Improved seagrass classification using linear spectral unmixing

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Classification of seagrass from low resolution, multi-spectral imagery using traditional techniques often obscures the patchy nature of seagrasses. Thus, visual photointerpretation of high resolution aerial photography remains the most widely adopted approach for seagrass mapping but requires painstaking manual delineation of general seagrass habitat that typically overestimates actual coverage. Semi-automated classification of seagrass from aerial photography is uncommon and varies widely in scope and accuracy. Here, we evaluated a linear spectral unmixing (LSU) classifier where representative endmembers (seagrass and sand) were chosen directly from aerial photos and LSU reported endmember proportions present in each image pixel. Seagrass pixel proportions were evaluated in 0.1 increments (0-1) using confusion matrices, Receiver Operating Characteristic curve analysis, and Euclidean distance to determine optimal seagrass pixel proportions for classification. When used in combination with photointerpretation, LSU successfully classified North Carolina seagrasses and distinguished small patches. Selection of optimal pixel proportions required analyst knowledge of the system and an evaluation of tradeoffs among overall thematic accuracy and the costs of failing to detect seagrass versus costs of false detection. LSU can improve seagrass maps providing resource managers with more accurate estimates of coverage and the classified raster layers can be used in seagrass spatial pattern analyses.

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