Great Lakes Basin Ecosystem Team
Geographic Information Systems & Decision Support Systems

What is a Geographic Information System and Decision Support System?

Geographic Information Systems (GIS) and Decision Support Systems (DSS) are mechanisms that can be used to provide managers with information needed to make sound resource management decisions. The role of the GIS/DSS Committee is to examine the use of geospatial data, technologies, and analyses within the Great Lakes basin and assist the other committees with implementing this technology to effectively manage the resources.

## Implementing GIS throughout the Great Lakes basin

Over the last three years, the GIS/DSS committee has developed a draft strategic plan for the Team by investigating the capabilities and issues within both regions and recommending strategies for implementing the technology. Since the development of the plan, there have been some significant improvements and opportunities for the Service. While incorporating these advancements, the goal of the GIS/DSS committee is to implement this technology for use in the field stations and develop the GIS-related infrastructure to promote the sharing of information and expertise.

Great Lakes Islands Decision Support System

The Great Lakes contain about 30,000 islands, ranging in size from small boulders to over a hundred thousand acres. These islands form the world's largest freshwater island system and are a unique natural resource. A large number of rare natural features are located on the islands of the Great Lakes, including several species of plants endemic solely to Great Lakes islands, and many U.S. Fish and Wildlife Service (USFWS) trust resources such as rare and endangered species, neotropical migrants, interjurisdictional fishes, colonial water birds, and waterfowl. The extensive island shoreline epitomizes the Great Lakes coastal ecology. The issue of Great Lakes island protection is timely in that pressures from invasive species and humans continue to increase.

The Great Lakes Islands decision support system is a tool, which helps the user answer simple questions concerning Great Lakes islands and the Great Lakes basin as a whole. The system

facilitates decision-making for land acquisition, environmental review, management planning, and provides a valuable tool for communication and outreach. The Islands DSS will be available from the desktop of all USFWS field stations that manage resources within the Great Lakes Basin. Managers will be able to review Great Lakes islands within the GIS/DSS for natural resource values and threats and for their potential for acquisition by the National Wildlife Refuge System.
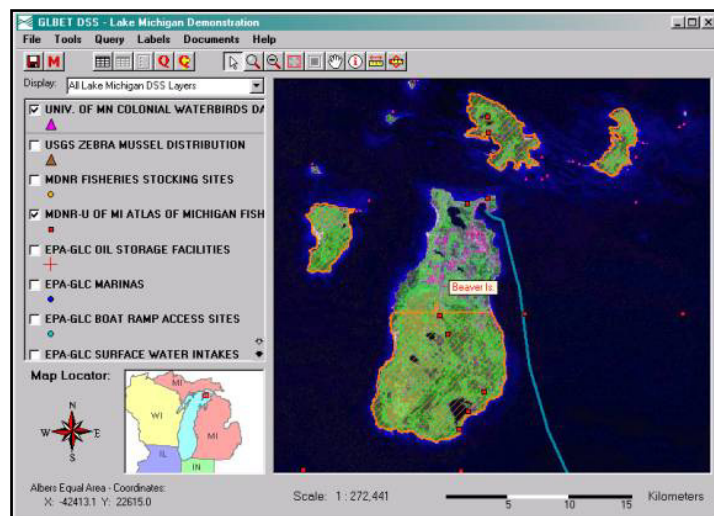
The Great Lakes Basin Ecosystem Team island committee collaborated with the USGS Upper Midwest Environmental Sciences Center (UMESC) and the USGS Great Lakes Science Center (GLSC) to gather

spatial and non-spatial data relating to Great Lakes islands and their watershed. The Decision Support System was created by the UMESC to guide future management and protection of islands and surrounding areas at many scales ranging from small, site-specific projects to basin-wide examinations. The GIS/DSS presently in use on the Upper Mississippi River was used as a model for the project. The tool was created using Microsoft Visual Basic 6.0 and Environmental Systems Research Institute (ESRI) MapObjects LT2.

Features of the system include:
- Spatial data viewing
- Map export
- Table Export
- Length and area measurement tools
- Feature and table queries
- Metadata viewer
- Links to Great Lakes islands documents
- Feature labeling and identification
- Links to textual island summaries

Lake Sturgeon Decision Support System

Coordination and information sharing is an important part of managing the resources on a landscape level. The GIS/DSS committee has assisted the GLBET Lake Sturgeon committee with developing a Lake Sturgeon tributary database. Currently, field staff have been entering Lake Sturgeon sampling information into a database structure that

will link to the National Hydrographic Dataset (streams) for display in an interactive web-based application. This project will significantly enhance a unified, interactive web-based GIS application and meta-database of Great Lakes lake sturgeon information important to researchers and managers. The database will improve upon the existing maps and database developed for the 2000 and 2002 Great Lakes Fishery Trust (GLFT) Lake Sturgeon Workshops.

The GLFT Workshop base maps and database identifies and categorizes all known lake sturgeon waters within the Great Lakes Basin into extirpated, historic, reintroduced, and/or current lake sturgeon populations. This project has created a metadata structure that broadens the information that can be stored and made available to researchers. Greater resolution of the degree of use or presence in a river system has been added for all populations. Where available, information is referenced for presence of adults, juveniles, and subadults, and whether spawning has been observed, egg deposition documented, and larvae captured. Data fields reporting sampling methods used, whether contaminant, genetic, or aging samples were collected, date(s) or year(s) for which the information was collected, investigator(s) involved, citations for available reports and publications, and point of contact for additional information are included.

Our long-term objective is to compile the available lake sturgeon
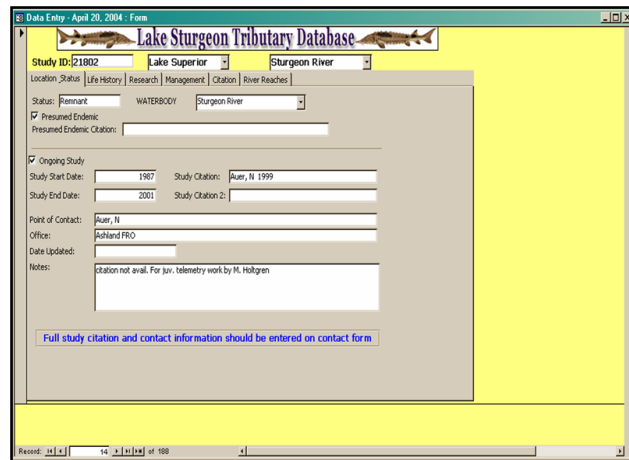
data sources to help focus restoration and research activities on priority lake sturgeon waters.

Spatial Data Development for the Great Lakes Basin

The ability to make sound management decisions depends on the quality and availability of information. Implementing geospatial technologies within the Great Lakes basin depends on coordination between field stations, programs, regions, agencies, and countries. The GIS/DSS committee will continue to compile and create base layer data for the Great Lakes basin with an emphasis on the islands layer. Other data sources will be identified and compiled for aquatic and terrestrial components of the basin. The GIS/DSS committee will also be part of a volunteer coordination group and assist with the development of GIS within the Great Lakes. These efforts will help promote the use of GIS and enhance the cooperation between beginner, intermediate, and advanced users.
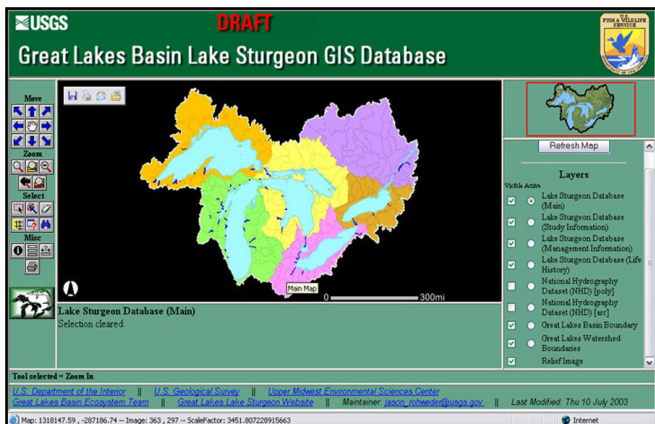
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