

WETLAND COMMUNITY MAPPING USING HIGH-RESOLUTION SATELLITE IMAGERY AND MACHINE LEARNING

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Recent advances in remote sensing technology allow for a variety of ways to collect and analyze imagery of plant communities. The St. Johns River Water Management District (SJRWMD) has been evaluating the use of different remote sensing techniques to streamline vegetation mapping efforts, including automated mapping using high-resolution, multispectral satellite data. From 1991 - 2016, monitoring requirements for cattail in the Blue Cypress Water Management Area were fulfilled by using aerial photography and traditional photointerpretation. In 2018, the District obtained 8-band satellite imagery from the WorldView-3 satellite to determine if machine learning methods could be applied to produce adequate cattail maps. A random forest model was developed to classify a total of six vegetation classes, with cattail as its own class. Band indices and grey-level co-occurrence texture metrics were input to the model as predictors. Spatial cross-validation estimated a model accuracy of 88.7 %, with the cattail class having an accuracy of 85.9 %. An independent set of 100 accuracy assessment points was used to assess the thematic accuracy of the final map generated using the model. Overall map accuracy was estimated at 76 %, and cattail user's and producer's accuracies were 91 % and 94 %, respectively. The plant community maps created using this method may have fewer vegetation classes than traditional photointerpretation, but they allow for less expensive and more frequent mapping efforts to assess and inform management of cattail. Looking forward, the application of this method will be investigated for mapping other invasive plants (e.g., *Phragmites australis*) in riparian areas.