**Introduction:** Streams and wetlands function as the primary drainage network for the terrestrial landscape. Stream carbon is predominantly sourced from uplands, with only a minor portion being internally produced (Battin et al., 2009; Regnier et al., 2022). Streams are a global carbon source, emitting more carbon dioxide (CO2) than what can be explained by stream productivity. In contrast, wetlands are regarded as carbon sinks, accumulating organic carbon within their soils that offset wetland greenhouse gas emissions (Mitsch et al., 2013; Raymond et al., 2013; Vlek, 2014). Yet, wetlands and streams are intricately connected, forming a complex carbon transport network (Leibowitz et al., 2018). Wetlands serve as stream headwaters and catchments while streams connect wetlands through overland and subsurface flows (Abril & Borges, 2019; Casson et al., 2019; Li et al., 2023; Moustapha et al., 2022).

North Florida’s flatwoods have immense capacity for carbon sequestration. Primarily managed for commercial forestry, these flatwoods feature low-relief terrain with wetland depressions and an accompanying shallow water table. This hydrology supports both carbon sinks (i.e., wetlands) and transport networks wherein carbon flows laterally before ultimately discharging into tannic, blackwater streams. Our project aims to improve understanding of carbon flow dynamics and explore venues for enhanced carbon storage within North Florida’s flatwoods. Specifically, we will investigate (Project 1) the conditions under which flatwoods streams have the greatest carbon-export potential, (Project 2) the carbon-storage potential of riparian wetlands- an understudied ecosystem hypothesized to possess significant carbon sequestering capabilities, and (Project 3) the distribution of carbon within flatwoods and how watershed hydrology influences carbon storage.

**Progress:** Within Bradford Forest, a 27,000-acre pine-flatwood landscape, we selected nine streams for the installation of continuous, water-quality sensor packages. Our sensor packages include a dissolved oxygen, carbon dioxide, pH, specific conductivity, and pressure transducer sensors, collecting measurements at hourly intervals to infer stream productivity and alkalinity. Our objective is to observe long-term (seasonal) and short-term (precipitation disturbances) patterns and influences on stream carbon.Additionally, water samples for particulate organic carbon (POC), dissolved inorganic carbon (DIC), dissolved organic carbon (DOC), and nutrient concentrations (N&P) are taken monthly or after major precipitation events. Data collection for Project 1 began in May 2023.

Of the nine streams, three were selected for Project 2. Groundwater wells were strategically installed along the riparian wetland to capture existing variation in elevation and microsite diversity at streams 5, 6, and 9, with an additional well installed within each stream's adjacent uplands.Each well will be sampled monthly for DOC and DIC to quantify contribution of riparian wetlands to stream carbon. Point measurements of CO2, pH, and water table depth will also be recorded. Wells were installed in March 2024 and sampling began mid-April 2024.

Project 3 is in development with the goal of starting in late May. Our focus will be to interrogate the distribution of carbon within the flatwoods. This will involve longitudinal sampling of streams 5, 6, and 9 (from upstream to downstream) and their associated upland-embedded depressional wetlands. Geospatial analysis is underway to identify which wetland depressions have the potential to significantly contribute to the carbon content of streams 5, 6, and 9.

Trends and discoveries regarding stream carbon are still in their early stages. However, each stream exhibits a unique chemical signature and responds differently to fluctuating discharge. As the hurricane season approaches, we anticipate that more pronounced findings will emerge.

**Future goals**: Our overarching objective is to comprehensively understand the carbon sequestration potential of flatwoods landscapes, identify opportunities for enhanced storage, and document periods of enhanced carbon export. To achieve this goal, our next steps include maintaining Projects 1 and 2 while refining our methodologies. We are currently selecting sites for Project 3 with intentions of beginning in late May. Once our methodologies are finalized, we will initiate analysis and modeling efforts. This will include parsing data collected during both high and low discharge periods and categorizing them based on their wetland-proportion potential.

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