Moving the Ohio River Basin Fish Habitat Partnership from “Early Action Sites” to true “Priority Areas”

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Forged to …

- Protect
- Restore
- Enhance

… fish habitat through partnerships
Ohio River Basin
Ohio River Basin – Early Action Sites
Downstream Strategies & FHPs

- Create spatially-explicit habitat assessment models for each of the Midwestern FHPs, using Boosted Regression
- Create an integrated GIS decision support tool
- Create a regional representation of habitat condition
Boosted Regression Trees

• **Combines**
  – *Machine learning*
  – *Traditional statistical techniques*

• **Decision Trees**
  – partition the predictor space using rules that identify regions having the most homogeneous response
  – e.g., CART

• **Boosting**
  – Easier to find and average many rough rules than to find a single, highly accurate prediction rule
  – Related to model averaging
Response Variable: Brook Trout
## Predictor Variable Weights

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Relative Influence</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local population density</td>
<td>9.044</td>
<td>100</td>
</tr>
<tr>
<td>Minimum stream elevation</td>
<td>7.732</td>
<td>91</td>
</tr>
<tr>
<td>Network wetland land cover (percent)</td>
<td>6.838</td>
<td>83</td>
</tr>
<tr>
<td>Network soil class C land cover (percent)</td>
<td>6.757</td>
<td>76</td>
</tr>
<tr>
<td>Watershed slope</td>
<td>6.277</td>
<td>70</td>
</tr>
<tr>
<td>Network soil class A land cover (percent)</td>
<td>6.090</td>
<td>63</td>
</tr>
<tr>
<td>Network forest land cover (percent)</td>
<td>4.570</td>
<td>57</td>
</tr>
<tr>
<td>Network impervious surface cover (percent)</td>
<td>4.097</td>
<td>53</td>
</tr>
<tr>
<td>Network density of road crossings</td>
<td>3.601</td>
<td>49</td>
</tr>
<tr>
<td>Local forest land cover (percent)</td>
<td>3.192</td>
<td>45</td>
</tr>
<tr>
<td>Upstream drainage area</td>
<td>3.187</td>
<td>42</td>
</tr>
<tr>
<td>Local density of cattle</td>
<td>3.054</td>
<td>39</td>
</tr>
<tr>
<td>Network developed land cover (percent)</td>
<td>2.926</td>
<td>36</td>
</tr>
<tr>
<td>Predicted thermal regime (cold, cool, warm)</td>
<td>2.321</td>
<td>33</td>
</tr>
<tr>
<td>Local groundwater withdrawal amount</td>
<td>2.222</td>
<td>30</td>
</tr>
</tbody>
</table>
Probability of Brook Trout
**Predictor-Response Functions**

Independent functional relationship between the fish response variable and *natural landscape attributes*.

- **Min. Elevation**: (1.00)
- **Soil C % Land Cover**: (0.87)
- **Average Slope**: (0.81)

CHQI is calculated for each 1:100K Segment Level Watershed.
Natural Habitat Quality Index

Legend
GLBFHP 1:100K Catchments
NHQI Score
- Very Poor
- Poor
- Moderate
- Good
- Very Good
- Not Modeled for Brook Trout
Anthropogenic Stress Index
NHQI vs. CASI

Cumulative Anthropogenic Stress Index Score

Natural Habitat Quality Index Score

Restoration Priorities

Protection Priorities
Decision Support Tool

- Integrated within ArcMap 9.3
- Index calculator
- Downstream future conditions based on user input and model output.
ORBFHP – Example Response Variables

1. Streams Signature Fish Index
2. Smallmouth Bass Abundance
3. Mussel Species Richness
4. Etc.....
Streams Signature Fish Index
Moving Forward

- **Days:** last response variable data submitted, initial draft models

- **Weeks:** FHP review of initial draft models, fully developed draft models

- **Month(s):** FHP review of full models, finalization of models
Healthy habitats, healthy mussels, healthy fish...all good for the American public.

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