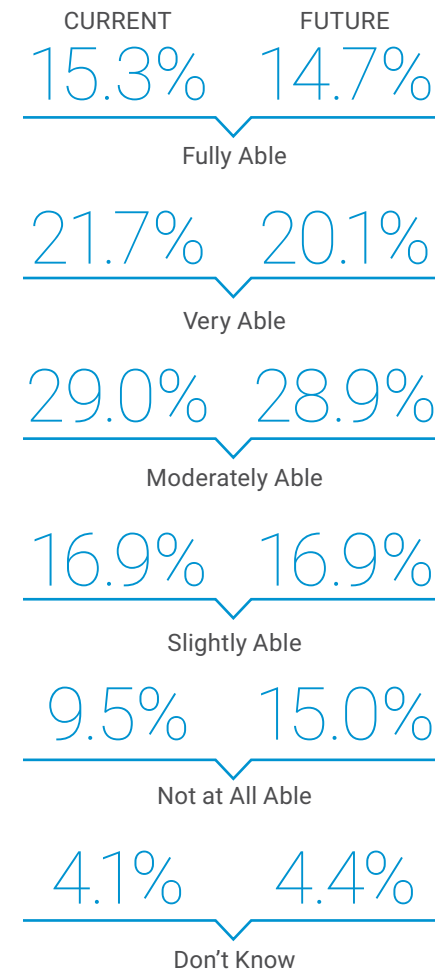
- Given your utility's current and future infrastructure needs for renewal and replacement and expansion, do you think your utility will be able to meet the full cost of providing service(s) through customer rates and fees?

As shown in **Figure 8**, combining those respondents who are **not at all able** and those who are **slightly able**, 26.4% of utilities responding are currently struggling to implement full-cost pricing. In addition, 32% of respondents believe they will struggle to cover the full cost of service in the future. Both values are consistent with previous years.

Utility executives are perhaps still expecting challenges ahead, as the percentage of respondents who felt that their utilities would be fully able to cover the cost of providing service in the future decreased from 18.8% to 14.7%.

Figure 8. Current and Future Ability to Cover Cost of Service

(n = 727; utility executive/management and financial officers)



Financial Matters

COST RECOVERY

Utility revenues generated through rates and fees are used to fund ongoing O&M activities. Cost recovery refers to pricing water and wastewater services to accurately reflect their true costs and then obtaining these from customers through rates.

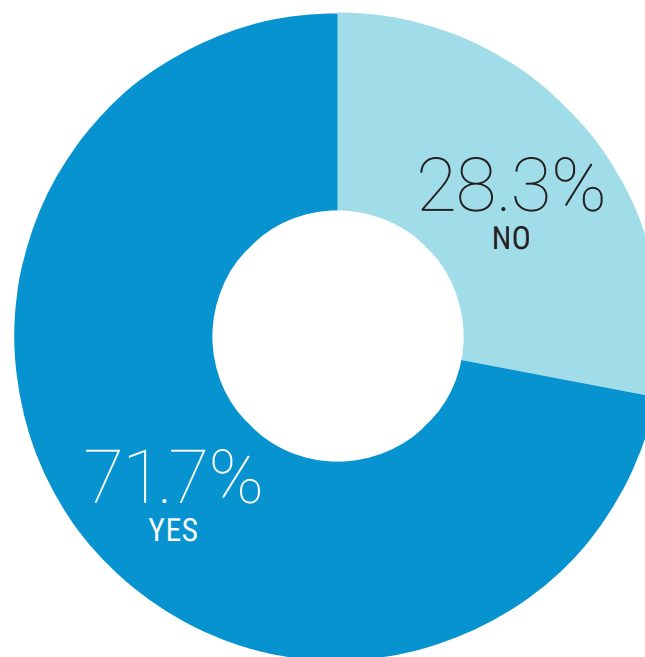
The 2022 SOTWI survey asked utility personnel who identified as **executive/management and financial officer** if their utility intends to raise water and/or wastewater rates in the coming year.

- **Figure 9** shows 71.7% of the utility **executive/management and financial officer** respondents indicated they are planning a rate increase in 2022.
- As previously mentioned, the increasing per-account water sales (either more than a 10-year trend or less than a 10-year trend) will affect a utility's approach to cost recovery.
- Utility **executive/management and financial officer respondents** ($n = 716$) also indicated they are not deferring rate increases as a primary means to assist customers.
- When asked about various funding opportunities, utility **executive/management and financial officer** respondents indicate rate increases will be used to generate revenue.

Cost recovery ranked **14th** of the top issues facing the water sector in 2022.

Public understanding of **the value of water systems and services** ranked **No. 5**, and public understanding of **the value of water resources** ranked **No. 8** of the top issues facing the water sector in 2022.

Figure 9. Intention to Raise Rates in 2022
($n = 724$; utility executive/management and financial officers)

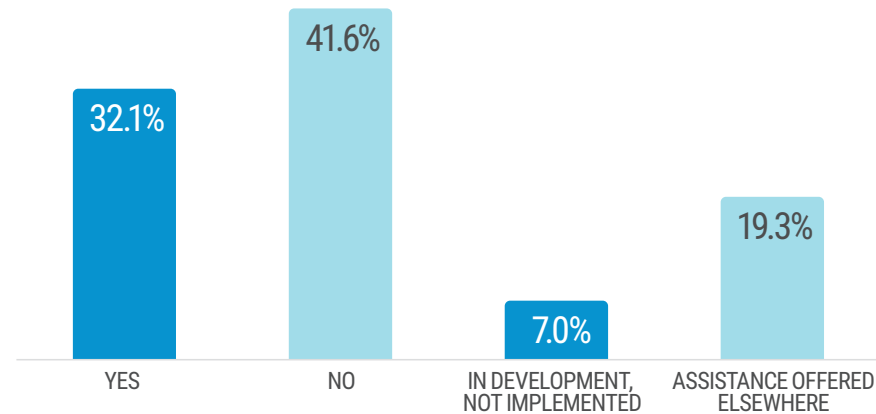




Financial Matters (continued)

CUSTOMER ASSISTANCE

Figure 10. Prevalence of Utility Affordability Programs
(n = 657; utility executive/management and financial officers)



The affordability of water is an issue for water and wastewater utilities that struggle to reconcile the need to adequately fund the business of water 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 at an average of 4.2% per year since 2012. A typical US household water and wastewater bill has increased 43% during this same time. (Bluefield Research, U.S. Municipal Water & Wastewater Utility Rate Index, 2021).

This year's SOTWI survey asked utility **executive/management and financial officer** respondents to gauge the importance of water affordability at their utility by asking if their utility offered a program to assist low-income customers in paying their water and/or wastewater bills.

As shown in **Figure 10** and expected, data indicate very large systems (54% of respondents) offer some assistance to low-income customers, while small systems (56% of respondents) do not have the capacity to help low-income customers.

The 2022 SOTWI survey asked utility personnel identifying as **executive/management and financial officer** if their utility had considered and/or implemented customer assistance measures in the past year. Respondents (n = 716) identified the top three measures fully implemented at their utility:

- Flexible payment plans (55%)
- Suspending customer shutoffs (33%)
- Suspending late-payment fees (24%)

“



Gwen Ruff,
Columbus Water Works
Senior Vice President,
Administration and
Community Outreach

“Columbus Water Works (Georgia) employs more than 250 employees with diverse skills, competencies and talents. Within the last two years, we have experienced high levels of turnover related to retirements and resignations. In response, we have expanded recruitment efforts to create partnerships with our local university and technical college, reevaluated pre-hire certification requirements, held an on-site job fair, and coordinated hires under the local re-entry program for ex-offenders. We also partner with our local Fort Benning military installation’s Transition Assistance Program (TAP). This program offers apprenticeships, on-the-job training, job shadowing, internships, training, and employment skills to transitioning veterans at no cost to CWW, unless the individual is hired. We’ve also implemented an internal, two-tiered leadership development program which includes training on leadership principles, the use of 360 evaluations for self-awareness, and operational on-site visits to various departments within the utility.”

Financial Matters (continued)

CAPITAL EXPENDITURES

The 2022 SOTWI survey asked utility personnel who identified as **executive/management and financial officer** about the status of their capital improvement projects. Fifty-one percent of respondents indicate that projects with funding are proceeding as scheduled (**Table 5**).

Backing up and looking at capital improvement project (CIP) planning, utility participants were asked about the status of CIPs at their utility.

- Overall, 87% ($n = 1711$) indicated CIP planning was fully implemented and/or implementation was in progress.
- Medium, large, and very large utilities are above 90% with CIP development and implementation.
- Seventy-four percent of small-system respondents indicated CIPs at their utility are in some stage of development and implementation.

Table 5.

Status of Capital Improvement Projects

- 51%** Projects with funding in progress
- 28%** Actively seeking funding for new projects
- 10%** Contracts have been deferred
- 6%** No change
- 4%** No new projects in development
- 1%** Contracts have been canceled

$n = 1031$; utility executive/management and financial officers

Financing for capital improvements ranked **No. 2** of the top issues facing the water sector in 2022.



Financial Matters (continued)

FUNDING SOURCES

Utilities and state and local governments that want to invest in infrastructure can do so either by funding it directly (spending reserves) or by financing it (taking out loans or issuing bonds to obtain funds that will be repaid over time). Financing can allow infrastructure to be paid for over a period that more closely matches its useful life and makes money available to pay for projects sooner. Financing can also add to grants and other funding for infrastructure projects. In the long run, 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 unplanned or accelerated capital projects due to asset failures.

The 2022 SOTWI survey asked utility personnel who identified as **executive/management and financial officer** to identify their utility capital funding sources and/or strategies.

Respondents were asked to choose “all that applied”; the results shown in **Table 6** are ranked in order of the percent of the total mentions, with the most-mentioned source at the top.

“Funding capital improvements for small rural communities is critical. I’ve seen dozens of small systems that were constructed post-WWII that are now in need of major capital investment to meet regulatory requirements. Most of these communities do not have the means to raise rates to the levels needed for a fully funded capital improvement plan.”

Table 6.
Utility Capital Funding Sources

1	Rate increases	19.7%
2	Grants	16.1%
3	Bonds	15.6%
4	State revolving funds	13.5%
5	Reserves	12.6%
6	Operational savings	12.3%
7	Water Infrastructure Financing and Innovation Act (WIFIA)	5.8%

Total # of mentions = 2468; executive/management and financial officers

Financial Matters (continued)

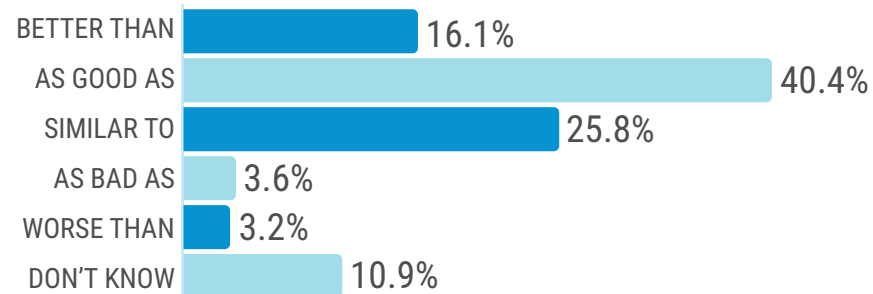
ACCESS TO CAPITAL

To help clarify the current financing environment for the water sector, utility personnel who identified themselves as **executive/management and financial officer** were asked to assess their utility’s current access to capital for financing infrastructure renewal/replacement projects.

Fifty-six percent of utility personnel identifying as **executive/management and financial officer** reported that their utility’s access to capital was as good as or better than at any time in the past five years (**Figure 11**).

- On the basis of $n = 725$ responses in 2022, this value 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.

Figure 11. Access to Capital in the Past Five Years
($n = 725$; executive/management and financial officers)





Risk and Resilience

ASSESSING RISK AND PREPARING

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 2022 SOTWI survey asked utility respondents if their utility has considered and/or implemented programs and plans related to assessing risk and resilience and preparing for risk (**Table 7**).

Assessing Risk

Utility respondents ($n = 1481$) indicate that 81% have fully implemented a risk and resilience assessment or implementation is in progress.

Preparing

Overall, 91% of responding utilities ($n = 1758$) have a fully implemented emergency preparedness plan or plan implementation is in progress.

Table 7. Assessing Risk and Preparedness (fully implemented or implementation is in progress)

81% Risk and resilience assessments
 $n = 1481$; utility respondents

91% Emergency preparedness plan
 $n = 1758$; utility respondents

Digital Future of Water

INFORMATION TECHNOLOGY

Digital technology in the water sector provides both an opportunity and a challenge for utilities. The availability of new tools centered on data-driven decision-making grows annually. Are utilities embracing mobile applications, identifying needed technology, and the influx of data to be managed?

All utility participants were asked if their utility is planning, revising, or assessing information technology (IT) needs for a variety of applications; the resulting responses are presented in **Figure 12**.

Responses are clustered at less than 30%, with cyber intrusion, data management, and meter reading leading the digital charge.

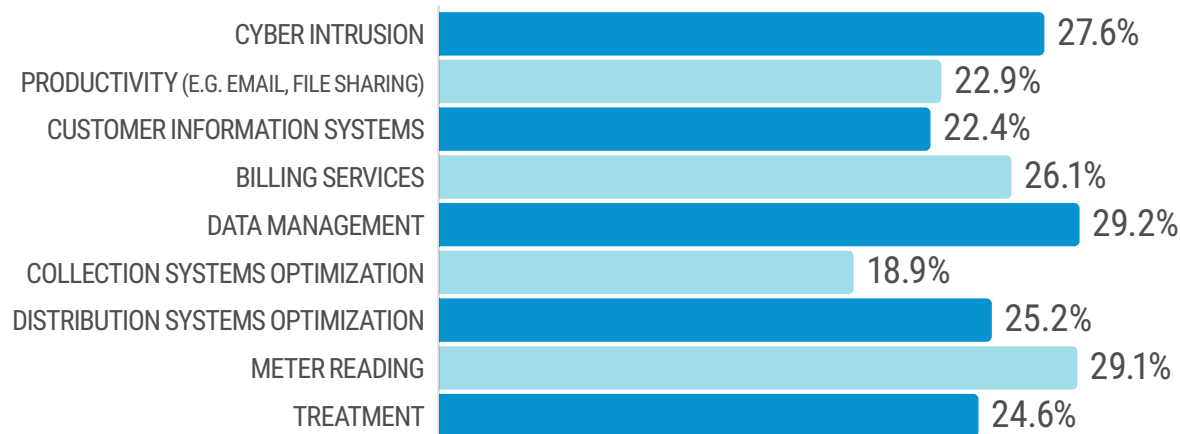
Cybersecurity

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 individual criminal actors and groups threaten the security of our nation’s water and wastewater systems’ operations and data.

Utility respondents (n = 1826) indicate that 27.6% have fully implemented some form of cyber intrusion protection, and another 19% indicate they are assessing their cyber intrusion needs.

“[A critical issue is] bringing utilities into the future of decision analytics using artificial intelligence to meet up with institutional knowledge, and using machine learning combined with SCADA to identify issues/inefficiencies.”

Figure 12. Utilities Planning, Revising and Assessing IT Needs
(n = 1826; all utility respondents)



Cybersecurity ranked **10th** of the top issues facing the water sector in 2022.



Joe Jacangelo,
AWWA President-Elect



"I am confident that the challenges facing our water community will be solved through collaboration, research, technology and policy, all of which will advance innovation. Further, increased investment in water infrastructure will help drive progress, attract skilled workers, and increase public awareness about the value of water services and resources ... and above all, protect public health."

Workforce

UTILITY WORKFORCE ISSUES

“Attracting highly effective, skilled employees and successfully retaining them will be critical to the success of water utilities in the future. The workplace of 2000 and beyond must be staffed with better-educated and technically skilled employees. The importance of a positive community profile should not be underestimated. Organizations must recognize current trends in technology and understand that how they address employees is essential to their ability to flourish. Organizations will also need to understand and respond to a multicultural workforce.” This observation was made in an article by Celso Guzman in the January 2000 issue of *Journal AWWA*. Its assertions ring true today.

The 2021 SOTWI survey received numerous comments on the importance of workforce to a sustainable water sector future. The 2022 SOTWI survey followed up by asking participants a series of questions on how they rated the aging workforce and the importance of worker retention.

As utilities start building the 21st-century workforce, the 2022 SOTWI survey asked utility respondents the status of diversity, equity and inclusion discussion at their utility. The survey results are shown in **Figure 13**.

“Our industry needs to work very hard to build tomorrow’s workforce in the water and wastewater industry. The number of people that will retire in this industry in the next five years is scary.”

Aging workforce/anticipated retirements ranked **No. 4** and diversity and inclusion in the workforce ranked **24th** of issues facing the water sector in 2022.

Figure 13. Utility Workforce



Service Providers Assessment

FOREIGN MARKET CONCERNS

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.

This group was asked about obstacles to developing business outside of the United States. They indicated financing and financial concerns were the most pressing, followed by contract risks and overall cost (**Table 8**).

Table 8.
Foreign Market Concerns for Service Providers

- 1 Financing
- 2 Financial concerns
- 3 Overall cost
- 4 Distribution
- 5 Contract risks
- 6 Divergent standards
- 7 Intellectual property security
- 8 Foreign exchange risks
- 9 Redundant test/compliance
- 10 Tied aid
- 11 Language barriers

n = 499; service providers

Service Providers Assessment (continued)

THE NORTH AMERICAN MARKET

Doing business in North America presents its own set of business challenges. To better quantify what service providers consider challenging, they were asked about concerns affecting business development. **Table 9** shows that low bid and utility budget constraint impacts are the top roadblocks to business development in the North American market.

Potential for Innovation

When asked what single water sector issue they believed held the most potential for innovation, service providers provided 281 ideas, and a majority indicated the following held the most promise for innovation:

- Water quality issues/treatment
- Potable reuse
- Smart water technology

Table 9.
Roadblocks to Business Development in
North America

- 1 Cost/price/low bid mentality
- 2 Budgetary issues faced by utilities
- 3 Regulatory (permitting, approvals, certifications)
- 4 Water sector attitudes toward change
- 5 Availability of good market data
- 6 Federal funding
- 7 Policy
- 8 Financial performance of the water sector
- 9 Venture capital or equity investments
- 10 Specifications
- 11 Competition

n = 510; service providers



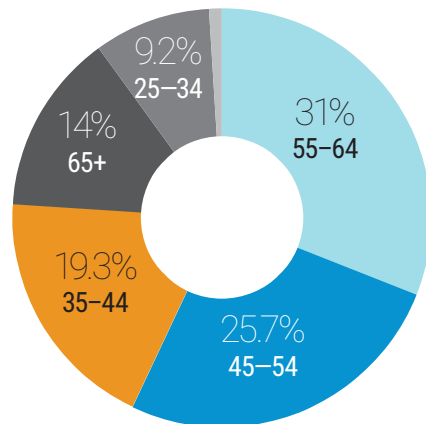
Survey Demographics

ALL PARTICIPANTS

The 2022 SOTWI survey asked participants a series of demographic questions. Responses were not required, and not all participants chose to provide information. All responses are percent of total.

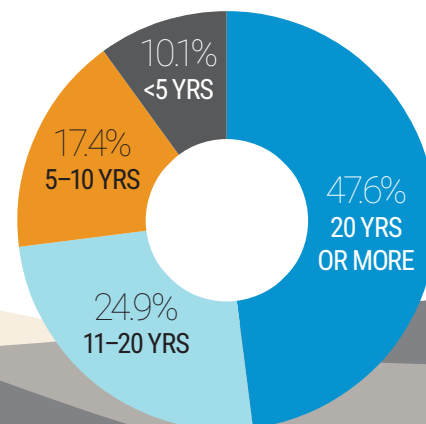
Age

(n = 3051; all respondents)



Time in the Water Sector

(n = 3058; all respondents)



Number of participants indicating organization type

(n = 3772; all respondents)

Organization Type	% of Total
Combined water/wastewater utility (may include other services, too)	31.2%
Drinking water utility	29.1%
Consulting firm/consultant	11.3%
Wastewater utility	5.1%
Manufacturer (including products, representatives, and/or distributors)	5.1%
Regulatory authority/regulator	3.4%
Non-utility government (municipal, provincial, federal, etc.)	2.7%
Other (please specify)	2.5%
Technical services/contractor	2.3%
University/educational institution	2.3%
Retired	1.7%
Nonprofit organization	1.7%
Water wholesaler	1.1%
Stormwater utility	0.2%
Reuse/reclamation utility	0.2%

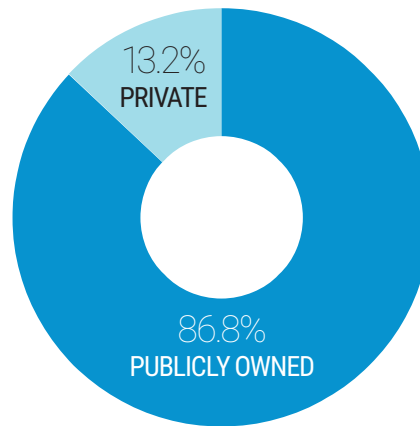
Survey Demographics (continued)

UTILITY PARTICIPANTS

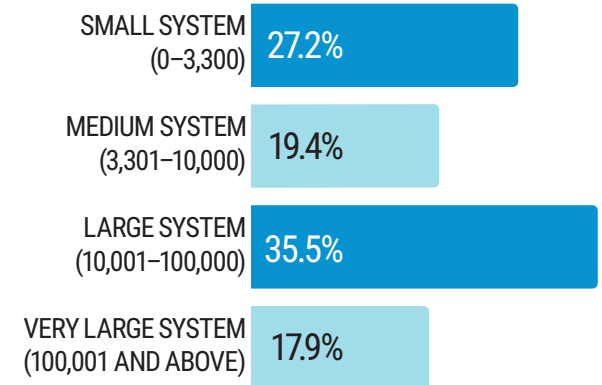
Utility Participants by Job Category
(n = 1999; all utilities)

Job Category	% of Total
Operations and maintenance	42.0%
Executive or management	38.4%
Engineer	7.4%
Scientist	2.7%
Financial officer	1.3%
Planning	0.6%
Purchasing	0.3%
Research	0.2%
Other	7.2%

Utility Ownership
(n = 1994; all utilities)



Utility Respondents by Number of Connections
(n = 1990; all utilities)





Robert Cheng,
Coachella Valley Water
District Assistant
General Manager



“Coachella Valley Water District (CVWD) provides multiple water services to more than 300,000 residents in its 1,000-square-mile service area in Southern California. CVWD’s board-adopted goals of water reliability, safety and affordability cover supply delivery and other services, including stormwater. CVWD has benefited from various federal funds (Safe Water/Clean Water State Revolving Funds) to improve water safety and supply reliability. More recently, CVWD was awarded \$59 million in WIFIA funds for two stormwater projects to improve system safety and reduce insurance costs for our customers.”

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 depending on 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, provincial, federal, etc.)
- University/educational institution
- Nonprofit organization
- Retired
- Other (please specify)

AWWA made deliberate efforts throughout the 2022 SOTWI study to anticipate and minimize errors from coverage, sampling, nonresponse, and measurement. The 2022 SOTWI sample frame consisted of a general list of AWWA members and contacts. The survey primarily reflects water sector concerns in the United States, but participants from Canada and Mexico also contributed.

The sample for the 2022 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 October 21, 2021, initial email invitations were delivered to more than 153,000 email addresses on the basis of the criteria described. Subsequently, two follow-up emails were sent to this same group between October 21 and December 3, 2021. 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 2022 SOTWI survey participants is $n = 3778$.

A total of 3,778 participants replied, for a 2.5% response rate. Of those 3,778 participants, all answered some questions but many skipped questions, meaning not all charts will add up to 3,778. 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 November through December 2021.





Methodology (continued)

Response Drivers

The 2022 SOTWI survey was issued in October 2021, closing in December 2021. It straddled the Biden administration's signing of the Infrastructure Investment and Jobs Act on November 15, 2021, and the SARS-coV-2 (COVID-19) omicron variant surge. It is impossible to know the impact, if any, on survey responses.

Job Category Analysis

There was a large jump in participants in the Operations and Maintenance job category from 2021 to 2022, likely a result of sending the survey to several state operator lists that were not previously available. This job category drove the increase in response rate in 2022.

State Response Analysis

There has been some movement in percentage of total response rates by state from 2021 to 2022. There are notable decreases and increases:

- **% Decreased responses:** California, Colorado, Michigan, Texas
- **% Increased responses:** Alaska, Arizona, Minnesota, Tennessee, Washington

States with the most responses: California ($n = 271$), Washington ($n = 229$), Texas ($n = 212$), Ohio ($n = 158$)

Analysis of Drop-in-Optimism Scores

The drop-in-optimism scores do not appear to be driven by any particular demographic group. The largest job categories who replied are Executives and Operators, and both of those groups' scores dropped from the previous year, as did other job categories. Other demographics yielded no insight as far as a specific group that drove the scores down. Therefore, it can be surmised that participants are generally feeling slightly less optimistic as of fall 2021 data collection than they did in fall 2020.

The drop could be attributed to social/cultural events, such as an increase in media coverage of climate change, severe weather, and an increase in average temperatures through the summer and fall of 2021. The COVID-19 pandemic may also be a factor.

Qualitative data reveal further anxieties about the future of the water industry, such as anxiety about regulations, climate change, and lack of incoming workforce. The influence of social and political factors on these scores should not be overlooked, nor would it be correct to attribute it solely to COVID-19.

Survey Findings

Demographics

- The total number of survey respondents is 3,778—a record number of respondents to the 2022 SOTWI survey.
- The breakdown of responses from North America is 92.9% from the United States, 3.4% from Canada, and 0.2% from Mexico.
- 3.5% of total responses were received from entities outside of North America.
- 10.1% of participants indicate they are young professionals (≤ 35 years of age).
- 45% of participants indicate they are 55 and older.
- The largest response group by age was 45–54, at 25.7%.
- 47.6% of respondents indicate they have been in the water sector 20 or more years.
- 66.9% of the 2022 SOTWI survey respondents were from utilities.
- 31.2% of utility respondents indicate they work at a combined water/wastewater utility ($n = 1177$); 29.1% of utility respondents indicate they work at a drinking-water-only facility ($n = 1099$).
- The 2022 SOTWI survey was able to collect 193 responses from wastewater-only workers.
- 86.8% of responding utilities are publicly owned.

- Small-system response (as a % of total utility response) is 27.2%, or 541 systems.
- Medium system response (as a % of total utility response) is 19.4%, or 386 systems.
- Large-system response (as a % of total utility response) is 35.5%, or 707 systems.
- Very-large-system response (as a % of total utility response) is 17.9%, or 356 systems.
- 42.0% of the 1,999 utility respondents indicate they work in operations and maintenance.
- 38.4% of utility respondents indicate they are an executive or in management.
- Non-utility participants made up 33.1% of the total respondents.

Health of the Water Sector

- Regarding the overall perceived health of the water sector, the 2022 SOTWI survey scored 5.0, which is above the average of 4.67 (based on a scale of 1 to 7, where 1 = not at all sound and 7 = very sound).
- The future perceived health dropped in 2022, to a survey score of 4.7 (based on a scale of 1 to 7, where 1 = not at all sound and 7 = very sound).

Macro Challenges and Concerns

- The top five water sector challenges, as expressed by all survey participants, are renewal and replacement of aging water and wastewater infrastructure, financing for capital improvements, long-term water supply, aging workforce/anticipated retirements, and public understanding of the value of water systems/services.
- New to the top five is aging workforce/anticipated retirements.
- Supply chain issues ranked as the most negatively impactful macro-phenomena by all respondents, with 51.5% indicating this is a significant impact.
- Respondents are concerned about contaminants and the ability of the sector to meet current and future regulations. The top three contaminants indicated by all respondents are per- and polyfluoroalkyl substances, lead and copper, and microplastics.

Water Supplies

- 12.4% 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).
- 53.2% of participants indicated that their utilities are very or fully prepared, down from 64.5% and 57% reported in 2021 and 2020, respectively.
- The West's active implementation of water restrictions in the past decade trends 7% higher than the averages.

- States trending higher in voluntary use restrictions for five or more years are California, Colorado, Florida, Georgia, Hawaii, Massachusetts, Nevada, New Hampshire, New Mexico, Rhode Island, Texas, Utah, and Wyoming.
- States implementing higher involuntary use restrictions five or more years are California, Colorado, Florida, Georgia, Hawaii, Massachusetts, Nevada, Oklahoma, Rhode Island, and Texas.

Infrastructure

- All respondents ranked a list of issues related to renewal and replacement in the order of importance as follows:
 1. Infrastructure reliability
 2. Financing renewal and replacement
 3. Access to funding

Financials

- 34.8% of utility participants reported increasing per-account water sales (either more than a 10-year trend or less than a 10-year trend). This is trending higher compared with the pre-pandemic value of 28% reported in 2020. Although cause was not investigated, this increase is likely a result of the COVID-19 pandemic.
- Combining those who are not at all able and those who are slightly able, 26.4% of utilities responding are currently struggling to implement full-cost pricing.
- In addition, 31.9% of respondents believe they will struggle to cover the full cost of service in the future. Both values are consistent with previous years.

- The percentage of executive/management and financial officer respondents who felt that their utilities would be fully able to cover the cost of providing service in the future decreased from 18.8% to 14.7%.
- 71.7% of the utility executive/management and financial officer respondents indicated they are planning a rate increase in 2022.
- Utility executive/management and financial officer respondents ($n = 716$) also indicated they are not willing to defer rate increases as a primary means to assist customers.
- When asked about various funding opportunities, utility executive/management and financial officer respondents indicate rate increases will be used to generate revenue.
- 32.1% of executive/management and financial officer respondents indicate they have low-income assistance available, while 19.3% indicate low-income assistance is available elsewhere (e.g. city, nonprofits).
- Utility personnel identifying as executive/management and financial officer ($n = 716$) indicate the top three measures that are fully implemented:
 - Flexible payment plans (55%)
 - Suspending customer shutoffs (33%)
 - Suspending late payments (24%)
- 87% utility personnel ($n = 1711$) indicated capital improvement planning was fully implemented and/or implementation was in progress.

- Medium, large, and very large utility respondents indicate they are above 90% with capital improvement project development and implementation.
- 74% of small-system respondents indicated capital improvement projects at their utility are in some stage of development and implementation.
- Utility personnel who identified as executive/management and financial officer to identify their utility capital funding sources and/or strategies include rate increases, grants, and bonds.
- 56% of utility personnel identifying as executive/management and financial officer reported that their utility's access to capital was as good as or better than at any time in the past five years.

Risk and Resilience

- 81% of utility participants indicate they have implemented a risk and resilience assessment.
- 91% of utility respondents indicate they have an emergency preparedness plan.
- Utility respondents ($n = 1826$) indicate that 27.6% have fully implemented some form of cyber intrusion protection, and another 19% indicate they are assessing their cyber intrusion needs.

“With over 30 years experience in the Water Industry with all challenges that Water Purveyors face, I am confident that the professionals that are in this Industry will see things through as the ones that paved the way in the past have done.”