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# Spatial Data Query and Visualization Tool for Analyzing Upper Mississippi River System Data Sets - Beta 2.0

by
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Collecting, storing and distributing data for water quality, fisheries, invertebrate, vegetation, and other biological and physical data on the Upper Mississippi River System (UMRS) are functions of the Upper Midwest Environmental Sciences Center's (UMESC) Long Term Resource Monitoring Program (LTRMP). In addition, spatial data (e.g., landcover/landuse, bathymetry, water control infrastructure, human use facilities, and ecologically sensitive areas) are collected, maintained, and stored in UMRS datasets. For these various large datasets to be most useful to scientists and river managers, a tool to view and analyze resource trend data along with spatial data is necessary. To meet this need, we are developing a Spatial Data Query and Visualization Tool (Spatial Query Tool).

## *LTRMP Spatial Data Query and Visualization Tool*

We are employing multiple strategies to get LTRMP data into the hands of users. Our first Spatial Query Tool, developed on a UNIX computer platform, had to be implemented as a macro language application needing geographic information systems (GIS) software (e.g., ARC/INFO, ArcView) to run the program. Our next primary strategy, to develop stand alone desktop applications for Microsoft Windows 98, NT-4, and 2000, will provide users with viewing and querying capabilities for a vast array of UMRS spatial data sets at a variety of scales.

## *Spatial Query Tool Module*

The first module being released for beta testing contains component data (i.e., water quality, fisheries, and invertebrate) collected from fixed and stratified random sites in each of the LTRMP study pools: 4, 8, 13, and 26, of the Upper Mississippi River; the Open River Reach on the Mississippi River near Cape Girardeau, Missouri; and La Grange Pool of the Illinois River near Havana, Illinois (Figure 1). Our approach creates a completely compiled program that requires no additional software to run. The development software used to create this tool was Microsoft Visual Basic 6, and ESRI's (Environmental Systems Research Institute, Inc.) Map Objects class library.

The Spatial Query Tool (Figure 2) integrates the LTRMP component data with spatial data layers and allows the user to overlay sampling point locations on basemap layers (e.g., land/water, landcover/landuse, and USGS quadrangles) and graphically or logically select sampling sites and their corresponding records. The application features an easy-to-use interface and requires only basic computer knowledge. The user

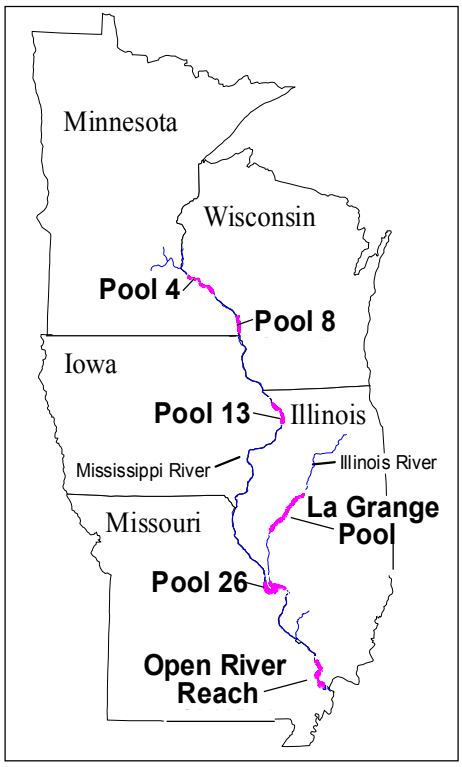


**Figure 1. Long Term Resource Monitoring Program (LTRMP) study areas of the Upper Mississippi River System.** *Graphic by Todd M. Koel, Illinois Natural History Survey, Havana, Illinois.*

can pan and zoom, turn on and off basemap and sampling site layers, save images in the Windows bitmap (.BMP) format, and output selected database records to an ASCII file for analysis in other applications.

Although the LTRMP Spatial Query Tool was designed to be simple to use, it

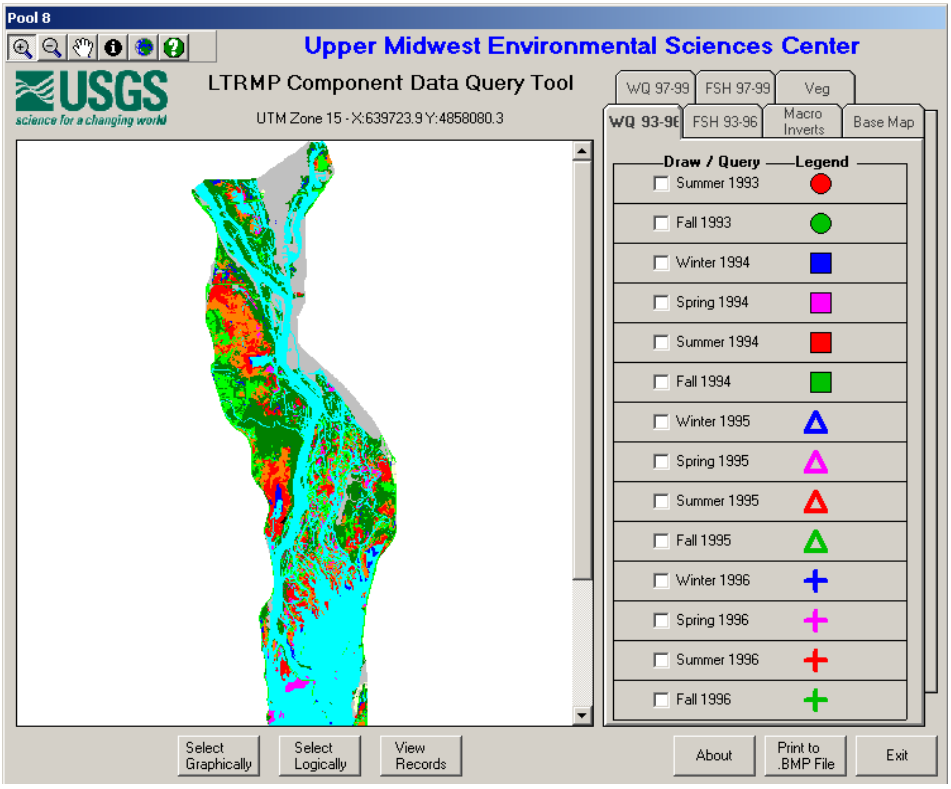


**Figure 2. Long Term Resource Monitoring Program Component Database Spatial Query Tool for Pool 13 of the Upper Mississippi River System.**

requires an understanding of GIS, relational databases, and the LTRMP component database. To assist our partners and others in understanding these concepts, the UMESC offers basic training classes in ArcView and provides other specialized assistance when requested. For a detailed description of the LTRMP component database structure and sampling methodologies, see www.umesc.usgs.gov/ltrmp.html.


*Summary*

This module is the first in a series that will comprise a LTRMP Spatial Data Query and Visualization Tool desktop application. We believe an easy-to-use display and query tool for Windows 98, NT-4, and 2000 will give users GIS display and query functionality. It is important to note that the Spatial Query Tool uses standard ESRI shapefiles that are compatible with ArcView as its data source. It would be a simple matter to use the data included with the desktop tool to build an ArcView project should the need for full-featured GIS functionality be required.

User feedback will be essential to ensure that these tools are useful. If you are interested in evaluating or testing this beta module, we can ship the product on CD or it can be downloaded from our Home Page (http://www.umesc.usgs.gov/) under available data/geospatial applications.



This report is a product of the Long Term Resource Monitoring Program.


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