

Water and Wastewater Rates and Rate Structures in North Carolina April 2007

This document details the results of a survey of FY 06-07 water and wastewater rates and rate structures conducted by the North Carolina League of Municipalities and the UNC School of Government Environmental Finance Center¹. Rates and rate structures are analyzed for public service providers throughout the State. For more information, and to download a listing of water and wastewater rate tables, please visit www.nclm.org and www.efc.unc.edu.

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 North Carolina League of Municipalities and the Environmental Finance Center.

Over the course of this survey, 463 public water and wastewater utilities were contacted by letter, email or phone, of which 47 utilities were discovered to not provide services. Of the remaining 416 utilities, 293 responded by submitting their rate information, yielding a response rate of 70 percent. An additional 77 rate schedules were collected using follow-up methods, increasing the participation response to 370 utilities. Table 1 shows the composition of utilities whose rate structures were analyzed. A handful of utilities use more than one rate structure for different portions of their service areas, raising the total number of rate schedules in our sample to 396 across the state. Collectively, the utilities included in this study serve 89 percent of public water consumers in the state.

Table 1: Number of Participating Utilities with Rate Data for FY 2006-2007

Institutional Arrangement	Provides Water and Wastewater	Provides Water Only	Provides Wastewater Only	Total
Municipality	272	27	10	309
County/District	16	19	2	37
Sanitary District	4	3	2	9
Authority	2	1	0	3
Metropolitan District	0	0	1	1
Not-For-Profit	0	11	0	11
Total	294	61	15	370

¹ Partial funding for this activity was provided by the U.S. Environmental Protection Agency.

In addition to this report, tables of each individual utility's rates are available from NCLM and the EFC. **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 www.sogpubs.unc.edu.

High rates do not necessarily reflect poor or inefficient management — in fact; some utilities have low rates at the expense of their assets by making short-term sacrifices that are likely to have long-term adverse cost and service impacts. Other systems 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 the base charges and variable charges are calculated and how they are charged for different classes of customers.

Base Charges

Base charges are a good way to increase revenue stability because they do not vary from month to month, regardless of consumption. However, they can also make it difficult for a utility to encourage conservation for the same reason. Base charges are very common. In this survey, 99 percent of water and 96 percent of wastewater utilities use them. The number of utilities with base charges and the median² charge for those systems are presented in Table 2 by utility size. The median base charge for water in 2007 was \$10.83 per month compared to a median base charge of \$10.30 per month in 2006. The median base charge for wastewater in 2007 was \$12.08 per month compared to a median base charge of \$11.12 per month in 2006.

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	62	62	\$12.25	47	45	\$14.00
1,000 – 2,499	74	74	\$11.85	69	68	\$13.90
2,500 – 4,999	70	68	\$11.36	70	67	\$12.50
5,000 – 9,999	53	53	\$10.70	41	37	\$12.00
10,000 – 24,999	64	64	\$10.00	47	47	\$9.50
25,000+	55	55	\$7.82	37	35	\$7.60
All Rate Structures	378	376	\$10.83	315	302	\$12.08

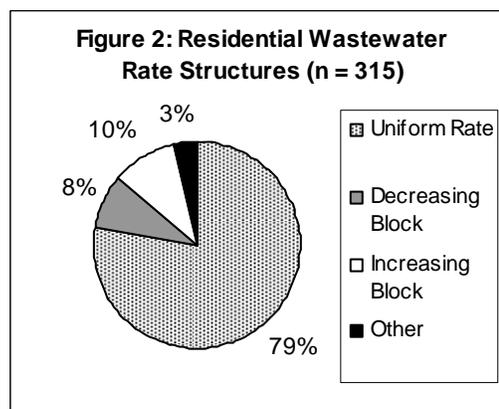
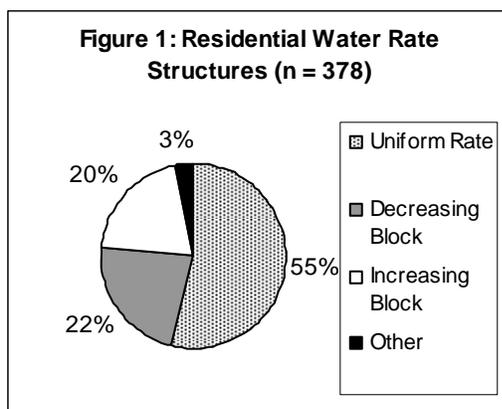
² Most of the statistics reported in this report refer to *medians*. Exactly half of all the utilities in the sample have a value that is equal to or greater than (or equal to or lower than) the median value. The median is preferred over the average because averages are influenced by outlier or anomalous values whereas medians are not.

While nearly every utility in this survey 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 larger utilities having broad customer bases and thus having revenues that are naturally more stable. Smaller utilities may, on average, have less stable customer consumption and therefore shift a greater fraction of their operating costs into the base charge.

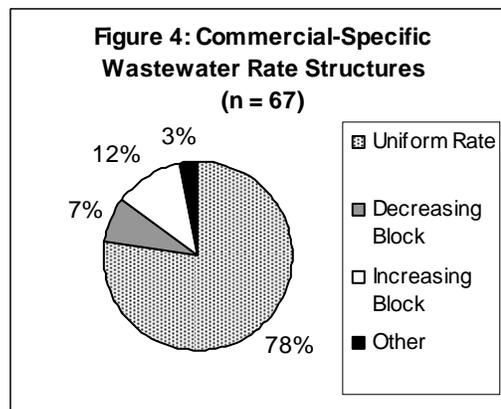
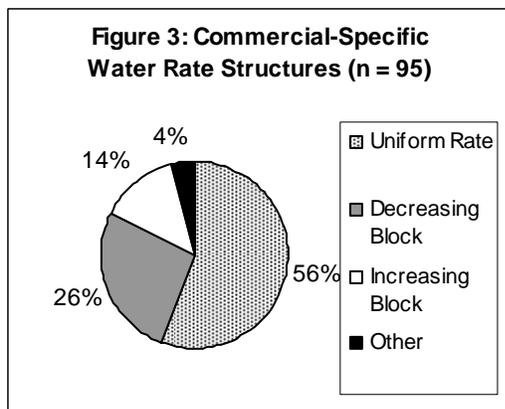
The majority of utilities (68 percent of water utilities and 57 percent of wastewater utilities) include a minimum amount of water consumption or wastewater disposal with their base charges. For these utilities, the variable portion of the rate structure only takes effect when a customer uses more than the minimum included in the base charge. Thus, customers of these utilities who use any consumption amount within the minimum allocation would receive the same bill amount, which is equal to the base charge. For both water and wastewater utilities, the median amount of consumption included is 2,000 gallons per month, while 3 percent of water utilities and 7 percent of wastewater utilities include 4,000 gallons per month or more of consumption with the base charge.

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

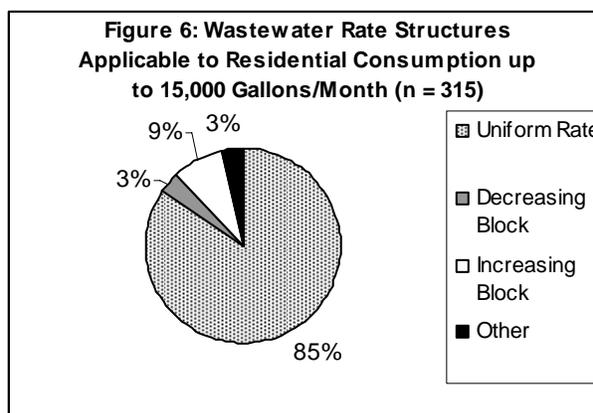
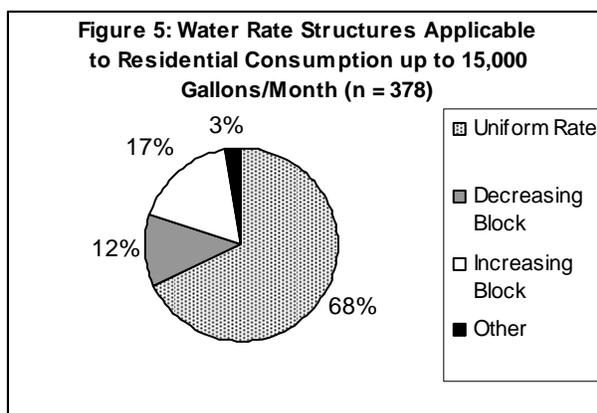
Figures 1-4 present information on water and wastewater rate structures for “inside” customers: those who live within a utility’s political jurisdiction. The three most common rate structures are uniform, increasing block, and decreasing block. In a uniform rate structure, the rate at which water/wastewater 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; however, the Environmental Finance Center found that some uniform rate structures in North Carolina may send equally strong conservation pricing signals, based on their design. In a decreasing block structure, water rates reduce 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 amounts, seasonal rate structures applying different rates at different times of the year, uniform rates that are capped at a maximum billable consumption amount, and flat fees. Seasonal uniform rate structures support conservation, especially for those utilities that experience great 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. In other words, a customer that uses 15,000 gallons per month of water may only be charged for 10,000 gallons for their wastewater bill.



In this survey, 25 percent of water utilities have a separate rate structure for their commercial customers, and a fraction of these utilities also have a separate structure that pertains to their industrial customers. On the wastewater side, 21 percent have a separate rate structure for their commercial customers. Information on the rate structures that pertain only to commercial customers is presented in Figures 3 and 4.



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 from 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. An examination of consumption levels between zero and 15,000 gallons per month (an average household in North Carolina may consume 6,000 gallons per month) shows that an even greater majority of utilities apply uniform water and wastewater rates to charge residential customers (Figures 5 and 6).



Among the 378 water rate structures in the sample, the median price (not including base charges) at the consumption level of 6,000 gallons per month is \$2.98 per 1,000 gallons – this compares to a price of \$2.80 per 1,000 gallons for the water rate structures included in the 2006 survey. At that same level of consumption, 50 percent of the water rate structures have a price that is between \$2.01 and \$4.00 per 1,000 gallons. The price for wastewater is slightly higher. Among the 315 wastewater rate structures in the sample, the median wastewater price (not including base charges) at 6,000 gallons per month is \$3.58 per 1,000 gallons compared to a 2006 survey median price of \$3.45 per 1,000 gallons. Fifty percent of the wastewater rate structures have a price that is between \$2.59 and \$4.79 per 1,000 gallons.

What Utilities Charge their Customers

Residential Water

Figure 7 shows the median amount utilities bill their residential water customers for a range of consumption amounts on a monthly basis³. These calculations include base charges. The 10th (lower) and 90th (upper) percentile lines are also included to indicate the lowest 10% of charges and the highest 10% of charges in the sample across the consumption spectrum. In other words, 80% of all bill amounts in the sample fall between these two lines. The median monthly amount charged for zero gallons of water is \$10.72, \$24.23 for 6,000 gallons, and \$35.55 for 10,000 gallons. As a point of comparison, a gallon of potable water at a major grocery retailer is approximately \$1.00 per gallon while the median bill for 6,000 gallons is approximately \$0.004 per gallon, which is 250 times cheaper.

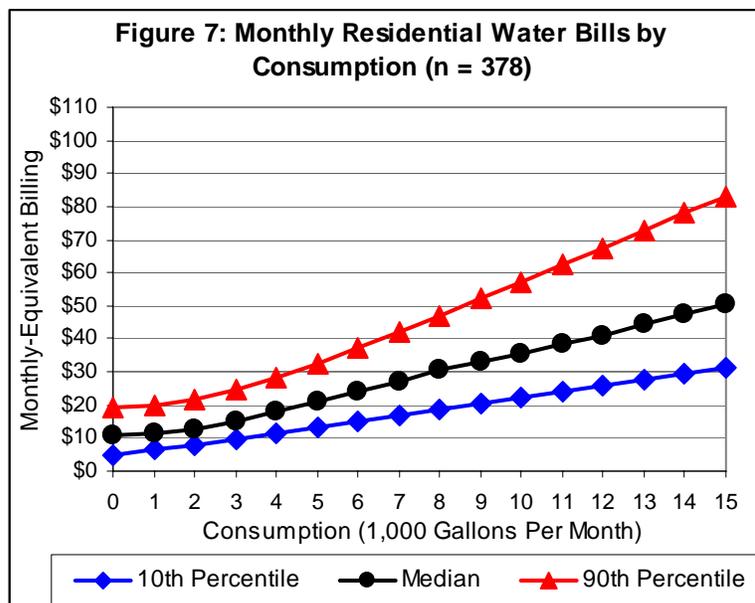


Table 3 demonstrates that the median water bills among the largest utilities are smaller than those of smaller utilities. Table 4 shows that municipal utilities and large water authorities generally have lower median water bills than other service providers. It is not surprising that the median bill for county utilities is the highest because county systems are typically more spread out and have to pay significantly more for distribution per customer, which translates to higher bills for county customers.

Table 3: Median Water Bill by Utility Size (6,000 Gallons/Month)

Utility Size (Service Population)	Number of Water Rate Structures	Median Bill
1 - 999	62	\$25.23
1,000 – 2,499	74	\$25.25
2,500 – 4,999	70	\$23.06
5,000 – 9,999	53	\$24.64
10,000 – 24,999	64	\$23.43
25,000+	55	\$22.80
All Rate Structures with Population Data	378	\$24.23

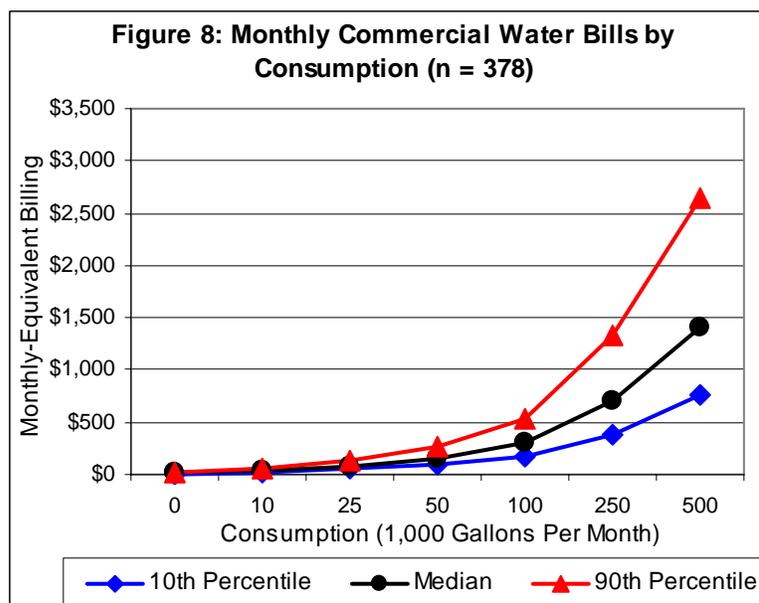
Table 4: Median Water Bill by Utility Type (6,000 Gallons/Month)

Utility Type	Number of Water Rate Structures	Median Bill
Municipality	300	\$22.77
County/District	54	\$32.93
Sanitary District	7	\$30.45
Authority	6	\$21.00
Not-For-Profit	11	\$23.40
All Rate Structures	378	\$24.23

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 comparison.

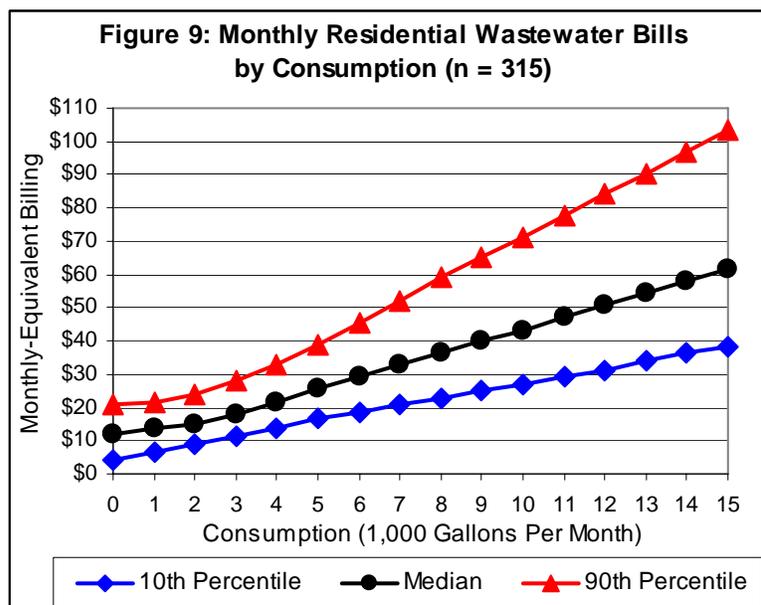
Commercial Water

Figure 8 shows monthly median water bills for commercial water customers at different levels of consumption⁴. Median bills for those in the 10th and 90th percentiles are also included. The median monthly bill for inside customers consuming zero gallons (on a 3/4” meter⁵) is \$11.45. Median bills for 50,000 gallons per month total \$152.33 and \$1,408.40 for those consuming 500,000 gallons per month.



Residential Wastewater

Figure 9 presents information on median monthly wastewater bills at various consumption levels. The median monthly wastewater bill for customers consuming zero gallons of water is \$12.00. At 6,000 gallons, median bills rise to \$29.23. Median bills for 10,000 gallons total \$43.30. Tables 5 and 6 show differences in median residential wastewater bills by utility size and type. Similar to water, the median wastewater bill is highest for the group of utilities with the smallest service populations.



⁴ The residential rate structure is used to calculate the billings for commercial customers except for the service providers 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 of up to 100,000 gallons/month was computed assuming a 5/8” or 3/4” meter size, 250,000 gallons/month assuming a 1” meter size, and 500,000 gallons/month assuming a 1 1/2” 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.

Table 5: Median Wastewater Bill by Utility Size (6,000 Gallons/Month)

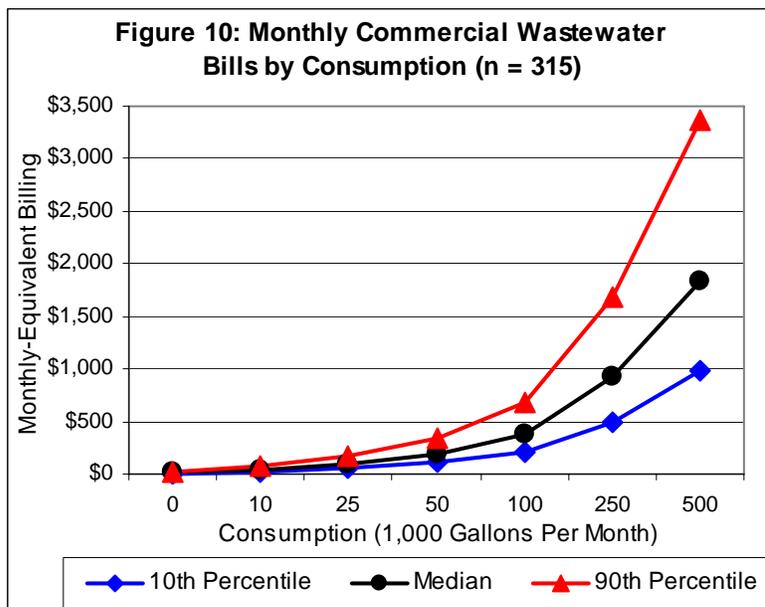
Utility Size (Service Population)	Number of Wastewater Rate Structures	Median Bill
1 - 999	47	\$32.04
1,000 – 2,499	69	\$28.00
2,500 – 4,999	70	\$28.02
5,000 – 9,999	41	\$29.99
10,000 – 24,999	47	\$28.34
25,000+	37	\$29.20
All Rate Structures with Population Data	311	\$29.20

Table 6: Median Wastewater Bill by Utility Type (6,000 Gallons/Month)

Utility Type	Number of Wastewater Rate Structures	Median Bill
Municipality	283	\$28.70
County/District	21	\$31.00
Sanitary District	6	\$42.25
Authority	4	\$29.60
Metropolitan Sewer District	1	\$33.28
All Rate Structures	315	\$29.23

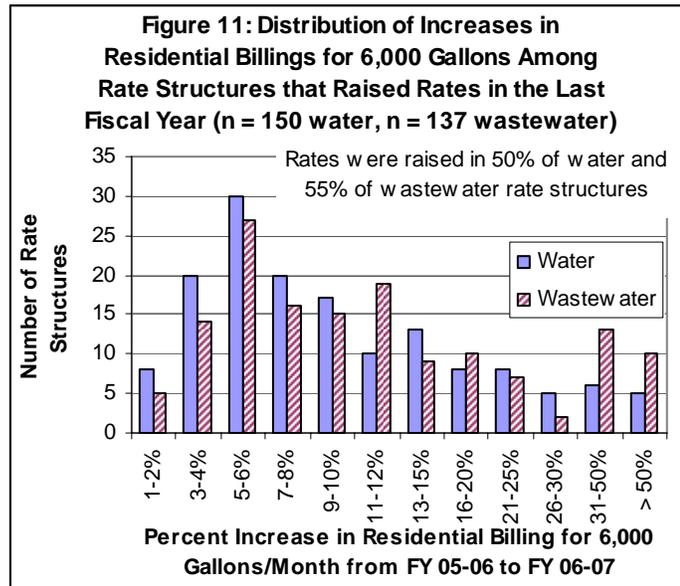
Commercial Wastewater

Figure 10 depicts the estimated monthly wastewater bills for inside commercial customers at different consumption levels. Median bills for commercial customers are \$12.36 for zero consumption (using 3/4” meters), \$190.84 at 50,000 gallons and \$1,837.24 at 500,000 gallons.



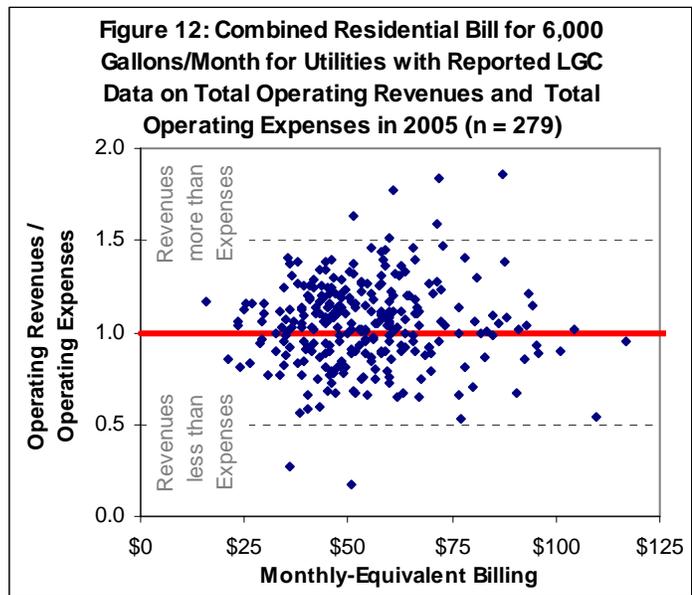
Annual Rate Adjustments

This year’s survey included 300 water rate structures and 251 wastewater rate structures that were also included in the 2006 survey. Rates from last year were increased for 50 percent of the water rate structures and 55 percent of wastewater rate structures. Figure 11 shows the annual effective rate increases for customers that use 6,000 gallons among utilities that have raised their rates in the last year. The median customer cost increase for the utilities that increased their rates between 2006 and 2007 was 7.7 percent for water and 9.0 percent for wastewater. This compares to a median increase of 8.0 percent and 8.1 percent between, respectively, for 227 water and 213 wastewater rate structures surveyed both in 2006 and 2005 and had raised rates between those two years. Overall, 66 percent of rate structures that were surveyed in 2005 and 2007 had higher rates in 2007 than in 2005.



The Status of Full Cost Pricing in North Carolina

Comparing rates across the state or among specific jurisdictions is further complicated by the variation in full cost pricing across the state. Rates that provide enough revenue to balance an annual budget do not necessarily provide enough revenue to cover long term capital and maintenance needs. Figure 12 shows rates in terms of combined water and wastewater charges for customers using 6,000 gallons per month plotted against the ratio of operating revenue over operating expenses. This measure, often referred to as an operating ratio, helps identify if an entity is operating at a financial loss, gain, or is breaking even. Financial data were provided by the Local Government Commission. The figure shows, that in financial terms, many utilities with lower rates are not covering their operating expenses, making it difficult to rehabilitate aging infrastructure and engage in other proactive asset management activities.

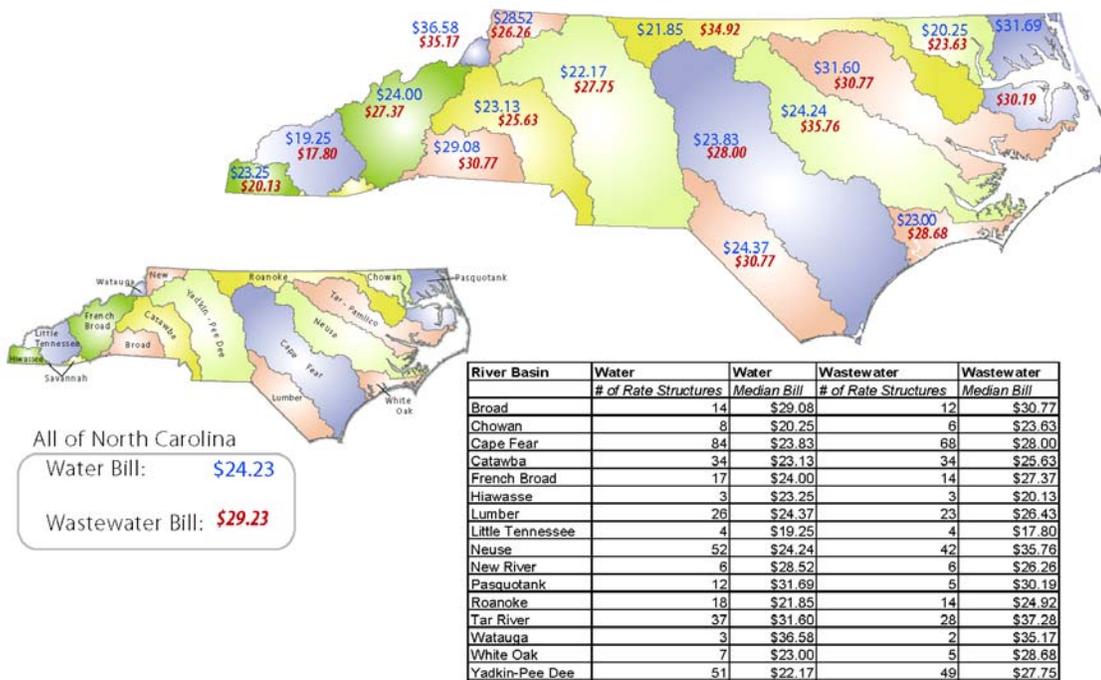


What Utilities Charge by River Basin

It is important to consider 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 rates for 6,000 gallons of consumption were calculated for each of North Carolina’s 17 major river basins; they are displayed in Figure 13.

The highest median water charges in river basins with a sample of more than 10 rate structures can be found in the Pasquotank and the Tar-Pamlico River Basins. The lowest median water charges, by contrast, are found in the Roanoke and Yadkin-PeeDee River Basins. 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 Roanoke and Catawba River Basins.

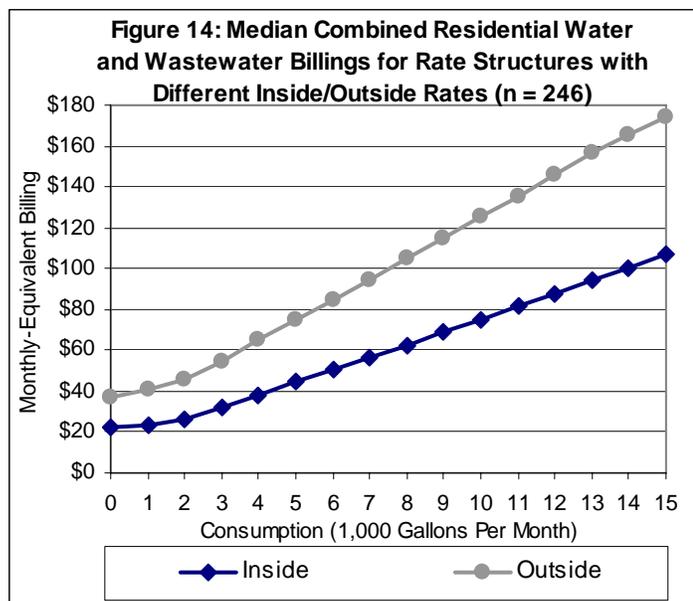
Figure 13: Median Water and Wastewater Charges for 6,000 Gallons/Month by River Basin



What Utilities Charge Customers that Live 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 those residing “inside” and “outside” those boundaries. In many cases, utilities charge different rates for customers living inside or outside the boundary. Overall, 67 percent of water rate structures and 72 percent of wastewater rate structures specified higher rates for customers living outside, and the vast majority were for municipal utilities. In fact, 84 percent of the rate structures from municipal utilities in the sample specified different inside and outside rates for either water or wastewater service.



At the average consumption level of 6,000 gallons per month, outside customers who are charged a different rate for inside customers pay, on the median, a water bill that is 1.95 times more than inside customers. For wastewater, the median ratio is 1.97. The majority of utilities with different outside rates simply double the inside charges. Figure 14 shows median charges for combined residential water and wastewater service for all utilities that have a separate rate schedule for outside customers for either their water or wastewater service, or both. The median bill charged to inside customers for 6,000 gallons per month of water and wastewater combined is \$50.88 compared to \$84.47 for outside customers.

There are at least three reasons why utilities would 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 unit⁶.

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 UNC School of Government Environmental Finance Center (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. Each year in January, the NCLM and the EFC request local government and not-for-profit utilities to 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.

⁶ AWWA. *Principles of Water Rates, Fees, and Charges*. Manual of Water Supply Practices: M1. 5th Ed. 2000.