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Establishing the Causes and Effects of Low Dissolved Oxygen Concentrations in the Rivers and Streams of the Georgia Coastal Plain

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Abstract Text:

We are in the final stage of a 4-year multidisciplinary project designed to understand and explain the relationships between dissolved oxygen, water quality, and natural stream ecosystems in the Coastal Plain of Georgia. The project has 2 major components: A research component that conducts hypothesis driven research on DO issues and an education, extension, & outreach component that educates science teachers and students in K-12 programs, undergraduate and graduate college students, county extension agents, local elected officials, and volunteer watershed organizations about important regional water quality issues, TMDLs, DO, and how they as individuals or their organizations can make a difference. This presentation will address the progress made to date on the research components. Specifically, the presentation will address the following three issues:

Primary production – We know that most coastal plain streams are somewhat enriched as a result of nonpoint source pollution and discharge from municipal sewage treatment plants. Does this enrichment result in oxygen depletion or do shading and tannic waters negate any algal growth that might result from enrichment?

Sediment Oxygen Demand (SOD) – also know as benthic oxygen demand. The scientific community agrees that this is a major cause of oxygen depletion and we have now measured it extensively in the field. The surprising results will be presented.

The role of in-stream wetlands and swamps – We have measured very low DO values in waters exiting in-stream wetlands. Intuitively, this make sense as flows slow down, reaeration decreases, contact with organic matter increases significantly, and the biological activity picks up in swamps. How important are these swamps in controlling DO? Results from dye tracer studies, modeling, and a number of different experiments provide an answer.

Impact Statement:

Our results will assist environmental decision makers to establish dissolved oxygen standards that reflect the natural conditions of the Coastal Plain. Without a good understanding of these complex processes, we will never be able to truly understand nor predict DO concentrations. And our regulatory agencies may continue investing taxpayer funds to solve a water quality problem that may not be a problem after all.