THE GREAT RIVERS NEWSLETTER

GIS Model Helps Identify Potential Reference Sites For the Great Rivers of the Central Basin
Ted Angradi (USEPA)

A key component of the EMAP-GRE effort is the determination of reference expectations for each river so that the condition of the river can be assessed. Because there are only three Great Rivers of the Central Basin (the Upper Mississippi, Missouri, and Ohio Rivers) and each has a unique character and ecological setting, there is not a population of rivers from which to determine reference. Therefore, an internal "least disturbed condition" for empirical bioassessment must be determined from the best sites on each river. EPA scientists in Duluth, MN in collaboration with GIS programmers at Computer Sciences Corporation are developing a GIS model to help identify reaches of each river that are in the least disturbed condition.

The model is based on the assumption that river conditions improve with increasing intensity of or distance from human disturbances (or decreasing distance from tributaries with relatively undisturbed watersheds). The model development and implementation includes the following steps (much simplified):

1. Identify a set of variables based on available GIS data that can be used to score the probable condition of all possible candidate sample sites along each river. Some example variables include: distance downriver from large and small tributaries, distance from NPDES permits, distance from dams, distance from urban areas, and land use adjacent to each candidate site. Variables are not weighted uniformly in the model.

2. Calculate the score for each variable at each site based on distance or intensity and calculate the overall probable condition score for each site by combining the scores for all the variables. Normalize the scores to a range of 1-10.

3. Define reference reaches from site condition scores. For example, continuous segments of river that are comprised of high scoring (8-10) sites are defined as reference reaches.

4. Create a probability sample design for the reference reaches.

5. Draw sample sites from the reaches and sample them in 2006 - 2007 using EMAP-GRE methods.

6. Filter all sites (2004-2007) using site-scale abiotic data to determine which sampled sites belong in the reference data set for each river. Abiotic filtering variables may include water chemistry, sediment chemistry, physical habitat attributes, human disturbance scores, and riparian habitat.

7. Validate data by comparing biotic condition between reference and non-reference sites. Final reference sites are used to determine threshold values for determining ecological condition of each river.

The goal of the model is to increase the likelihood of sampling least disturbed sites in 2006 and 2007, and to increase the total number of sites sampled in least disturbed condition reaches.

Portion of map showing results of GIS model for Upper Mississippi River. Green segments of river are reference reaches based on model output.
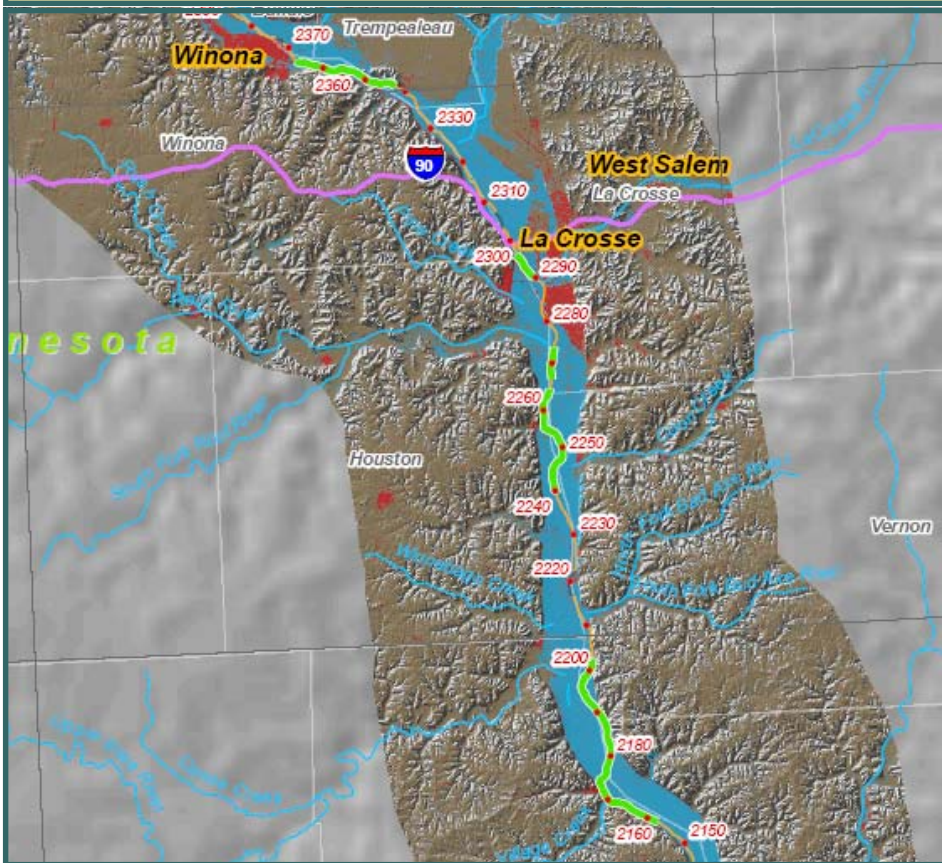
Great Rivers Science Advisory Committee
Janet Keough (USEPA)

The Environmental Monitoring and Assessment Program (EMAP) has established advisory committees for each of its ongoing programs (National Coastal Assessment, Western Stream Assessment), and the Great Rivers Ecosystem EMAP is no exception. The EMAP-Great Rivers Science Advisory Committee is now established and conducting monthly conference calls. Members of the Committee are top-level managers and their representatives within EPA's Office of Water, Regional Offices, and Office of Research and Development; USGS Research Centers; US Army Corps of Engineers; and key organizations, such as ORSANCO (Ohio River Valley Water Sanitation Commission). The purpose of the Science Advisory Committee is to communicate EMAP progress and issues to top managers within these respective organizations, facilitate communication and outreach to other stakeholders, and especially to seek the advice of the Committee on program objectives, priorities, and opportunities to fill important science gaps. Conference calls are being held on the third Wednesday of each month at 1PM CST. Each month, we have received excellent suggestions and input from Committee members, and we view this Committee as a very important source of advice.

CSG and EPA Co-hosting Workshops For 2006

Gene Slusher and David Bolgrien (CSG and USEPA)

EMAP has teamed up with the Council of State Governments (CSG) to promote the interaction of state, federal, and university scientists for the analysis of environmental data. Previously, CSG has helped EMAP bridge the gap between the science and practice of generating data and interpreting results to improve Clean Water Acts Reports. In 2006, CSG and EMAP-GRE will co-host a series of workshops to bring together technical and management experts from across the nation to focus on Great Rivers issues. The exchange of technical information will aid in the creation of uniform approaches for monitoring and assessing water quality in complex, multi-jurisdictional river systems. The first workshop (see announcement on this page) will develop a framework for characterizing and sampling reference conditions of large rivers. Empirical and modeled reference conditions lead to the standards and the public expectations of river conditions that are necessary for management and restoration. The second workshop, planned for March, is being co-hosted by the EMAP, CSG, and the EPA Regional offices in Kansas City and Denver. The focus will be water quality issues of the Missouri River. Objectives for other workshops are being developed.

The US EPA and CSG are pleased to formally invite you to attend the Great Rivers Reference Condition Workshop being held January 10th-11th at the Netherland Plaza Hotel in downtown Cincinnati. Register at: http://www.epa.gov/emap/greatriver/refcond.html

Updates, Meetings, Goings On

Technical Committee Meeting in Cincinnati

The EMAP-GRE Technical committee meeting will be held in conjunction with the Great Rivers Reference Condition Workshop on Jan 12th, 2005 at the Netherland Plaza Hotel in Cincinnati, OH starting at 8 AM.

EMAP-GRE Algae Cooperative Makes Headlines

A recent story was printed in the Duluth News Tribune discussing the merits of our cooperative agreement with Dr. Euan Reavie (NRRI) and Dr. Brian Hill (US EPA). The complete story can be accessed at : http://www.duluthsuperior.com/mld/duluthsuperior/news/local/13049675.htm

International Conference on Rivers to Include Presentations of EMAP-GRE Data

Ted Angradi and Debra Taylor, two of our EMAP-GRE researchers will be giving presentations at the International Conference on Rivers and Civilization June 25-28, 2006, in LaCrosse, WI. Ted will speak on "A Reference Condition Approach for Great Rivers of the Central Basin: The Oho, Missouri, and Mississippi Rivers" and Debra will present a talk titled "From Data to Information: Development of Integrative Habitat Indices for Great River Ecosystems."

EPA Region VII Environmental Scientist Visits Duluth

Larry Shepard, an Environmental Scientist from the EPA Region VII office in Kansas City, KS is on a work detail to the Mid-Continent Ecology Division in Duluth, MN. Larry brings a wealth of information about water quality issues from the perspective of states in the lower Missouri River basin to the EMAP-GRE project.