USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

1. **Title:** Well-Field Pumping Effects on Isolated Wetlands

2. **Focus Categories:** WL, HYDROL, ECL

3. **Keywords:** (alphabetical) Drainage, Ecosystems, Hydrologic Models, Land Use, Plant Stress, Soil-Water Relationships, Surface-Groundwater Relationships, Water Levels, Wetlands

4. **Duration:** This Request: September 1998 to August 2000; Project: September 1997 to August 2000

5. **Federal Funds Requested:** $71,212

6. **Non-Federal:** $142,424

7. **Principal Investigators:**

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8. **Congressional District:** 5th

9. **Statement of critical regional water problems:**

Increasing demographic pressures in the southeastern United State, particularly in Florida, are stressing the water balances in many areas of urbanization and potential urbanization. Problems arise relating both to water-supply and stormwater-quantity/quality issues. The proposed work addresses the former. Specifically, delicate ecological balances in isolated wetlands may be disturbed as well fields in proximate (underlying) aquifers are developed to provide for the increasing demands associated with development of population centers. Destruction of ever-decreasing wildlife habitat and diminishment of the quality of human life in affected regions is possible.

At the present, there is a dearth of understanding of how such isolated wetlands respond to increased pumping in underlying aquifers. In many near-coastal areas, deeper, confined aquifers are not able to supply water for consumption due to enhanced salinity. As a result, pumping from unconfined or semi-confined aquifers is required to satisfy demand. As well fields in such areas are developed, regional water tables fall. A key issue to the ecological health of isolated wetland systems is how well wetland sediments may resist or retard

wetland drainage over times sufficient for replenishment of the wetland by rainfall (perhaps including water table rebound effects). Regulators are currently forced to make decisions regarding land and water use based upon inadequate information. Sub-optimal or possibly even irresponsible management of resources may result without proper understanding of the natures of responses of isolated wetland systems (for a variety of wetland types, such as marshes and cypress domes, to name two) to increased pumping.

10. **Statement of the results, benefits, and/or information expected:**

Among the principal benefits expected is the closing of the above-mentioned knowledge gap. An enhanced understanding of surface-groundwater interactions as they pertain to isolated wetland systems is being and will continue to be developed and refined. Comprehensive data bases (for at least two isolated wetland types) from which accurate water balances may be performed are being and will continue to be collected and analyzed. In particular, a methodology is being developed from which wetland vulnerability to well-field pumping may be assessed through the use of easily managed field procedures, such as soil/sediment sampling and pumping tests, coupled with modeling exercises. Guidance to water managers as to how best predict well-field influences will be enhanced. Ultimately, conservation of wildlife habitat and preservation of the quality of human life should result from better management of water resources in vulnerable systems. Several students will be trained on the project, including at least one from this request, two from the matching funds, and potentially two independently funded students.

The investigators are not only dedicated to the advancement of knowledge through research, but also through the dissemination of knowledge through teaching and innovative publication of results. The former tact will naturally be realized as research results are incorporated into the many courses in which they will be pertinent, such as Environmental Hydrology, Field Methods in Hydrogeology, and Wetlands Ecology. A graduate course titled Wetlands Hydrology is being offered by the investigators this summer for the first time. This course will reflect many of the lessons learned during the research described herein. Tours of our instrumented sites, including participation in tests (weather permitting), will likely be included in the course. The research project is providing real-world data sets for both examples and exercises. In addition to formal university courses, the principal investigators are currently developing short courses in which the research results will be shared with a variety of professionals in both the public and private sectors. Trained individuals will benefit from reviewing how wetlands respond through time and space to both natural cycles and anthropogenically induced stresses.