New Hampshire Water Resources Primer

New Hampshire Department of Environmental Services

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Chapter 8
Drinking Water

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Overview

New Hampshire has an abundant supply of clean drinking water. There are challenges, however, for the public water systems that serve 64 percent of New Hampshire's population and for the remaining 36 percent of residents that rely on private, household drilled or dug wells (NHDES, 2008a). Drinking water from public water supplies is highly regulated to protect public health, but aging infrastructure and the cost of treating drinking water and otherwise meeting ever increasing regulatory requirements are significant issues for public water suppliers. Few public water systems in New Hampshire charge the true cost of providing water or have adequately planned to maintain and replace infrastructure that is decades old. Also, as our ability to detect and evaluate contaminants in drinking water has increased, so has the need to address more contaminants to protect public health. A recent example of this phenomenon is the presence of trace amounts of personal care products and pharmaceuticals in some water supply sources. The wisdom of treating all water to drinking water standards, water which is then used for non-drinking water purposes, is being addressed elsewhere in the country and needs to be considered in New Hampshire as well. Because of New Hampshire's rural nature, there is a large proportion of very small community public water systems, many of which are hard-pressed to meet the same requirements as larger systems, but with far fewer resources.

For both private well owners and public water systems that use wells, naturally occurring contaminants such as radon and arsenic are significant health concerns. Unlike public water systems, there is no requirement for private well water to be tested or treated, and many people in New Hampshire are unknowingly drinking water that exceeds health-based contaminant limits.

Finally, New Hampshire is a nationally recognized leader in protecting the groundwater and surface water that are the sources of drinking water. Still, landscape change has the potential to degrade our sources of drinking water by contributing contaminants and changing hydrology as described in Chapter 1 – Introduction and Overview.

8.1 Description and Significance

8.1.1 Drinking Water Is Critical to Health and Quality of Life

Human life depends on water. The average human can live 40 days or more without food, but only three to five days without water (Kendall, 1991). Drinking water is also used for food production and preparation, sanitation, outdoor irrigation, industrial processes and for many other activities.

The importance of drinking water and its protection was recognized 400 years ago at colonial Jamestown, Va., (see sidebar) and has been an acknowledged public health priority for centuries in the U.S. Unlike in developing countries, fewer than 1 percent of U.S. residents lived without complete indoor plumbing by the year 2000 (Rural Community Assistance Partnership, n.d.). As a result, diseases caused by unclean water supplies are much rarer in the U.S. Waterborne disease outbreaks, however, continue to occur in the U.S. and the endemic waterborne disease burden is significant. Recently, an expert panel of scientists from the Centers for Disease Control and Prevention and the U.S. Environmental Protection Agency estimated that 5.5 million to 32.8 million cases of acute gastrointestinal illness per year are attributable to community drinking water systems in the U.S. (Messner et al., 2006).

"There shall be no man or woman dare to wash any unclean linen, wash clothes, ...nor rinse or make clean any kettle, pot or pan, or any suchlike vessel within twenty feet of the old well or new pump. Nor shall anyone aforesaid within less than a quarter mile of the fort, dare to do the necessities of nature, since by these unmanly, slothful, and loathsome immodesties, the whole fort may be choked and poisoned."

- Governor Gage of Virginia, 1610

(Source: Virginia Dept. of Health, 2007)

8.1.2 New Hampshire Water Supply: Where Do We Get Our Drinking Water and How Is It Tested?

Private Wells

An estimated 36 percent of New Hampshire residents obtain their drinking water from private wells with roughly 4,700 new wells constructed each year. There are two main types of private wells in New Hampshire: bedrock wells and shallow dug wells. The type of well used is largely dependent on local soil types and water availability on the property. An estimated 90 percent of all new wells are bedrock wells, which can be from 100 to 700 feet deep, depending on where an adequate supply or yield is reached (NHDES, 2008c).

Since 2000, private wells have had to meet statewide design criteria for construction and placement (We 100-1000), but there are no clear state requirements for minimum well water quality or quantity. The State Plumbing Code requires that only potable water sources be connected to domestic plumbing systems, but this requirement is not uniformly applied, in part due to confusion about the meaning of "potable" and the absence of specific water quality standards. When homes are sold, the owner must disclose information about both the water supply system and the wastewater disposal system, including the date of the most recent water test and whether the seller has experienced a problem such as an unsatisfactory water test (RSA 477:4-c), but there is no requirement to do a test. As a result, private wells are usually only tested when the buyer chooses to do so, when a lender requires it at the time of sale, when a homeowner has a new well drilled by a contractor who recommends a test, when problems with water quality are noticeable, or in those few towns where a private well water test is required for a certificate of occupancy or for property transfer. There are also no state standards in regards to treatment of water from private wells.

Public Water Systems

A public water system is defined as "a piped water system having its own source of supply, serving 15 or more services or 25 or more people, for 60 or more days per year" (RSA 485:1-a). Public water systems must meet all the requirements of the federal and state Safe Drinking Water Acts. These requirements have increased over time.

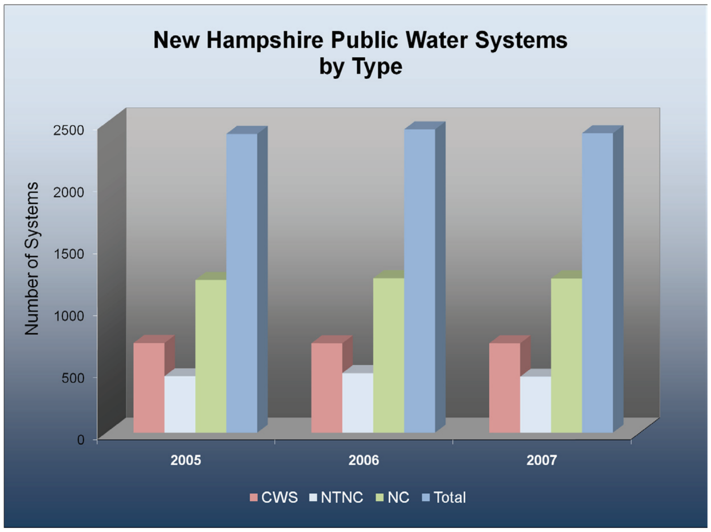


Figure 8-1. New Hampshire public water system profile: Community water system (CWS); non-transient/non-community (NTNC); transient/non-community (NC). ***Source: NHDES, 2008a.***

There are three types of public water systems: community water systems; non-transient/non-community systems; and transient systems. Depending on the type of system, the requirements vary, with more stringent requirements for larger systems and for those serving residential populations. Figure 8-1 shows the number of New Hampshire's public water systems among these categories. Each is described briefly below.

In 2007 there were 721 community water systems (CWSs) serving a combined resident population of approximately 849,905 (average size: 1,179) (NHDES, 2008a). These include municipalities, apartments and condominiums, mobile home parks, and single family home developments. Ninety-five percent of the CWSs in New Hampshire are small systems serving fewer than 3,300 residents. There are also 36 medium CWSs that each serve between 3,300 and 50,000 people, and two that are classified as large systems serving more than 50,000 each – Manchester Water Works and Pennichuck Water Works in the Nashua area (Figure 8-2) (NHDES, 2008a). The largest systems primarily use surface water for their source of supply, while the majority of small systems use groundwater.

The largest community systems are required to do the most comprehensive monitoring and treatment. Currently community systems must monitor for over 100 contaminants on a relatively frequent basis.

In 2007 there were 451 non-transient/non-community water systems (NTNCs) in New Hampshire (NHDES, 2008a). Typical NTNCs include non-residential schools, day cares, office buildings, commercial and industrial buildings, and

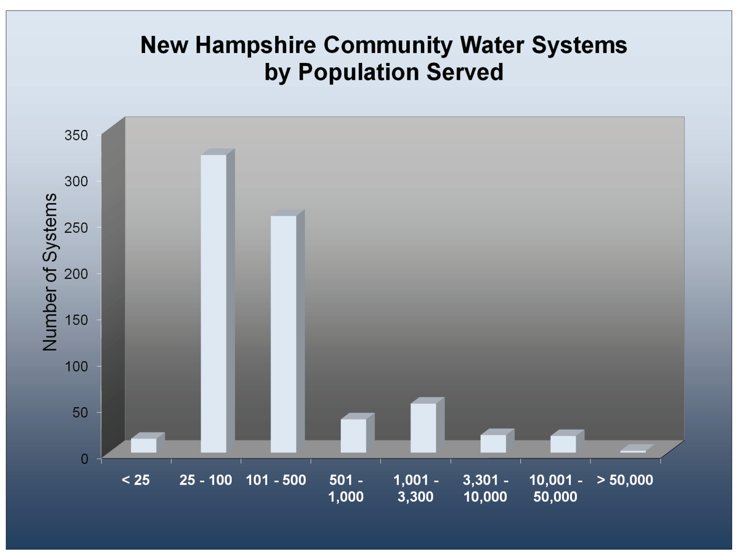


Figure 8-2. Of community water systems, the majority (82%) serve relatively small populations that have fewer than 500 customers. ***Source: NHDES, 2008a.***

businesses with permanent employees. Nineteen percent of New Hampshire's public water systems are NTNCs. This is larger than any of the other New England states and is a reflection of New Hampshire's rural nature. On average, these systems only serve about 200 people each, so there is often little economy of scale compared to community water systems.

All of New Hampshire's NTNC systems use groundwater for their source of water. The system operator is required to monitor for bacteria, lead and copper, nitrate, nitrite, inorganic contaminants (metals), volatile organic compounds or VOCs (solvents and hydrocarbons), and synthetic organic compounds or SOCs (pesticides). However, the sampling frequencies are less than for community systems and the compliance schedules for various treatment needs and monitoring are usually delayed until after community systems have complied.

In 2007 New Hampshire reported that there were 1,244 Transient/Non-Community Water Systems. Typical transient systems include restaurants, motels, hotels, ski areas, beaches and camp-grounds (NHDES, 2008a). All but one of these transient systems rely on groundwater for their source of water. Transient systems are only required to monitor for bacteria, nitrate and nitrite.

As indicated in Figure 8-3, 38 percent of the population served by CWSs is served by systems using only groundwater, 39 percent by systems using only surface water, and 23 percent by systems using both groundwater and surface water sources.

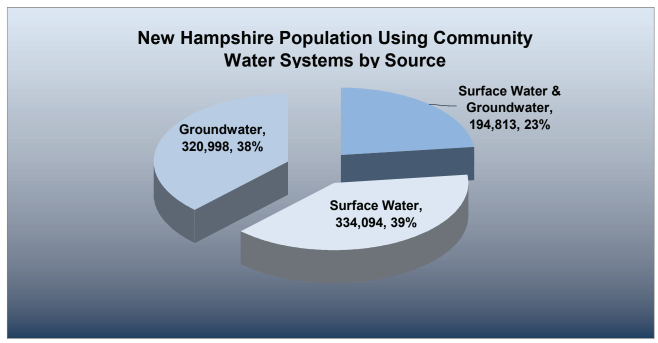


Figure 8-3. Population served by New Hampshire's community water systems. *Source: NHDES Drinking Water and Groundwater Bureau.*

8.1.3 Drinking Water Uses and Statistics

Between 1950 and 2000 the U.S. population nearly doubled, but during the same period public demand for water more than tripled. Americans now use an average of 100 gallons of water each day, even though only two or three gallons might actually be consumed or used in cooking (U.S. Environmental Protection Agency [USEPA], 2008b). Indoor use varies but is typically around 70 gallons, nearly half of this for toilet flushing and clothes washers. That leaves nearly 30 gallons as outside water use for lawns, gardens and car washing (American Water Works Association, 2008). A recent study of the New Hampshire Seacoast estimated that each person uses an average of 75 gallons per day, although usage varied greatly among communities (Horn et al., 2008). A number of public water systems in New Hampshire report a doubling of customers' water use in the summer months due to irrigation. (See also Chapter 7 – Water Use and Conservation.)

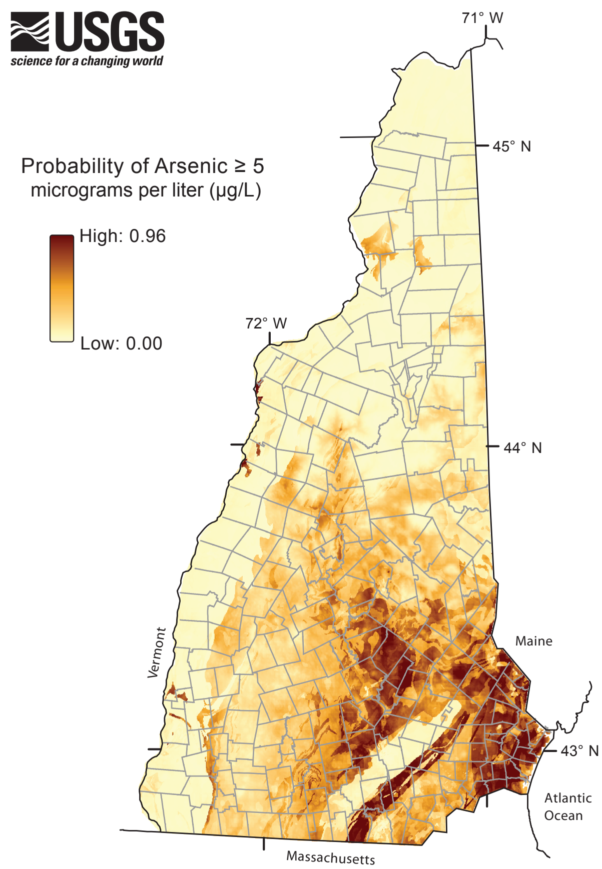


Figure 8-4. Probability that wells in each area of New Hampshire are likely to have water with arsenic concentrations exceeding 5 micrograms per liter (µg/L). ***Source: Ayotte et al., 2006b.***

8.1.4 Estimates of Naturally Occurring Contaminants in New Hampshire Well Water

New Hampshire's geology lends itself to certain common, naturally occurring contaminants, the most predominant being arsenic and radon. There are also iron and manganese deposits that can create common aesthetic concerns such as unpleasant taste and odor and unwanted staining. Our understanding of naturally occurring contaminants in well water is largely derived from the testing required at public water systems, the voluntary testing of private wells, and a number of scientific studies by USGS and others. It should be noted that many private wells are never tested.

Arsenic in well water is fairly widespread in New Hampshire (Figure 8-4). It is estimated that 20 percent of the state's private wells exceed the recently revised standard of 10 parts per billion of arsenic, which public systems must not exceed (Moore, 2004; Ayotte et al., 2006a). Although most of the arsenic in groundwater is likely of geologic origin, some of it may also be from historic pesticide use on apple orchards and other crops or from ash disposal (Robinson & Ayotte, 2006). Arsenic is a known carcinogen.

Radon gas is a byproduct of the radioactive decay of radium in certain rocks such as granite, so it is naturally common in the Granite State (Figure 8-5). Radon is a carcinogen. The major pathways to people are via migration of the gas through the soil and into homes where it may be inhaled, through groundwater entering the home as drinking water and then released as a gas, such as when showering or running water, and through ingestion of drinking water. The greatest exposure is through the first pathway.

Drinking water standards for radon have been quite controversial, with an initial proposal from U.S. Environmental Protection Agency of 300 picocuries per liter (pci/L), a limit that would have been exceeded by an estimated 95 percent of all New Hampshire wells. That standard was never finalized and it is unclear when a federal standard will emerge. Some New England states have set standards ranging from 4,000 – 10,000 pci/L and DES recommends that treatment be considered if the levels in well water exceed 2,000 pci/L. Nearly 40 percent of New Hampshire's wells are estimated to exceed 4,000 pci/L (NHDES, 2005). Other, less predominant naturally occurring contaminants found in some areas of the state include other radionuclides, fluoride and beryllium. Manganese at very high levels has also emerged as a health concern.

8.1.5 Water Supply System Components and Costs

Infrastructure in private water supply systems is minimal, consisting typically of a well, a pump, piping to the home, and a pressure tank. If there are water quality problems, the homeowner may have a point-of-entry device that treats all of the water entering the home, such as for radon. Alternatively, some homeowners are able to use point-of-use devices under the sink that treat only the drinking water coming from the tap, such as for arsenic. Older plumbing within the home may contain lead solder and fixtures that can leach lead and copper into the water. As previously noted, there is no uniform set of private well testing requirements or standards for treatment in New Hampshire, leaving it up to the homeowner to test their water and deal with the quality issues.

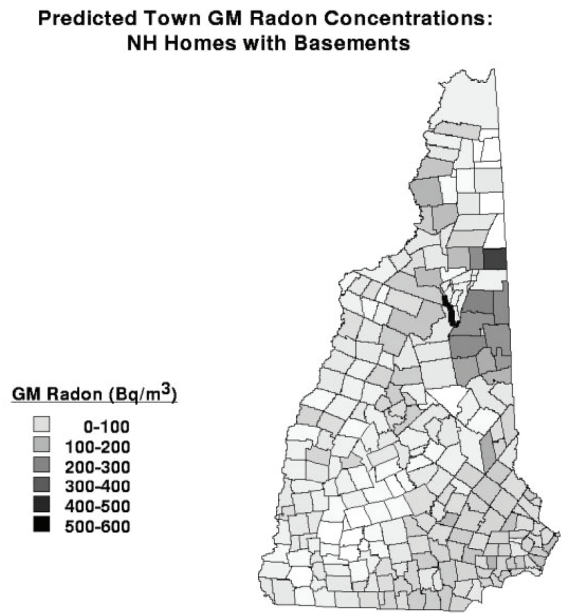


Figure 8-5. Predicted geometric mean (GM) concentrations of radon in homes with basements, by Town. *Source: Apte et al., 1999.*

Almost all private and small community water sources are wells, either dug or bedrock as previously described. As the number of customers increases, it can become difficult to meet demands through wells. As a result, larger systems most often rely on surface water sources or a combination of surface and groundwater.

The infrastructure for public water systems includes additional components such as treatment, storage, pumping and distribution. Typically, the larger the system, the more complex the system components, with surface water systems generally requiring significantly more treatment than groundwater based systems. For many of New Hampshire's municipal systems, the infrastructure is decades if not centuries old. Therefore, routine and long-term maintenance of treatment and water distribution systems are important.

The sophistication of system monitoring and management also varies greatly. Generally, the larger systems can afford to have computerized monitoring and control systems and multi-level staffing, while smaller systems often struggle to cover the costs of basic treatment, monitoring and maintenance.

8.1.6 Multiple Barrier Approach to Safe Drinking Water

As regulations under the Safe Drinking Water Act have become more and more inclusive and stringent in response to new information about contaminants and their health impacts, water systems that once needed only basic treatment have had to implement more complex processes. Treatment,

The Multiple Barrier Approach to Protecting Public Health

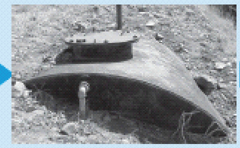
The multiple barrier approach provides "defense in depth" against waterborne pathogens and chemical contaminants that can cause a variety of illnesses and conditions, some of them potentially fatal. By erecting barriers against these contaminants at each step in the process from raw, untreated source water to the delivery of treated finished water, system owners and operators can protect the health and well being of the people who rely on them for potable water.

Source Water

Barriers: Selecting and protecting the best source of supply.

Treatment

Barriers: Installing treatment methods, implemented by a certified operator, that will improve the quality of the source water.



Storage and Distribution

Barriers: Constructing, operating, and maintaining well-engineered storage facilities and distribution systems.

Monitoring and Public Information

Barriers: Providing consumers with information on water quality and health effects.

Figure 8-6. Multiple-barrier approach to safe drinking water. ***Source: USEPA, 2003.***

however, is only one element of an overall approach to ensuring safe drinking water that has been adopted over time by both the EPA and the water supply industry. The multiple barrier approach is now firmly established as the preferred way to ensure safe drinking water, although many water systems have employed the elements of this approach for many decades.

The multiple barrier approach may be slightly different for each type of system, but in general it includes steps that go all the way from the source of the drinking water to the tap. For example, a typical surface water multiple barrier approach includes watershed protection focusing on managing land uses and water-based activities, possibly optimization of the intake(s) to draw water from the location where water quality is optimal, a series of chemical and physical treatment steps including filtration and disinfection, protected storage of the treated water, monitoring steps, distribution system operations and maintenance, ongoing operator training, and additional tap water monitoring. Each of these provides a partial barrier to pathogens and chemical contamination, and together, public health is well-protected. Figure 8-6 shows the multiple-barrier approach graphically.

The multiple barrier approach can also be used for private wells. The steps are simpler but no less important, and may include using a reputable contractor to construct the well, locating it properly to avoid exposure to sanitary waste or other contaminants, keeping harmful materials away from the well, avoiding the use of nitrate fertilizers and pesticides nearby, disinfection of the piping to the house, testing of the well before use and every three years thereafter, installation and maintenance of appropriate treatment if indicated, and the use of backflow prevention devices wherever irrigation connections occur.

New Hampshire has embraced this approach and has promoted protection of the sources of our drinking water as an important tool in ensuring safe drinking water. The state supports local land use planning consistent with protecting both the quantity and quality of drinking water and many municipalities have adopted ordinances to protect their drinking water.

8.2 Issues

8.2.1 Private Well Users at Risk

Although about 36 percent of New Hampshire residents use private wells for their drinking water supply, the water quality of many of these wells is unknown. Currently there are no statewide monitoring or treatment requirements for private wells. Private wells are not covered by the Safe Drinking Water Act and are rarely regulated in towns or other states. New Hampshire has required a well construction report for private wells since the year 2000; however, there may be no records for wells constructed before then. Further, while New Hampshire encourages private well testing, it is unclear how effective the educational efforts have been.

As previously described, estimates suggest that a significant proportion of New Hampshire's private bedrock wells are contaminated with arsenic and/or radon, two naturally occurring contaminants. Recent studies have also increased concern about the health risks of elevated manganese and fluoride in some areas (Rocha-Amador et al., 2007). Dug wells are often at risk for pathogen entry if they are improperly maintained or constructed, or if wells are located where contaminants might enter due to flooding, nearby animal pens, manure piles, etc. In addition, there are other less common contaminants such as radionuclides other than radon, fluoride or beryllium, which can occur at unsafe levels in particular geographic areas. Salt from roads or salt piles is also a common problem in many areas of the state.

8.2.2 New Hampshire Has a High Proportion of Struggling Small Community Systems

Even large community water systems find the Safe Drinking Water Act regulations difficult and costly to meet, so it is no surprise that it is much more difficult for small water systems. Figure 8-7 depicts the many challenges that small water systems may encounter as they provide safe drinking water. New Hampshire has a large proportion of small systems which are widely distributed and often impossible to interconnect. Per customer costs may be dramatically different than those associated with large systems. These small stand-alone systems require fairly sophisticated operations, yet they cannot afford to hire full-time staff that specialize in drinking water. Some small municipal water systems may have to share one part-time staff member with the highway department, the fire department and others.

Conversely, larger systems benefit from economies of scale and can afford to hire highly educated, specialized staff teams with in-depth knowledge of treatment, distribution, and other aspects of drinking water provisions. As a result, customers of the smallest systems often pay the most for

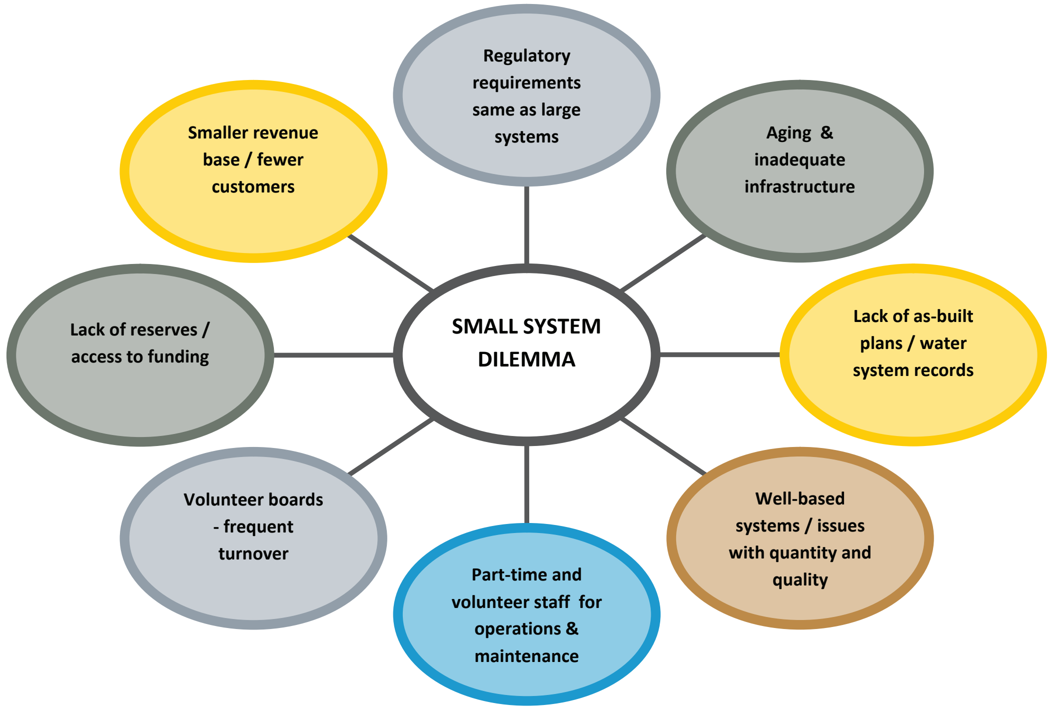


Figure 8-7. Challenges for small community water systems in New Hampshire.

the least in services. It is also important to note that providing water supply is a highly capital intensive mission where even the largest systems struggle to maintain and replace their aging infrastructure.

8.2.3 Aging Water Supply Infrastructure Is Widespread: Funding Insufficient

Much of the drinking water infrastructure in New Hampshire's cities and towns is 50 to100 years old. The infrastructure can include some or all of the following: dams for reservoirs, intakes, wells, pumps, transmission lines that take the water supply to treatment facilities, treatment facilities, water storage tanks, distribution networks, pump stations, meters, and electronic monitoring systems. Nearly all of these are costly to maintain or replace. Without regular capital improvements, more water leakage can occur and drinking water can become more difficult and costly to meet community needs.

A few of the largest systems are able to develop and implement long-term capital improvement plans, making infrastructure improvements over time. But for the most part, typical municipal systems are unable to keep up with the capital improvements that are needed to keep their systems up to date and operating efficiently, since they lack larger systems' economies of scale. Most water systems do not charge enough to cover all of the costs associated with providing water.

In 1996 a Drinking Water State Revolving Fund was established by Congress to, in part, help public water systems address aging infrastructure. New Hampshire receives approximately $8 million each year to loan out at reduced interest rates to our public water systems. In 2005 the 20-year projected demand for this funding in New Hampshire was $595.6 million (USEPA, 2005). Each year projects are prioritized based on severity of public health threat but demand consistently far exceeds supply. Because of the extensive process involved in receiving these loans, needy small public water systems rarely apply.

8.2.4 Population Pressures and the Purity Paradox

Treatment standards under the Safe Drinking Water Act are geared solely for the cost-effective protection of public health. Yet these stringent and costly standards are used to treat the entire water supply even though only a very small proportion of that water supply is actually used for drinking water. A considerable amount of water supply treated to drinking water standards is used to do laundry, flush toilets, irrigate lawns, put out fires, and clean streets.

Water systems expand to meet the peak demand of all uses, whether for drinking, lawn watering, or sanitary uses. Wells are drilled and re-drilled, surface water sources are expanded, and treatment capacity is increased to accommodate demand. Yet only a small portion of the total water used really needs to be of such high quality. There is a potential for both water and energy savings if non-drinking water uses could be satisfied by sources that are not treated to drinking water standards. Water from sinks and clothes washing (grey water) could be used for toilet flushing. Stormwater could be used to irrigate lawns with only minimal treatment in most cases. Until water costs much more, however, the savings associated with recycling grey water and stormwater will not outweigh the cost of separate conveyance systems.

This issue is likely to become more important in the future as population growth strains available supply and the cost of treatment continues to climb. As noted in Chapter 4 – Groundwater, continued growth and development also severely limits the ability to develop new municipal wells in many areas. Emerging contaminants that could drive the increase in treatment costs include pathogenic viruses, toxic algae, and pharmaceuticals and personal care products, e.g., prescription and over the counter therapeutic drugs, veterinary drugs, fragrances, cosmetics, sunscreen products, diagnostic agents and vitamins.

8.2.5 Climate Change May Have Implications for Public Health and Infrastructure

Some researchers are concerned that the rise of extreme precipitation events linked to climate change (see Chapter 1 – Introduction and Overview) will worsen U.S. waterborne disease outbreaks in the future. A 2001 article in the Journal of Public Health reported evidence that 68 percent of the waterborne disease outbreaks in the U.S. from 1948-1994 were preceded by the largest precipitation events (Curriero et al., 2001). It has not been determined whether this association holds true in New Hampshire. However, the predicted increase in frequency and intensity of storm events is a concern in terms of flooding at public water systems.

8.2.6 Water Supply Policies May Help or Hinder Smart Growth

Generally, land use patterns that concentrate growth in or near existing population centers and that involve compact development in newly developed areas are more protective of water resources and other aspects of environmental quality (air quality, energy use, consumption of other resources). There are several ways in which water supply policies on both the local and state levels may promote or hinder such "smart growth" land use patterns. First, as noted in section 8.2.4 and in Chapter 4 – Groundwater, attention should be given to the protection of future community well sites to enable growth of municipal systems in or near their existing service areas. Without this attention, these well sites will continue to be choked out by nearby development. Second, policies that address the expansion of service areas can either promote or hinder smart growth objectives, depending on the extent to which they encourage infill or compact development. Finally, the regulatory and financial demands on small community water systems may present an obstacle to compact development (as an alternative to large-lot development) outside existing service areas.

8.3 Current Management and Protection

8.3.1 Public Drinking Water Program

The New Hampshire Public Drinking Water Program implements the New Hampshire Safe Drinking Water Act (SDWA), which includes the requirements of the federal SDWA, which have expanded over the years (Figure 8-8). The federal SDWA was reauthorized in August 1996. New Hampshire has received "Primacy," the official designation by EPA for a state to implement the provisions of the federal SDWA. Approximately 90 percent of the funding for New Hampshire's Public Drinking Water Program comes from EPA, the remaining 10 percent comes from fees paid by water systems. Consequently, much of the work of DES's Drinking Water and Groundwater Bureau is dictated by the federal SDWA, including maximum contaminant levels (MCLs), monitoring schedules, and water system inspections. These requirements are designed to protect public health and were created at the national level in response to concerns expressed to the U.S. Congress regarding the need for

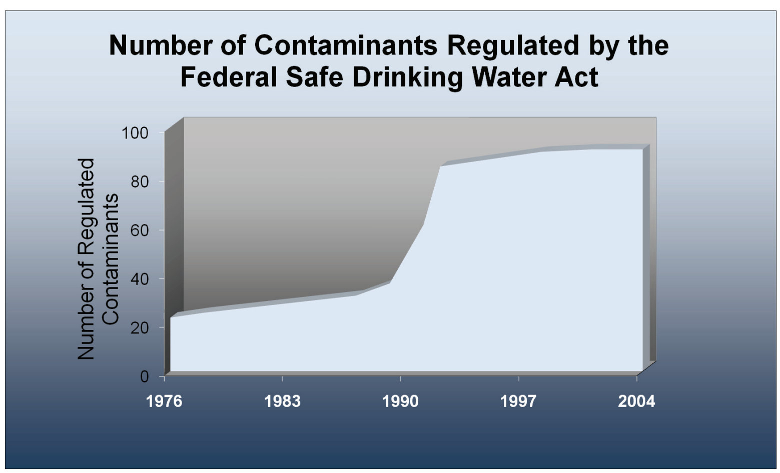


Figure 8-8. The number of contaminants regulated by the federal Safe Drinking Water Act has increased substantially over the past three decades. While compliance with the drinking water standards for so many contaminants proves to be difficult, this Figure does not account for regulatory standards that have changed to further limit a specific contaminant. *Source: USEPA, 2008a.*

strict standards in the drinking water industry. Overall, New Hampshire's drinking water program includes design, operation, and monitoring requirements for public water systems as well as protection of the sources of drinking water. In addition to DES, two public water system member groups have active roles in safe drinking water issues and provide significant training for public water system operators: New Hampshire Water Works Association and Granite State Rural Water Association. Finally, the Rural Community Assistance Program also provides assistance to public water systems in rural areas of the state.

8.3.2 Private Well Initiative

In 2000 DES and EPA launched a private well testing initiative, encouraging users of private wells to test their water more often and for a broader range of contaminants than before. DES enlisted the help of local health officers to blanket the state with posters and flyers urging homeowners to "Protect Your Family – Test Your Well's Water Quality Today." Health officers were asked to display the flyers in high-traffic locations in their municipalities. Public service announcements were produced and distributed to radio stations. A web site was developed containing pertinent fact sheets about contaminants of concern, lists of licensed well drillers and accredited laboratories, wellhead protection information, checklists, and other information for private well owners (NHDES, 2008e). Outreach to realtors and homeowners continue on a limited basis due to funding constraints.

8.3.3 Water Well Construction and Driller Licensing

Water well contractors and pump installers are licensed under RSA 482-B, which also establishes a Water Well Board to oversee licensing and the filing of well completion reports. The Water Well Board also adopts and enforces standards for the construction of wells and the installation of pumps. The board maintains records of over 112,000 wells constructed throughout the state since 1984 (NHDES, 2008d). The information is available for easy access through the internet, and is used frequently by homeowners, professionals such as hydrogeologists, and other interested parties.

8.3.4 Local Source Water Protection and Private Well Testing Ordinances

While a significant number of New Hampshire municipalities have taken steps to protect their important groundwater resources from contamination by human activities, very few have adopted regulations to protect private well users through mandatory testing. Seventy-five municipalities have adopted ordinances to protect aquifers, public wells, or other groundwater resources. Seventy of those ordinances rely on land use restrictions, while 27 incorporate a requirement for potential contamination sources to use best management practices. Twenty-one municipalities have adopted ordinances similar to the model groundwater protection ordinance developed by DES and the New Hampshire Office of Energy and Planning (NHDES, 2006), incorporating both land use restrictions and BMP requirements.

In contrast, only five municipalities have adopted ordinances that require testing of private wells for a prescribed list of contaminants, either in connection with real estate transfers or certificates of occupancy. An additional 44 municipalities report that they have a private well testing requirement, apparently in reference to the state plumbing code, which requires that water supplies connected to domestic plumbing systems supply potable water. However, the code does not define "potable" in terms of specific contaminants, so there is no assurance that the water is tested for common contaminants such as arsenic and radon.

8.4 Stakeholder Recommendations

8.4.1 Increase Private Well Protection

In spite of the major efforts towards protecting private wells by licensing contractors and drillers and requiring standards for well construction, there are no clear water quality or testing standards for private wells. There are also no mandatory state standards for vendors installing treatment for private wells. Since a large percentage of private wells produce water that exceeds health-based contaminant limits, additional steps are needed to improve the effectiveness of programs to inform and protect private well users.

8.4.2 Improve Capacity of Small Systems

New Hampshire has many small drinking water systems that are often unable to provide the same level of public health and safety protection as larger systems due to a lack of economy of scale and the difficulty in finding certified operators to assist them. Their capacity for financial management is critical, including training of water commissioners and understanding how to charge the true cost of water to customers. They also need technical assistance and managerial capacity to help deal with complex Safe Drinking Water Act regulations and critical drinking water operations. Where possible, regionalization is one option to assist small communities in meeting their obligations. Another option is to assist them through funding and technical assistance to develop better technical, financial, and management capabilities. Drinking Water State Revolving Funds should be made more accessible for small systems.

8.4.3 Maintain and Upgrade Drinking Water Infrastructure

As treatment facilities, water tanks, pumps, and water mains age, their tendency to fail increases, sometimes dramatically. However, few water systems, even the largest, can afford to pay for all of the capital improvements required to get their systems up-to-date. A significantly greater funding level is needed to protect public health and safety; the long-term economic and public health costs of not upgrading the infrastructure are too great.

8.4.4 Improve Local Protection Efforts

Although the state provides siting criteria for certain potential contamination sources, such as above ground and underground storage tanks and landfills, local planning and zoning boards have a much greater role in restricting the siting of activities that present a risk of contamination. Municipal governments need to improve their capacity to protect their own water supplies from the negative impacts that can result from development (see description of landscape change in Chapter 1 – Introduction and Overview). In addition to water wise local ordinances, more permanent protection of critical water supply lands through conservation is needed. Finally, in lieu of a statewide approach to ensure private wells are tested, municipalities should be encouraged to adopt ordinances to ensure that well testing and disclosure is occurring.

8.4.5 Track Emerging Contaminants

Although the provision of drinking water is already highly regulated, new contaminants and po-tential contaminants are identified every day. For example, using MTBE (Methyl tertiary-Butyl Ether) in gasoline to improve air quality turned out to be a mistake from the standpoint of groundwater protection, and this highly soluble contaminant has been found in many areas of New Hampshire (Ayotte et al., 2008). Although MTBE is no longer used in New Hampshire, other contaminants may threaten our drinking water quality in the future. For example, pharmaceuticals and personal care products are now being found at trace levels in groundwater and surface water in many parts of the country. Whether these will be found in New Hampshire, whether they will have human health effects, and the extent of their ecological effects, remain to be seen, but New Hampshire must continue to track research and health assessments to make sure that appropriate water quality health standards are developed when needed.

8.4.6 Water System Security and Interconnection

The water sector continues to be a concern as a target for terrorism. Preparedness for natural disasters is also necessary. DES and EPA have provided funding to help harden public water systems and to promote emergency interconnections between municipal systems. The state also encourages public water systems to join New Hampshire's Public Works Mutual Aid Program so that water systems can assist one another in the event of an emergency by enabling a prompt and effective response. Although emergency plans are required for community water systems, more emphasis in emergency preparedness is necessary including improved communications and coordination with local first responders and funding for backup power.

8.4.7 Prepare for Climate Change

Water systems need to understand climate change (see Chapter 1 – Introduction and Overview) and prepare adaptation strategies. The state should assist with identifying the anticipated impact of future climate change for the state's large, municipal water systems. The Drinking Water State Revolving Loan Fund program should take this information into consideration when making infrastructure investment decisions. It should also address drinking water impacts overall in future versions of the New Hampshire Climate Change Action Plan (NHDES, 2008b).

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Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"

WHEREAS, A number of innovative regulatory policies and mechanisms have been implemented by public utility commissions throughout the United States which have contributed to the ability of the water industry to effectively meet water quality and infrastructure challenges; *and*

WHEREAS, The capacity of such policies and mechanism to facilitate resolution of these challenges in appropriate circumstances supports identification of such policies and mechanisms as "best practices"; *and*

WHEREAS, During a recent educational dialogue, the "2005 NAWC Water Policy Forum," held among representatives from the water industry, State economic regulators, and State and federal drinking water program administrators, participants discussed (consensus was not sought nor determined) and identified over 30 innovative policies and mechanisms that have been summarized in a report of the Forum to be available on the website of the Committee on Water at www.naruc.org; *and*

WHEREAS, As public utility commissions continue to grapple with finding solutions to meet the myriad water and wastewater industry challenges, the Committee on Water hereby acknowledges the Forum's *Summary Report* as a starting point in a commission's review of available and proven regulatory mechanisms whenever additional regulatory policies and mechanisms are being considered; *and*

WHEREAS, To meet the challenges of the water and wastewater industry which may face a combined capital investment requirement nearing one trillion dollars over a 20-year period, the following policies and mechanisms were identified to help ensure sustainable practices in promoting needed capital investment and cost-effective rates: a) the use of prospectively relevant test years; b) the distribution system improvement charge; c) construction work in progress; d) pass-through adjustments; e) staff-assisted rate cases; f) consolidation to achieve economies of scale; g) acquisition adjustment policies to promote consolidation and elimination of non-viable systems; h) a streamlined rate case process; i) mediation and settlement procedures; j) defined timeframes for rate cases; k) integrated water resource management; l) a fair return on capital investment; *and* m) improved communications with ratepayers and stakeholders; *and*

WHEREAS, Due to the massive capital investment required to meet current and future water quality and infrastructure requirements, adequately adjusting allowed equity returns to recognize industry risk in order to provide a fair return on invested capital was recognized as crucial; *and*

WHEREAS, In light of the possibility that rate increases necessary to remediate aging infrastructure to comply with increasing water quality standards could aversely affect the affordability of water service to some customers, the following were identified as best practices to address these concerns: a) rate case phase-ins; b) innovative payment arrangements; c) allowing the consolidation of rates ("Single Tariff Pricing") of a multi-divisional water utility to spread capital costs over a larger base of customers; *and* d) targeted customer assistance programs; *and*

WHEREAS, Small water company viability issues continue to be a challenge for regulators, drinking water program administrators and the water industry; best practices identified by Forum participants include: a) stakeholder collaboration; b) a memoranda of understanding among relevant

State agencies and health departments; c) condemnation and receivership authority; and d) capacity development planning; *and*

WHEREAS, The U.S. Environmental Protection Agency's "Four-Pillar Approach" was discussed as yet another best practice essential for water and wastewater systems to sustain a robust and sustainable infrastructure to comprehensively ensure safe drinking water and clean wastewater, including: a) better management at the local or facility level; b) full-cost pricing; c) water efficiency or water conservation; *and* d) adopting the watershed approach, all of which economic regulators can help promote; *and*

WHEREAS, State drinking water program administrators emphasized the following mechanisms which Forum participants identified as best practices: a) active and effective security programs; b) interagency coordination to assist with new water quality regulation development and implementation, such as a memorandum of understanding; c) expanded technical assistance for small water systems; d) data system modernization to improve data reliability; e) effective administration and oversight of the Drinking Water State Revolving Fund to maximize infrastructure remediation, along with permitting investor owned water companies access in all States; f) the move from source water assessment to actual protection; *and* g) providing State drinking water programs with adequate resources to carry out their mandates; *now therefore be it*

RESOLVED, That the National Association of Regulatory Utility Commissioners (NARUC), convened in its July 2005 Summer Meetings in Austin, Texas, conceptually supports review and consideration of the innovative regulatory policies and practices identified herein as "best practices;" *and be it further*

RESOLVED, That NARUC recommends that economic regulators consider and adopt as many as appropriate of the regulatory mechanisms identified herein as best practices; *and be it further*

RESOLVED, That the Committee on Water stands ready to assist economic regulators with implementation of any of the best practices set forth within this Resolution.

Sponsored by the Committee on Water
Adopted by the NARUC Board of Directors July 27, 2005

Resolution Endorsing Consideration of Alternative Regulation that Supports Capital Investment in the 21st Century for Water and Wastewater Utilities

WHEREAS, Through the *Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"* (2005), the National Association of Regulatory Utility Commissioners (NARUC) has previously recognized the important role of innovative regulatory policies and mechanisms in facilitating the efforts of water and wastewater utilities to address their significant infrastructure investment challenges; *and*

WHEREAS, Traditional cost of service ratemaking, which has worked reasonably well in the past for water and wastewater utilities, no longer adequately addresses the challenges of today and tomorrow. Revenue, driven by declining use per customer, is flat to decreasing, while the nature of investment (rate base) has shifted largely from plant needed for serving new customers to non-revenue producing infrastructure replacement and compliance with new drinking water standards; *and*

WHEREAS, The traditional cost of service model is not well adapted to a no/low growth, high investment utility environment and is unlikely to encourage the necessary future investment in infrastructure replacement; *and*

WHEREAS, Compared to the water and wastewater industry, the electric and natural gas delivery industries have in place a larger number and a greater variety of alternative regulation policies, such as multiyear rate plans and rate stabilization programs, and those set forth in the 2005 Resolution; *and*

WHEREAS, The U.S. water industry is the most capital intensive sector of regulated utilities and faces critical investment needs that are expected to total $335 billion to $1 trillion over the next quarter century, as noted in the *American Society of Civil Engineers 2013 Report Card for America's Infrastructure*; *and*

WHEREAS, Tap water is physically ingested and the quality of the service must be maintained to protect the health and economic well-being of communities across our Nation and comply with current and future regulations covering the control of a number of contaminants from nitrosamines to chromium, at a cost estimated at $42 billion by the EPA as part of their April 2013 Report to Congress; *and*

WHEREAS, Alternative regulatory mechanisms can enhance the efficiency and effectiveness of water and wastewater utility regulation by reducing regulatory costs, increasing rates for customers, when necessary, on a more gradual basis; and providing the predictability and regulatory certainty that supports the attraction of debt and equity capital at reasonable costs and maintains that access at all times; *now, therefore be it*

RESOLVED, That the National Association of Regulatory Utility Commissioners, convened at its 125th Annual Meeting in Orlando, Florida, supports consideration of alternative regulation plans and mechanisms along with and in addition to the policies and mechanisms outlined in the

Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices" adopted by the NARUC Board of Directors on July 27, 2005; *and be it further*

RESOLVED, That the Committee on Water stands ready to assist economic regulators with implementation of alternative regulatory approaches that support water companies' capital investment needs of the 21st century.

Sponsored by the Committee on Water
Recommended by the NARUC Board of Directors November 19, 2013
Adopted by the NARUC Committee of the Whole November 20, 2013.

Resolution Supporting the Consideration of Regulatory Mechanisms and Policies Deemed "Best Practices" for the Regulation of Small Water Systems

WHEREAS, The United States Environmental Protection Agency estimates that more than eighty percent of the total water systems in the United States serve fewer than 3,300 people per system; *and*

WHEREAS, The NARUC Water Committee recognized that "small water company viability issues continue to be a challenge for regulators" in the *Resolution Supporting Consideration of Regulatory Best Policies Deemed as Best Practices* (2005)*; and*

WHEREAS, It is acknowledged that the traditional cost-of-service regulatory model as applied to small water systems may result in regulatory costs that are disproportionately high on a per-customer basis, which ultimately impacts customers served by those systems; *and*

WHEREAS, A number of regulatory policies and mechanisms have been implemented by public utility commissions throughout the United States to specifically address the challenges of regulating small water systems; *and*

WHEREAS, In the regulation of small water systems, it is recognized that rate application processes and mechanisms that reduce or remove the need for use of outside counsel or consulting services, thus reducing rate application duration and costs, should be encouraged; *and*

WHEREAS, To meet the challenges of environmental compliance and continued capital investment required to deliver safe and reliable service to the customers served by regulated small water systems, the following practices have been identified as means to improve sustainable and continued investment in small water system infrastructure at cost-effective rates: a) simplified rate applications for small water systems; b) electronic filing procedures; c) use of the annual report provided by the utility to the public utility commission to provide a significant portion of the rate application; d) commission staff assisted rate cases including both direct commission staff involvement in the rate application process and site visits to reduce the need for formal discovery; f) simplified rate of return mechanisms that may include formulaic rate of return calculations or percentage increases in authorized returns indexed to recent water cases in the same jurisdiction; g) cost of living adjustments; h) rate mechanisms to facilitate emergency infrastructure funds; i) operating ratio rate mechanisms where there is very limited rate base; j) limiting the use of Contributions In Aid of Construction in situations where unsustainably low rates may be instituted as a result; and k) combining water and wastewater revenue requirements for purposes of rate cases, as appropriate, if the water and wastewater utilities are under the same ownership, which will reduce rate case expense and offer rate increase mitigation options driven by economies of scale that would be unavailable otherwise; *and*

WHEREAS, It is further recognized that there are regulatory policies and mechanisms that address the viability of newly operating small water systems, including: a) enforcing the technical, managerial, and financial requirements as defined by the United States Environmental Protection Agency; b) where applicable and beneficial to the customer, encouraging consolidation with a nearby water system; and c) in the case where the new system provides the most benefit to the consumers, assuring adequate rates for infrastructure sustainability and emergency funding; *and*

WHEREAS, It is recommended that jurisdictions periodically evaluate classification criteria for defining which water systems qualify as small water systems; *now, therefore be it*

RESOLVED, That the National Association of Regulatory Utility Commissioners, convened in its 2013 Summer Meetings in Denver, Colorado, conceptually supports review and consideration of the innovative regulatory policies and practices identified herein as "best practices" in the regulation of small water systems; *and be it further*

RESOLVED, That NARUC recommends that economic regulators consider and adopt as many as appropriate of the regulatory mechanisms identified herein as best practices; *and be it further*

RESOLVED, That the Committee on Water stands ready to assist economic regulators with implementation of any of the best practices set forth within this Resolution.

Sponsored by the Committee on Water
Adopted by the NARUC Board of Directors, July 24, 2013

WA-3 Resolution Addressing Gap Between Authorized Versus Actual Returns on Equity in Regulation of Water and Wastewater Utilities

WHEREAS, There is both a constitutional basis and judicial precedent allowing investor owned public water and wastewater utilities the opportunity to earn a rate of return that is reasonably sufficient to assure confidence in the financial soundness of the utility and its ability to provide quality service; *and*

WHEREAS, Through the *Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"* (2005), the National Association of Regulatory Utility Commissioners has previously recognized the role of innovative regulatory policies and mechanisms in the ability for public water and wastewater utilities to address significant infrastructure investment challenges facing water and wastewater system operators; *and*

WHEREAS, Public utilities carry the responsibility to invest prudently, provide safe and reliable service, and take reasonable action to take precautionary measures to address business risk and economic forces, as necessary; *and*

WHEREAS, Recent analysis shows that as compared to other regulated utility sectors, significant and widespread discrepancies continue to be observed between commission authorized returns on equity and observed actual returns on equity among regulated water and wastewater utilities; *and*

WHEREAS, The extent of such discrepancies suggests the existence of challenges unique to the regulation of water and wastewater utilities; *and*

WHEREAS, Ratemaking that has worked reasonably well in the past for water and wastewater utilities no longer addresses the challenges of today and tomorrow. Revenue, driven by declining use per customer, is flat to decreasing while the nature of investment (rate base) has shifted largely from plant needed to serve new customers to non-revenue producing infrastructure replacement; *and*

WHEREAS, Deficient returns present a clear challenge to the ability of the water and wastewater industry to attract the capital necessary to address future infrastructure investment requirements necessary to provide safe and reliable service, which could exceed one trillion dollars over a 20-year period; *and*

WHEREAS, The NARUC Committee on Water recognizes the critical role of the implementation and the effective use of sound regulatory practice and the innovative regulatory policies identified in the *Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"* (2005); *and*

WHEREAS, It is recognized that State legislative bodies play a significant and important role in considering and addressing the challenges present in the regulation of water and wastewater utilities; therefore, it is critical that economic regulators strive to continue to foster an environment of cooperation and open communication between themselves, legislative bodies, and other State agencies involved in the oversight of water and wastewater utilities such that implementation and effective use of sound regulatory practice and the innovative regulatory policies identified in the *Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"* (2005) is both possible and effective; *and*

WHEREAS, A number of issues have been identified that if addressed may assist in lessening the discrepancy between authorized and actual returns, including: a) reducing, where appropriate, the length of time between rate cases and/or the length of time to process rate cases for regulated water and wastewater utilities; b) reducing rate case expense relative to requested revenue increases through the encouragement of mediation and settlement as appropriate; and c) examining the rate of infrastructure replacement and system improvements among regulated water and wastewater utilities; *now, therefore be it*

RESOLVED, That the Board of Directors of the National Association of Regulatory Utility Commissioners, convened at its 2013 Summer Meeting in Denver, Colorado, identifies the implementation and effective use of sound regulatory practice and the innovative regulatory policies identified in the *Resolution Supporting Consideration of Regulatory Policies Deemed as "Best Practices"* (2005) as a critical component of a water and/or wastewater utility's reasonable ability to earn its authorized return; *and be it further*

RESOLVED, That NARUC recommends that economic regulators carefully consider and implement appropriate ratemaking measures as needed so that water and wastewater utilities have a reasonable opportunity to earn their authorized returns within their jurisdictions; *and be it further*

RESOLVED, That the Committee on Water stands ready to assist economic regulators with the execution of a sound regulatory environment for regulated water utilities, and will continue to monitor progress on this issue at future national committee meetings until satisfactorily improved.

Sponsored by the Committee on Water
Adopted by the NARUC Board of Directors, July 24, 2013

Troubled Water Systems Acquired by Lakes Region Water Co., Inc.

System	Customers (as of 7/28/2015)	Order No.	Date	Notes
Wentworth Cove	55	14116	3/10/80	Transfer for $1. Prior owner/developer sought to discontinue service because the "water system did not produce adequate revenues to make further operations profitable."
Waterville Gateway aka White Mountain Resort/Gateway (Al Moulton)	84	16795	12/7/83	"The owner/[developer] of the water system testified that he does not wish to continue operating . . ."
Waterville Gateway aka White Mountain Resort/Gateway	84	18549	1/27/87	Purchased from Chapter 11 bankruptcy sale.
Deer Run	59	20334	12/12/91	Purchased after Commission investigation because the owner/developer resides in Florida and "Staff was concerned about his ability to operate the company."
Echo Lake & Woodland Grove	Echo Lake: 44 Woodland Grove: 74	20144	6/5/91	"LRWC has better financial, managerial and technical expertise than Demers."
Brake Hill	47	21475	12/22/94	Customers, Commission had "been working with Ms. York for some time to bring the water system into compliance with applicable statutes." Ms. York was the original developer of the system.
Tamworth Water Works	101	21943	12/12/95	Lakes Region had met with NHDES and PUC Staff "to discuss the system's deficiencies" and the need to make system improvements.
Lake Ossipee Village	232	23288	8/23/99	Owner/developer David Sands sanctioned by PUC numerous occasions. See also Order No. 24,376.
Hidden Valley Shores, 175 Estates	HV: 119 175Estates: 44	23901	1/7/02	Two water systems serving only 26 and 42 customers.
Gunstock Glen	54	24104	12/23/02	Gunstock Glen had been dissolved. After receiving Order Nisi, Pennichuck declined to purchase. LRWC purchased per Order No. 24,502.

FY 2018 CAPACITY DEVELOPMENT

ANNUAL REPORT TO EPA

July 2017 to June 2018

October 4, 2018

NEW HAMPSHIRE

NHDES

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R-WD-18-17

FY 2018 CAPACITY DEVELOPMENT ANNUAL REPORT TO EPA

July 2017 to June 2018

September 30, 2018

Compiled by Shelley Frost, P.G., P.E.
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Robert R. Scott, Commissioner
Rene Pelletier, Water Division Assistant Director

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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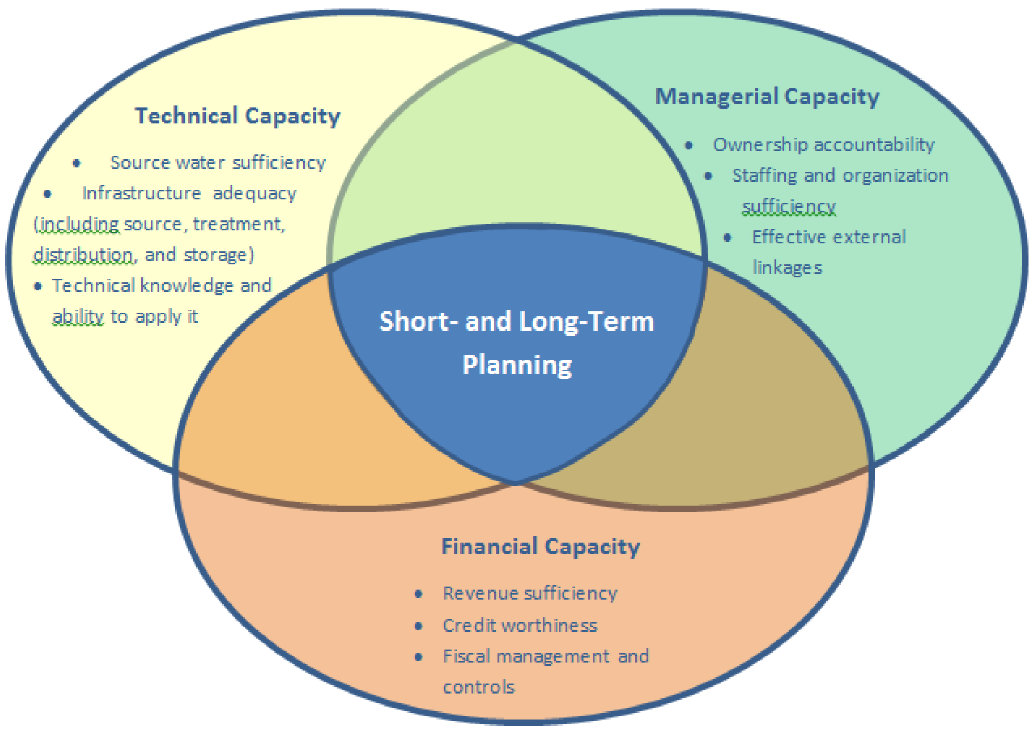
I. INTRODUCTION

1. BACKGROUND

Under the 1996 Amendments to the Safe Drinking Water Act (SDWA), Section 1420(c), each state must develop, implement, measure and report on their "capacity assurance" efforts to ensure that all new and existing public water systems (PWS) have adequate technical, managerial and financial means to provide clean, safe and reliable drinking water to their customers. States failing to comply with these requirements are subject to withholding up to 20%of their Drinking Water State Revolving Loan Fund (DWSRF) allotment.

Figure 1 – Small Water System Challenges



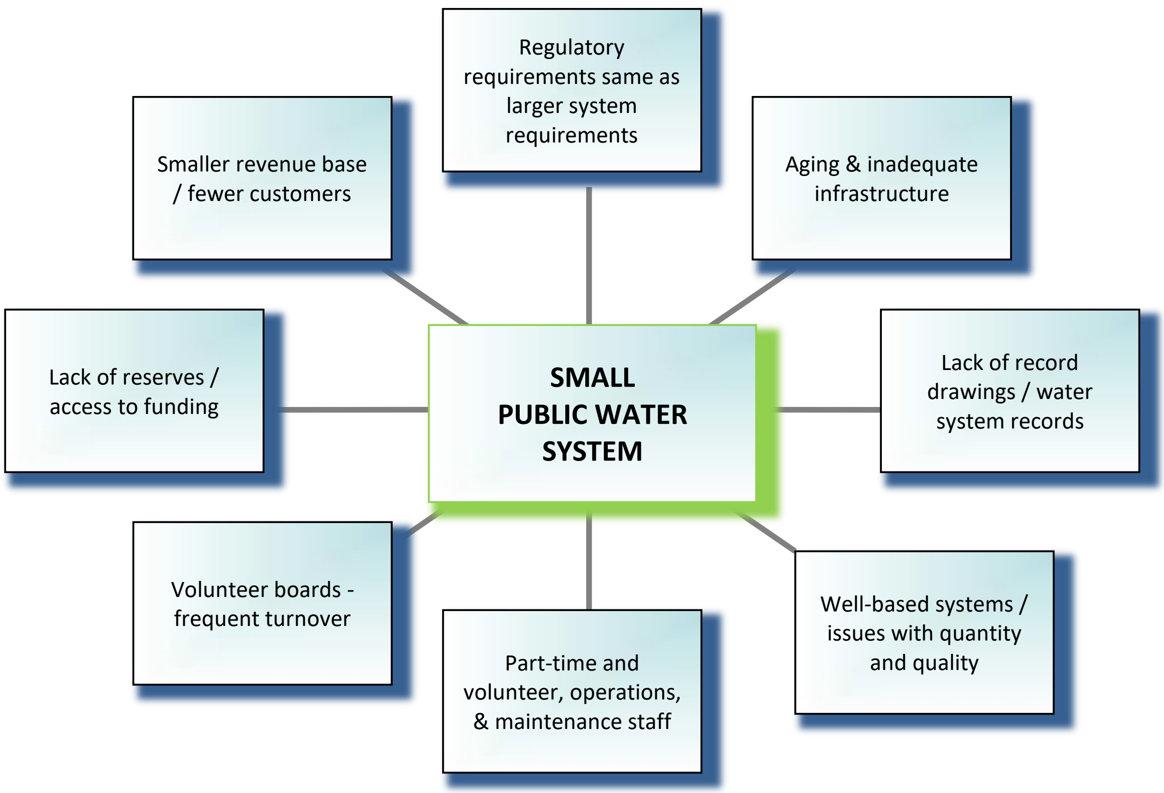
Technical - The physical and operational ability of a water system to meet SDWA requirements, including the adequacy of its source water, physical infrastructure, technical knowledge and capability of operating personnel.

Managerial - The ability of a water system to conduct its affairs in such a manner to achieve and maintain compliance with SDWA requirements, including the system's institutional and administrative capabilities.

Financial - The water system's ability to acquire and manage sufficient financial resources to achieve and maintain compliance with SDWA.

This report is structured in accordance with the reporting criteria required by EPA. Section II describes water system compliance issues or capacity development “needs”; Section III describes activities to ensure adequate capacity of ***new*** public water systems, and Section IV summarizes activities to improve the capacity development of ***existing*** systems.

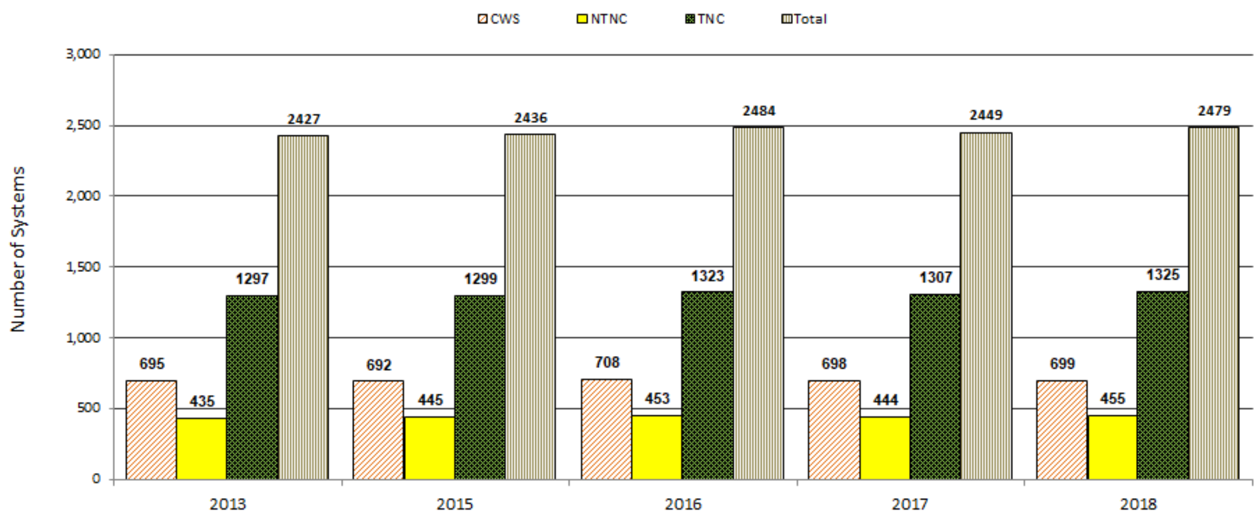
The goal of capacity assurance is to improve the long-term sustainability and rate of compliance of community public water systems (CWS) and non-transient non-community (NTNC) public water systems. New Hampshire’s program is administered through the state’s Department of Environmental Services Drinking Water & Groundwater Bureau (DWGB). New Hampshire focuses our capacity development efforts on the very small water systems (<250 service population), because these systems exhibit a multitude of hardships to manage and maintain water system compliance (Figure 1), have a limited rate base, and incur the highest number of violations both for health-based parameters and for monitoring and reporting requirements.



2. Profile of New Hampshire Public Water Systems

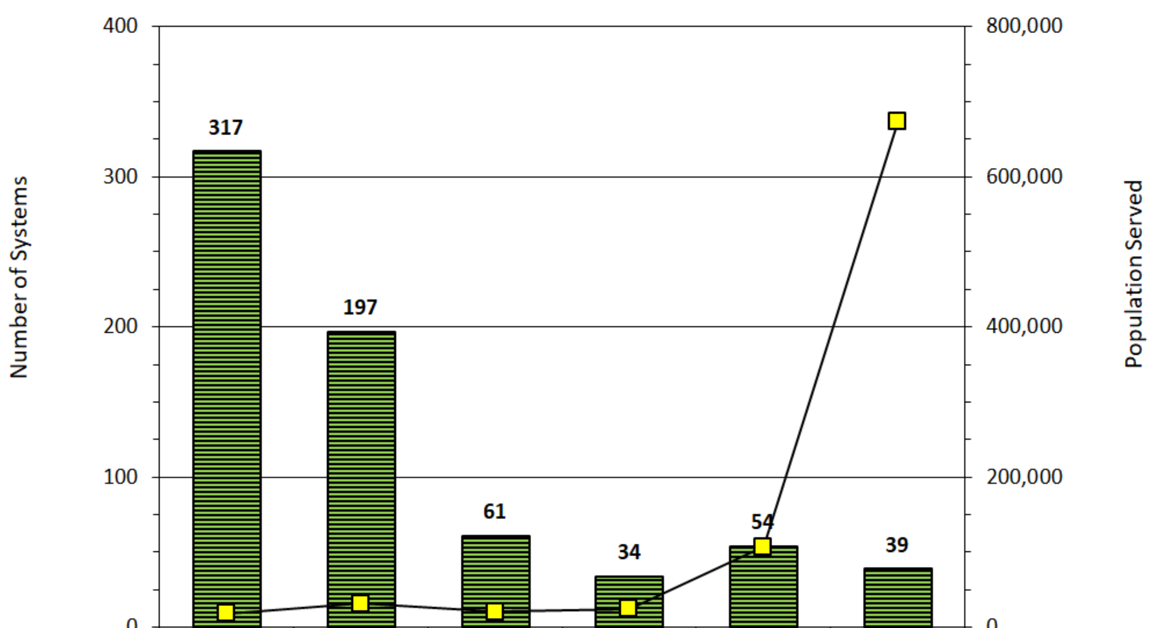
In Calendar year 2017, New Hampshire’s approximately 2,500 public water systems consisted of about half (47%) non-transient systems, serving residential communities, schools and businesses. The remaining 53% serve transient populations such as hotels, restaurants and campgrounds (Figure 2). It is also important to note that only **54%** of the state’s residential population is served **by public water systems**; with the balance **46%** served by **private wells**.

Figure 2 - Active Public Water Systems in NH (by previous calendar year)



Further breakdown of New Hampshire's public water system inventory shows that **73%** of our residential *community* water *systems* serve 250 people or less, representing about **6%** of the community water system *populations* served (Figure 3). This bracket has the highest rate of non-compliance, underscoring the need to target capacity assistance efforts to this system size.

Figure 3 - Community Water Systems by Population Served in Calendar Year 2017



System Population	25 - 100	101 - 250	251 - 500	501 - 1,000	1,001 - 3,300	3,301+
#Systems	317	197	61	34	54	39
Population Served	18,442	31,577	20,767	24,402	106,738	673,633

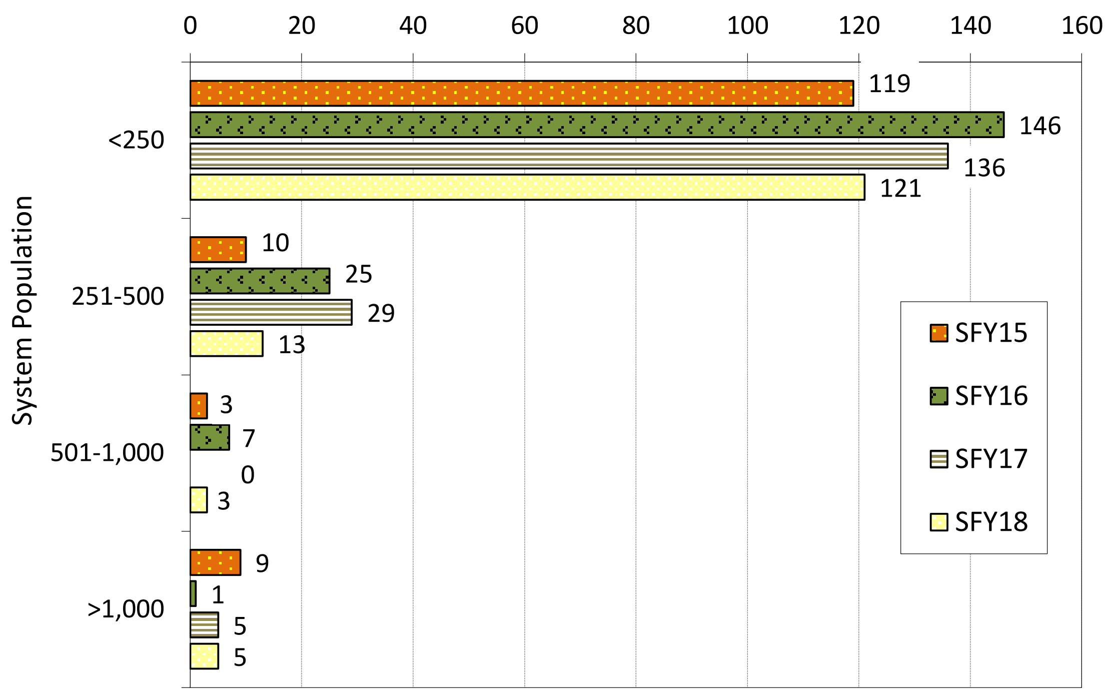
II. STATEWIDE CAPACITY NEEDS IDENTIFIED THIS PERIOD

1. VIOLATIONS FOR MONITORING AND REPORTING

Monitoring and reporting violations include failure to conduct the following actions: submit samples on time; sample for or report bacteria results under the Revised Total Coliform Rule (RTCR); perform public notice; submit Consumer Confidence Reports; provide Lead Education; and other "paper" violations. As shown in Figure 4, the *number* of violations issued to systems serving up to 250 persons is about four times higher than those issued for all other system sizes, due to the predominance of very small systems in the state. The number of violations per system is also the highest for systems serving up to 500 people (21% to 24%), compared to the larger systems with only 5% to 8% receiving violations. More violations occurred in SFY16 due to the state's early adoption of the RTCR and the additional monitoring and reporting especially for Seasonal Systems. Data show that transient systems incur over 10 times as many violations as non-transient systems for the following violations: failure to collect routine samples; failure either to provide results to the state; failure to notify the state that a monitoring violation happened; and failure to collect triggered monitoring samples.

Figure 4 - Non-Transient Systems Monitoring and Reporting (M/R) State and Federal Violations by Population

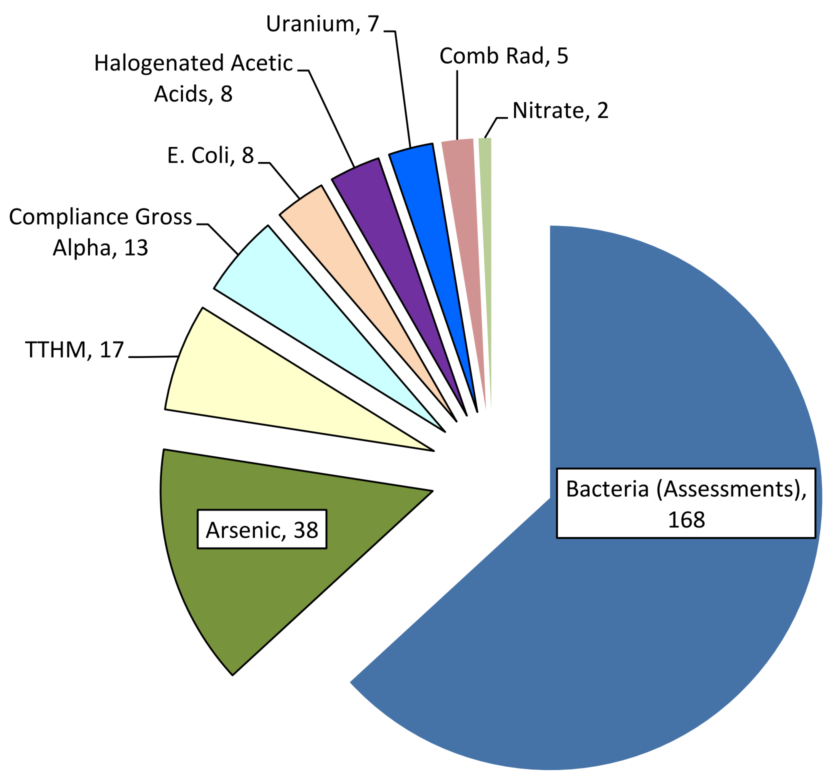
(by State Fiscal Year [July - June])



2. VIOLATIONS FOR WATER QUALITY

Violations are issued for exceedances of health-based, maximum contaminant levels (MCLs) for *E. coli* bacteria, chemical parameters and radionuclides. A breakdown per contaminant for the past state fiscal year (Figure 5, following page) shows that Bacteria and Arsenic continue to be the focus of outreach and assistance. Systems with populations of 25 to 250 incurred 73% of the water quality violations in SFY 2018.

Figure 5 - Chemical MCL Violations and Bacteria-based Assessments for Non-Transient Systems
(SFY 2018, Total = 266)

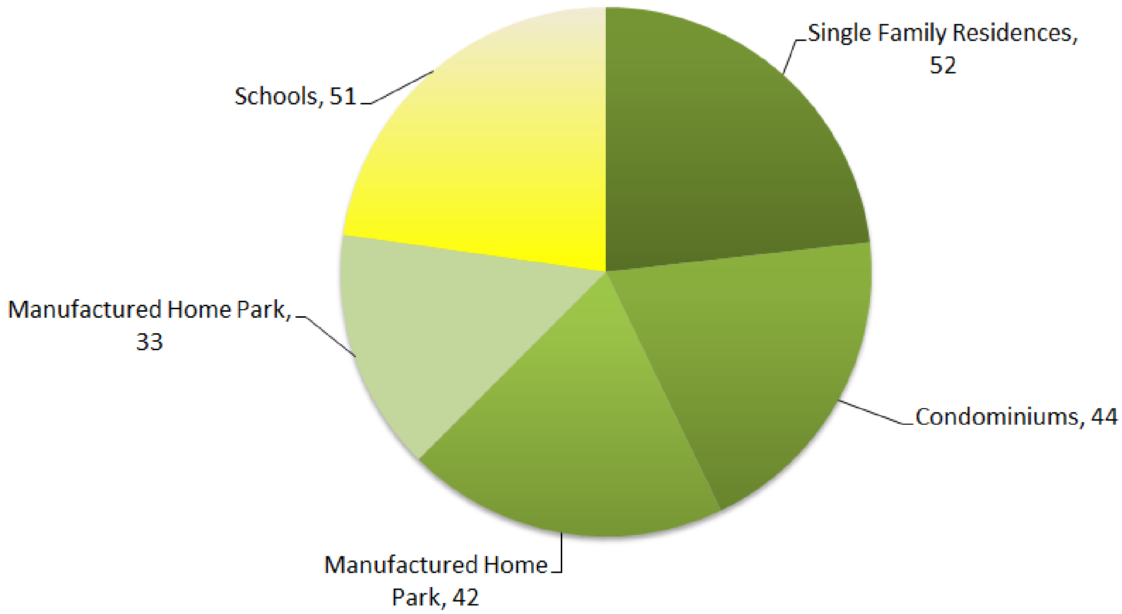


3. Non-Transient System Categories with Most federal Violations

The top five categories of small systems incurring federal violations in 2018 (Figure 6, following page) were fairly evenly divided. Single-family residences and schools were the most frequent violators, with different violation profiles. Top school violations were: failure to report results for routine samples, failure to collect routine samples, and failure to sample for disinfection byproducts. For residences, violations by apartments differed from condominiums, single family residences, and manufactured homes, likely due to type of management (apartments are managed by landlords, while the others are typically managed by an association of owners). Apartment top violations were failure to report results for routine bacteria samples and failure to submit public notice, while top violations for the remaining community categories were: sample average MCL exceedance (arsenic violations accounted for almost half the violations, and radiological parameters the rest), failure to sample for disinfection byproducts, and failure to monitor or report for non-bacteria parameters. For transient systems (not shown), campgrounds and restaurants incurred far more violations than other categories. This information will be used to focus future outreach.

Figure 6 - System Categories Incurring Most Violations

Federal violations by non-transient systems (25-1,000 persons), SFY 2018)



4. Deficiencies Noted from Onsite Inspections and Assessments

New Hampshire has defined 51 significant deficiencies within the eight inspection elements of a water system, 35 of which were cited in SFY 2018 to non-transient systems during 321 sanitary surveys, boil order site visits, and Level 1 and Level 2 assessments. The top five significant deficiencies (based on numbers cited) were: well cap/cover sanitary seal problems (39), missing sample tap (19), storage tank subject to contamination (19), various distribution system deficiencies (primarily leaks, 19), and inoperative treatment (18).

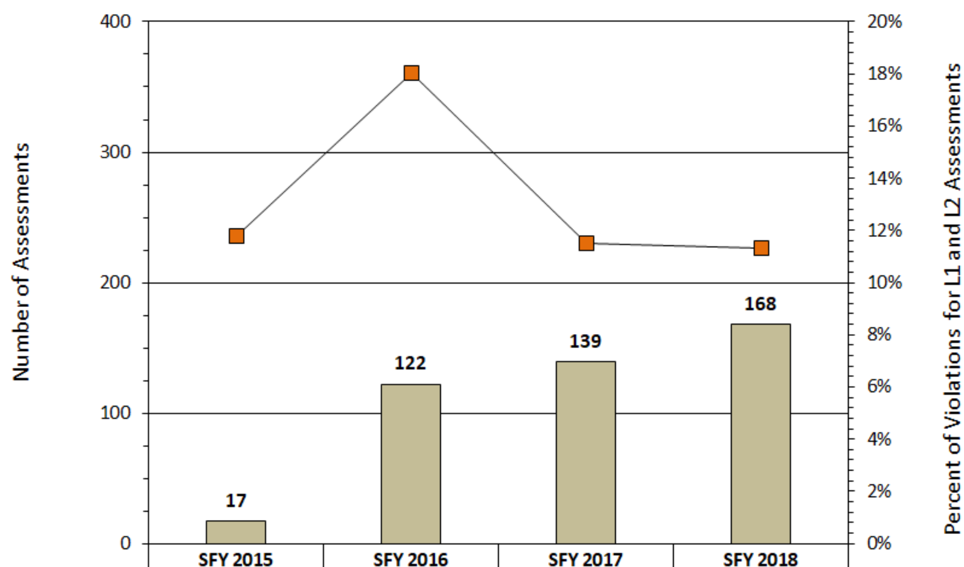
New Hampshire reinforced its outreach and enforcement along with its early implementation of the RTCR in 2015, which eliminated bacteria MCLs and introduced the requirement to perform system-wide self-assessments to identify and rectify the causes of bacterial presence. As shown earlier on Figure 5, the annual number of assessments is significantly higher than the total annual number of MCL violations for all chemical parameters combined.

Approximately 145 assessments are triggered each year in non-transient systems (Figure 7). Typically about 2/3 are due to Total Coliform, while the remaining 1/3 are due to either late sampling or failure to collect repeat samples. Letters are sent following the first total coliform event to better address the sampling requirements and possibly avoid repeated assessments. The number of bacteria assessments has increased, slowly approaching the 201 to 236 annual MCL violations occurring in the five years before the RTCR was implemented (Figure 7).

New Hampshire's enforcement process starts with issuance of a state-only Notice of Violation (NOVs) when systems fail to correct a sanitary survey deficiency within the required timeframe, which is generally set at 30 days. If the system still fails to correct the deficiency after receipt of the NOV, the next level of enforcement is a Letter of Deficiency (LOD). Depending on the type of deficiency and the length of time to correct, the water system may also incur a federal violation and requirement for Public Notice.

The violation rate for incomplete, inadequate, or missing assessments has dropped to approximately 11% since SFY 2016 (the second year of implementation of the RTCR), when New Hampshire started providing additional technical assistance to address the causes of coliform in systems experiencing repeated assessments.

Figure 7 - Level 1 and 2 Assessments and Assessment Violation Rates
(for Non-Transient Systems per SFY)



	SFY 2015	SFY 2016	SFY 2017	SFY 2018
Number of L1 & L2 Assessments	17	122	139	168
Percent Assessment Violations	12%	18%	12%	11%

5. Identification and Prioritization of Systems in Need of Assistance

Small systems in need of targeted, one-on-one technical assistance through the Capacity Development Program are identified through regular interactions including sanitary surveys, referrals from contract operators, customer complaints, grant and loan application lists, boil order assessments, repeated assessments, bulk water deliveries, enforcement lists and database queries for accumulated violations. A rolling capacity development "priority list" is maintained wherein each system is assigned a lead "Technical Assistance" contact from the bureau, to identify root causes and solutions with the system representatives and consultants. In SFY 2018, staff provided *extended one-on-one, in-person* capacity development assistance to 20 non-compliant systems and additional, extended, one-on-one capacity development assistance via office communications to 81 systems, for a total of **101 capacity development events**. Of these, 31 resolved their deficiencies in SFY 2018, and 19 remain open. Six of the 19 active capacity systems have applied for funding from the Drinking Water State Revolving Loan Fund (DWSRF).

Technical Assistance and parallel enforcement interactions with systems on the priority list (and others) are documented in water system files. Capacity development efforts often require several months to years to address the core causes of non-compliance. Assistance efforts typically include site visits and meetings, email and phone interactions, coordination with national and state TA partners, and funding assistance via grants and/or the DWSRF. This assistance lowers the number of violations, which focuses enforcement on the least responsive violators.

III. CAPACITY ASSURANCE FOR NEW SYSTEMS

From their inception, new public water systems must be designed to support adequate technical, financial and managerial resources for their long-term sustainability and reliability. This section describes state rules and control points for capacity assurance for new systems.

1. Design Standards and Capacity Assurance Regulations

Capacity assurance for new water systems begins with a detailed review of system water sources and infrastructure design in accordance with state regulations. Applicable standards are established in the following Administrative Rules:

- Env-Dw 301 Small Production Wells for Small Community Water Systems.
- Env-Dw 405 Design Standards for Small Community Water Systems.
- Env-Dw 406 Design Standards for Non-community Water Systems.
- Env-Dw 600 Capacity Assurance for Proposed and Existing Public Water Systems.

New Hampshire's main control point for capacity assurance is the water system **Business Plan**. As established by Env-Dw 602 Capacity Assurance for Proposed Public Water Systems, the business plan documents the water system asset inventory, management structure, and financial assets. New Hampshire approved seven new Non-Transient systems in SFY18. None of the new non-transient public water systems have been listed on the Enforcement Targeting Tool (ETT) report.

2. Capacity Assurance for New System Startup

Capacity assurance for new system startup is accomplished through a comprehensive startup Sanitary Survey and issuance of an informative "welcome packet" to new system owners. Additional outreach is provided for startup of new or reactivated *transient* systems by performing one-on-one meetings with new system owners at the time of system registration, as these are not required to hire a certified water operator in New Hampshire. Outreach to new owners this fiscal year included site visits to 12 systems, mailing of "New Owner Binders" to an additional 18 new owners, and additional outreach via office-based communications.

IV. CAPACITY ASSURANCE ACTIVITIES FOR EXISTING PWS

This section describes the different assistance programs administered by the DWGB to improve the managerial, financial and technical capacity of **existing** PWS. Activities include general and targeted outreach, grants and loans, and one-on-one site visits and capacity meetings for technical assistance.

1. Source Water Protection & Emergency Preparedness Assistance

DWGB programs include regular outreach activities for source water protection and emergency preparedness assistance to community public water systems, especially municipalities and districts. Highlights for the past fiscal year included:

- Provided presentations on the New Hampshire Public Works Mutual Aid program.
- Conducted three workshops to train land use planners in source water protection.
- Trained 219 water supply, municipal, non-governmental staff and consultants regarding how to apply surface and groundwater protections during the annual Local Source Water Protection Conference.
- Participated with municipal and public water system staff in the development of a "geographic response plan" for a critical reach of the Merrimack River to coordinate local response(s) to a chemical or oil spill into the river.

2. Grants, Loans and Asset Management

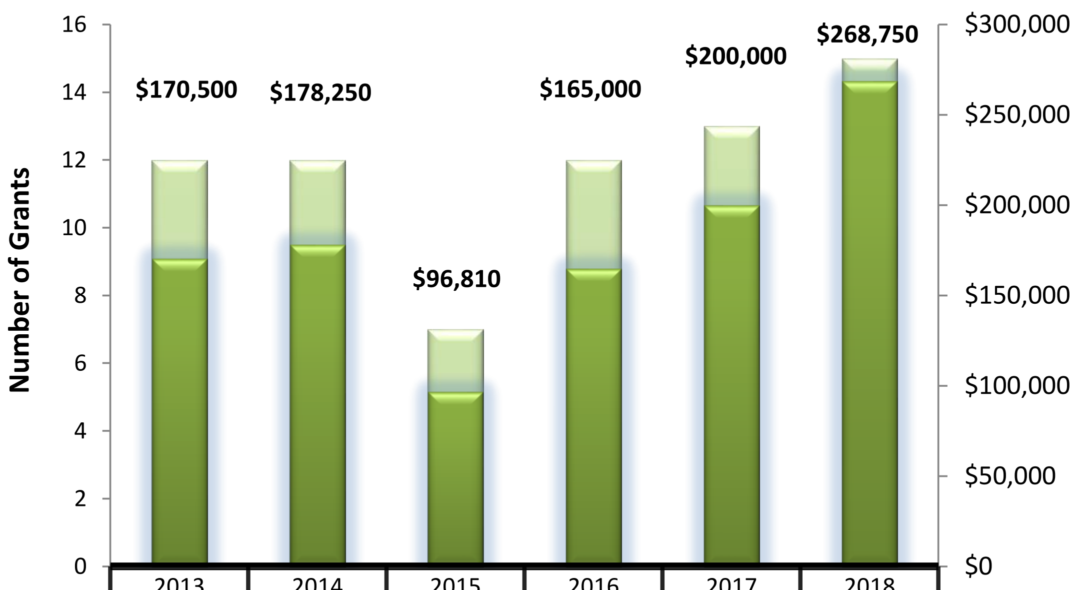
DWGB administers various funding programs to provide financial assistance and incentives for PWS infrastructure improvements and sustainability. Highlights for this reporting period include:

- Award of **$11.4 million** from the **Drinking Water State Revolving Loan Fund (DWSRF)** for infrastructure project loans in 2017, for systems serving a population of up to 500 (Table 1 on following page).
- Award of **10 Local Source Water Protection grants** for source security and other source protection projects.
- Award of **16 Asset Management grants** totaling $268,750 to assist communities with the development and/or the implementation of an asset management program. Since 2013 a total sum of approximately $1,079,310 in grants were awarded to 55 communities (Figure 9, following page and Table 2 on page 11).
- The fourth Annual **Asset Management Awareness Workshops** had 110 participants.

Table 1 –DWSRF 2017 Loan Commitments to Systems Serving <500 people

PWS ID	PWS Name	Town	Project Description	Loan Amount	Population	Projected Forgiveness
0612210	Old Coach Village	Derry	Pump House Replacement	$150,000	50	0%
0613050	Frost Residents Coop, Inc.	Derry	Water Main Replacement and System Improvements	$852,760	49	11%
1211010	Jackson Water Precinct	Jackson	Route 16 Water Main Extension	$688,900	500	0%
1932110	Bryant Brook Condo Association	Plaistow	Pump House and Source Water Upgrades	$240,000	55	11%
2194010	Coos County Farm	Stewarts -town	Interconnection with West Stewartstown Water Precinct	$900,000	228	15%

Figure 8 – Asset Management Grants Awarded in CY 2018



	2013	2014	2015	2016	2017	2018
No. of Grants	12	12	7	12	13	15
$ Amount	$170,500	$178,250	$96,810	$165,000	$200,000	$268,750

Table 2 – Asset Management Grant Awards 2018

SYSTEMS	TOWN NAME	GRANT AMOUNT
Antrim Sewer and Water	ANTRIM	$20,000
Bennington Water System	BENNINGTON	$20,000
Plymouth Village Water and Sewer District	PYLMOUTH	$20,000
Town of Newport	NEWPORT	$20,000
Town of Enfield	ENFIELD	$16,500
Rollinsford Water & Sewer	ROLLINSFORD	$20,000
Penacook and Boscawen Water Precinct	BOSCAWEN	$20,000
City of Claremont	CLAREMONT	$20,000
Sullivan County Complex	UNITY	$18,000
Town of Lisbon	LISBON	$12,000
City of Franklin	FRANKLIN	$17,500
Ashland Water & Sewer	ASHLAND	$20,000
Town of Winchester	WINCHESTER	$15,000
Emerald Acres COOP	BARRINGTON	$10,000
Town of Sunapee	SUNAPEE	$20,000
	Subtotal	**$268,750**
	Grants awarded through CY 2018	$810,560
	Total Amount Awarded to Date:	**$1,079,310**

3. Operator Certification Training and Outreach

The New Hampshire Operator Certification program supports numerous outreach and training activities for water system operators, owners and managers. In the past fiscal year, activities included:

- Contracting with the New Hampshire Water Works Association (NHWWA) for two Small Public Water System Operator Grade IA courses (fall and spring), two Basic Math courses, and two Operator Exam Review sessions.
- Contracting with the New England Water Works Association (NEWWA) (an approved IACET training provider) for 20 instructor-led training sessions in New Hampshire specifically targeted for New Hampshire water works operators.
- Coordination with NHWWA to provide six Operator Roundtables throughout the state. These are operator-driven roundtable discussions, which allow industry professionals to relay challenges confronting them and their professions. These forums also allow operators to ask questions of state officials and for the state to discuss anticipated and new regulations.
- Participation on the New England Water Works Operator Certification Committee. This is a regional committee comprised of New England state operator certification officers, EPA

representatives and professional water works operators. The committee promotes water works operator certification and initiatives to grow and strengthen the profession.

- Participation in other statewide industry trade shows and training seminars throughout the year with the New Hampshire Water Well Association, New England Water Well Association, Granite State Rural Water Association and other training partners.

Table 3 –Operator Certification Activities

	CY 2014	CY 2015	CY 2016	CY2017
Active Certifications	1011	969	1035	972
Exams Administered	204	151	197	216

4. Leak Detection Surveys

Leak detection and repair play a fundamental role in reducing water loss and energy costs related to the treatment and delivery of drinking water. In CY2017, the professional leak detection firm hired through DWSRF set-asides completed surveys for 42 community water systems, spanning 505 miles of pipe. Fifty leaks were discovered, totaling approximately 331 gallons per minute. This equates to roughly 174 million gallons per year, equivalent to 4,766 people using 100 gallons of water per day for a year.

In CY2018, SRF set-asides are funding leak detection surveys at 34 community water systems, spanning approximately 732 miles of pipe.

5. Water Conservation Outreach

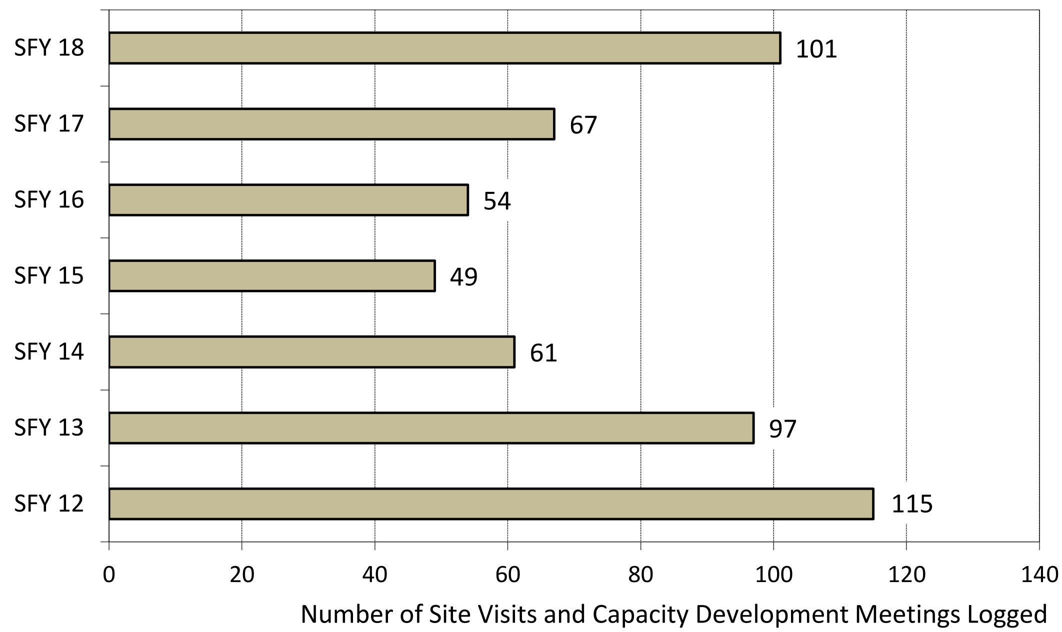
Promoting water conservation through outreach activities helps communicate the importance of reducing water loss and waste - especially as water and energy resources become increasingly limited. In SFY 2018, NHDES employees supported by DWSRF set-asides gave presentations or provided outreach at four events to promote water efficiency and support the sustainable use of water. Audiences included municipal leaders, elementary school students, state employees and the general public.

6. One-on-One Technical Assistance Site Visits and Capacity Meetings

DWGB technical staff provides ongoing technical assistance (TA) to small water systems to assist with source capacity issues, bacteria troubleshooting and financial and managerial planning. TA site visits and meetings attended by DWGB staff for SFY12 to SFY18 are shown in Figure 9. These site visits are *in addition* to standard sanitary surveys, permitting inspections, 41 SRF inspections in SFY 2018, and other special investigations performed by DWGB technical staff. As discussed in Section 1, this past fiscal year included 12 site visits with new transient system owners to review a customized binder (with sampling schedule and forms, instructions for using the PWS online portal "OneStop," and guidance on proper sampling procedures) and discuss their responsibilities as a PWS.

Further one-on one technical assistance to four small systems for business plans resulted in improvements in tracking water system expenses and attention to water rates for responsible fiscal planning.

Figure 9 - Technical Assistance Visits & Meetings by DWGB Staff



V. STATEWIDE REVIEW OF IMPLEMENTATION PROGRESS

Review of the capacity program implementation progress consists of biweekly meetings by the lead TA contacts, quarterly measures tracking through the statewide Measures Tracking and Reporting System (MTRS), annual reports to EPA, and a triennial report to the Governor.

VI. IMPROVEMENTS TO CAPACITY DEVELOPMENT STRATEGY

For SFY19, New Hampshire will continue to build and enhance its capacity development strategies for existing systems, including:

- Continued and new matching grants for small systems serving <500 people for development of Record Drawings and performing Tank Inspections.
- Continued requirement for water system Business Plans for asset management planning for systems serving <500 population, that have also received a grant or loan from the Drinking Water State Revolving Loan Fund.
- Continued one-on-one outreach and assistance to non-compliant systems and those lacking general capacity assurance.
- Continued collaboration with local and national TA providers including Granite State Rural Water Association, RCAP Solutions, Environmental Finance Center Network, New England Water Works and NH Water Works Association.

Number of Monitoring Violations by System Size in NH

Population Served	Numer of Systems	2018 Violations	Percent
25- 250	514	121	23.54%
251 - 500	61	13	21.31%
501 - 1000	34	3	8.82%
1000+	93	5	5.38%

Source: NHDES 2018 Capacity Development Annual Report to the EPA