ACCURACY ASSESSMENT OF WETLAND BOUNDARIES DELINEATED USING AERIAL PHOTOGRAPHY AND DIGITAL ORTHOPHOTOGRAPHY

BY

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

MASTER OF SCIENCE

IN

NATURAL RESOURCES

UNIVERSITY OF RHODE ISLAND

1997

ABSTRACT

My study compared the horizontal accuracy of forested wetland boundary delineations obtained from natural color aerial photography against delineations obtained from 'heads-up' digitizing of digital orthophotography. The distances from each of the derived boundaries (n=128) to the field-located 'true' wetland boundary were measured using global positioning system (GPS) and geographic information system software. This study also evaluated the horizontal accuracy of orthophotography, registered aerial photography, and a sub-meter accurate GPS in open sky and forested canopy conditions.

The mean distances (expressed in feet $\pm$ 1 standard deviation) for the digital orthophotography, sub-meter GPS, and registered aerial photography from true locations were 0.89 $\pm$ 0.72, 2.54 $\pm$ 1.88, and 12.69 $\pm$ 6.23, respectively. All three data sources met or exceeded their expected horizontal accuracy standards. GPS coordinates obtained under open sky conditions were significantly more precise than coordinates obtained under forested canopy conditions ($t = 10.49$, $P < 0.0001$). The number of fixes used to derive an averaged position had no effect on positional accuracy of GPS-derived locations.

The mean absolute value distance (expressed in feet $\pm$ 1 standard deviation) between the field-derived 'true' wetland boundary location and the orthophotograph-derived wetland boundaries (11.26 $\pm$ 11.31) was significantly different ($Z = -2.53$, $p < 0.05$) from the mean distance between the 'true' boundary and the aerial photo-derived wetland boundaries (14.87 $\pm$ 13.28). Field visitation increased the accuracy of delineating wetland boundaries and the majority of wetland edges for both orthophotograph- and photo-derived were placed on the wetland side relative to the 'true' boundary.

Despite the statistical differences in horizontal accuracy between orthophotograph- and aerial photograph-derived wetland boundaries, three feet on the ground is not significant in terms of 'true' wetland boundary delineation. This study showed that the resolution and scale of the digital orthophotography was more than sufficient to locate and delineate deciduous forested wetlands located in Warwick, Rhode Island.