NC LEAGUE OF MUNICIPALITIES

UNC SCHOOL OF GOVERNMENT ENVIRONMENTAL FINANCE CENTER

Water and Wastewater Rates and Rate Structures in North Carolina

Chris Nida, North Carolina League of Municipalities
Shadi Eskaf, Environmental Finance Center

March 2009

Click on any of the following questions:

Water and Wastewater Rates and Rate Structures in North Carolina March 2009

This report details the results of a survey of FY 08-09 water, irrigation and wastewater rates and rate structures conducted by the North Carolina League of Municipalities and the Environmental Finance Center at the UNC School of Government[1]*. Rates and rate structures are analyzed for 498 local government and not-for-profit utilities throughout the State. For more information, or to download tables of every rate structure and its computed bills, use interactive Rates Dashboards designed to allow you to compare rates using multiple selection criteria, and to view rate sheets of individual utilities, please visit www.nclm.org or www.efc.unc.edu/projects/NCWaterRates.htm.*

Any reference to tables, figures or subheadings, whether in the table of contents or within the text, are hyperlinked. Click on them to jump to the corresponding page.

Contents

[1] Partial funding for this activity was provided by the Public Water Supply Section of the North Carolina Department of Environment and Natural Resources.

List of Figures

List of Tables

Introduction

Water and wastewater rate setting is one of a local government's most important environmental and public health responsibilities. Water and wastewater rates ultimately determine how much revenue a community will have to maintain vital infrastructure. The purpose of this document is to help utilities in rate setting by providing an up-to-date, detailed survey of current statewide rate structures and trends. This report represents a collaborative effort between the NC League of Municipalities and the Environmental Finance Center.

Over the course of this survey, 538 local-government owned and non-profit water and wastewater utilities were contacted by email, fax, letter or phone, and 498 utilities (93 percent) responded by sending in their rate schedules. These utilities serve approximately 7.1 million North Carolinians and account for 98 percent of the population served by all local-government owned and not-for-profit water and wastewater utilities in the State. Table 1 describes the utilities analyzed. Some utilities use more than one rate structure for different portions of their service areas, raising the total number of rate structures in our sample to 549. Copies of the 549 rate structures of participating utilities are available online at www.efc.unc.edu/projects/NCWaterRates.htm.

Table 1: Number of Participating Utilities with Rates Data for FY 2008-09

Institutional Arrangement	Provides Water and Wastewater	Provides Water Only	Provides Wastewater Only	Total
Municipality	327	37	16	**380**
County/District	27	28	4	**59**
Sanitary District	7	7	2	**16**
Authority	5	2	0	**7**
Metropolitan District	0	0	2	**2**
Not-For-Profit	2	32	0	**34**
Total Number of Utilities	**368**	**106**	**24**	**498**
Number of Rate Structures	***384***	***137***	***28***	***549***

In addition to this report, tables of each utility's rates and key components of their rate structures are available from NCLM (www.nclm.org) and the EFC (www.efc.unc.edu/projects/NCWaterRates.htm). **It is important to stress that an examination of rates and rate structures only tells a part of the story.** Pressure to maintain low or relatively low rates has the potential to force utilities to run a deficit or avoid making necessary operational and capital expenditures. Ideally, rates should reflect the cost of providing service which depends on diverse factors including size of treatment facilities, customer base, age of assets, type of water supply, and quality of receiving waters. Two neighboring utilities with similar customer bases may have very different costs that justify very different rate structures and rates. **Therefore, policy decisions drawn from the comparative information in this document should also consider many other factors such as age of system, geographic location, site-specific regulatory requirements, source of water, demand, and availability of resources.** For more information, please read How Much Does Clean Water Cost? 2006: The Story Behind the Revenue, NCLM and EFC 2006, available at shopping.netsuite.com/sogstore. Free, interactive Rates Dashboards that combine utility financial, physical and customer characteristics with the capability of comparing rates among utilities that are similar in various categories are available on the web at www.efc.unc.edu/RatesDashboards/.

High rates do not necessarily reflect poor or inefficient management — in fact some utilities with low rates do not generate sufficient revenue to properly maintain their system's assets, thereby reducing short-term investments that are likely to have long-term adverse cost and service impacts. Other utilities may have low rates because they have not re-examined their rate structures in many years. Even when a utility customer base does not grow, operating costs rise every year and rates should be examined and readjusted on a yearly basis.

Overview of Rates and Rate Structures

Utilities employ a range of rate structures to determine what their customers pay. Almost all utilities use a combination of base charges and variable charges in their rate structures. There is considerable variation in how these are calculated and how they are charged for different classes of customers.

Base Charges

Base charges contribute to revenue stability because they do not vary from month to month, regardless of consumption. However, high base charges can also make it difficult for a utility to encourage conservation for the same reason. The number of rate structures with base charges and the range of the charges are shown in Figure 1. The median[2] base charges are presented in Table 2 by utility size. The median residential base charge applied by utilities in 2009 is $12.49 per month for water and $13.25 per month for wastewater. For combined utilities, the median combined water and wastewater base charge is $25.20 per month.

Figure 1: Monthly Base Charges for Residential Customers Among 514 Water and 395 Wastewater Rate Structures

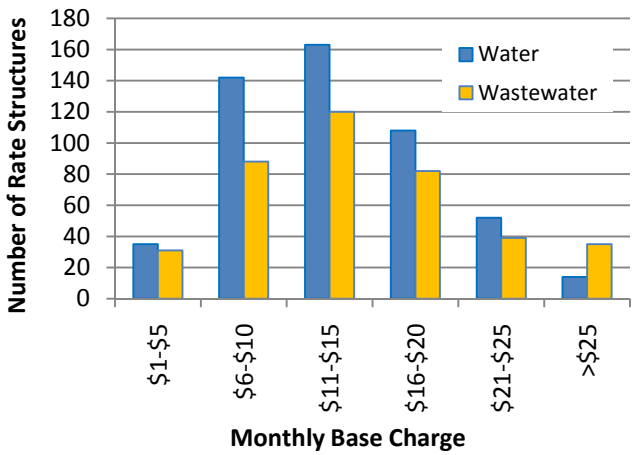


Table 2: Monthly Base Charges in Water and Wastewater Rate Structures, by Utility Size

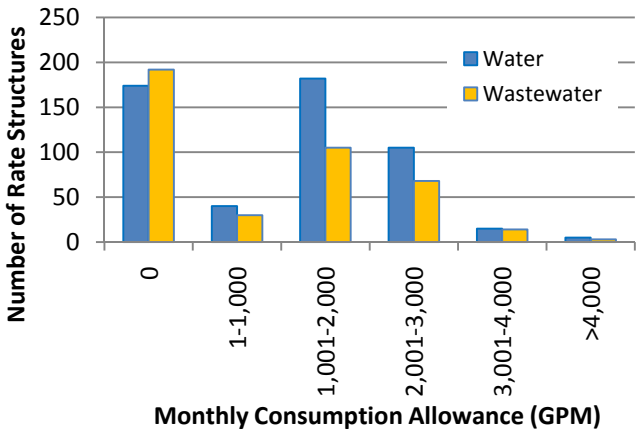
Size of Utility (Service Population)	Water Rate Structures			Wastewater Rate Structures		
	Total Number of Structures	Number with Base Charge	Median Base Charge	Total Number of Structures	Number with Base Charge	Median Base Charge
1 – 999	114	114	$14.00	91	90	$16.00
1,000 – 2,499	89	87	$13.25	80	77	$15.00
2,500 – 4,999	87	86	$12.00	75	73	$13.20
5,000 – 9,999	86	84	$12.59	55	48	$14.00
10,000 – 24,999	75	73	$11.58	56	54	$11.35
25,000+	68	68	$7.64	51	49	$8.55
All Rate Structures	***521***	***514***	***$12.49***	***412***	***395***	***$13.25***

While nearly every rate structure (99 percent of water and 96 percent of wastewater rate structures) has a base charge, their amounts vary by utility size. The largest utilities have smaller base charges than the smallest utilities. This may be a reflection of the fact that larger utilities have broader customer bases that provide a more stable revenue stream. Smaller utilities may, on average, have less stable customer consumption and therefore decide to shift a greater portion of their operating costs into the base charge.

[2] Most of the statistics cited in this report refer to *medians*. Exactly half of the rate structures in the sample have a value that is equal to or greater than (or equal to or lower than) the median value. The median is preferred over the average because averages are influenced by exceptionally high or low values whereas medians are not.

The majority of rate structures (68 percent of water and 56 percent of wastewater rate structures) include a minimum amount of water consumption or wastewater disposal with their base charges (see Figure 2). For these utilities, the variable portion of the rate structure only takes effect when a customer uses more than the minimum included in the base charge. Thus, all customers of these utilities who consume or dispose of an amount up to the minimum allocation would receive the same bill, which is equal to the base charge. For both water and wastewater utilities, the median amount of allowance included with the base charge is 2,000 gallons per month (GPM). Only 4 percent of water and wastewater utilities include more than 3,000 GPM with the base charge.

Figure 2: Consumption Included with Base Charge for Residential Customers Among 521 Water and 412 Wastewater Rate Structures



Variable Charges: Uniform, Increasing Block, Decreasing Block, and Other Rate Structures

Figures 3-6 present information on water and wastewater rate structures for "inside" customers: those who live within a utility's political jurisdiction or municipal boundaries. The three most common rate structures are uniform, increasing block, and decreasing block. In a uniform rate structure, the rate at which water/wastewater is charged does not change as the customer uses more water. In an increasing block structure, the rate increases with greater water consumption. This structure is often employed by utilities that want to encourage conservation. In a decreasing block structure, water rates decrease as consumption rises. This structure might be used to encourage economic development. Other rate structures used in North Carolina include a hybrid of increasing and decreasing blocks where rates increase or decrease for specific targeted blocks of consumption, seasonal rate structures applying different rates at different times of the year, uniform rates that are capped at a maximum billable consumption amount, tiered flat fees, and a block rate structure that charges all consumption at the rate of the last used block. Seasonal uniform rate structures support conservation, especially for those utilities that experience large seasonal consumption changes (e.g. tourist locations). Wastewater bills are almost always calculated based on the amount of metered water consumption; however, a fraction of wastewater utilities use rate structures with a cap on residential wastewater consumption. For example, if a utility caps their wastewater bill at 20,000 gallons, a customer that uses 25,000 gallons of water will only be charged for 20,000 gallons of wastewater disposal.

Figure 3: Residential Water Rate Structures (n=521)

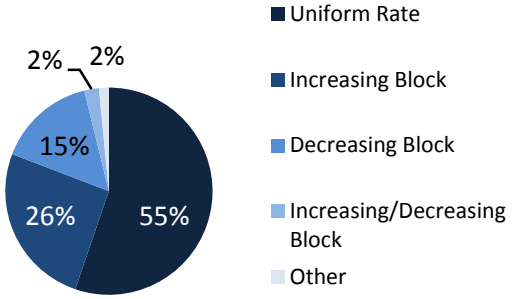
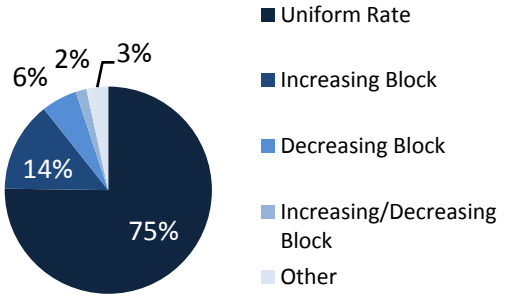


Figure 4: Residential Wastewater Rate Structures (n=412)



Most water and wastewater utilities use the same rate structure for residential, commercial, and industrial customers, but some have separate rate structures. In this survey, 26 percent of water utilities have a separate rate structure for their commercial customers, and a fraction of these utilities also has a separate structure that pertains to their industrial customers. On the wastewater side, 23 percent have a separate rate structure for their commercial customers. The percentages of all utilities that use each rate structure for commercial users (whether or not a separate rate structure is used) are similar to those for residential structures. The pattern is different when looking at only those utilities that use a separate commercial rate structure. Information on the rate structures that pertain only to commercial customers is presented in Figure 5 and Figure 6.

Figure 5: Commercial-Specific Water Rate Structures (n=133)

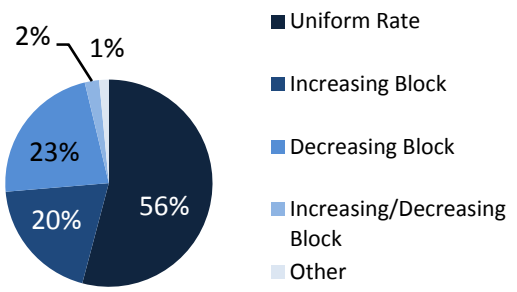
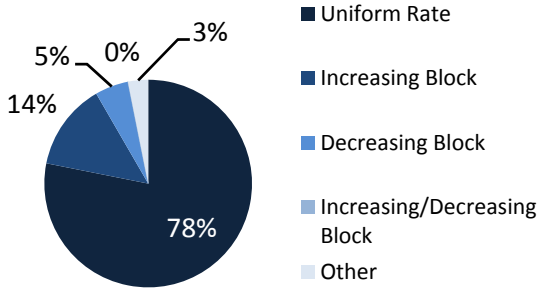
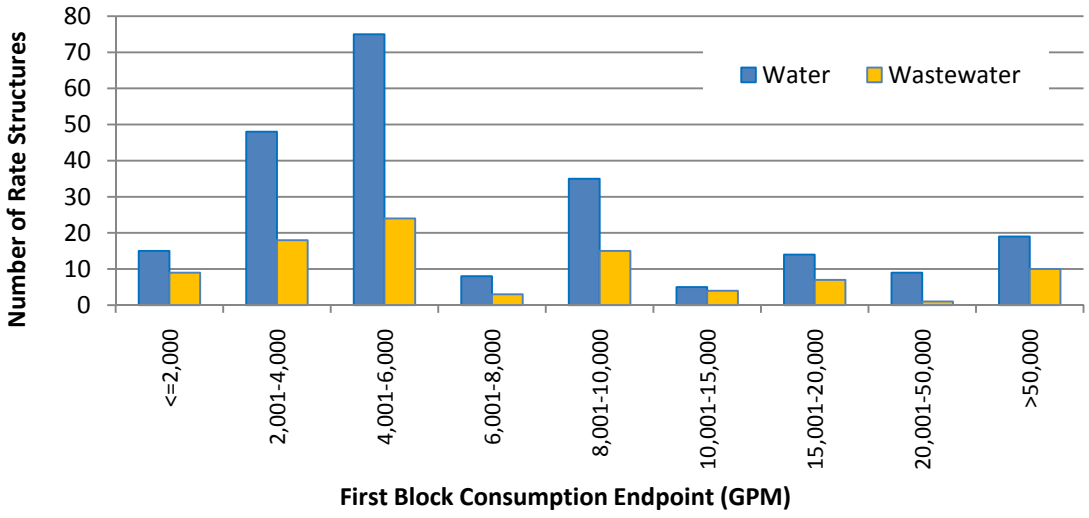


Figure 6: Commercial-Specific Wastewater Rate Structures (n=96)



While some utilities design separate rate structures for commercial users, other utilities use only one rate structure but design the blocks so that they inherently distinguish residential use from that of large commercial customers. A common practice is to set the first block high enough so that essentially all residential consumption is charged one rate (which is equivalent to a uniform rate for these customers) while most large commercial customers will typically exceed the first block, thus paying an increasing or decreasing block rate. Figure 7 shows how many rate structures include various amounts of consumption and disposal in the first block of their residential block rate structure.

Figure 7: Maximum Quantity in the First Block among 228 Water and 91 Wastewater Residential Block Rate Structures



An examination of rate structures over the range of typical residential consumption reveals that many increasing and decreasing block structures are effectively uniform below 15,000 GPM (shown in Figure 8 and Figure 9). For example, whereas 15 percent of residential water rate structures are decreasing block structures (Figure 3), only 9 percent actually apply decreasing rates within the first 15,000 GPM of consumption (Figure 8) – the other 6 percent have a first block that exceeds the range of typical residential use. Figure 8 and Figure 9 also show the percent of the population served under each rate structure applicable to consumption/disposal levels of up to 15,000 GPM. While only 23 percent of the water rate structures are increasing block structures through 15,000 GPM, 42 percent of all residential customers are served by these rate structures. Figure 9 shows that the vast majority of residential customers pay uniform rates for wastewater disposal.

Figure 8: Water Rate Structures Applicable to Residential Consumption up to 15,000 GPM (n=521)

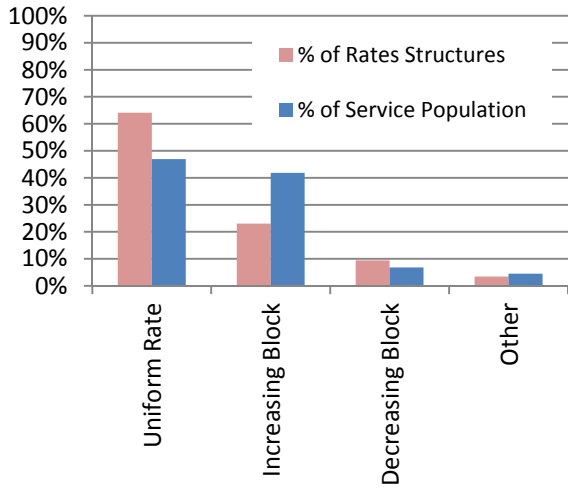
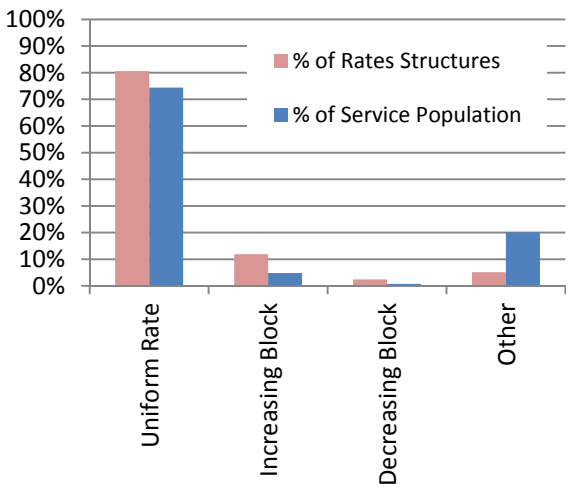


Figure 9: Wastewater Rate Structures Applicable to Residential Disposal up to 15,000 GPM (n=412)



The State of North Carolina is now actively discouraging the use of decreasing block rate structures for residential consumption. In 2008, the General Assembly passed House Bill 2499 (colloquially known as the "Drought Bill"), which states in Section 9 of G.S. 143-355.4(b):

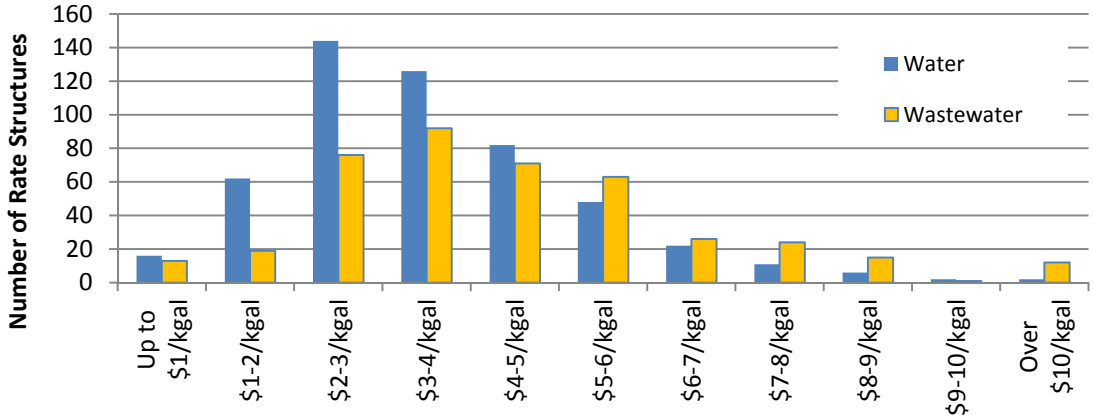
> "To be eligible for State water infrastructure funds from the Drinking Water Revolving Fund or the Drinking Water Reserve Fund or any other grant or loan of funds allocated by the General Assembly … a local government or large community water system must demonstrate that the system:
> … (5) Does not use a rate structure that gives residential water customers a lower per-unit water rate as water use increases."

As shown in Figure 8, 9 percent of the water rate structures analyzed in this study are still designed to charge residential customers using less than 15,000 GPM decreasing rates as water use increases. To be eligible for the aforementioned funds, these utilities would need to change their water rate structures.

Residential customers in North Carolina consume an average of 5,000 to 6,000 GPM. Among the 521 water rate structures in the sample, the median price for the next 1,000 gallons (not including base charges) at the consumption level of 6,000 GPM is $3.45 per 1,000 gallons – 50 percent of the water rate structures have a price that is between $2.50 and $4.64 per 1,000 gallons. This compares to a median price of $3.10 per 1,000 gallons for the water rate structures studied in the 2008 survey. Changes in rate structures since last year are shown on page 7, and changes in rates are shown on page 10.

The price for wastewater is slightly higher. Among the 412 wastewater rate structures in the sample, the median wastewater price for the next 1,000 gallons at 6,000 GPM is $4.14 per 1,000 gallons – 50 percent of the wastewater rate structures have a price that is between $3.00 and $5.50 per 1,000 gallons. This compares to a median price of $3.96 per 1,000 gallons for the wastewater rate structures studied in the 2008 survey. The range of water and wastewater prices for the next 1,000 gallons at the 6,000 GPM consumption level is shown on Figure 10.

Figure 10: Price for the Next 1,000 Gallons at 6,000 GPM for 521 Water and 412 Wastewater Rate Structures



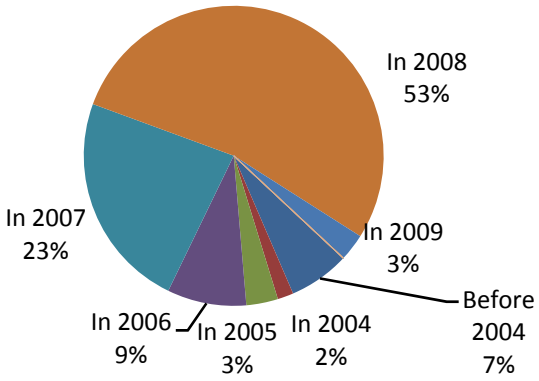
Among the 384 combined water and wastewater rate structures, the median combined price for the next 1,000 gallons is $7.64 per 1,000 gallons – 50 percent of the combined rate structures have a price that is between $5.60 and $9.85 per 1,000 gallons.

Many utilities provide the option to residential customers to install separate irrigation meters to supply their outdoor water usage. In some cases, the utilities have created a separate, unique rate structure specifically for these irrigation meters. In our sample of 521 water rate structures, only 46 (9 percent) had a unique rate structure for residential irrigation meters. Almost all, 45 out of 46, use a uniform or an increasing block rate structure. Read more about irrigation rates, and how they compare to standard rates, on page 12.

Changes in Residential Rate Structures in the Last Year

Most North Carolina utilities actively evaluate and modify their rate structures every one to two years. The calendar year in which each of 410 of the rate structures active presently (in March 2009) were first put into effect is shown in Figure 11. The figure shows that 56 percent of the current rate structures were made effective since January 2008, and 79 percent have changed their rates in the last two years. Only 7 percent of the rate structures were instated prior to 2004 (more than five years ago).

Figure 11: In What Calendar Year were the Current Rate Structures First Instated? (n=410)



The trend among North Carolina utilities for many years has been to move away from decreasing block rate structures to either uniform or increasing block structures. This trend is largely driven by an interest in preserving water supplies by promoting water conservation and discouraging excessive or wasteful consumption. The trend is in keeping with the State's encouragement of using conservation oriented rates and rate structures as mentioned previously.

This year's survey included 459 water rate structures and 361 wastewater rate structures that were also included in the 2008 survey. Out of the 459 water rate structures included in last year's rates survey, 42 changed in the last year, shown in Table 3. Almost all of the changes were from decreasing blocks changing to uniform rates, and uniform rates changing to increasing block rate structures. Overall, 16 decreasing block rate structures were changed in the last year, and 27 increasing block structures were gained. Only 17 wastewater rate structures were changed between 2008 and 2009, out of the 361 surveyed in both years. An analysis on how much rates have increased in the past year is shown on page 10.

Table 3: Changes to Water Rate Structures from March 2008 to March 2009

			Changed To			
			Increasing Block	Uniform Rate	Decreasing Block	Other
		TOTAL	*27*	*12*	*2*	*1*
Changed From	Increasing Block	*1*		0	1	0
	Uniform Rate	*24*	23		1	0
	Decreasing Block	*16*	4	11		1
	Other	*1*	0	1	0	

What Utilities Charge their Customers

Residential Water and Wastewater Bills

Figure 12 and Figure 13 show the median amount utilities that bill their residential water and wastewater customers, respectively, for a range of consumption/disposal amounts on a monthly basis[3]. These calculations include base charges and consumption allowances. The colored bars highlight what the middle 80 percent of utilities charge (between the 10th and 90th percentile) across the consumption spectrum. Utilities that charge below or above the colored bars are charging less than or more than 90 percent of all other utilities in the sample, respectively.

Figure 12: Monthly-Equivalent Residential Water Bills by Consumption (n=521)

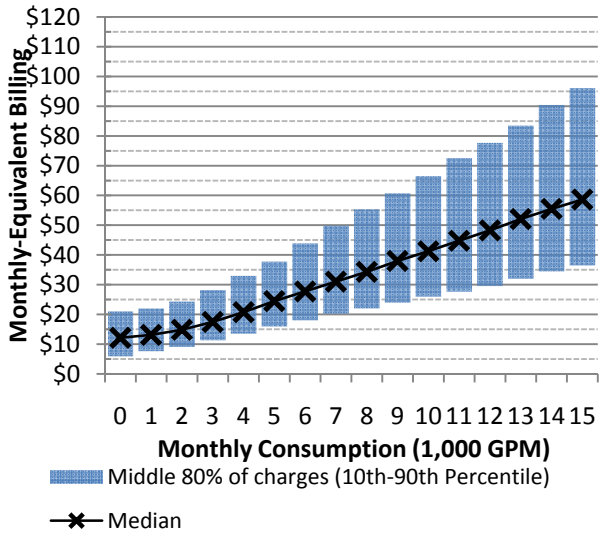
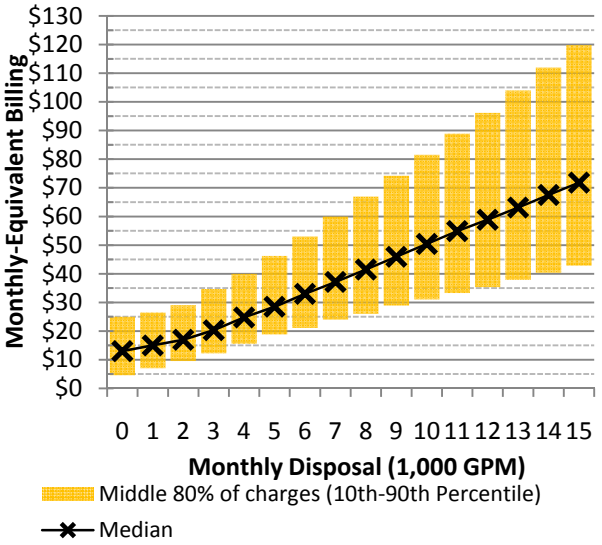


Figure 13: Monthly-Equivalent Residential Wastewater Bills by Disposal (n=412)



The median monthly amount charged for zero gallons of water is $12.17, $24.50 for 5,000 gallons, $27.75 for 6,000 gallons, and $41.25 for 10,000 gallons. As a point of comparison, a gallon of potable water at a major grocery retailer is approximately $1.00 while the median bill for 6,000 gallons is approximately $0.0046 per gallon, which is 216 times cheaper.

Wastewater bills are generally higher than water bills. The median monthly wastewater bill for customers disposing zero gallons of water is $13.00, $28.50 for 5,000 gallons, $32.99 for 6,000 gallons, and $50.44 for 10,000 gallons.

The range of combined water and wastewater bills for various levels of consumption is shown on Figure 14. The median monthly combined bill for zero gallons is $24.50, $52.52 for 5,000 gallons, $60.20 for 6,000 gallons and $91.25 for 10,000 gallons.

[3] For utilities that bill on a non-monthly basis (bi-monthly or quarterly), charges have been calculated and presented on a monthly basis to allow for accurate comparison.

Figure 14: Monthly-Equivalent Residential Combined Water and Wastewater Bills by Consumption (n=384)

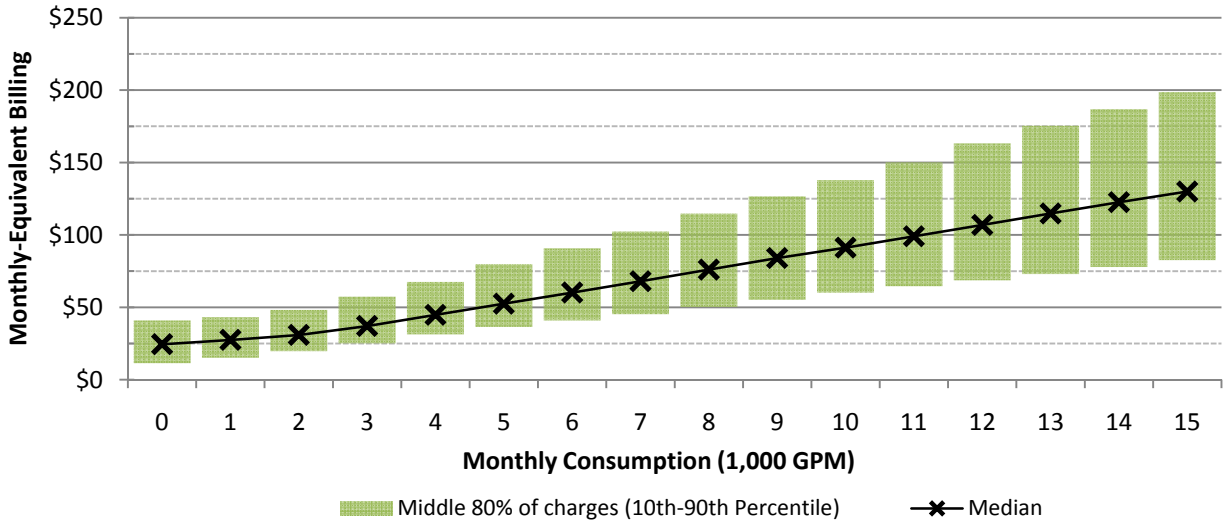


Table 4 shows that the median water bills among the largest utilities generally are lower than those of smaller utilities. This trend is not as evident for wastewater bills. Table 5 shows that municipal utilities generally have lower water and wastewater bills than other service providers, possibly because the population density is highest for municipal utilities, which translates into lower per customer costs (and therefore bills) for distribution and collection. Conversely, county utilities, which are typically more spread out, have the highest water bills.

Table 4: Median Water and Wastewater Monthly Bills at 6,000 GPM, by Utility Size

Size of Utility (Service Population)	Water Rate Structures		Wastewater Rate Structures	
	Total Number of Structures	Median Monthly Bill at 6,000 GPM	Total Number of Structures	Median Monthly Bill at 6,000 GPM
1 – 999	114	$27.00	91	$33.50
1,000 – 2,499	89	$29.54	80	$31.50
2,500 – 4,999	87	$27.18	75	$35.25
5,000 – 9,999	86	$27.95	55	$32.40
10,000 – 24,999	75	$29.24	56	$31.88
25,000+	68	$26.32	51	$32.12
All Rate Structures	***521***	***$27.75***	***412***	***$32.99***

Table 5: Median Water and Wastewater Monthly Bills at 6,000 GPM, by Utility Type

Utility Type	Water Rate Structures		Wastewater Rate Structures	
	Total Number of Structures	Median Monthly Bill at 6,000 GPM	Total Number of Structures	Median Monthly Bill at 6,000 GPM
Municipality	377	$25.84	356	$32.11
County/District	82	$35.89	37	$40.00
Sanitary District	19	$31.00	9	$37.00
Authority/Metropolitan District	8	$34.33	8	$38.07
Not-for-Profit	35	$29.79	2	$37.52
All Rate Structures	***521***	***$27.75***	***412***	***$32.99***

Changes in Residential Rates in the Last Year

Out of the 459 water and 361 wastewater rate structures included in last year's rates survey, residential rates were increased from last year for 53 percent of the water rate structures and 58 percent of wastewater rate structures, as shown in Figure 15. Similar to this past year, 50 percent of water and 50 percent of wastewater rate structures had raised residential rates between 2007 and 2008.

Figure 15: Percent of Rate Structures that Increased Residential Rates in the Last Year

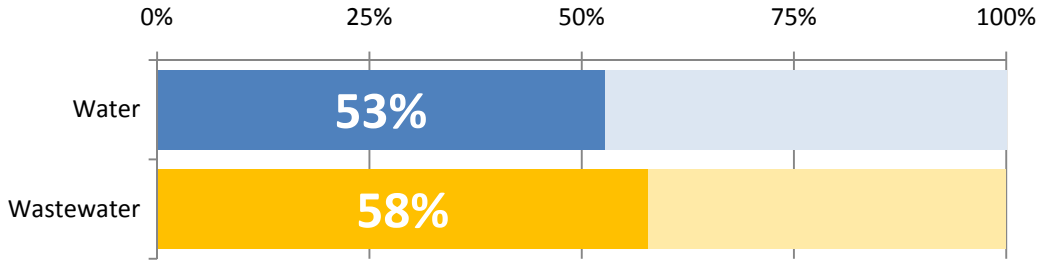


Figure 16 and Figure 17 show the residential monthly bill increase for customers that use 6,000 GPM among the 242 water and 209 wastewater rate structures that have raised rates in the last year. The median increase was $1.64/month for water (a 6.8 percent increase) and $2.09/month for wastewater (a 7.2 percent increase). This compares to a median increase of 6.8 percent and 7.0 percent between the 179 water and 148 wastewater rate structures, respectively, that were surveyed and had raised rates between 2007 and 2008.

Figure 16: Increase in Residential Monthly Bill Amount Since Last Year for 6,000 GPM Among 242 Water and 209 Wastewater Rate Structures that Raised Rates

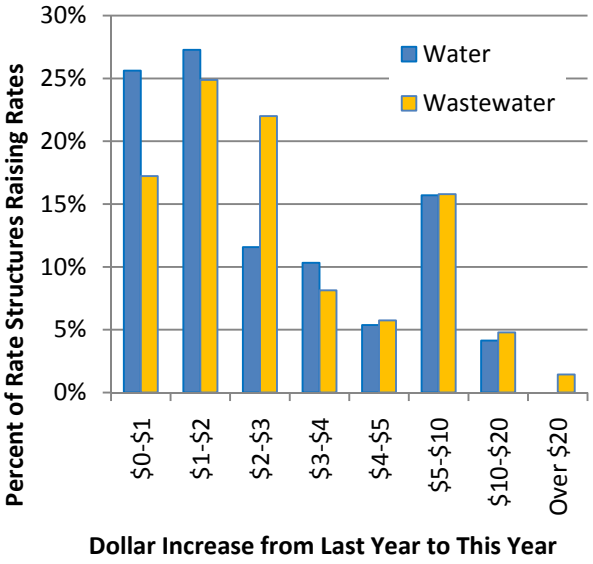
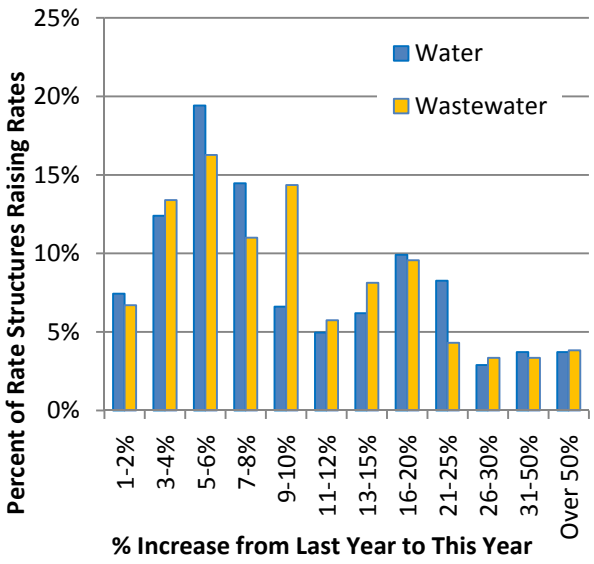


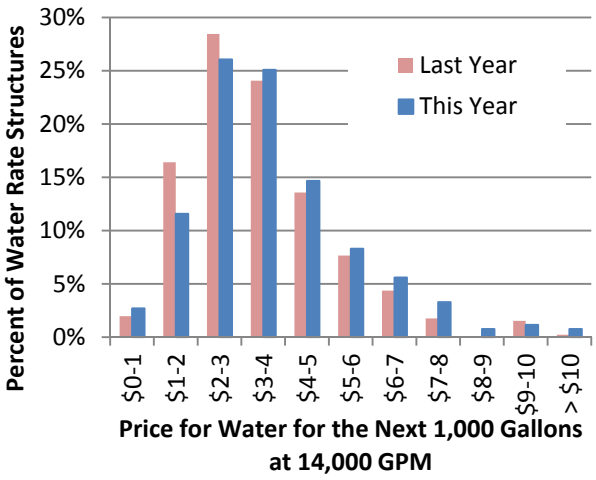
Figure 17: Percent Increase in Residential Monthly Bills Since Last Year for 6,000 GPM Among 242 Water and 209 Wastewater Rate Structures that Raised Rates



One of the water rate structure components that utilities can manipulate to send a strong pricing signal to encourage water conservation is the rate that customers pay at higher levels of consumption. Average residential consumption is between 5,000 and 6,000 GPM. Seasonal use of water can raise consumption levels for some customers to two or three times this amount, or more, and utilities can discourage excessive use by

setting high prices for the next 1,000 gallons of water at that level of consumption. More than half of North Carolina's utilities raised the residential water rate at high levels of consumption in the past year. Out of the 459 water rate structures included in last year's survey, the price for the next 1,000 gallons at 14,000 GPM was raised for 244 rate structures (53 percent). The distribution of the prices for water for the next 1,000 gallons at that consumption level is shown in Figure 18. Utilities generally have shifted their high use water rates upwards. In particular, a smaller proportion of utilities charge less than $2/1,000 gallons than did last year, and 6 percent of utilities charge over $7/1,000 gallons, whereas 4 percent charged that much last year.

Figure 18: Price for Water for the Next 1,000 Gallons at 14,000 GPM in 459 Water Rate Structures in FY2007-08 and 521 Water Rate Structures in FY2008-09



Commercial Water and Wastewater Bills

Figure 19 and Figure 20 show the median monthly water and wastewater bills, respectively, for commercial customers at different levels of consumption and disposal[4]. The middle 80 percent of charges also are indicated. The median monthly bill for commercial customers consuming zero gallons (on a ¾" meter[5]) is $13.14 for water and $13.70 for wastewater. The median monthly bill for 50,000 GPM is $177.00 for water and $229.08 for wastewater. The median bill for those consuming 500,000 GPM (on a 1½" or 2" meter) is $1,652.88 for water and $2,218.25 for wastewater. The variation in commercial bills across rate structures increases significantly as the consumption/disposal amount increases.

Figure 19: Monthly-Equivalent Commercial Water Bills by Consumption (n=521)

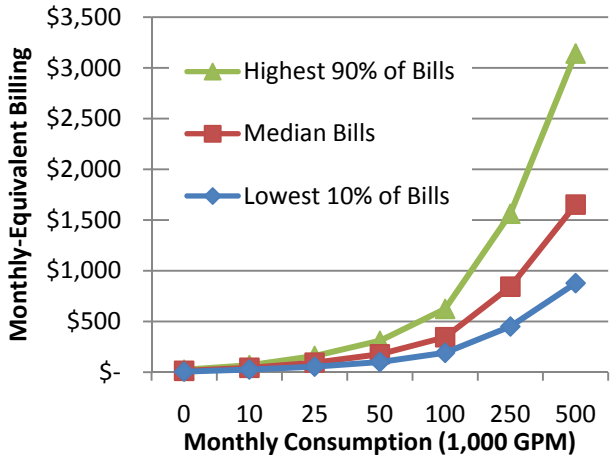
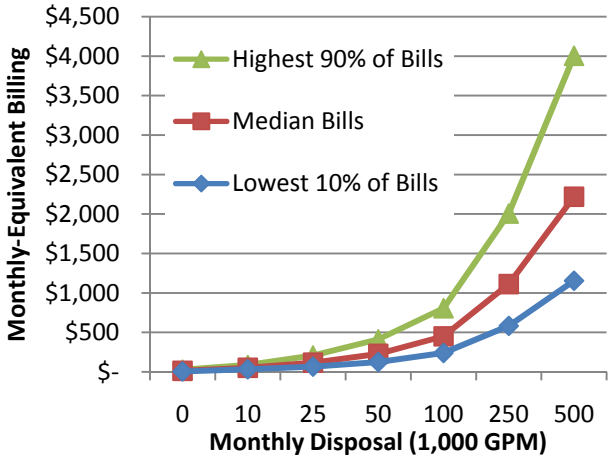


Figure 20: Monthly-Equivalent Commercial Wastewater Bills by Consumption (n=412)



[4] The residential rate structure is used to calculate the billings for commercial customers except for the utilities that specify different rates and rate structures for commercial or non-residential customers.

[5] Some utilities use different base charges for different meter sizes for customers. Bills for consumption or disposal of up to 100,000 GPM was computed assuming a 5/8" or ¾" meter size, 250,000 GPM assuming a 1" meter size, and 500,000 GPM assuming a 1½" or 2" meter size. When applicable, the "next largest" meter size is used in calculating the bills when a utility does not utilize a specific meter size.

Irrigation Bills for Residential Customers

Residential customers who water their lawns, wash their cars, or otherwise use water outdoors very frequently use much more water outdoors than they do indoors. An EFC study of customers in three cities in North Carolina shows that residents with irrigation meters tend to use, on average, two to seven times as much water outdoors in the summer months as they do indoors[6].

With such large volumes of water used outdoors, particularly in the summer months, and with House Bill 2499 clearly encouraging the use of rates to support conservation, some utilities have taken the opportunity to charge for water used through irrigation meters at a unique rate structure. In our survey, 46 rate structures included such unique rates. Typically, irrigation rates are higher than the standard water rates, but less than the combined water and wastewater rates. The ratio of the irrigation water bill at 15,000 gallons/month to the residential (indoor) water or combined bill is shown in Figure 21. The irrigation bill for 15,000 GPM is higher than what the customer would have been charged under the standard water rate structure for that consumption amount in 31 out of the 46 rate structures (67 percent). However, 9 of the irrigation rate structures actually provide a price *discount* to customers for their outdoor water usage, which essentially discourages water conservation.

As shown in Figure 21, almost all of the irrigation rate structures provide residential customers with a price break compared to the combined water and wastewater charge for 15,000 GPM. This is logical, since outdoor water usually does not enter the sewer system after use, and therefore the utility does not encounter wastewater treatment costs for the water that flows through the irrigation meters.

Whether or not a utility has a unique rate structure for irrigation water, all utilities must evaluate carefully what they are charging for large consumption of water through their residential rate structures. The monthly-equivalent bills for all 521 rate structures in our sample are shown in Figure 22 for a consumption range that is typical of residential irrigation usage.

Figure 21: Comparing the Irrigation Bill to the (Indoor) Water and Wastewater Bills for Residential Customers at 15,000 GPM among the 46 Unique Irrigation Rate Structures

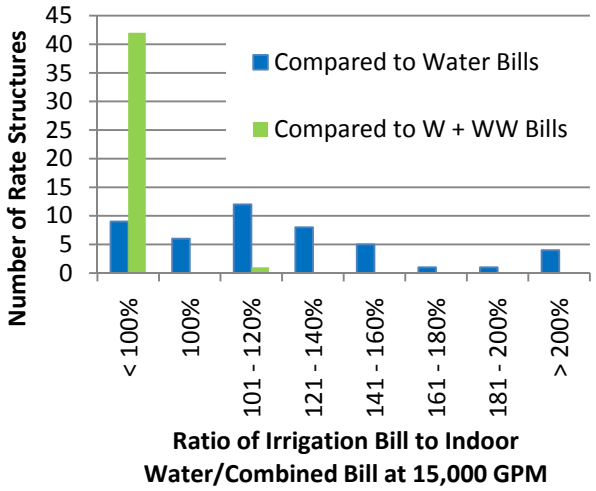
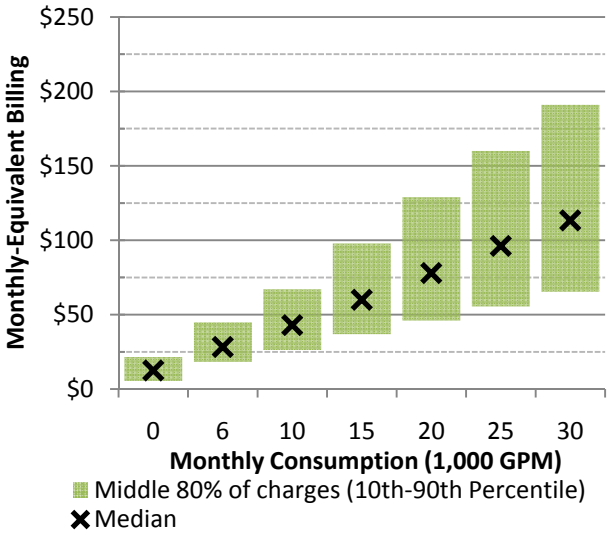


Figure 22: Monthly-Equivalent Bills for Outdoor Water Use by Residents, Including Irrigation Rates, by Consumption (n=521)



[6] Environmental Finance Center at the University of North Carolina (2008). *Residential Customer Water and Wastewater Sales Analyses and Profiles*. Chapel Hill, NC. Available at www.efc.unc.edu/projects/ResidentialWaterConsumptionBehavior.htm

What Utilities Charge by River Basin

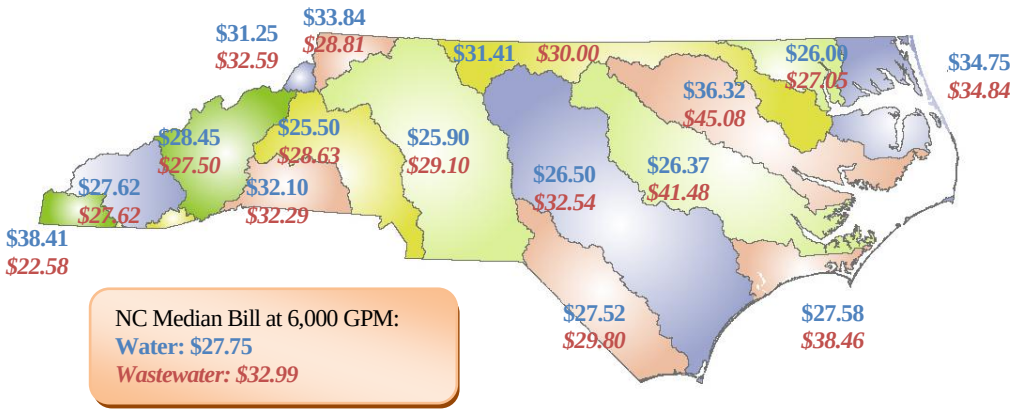
It is important to consider the operating environment when comparing rates among utilities. Source water quality and quantity can have a significant impact on the cost to produce water. Likewise, receiving water quality can have a major impact on the cost of wastewater treatment. In an attempt to consider these impacts, median water and wastewater bills for 6,000 GPM were calculated for each of North Carolina's 17 major river basins; they are displayed in Table 6 and Figure 23.

The highest median water charges in river basins with a sample of more than 10 rate structures can be found in the Tar-Pamlico River Basin. The lowest median water charges, by contrast, are found in the Catawba River Basin. The highest median wastewater charges can be found in the Tar-Pamlico and the Neuse River Basins, both of which are under stringent discharge regulations. The lowest median wastewater charges can be found in the Chowan River Basin.

Table 6: Median Water and Wastewater Monthly Bills at 6,000 GPM, by River Basin

River Basin	Water Rate Structures		Wastewater Rate Structures	
	Total Number of Structures	Median Monthly Bill at 6,000 GPM	Total Number of Structures	Median Monthly Bill at 6,000 GPM
Broad	17	$32.10	12	$32.29
Cape Fear	101	$26.50	76	$32.54
Catawba	42	$25.50	40	$28.63
Chowan	19	$26.00	12	$27.05
French Broad	25	$28.45	17	$27.50
Hiwassee	3	$38.41	3	$22.58
Little Tennessee	7	$27.62	5	$27.62
Lumber	39	$27.52	27	$29.80
Neuse	74	$26.37	60	$41.48
New	6	$33.84	6	$28.81
Pasquotank	20	$34.75	12	$34.84
Roanoke	32	$31.41	25	$30.00
Savannah	0	--	0	--
Tar-Pamlico	49	$36.32	32	$45.08
Watauga	4	$31.25	3	$32.59
White Oak	10	$27.58	5	$38.46
Yadkin-PeeDee	69	$25.90	60	$29.10

Figure 23: Median Water and Wastewater Monthly Bills at 6,000 GPM, by River Basin



What Utilities Charge Customers Located Outside their Political Boundaries (Inside vs. Outside)

All of the charges presented above refer to what utilities charge customers that live within their political boundaries. Municipal utilities often serve customers who live outside of city limits, and a handful of other utilities specify geographical boundaries within their service areas and identify their customers as residing "inside" and "outside" those boundaries. In many cases, utilities charge different rates for customers living inside or outside the boundary. Overall, 61 percent of water rate structures and 64 percent of wastewater rate structures specified different rates for customers living outside, and the vast majority were for municipal utilities. In fact, 83 percent of the rate structures from municipal utilities in the sample charged more for outside customers than for inside customers. At 6,000 GPM, outside customers who are charged a different rate than inside customers pay, at the median, a water bill that is 1.93 times more than inside customers. For wastewater, the median ratio is 1.96. The majority of utilities with different outside rates simply double the inside charges, as shown in Figure 24. Figure 25 shows median charges for combined residential water and wastewater service for all utilities that have a separate rate schedule for outside customers for both water and wastewater service. The median bill charged to inside customers for 6,000 GPM of water and wastewater combined is $56.89 compared to $98.46 for outside customers.

Figure 24: Ratio of Outside Residential Bills to Inside Bills at 6,000 GPM (n=521 water, n=412 wastewater)

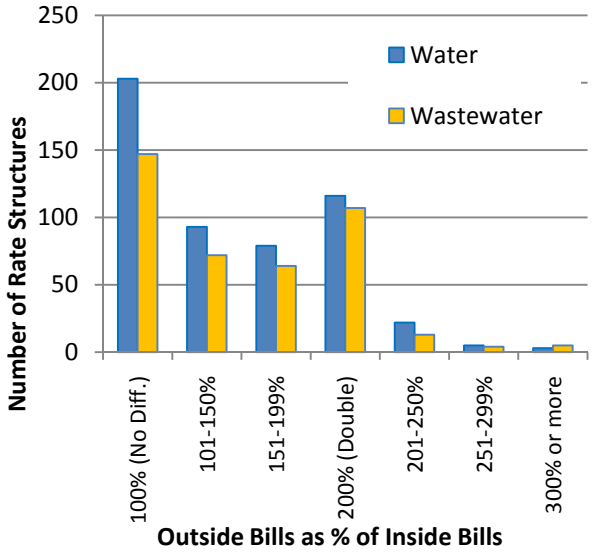
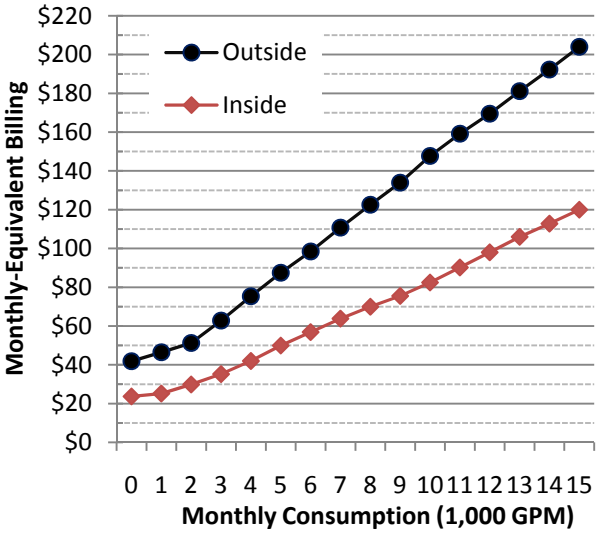


Figure 25: Median Combined Residential Water and Wastewater Bills for Rate Structures with Different Inside/Outside Rates (n=247)



There are at least three reasons why utilities might charge more for outside customers. First: in the case of municipalities, higher outside charges might be part of managing growth and annexation. Second: for all utilities, outside customers are often inherently more expensive to serve because of lower densities and the fact they reside farther, on average, from the water or wastewater treatment plant than inside customers. Extra costs for distribution and collection systems justify higher rates for outside customers. Third: inside customers, as citizens of the unit of local government that provides the utility service, bear more of the investment risks of owning and operating a utility. They also bear more of the burden of financing and facilitating its operations through their local government unit[7].

[7] AWWA (2000). *Principles of Water Rates, Fees, and Charges*. Manual of Water Supply Practices: M1. 5th Ed.

Affordability of Residential Rates

What the Average North Carolinian Pays for 6,000 Gallons

The above figures and tables are useful in determining the range of rates that utilities across the state are currently charging. As mentioned above, the median price for 6,000 GPM across all the utilities is $27.75 for water and $32.99 for wastewater, using "inside" residential rates. This indicates that half of the 521 water rate structures in this sample charge more than $27.75 for water for 6,000 GPM, and half of 412 wastewater rate structures charge more than $32.99 for wastewater. However, as shown in Table 4, larger utilities may be charging lower rates because they are able to spread their costs across a large customer base. The utilities in this study serve over 7.1 million North Carolinians. If we assume that everyone in this sample pays "inside" rates only, the average North Carolinian in this sample would be paying a weighted average[8] of $26.07 for water, $32.03 for wastewater or $55.30 for combined water and wastewater for 6,000 GPM. These numbers represent a good estimate of average bills across the population of the state. The actual average bill for a North Carolinian for 6,000 gallons is likely to be higher however, since a substantial portion of the citizens are paying "outside" rates that are greater than "inside" rates as shown in Figure 24. Furthermore, some citizens may be paying a portion of their water bill through irrigation rates, making it impossible to accurately estimate what the average North Carolinian actually pays for 6,000 gallons.

Annual Bills as a Percent of Household Income

Is the weighted average bill of $55.30 per month for combined water and wastewater for 6,000 gallons too high for most North Carolinians? Compared to monthly electric bills, gas bills, grocery bills, and even discretionary bills such as cable TV bills or high-speed internet bills, water and wastewater bills oftentimes make up a smaller portion of a household budget. Nevertheless, because citizens may not have an alternative to the water service they are currently receiving, and water service is necessary for public health, the issue of affordability of water and wastewater rates remains vital.

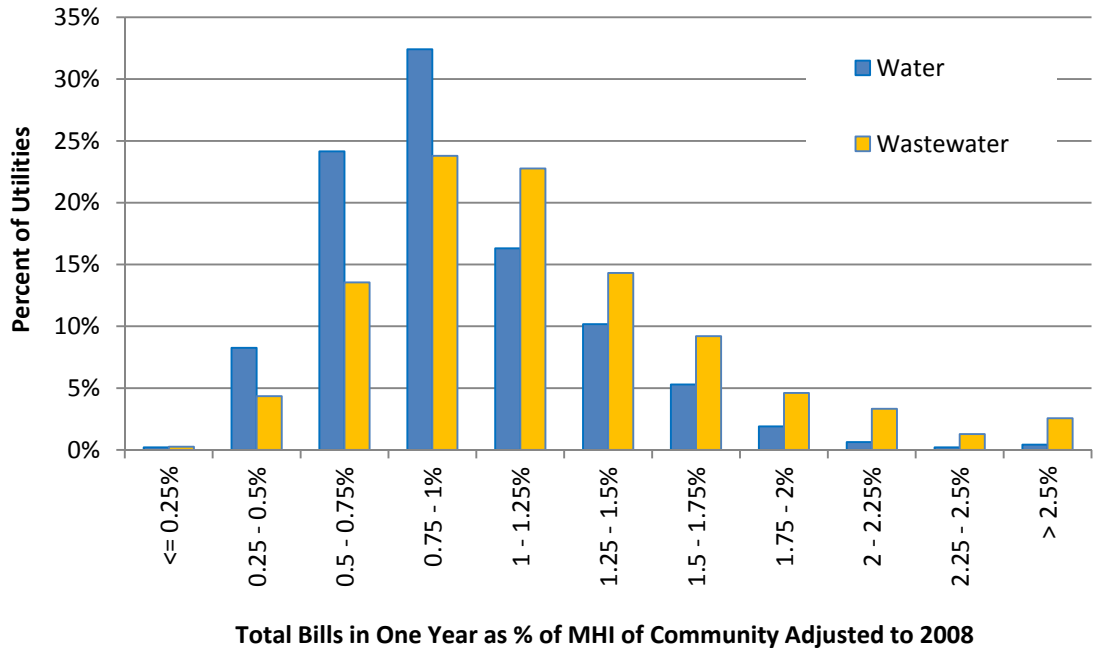
Affordability is very difficult to assess, and there is no one true, accurate measure for affordability. The most commonly used and most cited measure in the water industry is "percent MHI" – that is, calculating what a year's worth of water and wastewater bills for an average level of consumption (e.g.: 6,000 GPM) is compared to the median household income (MHI) in the community served by the utility. This indicator is easy to calculate by simply using the calculated bill amount and the U.S. Census Bureau's median household income data, available at http://www.census.gov. Since the nationwide Census is only administered every 10 years, an adjustment factor may be applied to adjust the household income data from year to year[9].

Compared to the 2008-adjusted median household incomes of the communities served by 472 water and 391 wastewater utilities, annual bills for 6,000 GPM range from 0.5% MHI to over 2.5% MHI for each service, as shown in Figure 26. The majority of water rates fall between 0.5% and 1.25% MHI, with a median of 0.88% MHI across all utilities. Wastewater rates are higher, with the majority of wastewater rates falling between 0.75% and 1.5% MHI, and a median of 1.1% MHI across the utilities. For combined water and wastewater bills at 6,000 GPM, half of the utilities charge more than 1.98% MHI.

[8] The "weighted average bill" is the average bill being paid by customers, taking into account the different utility's rates and service populations, assuming that all of the customers are paying their utility's bill for 6,000 GPM.

[9] The U.S. Department of Housing and Urban Development (HUD) publishes income adjustment factors yearly at http://www.huduser.org/datasets/il.html.

Figure 26: Annual Bills for 6,000 GPM as a Percent of the Serviced Community's 2008-Adjusted Median Household Income (n=472 water, n=391 wastewater)



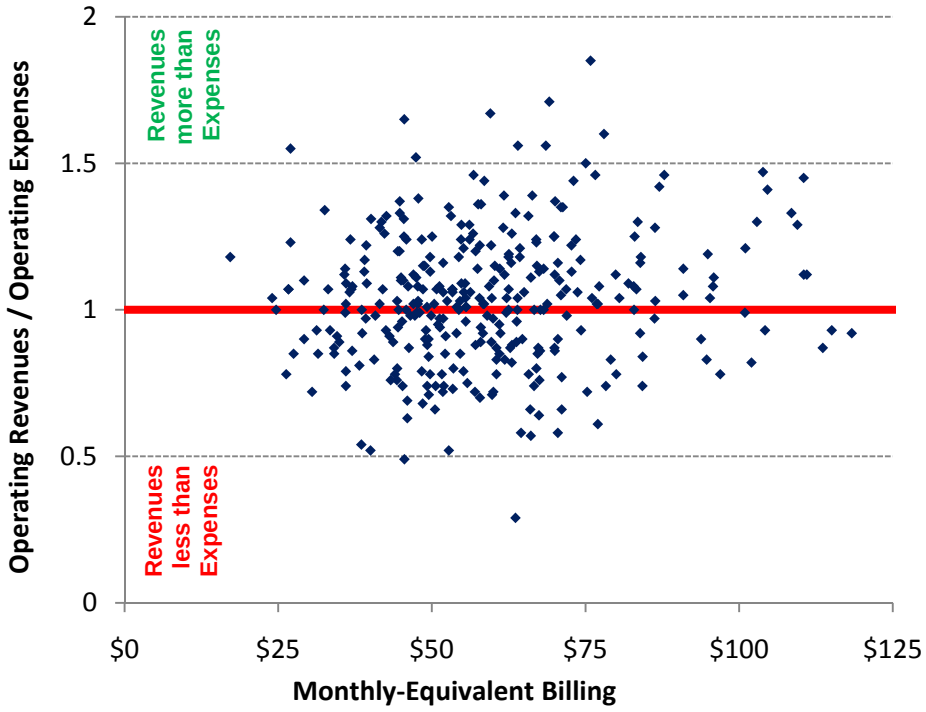
There is no single target for affordability, even in terms of percent MHI. Early reports within the Environmental Protection Agency, as well as by some agencies in the State of North Carolina, suggest that rates that exceed a point somewhere between 0.75% and 1.25% MHI, for either water or wastewater service, may be difficult to afford.

Do Prices Reflect the True Cost of Water Services in North Carolina?

Comparing rates across the State or among specific utilities is further complicated by the variation in the extent to which utilities charge the full cost of providing service. Rates that provide enough revenue to balance an annual budget do not necessarily provide enough revenue to cover long term capital and maintenance needs and many utilities charge much less than the full cost of service provision. Figure 27 shows rates from FY 2007-08 in terms of combined water and wastewater charges for customers using 6,000 GPM plotted against the ratio of operating revenue over operating expenses (including depreciation) from the same fiscal year. This measure, often referred to as an operating ratio, helps identify if an entity is operating at a financial loss, financial gain, or is breaking even. Financial data were provided by the Local Government Commission in the Department of the State Treasurer. The figure shows that many utilities are not covering their operating expenses, making it difficult or impossible to rehabilitate aging infrastructure, save for operating emergencies, finance system improvements and expansion, and engage in proactive asset management. It is interesting to note that the utilities that did not recover their operating expenses (operating at a financial loss) are not always charging low rates – even some utilities with high rates can be operating at a financial loss. Nevertheless, there are several utilities that charged low rates in FY 2007-08 (to the left of the graph), which resulted in operating at a financial loss (below the horizontal line on the graph) in that fiscal year.

Operating ratio as calculated here may be a flawed measure, however, due to the distorting effects of book value depreciation. Due to inflation, older plants' assets that were purchased long ago have nominally cheaper prices than assets of plants that are newer. This makes older plants' depreciation expense smaller in comparison to the depreciation of a newer plant with the same types of assets. In turn, this means that the operating ratio seems higher (better) for older plants than for newer plants, due to the effect of inflation. Despite this, the measure maintains a level of intuitive power which makes it a useful tool for examining the ongoing capacity for the utility to bring in enough revenue to cover its operating costs.

Figure 27: Combined Residential Bill in FY2007-08 for 6,000 GPM for Utilities with Reported LGC Data on Total Operating Revenues and Total Operating Expenses in FY2007-08 (n=324)



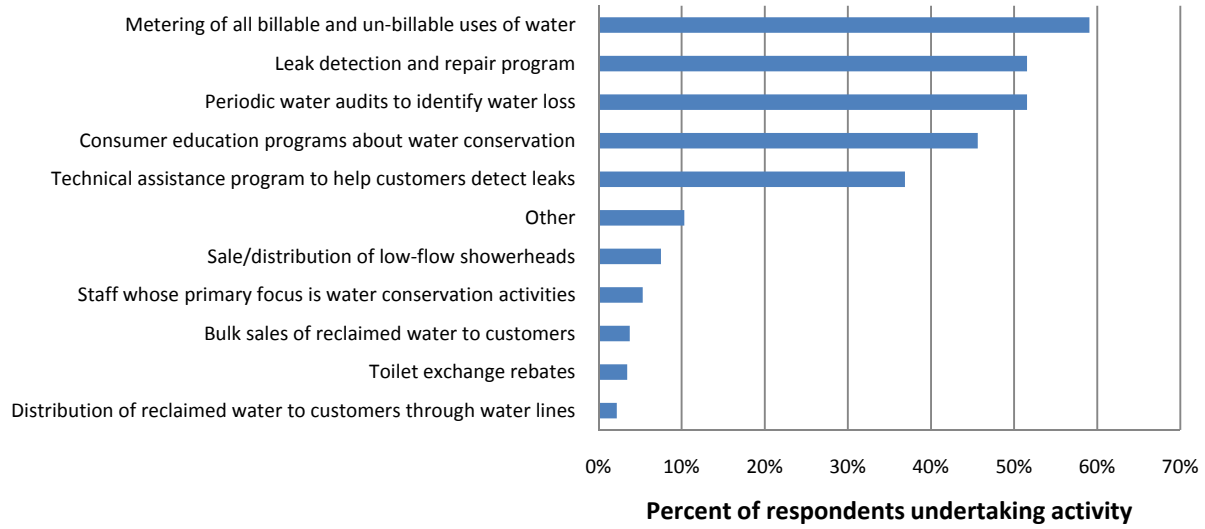
How Utilities Can Respond to Drought Conditions by Changing Rates, Rate Structures or Billing Periods, or Through Non-Price Strategies

Due to the recent (and ongoing) drought conditions, utilities under severe supply constraints are considering different options to manage demand as part of their water drought plans. These options may include a combination of pricing strategies as well as more structural or operational practices strategies.

As part of this year's survey, NCLM and EFC asked water utilities around the state to report on their non-price water conservation activities. Responses from 320 water utilities serving more than 5.6 million North Carolinians indicate that local utilities are making concerted efforts to reduce their customers' water consumption. The variety of strategies that have already been employed by utilities are shown in Figure 28.

Over 90 percent of survey respondents indicated that they had employed at least one of the non-price water conservation strategies in 2008. As shown in the figure, the most popular strategies were 1) metering of all billable and un-billable uses of water; 2) periodic water audits to identify water loss; 3) leak detection and repair programs; 4) consumer education programs about water conservation; and 5) technical assistance programs to help customers detect leaks. More than 85 percent of respondents had undertaken at least one of these five activities, and 70 percent were engaged in at least two of the five top activities to encourage water conservation.

Figure 28: Non-Price Conservation Strategies Employed by Water Utilities in North Carolina in 2008



In addition to these operational strategies, utilities also may choose to employ pricing strategies to encourage conservation. Some options include changing the billing periods, changing the rate structure, raising the rates, or employing the use of drought surcharges.

Few utilities with bi-monthly or quarterly billing are considering switching to monthly billing cycles. Although this switch would increase meter reading, billing and accounting costs, customers who receive bills monthly receive quicker (and more frequent) feedback on their usage and conservation efforts. Additionally, utilities that include news and statements as inserts with the water/wastewater bills would be able to communicate with their customers more frequently under a monthly billing cycle.

Some utilities have considered switching their rate structures to ones that provide stronger price signals at higher ends of consumption, or using separate rate structures for irrigation meters charging rates that are higher than the residential water rates. Increasing block structures typically are assumed to provide a stronger conservation incentive than uniform rates or decreasing block structures – however, the Environmental Finance Center has shown that many utilities with uniform rates provide a price signal as strong as that of utilities with increasing block rate structures. This is a result of how the rate structure is designed. Careful selection of the base charge, consumption allowance with the base, the block endpoints, the rates and the difference in the rates between blocks are essential to designing a conservation-oriented rate structure. For advice on rate setting or more information on making appropriate rate comparisons, please contact Jeff Hughes (jhughes@sog.unc.edu) or Shadi Eskaf (eskaf@sog.unc.edu) at the Environmental Finance Center.

About this Report

This report is one of an annual series of reports on water and wastewater rates and rate structures in North Carolina, compiled by the North Carolina League of Municipalities (NCLM) and the Environmental Finance Center at UNC's School of Government (EFC). For reports from previous years, including more in-depth analysis on the relationships between rates, rate structures, system characteristics and policies including cost-recovery, conservation, affordability, regionalization, economic development and growth management, please visit our websites at www.nclm.org and www.efc.unc.edu. You may also access the Rates Dashboards – free, interactive tools designed to allow you to compare rates across the State along with financial, affordability and socioeconomic indicators – at www.efc.unc.edu/RatesDashboards/. Each year in November, we request that local government and not-for-profit utilities submit a copy of their water and wastewater rate schedules. Information on how to participate in next year's survey is provided on the EFC website.

Partial funding for this study was provided by the Public Water Supply Section of the North Carolina Department of Environment and Natural Resources.