INVESTIGATING THE HYDROLOGIC CONNECTIVITY OF GEOGRAPHICALLY ISOLATED WETLANDS USING SOLUTE TRACERS

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Florida's wetlands are an important ecological resource that have significant impacts to landscape hydrology and downstream transport of key solutes (nutrients, organic matter). Because geographically isolated wetlands (GIWs) vary in degree of connectivity, their contribution to landscape hydrology is contested, especially as it applies to their protections under the Clean Water Act. Understanding GIW connectivity is important for quantifying and predicting landscape scale processes of which they are part. We sought to quantify landscape patterns of time-varying GIW connectivity by investigating solute signatures of water in GIWs across three contrasting wetlandscapes. We selected 16 wetlands in each of three locations spanning a connectivity gradient from exclusively surface connectivity (Big Cypress National Preserve), surface and shallow subsurface connectivity (Austin Cary Forest flatwoods) and primarily subsurface connectivity (Ordway Swisher Biological Preserve) across Florida. These wetlands varied their physical attributes (size, spill-elevation), geographic proximity to adjacent wetlands, and flow path position. We assessed hydrochemical similarity among these sites using a suite of solute tracers including major ion chemistry, dissolved organic matter fluorescence properties, water isotopes, and nutrients. This array of tracers was analyzed as a wetland solute signature to extract spatial and temporal patterns of similarity from which conclusions about the temporal and spatial heterogeneity of connectivity could be obtained.

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