Intensification of the National Wetland Condition Assessment (NWCA) in Ohio

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NWCA consists of a total of ~1000 wetlands monitored nationwide – Ohio had 11 of these sites.

The Ohio EPA Wetland Ecology Group (WEG) conducted the NWCA surveys for Ohio’s random picks (11 sites + 2 revisits).

The WEG received a US EPA Wetland Program Development grant to “intensify” the dataset to a total of 50 wetlands monitored across the state over a 3 year period (2011-2013). This intensification grant will allow us to prepare a scorecard of wetland condition for Ohio.

Both the NWCA and Ohio EPA developed field assessment techniques will be used on each of the wetlands included in this study.
NWCA Wetland Sample Sites

- Updated National Wetland Inventory (NWI) layer (226,228 wetland polygons) for Ohio used to pick the NWCA and intensification sample.
- A Generalized Random Tessellation Stratified (GRTS) survey design was used to select 50 base and 550 oversample sites.
- Breakdown of sample based on wetland type is as follows:
  - PEM (emergent) – 107
  - Pf (farmed) – 113
  - PFO (forested) – 138
  - PSS (scrub-shrub) – 119
  - PUBPAB (ponds) – 123
Non-target Wetland Type
NWI Mapping Error
Landowner Resistance

“Hey you Wetland Ecologists, get off my yard!!!”
NWCA Wetland Assessments

- **Soils**
  - Dig 4 soil pits (~60cm deep)
  - Collect bulk density, soil enzyme, and soil chemistry samples from single “representative” pit

- **Vegetation**
  - Five 10M x 10M plots evaluated for numerous types of vegetation data (presence, cover, bryophyte/lichen, woody debris, etc.)

- **Algae**
  - Samples of water and substrate collected for algal taxonomic and toxin work
  - Water samples filtered for algal chlorophyll samples

- **Hydrology**
  - Water samples collected for chemical analysis
  - Basic hydrologic field data collected at time of site visit

- **Buffer**
  - Twelve 10M x 10M buffer plots located along N/S and E/W axes examined for large number of parameters, including invasive species presence, human disturbances, and cover of natural vegetation.

- **USA-RAM**
  - A preliminary 11 metric “rapid” approach was tested for each wetland. Data on various habitat features and stressors collected for the assessment area.
**NWCA Intensification Wetland Assessments**

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  - Water samples collected for chemical analysis (to be conducted by Ohio EPA Lab)
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Ohio Wetland Assessment Techniques

- Ohio Rapid Assessment Method for Wetlands (ORAM), version 5.0.
  - Field procedure taking approximately 1 hour to conduct
  - Several metrics evaluated, examining various aspects of wetland’s ecological condition (e.g., buffer integrity, surrounding land use intensity, plant community quality, hydrology/substrate/habitat “intactness”)
  - Results in a score from 0 to 100 which allows Ohio EPA 401 permit reviewers to place the wetland in its appropriate antidegradation category.

- Vegetation Index of Biotic Integrity (VIBI).
  - Detailed analysis of wetland plant community
  - 10 metrics derived from plant presence and cover class data collected from a 20M x 50M plot. Different suite of metrics are calculated for each wetland plant community type (emergent, forested, scrub-shrub)
  - Can take several hours to conduct, depending on diversity off plant community.
  - Protocols modified slightly to allow vegetation data collected using standard NWCA methodology to also calculate a VIBI score
“Simplified” VIBI or “VIBI-Floristic Quality”

- Focuses exclusively on site diversity and dominance as they relate to FQAI species sensitivity concept (only two metrics are calculated!).
- Resultant “Simplified” VIBI or “VIBI-FQ” score correlates closely with traditional VIBI and ORAM calculations.
- Easier to conduct, calculate and interpret than the traditional VIBI, with very little (if any) loss of information.
- Unlike the traditional VIBI, the “VIBI-FQ” does not require classification of the habitat, and therefore numeric differences accurately differentiate habitats based on deviation from true “reference” condition (apples to apples comparison).
- Is a viable ecological assessment technique in any area of the United States that has a comprehensive FQAI document for the region’s flora (i.e., not just Ohio).
Assessment of Wetland Bryophyte Community

Tree Moss
(Climacium americanum)
Results
The regression equation is

\[ \text{ORAM} = 27.9 + 0.556 \times \text{VIBI} \]

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
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<tbody>
<tr>
<td>Constant</td>
<td>27.893</td>
<td>1.728</td>
<td>16.15</td>
<td>0.000</td>
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<td>VIBI</td>
<td>0.55671</td>
<td>0.02750</td>
<td>20.21</td>
<td>0.000</td>
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</table>

\[ S = 10.6617 \quad \text{R-Sq = 61.2\%} \quad \text{R-Sq(adj) = 61.0\%} \]

Scatterplot of ORAM vs VIBI: Natural Wetlands Monitored (1999-2010)
(N=261)
The regression equation is

$$\text{ORAM} = 25.3 + 0.555 \text{VIBI}$$

<table>
<thead>
<tr>
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<th>SE Coef</th>
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<th>P</th>
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<tbody>
<tr>
<td>Constant</td>
<td>25.285</td>
<td>5.164</td>
<td>4.90</td>
<td>0.000</td>
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<tr>
<td>VIBI</td>
<td>0.5546</td>
<td>0.1149</td>
<td>4.83</td>
<td>0.000</td>
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</table>

$S = 9.90421 \quad R^2 = 62.5\% \quad R^2(\text{adj}) = 59.8\%$
The regression equation is
VIBI-FQ = 2.85 + 0.883 VIBI

Predictor Coef SE Coef T P
Constant 2.854 2.168 1.32 0.189
VIBI 0.88310 0.03452 25.59 0.000

S = 13.3799  R-Sq = 71.7%  R-Sq(adj) = 71.5%
The regression equation is

\[ \text{VIBI-FQ} = 15.7 + 0.570 \times \text{VIBI} \]

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
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<th>P</th>
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<td>Constant</td>
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<td>VIBI</td>
<td>0.5699</td>
<td>0.1717</td>
<td>3.32</td>
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\[ S = 14.7940 \quad \text{R-Sq} = 44.1\% \quad \text{R-Sq(adj)} = 40.1\% \]
## Preliminary Bryophyte Sampling Results

<table>
<thead>
<tr>
<th>Site</th>
<th>ORAM Score</th>
<th>VIBI Score</th>
<th>VIBI-FQ Score</th>
<th>Number of Moss Species</th>
<th>Moss FQAI</th>
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<tbody>
<tr>
<td>NWCA-OH-3003</td>
<td>42</td>
<td>40</td>
<td>31.7</td>
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<td>5.367</td>
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<td>61</td>
<td>35.7</td>
<td>7</td>
<td>6.803</td>
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<td>64</td>
<td>61</td>
<td>59.3</td>
<td>22</td>
<td>16.056</td>
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</table>
1) 4 soil pits is overkill.
2) Should have experienced Phycologist collecting algae data.
3) Field recon is imperative for an efficient sampling day!
4) Minimize paperwork as much as possible!
5) Future NWCA projects should include at least two funded “dummy” site visits, which would can be conducted prior to the actual field sampling window.
1) Determine property ownership and request site access for remaining 36 sites.
2) Perform field recon to verify site meets criteria for inclusion in NWCA, determine if modified AA set-up will be necessary, and evaluate site sampling logistics.
3) Conduct field assessments (18 sites each in 2012 and 2013).
4) Compare results of Ohio methodology with NWCA and USA-RAM metrics.
5) Generate a “scorecard” of Ohio wetland condition.
Thank You!