WATER QUALITY IN GEOGRAPHICALLY ISOLATED WETLANDS IN AGRICULTURAL LANDS AND SECOND GROWTH LONGLEAF PINE FOREST

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Geographically isolated wetlands (GIWs) are common aquatic features throughout the southeastern Coastal Plain. They are referred to as 'isolated' because they are surrounded by uplands and lack connection to perennial surface waters. In southwestern Georgia, these wetlands are referred to as 'limesinks' reflecting their geologic origins in a karst landscape. The lack of connection to surface waters or 'Waters of the US' means that regulatory authority is ambiguous. Most GIWs lack protection under Clean Water Act and its associated rules and provisions, making them vulnerable to alteration in human- dominated landscapes. In the southeastern US, GIWs occupy a small portion of the landscape (<3%) but are noted for their contribution to regional biotic richness. They also tend to be small (80% < 4 ha) and region-wide about 50% show signs of impairment. From 2010 through 2016, we sampled water quality in reference (second growth longleaf pine savanna) and intensively managed areas (agriculture and forestry). Replicate samples were taken early, mid-, and late hydroperiod at Ichauway (reference) and surrounding private farms with management practices typical of the region. Analyses included suspended solids, pH, alkalinity, dissolved organic carbon (DOC), NO_3-N, NH_4-N, and soluble reactive phosphorus (SRP). We also compared water column planktonic microbial communities during a single hydroperiod. During each hydroperiod sampled, wetlands in intensively managed areas had consistent and significantly greater concentrations of suspended solids, NO_3-N, NH_4-N, and SRP compared to reference sites. Wetland water column pH was also greater in managed areas. In managed areas, elevated suspended solids and nutrients reflect soil disturbance and subsequent runoff from fields, pastures, and pine plantations. Elevated pH reflected leaching of lime (a common crop amendment) and residual from irrigation water withdrawn from the carbonate-rich upper Floridan aquifer. Wetland water column microbial communities were dominated by small (<4µm) heterotrophic bacterial cells in both wetland types. Wetlands in intensively managed landscapes had greater microbial abundance. Wetland microbial communities respond to runoff from adjacent areas and likely play an important role in its processing or remediation. Geographically isolated wetlands clearly show altered water quality from adjacent land use. The potential for isolated wetlands to remediate runoff is largely unquantified and the effect of their alteration at a landscape scale is not well understood.

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