

# SOUND SCIENCE STUDIES IN COASTAL GEORGIA AND COMPREHENSIVE STATEWIDE WATER MANAGEMENT PLANNING

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## ABSTRACT

Since 1997 Georgia has been executing a program of scientific investigations in counties along the coast. The purpose of the program is quite focused; it is to generate data and information on which to base effective strategies for halting saltwater intrusion in the coastal area. Most of the investigations and associated tasks have been completed, and a set of management strategies is expected to be finalized by the end of 2005. Like the tasks associated with the program of scientific investigations, the set of management strategies will focus on halting saltwater intrusion. Since the passage of the 2004 Comprehensive Statewide Water Management Planning Act, there has been a fair amount of discussion of the need to develop a series of comprehensive regional water management strategies. The character of these latter regional comprehensive management strategies is yet to be defined the Georgia Environmental Protection Division and the Water Council. They are nevertheless sometimes confused with the kind of regional product that is expected to emanate from the current investigations along the coast. While they are separate and distinct products, it is clear that the program of scientific investigations will products results that will be transferable to the more comprehensive regional water planning for the coast.

## INTRODUCTION

In the last 15 years of the 19<sup>th</sup> century the City of Savannah began using the carbonate rocks comprising the Floridan aquifer as its principal source of water supply. At that time Savannah's withdrawals were less than 10 million gallons per day. Since that time many other municipalities and industries near or along Georgia's and South Carolina's coasts have demonstrated a preference for this clean, immediately available, and less expensive source. These areas, as well as adjacent parts of Florida, now withdraw hundreds of millions of gallons of water per day from the Floridan aquifer system to meet a host of consumptive and non-consumptive water needs.

The Floridan aquifer has two freshwater-saltwater interfaces. One such interface is that which occurs when freshwater in the aquifer comes in contact, flowing down-gradient from land towards the sea, at diffuse points along the coast with the salty groundwater from the Atlantic Ocean. The other freshwater-saltwater interface occurs at depths in the aquifer where the dissolution of naturally occurring minerals in deep sediments results in water of higher salt content being in contact with the aquifer's shallower fresh water.

As the amount and geographic concentration of water withdrawals increased over the first 5 years of the 20<sup>th</sup> century, the down-gradient flow of freshwater toward the coast began to decrease, and in some areas reverse. This caused the diffuse freshwater-saltwater interface to move landward. This has occurred at the northern end of Hilton Head Island for the past several decades. There is the concern that increasing the concentration and rates of withdrawals from the Upper Floridan aquifer at points along the coast that most affect this shift in the gradient will induce a quickening of the rate at which salty water moves landward and inland.

A similar concern exists in the Brunswick area, where brackish water of the Fernandina Permeable Zone flows upward into the freshwater zones of the Floridan aquifer through fractures. This phenomenon is exacerbated by the historic increases in the rates of withdrawals of water in areas that coincide with the fractures.

## INTERIM STRATEGY

In both Georgia and South Carolina these concerns grew over the latter 25 years of the last century. South Carolina's concerns were with the more immediate saltwater contamination of wells occurring on the northern end of Hilton Head Island, and the prospect that such contamination would grow in extent and severity. Georgia's concerns were related to the extent to which withdrawals in Georgia contributed to the landward encroachment of the freshwater-saltwater interface in South Carolina and eventually Georgia.

In 1997 the Georgia Environmental Protection Division, with cooperation from both South Carolina and Florida,

adopted and began implementing the *Interim Strategy for Managing Saltwater Intrusion in the Upper Floridan Aquifer in Southeast Georgia* (Interim Strategy). The over-arching purpose of this *interim* strategy was to install a set of temporary management measures to forestall aggravation of the encroachment and intrusion problems. During the period of the Interim Strategy - 1997 through 2005 - scientific studies would be designed and conducted in the region, and the information obtained would be used to make more informed water management decisions to control some of the causes of saltwater movement..

### SOUND SCIENCE

House Resolution 326, adopted during the 1997 Georgia General Assembly, acknowledged EPD's Interim Strategy and established a Joint House-Senate Study Committee and a Technical Advisory Committee to ... "study the needs, issues, and problems associated with the Upper Floridan Aquifer..." The final report of this Study Committee recommended a program of technical investigations to respond to a set of questions related to encroachment and intrusion of salt water. Among the issues to be addressed were:

1. The locations at which salt water is entering the aquifer;
2. The rate and direction of movement of this salt water within the aquifer under present and projected conditions;
3. A forecast of when selected wells in Georgia, South Carolina, and Florida would be affected by a level of salt water contamination that would exceed federal drinking water standards;
4. The location and cost of development of other fresh water sources in coastal Georgia;
5. Current information gaps; and
6. A description of a range of options that could be employed to halt the intrusion.

Additionally, the report charged the Technical Advisory Committee with continuing to manage the program of technical investigations, and make recommendations relative to the findings to EPD in support of developing a more scientifically defensible management strategy.

Both the Interim Strategy and the directives flowing from the final report of the Study Committee were conceived well before substantive discussion of the need for a comprehensive statewide water management plan began to occur in 2001.

### STATUS OF WORK

As of January of 2005 most of the work defined in the program of scientific investigation has been completed. This includes:

1. Completion of all field studies;
2. Publication of 41 scientific reports; and
3. Establishment of a comprehensive network of surface water and groundwater monitors in relevant parts of the three states,

Elements of the scientific investigations that are yet to be completed include:

1. Execution of mathematical models to where and when saltwater intrusion will occur under projected conditions; and
2. Development of cost estimates of various approaches to halting saltwater intrusion.

### CONCLUSION

The issues to be addressed as an outgrowth of the program of scientific investigations are centered upon management of those factors that influence saltwater encroachment and intrusion at specific coastal locations. The program of scientific investigations was conceived and conducted with the aim of producing a set of management strategies that would control those factors. The product that emanates from this program is likely to be quite useful when developing a set of comprehensive water management strategies for the areas covered by the Interim Strategy; however this product should not be confused with a comprehensive regional water management strategy as might be associated with current state water management plan efforts. Such comprehensive regional water management strategies have yet to be completely conceptualized and defined. When the conceptualization and definition is complete and region-specific water planning is imminent, the products emanating from the scientific studies described here should be used to inform this regional water planning effort.