

## ASSESSMENT OF FORESTRY BEST MANAGEMENT PRACTICES, I: STREAM WATER CHEMISTRY NATURAL VARIABILITY AND FERTILIZATION INFLUENCES

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Nutrient pollution can be a leading cause of impairment to some U.S. waters. As a result, state and federal agencies are actively engaged in designing management programs and numeric nutrient criteria (NNC) to address nutrient impairments. Following implementation of the Clean Water Act, Florida, like other timber producing states, developed, tested and implemented best management practices (BMPs) to reduce potential impacts to water resources resulting from forest management activities. While decades of research have continually documented the effectiveness of forestry BMPs, questions remain about their effectiveness, particularly for nutrients. Concerns about nutrient responses to forest activities are particularly important in Florida, one of the first states to develop NNC for springs, lakes and other flowing waters. Therefore, assessing the effectiveness of forestry nutrient BMPs on established NNC endpoints is a crucial exercise. To that end, the Florida Fertilization Study is designed to evaluate the response of the State's forestry BMPs to protect water resources and aquatic ecosystems during fertilization operations. In this paired watershed study, we employed a novel suite of in situ sensors in coastal blackwater streams to collect high resolution data (sub-hourly to sub-daily) on flow, nitrate, soluble reactive phosphorus (SRP), colored dissolved organic matter (CDOM), turbidity, dissolved oxygen (DO), pH, and specific conductance. Such sensors provide new tools to enumerate seasonal to sub-daily variation in water chemistry and flow, improving inferences of controls acting at different scales. Data will be used to compare baseline and post-fertilization conditions and to isolate fertilization effects from natural variation. First year pre-fertilization data clearly demonstrate large solute and flow variation in response to rainfall and day-night cycles. These latter diurnal patterns are evident in several analytes (flow, CDOM, DO), suggesting both watershed (transpiration) and in-stream (metabolism) influences. Flow variation has significant water quality effects, including enrichment of organic nitrogen and dilution of SRP. These data allow us to quantify natural variation in multiple parameters at the temporal scales at which they actually vary, and thus provide a much richer and more precise approach to elucidating the effects of forest fertilization and BMP effectiveness.

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