

# **History of Water Use, Regulatory Oversight and Saltwater Intrusion in the Upper Floridan Aquifer**

Savannah, Georgia and Hilton Head Island, SC area

## **1888 to 1900**

City of Savannah begins the production of groundwater at 5 Mgd from the Upper Floridan aquifer.

By 1900, production has increased to 11.5 Mgd.

## **1901 to 1940**

Circa 1916, saltwater contamination of Upper Floridan wells at Parris Island SC is documented. No distinction is made as to cause, whether it's regional or local pumpage of the aquifer. Well locations were moved further inland.

By 1939, metering of Savannah water customers is completed.

Savannah/Chatham County increase production to 35 Mgd. Between 1935 and 1938 water production increased 10 Mgd due to increased water use by the paper industry.

In 1940, Savannah completes a study commissioned to investigate long-term water supply resources for the City. Findings showed groundwater heads reduced from 30 feet above ground level to 40 feet below ground level. The report also discussed future saltwater intrusion and a recommendation to construct a surface water treatment plant.

## **1941 to 1960**

In 1944, Savannah/Chatham County production rate is 40 Mgd. The Federal Government published concerns of rapid development and production of the aquifer would contaminate the aquifer with saltwater.

In 1948, Savannah constructed the Industrial and Domestic (I and D) surface water treatment plant and began providing surface water to industries.

In 1953, Savannah connected water lines from the I and D surface water treatment plant to the City's main water system.

Beaufort County Water Authority (now BJWSA) was created in 1954 as a special purpose district by the South Carolina Legislature with the purpose to bring treated surface water to the military installations and rural sea island residents of Beaufort County.

Savannah/Chatham County increase production to 60 Mgd (USGS 1960). Increases appear to be attributable to the increase in population and industry.

In 1960, development of Hilton Head Island SC begins and the first production wells are installed producing approximately 0.9 Mgd from the Upper Floridan aquifer at the southern end of the Island.

## **1961 to 1970**

Beaufort County Water Authority began supplying treated surface water on May 1, 1965. The plant capacity was 8 mgd

In 1969, South Carolina passes the Groundwater Use Act requiring that groundwater users in designated "Capacity Use areas" report their quarterly water use to the South Carolina Water Resources Commission (WRC) if their productions equal or exceed 100,000 gallons on any day of the year.

Savannah/Chatham County increase production to 70 Mgd.

Hilton Head Island increases production to 6.6 Mgd (estimated based on the known number of wells). Most water use appears to be affiliated with irrigation at this time.

### **1971 to 1980**

In 1972, Georgia passes the Groundwater Use Act requiring permits for any production greater than 100,000 gpd. The first permits were issued in 1974.

In 1974, Fripp Island connected to the Beaufort County Water Authority because of salty wells.

In 1979, the first Middle Floridan well drilled on Hilton Head Island for Golf Course irrigation.

Economic development in South Carolina around and in the Port Royal Sound was cause for concern when dredging of the shipping channels into the confining layer above the aquifer was proposed. The ensuing Port Royal Sound Environmental Study recommended that no further dredging be allowed.

Savannah/Chatham County increase production to approximately 74 Mgd (USGS).

Hilton Head Island and adjacent areas increase production to 9.1 Mgd.

### **1981 to 1990**

South Carolina Water Resources Commission (SCWRC) Report 132 identifies saltwater problems at two of the many Hilton Head high capacity wells. Cause is inferred, but not determined to be from improper production methods.

Effluent irrigation onto acceptable areas (golf courses) begins in the early 1980's and by the mid to late 1980's many, if not all, golf courses in the Hilton Head Island and surrounding area are irrigating with treated effluent. Effluent irrigation begins to reduce the needed pumpage for the area.

In 1983, BJWSA increases its Chelsea Plant to 16 mgd.

By 1984, research drilling had begun in Port Royal Sound for the evaluation of groundwater quality.

The Beaufort County area falls under the Capacity Use permitting in 1981. In 1982, passage of the South Carolina Water Use Reporting and Coordination Act required that all users of ground and surface water who withdraw, divert, obtain, or discharge 100,000 gallons or more on any single day of the year report their quarterly water use to the SCWRC. (This authority was later reassigned to DHEC in 1994.)

In 1986, the second Middle Floridan well is drilled in the study area and begins a time frame for drilling the middle Floridan as a supplemental water supply source.

SCWRC caps water production on Hilton Head Island area to 9.7 Mgd. Savannah/Chatham County increase production to approximately 88 Mgd (USGS).

Hilton Head Island increased production to 14.3 Mgd.

Moss Creek System connected to the BJWSA Bluffton well system because in salt water intrusion in 1990.

In 1990, BJWSA began providing treated effluent to Rose Hill Plantation for irrigation of its golf course, a 285,000 gpd permitted spray site, and its polo field, a 118,000 gpd permitted site.

### **1991 to 2000**

In 1991, BJWSA began providing the 72 acre Hilton Head National Golf Course with treated effluent for purposes of irrigation.

The first Cretaceous test well was drilled in 1992 by the Town of Hilton Head to verify a deeper water supply.

In 1998, BJWSA entered into an agreement to provide Sun City, a Del Webb community in Bluffton Township, with treated effluent to its some 99 acres of individual sites, and to Hidden Cypress Golf Course, a 72 acre, 1.522 Mgd permitted effluent disposal site.

In 1994 BJWSA entered into an agreement to provide treated effluent irrigation to approximately 146 acres at Island West Golf Course in Bluffton Township. This site is permitted for 621,000 gpd.

In 1995, Georgia held a series of public meetings to inform residents of the potential for saltwater intrusion and to solicit comments that might aid in developing management strategies.

In 1996, BJWSA began providing Old Carolina Golf Course in Bluffton Township, a 173 acre tract, with effluent irrigation. This site is permitted at 285,000 gpd.

In 1997, Georgia, South Carolina, Florida, USGS, Glynn County, and four paper companies funded and initiated an 18 million dollar "Coastal Sound Science Initiative" (CSSI) to better understand saltwater intrusion.

In 1997, Georgia releases the "Interim Strategy for Managing Salt Water Intrusion in the Upper Floridan Aquifer." A moratorium on groundwater permits was put in place within a 24 county area in coastal Georgia.

In 1997, Travis Field in Savannah is converted from groundwater to surface water (0.6 Mgd).

In 1997, BJWSA began providing treated effluent water for irrigation purposes to the Colleton River Golf Course, a 550,000 gpd permitted site.

In 1998, BJWSA began providing treated effluent water to Belfair Plantation Golf Course, a 28 acre, 1.0530 Mgd permitted site.

In 1998, BJWSA completed construction of its first 500mg Aquifer Storage and Recovery (ASR) site.

In 1998, BJWSA entered into an agreement to provide treated effluent irrigation to Hidden Cypress Golf Course, a 72 acre, 1.522 Mgd permitted effluent disposal site.

In 1998, the first Cretaceous water supply well in SC was completed and permitted in 2001.

In 1998, Savannah expanded their surface water treatment plant from 50 Mgd to 62.5 Mgd so that

future water needs could be supplied by surface water rather than groundwater.

Reclaimed water agreement reached between Savannah and the Savannah Golf Club (0.5 Mgd).

In 1999, BJWSA increases its Chelsea Plant to 24 mgd.

Also in 1999, routine monitoring of vertical chloride profiles in the aquifer in this area begins. Chloride contamination determined to be present.

In 1999, Savannah converts Upper Floridan groundwater use to Miocene at the Bacon Park Golf Course (0.5 Mgd).

After much public debate BJWSA signed contracts in 1995 to supply treated surface water to two Hilton Head Island utilities- Hilton Head #1 PSD and Broad Creek PSD - who in turn blend the surface water with Floridan Aquifer well water. The project was completed and service began in July 1999. The Bluffton area was converted from ground water to surface water at the same time.

In 2000, Savannah and Pooler sign an agreement for wholesale treated surface water to be used for future growth (currently 1.5 Mgd).

Also in 2000, Savannah converts the area around Waltstrom Road from groundwater to surface water (0.28 Mgd).

By the end of the year 2000, three wells on Hilton Head Island had been shutdown due to chloride contamination.

Savannah/Chatham County reduce water production to 72 Mgd. (USGS).

Hilton Head Island and surrounding area reduce water production to 12.8 Mgd.

## **2001 to present**

In 2001, South Island PSD constructed a Reverse Osmosis Water Treatment Plant with a capacity of 1.404 MGD.

In 2001, Savannah and Port Wentworth sign an agreement for wholesale treated surface water to be used for future growth (0.4 mgd current use).

In 2002, Savannah and Bryan County sign an agreement for wholesale water using Savannah's surface water treatment plant capacity to offset groundwater pumpage by Savannah within Bryan County.

Effingham County commits to use surface water for future growth, ultimately investing over 8 million dollars in infrastructure.

In 2002, Savannah and Effingham County sign an agreement for wholesale treated surface water to be used for future growth (2.0 mgd current use).

Georgia develops a protocol for constructing wells in the Lower Floridan Aquifer as an alternate source to use of the Upper Floridan.

In 2003, BJWSA signed an agreement to deliver 336,000 gpd treated effluent to the 1,030 acre Hampton Hall Golf Course in Bluffton, South Carolina.

In 2003, an Aquifer Storage and Recovery well (ASR) becomes operational on Port Royal Island.

In 2003, BJWSA completes construction of the Purrysburg WTP with a capacity of 15mgd.

In 2004, the South Island PSD Reverse Osmosis Water Treatment Plant was expanded to 2.448 MGD.

In 2006, Georgia releases the "Coastal Georgia Water and Wastewater Permitting Plan for Managing Salt Water Intrusion." (CPP). The CPP caps Upper Floridan groundwater productions at 2004 amounts for Chatham and south Effingham Counties (Red Zone) and requires additional reductions of 5 Mgd by 2008. The CPP also caps increases of productions in Bryan and Liberty Counties (Yellow Zone) at 2004 amounts plus 5 Mgd to be distributed among both counties. Permits in the Yellow Zone have been extended until modeling is complete.

In 2006, BJWSA began providing treated effluent water for irrigation to Secession Golf Course in Beaufort, South Carolina, a 130 acre, 1.1270 Mgd permitted site. Around the same time BJWSA also

began providing Palmetto Bluff Golf Course and a dedicated spray site with treated effluent for purposes of irrigation. Together the Palmetto Bluff sites are permitted at 1.8 Mgd.

Chloride map generated by South Carolina for the year 2007.

In 2007, another well was shut down on Hilton Head due to chloride contamination.

In 2007, Savannah and Bloomingdale sign an agreement for wholesale surface water.

In 2007, a Memorandum of Agreement was signed by Georgia and SC where the two states agreed to undertake mutual steps to manage saltwater intrusion.

In 2008, Savannah and Garden City sign an agreement for wholesale surface water for future growth (0.4 Mgd current use).

In 2008, meetings were held with all water withdrawal permit holders in Chatham, south Effingham, Bryan, and Liberty Counties (total of 48) to inform them of Georgia's CPP and discuss how they will be affected.

In 2008, the permit limits for 36 groundwater use permit holders in Chatham and south Effingham counties were reduced to 2004 withdrawal amounts or were placed on an enforceable schedule to reduce withdrawals to 2004 amounts as called for in Georgia's CPP. In addition, Savannah and International Paper agreed to voluntarily reduce their permit limits an additional 3.5 Mgd below their 2004 production amount.

In 2008, the City of Springfield in Effingham County installed a new well above SR 119 and moved all of their groundwater production outside of the Red Zone.

In the first part of 2008 BJWSA began providing its first residential water reuse irrigation service to the Tradition Hilton Head Community. BJWSA is supplying Tradition and its residents with reclaimed water for all of their irrigation needs, including 4.0 Mgd for residential lots, common areas, and landscaped medians, and 4.267 Mgd for their golf course. The Tradition irrigation system is not only a

BJWSA first, but the first system of its type in the State of South Carolina.

In 2010, Savannah and Thunderbolt sign an agreement for wholesale water use for future growth (0.1 Mgd current use).

Hilton Head Public Service District plans a 3 million dollar aquifer storage and recovery system.

Reported municipal and industrial production in the Red Zone (Chatham and south Effingham Counties) is reduced from 62 Mgd in 2000 to 54 Mgd in 2009.

Reported municipal and industrial production in Savannah/Chatham County is reduced from 60 Mgd in 2000 to 51 Mgd in 2009.

Reported production for Hilton Head Island and surrounding area is reduced to 9.6 Mgd by 2008.