Beyond wetland boundaries: Characterizing forested wetland-upland transitions using LiDAR and passive acoustic monitoring

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Forested wetlands provide important habitat for biodiversity, yet their ecological characteristics are often poorly represented by conventional wetland classifications and mapped boundaries. This study investigated use of LiDAR-derived hydrogeomorphic descriptors to characterize 7 forested wetlands in southwestern Nova Scotia and explore relationships with avian communities. At each wetland, three autonomous recording units were positioned along a transect extending from 100 m into upland forest, through the wetland boundary, to 100 m into the wetland interior. Using the provincial 1-m LiDAR-derived digital elevation model, we developed multiscale descriptors including slope, topographic position, topographic wetness, local relief, and wetland morphology. Terrain characteristics were assessed at individual recording locations, across wetland-upland transitions, and at the whole-wetland scale. Passive acoustic monitoring data will be used to examine changes in bird-community composition along these gradients. This approach will help evaluate whether remotely sensed hydrogeomorphic transitions correspond with changes in avian communities and whether commonly used wetland metrics adequately describe on-the-ground conditions we experience. By integrating terrain analysis with biodiversity monitoring, our work aims to inform ecologically meaningful approaches to wetland characterization and buffer management in working forest landscapes.

Keywords: avian communities, forested wetlands, hydrogeomorphology, LiDAR, passive acoustic monitoring, wetland buffers