THE SPECTRAL ANALYSIS AND HYPERSPECTRAL MAPPING OF EELGRASS (*ZOSTERA MARINA* L).

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTERS OF SCIENCE

IN

NATURAL RESOURCE SCIENCES

UNIVERSITY OF RHODE ISLAND

2005

Abstract

An analysis of the spectral reflective characteristics of two SAV (Submerged Aquatic Vegetation) species common to temperate estuaries of the Northeast *Zostera marina L* (eelgrass) and *Ulva lactuca* (Sea lettuce) was conducted in the spring of 2002 and the summer of 2003. These two co-occurring species are often confused during manual interpretation of aerial photography. Hyperspectral imaging can be an effective tool to distinguish between these two species. To investigate the spectral separation of the target species, reflectance measurements were collected using a PP Systems Unispec© spectroradiometer. This instrument collects reflectance values between the wavelengths of 350 to 1100 nanometers at 3.3 nanometer intervals. Epiphyte fouled and epiphyte free eelgrass blades as well as one, two, and three layers of *Ulva* were tested. Three statistical tests, including principal component analysis, analysis of similarity, and similarity percentages, were performed to investigate the significance of observed differences and determine the wavelengths responsible for the differences. Significant spectral differences were observed within and between the two species and were driven primarily by the infrared wavelengths and red wavelengths.

The data described above were used perform an unsupervised classification eelgrass habitat in Ninigret Pond, Rhode Island using Airborne Visible and Infrared Imaging Spectroradiometer (AVIRIS) and Landsat Enhanced Thematic Mapper Plus (ETM+) imagery. The classification accuracy of these two image types was compared to that of manual delineation of true-color aerial photography. Of the three classification results, AVIRIS data resulted in the most accurate

classification of presence/absence of eelgrass (86%). AVIRIS and ETM+ were similarly capable of delineating eelgrass into percent cover classes with accuracies of 64.5% and 63.6% respectively. The aerial photography was not categorized for percent cover. The results of this study have broad reaching implications for the use of hyperspectral data in mapping submerged aquatic vegetation in turbid temperate habitats.