

AQUATIC GAP PROJECT REPORTS

(Status as of April 2005)

Ohio Aquatic GAP

Under way.

Anticipated completion date: September 2005

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Species modeling: Ohio Aquatic GAP predicted potential distributions for 130 fish, 17 crayfish, and 70 freshwater bivalves using either the Genetic Algorithm for Rule-Set Production (GARP) or a simple extrapolation method.

Analysis: The Ohio Aquatic gap analysis was completed in 2004. Ohio's two major watersheds, the Lake Erie and Ohio River basins, were analyzed separately. To prioritize potential conservation areas, criteria were identified for each 14-digit hydrologic unit or subbasin that maximized species richness for each taxa at each of three stream-size classes. Watersheds meeting the criteria at varying levels were identified and mapped, thus showing the best predicted areas for each taxa, as well as combinations of each taxa.

Reporting and data distribution: The Ohio Aquatic GAP final report is in review and will be ready for distribution in 2005. The report includes a discussion of watersheds identified as high conservation-priority areas using predicted species-richness values, current conservation lands, land use, and methods used to achieve these results.

The Ohio Aquatic GAP predicted-distribution data were used in a GIS-based decision support system tool designed as part of a cooperative project between the Cuyahoga River Community Planning Organization, the U.S. Geological Survey, the U.S. Environmental Protection Agency, the Ohio Department of Transportation, and the Northeast Ohio Areawide Coordinating Agency, which integrated watershed and transportation planning.

Great Lakes Regional Aquatic GAP

Anticipated completion date: September 2007

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The Great Lakes Regional Aquatic GAP project is currently in its third year, with state projects under way in Michigan, New York, Ohio, and Wisconsin, and a Coastal Pilot in western Lake Erie and eastern Lake Ontario.

Central database development: A Great Lakes Regional Aquatic GAP central relational database was developed to accommodate stream habitat characteristics, aquatic biota sample collections, and habitat affinity information for all Great Lakes Regional Aquatic GAP projects; the database is housed at the USGS Great Lakes Science Center. Fish sample collection data, including more than 57,000 sample collections from more than 25,000 different sites with data representing more than 170 different fish species, have been linked to stream segments for Michigan, New York, Ohio, and Wisconsin and loaded into the central database. Maps and expert review of the observed fish distribution data sets have been completed and the database has been revised. A web-based map application <<http://infotrek.er.usgs.gov/fishmap>> has been developed to produce dynamic species-distribution maps for Wisconsin in conjunction with a related project to update the comprehensive guide, *Fishes of Wisconsin*. Fish life-history data and habitat-affinity data have been acquired from two sources: the Ontario Freshwater Fishes Life History Database, compiled by R. J. Eakins (Eakins 2004), and a life-history database compiled by NatureServe. These data will be used to validate predicted fish distributions and analyze fish community ecology.

Stream habitat classification and modeling: Streams in Michigan, Wisconsin, Illinois, and the Great Lakes drainages of New York have been classified according to habitat

characteristics describing the channel, local riparian zone, upstream riparian zone, local watershed, and upstream watershed, and this information has been loaded into the central database. The habitat variables consist of macro-scale characteristics, including channel morphology, connection to the Great Lakes, land cover, bedrock and surficial geology, and climate. Habitat characterization is under way for the remainder of the New York drainages and for Ohio, using the same methods as the other Great Lakes Regional Aquatic GAP states. Preliminary temperature models have been developed to predict stream temperatures in Michigan, Wisconsin, and New York and will be finalized during 2005. A fish modeling workshop was held by the Great Lakes Regional Aquatic GAP team at the U.S. Geological Survey Tunison Laboratory of Aquatic Sciences in Cortland, New York, during November 2004. A number of modeling approaches have been used and compared, including multiple linear regression, linear discriminant analysis, logistic regression, classification and regression tree, and simple neural networks. The classification and regression tree, logistic regression, and neural network approaches are being tested further and pursued for analyses. Modeling of fish-environment relationships is currently under way and is a focus of Year 3 activities.

Coastal GAP pilot project: A conceptual framework for identifying and classifying coastal habitat types has been developed and applied to the western Lake Erie pilot study. A substantial amount of fieldwork was completed to help assess the efficacy of the classification framework and to collect data from unsampled and important habitat types. Habitat characteristics

that are thought to have a significant influence on the location and distribution of aquatic species include subaquatic vegetation, geomorphology, geologic formations, submerged substratum, submerged slope, and aspect, circulation, and currents. Databases of fish distributions in western Lake Erie and eastern Lake Ontario have been acquired and expert review of these data is under way. The modeling approach that has been tested in the coastal pilot project establishes a relationship between the location of the species and the characteristics of the habitat at that location before grouping similar habitat types. These groups allow for the species information to define the natural breaks in the habitat.

Outreach: Numerous papers and posters describing Great Lakes Regional Aquatic GAP progress and results have been presented at various meetings, including local American Fisheries Society (AFS) chapter meetings, the National AFS meeting, the USGS Ecological Relations with Water Quality Workshop, and the USGS National Aquatic Gap Analysis meeting. The Great Lakes Regional Aquatic GAP team continues to work closely with stakeholders in each of the Great Lakes Regional Aquatic GAP states and the coastal pilot project.

Becker, G. C. 1983. *Fishes of Wisconsin*. Madison: University of Wisconsin Press. 1,052 pp.

Eakins, R. J. 2004. Ontario Freshwater Fishes Life History Database. Version 2.56. Online database (<http://www.afs-soc.org/fishdb/index.htm>), accessed April 12, 2004.