USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: PROTECTING HIGH RISK WETLANDS IN GEORGIA'S COASTAL PLAIN FROM ANTHROPOGENIC GROUNDWATER PERTURBATIONS.

Duration: April 1996 through March 1997

Fiscal Year 1996 Federal Funds: $10,000

Non-Federal Funds Allocated: $20,002

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Congressional District: Tenth Congressional Distinct.

Critical Regional & State water Problems Addressed:

Destruction of approximately 6,880 hectares (17,000 acres) of wetlands in the central portion of a single county in west central Florida has been attributed to withdrawals of groundwater from the Floridan aquifer (House Committee on Natural Resources 1994). A large number of these wetlands are dominated by pondcypress *(Taxodium ascendens)*. Extensive damage to similar forested depressional wetlands and lakes along the Highlands Ridge has been documented in other counties in the central Florida region of the southeastern coastal plain (SCP) physiographic province (Bacchus 1994, Bacchus unpub. data, Rochow 1993, Rochow and Rhinesmith 1991, Watson *et al.* 1990). Wood storks and bald eagles, federally endangered species, use pondcypress wetlands for nesting. Hydrologic models predicting no significant response of shallow ground water to municipal and agricultural withdrawals from the Floridan and Intermediate aquifers in the lower coastal plain of west-central Florida assumed homogeneous, isotropic conditions. However, Watson *et al.* (1990) documented discontinuities in zones of lower permeability underlying some of the depressional cypress wetlands that were evaluated using groundpenetrating radar (GPR). These same wetlands appeared to be the most severely damaged of those that were evaluated. Severely damaged wetlands in that study also appeared to be associated with photolinears that could represent fractures or faults, serving as rapid conduits for groundwater.

Depressional wetlands like those described above occur throughout the SCP, including, the southeastern 2/3 of Georgia. Similar symptoms of decline were observed in pondcypress stands within the lower coastal plain of Georgia (e.g., Charlton, Clinch, and Ware Counties) and upper coastal plain of South Carolina (Bacchus 1994). Depressional wetands in other coastal plain counties of Georgia with extensive groundwater withdrawals (e.g., Camden, Chatham, Dougherty, Glynn, Liberty, Lowndes and Wayne) also were predicted to be susceptible to premature decline, based on field observations

and groundwater responses (Bacchus unpub., Brook 1985, Brook and Sun 1982, Brook *et* 1986, Brook *et al*, 1988). Ground water is the primary source for residential, commercial and agricultural activities in Georgia's coastal plain and withdrawals are predicted to increase in the future with increasing growth, Currently, no mechanism exists to predict the response of depressional wetlands to various perturbations in groundwater levels due to withdrawals in associated uplands, Such information is essential for effective management of the state's water resources, including preservation of wetlands, while developing the groundwater supply.

Results & Benefits:

Since no mechanism exists to predict the response of depressional ,wetlands to various anthropogenic groundwater perturbations (e.g., withdrawals from deep wells in associated uplands), the sustainable yield of groundwater resources cannot be determined. Such information is essential for promoting effective management of the state's water resources, since the primary source of water for uses such as residential, commercial and agricultural activities in Georgia's coastal plain is ground water. Groundwater withdrawals are predicted to increase in the future with increasing growth (e.g., proposed municipal wellfield for Albany, Georgia).

The goal of this project is to facilitate sound use of groundwater resources while simultaneously protecting valuable wetlands and endangered species habitat. During the final year of this project a model will be developed using geophysical data generated in Phase I, combined with hydrologic, remote sensing and ecological indicator data collected in Phase I, This information will be used to identify high risk, forested depressional wetlands. An attempt will be made to develop a mechanism for detecting signs of early decline in pondcypress wetlands. As a result, future research may be conducted to determine if any observed decline trends can be reversed and if pondcypress wetlands may be used as a tool for determining sustainable yield of groundwater resources.