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Partnering to Protect Human Health and the Environment

Remote Detection of Invasive and Opportunistic Plant Species in Great Lakes Coastal Wetlands

Year of Water: Thirty Years of Progress Through Partnering

Ricardo D. Lopez[1], Curtis M. Edmonds[1], Anne C. Neale[1], K. Bruce Jones[1], Daniel T. Heggem[1], John G. Lyon[1]

[1]United States Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Las Vegas, Nevada

Donald Garofalo[2], Eugene Jaworski[3], Marco Capodivacca[3], Terrence Slonecker[2]

[2]Environmental Photographic Interpretation Center, Reston, Virginia, [3]Eastern Michigan University, Department of Geography and Geology, Ypsilanti, Michigan

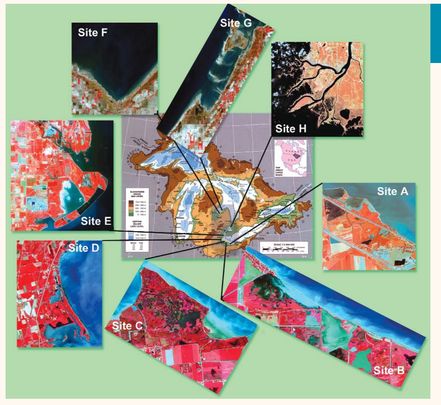
The Problem

Invasive and opportunistic plant species have been associated with wetland disturbance. Increases in the abundance of plant species such as common reed (*Phragmites australis*) in coastal Great Lakes wetlands are hypothesized to occur with shifts toward drier hydrologic regimes, from other physical disturbances within or on the periphery of wetlands, or as a result of all of these factors. Hyperspectral remotely sensed data is being used to develop spectral signatures of *Phragmites*-dominated wetlands. Successful identification of *Phragmites* using hyperspectral data will permit regionwide mapping, and the mapping results can then be used to develop replicate samples to test the hypothesis that increases in *Phragmites* abundance are associated with hydrologic or other physical wetland disturbances. This project is also exploring the same capability for mapping purple loosestrife (*Lythrum salicaria*) and cattails (*Typha* spp.).

Physical disturbances in or near wetlands may affect the presence of invasive plants.

Wetlands dominated by *Phragmites* are less biologically diverse and provide less suitable habitat for some organisms.

The Solution



Coastal wetland study sites in Ohio and Michigan coastal zone where airborne hyperspectral remote sensing imagery was used to map invasive and opportunistic plants.

This study was conducted to test the ecological applicability of airborne hyperspectral remote sensing data to accurately: (1) detect *Phragmites*, (2) map *Phragmites*' geographic extent, and (3) determine important ecological parameters (e.g., percent cover, stem density, and stem height) within *Phragmites* patches on the ground. The mapping results of this project support EPA's wetland assessment efforts in western Lake Erie, Lake St. Clair, Lake Huron, and Lake Michigan.

Partnership Success

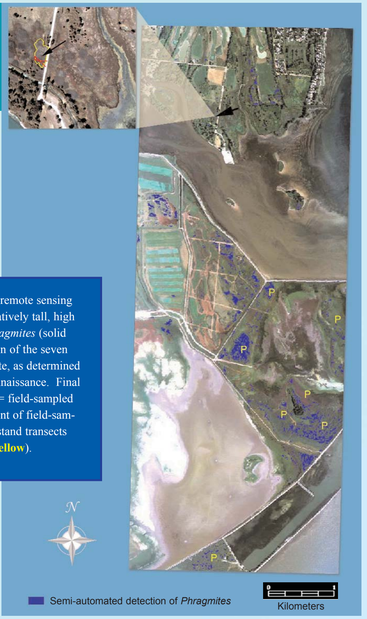
This project builds upon prior collaborative relationships and forges new and innovative partnerships with Eastern Michigan University, the Ohio State University, Michigan State University, the Ohio Department of Natural Resources, the Michigan Department of Natural Resources, the Little River Band of Ottawa Indians, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers (Detroit District), and private industry. U.S. Environmental Protection Agency (EPA) Region 5 and the U.S. EPA Office of Research and Development, Regional Environmental Monitoring and Assessment Program (REMAP) jointly funded this project.

For additional information about this project, please visit our website at the following URL:

http://www.epa.gov/nerlesd1/land-sci/wetlands.htm

Science Success

Results of this study demonstrate how a combination of hyperspectral airborne remote sensing and detailed baseline ecological field sampling may improve the accuracy of mapping wetland vegetation, one of the least accurately mapped land-cover classes at a landscape scale.



Semi-automated classification of remote sensing data at Site E, indicating areas of relatively tall, high percent-cover, high stem density *Phragmites* (solid blue). **P** indicates the general location of the seven largest stands of *Phragmites* at the site, as determined by aerial photographs and field reconnaissance. Final map accuracy = 91%. Black arrow = field-sampled *Phragmites* stand. Inset = enlargement of field-sampled *Phragmites* stand with internal-stand transects (**red**) and stand-perimeter transect (**yellow**).

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