WATER USE AND FUTURE REQUIREMENTS HILTON HEAD ISLAND AND VICINITY SOUTH CAROLINA

by
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WATER USE AND FUTURE REQUIREMENTS, HILTON HEAD ISLAND AND VICINITY, SOUTH CAROLINA

by Roger W. McCready

ABSTRACT

Water supplies for Hilton Head Island and vicinity presently are 99 percent from wells. Continuing development of the area could increase the demand for ground water by 50 percent. The rate of ground water withdrawal at present and in the future is the subject of this report.

Water use for 1986 and 1987 is compiled from data required for the South Carolina Water Resources Commission Capacity Use Program. Water use is divided into the following categories; public supply, golf course irrigation, agricultural irrigation, industry, and recreation. These categories are subdivided into individual users.

Population trends and projections from several sources show the largest growth occurring in southern Beaufort County, and with smaller growth in Jasper County. Southern Beaufort County's population could reach 75,500 by the year 2000. In the same time, Jasper County's population could reach 20,000.

Projections of ground-water withdrawals are calculated by housing unit projections, masterplans, and population projections. The results are presented for Hilton Head Island and vicinity from 1987 to 2010.

INTRODUCTION

Hilton Head Island and vicinity utilize the upper Floridan aquifer as the sole source for public water supply and irrigation. This usage averaged 16 mgd (million gallons per day) in 1987. Continual development of Hilton Head Island and vicinity will subject the upper Floridan to ever-increasing withdrawals and concurrent lowering of water levels. Several studies conducted by the South Carolina Water Resources Commission (SCWRC) and the U.S. Geological Survey (USGS) have indicated that lowering of water levels will subsequently result in water-quality problems owing to saltwater intrusion. The rate of withdrawal at the present time and in the future is the subject of this report.

Objectives of Investigation

The objectives in determining present and future rates of withdrawal from the upper Floridan aquifer were:

1. Quantify pumping rates from the upper Floridan aquifer during 1986 and 1987.
2. Quantify pumping by use: public supply, irrigation, and industry.
3. Project the rate of withdrawal from the present through the year 2010.

Methodology

The area of interest was Jasper County and the part of Beaufort County south of the Broad River. Ground-water and surface-water use for 1986 and 1987 were compiled. Associated with the water-use figures was a cost analysis for water service from the individual utility companies. Population projections were compiled to indicate water-use projections and to express development trends. Water-use projections into the year 2010 were based on population and housing-unit projections.

The water-use analysis was carried out by collating data required by the SCWRC Capacity Use Program. The regulations require well owners pumping over 100,000 gallons on any day to obtain a permit and to report their pumpage quarterly. These well owners are referred to as Class-A users. The study area contains 40 Class-A users with 120 associated wells. The data were divided into subregions for more detailed analysis.

The surface-water distribution network was compiled from information provided by the Beaufort-Jasper County Water Authority (BJCWA) and a report by B.P. Barber & Associates (written communication, 1982).

The costs associated with ground-water and surface-water use were compared by using the rate structures of representative utilities. There are 10 public service districts that distribute water for public supply and 6 companies that distribute irrigation water. The rates for retail water were tabulated and compared with the BJCWA rates.

Projections of water use were made by utilizing housing unit projections obtained from the Town of Hilton Head Planning Department, masterplans for various planned unit developments (PUDS), and population projections. "Planned unit development is a development usually consisting of more than one type of land use comprising some detached, attached, single family or multi-family dwellings including a mix of residential, recreational, limited convenience commercial, cultural and common open space areas" (Daufuskie Island Plan, 1985, p. 66).

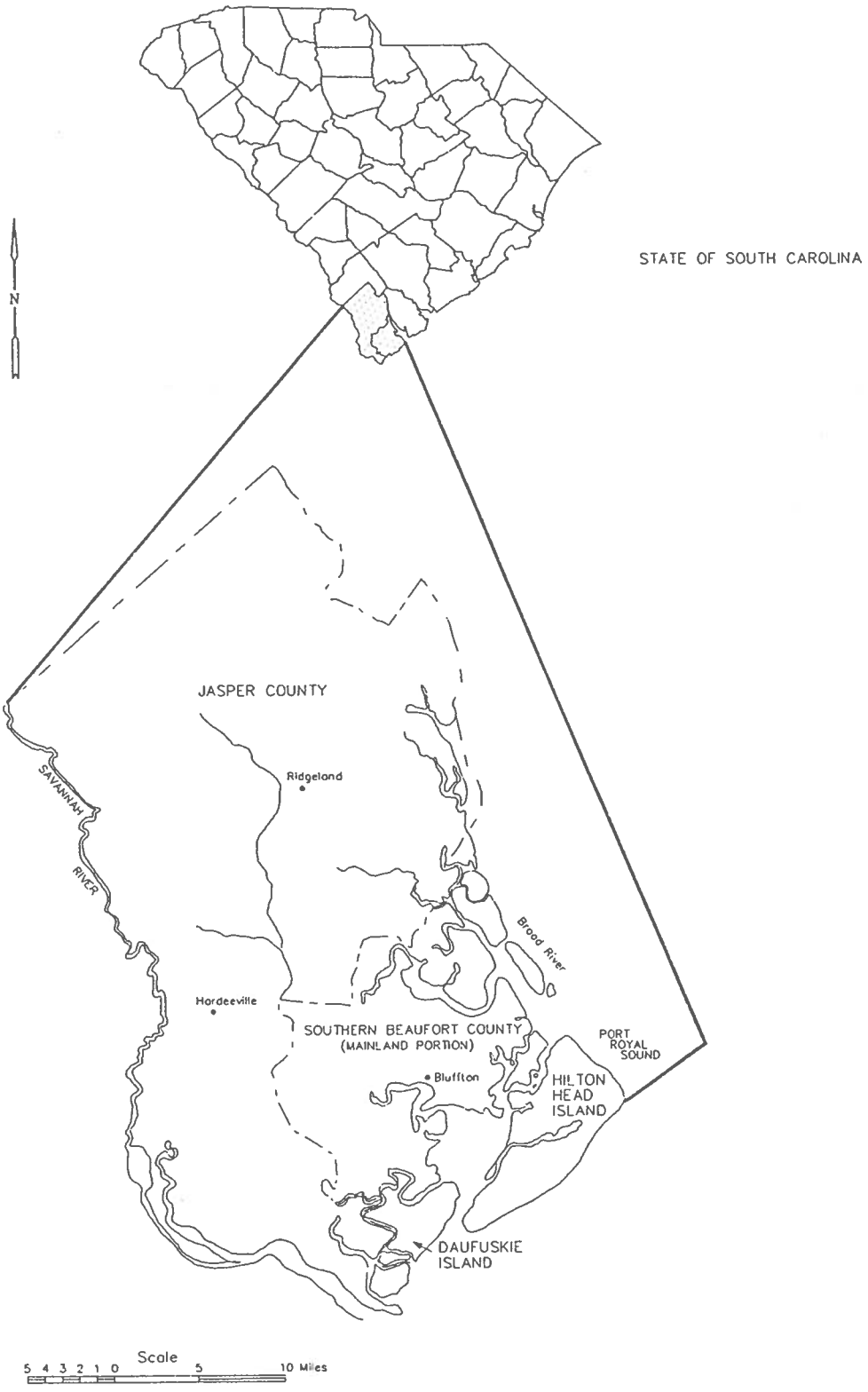

Figure 1. Location of Daufuskie Island, Hilton Head Island, Southern Beaufort County (mainland), and Jasper County.

Location of Study Area

The study area is located in the southern tip of South Carolina (Fig. 1) and includes all of Jasper County and the part of Beaufort County southwest of the Broad River. The Beaufort County portion has been divided into three parts, on the basis of geographic boundaries. They are Hilton Head Island; Daufuskie Island; and the mainland portion of southern Beaufort County, which will be referred to as the mainland. The reason for the division was twofold: 1) population data were presented in this manner and 2) to provide geographic specifics about water use.

Previous Investigations

This area has not been studied exclusively with respect to water use; however, a few reports have contained sections on water use for portions of the area. Some of this work was done by B.P. Barber & Associates, John Present of the Water Management Task Force for Hilton Head Island, and M.R. Davies of SCWRC.

B.P. Barber & Associates, Inc. (written communication, 1982) submitted a rigorous water-use analysis and population projection as a part of their report "Comprehensive Southern Beaufort County Surface Water Canal Plan". The water analysis included meter readings for a 12-month period for all of Hilton Head Island's public service districts. Water use was divided into categories of single-family, condominium/multi-family, sprinklers, restaurants and lounges, retail shops, offices, and other commercial (hotels). The water-use was then reported for each season. Water-use projections were calculated by multiplying the average use per unit by the projected number of units.

A memorandum to the Hilton Head Island Water Management Task Force, concerning the 1984 water utilities sales on Hilton Head Island, was compiled by John Present (1984). Present's report broke down the utility sales by type of customer and made some comparisons, after adjustment for growth, with a similar report by R.A. Ellison (1982) for 1981 and 1982.

John Present (1985) submitted a memorandum to the Water Management Task Force on the 1984 water usage by golf courses. This report summarized sources of golf course irrigation water and the total amount of groundwater use per day by the individual golf courses. Sources included the upper Floridan aquifer, treated wastewater, and freshwater lagoons.

M.R. Davies of SCWRC, in a memorandum to A.D. Park, assessed the Capacity Use Program with respect to grandfathered wells, new wells, wells with pending permits, amount of ground water used, and amount of ground water permitted. He also cited quarterly totals for the years 1982 through 1985 by subareas. These subareas were Port Royal Island, St. Helena Island, Ladies Island (all northeast of the study area), and Hilton Head Island, Bluffton, and the remaining portion of Beaufort County. This investigation included 1985 water rates charged by BJCWA and six utilities on Hilton Head Island.

A report on water use from the Floridan aquifer and treated effluent was submitted to the Hilton Head Island Planning Commission in October 1987 (Present, 1987). The report summarized the 1984, 1985, and 1986 groundwater use by public service districts, golf courses, and other Class-A well installations. The report also showed the daily average disposition of sewage effluent per quarter for each public service district (PSD). Present concluded that 60 percent of the island's total public-supply water sales are for irrigation of lawns and common areas, and that golf-course irrigation would account for only 20 percent of the total public-supply sales.

Ellison and Present (1988) submitted a report to the Water Management Task Force concerning water use projections for Hilton Head Island. Their report utilized average daily water-use records for single family, multifamily, hotels/motels, commercial, and irrigation units from nine public service districts. Where records were not available, similar usage values from other PSD's were assumed. These average daily usage records were employed in conjunction with market-driven housing-unit projections provided by the Town of Hilton Head Planning Department to project the water use for the island. Net sales, well pumpage, golf course demand, amount of treated effluent available, and net use from the aquifer were estimated. The report also estimated the amount of golf course irrigation provided from three sources: aquifer, treated effluent, and surface water. The total water demand for nine major PSD's was estimated.

WATER-SUPPLY SUMMARY

Ninety-nine percent of the water supply for this study area is derived from ground-water sources and less than 1 percent from surface-water sources. Ground-water supplied 5,700 million gallons in 1986, compared to a meager 1.82 million gallons from surface-water sources for the period July 1986-June 1987. Reasons for such a heavy reliance on ground water are: 1) the great supply of potable water available from the upper Floridan aquifer in this area; and 2) the large capital outlays associated with an area-wide surface water system. Ground water is distributed in the study area by 16 individual systems that provide water for public supply or irrigation. Surface water is distributed by the Beaufort-Jasper County Water Authority.

Surface Water

Beaufort County, as a whole, is a major user of surface water, but the use is primarily in the area northeast of the Broad River. This water is transmitted by canal from the Savannah River to a treatment plant southwest of the Broad River. The canal can deliver approximately

Table 1. Class-A users permitted for public supply and irrigation, Hilton Head Island and vicinity

PUBLIC WATER SUPPLIES	IRRIGATION WATER SUPPLIES
Hilton Head Island	
BJCWA	Hilton Head Co.
Broad Creek Public Service District (PSD)	Hilton Head Plantation
Forest Beach PSD	Palmetto Dunes
Hilton Head Plantation Utilities	Sea Pines Plantation Co.
Hilton Head No. 1 PSD	Shipyard Golf Course Maintenance
Hilton Head Utilities	Spanish Wells
Hudson's Seafood	
Long Cove Club Utilities	
Outdoor Resorts	
Sea Pines PSD	
Wexford Plantation Utilities	
Windmill Harbour (Coastal Utilities)	
Daufuskie Island	
Haig Point Utility Co.	Haig Point Utility Co.
Melrose Utility Co.	
Mainland	
BJCWA	Ginn Plantation
Moss Creek Corp.	Moss Creek Corp.
Rose Hill Utility	R.C. Neal
	Rose Hill Utility
Jasper County	
Town of Hardeeville	Good Hope Corp.
Town of Ridgeland	F.A. Nimmer
Wise Batten & H.L. Peeples	Pecan Hill Plantation
	Wise Batten & H.L. Peeples

14 mgd (million gallons per day) into the BJCWA's treatment plant at Chechessee, which has a design capacity of 16 mgd. A finished-water storage tank holds 1.5 million gallons and there is a system pumping capacity of 17 mgd. The BJCWA presently serves two military installations; the city of Beaufort; the town of Port Royal; the Warsaw, Eustice, and Oaks subdivisions; Fripp, Harbor, and Callawassie Islands; and the community of Chelsea on a wholesale basis. Retail services are provided to Ladies and St. Helena Islands. The total water sales between July 1986 and June 1987 were 2,156 million gallons, an average of 5.91 mgd.

The only BJCWA surface-water customer in the study area is Callawassie Island, with a total use, from July 1986 to June 1987, of 1.82 million gallons. Spring Island has proposed to buy BJCWA water for their distribution system, with a 1990 estimated peak daily demand of 1.65 million gallons. These are but a small percentage of BJCWA total sales and indicate the great dependence that southern Beaufort County and Jasper County have on ground-water supplies.

Ground Water

The predominant usage of ground water in the study area (82 percent) is for public supply, with agricultural and commercial irrigation (golf course irrigation) and industry using only 18 percent of the total pumpage. Industry is a small consumer of ground water, with only one well owner permitted for industrial use.

There are 16 extensive ground-water systems that are Class-A users and permitted to distribute water for public supply. There are four other Class-A users permitted to distribute water for public supplies that do not have large distribution systems but are considered in this report (Table 1). Fifteen Class-A users have permits for irrigation, of which nine are for golf course irrigation.

Ground water use in the study area has increased steadily since 1984, more so on Hilton Head Island than any other part of the study area (Fig.2). The increase is primarily a reflection of continuing commercial and recreational development and construction of new housing.

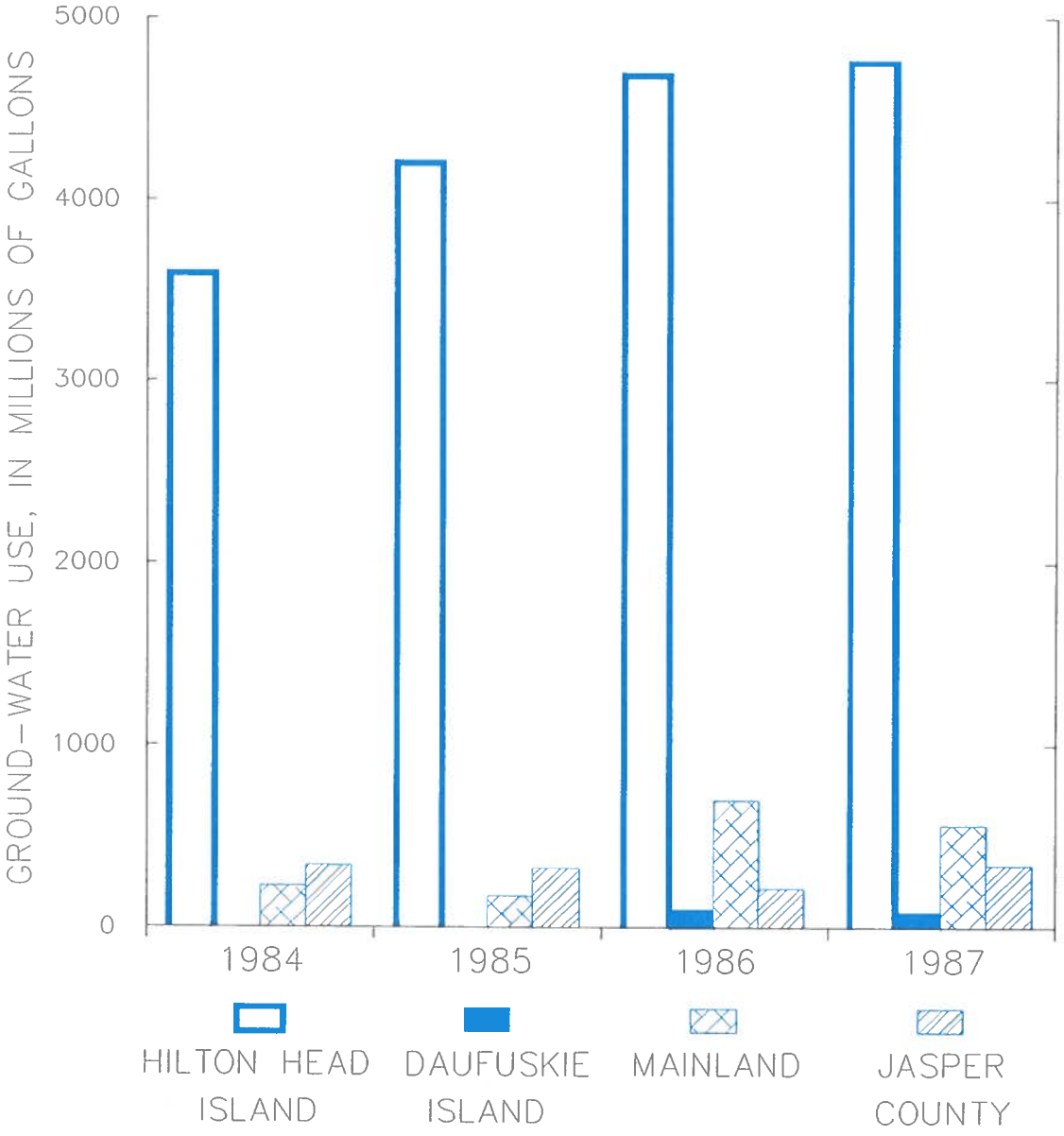

Figure 2. Yearly ground-water use from January 1, 1984, to December 31, 1987.

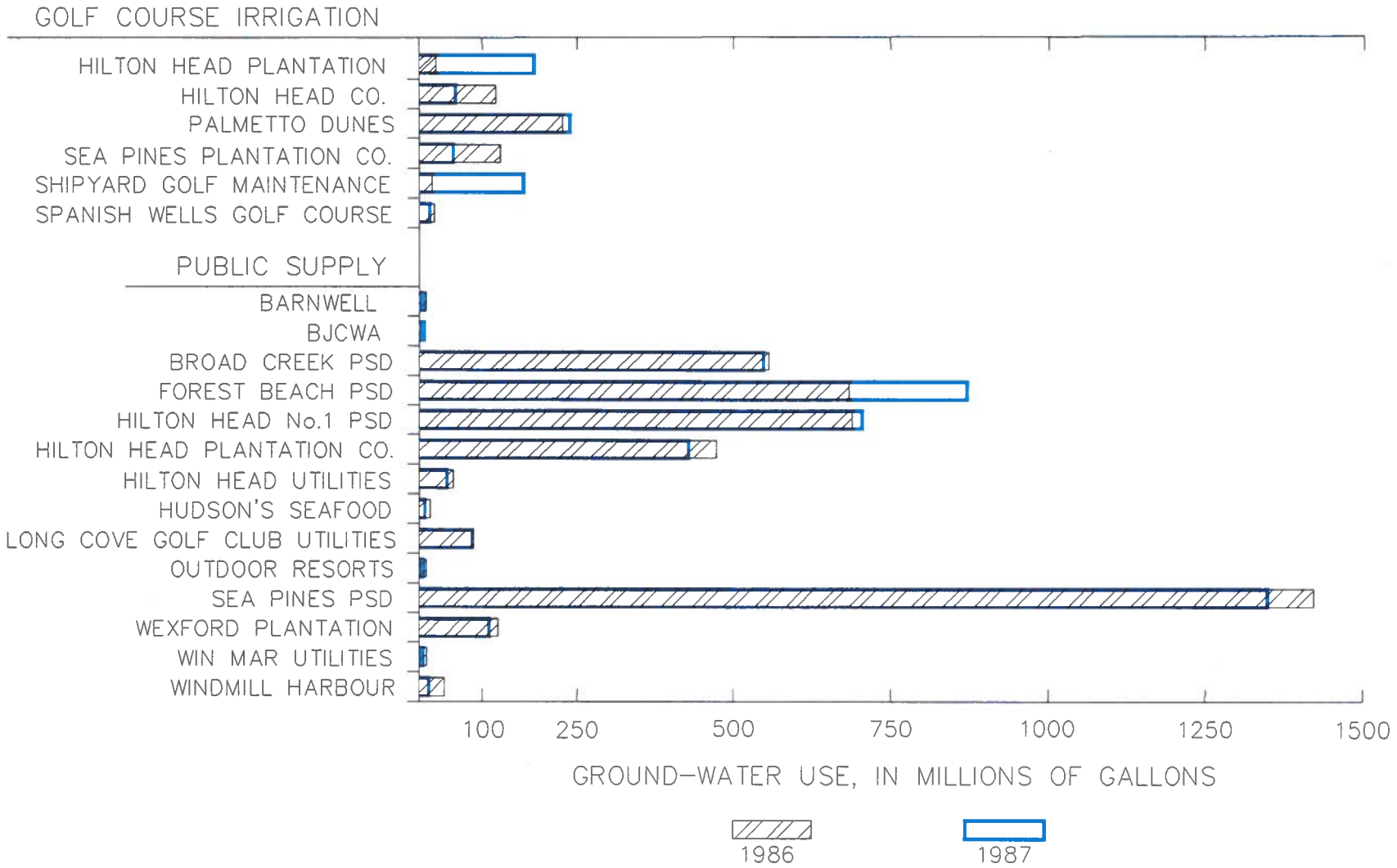

Figure 3. Hilton Head Island Class-A total pumping for 1986 and 1987, in millions of gallons.

The source for ground-water use data was records compiled in the Low Country Capacity Use Program. A deficiency of Class-A water-use figures is the omission of domestic wells. These wells serve one or more single-family homes, and no agency required notification of their existence until adoption of the State Well Construction Standards in 1985. It is, therefore, not possible to reliably estimate the number of domestic wells, the amount of water they pump, or whether the water is obtained from the Floridan or shallower aquifers. It is probable, however, that domestic users do not pump a significant volume in comparison with the Class-A users.

There are other deficiencies of Class-A well use reports that must be considered in evaluating the reported data. First, it is required that pumpage be recorded monthly and reported quarterly. This schedule is not followed by all permittees. Second, each Class-A well is required to have either an hour meter or a flowmeter to measure discharge. The method applied to measure discharge by means of the hour meter involves the assumption that the pump is operating at a known constant capacity, such as the manufacturer's rated capacity. The amount of discharge is then calculated by multiplying the pump's rated capacity by the number of hours pumped. This method does not take into consideration variations in head or changes in pump efficiency, which cause variation in discharge, depending on the type of pump utilized. A more accurate measuring device is a flowmeter, which will measure the amount of flow through the discharge pipe. However, flowmeters must be calibrated periodically to assure accurate measurements. Despite these program deficiencies, the water-use records are reasonably accurate and are vital data with which to evaluate ground-water use.

GROUND WATER USE 1986-1987

Hilton Head Island

Hilton Head Island used a total of 4,678 million gallons of ground water in 1986 and 4,852 million gallons in 1987. Class-A use is depicted graphically in Figure 3. Ground water used for "public supply" accounted for 87 percent of the total amount pumped, which was 4,041 and 4,208 million gallons in 1986 and 1987, respectively. The remaining 13 percent was used for golf course irrigation.

There are 14 Class-A users that distribute water for public supply. Of these, Sea Pines Public Service District (PSD) distributed 35 percent, or 1,420 million gallons, in 1986. Forest Beach PSD and Hilton Head No.1 PSD each distributed 17 percent, or 682 and 687 million gallons, respectively. Broad Creek PSD distributed 14 percent, or 555 million gallons. The remainder of the public-supply water use is distributed by 10 companies that accounted for 697 million gallons, or less than 17 percent (Table 2).

The average use in 1987 for a single family unit was 568 gpd (gallons per day), with a maximum of 745 gpd and a minimum of 319 gpd. Multi-family units averaged 205 gpd, with a maximum of 342 gpd and a minimum of 118 gpd (Ellison and Present, 1988).

Six companies pump water from the upper Floridan aquifer for the irrigation of 16.5 (18 holes/course) golf courses (Table 2). Golf course irrigation for 1986 and 1987 required 637 and 644 million gallons, respectively. The number of courses per planned unit development (PUD), approximate number of irrigated acres, ground water use in 1987, average use per acre, and inches of ground water used per year are shown in Table 3. Palmetto Dunes used 36 and 37 percent in 1986 and 1987, or 226 and 241 million gallons. Sea Pines Plantation Company used 20 and 9 percent, or 127 and 56 million gallons, respectively. Hilton Head Company used 120 and 60 million gallons in 1986 and 1987. These are the recorded figures for golf course irrigation, but it is known that some Class-A users permitted for public supply are selling water for golf course irrigation. Some of these figures have been included in the proper category while others are still under investigation.

Domestic irrigation, for purposes of this report, was defined to include the water used for landscape irrigation, car washing, and other applications in which water is not transported through sewer lines to wastewater treatment plants. The amount of domestic irrigation on Hilton Head Island was calculated by subtracting the amount of effluent from the amount of total pumping for 1986 and the first two quarters of 1987. This analysis was performed with data from four utility companies; Sea Pines PSD, Coastal Utilities, Long Cove Club Utilities, and Wexford Utilities. The results show, that depending on the time of year, the monthly percentage of pumped water used for domestic irrigation ranges from 5 to 95 with an average of 70 (Appendix A). It is estimated by the utility companies that there is a 10-percent loss, owing largely to water-line leaks and fire-fighting supplies. The overall average water use for lawn watering is 60 percent of the total public supply use; 2,425 million gallons of potable water was used to water lawns in 1986. This analysis is based on one-fourth of the utility companies on Hilton Head Island and may not be conclusive, but it indicates that large quanities of water are expended by what many would consider the least essential of uses.

The amount of ground water used on Hilton Head Island varies with the seasons and, consequently, with tourism. As it may been seen in Figure 4, public supply use in the second and third quarters of the year, April through September, is more than one and a half times that of the first and fourth quarters in aggregate.

Daufuskie Island

Water use on Daufuskie Island is very low in comparison with Hilton Head Island. The island is starting

Table 2. Hilton Head Island Class-A quarterly pumpage for 1986 and 1987, in millions of gallons

	1986						1987					
PUBLIC SUPPLY	**First quarter**	**Second quarter**	**Third quarter**	**Fourth quarter**	**Total**	**Daily average**	**First quarter**	**Second quarter**	**Third quarter**	**Fourth quarter**	**Total**	**Daily average**
Thomas C. Barnwell	0.7	0.7	0.7	0.7	2.8	0.008	0.7	0.7	0.7	0.7	2.7	0.007
BJCWA	0.9	1.4	1.3	2.5	6.1	.017	1.3	1.3	2.3	0.6	5.4	0.015
Broad Creek PSD	76.6	171.6	182.2	124.1	554.5	1.519	72.2	190.2	178.3	110.5	551.2	1.510
Forest Beach PSD	127.1	146.5	211.4	197.0	682.0	1.868	105.2	295.4	250.1	222.0	872.7	2.391
Hilton Head No. 1 PSD	175.2	207.3	182.1	122.7	687.3	1.883	122.7	211.4	220.2	152.2	706.5	1.936
Hilton Head Plantation Co.	75.4	96.8	94.2	94.4	360.8	0.988	53.8	140.9	120.3	117.0	432.0	1.184*
Hilton Head Utilities	9.0	14.3	16.0	13.0	52.3	0.144	7.1	14.8	14.8	9.8	46.5	0.127
Hudson's Seafood	2.1	5.1	5.1	3.1	15.4	0.042	1.5	3.6	4.0	2.6	11.7	0.032
Long Cove Club Utilities	7.6	31.0	28.1	15.7	82.4	0.226	10.9	38.9	22.9	13.9	86.6	0.237
Outdoor Resorts	1.8	3.4	3.1	1.4	9.7	0.027	1.0	3.6	3.1	1.4	9.1	0.025
Sea Pines PSD	223.0	459.6	475.2	262.2	1420.0	3.890	158.4	438.7	437.8	315.9	1350.7	3.701
Wexford Utilities	11.1	47.5	44.4	20.3	123.3	0.338	8.8	44.0	34.0	26.8	113.6	0.311
Win Mar Utilities	1.5	1.7	2.0	1.4	6.6	0.018	NR	NR	NR	NR	NR	NR
Windmill Harbour	7.7	17.2	9.5	3.4	37.8	0.104	2.0	7.3	5.7	4.0	19.0	0.052
TOTAL	719.7	1204.1	1255.3	861.9	4041.2	11.072	545.6	1390.8	1294.2	977.4	4207.7	11.528
GOLF COURSE IRRIGATION												
Hilton Head Plantation	28.6	33.6	41.3	32.4	135.9	0.372	25.3	25.3	25.3	25.3	101.2	0.277**
Hilton Head Co.	0.9	63.7	37.7	17.3	119.6	0.327	4.6	4.9	28.4	22.0	60.0	0.164
Palmetto Dunes	38.7	79.8	68.2	39.6	226.4	0.620	6.2	96.1	103.4	35.5	241.2	0.661
Sea Pines Plantation Co.	7.3	72.8	31.2	16.0	127.3	0.349	1.4	34.9	19.5	NR	55.8	0.204
Shipyard Golf Maintenance	2.5	0.4	0.5	2.2	5.5	0.015	0.4	14.7	17.8	133.7	166.6	0.458
Spanish Wells	0.0	10.9	8.9	2.0	21.8	0.060	1.0	8.3	7.2	2.9	19.4	0.052
TOTAL	78.0	261.2	187.8	109.5	636.5	1.743	38.9	184.2	201.6	219.4	644.2	1.765
HILTON HEAD ISLAND TOTAL	797.7	1465.3	1443.1	971.4	4677.7	12.815	584.5	1575.0	1495.8	1196.8	4851.9	13.293

NR, No report

* Not actual quarterly use, total correct

** Corrected annual use distributed evenly

Table 3. Distribution of Hilton Head Island's golf courses and ground water used for golf course irrigation

	Number of 18-hole courses	Approximate number of irrigated acres	Reported ground-water use in 1987 (Mgals)	Average use per acre (gallons/day/acre)	Inches of ground water per year
Hilton Head Plantation	4	550	184	919	19
Palmetto Dunes	3	220	241	3,001	40
Port Royal Plantation (Hilton Head Co.)	3	360	60	457	6
Sea Pines Plantation	3	360	56	425	6
Shipyard Plantation	2.5	300	167	1,521	20
Spanish Wells	1	120	19	443	6
TOTAL	16.5	1,910	727	1,043	10

to develop into a resort-residential area and, consequently, ground-water use will increase. At this time there are only two major users of ground water and both are in their early developmental stage. These are Haig Point Utility, which distributes public supply water for Haig Point Plantation, and Melrose Utility Company, which distributes public supply water for the Melrose resort-residential area. Haig Point Co. has collaborated with SCWRC to investigate the use of the shallow aquifer as a source for golf course irrigation. Eventually, 90 percent of all golf course irrigation on Daufuskie Island will be provided by treated effluent and the remainder by fresh-water lagoons and shallow aquifers. The total ground-water use on Daufuskie Island is only 1.5 percent of the total ground water used in the study area, or 97 million gallons for 1986 and 84 million gallons for 1987 (Table 4).

Mainland

The total ground water use in this portion of the study area during 1986 was 704 million gallons, and for 1987 it was 567 million gallons (Table 5). These quantities amounted to roughly 12 percent of the total ground water use in the study area. The major public supply users were the town of Bluffton, Moss Creek Plantation, Rose Hill Plantation, and Callawassie Island. Spring Island is in the developmental stage and is expected to use ground water only as a temporary source until connection with the BJCWA is possible. Bluffton's distribution system is operated by BJCWA and consists of two wells in the Floridan aquifer that provided 95 million gallons in 1986. Moss Creek and Rose Hill plantations have their own utility companies and distributed 156 and 50 million gallons, respectively, in 1986. Public supply use accounted for 36 percent of the ground-water withdrawals in this area. Irrigation for golf courses and agricultural purposes accounted for 26 percent, and one industrial user, the South Carolina Wildlife and Marine Resources Department-Waddell Mariculture Center, accounted for 38 percent of the total use in this area, or 270 million gallons (Fig.5).

Jasper County

Ground-water in Jasper County is obtained primarily from domestic wells. The major public supply distribution systems are the towns of Ridgeland and Hardeeville. The remaining Class-A use in Jasper county is for irrigation or recreation (Table 6).

Jasper County accounted for only 4 and 6 percent, respectively, of the total Class-A ground-water use in the study area in 1986 and 1987 (222 and 350 million gallons). Of the 222 million gallons, 46 percent was used for public supply and 46 percent for irrigation. In 1987, 75 percent of ground-water use was for public supply, of which the towns of Hardeeville and Ridgeland used 63 and 29 percent, respectively. Irrigation accounted only for 18 percent, with wells permitted for recreation accounting for 6.5 percent. Irrigation in this area is for agriculture, rather than golf-course watering. Figure 6 shows the Class-A users' pumping rates for 1986 and 1987.

WATER USE COSTS

Ten of the 16 utility companies provided 1987 rate structures for residential and commercial usage. A comparison was based on a monthly, residential 3/4-inch meter (Table 7). The complete rate structures are in Appendix B.

POPULATION TRENDS AND PROJECTIONS

The study area, as a whole, has experienced steady growth over the past 20 years. The population of southwestern Beaufort County (including the town of Hilton Head, Daufuskie Island, and the town of Bluffton) has increased four-fold, according to the Beaufort Joint Planning Commission (March 1987). Hilton Head Island has been the center for this population growth, owing primarily to the resort-residential style of development. This type of development has flourished since the early 1970's, with nine Planned Unit Developments

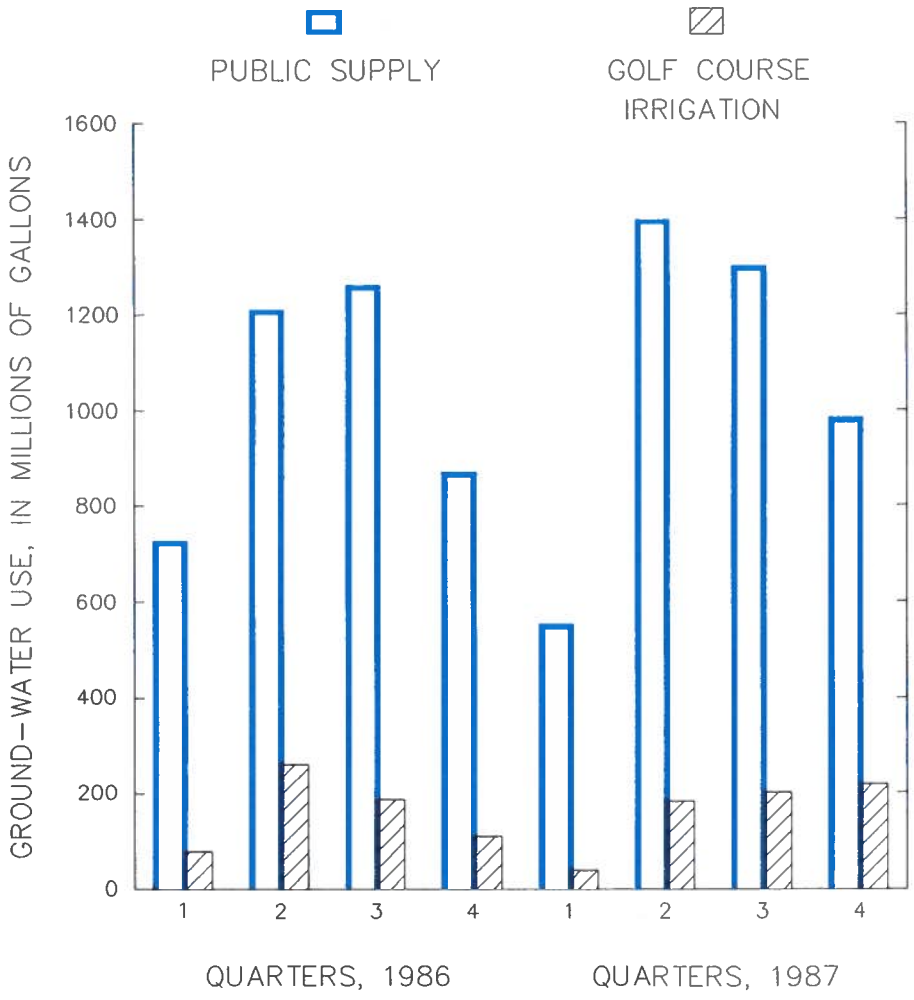

Figure 4. Hilton Head Island public-supply and irrigation pumping rates, per quarter, for 1986 and 1987.

Table 4. Daufuskie Island Class-A quarterly pumpage for 1986 and 1987, in millions of gallons

	1986						1987					
	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average
PUBLIC SUPPLY												
Haig Point Utility Co.	0.0	29.7	32.1	14.8	76.5	0.210	0.5	8.0	13.7	6.3	28.5	0.078
Melrose Utility Co.	0.0	0.0	0.0	0.0	0.0	0.000	0.2	2.2	1.1	1.4	4.8	0.013
TOTAL	0.0	29.7	32.1	14.8	76.5	0.210	0.7	10.2	14.8	7.7	33.4	0.091
IRRIGATION												
Haig Point Utility Co.	0.0	4.9	14.5	1.3	20.7	0.093	0.9	19.8	11.0	13.9	45.6	0.125
Melrose Utility Co.	0.0	0.0	0.0	0.0	0.0	0.000	0.2	2.2	1.1	1.4	4.8	0.013
TOTAL	0.0	4.9	14.5	1.3	20.7	0.093	1.1	21.9	12.1	15.3	50.4	0.138
DAUFUSKIE ISLAND TOTAL	0.0	34.6	46.6	16.1	97.3	0.303	1.8	32.1	26.8	23.0	83.7	0.229

Table 5. Mainland Class-A quarterly pumpage for 1986 and 1987, in millions of gallons

	1986						1987					
	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average
PUBLIC SUPPLY												
BJCWA	21.1	27.7	27.0	18.5	94.2	0.258	17.1	24.3	22.6	22.2	86.2	0.236
Moss Creek Corp.	11.5	44.3	38.6	14.6	109.0	0.299	7.8	43.1	34.4	17.9	103.2	0.283
Rose Hill Utility	6.3	16.6	16.8	11.2	49.9	0.137	6.3	11.0	11.5	11.0	39.8	0.109
TOTAL	38.9	88.6	82.4	44.3	253.1	0.693	31.2	78.4	68.5	51.1	229.2	0.628
IRRIGATION												
Callawassie Group	0.0	18.0	16.4	5.9	40.3	0.110	2.7	3.5	0.7	NR	6.9	0.020
Edward R. Ginn	7.1	20.9	15.5	8.6	52.1	0.143	0.0	0.0	0.0	0.0	0.0	0.000
Moss Creek Corp.	9.3	15.2	12.7	9.7	46.9	0.128	7.7	16.0	13.4	14.3	51.4	0.141
R.C. Neal	6.5	22.0	6.8	7.4	42.7	0.117	6.0	16.6	9.0	9.9	41.5	0.114
Rose Hill Plantation	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.0	0.0	0.0	0.0	0.000
TOTAL	22.9	76.1	51.4	31.6	182.0	0.499	16.4	36.1	23.1	24.2	99.8	0.273
INDUSTRY												
SCWMRD Waddell Mariculture Center	30.3	46.6	118.5	73.6	269.0	0.737	64.2	85.7	85.0	3.2	238.1	0.652
MAINLAND TOTAL	92.1	211.3	252.3	149.5	704.1	1.929	111.8	200.2	176.6	78.5	567.1	1.554

NR, No report

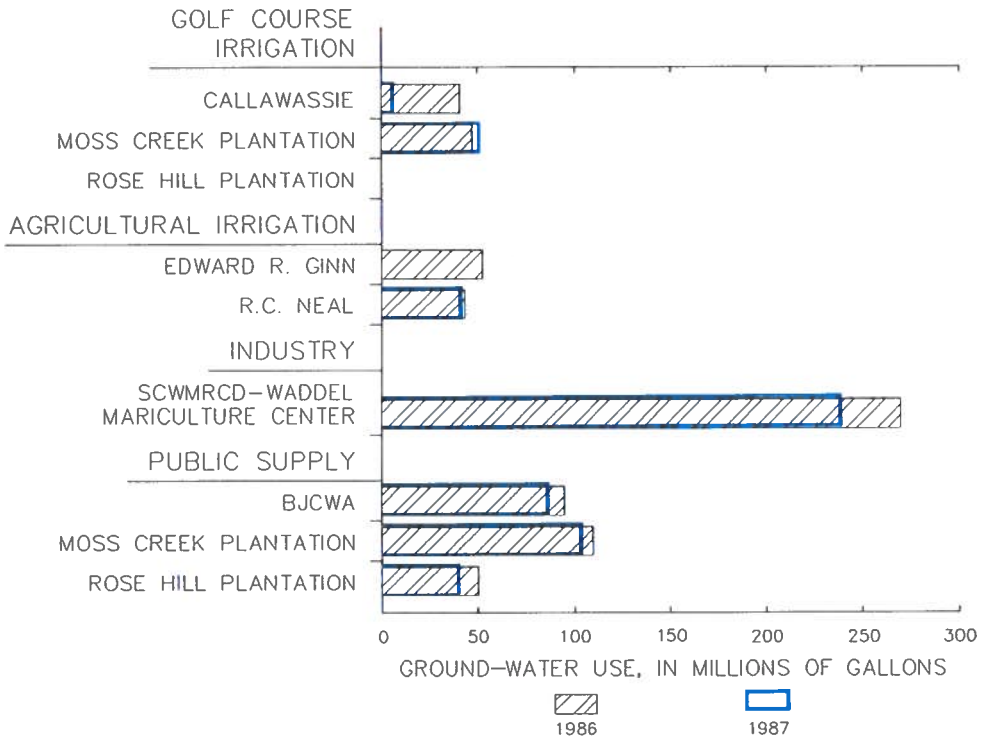

Figure 5. Mainland Class-A total pumping for 1986 and 1987, in millions of gallons.

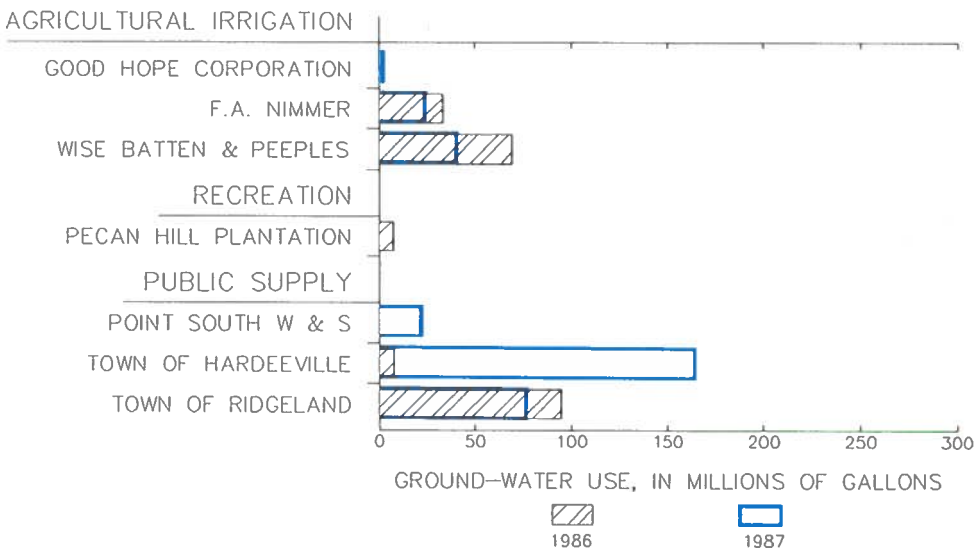

Figure 6. Jasper County Class-A total pumping for 1986 and 1987, in millions of gallons.

(PUDs) established. The population on Daufuskie Island has dropped since the early 1970's, but this situation will be reversed by the development of at least five PUDs. The remainder of southern and southwestern Beaufort County has increased in population since the 1970's, owing to the spillover from Hilton Head Island. Jasper County's population has increased only slightly in the past few years (S.C. Statistical Abstracts, 1984).

A major assumption in projecting future population is that present trends will continue, and sometimes they do not. Reasons for alterations in trends are changes in governmental policies, economic and social conditions, technology, and worldwide events and the way humans will react to these changes (Otten, 1985). Some examples of factors that cannot be predicted but could affect population in the future would be (1) construction of a community-wide waste-water treatment facility, (2) development of large tracts of land in single ownership, mainly in Jasper County and southern Beaufort County, (3) continual economic development based on the resort-residential type of developments. All of these would significantly affect the population in the southern Beaufort County area. Present population and population projections for the four subdivision of the study area are presented.

Hilton Head Island

Hilton Head Island is the nucleus for population growth in southwestern Beaufort County. This island has undergone substantial growth in the past 18 years, with the population increasing from 2,456 to 11,344 in the 1970's (U.S. Bureau of the Census, 1970, 1980). These figures pertain to the permanent population, that which resides on the island for longer than 6 months of the year.

Several projections have been made for Hilton Head Island. These projections show the permanent population growing from 17,500 in 1985 to a maximum of 68,620 in 2005. This assumes an average 5-year growth rate of 41.9 percent from 1990 to 2005. The minimum and maximum growth rate could be 30.9 and 49.9 percent respectively (Town of Hilton Head Island, Staff Projections, 1986) The projected increase in population is based primarily on the expected continuous development of the major PUD's. It is in the years 2005 to 2010 that most of the PUD's will reach their build-out density. Build-out refers to the completion of all phases in a development plan. The fact that Hilton Head Island is a resort-residential area accounts for a substantial population that resides for less than 6 months of the year and is not included in these projections.

Daufuskie Island

The population of Daufuskie Island was only 59 permanent inhabitants in 1980 (Census,1980); however, the population of Daufuskie should have a dramatic increase in the next 5 years with the development of at least five PUD's. The five PUD's would include the development of two on land owned by the Daufuskie Island Land Trust (Webb Tract and Oak Ridge Plantation), one each on lands owned by the Melrose Group (Melrose Plantation) and International Paper Realty(Haig Point), and possibly one on the single-ownership land of Bloody Point. The future population has been projected by the Beaufort County Joint Planning Commission(BCJPC) with the main assumption that the island's economy will depend on its development as a resort-residential area. In order to predict the population growth on Daufuskie Island, the BCJPC divided the island into four areas. These four areas are all land previously owned by the Daufuskie

Table 6. Jasper County Class-A quarterly pumpage for 1986 and 1987, in millions of gallons

	1986						1987					
	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average	First quarter	Second quarter	Third quarter	Fourth quarter	Total	Daily average
PUBLIC SUPPLY												
Point South Water and Sewer	NR	NR	NR	NR	NR		4.9	5.6	6.7	4.8	22.0	0.060
Town of Hardeeville	7.2	0.2	0.1	0.1	7.6	0.021	38.6	41.9	45.5	38.1	164.0	0.449
Town of Ridgeland	21.3	26.5	25.8	20.7	94.3	0.258	20.7	26.4	29.8	NR	76.9	0.211
TOTAL	28.5	26.7	25.9	20.8	101.9	0.279	64.2	73.9	82.0	42.9	262.9	0.720
IRRIGATION												
Good Hope Corporation	0.2	0.1	0.1	0.1	0.3	0.001	0.2	0.1	0.1	0.1	0.3	0.001
F.A. Nimmer	1.4	12.7	12.3	6.1	32.6	0.089	0.0	7.2	6.3	10.3	23.8	0.065
Wise Batten & Peeples	0.0	58.4	10.3	0.0	68.7	0.188	0.0	33.9	6.3	0.0	40.2	0.110
TOTAL	1.6	71.1	22.6	6.1	101.6	0.278	0.2	41.1	12.6	10.4	64.3	0.176
RECREATION												
Gordon E. Gale	0.0	0.0	7.0	3.5	10.5	0.029	0.0	4.5	2.5	3.5	10.6	0.033
Moultrie Plantation	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.0	0.0	0.0	0.0	0.000
Okeetee Club	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.0	0.0	12.2	12.2	0.033
Pecan Hill Plantation	0.0	0.0	7.0	0.0	7.0	0.019	0.0	0.0	0.0	0.0	0.0	0.000
TOTAL	0.0	0.0	14.0	3.5	18.0	0.048	0.0	4.5	2.5	15.7	22.8	0.062
JASPER COUNTY TOTAL	30.1	97.8	62.5	30.4	221.5	0.607	64.4	119.5	97.1	69.0	350.0	0.959

NR, No report

Table 7. Comparison of water costs for several utility companies in the study area

	3,000 gals	5,000 gals	10,000 gals	15,000 gals
BJCWA (Retail)	15.50	21.50	32.75	44.00
Broad Creek PSD	11.00	11.00	11.00	14.30
Coastal Utilities	12.00	12.00	17.00	22.00
Hilton Head Plantation	10.50	13.90	15.00	18.75
Hilton Head Utilities	11.00	11.00	16.00	21.00
Hilton Head No.1 PSD				
In-District	11.50	11.50	15.25	19.00
Out-of-District	15.00	17.25	22.90	28.55
Long Cove	16.00	16.00	21.00	26.00
Melrose	15.00	15.00	18.00	24.00
Sea Pines PSD	10.30	11.40	13.50	14.55
Wexford	12.00	12.00	17.00	22.00

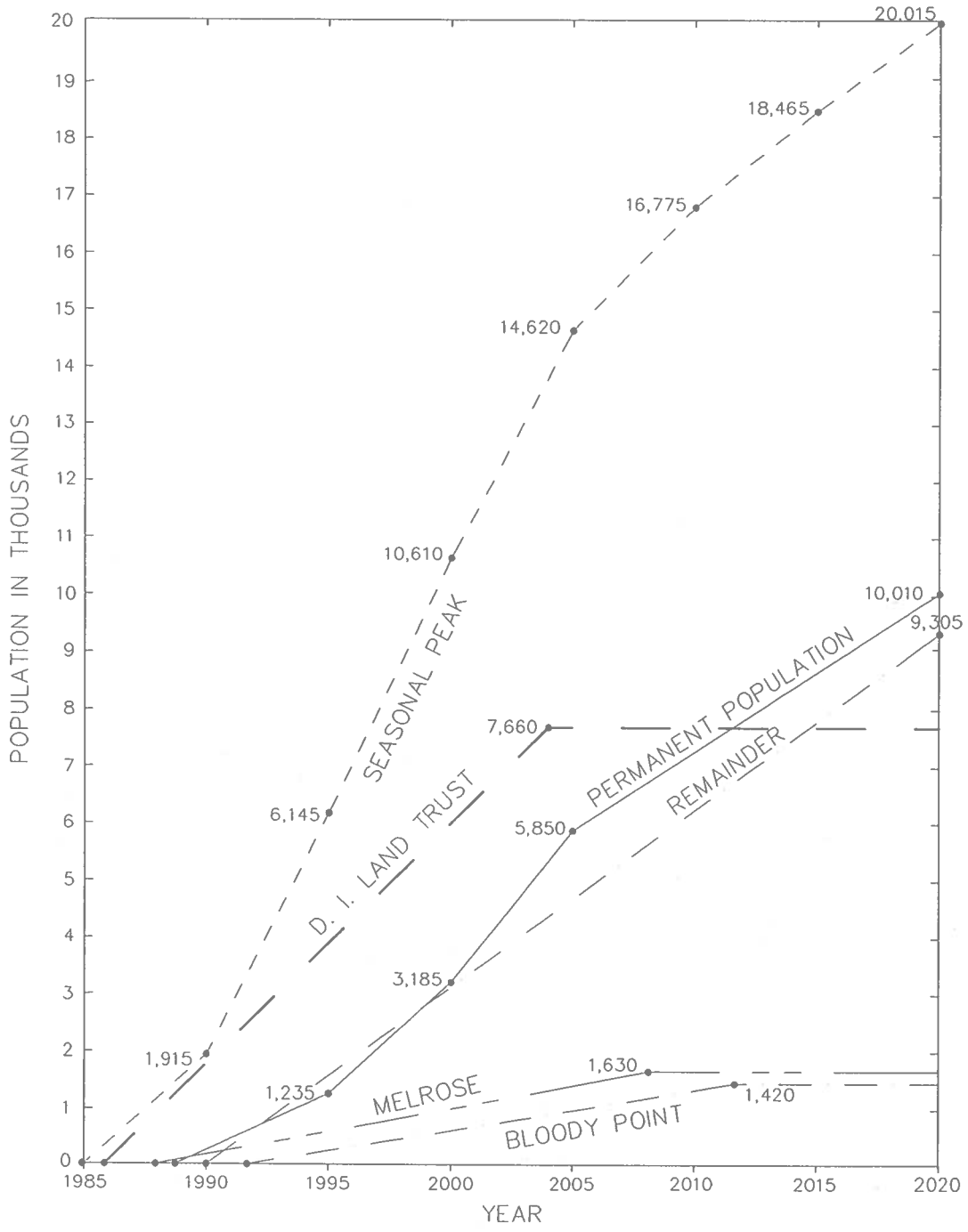

Figure 7. Population projections for Daufuskie Island (Beaufort County Joint Planning Commission, 1985).

Table 8. Population trends and projections for Hilton Head Island, Daufuskie Island, and the mainland portion of southern Beaufort County

	1970	1980	1982	1985	1990	2000
Daufuskie Island	112	59	54	61	1,915	10,610
Town of Hilton Head Island	2,456	11,344	14,483	17,622	25,500	45,574
Town of Bluffton	529	541	623	735	792	851
Remainder of southern Beaufort County[1]	2,065	3,034	3,862	4,660	9,448	18,529
Southern Beaufort County total	5,162	14,978	19,022	23,078	37,655	75,564

Sources: U.S. Bureau of the Census, Census of Population, 1970.
U.S. Bureau of the Census, Census of Population and Housing, 1980.
S.C. State Data Center, Division of Research and Statistical Services, Population Projections, July 1985.
Beaufort County Joint Planning Commission, Staff Projections, March 1987

[1] Does not include Daufuskie Island, Town of Bluffton, and Town of Hilton Head.

Island Land Trust (DILT), the land owned by the Melrose Group, the Bloody Point area, and the remainder of the island. Once these areas were distinguished, the build-out density and time to reach build-out were estimated.

The peak population of Daufuskie Island in the year 2020 has been estimated by the BCJPC to be 20,015 (Fig.7). The permanent population is estimated to be 10,010. Seasonal peak population will grow substantially from 1990 to 2005. The average 5-year growth rate could be 29 percent for this time period. The same is projected for the permanent population. Around the year 2005, the increase will level off to an average 5-year growth rate of 9 percent until the build-out in year 2020.

Mainland

This portion of Beaufort County remains largely wooded with tracts of land in single ownership, although the area is not devoid of development. In the past 10 years, 1,291 single-family lots have been plotted, not including planned unit developments (PUD's). The growth rate of this area will depend on the natural surroundings and the close proximity to Hilton Head Island. Further development is subject to the future use of large tracts of land in single ownership and whether or not there will be a regional sewerage plant. (Southern Beaufort County Plan, 1987).

The population of mainland Beaufort County has undergone a continual increase since 1970. The increase in no way has been as dramatic as that of Hilton Head Island, but the town of Bluffton will grow substantially, owing to established facilities and proximity to Hilton Head.

Population projections for this portion of Beaufort County, as compiled by Beaufort County Joint Planning Commission (1985), are shown in Table 8.

Jasper County

The population of Jasper County has not changed significantly in the past 50 years. The population increased by only about 4,500 from 1930 to 1980 (U.S. Department of Commerce, Bureau of the Census). This situation may change as a result of the completion of Highway I-95, which allows more access to the county from the north and south and faster interchange with Savannah. The two major incorporated towns in Jasper County are Hardeeville and Ridgeland. They account for only 17 percent of the Jasper County population (written communication, B.P. Barber & Associates, 1982), which emphasizes the rural setting that persists in the county. Population projections for Jasper County, as produced by B.P. Barber & Associates (written communication, 1982, vol. III), are shown in Table 9. Population projections for the county (S.C. Statistical Abstract, 1984) show that by the years 1990 and 2000 the population will be 17,900 and 20,700 respectively.

Table 9. Population projections for Jasper County, as compiled by B.P. Barber & Associates, 1982

	1990	2000	2005
Hardeeville	**4,525**	**5,377**	**5,889**
Ridgeland	**6,338**	**7,080**	**7,517**
Grays-Tillman	**4,811**	**5,388**	**5,719**
Jasper County	**15,674**	**17,845**	**19,125**

WATER-USE PROJECTIONS

Estimating future water use is essential for planning to meet the new demand. The difficulty is in correlating all the variables associated with water use. Some of these

variables are population, economics, technology, available resource, price, and the attitude of the public. The National Water Commission suggests using several different schemes employing, in dissimilar ways, the variables associated with water use (Mather, 1984, p 22). The outcome will be a range of future water-use demands that can be evaluated. The projections that follow are based on the assumption that present trends are going to continue. There will probably be some error associated with these projections, and any interpretation should acknowledge the assumptions used. The methodology used to calculate the water use projections for this study varied with each areal subdivision according to the available data.

Hilton Head Island

Three water use projections are presented to allow comparison of the range for future water-use demand. The first method employs a gallons-per-day-per-capita approach, where the per capita value for water use is calculated by considering housing unit projections and an average persons-per-unit value. The second method was used by by Ellison and Present (1988) and is based on averaged meter readings for individual unit types (single-family, mutli-family, hotel, and commercial) in accordance with the Town of Hilton Head Planning Department's housing unit projections. A third method calculates the water-use demand at build-out.

Data required for method 1 were: 1) per capita water usage; 2) average number of occupants per housing unit; and 3) the type and number of housing units per public service district. The national average of water consumed per capita, as presented by Mather (1984, p. 18), is approximately 150 gpd. A determination was made concerning the number of occupants per housing unit was made from a 1985 Special Census on Hilton Head Island. This census showed average persons per unit for the various plantations and non-plantation areas. The total number of housing units in a public service district was divided by the population to produce an average persons per unit value. The third requirement of this method was market-driven-housing-unit projections. Projections were based on 1987 sales that were then projected from 1987 to build-out. These data were provided by the Town of Hilton Head Planning Department. The housing unit projections provided number of single-family, multi-family, and hotel/motel units per public service district. A 200-gpd value was applied to each hotel/motel unit instead of a per capita value. The results are a modified gallons-per-

Table 10. Water use projections, methods 1 and 2, as applied to eight utility companies on Hilton Head Island

METHOD 1 PROJECTIONS

	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Broad Creek PSD	0.673	0.867	0.908	1.023	1.092	1.147	1.192
Forest Beach PSD	1.424	1.714	1.901	1.913	1.919	1.925	2.499
Hilton Head No.1 PSD	1.152	1.345	1.471	1.538	1.601	1.667	4.214
Hilton Head Plantation	0.852	1.278	1.513	1.561	1.736	1.762	2.350
Hilton Head Utilities	0.037	0.043	0.047	0.052	0.055	0.055	0.068
Long Cove Golf Club	0.151	0.230	0.251	0.293	0.315	0.315	0.324
Sea Pines PSD	1.480	1.622	1.852	1.926	1.986	2.115	2.358
Wexford Plantation	0.225	0.324	0.337	0.343	0.391	0.402	0.274
TOTAL	5.994	7.424	8.279	8.650	9.095	9.388	13.464

METHOD 2 PROJECTIONS

	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Broad Creek PSD	1.699	2.141	2.315	2.686	2.990	3.202	3.246
Forest Beach PSD	1.890	2.233	2.472	2.576	2.625	2.721	3.257
Hilton Head No.1 PSD	1.368	1.635	1.800	2.310	2.992	3.575	5.461
Hilton Head Plantation	1.275	2.054	2.420	2.517	2.736	2.821	3.115
Hilton Head Utilities	0.065	0.078	0.088	0.101	0.121	0.137	0.138
Long Cove Golf Club	0.211	0.312	0.368	0.481	0.542	0.551	0.552
Sea Pines PSD	3.044	3.516	3.698	3.958	4.038	4.424	4.708
Wexford Plantation	0.252	0.368	0.392	0.482	0.573	0.640	0.655
TOTAL	9.842	12.426	13.698	15.280	16.836	18.338	21.404

day-per-capita value, where the population figure was estimated by multiplying an average person-per-unit value by the housing unit projections. The housing unit projections also give the amount of commercial square footage. Ellison and Present (1988) used a 170-gpd per 1,000 square feet value. Ellison and Present (1988) have also projected the number of common-ground irrigation systems for each PUD and applied an average value based on meter readings for these units. Table 10 shows the results of method 1 with the addition of a commercial square footage water use estimate and common-ground irrigation value from Ellison and Present (1988). The calculations are in Appendix D.

Method 2 by Ellison and Present (1988) projected future water-use demand by applying an average water-use per unit value to the Town of Hilton Head Planning Department's housing unit projections (Appendix E). This projection is based on meter readings of individual unit types for nine PSD's: single-family, multi-family, hotel/motel, common-ground irrigation (not golf course), and commercial square footage. These average water use figures are multiplied by the respective number of units from the housing units projections. The average daily demand from 1987 to build-out was predicted for each public service district. A second set of projections included golf course irrigation, using projected golf course irrigation from masterplans. Ellison and Present also presented values for total water sales, well pumpage, golf course usage, treated effluent available, and net from the aquifer (total use minus effluent available). All of these are a further manipulation of the first set of projections based on average use and the housing unit projections (Appendix C). Table 10, Method 2 shows Ellison and Present's average water use per unit method.

A third water-use projection was made by calculating the demand at build-out. B.P. Barber & Associates (written communication, 1982) made this projection by utilizing future-development plans submitted to the Beaufort County Joint Planning Commission (BCJPC) and water use data. The BCJPC divides the island into 20 planning districts: it is these planning districts that B.P. Barber & Associates used to summarize water use. Water use data for the period 1981-82 were collected and analyzed with respect to the following types of customers: single-family, multi-family, hotel/motel, sprinklers, restaurants, and retail shops. The analysis provided average daily use per unit and total average daily use per type of unit per planning district. In areas of newer development, such as Wexford Plantation and Long Cove Club, water use data from similar developments were used to predict future water use. The average daily use per unit per quarter for each type of unit was multiplied by the number of units at build-out. This methodology was carried out for each planning district. No effort was made to predict golf course irrigation use, owing to the assumption that all golf course irrigation eventually could be provided by treated effluent. The results of B.P. Barber & Associates are shown in Table 11.

In addition to water use projections for public supply (the three previous methods), golf course irrigation must

Table 11. Summary of future water demand on Hilton Head Island, at the completion of planned development as of 1982 (B.P. Barber & Associates, 1982)

Planning district number and area	Winter usage (mgd)	Spring usage (mgd)	Summer usage (mgd)	Fall usage (mgd)	Total annual usage (Mgals)
1,4 and 5 - Sea Pines PSD	3.011	4.060	5.364	4.787	1,540.44
2 and 3 - Forest Beach	1.034	1.335	1.691	1.430	508.95
6a - Wexford Plantation	0.452	0.435	0.535	0.445	168.03
6b - Long Cove Club	0.327	0.427	0.517	0.401	150.48
7 - Shipyard	0.598	0.795	0.961	0.820	285.66
8 - Palmetto Dunes	1.098	1.679	1.893	1.317	538.83
9 - Bradley Beach/Folly Field	0.624	0.612	1.398	0.470	279.36
10 - Shelter Cove	0.394	0.699	0.691	0.395	196.11
11 - Port Royal Plantation	0.807	1.190	1.321	1.068	394.74
12 and 13 - Mid-Island	0.195	0.215	0.470	0.155	93.15
14 - Beach City/Baygall	0.163	0.153	0.364	0.140	73.80
15 - Gardner Matthews	1.279	1.737	2.189	1.853	635.22
16 - Hilton Head Plantation	2.061	3.385	4.270	3.233	1,165.41
17 - Mt. Calvary Church	0.131	0.146	0.274	0.105	59.04
18 - Spanish Wells	0.082	0.089	0.111	0.077	32.31
19 - Jarvis Creek	0.097	0.113	0.125	0.101	39.24
20 - Jenkins Island	0.266	0.347	0.471	0.402	133.74
Total	12.619	17.417	22.645	17.199	6,294.51

Note: Correlation between Hilton Head Planning Districts and Public Service Districts is shown in Appendix E.

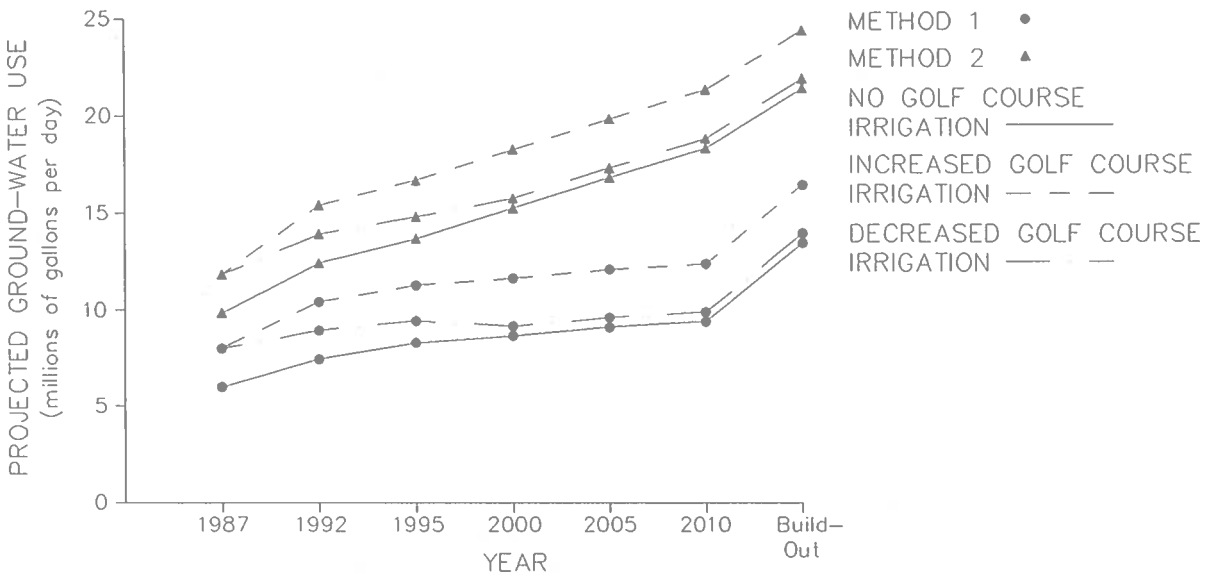

Figure 8. Water-use projections, Hilton Head Island.

also be projected, owing to its dependence on ground water. In 1987 the irrigation of golf courses required 2 mgd. A value of 3 mgd was added to the previous public-supply projection methods from 1992 till build-out. That projection presents water use as if no alternate golf course irrigation sources were to be used and allows for the addition of three or four new golf courses. A second set of projections was made by linearly decreasing the amount of golf course irrigation water from the Floridan aquifer to 500,000 gpd by the year 2000. This second projection is based on the increased use of other sources, such as treated effluent and wells in the shallow aquifer, for golf course irrigation. Figure 8 shows the water-use projections for the two public supply projection methods indivdually and with the addition of the two golf course irrigation projections. The desirability of all golf course irrigation being eventually met with treated effluent is evident, but the fact is that at least 2 mgd is presently being withdrawn from the Flordian aquifer. Because of this dependence on ground water, golf course irrigation is included in the water-use projections.

The accuracy of the projection methods was evaluated by comparing projected and reported water use for 1987. Method 1, without water for commercial square footage and common-ground irrigation, projects 3.5 mgd and is only 31 percent of the reported pumping in 1987. Method 1 with a water estimate for commercial square footage and common-ground irrigation projects 8 mgd, which is 53 percent of the 1987 reported water use. The large underestimate is due to projecting the bare essentials in water use (150 gpd per capita). Method 2 is considerably better, with a projection value of 9.8 mgd, which is 85 percent of the 11.5 mgd that was reported in 1987 for public supply. This was a difference of 15 percent; most water companies allow a 10 percent loss to fire storage and leaks. Either there was more development than projected or there was 1.7 mgd unaccountable.

Daufuskie Island

The water use projections for Daufuskie Island were calculated differently from the projections for Hilton Head Island, owing to the amount of data available. Two methods will be calculated, based on engineering master plans and population projections. The first method utilized population projections produced by the Beaufort County Joint Planning Commission in 1985 (BCJPC, 1985, p.39). The seasonal peak population was based on 2.2 persons per unit for all units. This assumes 100-percent occupancy. The national average of 150 gallons per day per capita was multiplied by 70 percent of the seasonal peak. This allowed for a yearly average of 70-percent occupancy. The same methodology was used to project water use for the individual PUD's (Table 12). This method does not take into consideration the amount of water used by restaurants, beach clubs, golf and tennis clubs, and other common facilities.

The second method employed engineering master plans and applications for ground water use permits. Hill and Company has estimated that the maximum peak demand for potable and irrigation water will be 3.6 mgd. This will be the use required when the Daufuskie Island Land Trust lands (DILT) are completely developed. The potable-water demand was estimated to be 1,158,000 gpd with a peak demand of 2.9 mgd. Irrigation of 3.5 golf courses (18 hole courses) will require 200,000 gpd each (written communication, Hill & Company, 1982, p.10) This 700,000 gpd of irrigation will be supplied from treated

Table 12. Daufuskie Island water-use projections, based on population with 70-percent occupancy and 150-gpd per capita use

	1990	1995	2000	2005	2010
			(millions of gallons per year)		
DILT	69	146	230	294	294
Melrose	10	19	38	54	62
Bloody Point	0	0	19	38	50
Remainder	0	0	123	176	238
Seasonal peak	73	236	407	560	643
Permanent population	10	68	174	320	394

Note: DILT includes Haig Point Plantation

sewage effluent and freshwater ponds. Haig Point, which was Phase I of the DILT Project but is now owned by the International Paper Company, requires an average demand of 0.265 mgd for potable water supply and a maximum of 0.3 mgd for golf course irrigation. Treated effluent will eventually supply 130,000 gpd for golf course irrigation; the remaining 170,000 gpd needed for golf course irrigation must be supplied from freshwater ponds or shallow-aquifer wells (written communication, Hill & Company, 1982, p.11).

Phase II of the Land Trust project includes the Webb Tract and Oak Ridge Plantation. These two areas have maximum peak daily water demands of approximately 2.6 mgals (written communication, Hill & Company, 1982, p.11). Potable water will be 86 percent of this 2.6 mgd, or 2.24 mgd, which is 2.5 times the average per capita use of 150 gpd. Golf Course irrigation will demand 400,000 gpd, for which treated effluent will be used, supplemented by freshwater ponds or wells.

A straight-line projection was applied to obtain yearly water use, from 1988 to 1993, for Haig Point, Webb Tract, and Oak Ridge Plantations. The projection was based on the estimated average demand of 1.9 mgd at build-out and divided over a 6-year period. The amount of effluent available for golf course irrigation was estimated by increasing the amount proportionately until the build-out estimate of 300,000 gpd was reached. The amount of water needed from freshwater ponds or other sources can be estimated as the difference between projected demand and available effluent (Table 13).

The Melrose development at build-out in 1997 is estimated to require 320,185 gpd of potable water (written communication, Thomas & Hutton Engineering Company, 1986) Golf course irrigation will require, on a yearly average, 500,000 gpd. At build-out, 256,000 gpd of treated effluent will be available for golf course irrigation. In the meantime, water from freshwater lagoons will be the primary source for irrigation. As before, a linear projection was assumed to produce a breakdown of water use from the build-out values (Table 14). Golf course irrigation will be supplied by freshwater ponds and treated effluent. It was estimated that 500,000 gpd would be required for golf course irrigation, but on Hilton Head Island 300,000 gpd is adequate to sustain a quality golf course (written communication, Thomas & Hutton Engineering Company, 1986). Therefore, 300,000 gpd was used here as the total quantity for golf course irrigation. The quantity of effluent available each year was subtracted from the total requirement for golf course irrigation to estimate the quantity of water required from freshwater ponds.

Table 13. Water-use projections for Haig Point Plantation, Webb Tract, and Oak Ridge developments

Year	Average total use (gpd)	Average public-supply use (gpd)	Amount of effluent available (gpd)	Golf course irrigation from freshwater lagoons or wells in the shallow aquifer (gpd)
1988	893,133	193,133	50,000	650,000
1989	1,086,266	386,266	100,000	600,000
1990	1,279,399	579,399	150,000	550,000
1991	1,472,532	772,532	200,000	500,000
1992	1,665,665	965,665	250,000	450,000
1993	1,858,800	1,158,800	300,000	400,000

Table 14. Water-use projections for Melrose Plantation, based on master plan build-out figures

Year	Linear projections of ground-water use for public supply (gpd)	(Mgals/year)	Total water required for public supply and golf course irrigation (Mgals/year)	Golf course irrigation required from fresh water lagoons (gpd)	(Mgals/year)	Amount of effluent available for golf course irrigation (gpd)	(Mgals/year)
1989	35,576	12.99	122.49	271,556	99.12	28,444	10.38
1990	71,152	25.97	135.47	243,111	88.74	56,889	20.76
1991	106,728	38.96	148.46	214,667	78.35	85,333	31.15
1992	142,304	51.99	161.44	186,222	67.97	113,778	41.53
1993	177,881	64.93	174.43	157,778	57.59	142,222	51.91
1994	213,457	77.91	187.41	129,333	47.21	170,667	62.29
1995	249,033	90.90	200.40	100,889	36.82	199,111	72.68
1996	284,609	103.88	213.38	72,444	26.44	227,556	83.06
1997	320,185	116.87	226.37	44,000	16.06	256,000	93.44

Mainland

Future water demands for this part of the project area were determined by using masterplan projections and projecting present pumping rates. Water-use projections for Rose Hill Plantation were calculated by utilizing the total number of units approved by the Beaufort Joint Planning Commission. The number of housing units was multiplied by a persons per housing unit value and then multiplied by a gallons-per-day-per-capita value. An annual value for landscape irrigation of 31,000,000 gallons and 5,000,000 gallons for the Golf Club and Equestrian Center, respectively, of Rose Hill was added to housing unit projections. Moss Creek water-use projections were based on master plan figures with an estimated build-out of 1989. The total ground water use in 1989 is estimated to be 464 Mgals. This total use comprises 1,700 housing units, golf course irrigation, and clubhouse use. Potable water accounts for 70 percent of the total annual use at build-out, or 324 Mgals. Golf course irrigation is approximately 111 Mgals, and water for the clubhouse facilities is estimated to be 29 Mgals. The remaining five Class-A users' present water use was projected, assuming no change in pumping rates.

As mentioned earlier, Spring Island will use ground water until a bridge is built, at which time the Island will tap on to the BJCWA distribution system. The master plan projections for potable water demands are included here in the event that the connection with BJCWA fails. The amount of potable water needed at build-out in 1997 is estimated to be 1,037 million gallons per year, based on average daily use. A summary of the mainland portion of southern Beaufort County projections are shown in Table 15.

Table 15. Water-use projections for mainland southern Beaufort County

	1992	1995	2000	2005	2010
	(millions of gallons per day)				
Rose Hill	0.784	0.877	1.038	1.197	1.356
Moss Creek	1.271*	1.271	1.271	1.271	1.271
BJCWA-Bluffton	0.300	0.300	0.315	0.331	0.348
Callawassie Island	0.120	0.120	0.120	0.120	0.120
Gatherings	0.067	0.067	0.067	0.067	0.067
R.C. Neal	0.120	0.120	0.120	0.120	0.120
Waddell Mariculture Center	1.416	1.416	1.416	1.416	1.416
Mainland southern Beaufort County total	4.078	4.171	4.347	4.522	4.698

* Moss Creek Plantation estimated build-out in 1989

Table 16. Water-use projections for Jasper County

	1992	1995	2000	2005	2010
	(millions of gallons per day)				
Public supply	1.846	1.930	2.070	2.210	2.350
Irrigation and recreation	0.250	0.500	0.500	0.500	0.500
Commercial	3.0	3.0	3.0	3.0	3.0
Total	5.096	5.430	5.570	5.710	5.850

Jasper County

Water-use projections for Jasper County were calculated by a per capita method plus the projection of present irrigation and future commercial uses. The population of Jasper County primarily relies on individual wells or water systems distributing only to a small number of homes. A value of 100 gpd per capita was used to project water use for the county. This was used instead of 150 gpd per capita because of the rural setting. The per capita value was multiplied by the population projections for 1990 and 2000 (S.C. Statistical Abstract, 1984). These projections were extrapolated to 2010 by applying the same annual increase as was projected from 1990 to 2000. The irrigation and recreation use in 1987 was 248,000 gpd. A value of 500,000 gpd is projected from 1995 to 2010 for additional irrigation and recreation uses. Future commercial uses will require 3 mgd starting in 1989. The water-use projections for 1992 to 2010 are shown in Table 16.

SUMMARY

The water-use analysis of Hilton Head Island and vicinity was based largely on water-use reports received in 1986 and 1987 from Class-A well owners. There were five general categories of water-use: public supply, commercial irrigation (golf course irrigation), agricultural irrigation, industry, and recreation. Water-use figures for individual Class-A users were presented quarterly and yearly. The total ground water used by each area is summarized by category in Table 17.

The accuracy of the ground-water use figures presented is dependent upon the percentage of water use supplied by Class-A wells versus domestic non-Class-A wells. Jasper County's water-use figures are 20 to 30 percent of the actual water use. The reason is that about 80 percent of the wells are non-Class-A and are not monitored. A second area where the water-use figures are less than actual is the mainland portion of southern Beaufort County. Water-use figures for this area are 80 to 90 percent of the total water use. Hilton Head and Daufuskie Islands' water-use figures are much more accurate, owing to the fact that all but 2 to 5 percent of the population is served by Class-A wells.

Hilton Head Island has many acres of landscaping that are irrigated regularly. An estimate of the water used for this purpose was obtained by subtracting monthly sewage flows from pumping rates and assuming that the difference approximates the domestic irrigation rate. The results show that, on the average, 60 percent of the water pumped for public supply is used for irrigating homeowners' landscaped areas. Domestic irrigation may have used as much as 253 Mgals in 1987.

Table 17. Summary of ground-water use from Class-A wells in 1987

	Public supply	Golf course irrigation	Agricultural irrigation	Industry	Recreation	Total
	(millions of gallons per day)					
Hilton Head Island	11.528	1.765	0.0	0.0	0.0	13.293
Daufuskie Island	0.091	0.138	0.0	0.0	0.0	0.229
Mainland portion of southern Beaufort Co.	0.628	0.161	0.114	0.652	0.0	1.555
Southern Beaufort Co. total	12.247	2.064	0.114	0.652	0.0	15.077
Jasper County	0.720	0.0	0.176	0.0	0.062	0.958

Table 18. Water-use projections

	1992	1995	2000	2005	2010
			(millions of gallons per day)		
Hilton Head Island	15.4	16.7	18.3	19.8	21.3
Daufuskie Island	1.1	1.5	1.5	1.5	1.5
Mainland portion of southern Beaufort County	4.1	4.2	4.3	4.5	4.7
Total southern Beaufort County	20.6	22.4	24.1	25.8	27.5
Jasper County	5.1	5.4	5.6	5.7	5.9
Study area total	25.7	27.8	29.7	31.5	33.4

Water-use costs vary, owing to the many utility companies that distribute water throughout the study area. Ten utility companies' 1987 water costs were presented for a range of use per month. The average cost for 10,000 gallons per month of ground water was $16.67. The minimum and maximum costs were $11.00 (Broad Creek PSD) and $32.75 (BJCWA). The rate structures for these 10 companies are presented in Appendix B.

Projections indicate that by the year 2000 the population of this study area will reach 89,000. Hilton Head Island could have a permanent population between 45,600 and 52,400. Daufuski Island's permanent population could reach 3,200 with the seasonal peak to reach 10,600. The mainland portion of southern Beaufort County's population may double from 9,500 to 19,400 by the year 2000. The population will grow less rapidly in Jasper County, from 14,500 (1980) to 20,500 (2000).

Water-use projections were made by several methods. Three methods described in this report are:

1) Average use per unit type in association with housing unit projections (Ellison and Present, 1988) and the continuation of golf course irrigation from the Floridan aquifer, as applied to Hilton Head Island.

2) Water use calculated by master plans, as applied to Daufuskie Island and mainland portion of southern Beaufort County.

3) Per capita water use multiplied by projected population, as applied to Jasper County.

These methods were chosen for one or more of the following reasons: Method estimates present water use; method projects all types of water use; and method uses only available data.

The projections show that there will be a substantial increase in water demand by the year 2010. Projected demands are summarized in Table 18.

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APPENDIX A. SEWAGE FLOWS AND TOTAL PUMPAGE, AN ESTIMATE OF DOMESTIC IRRIGATION

Sea Pines PSD and Forest Beach PSD.....A-1
Coastal Utilities (Windmill Harbour).....A-2
Long Cove Club Utilities.....A-3
Wexford Plantation Utilities.....A-4

APPENDIX A-1.
Sewage flows and total pumpage, an estimate of domestic irrigation, Sea Pines PSD and Forest Beach PSD

Year	Month	Total effluent (Mgals)	Sea Pines PSD Total pumpage (Mgals)	Forest Beach PSD Total pumpage (Mgals)	Estimated domestic irrigation (Mgals)	Percent of total pumpage
1986	JAN	56.866	62.466	35.160	40.760	42
	FEB	52.933	65.760	43.980	56.757	52
	MAR	60.415	94.823	48.050	82.458	58
	APR	60.936	144.249	49.110	132.423	68
	MAY	58.882	163.600	48.058	152.776	72
	JUN	69.635	151.726	49.103	131.194	65
	JUL	76.153	189.215	57.673	170.735	69
	AUG	78.049	145.071	60.622	127.644	62
	SEP	54.431	140.897	93.070	179.536	77
	OCT	54.712	117.542	76.780	139.610	72
	NOV	48.000	81.730	63.440	97.170	67
	DEC	51.027	62.883	56.778	68.634	57
1987	JAN	57.556	46.960	37.034	26.438	31
	FEB	42.504	37.980	36.732	32.208	43
	MAR	50.384	73.430	31.390	54.436	52
	APR	55.411	113.640	77.271	135.500	71
	MAY	62.294	164.370	86.224	188.300	75
	JUN	71.825	160.680	131.910	220.765	75

APPENDIX A-2.
Sewage flows and total pumpage, an estimate of domestic irrigation Coastal Utilities (Windmill Harbour)

Year	Month	Total effluent (Mgals)	Total pumpage (Mgals)	Estimated domestic irrigation (Mgals)	Percent of total pumpage
1986	JAN	0.867	2.048	1.181	58
	FEB	1.031	1.846	0.815	44
	MAR	0.734	3.764	3.030	80
	APR	0.944	6.341	5.397	85
	MAY	0.977	5.235	4.258	81
	JUN	1.205	5.622	4.417	79
	JUL	0.936	4.564	3.628	79
	AUG	1.362	3.377	2.015	60
	SEP	0.978	1.606	0.628	39
	OCT	0.996	1.387	0.391	28
	NOV	1.176	1.411	0.235	17
	DEC	1.311	0.597	0.714	120
1987	JAN	1.179	0.635	0.544	86
	FEB	0.634	0.601	0.033	5
	MAR	0.255	0.759	0.504	66
	APR	0.178	1.456	1.278	88
	MAY	0.096	2.560	2.464	96
	JUN	0.052	3.254	3.202	98

APPENDIX A-3.
Sewage flows and total pumpage, an estimate of domestic irrigation, Long Cove Club Utilities

Year	Month	Total effluent (Mgals)	Total pumpage (Mgals)	Estimated domestic irrigation (Mgals)	Percent of total pumpage
1986	JAN	0.467	1.598	1.131	71
	FEB	0.539	2.306	1.767	77
	MAR	0.571	3.704	3.133	85
	APR	0.571	10.250	9.679	94
	MAY	0.533	12.899	12.366	96
	JUN	0.585	7.838	7.253	93
	JUL	0.625	13.528	12.903	95
	AUG	0.783	8.178	7.395	90
	SEP	0.576	6.408	5.832	91
	OCT	0.785	7.253	6.468	89
	NOV	0.939	4.387	3.448	79
	DEC	1.197	4.076	2.879	71
1987	JAN	1.468	2.368	0.900	38
	FEB	1.167	3.505	2.338	67
	MAR	1.149	5.056	3.907	77
	APR	0.976	4.986	4.010	80
	MAY	0.881	1.221	0.340	28
	JUN	0.935	3.562	2.627	74

APPENDIX A-4.
Sewage flows and total pumpage, an estimate of domestic irrigation, Wexford Plantation Utilities

Year	Month	Total effluent (Mgals)	Total pumpage (Mgals)	Estimated domestic irrigation (Mgals)	Percent of total pumpage
1986	JAN	0.861	4.229	3.368	80
	FEB	1.096	22.164	21.068	95
	MAR	1.167	4.717	3.550	75
	APR	1.067	13.676	12.609	92
	MAY	0.809	19.920	19.111	96
	JUN	1.229	13.943	12.714	91
	JUL	1.443	21.239	19.796	93
	AUG	1.625	12.136	10.511	87
	SEP	1.108	11.019	9.911	90
	OCT	1.362	10.284	8.922	87
	NOV	1.457	5.585	4.128	74
	DEC	1.954	4.436	2.482	56
1987	JAN	2.655	2.912	0.257	9
	FEB	1.750	2.436	0.686	28
	MAR	1.619	3.487	1.868	54
	APR	1.438	9.902	8.464	85
	MAY	0.881	1.221	0.340	94
	JUN	1.194	15.180	13.986	92

APPENDIX B. RATE STRUCTURES FOR SEVERAL PUBLIC-SUPPLY DISTRIBUTORS IN 1987

Beaufort-Jasper County Water Authority Wholesale Rates

Area 1 $1.1000/1000 gal
Area 2 $2.2959/1000 gal
Area 3 $1.3359/1000 gal

Retail Rates
(Water Authority Customers Only)

$8.50 Minimum bill (includes first 1,000 gal)
3.50 per 1,000 gal for next 2,000 gal
3.00 per 1,000 gal for next 2,000 gal
2.25 per 1,000 gal for next 20,000 gal
1.25 per 1,000 gal over 25,000 gal

Covers North Burton, Lady's Island, St. Helena Island

Sea Pines PSD
Water Rates

Residential & Commercial

Water Usage	Minimum chg./qtr.	Excess over 2,000 gals	Excess over 50,000 gals
5/8″ Meter - A	$25.00	$0.35/1,000	$0.50/1,000
3/4″ Meter - B	$30.00	$0.35/1,000	$0.50/1,000
1″ Meter - C	$57.00	$0.35/1,000	$0.50/1,000
1-1/2″ Meter- D	$115.00	$0.35/1,000	$0.50/1,000

Multiple Units

Minimum quarterly charge for meter size - Provides 12,000 gals/unit.

3/4″ x 5/8″ Meter	$ 0.00 plus $25.50 x number of units
1″ Meter	$ 57.00 plus $25.50 x number of units
1-1/2″ Meter	$115.00 plus $25.50 x number of units
2″ Meter	$180.00 plus $25.50 x number of units

Excess water over 12,000 gals. x number of units $0.35/1,000 gals
Excess water over 50,000 gals. x number of units $0.50/1,000 gals
(Each unit allowed 12,000 gallons)

Hotels/Motels & Campgrounds
Quarterly Rates

3/4″ Meter	$ 0.00 plus $8.00 x number of rooms or site
1″ Meter	$ 57.50 plus $8.00 x number of rooms or site
1-1/2″ Meter	$115.00 plus $8.00 x number of rooms or site
2″ Meter	$180.00 plus $8.00 x number of rooms or site

Excess water over 4,000 gals. x number of units $0.35/1,000 gals
Excess water over 16,000 gals. x number of units $0.50/1,000 gals
$3.00 late penalty charge

Recondition Fees:	Nonpayment	$50.00
	Shut off at owner's request	$25.00

Hilton Head Plantation Utilities, Inc.

Residential Service

Water:

Minimum charge for first 4,000 gallons per month:

Meter Size	Monthly Minimum
5/8″	$ 9.00
3/4″	$10.50
1″	$13.00
1-1/2″	$16.00
2″	$32.00 or $ 9.00 x no. of units whichever is greater
Next 12,000 gals	$0.75/1,000 gals
All over 16,000 gals	$1.25/1,000 gals

Commercial Service

Water:

Minimum charge for first 4,000 gallons per month:

Meter Size	Monthly Minimum
5/8″	$15.00
3/4″	$17.50
1″	$20.00
1-1/2″	$25.00
2″	$50.00 or $16.00 x no. of units, whichever is greater
Next 12,000 gals	$ 0.75/1,000 gals
All over 16,000 gals	$ 1.25/1,000 gals

Hilton Head Utilities,Inc.

Water Service

Minimum quarterly charge for 15,000 gallons	$33.00
Next 10,000	1.00 per 1,000 gals
All over 25,000	1.25 per 1,000 gals

Tap Fee

3/4″	$250.00
1″	300.00
1 1/2″	400.00
2″	500.00

Hilton Head No. 1 PSD
Rate Structure

Usage	Residential	Commercial	
		Type 1	Type 2
	($/1,000 gal)	($/1,000 gal)	
In District Rates			
Base Cost			
Up to 2000 (min)	$10.00	$15.00	$10.00
Next 3,000	$ 0.50	$ 0.75	$ 0.50
Next 12,000	$ 0.75	$ 1.00	$ 0.75
Next 15,000	$ 1.00	$ 1.25	$ 1.00
Over 32,000	$ 1.25	$ 1.50	$ 1.25
Out of District Rates			
Base Cost			
Up to 2,000 (min)	$15.00	$22.50	$15.00
Next 3,000	$ 0.75	$ 1.13	$ 0.75
Next 12,000	$ 1.13	$ 1.50	$ 1.13
Next 15,000	$ 1.50	$ 1.88	$ 1.50
Over 32,000	$ 1.88	$ 2.25	$ 1.88

Note: Commercial Type 1 and Type 2 rates apply to business and lodging facilities, respectively.

Wexford Utilities, Inc.
Water Usage Rates

	Minimum chg./qtr.	Excess over 15,000 gals.
Domestic Water	$36.00	$1.00/1,000 gals
Irrigation	$36.00	$1.00/1,000 gals
Commercial: 3/4" meter or smaller	$36.00	$1.00/1,000 gals
1" and 1 1/2" meters	$45.00	$1.00/1,000 gals

Long Cove Club Utilities, Inc.

Water Usage Rates

	Minimum chg./qtr.	Excess over 15,000 gals.
Domestic Water	$42.00	$1.00/1,000 gals
Commercial:		
3/4" Meter	$48.00	$1.00/1,000 gals
1" Meter	$54.00	$1.00/1,000 gals
1 1/2" Meter	$75.00	$1.00/1,000 gals

Hotels & Motels
First 6,000 gallons per quarter per room $18.00/room
Usage over 6,000 gallons per quarter per room $1.00/1,000 gals

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Coastal Utilities, Inc.

Water Usage

	Minimum chg./qtr.	Excess over 15,000 gals.
Domestic Water	$36.00	$1.00/1,000 gals
Landscape Irrigation	$36.00	$1.00/1,000 gals
Commercial:		
3/4" Meter	$36.00	$1.00/1,000 gals
1" - 1 1/2" Meter	$45.00	$1.00/1,000 gals
2" Meter	$90.00	$1.00/1,000 gals
Multiple Units	$36.00/unit	$1.00/1,000 gals
RV & Trailer Park	$36.00	$1.00/1,000 gals

Broad Creek PSD

Water Rates

Residential		
Single Family; Condominiums; Apartments: Charge per meter		
Minimum Charge or	first 12,000 gals	$11.00
	Next 13,000 gals	$1.10/1,000 gals
	Over 25,000 gals	$3.00/1,000 gals
Commercial		
5/8", 3/4", 1"	First 12,000 gals	$11.00
	Next 13,000 gals	$1.10/1,000 gals
	Over 25,000 gals	$3.00/1,000 gals
1 1/2"	First 25,000 gals	$30.00 + $1.10/1,000 gals
	Over 25,000 gals	$3.00/1,000 gals
2"	First 100,000 gals	$125.00 + $1.10/1,000 gals
	Over 100,000 gals	$2.75/1,000 gals
3"	First 100,000 gals	$245.00 + $1.10/1,000 gals
	Over 100,000 gals	$2.50/1,000 gals
4"	First 100,000 gals	$450.00 + $1.10/1,000 gals
	Over 100,000 gals	$2.25/1,000 gals
6"		$1,050 + $1.10/1,000 gals
8"		$1,800 + $1.10/1,000 gals

Melrose Utility Company, Inc.

Water Usage Rates

Residential	
Tapping fee & 3/4" meter/box	$ 500.00
Base Monthly Charge, 0 - 7,500 gals	$ 15.00
Each 1,000 gals over 7,500 gals/month	$ 1.20
Irrigation	
Tapping fee & 3/4" meter/box	$ 500.00
Each 1,000 gals used per month	$ 1.20
Commercial	
Tapping Fee per Hotel or Inn Room	$ 250.00
Tapping Fee per Club Cottage	$ 400.00
Tapping Fee up to 1-1/2" water meter	$ 500.00
Tapping Fee for 2" & 3" meter	$1,500.00
Tapping Fee for 6" meter	$3,500.00
Base Monthly charge, 0 - 7,500 gals	21.00
Each 1,000 gals over 7,500 gals/month	1.20
Irrigation	
Tapping fee & 3/4" meter/box	$ 500.00
Each 1,000 gals used per month	$ 1.20

APPENDIX C. WATER-USE PROJECTIONS, HILTON HEAD ISLAND 1987 TO 2010 (Ellison and Present, 1988)

Service area	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Sea Pines PSD							
Water sales	3.044	3.516	3.698	3.958	4.038	4.424	4.708
Well pumpage	3.349	3.867	4.067	4.354	4.442	4.866	5.179
Golf course demand	0.630	0.630	0.630	0.630	0.630	0.630	0.630
Sub total	3.979	4.497	4.697	4.984	5.072	5.496	5.809
Treated effluent available	1.136	1.310	1.382	1.488	1.544	1.710	1.877
Net from aquifer	2.843	3.187	3.315	3.495	3.528	3.786	3.932
Forest Beach PSD							
Water sales	1.890	2.233	2.472	2.576	2.625	2.721	3.257
Well pumpage	2.079	2.456	2.720	2.833	2.888	2.993	3.583
Golf course demand	0.390	0.390	0.390	0.390	0.390	0.390	0.390
Sub total	2.469	2.846	3.110	3.223	3.278	3.383	3.973
Treated effluent available	1.033	1.135	1.222	1.306	1.341	1.410	1.884
Net from aquifer	1.436	1.712	1.888	1.917	1.937	1.973	2.088
Broad Creek PSD							
Water sales	1.699	2.141	2.315	2.686	2.990	3.202	3.246
Well pumpage	1.869	2.355	2.547	2.955	3.289	3.523	3.571
Golf course demand	1.271	1.271	1.271	1.271	1.271	1.271	1.271
Sub total	3.140	3.626	3.818	4.226	4.560	4.794	4.842
Treated effluent available	0.701	0.889	0.961	1.106	1.227	1.316	1.360
Net from aquifer	2.440	2.736	2.857	3.120	3.333	3.477	3.482
Hilton Head #1 PSD							
Water sales	1.368	1.635	1.800	2.310	2.992	3.575	5.461
Well pumpage	1.505	1.799	1.980	2.541	3.291	3.932	6.007
Golf course demand	0.690	1.235	1.235	1.235	1.235	1.235	1.235
Sub total	2.195	3.034	3.215	3.776	4.526	5.167	7.242
Treated effluent available	0.755	0.890	0.987	1.407	1.957	2.418	4.290
Net from aquifer	1.439	2.144	2.229	2.369	2.569	2.749	2.953
Hilton Head Planatation							
Water sales	1.275	2.054	2.420	2.517	2.736	2.821	3.115
Well pumpage	1.403	2.259	2.662	2.769	3.009	3.103	3.426
Golf course demand	0.655	0.740	0.740	0.740	0.740	0.740	0.740
Sub total	2.058	2.999	3.402	3.509	3.749	3.843	4.166
Treated effluent available	0.601	0.826	0.961	1.186	1.411	1.636	1.840
Net from aquifer	1.457	2.173	2.441	2.323	2.338	2.207	2.326

Service area	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Wexford Plantation							
Water sales	0.252	0.368	0.392	0.482	0.573	0.640	0.655
Well pumpage	0.277	0.405	0.432	0.531	0.631	0.704	0.720
Golf course demand	0.252	0.252	0.252	0.252	0.252	0.252	0.252
Sub total	0.529	0.657	0.684	0.783	0.883	0.956	0.972
Treated effluent available	0.033	0.046	0.058	0.094	0.125	0.145	0.153
Net from aquifer	0.496	0.611	0.626	0.689	0.758	0.811	0.819
Long Cove Club							
Water sales	0.211	0.312	0.368	0.481	0.542	0.551	0.552
Well pumpage	0.233	0.343	0.405	0.529	0.597	0.606	0.607
Golf course demand	0.232	0.232	0.232	0.232	0.232	0.232	0.232
Sub total	0.465	0.575	0.637	0.761	0.829	0.838	0.839
Treated effluent available	0.090	0.115	0.132	0.168	0.186	0.195	0.196
Net from aquifer	0.375	0.460	0.504	0.595	0.642	0.643	0.643
Windmill Harbour							
Water sales	0.037	0.090	0.144	0.169	0.218	0.267	0.272
Well pumpage	0.040	0.099	0.158	0.186	0.240	0.294	0.299
Golf course demand	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub total	0.040	0.099	0.158	0.186	0.240	0.294	0.299
Treated effluent available	0.029	0.050	0.062	0.083	0.103	0.124	0.272
Net from aquifer	0.011	0.049	0.096	0.103	0.137	0.170	0.027
Hilton Head Water Co.							
Water sales	0.065	0.078	0.088	0.101	0.121	0.137	0.138
Well pumpage	0.072	0.086	0.097	0.112	0.133	0.151	0.152
Golf course demand	0.067	0.067	0.067	0.067	0.067	0.067	0.067
Sub total	0.139	0.153	0.164	0.179	0.200	0.218	0.219
Treated effluent available	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Net from aquifer	0.139	0.153	0.164	0.179	0.200	0.218	0.219
Total Island							
Water sales	9.842	12.426	13.698	15.280	16.836	18.338	21.404
Well pumpage	10.826	13.669	15.068	16.808	18.519	20.172	23.544
Golf course demand	4.187	4.817	4.817	4.817	4.817	4.817	4.817
Sub total	15.013	18.486	19.885	21.625	23.336	24.989	28.361
Treated effluent available	4.378	5.261	5.765	6.837	7.894	8.954	11.872
Net from aquifer	10.635	13.225	14.120	14.788	15.442	16.034	16.490

Service area	Average daily use (gpd)	1987	1992	1995	2000	2005	2010	Build-out
				(number of units)				
Sea Pines PSD								
Single family homes	628	2,979	3,259	3,475	3,835	3,835	4,247	4,247
Multi-family homes	206	2,427	2,427	2,515	2,674	2,957	3,257	3,663
Hotels/Motels, rooms	282	0	100	200	200	248	448	970
Commercial, 1000 sq ft	170	596.6	1,193.1	1,193.1	1,201.1	1,251.1	1,301.1	1,618.8
Irrigation	3,690	155	200	200	200	200	200	200
Forest Beach PSD								
Single family homes	319	569	614	641	736	826	948	1,359
Multi-family homes	209	4,456	4,956	5,256	5,436	5,536	5,786	6,180
Hotels/Motels, rooms	282	931	1,091	1,438	1,438	1,438	1,438	1,438
Commercial, 1000 sq ft	170	844.2	846.2	856.2	1,064.2	1,064.2	1,089.2	2,987.8
Irrigation	6,870	54	80	90	90	90	90	90
Broad Creek PSD								
Single family homes	630	599	749	869	1,094	1,319	1,398	1,398
Multi-family homes	342	2,607	3,207	3,492	3,967	4,442	4,917	4,917
Hotels/Motels, rooms	288	852	1,092	1,092	1,323	1,323	1,323	1,323
Commercial, 1000 sq ft	170	526.6	766.6	776.6	776.6	776.6	776.6	1,032.6
Irrigation	2,647	36	48	48	48	48	48	48
Hilton Head #1 PSD								
Single family homes	324	1,385	1,675	1,925	3,118	4,721	6,138	8,013
Multi-family homes	118	3,090	3,140	3,390	4,285	5,127	5,702	13,427
Hotels/Motels, rooms	280	418	693	693	693	693	693	1,118
Commercial, 1000 sq ft	170	1,696.3	1,896.3	1,916.3	2,020.3	2,390.3	2,718.3	4,181.3
Irrigation	5,137	29	40	50	50	50	50	50
Hilton Head Plantation								
Single family homes	543	1,588	2,788	3,268	3,290	3,290	3,290	3,290
Multi-family homes	173	419	469	549	724	924	1,224	2,440
Hotels/Motels, rooms	280	0	136	136	136	136	136	220
Commercial, 1000 sq ft	170	238.9	268.9	368.9	688.9	888.9	1,085.9	1,439.0
Irrigation	3,000	100	125	150	150	200		

Service area	Average daily use (gpd)	1987	1992	1995	2000	2005	2010	Build-out
				(number of units)				
Wexford Plantation								
Single family homes	745	57	92	116	211	326	416	429
Multi-family homes	200	0	0	0	96	96	96	96
Hotels/Motels, rooms	280	0	0	0	0	0	0	0
Commercial, 1000 sq ft	170	121.6	148.6	188.6	188.6	218.6	218.6	246.0
Irrigation	2,740	69	100	100	100	100	100	100
Long Cove Club								
Single family homes	745	118	218	293	443	525	525	525
Multi-family homes	200	0	0	0	0	0	0	0
Hotels/Motels, rooms	280	114	114	114	114	114	114	114
Commercial, 1000 sq ft	170	303.8	323.8	323.8	333.8	333.8	383.8	388.2
Irrigation	2,500	16	25	25	25	25	25	25
Windmill Harbour								
Single family homes	528	14	39	44	84	139	194	200
Multi-family homes	202	21	21	71	91	191	291	300
Hotels/Motels, rooms	280	0	100	200	200	200	200	200
Commercial, 1000 sq ft	170	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation	2,500	10	15	20	20	20	20	20
Hilton Head Water Co.								
Single family homes	655	75	95	110	130	160	185	186
Multi-family homes	191	0	0	0	0	0	0	0
Hotels/Motels, rooms	280	0	0	0	0	0	0	0
Commercial, 1000 sq ft	170	20.0	22.0	22.0	22.0	22.0	22.0	22.0
Irrigation	2,500	5	5	5	5	5	5	5
Total Island								
Single family homes		7,384	9,529	10,741	12,941	15,141	17,341	19,647
Multi-family homes		13,020	14,220	15,273	17,273	19,273	21,273	31,023
Hotels/Motels, rooms		2,315	3,326	3,873	4,104	4,152	4,352	5,383
Commercial, 1000 sq ft		4,384.0	5,465.5	5,645.5	6,295.5	6,945.5	7,595.5	11,915.8
Irrigation		474	638	688	688	738	738	738

Service area	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Sea Pines PSD							
Single family homes	1.871	2.047	2.182	2.408	2.408	2.667	2.667
Multi-family homes	0.500	0.500	0.518	0.551	0.609	0.671	0.755
Hotels/Motels, rooms	0.000	0.028	0.056	0.056	0.070	0.126	0.274
Commercial, sq ft	0.101	0.203	0.203	0.204	0.213	0.221	0.275
Irrigation	0.572	0.738	0.738	0.738	0.738	0.738	0.738
Total	3.044	3.516	3.698	3.958	4.038	4.424	4.708
Forest Beach PSD							
Single family homes	0.182	0.196	0.204	0.235	0.263	0.302	0.434
Multi-family homes	0.931	1.036	1.099	1.136	1.157	1.209	1.292
Hotels/Motels, rooms	0.263	0.308	0.406	0.406	0.406	0.406	0.406
Commercial, sq ft	0.144	0.144	0.146	0.181	0.181	0.185	0.508
Irrigation	0.371	0.550	0.618	0.618	0.618	0.618	0.618
Total	1.890	2.233	2.472	2.576	2.625	2.721	3.257
Broad Creek PSD							
Single family homes	0.377	0.472	0.547	0.689	0.831	0.881	0.881
Multi-family homes	0.892	1.097	1.194	1.357	1.519	1.682	1.682
Hotels/Motels, rooms	0.245	0.314	0.314	0.381	0.381	0.381	0.381
Commercial, sq ft	0.090	0.130	0.132	0.132	0.132	0.132	0.176
Irrigation	0.095	0.127	0.127	0.127	0.127	0.127	0.127
Total	1.699	2.141	2.315	2.686	2.990	3.202	3.246
Hilton Head #1 PSD							
Single family homes	0.449	0.543	0.624	1.010	1.530	1.989	2.596
Multi-family homes	0.365	0.371	0.400	0.506	0.605	0.673	1.584
Hotels/Motels, rooms	0.117	0.194	0.194	0.194	0.194	0.194	0.313
Commercial, sq ft	0.288	0.322	0.326	0.343	0.406	0.462	0.711
Irrigation	0.149	0.205	0.257	0.257	0.257	0.257	0.257
Total	1.368	1.635	1.800	2.310	2.992	3.575	5.461
Hilton Head Plantation							
Single family homes	0.862	1.514	1.775	1.786	1.786	1.786	1.786
Multi-family homes	0.072	0.081	0.095	0.125	0.160	0.212	0.422
Hotels/Motels, rooms	0.000	0.038	0.038	0.038	0.038	0.038	0.062
Commercial, sq ft	0.041	0.046	0.063	0.117	0.151	0.185	0.245
Irrigation	0.300	0.375	0.450	0.450	0.600	0.600	0.600
Total	1.275	2.054	2.420	2.517	2.736	2.821	3.115

Service area	1987	1992	1995	2000	2005	2010	Build-out
			(millions of gallons per day)				
Wexford Plantation							
Single family homes	0.042	0.069	0.086	0.157	0.243	0.310	0.320
Multi-family homes	0.000	0.000	0.000	0.019	0.019	0.019	0.019
Hotels/Motels, rooms	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Commercial, sq ft	0.021	0.025	0.032	0.032	0.037	0.037	0.042
Irrigation	0.189	0.274	0.274	0.274	0.274	0.274	0.274
Total	0.252	0.368	0.392	0.482	0.573	0.640	0.655
Long Cove Club							
Single family homes	0.088	0.162	0.218	0.330	0.391	0.391	0.391
Multi-family homes	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hotels/Motels, rooms	0.032	0.032	0.032	0.032	0.032	0.032	0.032
Commercial, sq ft	0.052	0.055	0.055	0.057	0.057	0.065	0.066
Irrigation	0.040	0.063	0.063	0.063	0.063	0.063	0.063
Total	0.211	0.312	0.368	0.481	0.541	0.551	0.552
Windmill Harbour							
Single family homes	0.007	0.021	0.023	0.044	0.073	0.102	0.106
Multi-family homes	0.004	0.004	0.014	0.018	0.039	0.059	0.061
Hotels/Motels, rooms	0.000	0.028	0.056	0.056	0.056	0.056	0.056
Commercial, sq ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Irrigation	0.025	0.038	0.050	0.050	0.050	0.050	0.050
Total	0.037	0.090	0.144	0.169	0.218	0.267	0.272
Hilton Head Water Co.							
Single family homes	0.049	0.062	0.072	0.085	0.105	0.121	0.122
Multi-family homes	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hotels/Motels, rooms	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Commmercial, sq ft	0.003	0.004	0.004	0.004	0.004	0.004	0.004
Irrigation	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Total	0.065	0.078	0.088	0.101	0.121	0.137	0.138
Total Island							
Single family homes	3.928	5.085	5.732	6.746	7.631	8.550	9.302
Multi-family homes	2.764	3.088	3.320	3.712	4.108	4.524	5.814
Hotels/Motels, rooms	0.657	0.942	1.096	1.163	1.177	1.233	1.523
Commercial, sq ft	0.739	0.929	0.960	1.070	1.181	1.291	2.026
Irrigation	1.754	2.382	2.589	2.589	2.739	2.739	2.739
Total	9.842	12.426	13.698	15.280	16.836	18.338	21.404

Location	Number of 18 hole courses	Well water MGD	Reclaimed water MGD	Surface water MGD	Total water use MGD
Sea Pines Plantation	4	0.630	0.561	0.000	1.191
Shipyard Plantation	1.5	0.390	0.300	0.000	0.690
Palmetto Dunes	3	1.271	0.536	0.000	1.807
Port Royal Plantation	3	0.690	0.710	0.000	1.400
Hilton Head Plantation	5	0.740	0.289	0.000	1.029
Spanish Wells	0.5	0.067	0.000	0.000	0.067
Long Cove Club	1	0.232	0.022	0.000	0.254
Wexford Plantation	1	0.252	0.040	0.000	0.292
Indigo Run	2	0.545	0.000	0.000	0.545
Total average daily water use		4.817	2.458	0.000	7.275

	1987	1992	1995	2000	2005	2010	Build-out
	(millions of gallons per day)						
Sea Pines PSD	1.136	1.310	1.382	1.488	1.544	1.710	1.877
Forest Beach PSD	1.033	1.135	1.222	1.306	1.341	1.410	1.884
Broad Creek PSD	0.701	0.889	0.961	1.106	1.227	1.316	1.360
Hilton Head #1 PSD	0.755	0.890	0.987	1.407	1.957	2.418	4.290
Hilton Head Plantation	0.601	0.826	0.961	1.186	1.411	1.636	1.840
Wexford Plantation	0.033	0.046	0.058	0.094	0.125	0.145	0.153
Long Cove Club	0.090	0.115	0.132	0.168	0.186	0.195	0.196
Windmill Harbour	0.029	0.050	0.062	0.083	0.103	0.124	0.272
Total flows	4.378	5.261	5.765	6.837	7.894	8.954	11.872

APPENDIX D. WATER-USE PROJECTIONS METHOD 1, HILTON HEAD ISLAND 1987 TO 2010

PROJECTIONS 1987

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	599	0.66	150	59,301
MULTI-FAMILY	2607	0.66	150	258,093
HOTEL/MOTEL	852	0	200	170,400
COMMERCIAL sq ft	526,613		170	89,524
IRRIGATION	36		2,647	95,292

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	569	0.96	150	81,936
MULTI-FAMILY	4456	0.96	150	641,664
HOTEL/MOTEL	931	0	200	186,200
COMMERCIAL sq ft	844,185		170	143,511
IRRIGATION	54		6,870	370,980

HILTON HEAD No. 1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,385	0.94	150	195,285
MULTI-FAMILY	3,090	0.94	150	435,690
HOTEL/MOTEL	418	0	200	83,600
COMMERCIAL sq ft	1,696,296		170	288,370
IRRIGATION	29		5,137	148,973

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,588	1.7	150	404,940
MULTI-FAMILY	419	1.7	150	106,845
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	238,912		170	40,615
IRRIGATION	100		3,000	300,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	75	1.87	150	21,038
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	118	1.8	150	31,860
MULTI-FAMILY	18	1.8	150	4,860
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	303,796		170	51,645
IRRIGATION	16		2,500	40,000

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	2,979	0.97	150	433,445
MULTI-FAMILY	2,427	0.97	150	353,129
HOTEL/MOTEL	100	0	200	20,000
COMMERCIAL sq ft	596,555		170	101,414
IRRIGATION	155		3,690	571,950

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	57	1.8	150	15,390
MULTI-FAMILY	0	1.8	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	121,600		170	20,672
IRRIGATION	69		2,740	189,060

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.488	0.090	0.095	0.673	245.503
FOREST BEACH PSD	0.910	0.144	0.371	1.424	519.866
HILTON HEAD No.1 PSD	0.715	0.288	0.149	1.152	420.450
HILTON HEAD PLANTATION	0.512	0.041	0.300	0.852	311.126
HILTON HEAD UTILITIES	0.021	0.003	0.013	0.037	13.482
LONG COVE CLUB	0.060	0.052	0.040	0.151	55.175
SEA PINES PSD	0.807	0.101	0.572	1.480	540.177
WEXFORD PLANTATION	0.015	0.021	0.189	0.225	82.170
TOTAL	3.526	0.739	1.729	5.994	2,187.950

PROJECTIONS 1992

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	749	0.66	150	74,151
MULTI-FAMILY	3,207	0.66	150	317,493
HOTEL/MOTEL	1,092	0	200	218,400
COMMERCIAL sq ft	766,613		170	130,324
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	614	0.96	150	88,416
MULTI-FAMILY	4,956	0.96	150	713,664
HOTEL/MOTEL	1,091	0	200	218,200
COMMERCIAL sq ft	846,185		170	143,851
IRRIGATION	80		6,870	549,600

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,675	0.94	150	236,175
MULTI-FAMILY	3,140	0.94	150	442,740
HOTEL/MOTEL	693	0	200	138,600
COMMERCIAL sq ft	1,896,296		170	322,370
IRRIGATION	40		5,137	205,480

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	2,788	1.7	150	710,940
MULTI-FAMILY	469	1.7	150	119,595
HOTEL/MOTEL	136	0	200	27,200
COMMERCIAL sq ft	268,912		170	45,715
IRRIGATION	125		3,000	375,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	95	1.87	150	26,648
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	218	1.8	150	58,860
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	323,796		170	55,045
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,259	0.97	150	474,185
MULTI-FAMILY	2,427	0.97	150	353,129
HOTEL/MOTEL	100	0	200	20,000
COMMERCIAL sq ft	1,193,110		170	202,829
IRRIGATION	155		3,690	571,950

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	92	1.8	150	24,840
MULTI-FAMILY	0	1.8	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	148,600		170	25,262
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.610	0.130	0.127	0.867	316.610
FOREST BEACH PSD	1.020	0.144	0.550	1.714	625.512
HILTON HEAD No.1 PSD	0.818	0.322	0.205	1.345	491.058
HILTON HEAD PLANTATION	0.858	0.046	0.375	1.278	466.634
HILTON HEAD UTILITIES	0.027	0.003	0.013	0.043	15.530
LONG COVE CLUB	0.113	0.055	0.063	0.230	84.043
SEA PINES PSD	0.847	0.203	0.572	1.622	592.063
WEXFORD PLANTATION	0.025	0.025	0.274	0.324	118.297
TOTAL	4.317	0.929	2.178	7.424	2,709.748

PROJECTIONS 1995

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	869	0.66	150	86,031
MULTI-FAMILY	3,492	0.66	150	345,708
HOTEL/MOTEL	1,092	0	200	218,400
COMMERCIAL sq ft	766,613		170	130,324
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	641	0.96	150	92,304
MULTI-FAMILY	5,256	0.96	150	756,864
HOTEL/MOTEL	1,438	0	200	287,600
COMMERCIAL sq ft	856,185		170	145,551
IRRIGATION	90		6,870	618,300

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,925	0.94	150	271,425
MULTI-FAMILY	3,390	0.94	150	477,990
HOTEL/MOTEL	693	0	200	138,600
COMMERCIAL sq ft	1,916,296		170	325,770
IRRIGATION	50		5,137	256,850

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,268	1.7	150	833,340
MULTI-FAMILY	549	1.7	150	139,995
HOTEL/MOTEL	136	0	200	27,200
COMMERCIAL sq ft	368,912		170	62,715
IRRIGATION	150		3,000	450,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	110	1.87	150	30,855
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	293	1.8	150	79,110
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	323,796		170	55,045
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,475	0.97	150	505,613
MULTI-FAMILY	2,515	0.97	150	365,933
HOTEL/MOTEL	200	0	200	40,000
COMMERCIAL sq ft	1,193,110		170	202,829
IRRIGATION	200		3,690	738,000

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	116	1.8	150	31,320
MULTI-FAMILY	0	1.8	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	188,600		170	32,062
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.650	0.130	0.127	0.908	331.245
FOREST BEACH PSD	1.137	0.146	0.618	1.901	693.726
HILTON HEAD No.1 PSD	0.888	0.326	0.257	1.471	536.782
HILTON HEAD PLANTATION	1.001	0.063	0.450	1.513	552.336
HILTON HEAD UTILITIES	0.031	0.003	0.013	0.047	17.006
LONG COVE CLUB	0.133	0.055	0.063	0.251	91.434
SEA PINES PSD	0.912	0.203	0.738	1.852	676.116
WEXFORD PLANTATION	0.031	0.032	0.274	0.337	123.144
TOTAL	4.782	0.958	2.539	8.279	3,021.850

PROJECTIONS 2000

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,094	0.66	150	108,306
MULTI-FAMILY	3,967	0.66	150	392,733
HOTEL/MOTEL	1,323	0	200	264,600
COMMERCIAL sq ft	766,613		170	130,324
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	686	0.96	150	98,784
MULTI-FAMILY	5,286	0.96	150	761,184
HOTEL/MOTEL	1,438	0	200	287,600
COMMERCIAL sq ft	864,185		170	146,911
IRRIGATION	90		6,870	618,300

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	2,400	0.94	150	338,400
MULTI-FAMILY	3,390	0.94	150	477,990
HOTEL/MOTEL	693	0	200	138,600
COMMERCIAL sq ft	1,916,296		170	325,770
IRRIGATION	50		5,137	256,850

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,290	1.7	150	838,950
MULTI-FAMILY	699	1.7	150	178,245
HOTEL/MOTEL	136	0	200	27,200
COMMERCIAL sq ft	388,912		170	66,115
IRRIGATION	150		3,000	450,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	130	1.87	150	36,465
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	443	1.8	150	119,610
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	333,796		170	56,745
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,835	0.97	150	557,993
MULTI-FAMILY	2,649	0.97	150	385,430
HOTEL/MOTEL	200	0	200	40,000
COMMERCIAL sq ft	1,201,110		170	204,189
IRRIGATION	200		3,690	738,000

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	161	1.8	150	43,470
MULTI-FAMILY	96	1.8	150	25,920
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	0		170	0
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.766	0.130	0.127	1.023	373.402
FOREST BEACH PSD	1.148	0.147	0.618	1.913	698.164
HILTON HEAD No.1 PSD	0.955	0.326	0.257	1.538	561.228
HILTON HEAD PLANTATION	1.044	0.066	0.450	1.561	569.586
HILTON HEAD UTILITIES	0.036	0.003	0.013	0.052	19.113
LONG COVE CLUB	0.173	0.057	0.063	0.293	106.837
SEA PINES PSD	0.983	0.204	0.738	1.926	702.848
WEXFORD PLANTATION	0.069	0.000	0.274	0.343	125.337
TOTAL	5.175	0.933	2.539	8.650	3,156.516

PROJECTIONS 2005

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,319	0.66	150	130,581
MULTI-FAMILY	4,442	0.66	150	439,758
HOTEL/MOTEL	1,323	0	200	264,600
COMMERCIAL sq ft	766,613		170	130,324
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	726	0.96	150	104,544
MULTI-FAMILY	5,286	0.96	150	761,184
HOTEL/MOTEL	1,438	0	200	287,600
COMMERCIAL sq ft	866,185		170	147,251
IRRIGATION	90		6,870	618,300

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	2,850	0.94	150	401,850
MULTI-FAMILY	3,390	0.94	150	477,990
HOTEL/MOTEL	693	0	200	138,600
COMMERCIAL sq ft	1,916,296		170	325,770
IRRIGATION	50		5,137	256,850

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,290	1.7	150	838,950
MULTI-FAMILY	799	1.7	150	203,745
HOTEL/MOTEL	136	0	200	27,200
COMMERCIAL sq ft	388,912		170	66,115
IRRIGATION	200		3,000	600,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	140	1.87	150	39,270
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	525	1.8	150	141,750
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	333,796		170	56,745
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,835	0.97	150	557,993
MULTI-FAMILY	2,997	0.97	150	436,064
HOTEL/MOTEL	248	0	200	49,600
COMMERCIAL sq ft	1,201,110		170	204,189
IRRIGATION	200		3,690	738,000

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	201	1.8	150	54,270
MULTI-FAMILY	96	1.8	150	25,920
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	218,600		170	37,162
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.835	0.130	0.127	1.092	398.697
FOREST BEACH PSD	1.153	0.147	0.618	1.919	700.391
HILTON HEAD No.1 PSD	1.018	0.326	0.257	1.601	584.387
HILTON HEAD PLANTATION	1.070	0.066	0.600	1.736	633.644
HILTON HEAD UTILITIES	0.039	0.003	0.013	0.055	20.137
LONG COVE CLUB	0.196	0.057	0.063	0.315	114.919
SEA PINES PSD	1.044	0.204	0.738	1.986	724.833
WEXFORD PLANTATION	0.080	0.037	0.274	0.391	142.843
TOTAL	5.435	0.971	2.689	9.095	3,319.851

PROJECTIONS 2010

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,398	0.66	150	138,402
MULTI-FAMILY	4,917	0.66	150	486,783
HOTEL/MOTEL	1,323	0	200	264,600
COMMERCIAL sq ft	766,613		170	130,324
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	771	0.96	150	111,024
MULTI-FAMILY	5,286	0.96	150	761,184
HOTEL/MOTEL	1,438	0	200	287,600
COMMERCIAL sq ft	866,185		170	147,251
IRRIGATION	90		6,870	618,300

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,120	0.94	150	439,920
MULTI-FAMILY	3,590	0.94	150	506,190
HOTEL/MOTEL	693	0	200	138,600
COMMERCIAL sq ft	1,916,296		170	325,770
IRRIGATION	50		5,137	256,850

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,290	1.7	150	838,950
MULTI-FAMILY	899	1.7	150	229,245
HOTEL/MOTEL	136	0	200	27,200
COMMERCIAL sq ft	388,912		170	66,115
IRRIGATION	200		3,000	600,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	140	1.87	150	39,270
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	525	1.8	150	141,750
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	333,796		170	56,745
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	4,247	0.97	150	617,939
MULTI-FAMILY	3,197	0.97	150	465,164
HOTEL/MOTEL	448	0	200	89,600
COMMERCIAL sq ft	1,201,110		170	204,189
IRRIGATION	200		3,690	738,000

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	241	1.8	150	65,070
MULTI-FAMILY	96	1.8	150	25,920
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	218,600		170	37,162
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.890	0.130	0.127	1.147	418.715
FOREST BEACH PSD	1.160	0.147	0.618	1.925	702.756
HILTON HEAD No.1 PSD	1.085	0.326	0.257	1.667	608.576
HILTON HEAD PLANTATION	1.095	0.066	0.600	1.762	642.951
HILTON HEAD UTILITIES	0.039	0.003	0.013	0.055	20.137
LONG COVE CLUB	0.196	0.057	0.063	0.315	114.919
SEA PINES PSD	1.173	0.204	0.738	2.115	771.935
WEXFORD PLANTATION	0.091	0.037	0.274	0.402	146.785
TOTAL	5.728	0.971	2.690	9.388	3,426.774

PROJECTIONS
BUILD-OUT

BROAD CREEK PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,398	0.66	150	138,402
MULTI-FAMILY	4,917	0.66	150	486,783
HOTEL/MOTEL	1,323	0	200	264,600
COMMERCIAL sq ft	1,032,624		170	175,546
IRRIGATION	48		2,647	127,056

FOREST BEACH PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	1,359	0.96	150	195,696
MULTI-FAMILY	6,180	0.96	150	889,920
HOTEL/MOTEL	1,438	0	200	287,600
COMMERCIAL sq ft	2,987,785		170	507,923
IRRIGATION	90		6,870	618,300

HILTON HEAD No.1 PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	8,013	0.94	150	1,129,833
MULTI-FAMILY	13,427	0.94	150	1,893,207
HOTEL/MOTEL	1,118	0	200	223,600
COMMERCIAL sq ft	4,181,320		170	710,824
IRRIGATION	50		5,137	256,850

HILTON HEAD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	3,290	1.7	150	838,950
MULTI-FAMILY	2,440	1.7	150	622,200
HOTEL/MOTEL	220	0	200	44,000
COMMERCIAL sq ft	1,439,000		170	244,630
IRRIGATION	200		3,000	600,000

HILTON HEAD UTILITIES

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	186	1.87	150	52,173
MULTI-FAMILY	0	1.87	150	0
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	20,000		170	3,400
IRRIGATION	5		2,500	12,500

LONG COVE CLUB

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	525	1.8	150	141,750
MULTI-FAMILY	115	1.8	150	31,050
HOTEL/MOTEL	114	0	200	22,800
COMMERCIAL sq ft	388,220		170	65,997
IRRIGATION	25		2,500	62,500

SEA PINES PSD

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	4,247	0.97	150	617,939
MULTI-FAMILY	3,663	0.97	150	532,967
HOTEL/MOTEL	970	0	200	194,000
COMMERCIAL sq ft	1,618,818		170	275,199
IRRIGATION	200		3,690	738,000

WEXFORD PLANTATION

UNIT TYPE	NUMBER OF UNITS	PERSONS PER UNIT	GALLONS PER CAPITA PER DAY	GPD
SINGLE FAMILY	429	1.8	150	115,830
MULTI-FAMILY	96	1.8	150	25,920
HOTEL/MOTEL	0	0	200	0
COMMERCIAL sq ft	246,000		170	41,820
IRRIGATION	100		2,740	274,000

	TOTAL WATER USE PER CAPITA (Mgals/day)	COMMERCIAL WATER USE (Mgals/day)	IRRIGATION COMMON GROUNDS (Mgals/day)	TOTAL (Mgals/day)	TOTAL (Mgals/year)
BROAD CREEK PSD	0.890	0.176	0.127	1.192	435.221
FOREST BEACH PSD	1.373	0.508	0.618	2.499	912.295
HILTON HEAD No.1 PSD	3.247	0.711	0.257	4.214	1,538.225
HILTON HEAD PLANTATION	1.505	0.245	0.600	2.350	857.670
HILTON HEAD UTILITIES	0.052	0.003	0.013	0.068	24.847
LONG COVE CLUB	0.196	0.066	0.063	0.324	118.296
SEA PINES PSD	1.345	0.275	0.738	2.358	860.708
WEXFORD PLANTATION	0.142	0.042	0.274	0.458	167.013
TOTAL	8.749	2.025	2.689	13.464	4,914.274

APPENDIX E. CORRELATION BETWEEN HILTON HEAD ISLAND'S PLANNING DISTRICTS AND PUBLIC SERVICE DISTRICTS (PSD)

Sea Pines PSD — (3) Planning district number

- Sea Pines Plantation (1)
- Palmetto Bay Road - Point Comfort (4)
- Palmetto Bay Road - Commercial (5)

Forest Beach PSD
- Forest Beach(North,South,Central) (2)
- Pope Avenue Commercial (3)
- Shipyard Plantation (7)

Broad Creek PSD
- Palmetto Dunes (8)

Wexford and Long Cove Utilities
- Wexford and Long Cove Plantations (6)

Hilton Head No.1 PSD
- Bradly Beach and Folly Field (9)
- Port Royal Plantation (11)
- Mid - Island Plaza (12)
- Old Woodland/Industrial Park (13)
- Beach City - Baygall Road (14)
- Indigo Run (15)

Hilton Head Plantation Co.
- Hilton Head Plantation (16)

Hilton Head Water Co.
- Spanish Wells Plantation (18)

Coastal Utilities (Windmill Harbour) and Hilton Head Water Co.
- Jenkins Island (20)

Rivial Water District
- Mt. Cavalry - Squire Pope (17)