

APPLICATIONS OF HYPERSPECTRAL DRONE IMAGERY FOR RAPID AQUATIC HABITAT ASSESSMENTS

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Effective and efficient monitoring of dispersed and heterogenous freshwater habitat requires innovative technologies, particularly in rapidly changing landscapes. Hyperspectral signatures from remotely sensed imagery are an emerging tool for identifying and tracking changes in aquatic environments. This study aimed to determine the extent to which hyperspectral drone imagery could accurately identify aquatic vegetation distribution and abundance. All data collection occurred in a sandhill lake in Ordway-Swisher Biological Station, Putnam County, Florida. Hyperspectral data were collected by the GatorEye Unmanned Flying Laboratory; water quality and vegetation data were collected by canoe using linear transects and stratified random quadrant samples, respectively. Images were processed using supervised and unsupervised classifications, linear spectral unmixing and band ratioing. Multiple linear regressions and principal component analyses were used to assess relationships between spectral signatures and classes, vegetation data and water quality. Results indicate the effective use of hyperspectral bands for general classification of vegetation (i.e. emergent, submerged, floating), with greatest accuracy in shallow water, and some potential use for highly characterizable target species. The techniques applied here may be especially useful in expansive areas where surveys by boat are not possible or unsafe; for frequent, repeated monitoring; and for areas of critical importance where data are needed rapidly, such as those under threat from harmful algal blooms or sea level rise.

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