Biocriteria and Land Use Assessment for Monitoring Emergent Marsh Wetlands in New York State

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ABSTRACT

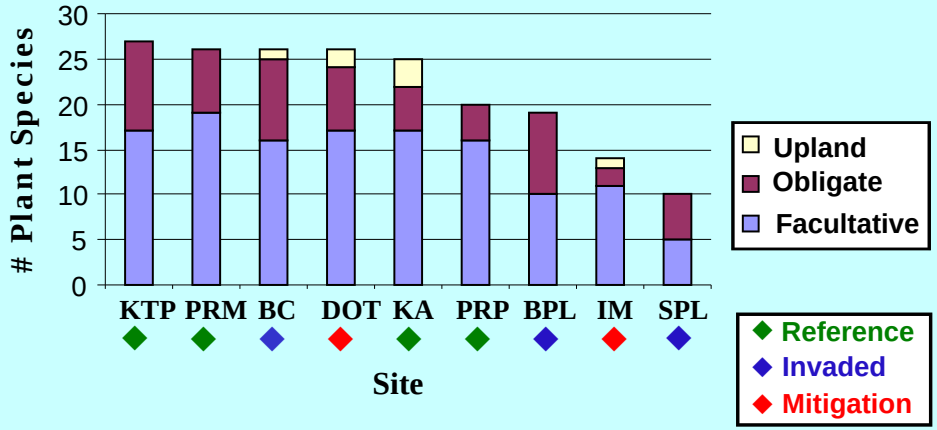
The need for a monitoring program to evaluate the health of NY state wetlands is widely recognized. The purpose of this research was evaluate bioassessment and land use assessment methods that will contribute to the development of this program. These assessment tools will be used to satisfy federal requirements for reporting on the status of NY's wetlands and for evaluating restored wetlands. Nine emergent marsh wetlands within western Albany County, NY were selected and categorized according to a visual assessment of human disturbance and presence of invasive plants. Seven wetlands were "natural" and varied along a gradient of human disturbance, and 2 wetlands were compensatory mitigation sites. During the 4 month field season, vegetative, avian, planktonic, amphibian and macroinvertebrate assemblages were evaluated. Standard water quality parameters (e.g. DO, conductivity, ORP) were also assessed. Additionally, land use was assessed using a geographic information system (GIS) to incorporate aspects of the local watershed and a wildlife buffer zone. Experiments were conducted to optimize bird point counting periods and to compare methods (plot versus transect/quadrat) for gathering vegetation data. Preliminary results indicate correlations between certain biological variables, chemical variables and land use attributes. Bird censuses may be insufficient for detecting the human impact on natural wetlands, but may be useful for evaluating the success of wetland restoration efforts.

VEGETATION SURVEY

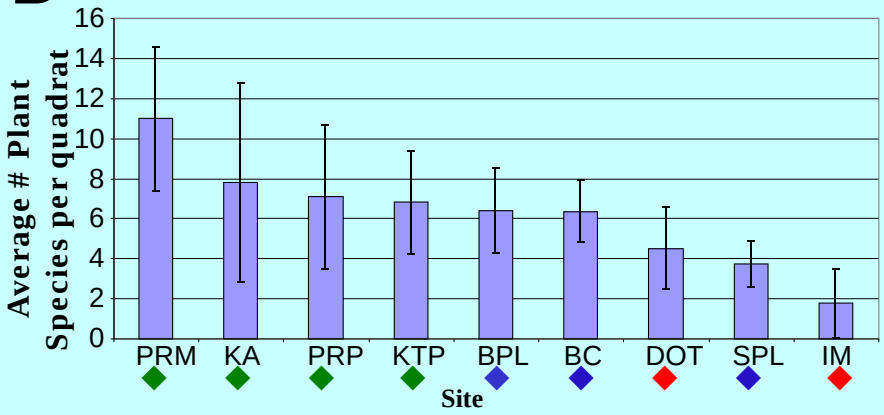
Methods:

➡ 1X1 m² quadrats were placed end to end along a transect from shallow to deep water. Relative percent cover was estimated and stem counts performed. ➡ 10X10 m² plots were visually investigated and percent cover was estimated for each plant species or terrain feature.

A **Plant Diversity in 10X10 Plots**



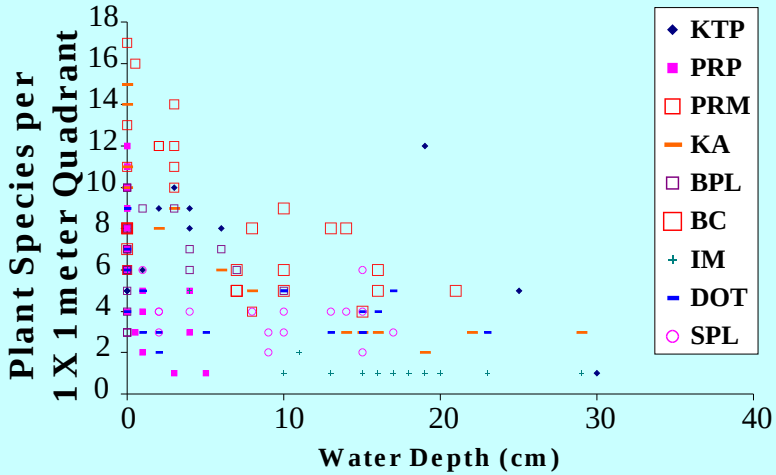
B **Plant Diversity in 1X1 meter Quadrats**



Results:

➡ Although the 10X10 m² plot covers a greater area (A), the smaller 1X1 m² (B) provides more information about variability within each site and makes it easier to sample similar water depths between sites. ➡ It is very important to consider water depth when sampling vegetation (C). Deeper water habitats seem to have inherently less diversity.

C **Water Depth and Plant Diversity**



AVIAN SURVEY

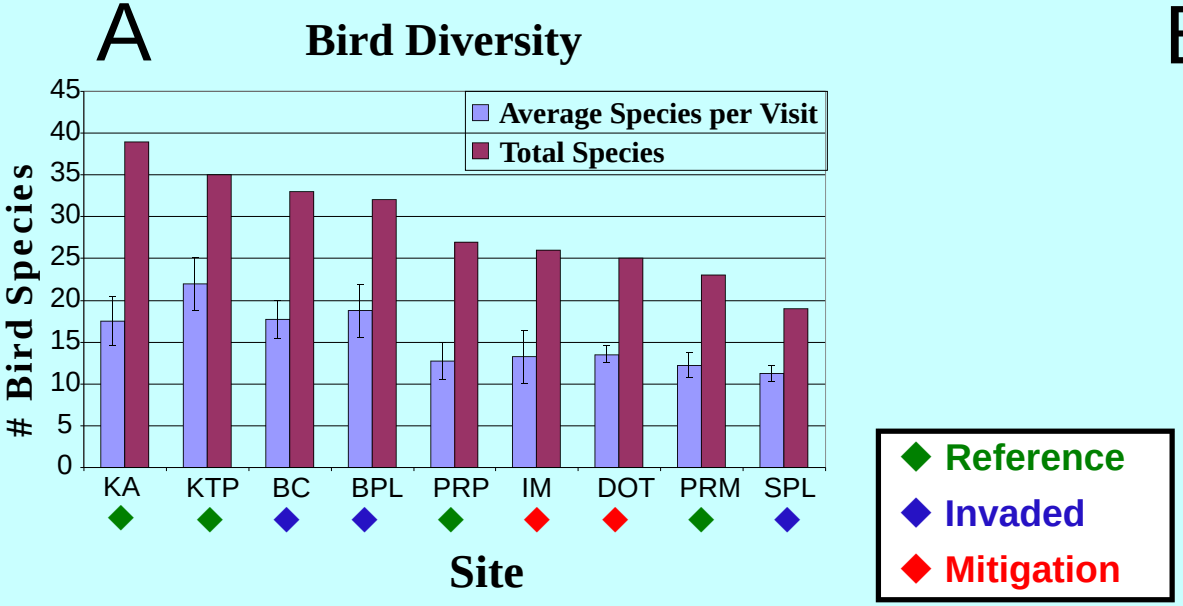
Methods:

➡ Bird surveys were conducted between 6:00 and 7:30 AM at each site using 45-minutes point counts. Every 5 minutes each "new" bird species and the number of "new" individuals was counted. Observers were allowed mobility of up to 20 meters to observe microhabitats and to confirm identifications.

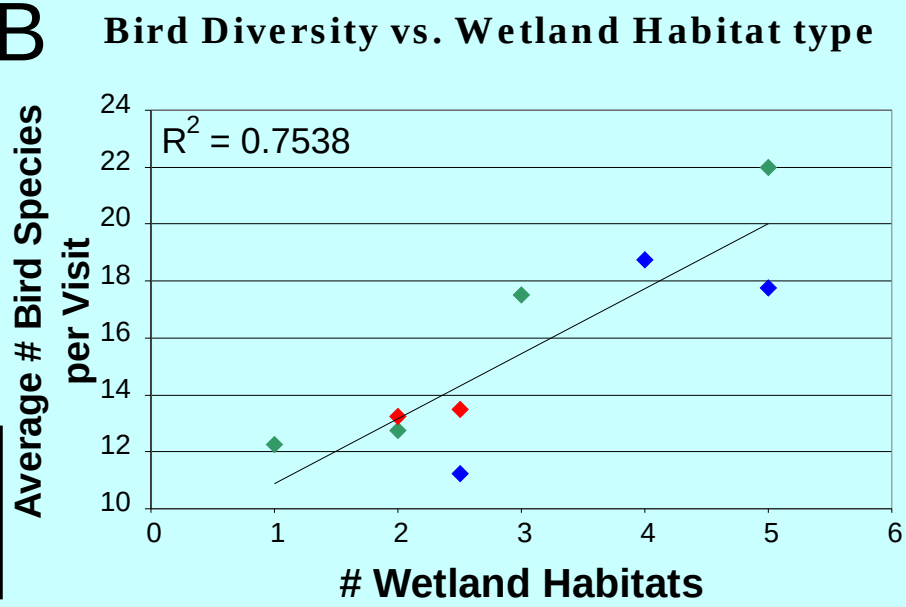
Results:

➡ Avian species richness varied from site to site from min of 11 species to a maximum of 29 species (A). Bird diversity seems to be driven by the structural diversity of the site. As the number of habitats (i.e. Forested wetland, emergent marsh, deep open water, etc.) increases, the species richness increases (B). ➡ When using birds to assess wetland health, it may be more informative to focus on indicator species rather than total species richness. However, if one is creating a wetland with the goal of attracting birds, species richness may be a good measure of how well they were able to create a structurally diverse wetland.

A



B

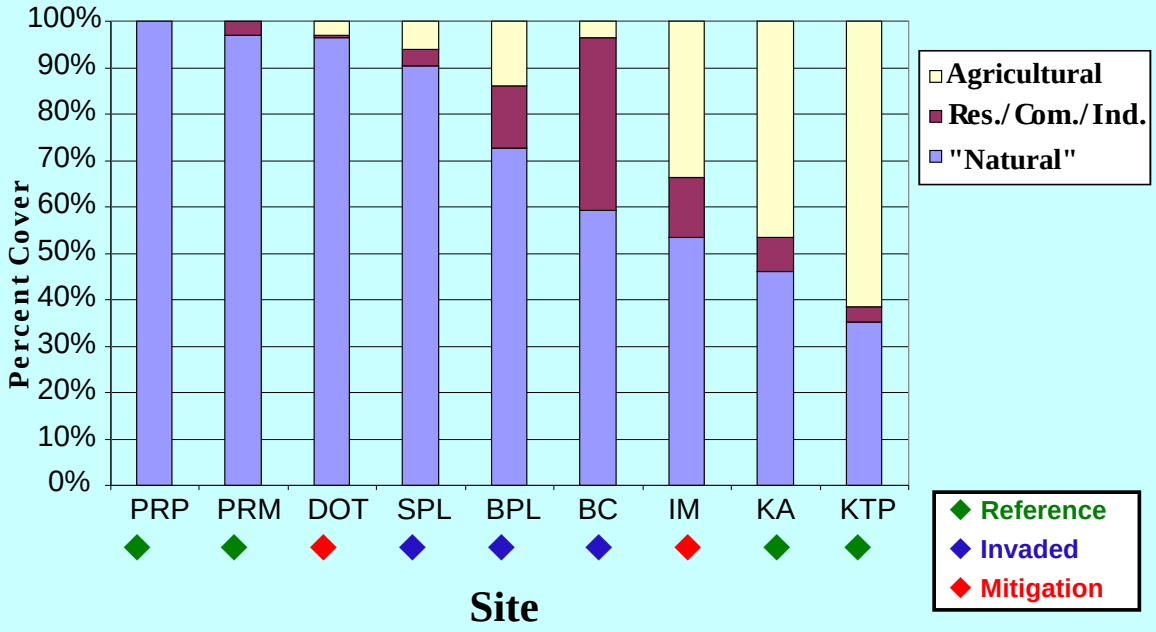


LAND USE SURVEY

Methods:

➡ The local watershed for each study site was delineated using Digital Elevation Models and New York State 2000 Digitally Enhanced OrthoImagery. The DEMs and orthophotos were imported into ArcView 3.2 (ESRI) and displayed using the Spatial Analyst (ESRI) extension. ➡ Each watershed was delineated by ridgelines. Contour lines and aspect images were used to determine the direction of water flow over the land surface. Land cover within each local watershed was interpreted using a level II LUNR classification.

A



Results:

➡ Land use within the local watershed can have major impacts on wetlands (A). The relationship between land use and biological criteria is clearly complex. However, certain trends were observed that support the use of certain biological indicators. ➡ Certain wetlands seem to have better buffers while others have a smaller watersheds and therefore less impact on the wetland. ➡ Future work will incorporate a wildlife habitat buffer as an additional tool for assessing land use impacts.

WATER QUALITY

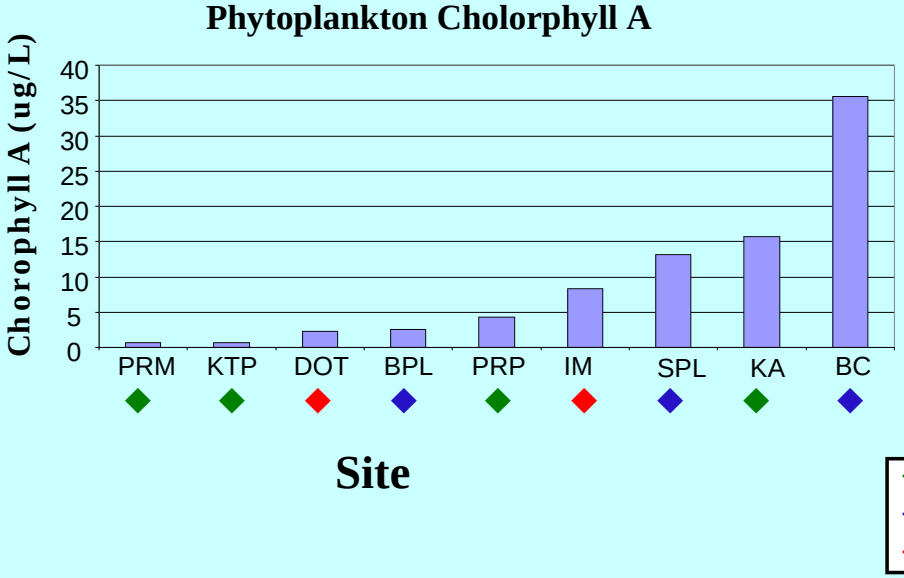
Methods:

➡ Three points along a transect line were selected along gradient of water depth. At each point, the following parameters where measured: water depth, temperature, dissolved oxygen, salinity, conductivity, oxidation-reduction potential and pH. Water samples were collected to measure total suspended solids and for a chlorophyll analysis.

Results:

➡ Phytoplankton production should reflect the availability of dissolved inorganic nutrients to the system. Analyses are still in progress, but chlorophyll concentrations seem to vary with proximity to sources of dissolved nutrients (A). The highest concentrations are from a possibly eutrophic wetland, an agriculturally impacted wetland and a suburban wetland. ➡ The oxidation-reduction potential may be another important indicator of stress (B). One site, marked with an arrow below, may be an agriculturally impacted site. This graph also separates the two mitigation sites, one of which seems to be more successful.

A



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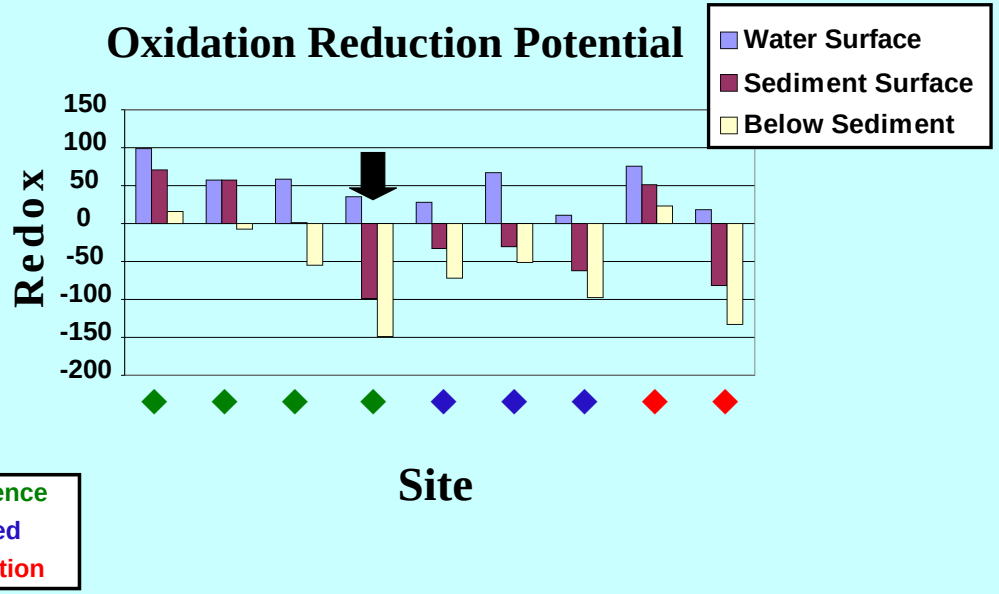

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