



## **Investigation of the Shallow Hydrogeologic System on St. Catherines Island to Define Salt Water Intrusion Pathways and the Potential for Shallow-Deep Aquifer Communication**

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### **ABSTRACT**

The goals of this project are to develop a 3-dimensional framework of the shallow stratigraphy and geologic structure of St. Catherines Island on which to build a more accurate conceptual model of the hydrogeology of the surficial aquifer and to characterize the spatial and temporal changes in the geochemistry of the island's surficial aquifer and the possible temporal variations in the hydrologic flow system of the island's surficial aquifer.

The outreach/extension/education efforts of this project to develop an extensive and reliable database with associated graphics and summary publications which accurately depict the shallow groundwater system and structural features that are potential salt water intrusion pathways. We plan to integrate our findings into public education via high volume introductory college courses, advanced geology and hydrology courses, resources for Georgia K-12 teachers and the general public as well as technical dissemination through professional outlets.

The overall goals of this project support achievement of the research targets to determine the active and potential pathways for salt water intrusion and evaluate the potential for vertical communication of groundwater from the surficial aquifer to the Upper Floridan aquifer.

The critical outreach goal is to inform decisions regarding sustainable consumption of fresh groundwater, and new salt-water intrusion threats to the Floridan aquifer by those involved with coastal groundwater resource management.

Promotion of a better public understanding of coastal groundwater systems, threats to groundwater quality and supply, support the growth of a populace that is knowledgeable about and supports sustainable groundwater policy through public education is a key component of our objectives.

The education/extension/outreach will be addressed through the organization and

facilitation of a salt-water intrusion workshop targeting coastal water resource managers and policy makers to disseminate findings, explain ramifications and encourage sound decision-making.

The education component will be accomplished by inclusion of hydrogeologic research results and implications for coastal Georgia in Environmental Geology and other courses for college students at Georgia Southern and Georgia State University, in downloadable web resources for teachers and in presentations for professionals and the general public. Georgia Southern will also integrate hydrogeologic components with coastal resource sustainability and climate change impact in its summer field courses on St. Catherines Island.

Geophysical surveys and the sampling and analyses of Upper Floridan well water by members of this team has indicated the presence of vertical structural pathways and upconing of Lower Floridan saline water into wells tapping the Upper Floridan aquifer under St. Catherines Island. Sampling of wells in an existing shallow well traverse has shown spikes in Cl levels and total dissolved solids that suggest lateral seawater intrusion in the shallow aquifer system. Confirmation of shallow salt-water intrusion and identification of structural and/or stratigraphic pathways is critical in management of ground water resources to avoid or slow salt water intrusion. It is important to identify these pathways and to determine if salt water may or can move along these pathways from the surface into the Upper Floridan aquifer. Vertical structural channels once permitted artesian flow of Upper Floridan water on the surface and it is important to know if that flow direction may be reversed with rising sea level. These vertical conduits have not been described previously in Liberty County. The presence of these conduits, and their potential links with shallow salt-water intrusion pathways must be made known for informed decisions on groundwater management in the region. No resource is more critical than fresh groundwater and the Floridan aquifer is the most important groundwater resource in coastal Georgia and the southeastern United States.

Data and interpretations needed to inform science based ground water management in coastal Georgia will be disseminated directly through a salt-water intrusion workshop conducted by CVIOG staff. Education efforts also include dissemination through college courses and to K-12 teachers. Data will also be released through peer-reviewed journals. Following journal publication, data will be made available to other researchers through the Georgia Coastal Research Council (GCRC) and website ([www.gcrc.uga.edu](http://www.gcrc.uga.edu)). The aim of the GCRC is “to provide mechanisms for improved scientific exchange between coastal scientists and decision makers in the State of Georgia, and to promote the incorporation of best-available scientific information into State and local resource management” (GCRC website). The GCRC is well positioned to reach scientists, resource managers, and other stakeholders.