

Tributary Habitat Assessment for Fisheries Conservation: Ensuring we're doing the right things, in the right places



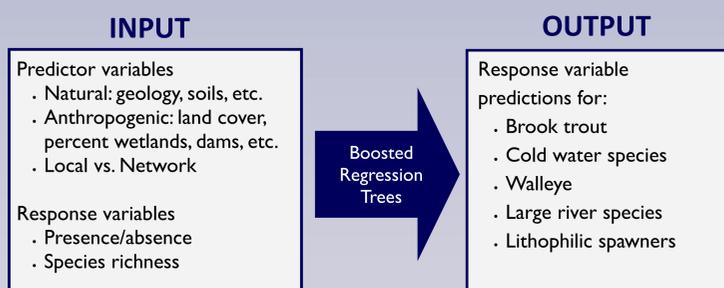
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Introduction: Meeting National Goals on a Great Lakes Scale

The National Fish Habitat Partnership (NFHP) is an unprecedented effort to improve fisheries by making the most effective use of habitat conservation dollars to achieve real gains in aquatic habitat quality and quantity. As one of 18 partnerships formally recognized by the NFHP Board, the Great Lakes Basin Fish Habitat Partnership (GLBFHP) works to protect, restore, and enhance fish habitat in the Great Lakes Basin by providing leadership, coordination, and collaboration with existing and future partners. The GLBFHP completed tributary habitat assessment modeling to improve our understanding of the links among natural habitat conditions, human influences on aquatic habitats and aquatic health. The models, analyses, and data produced characterize the extent of habitat degradation and display how anthropogenic stress and natural conditions influence the distribution of fish throughout the Great Lakes Basin.



Step 1: Where are the fish?



The GLBFHP contracted with consulting firm Downstream Strategies to complete the assessments for the entire Great Lakes basin using the NHD data framework. (Results below are shown for the Minnesota portion of the analysis.) Predictor variables included landscape level data that were classified as natural or anthropogenic. Variables were summarized by catchment to reflect local conditions and to reflect watershed conditions by calculating the cumulative sum of attribute measures for all upstream and downstream catchments in the network. Response variable data were survey data of fish species compiled from state, tribal and NGO partners throughout the basin. Boosted regression trees were used as the statistical modeling approach to relate inchannel response variables with landscape scale predictor variables.

The resulting models determine how certain land uses affect fish and animals living in streams and identify rivers that support habitat for key species. Model outputs also include a description of the relative importance of each predictor variable in affecting response variable outcomes. Results are displayed in maps that describe the probability of presence of modeled species/guilds throughout the Great Lakes basin.

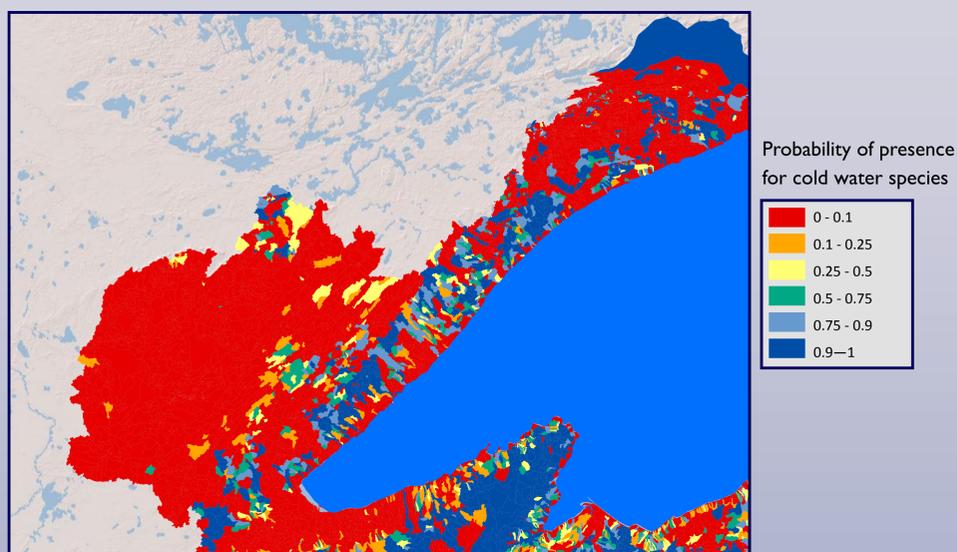


Figure 1. Coldwater species model results in the western arm of Lake Superior.

Step 2: Identifying Protection and Restoration Priorities

The relationships established in the boosted regression tree analysis can then be used to characterize conditions that favor or stress fish populations. The predictor variable influence and functional relationship plots between predictor and response are used to create indices of quality. Predictor variables classified as anthropogenic are used to create a cumulative anthropogenic stress index (CASI). Predictor variables classified as natural are used to create a cumulative natural quality index (CNQI). These metrics, generated at the 1:100,000 NHD catchment scale, are used to generate and visualize restoration and protection priorities. A plot of CNQI versus CASI for all catchments can be used as a reference when defining thresholds to set restoration and protection priorities (Figure 2). Results can be displayed spatially to visualize priorities (Figure 3).

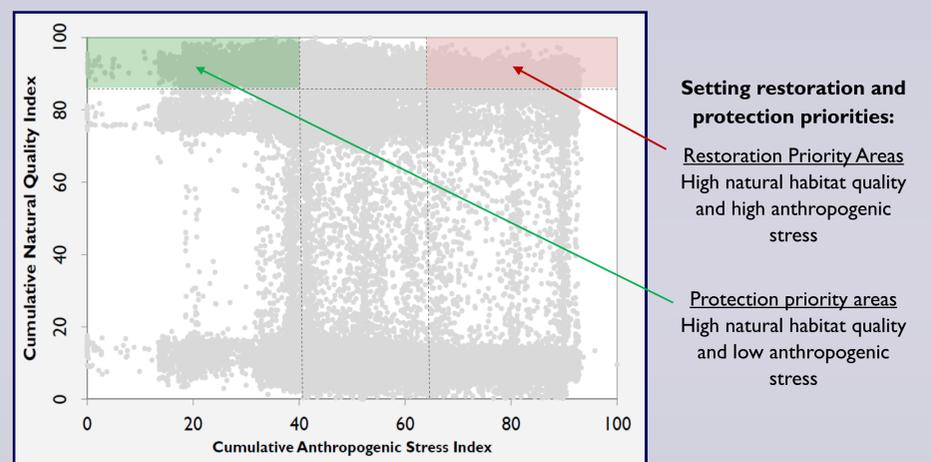


Figure 2. Catchment CASI and CNQI scores for the coldwater species model in the Great Lakes basin.

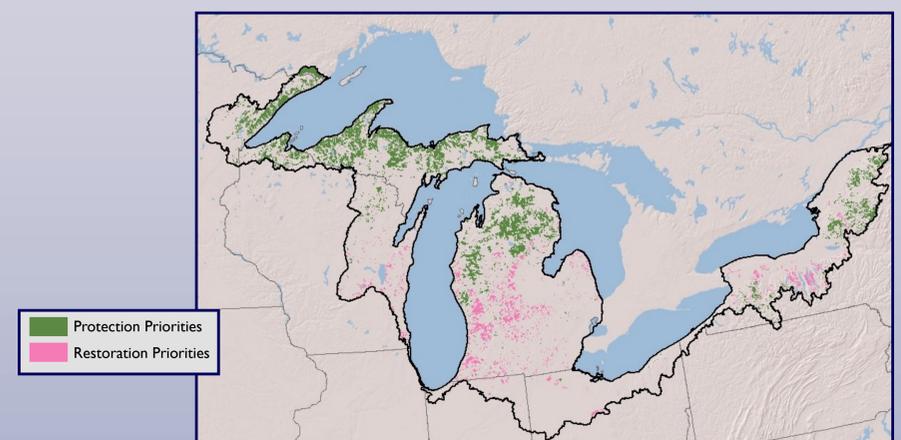


Figure 3. Visualization of restoration and protection priorities areas for coldwater species throughout the Great Lakes basin provides broad perspective on fisheries conservation.

Conclusions

- These models can help managers, agencies and local groups identify what kinds of restoration projects will improve fisheries and target where those projects will be most effective in benefiting aquatic species. Model results can be used to direct financial investment to areas where restoration will most make a difference.
- The models provide a baseline from which we can measure accomplishments at multiple scales
- The geodatabase of predictor and response variables, mapbooks that display results and the final report are **available on line at: midwestfishhabitats.org/resources/fhp/8**

Next Steps

- **Habitat Modeling at a Finer Scale:** The tributary habitat assessments currently provide a Great Lakes basinwide perspective on fisheries conservation needs by modeling relationships across the range of variability throughout the basin. However, smaller scale models are likely necessary to pinpoint localized stressors. Additional habitat modeling is underway at the HUC 8 and Lake Superior basin scales to improve local understanding of habitat conditions.
- **Coastal Habitat Assessment:** The importance of nearshore and coastal habitats is widely recognized. However a basin wide perspective on these habitats is currently lacking. The GLBFHP is developing a coastal habitat assessment to describe habitat status in the nearshore zone. This assessment will be spatially linked to our tributary habitat assessment work to provide the capability of measuring system processes.