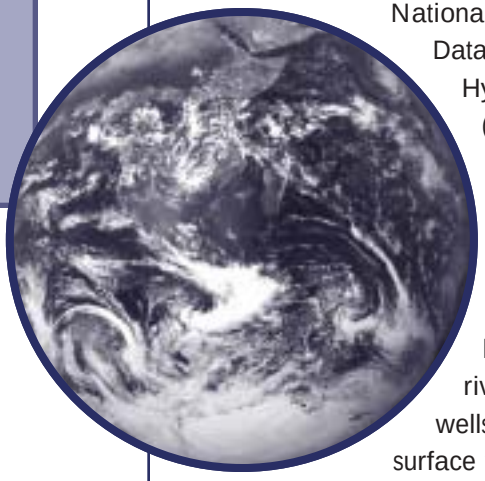
imagi NEWS

National Hydrography Dataset

*By **Steve Miller,** Michigan Department of Environmental Quality and **Rob Surber,** Michigan Department of Information Technology, Center for Geographic Information*

what's inside



There is a renewed focus on spatial aspects of Michigan hydrology with repositioning digital hydrography and development of the high resolution National Hydrography Dataset. The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. Within the NHD, surface water features are combined to form "reaches," which provide the framework for linking water-related data to the NHD surface water drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order. For more information, visit the NHD home page at http://nhd.usgs.gov/

NHD is designed as a framework for three essential spatial processes: production of cartographic products; linear referencing of water resources information; and modeling through use of the surface water network. Because of these requirements, the NHD dataset contains additional complexities beyond the standard, single feature coverage.

The State of Michigan is beginning to work on hydrographic repositioning and developing a high resolution (HR) version of the National Hydrography Dataset (NHD-HR). The Michigan Department of Information Technology, Center for Geographic Information (CGI) is responsible for the Michigan Geographic Framework that includes rivers, lakes and streams (hydrography) and will be the lead agency for ensuring a consistent approach to the NHD-HR in Michigan. Technical support will be provided by the Michigan Department of Environmental Quality (MDEQ), working with the Michigan Department of Natural Resources (MDNR), US Geological Survey (USGS), Michigan State University and many other agencies.

The U.S. Forest Service (USFS) is engaged in a major effort to develop NHD-HR for all national forests (http://www.fs.fed.us/emc/nris/water/nhd_lib/). The USFS has contracted with the Institute for Fisheries Research (IFR), MDNR to develop NHD-HR for 12 major watersheds. The USFS may contract for 13 additional watersheds covering the remainder of the national forest service lands.

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Who's Doing What in GIS and Spatial Technology?

*By **Michael Donovan**, Natural Resource Information Services Section, Michigan Department of Natural Resources*

GIS IN THE MICHIGAN DNR

The development of GIS in the Michigan Department of Natural Resources (DNR) has a relatively long history compared to other organizations. The Michigan Resource Inventory Act (P.A. 204,1979) formalized the start of GIS in the DNR. Among other things, the Act provided for the development within the DNR of a statewide land resource and current use inventory, a data management system, and a technical support function. The data management system and the staff who supported it and provided technical support on the use of the resource inventory to local units of governments was known as the Michigan Resource Information System (MIRIS). The MIRIS Base Map and Land Use digital maps were the initial data layers incorporated into many GIS developed by local and regional governmental agencies.

Early GIS activities at the DNR were heavily focused on development of statewide resource inventory data layers. GIS in the DNR today still involves significant data development activities but the focus has changed to bringing GIS data analysis capabilities to every DNR employee. This new focus creates significant challenges for an organization with staff located in offices throughout the State. The remainder of this article will discuss some of those challenges and how the DNR is attempting to overcome them.

One of the biggest challenges facing the DNR is training resource managers in the use of GIS software, and more specifically, using DNR data sets in their analyses. In order to accomplish this, the DNR developed its own GIS training courses. The ***Introduction to GIS in the DNR*** course taught staff basic GIS concepts and introduced staff to DNR GIS data layers and GIS support staff resources for assistance. The ***Introduction to ArcView GIS in the DNR*** course taught staff how to use ArcView to make maps and analyze resource management issues using DNR data layers. Over 200 DNR staff members attended these courses. Although these courses were very popular and praised for their focus on using GIS software within the DNR, the agency still has challenges with skill retention after training. Staff may have extended periods where their work schedules do not allow the use of GIS and most off-the-shelf GIS software is complicated enough that they lose the ability to accomplish relatively simple mapping or analysis task. Advancements in "Enterprise GIS" technologies may represent the best alternative for bringing simple-to-use GIS mapping and analysis capabilities to all DNR staff while also minimizing issues associated with skill retention. ArcIMS, ArcSDE, Windows Terminal Services, and Citrix ICA will be used to serve data, maps, and custom applications from central servers in Lansing. This eliminates the need to have multiple copies of GIS software and data at DNR offices across the State.

Another challenge the DNR faces is providing resource managers with the most current and comprehensive view of the Michigan landscape. The DNR's imagery initiative is an attempt at meeting this challenge. In cooperation with the United States Geological Survey (USGS) and the Center for

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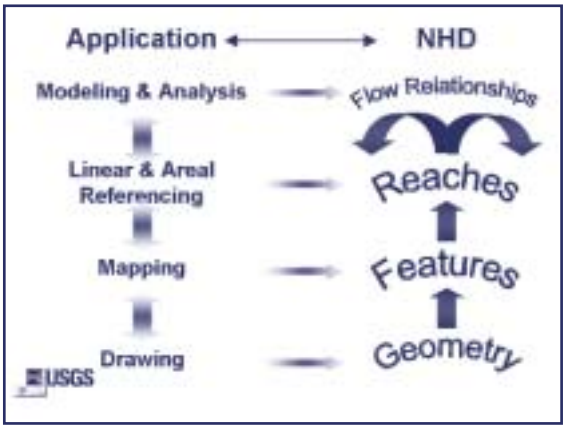
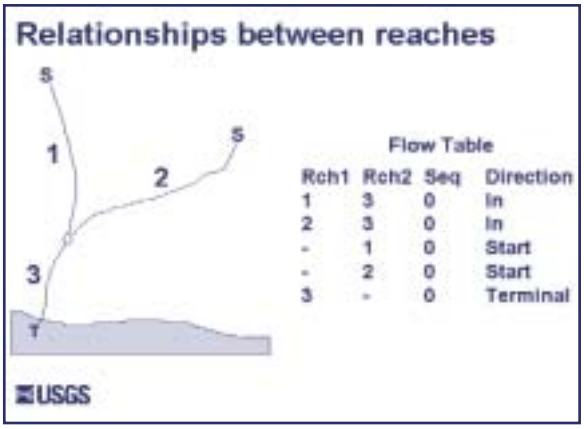
CHARACTERISTICS OF THE NATIONAL HYDROGRAPHY DATASET

- It is a feature-based dataset that interconnects and uniquely identifies the stream segments or "reaches" that make up the Nation's surface water drainage system.
- Common identifiers uniquely identify every occurrence of a feature.
- It is currently based on the content of the USGS 1:100,000-scale data, giving it accuracy consistent with those data and is available for the entire country.
- The reach code structure is designed to accommodate higher resolution data.

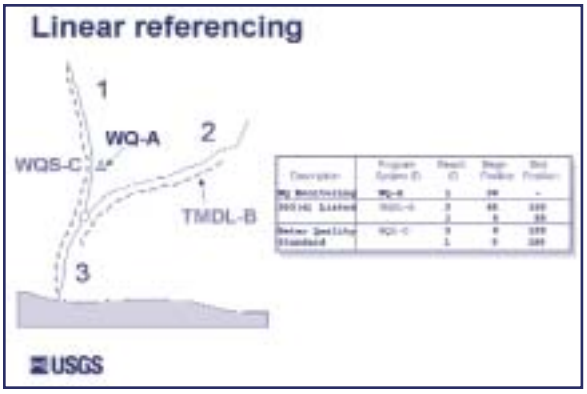


Components of NHD that are used by hydrographic application.

- Names with Geographic Names Information System (GNIS) identification numbers are included for lakes, other water bodies, and many stream courses.
- It provides flow direction and centerline representations through surface water bodies. Unique reach codes (originally developed by the USEPA) are provided for networked features and isolated water bodies



The relationship between reaches is defined for the entire network.



Linear referencing is used to relate point and stream segment information with the NHD.

- The data are now available for download by cataloging unit (CU) from the USGS at http://nhd.usgs.gov. The cataloging unit is a geographic area that subdivides the accounting units within hydrologic units.

RECENT EVENTS IN NHD-HR DEVELOPMENT

Issues and opportunities for repositioning and NHD-HR were discussed at an April 15-16 gathering in Lansing of 60 hydrography stakeholders from throughout the State. This included representatives of State agencies and County governments, as well as the USFS, the Environmental Protection Agency (by phone), and the USGS. The meeting covered a wide range of subjects, including the NHD ArcView Toolkit, feature content, accuracy, currency, and specific use of artificial paths and connectors. A complete record of results from the breakout groups and a PowerPoint presentation of NHD and repositioning can be viewed at http://www.michigan.gov/cgi/

The Institute for Fisheries Research and the University of Michigan, in partnership with the USFS, are working to complete a pilot project for the production of the 1:24,000 scale High-Resolution National Hydrography Dataset in Michigan. Twelve "priority-cataloging-units", partially or wholly located in 3 National Forests, are under contract for production. The 12 CUs in the Huron-Manistee, Hiawatha, and Ottawa National Forests slated for production will be run through standard USGS processing routines developed by the USGS Mid-Continent Mapping Center in Rolla, Missouri. These processing routines include pre-conflation and data preparation, conflation, and post-conflation.

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Geographic Information (CGI), the DNR Digital Orthophoto Initiative provides a standard Digital Orthophoto Quad (DOQ) image base for the State. Currently, the DOQs are available in either 1992 black and white panchromatic or 1998 color infrared. The DNR is working on securing enough funding to replace the 1992 DOQs with 1998 format DOQs. Through the DNRs IFMAP and USGS Gap projects, the DNR is processing satellite imagery to develop new land cover layers. IFMAP is also providing new high-resolution digital aerial imagery over DNR-managed lands.

Widespread use of the Internet has helped the DNR GIS program solve one of its most pressing challenges. As previously mentioned, the early focus of the MIRIS program was external data support to local and regional agencies. This support involved the delivery of data layers in hard copy format to these agencies. As GIS hardware and software became less expensive, many agencies started developing their own GIS programs. The 1990s saw an expansion in the number of local units of government developing their own GIS. At the same time, the number of data layers the DNR was maintaining continued to grow. The old method of distributing GIS data via hardcopy maps or digital media like compact disc wasn't cost effective.

The DNRs Spatial Data Library was initially developed as a way to distribute data internally on the DNR Intranet. It became obvious to support staff that the DNR should port the application to the Internet and have it be the primary tool for meeting our GIS data distribution needs both internally and externally. Recently, the data from the Spatial Data Library was merged with other State of Michigan geographic data and made available via the new Michigan Geographic Data Library at http://www.state.mi.us/cgi/mgdl.

Recent additions to the DNRs GIS data archive include National Wetlands Inventory Maps, Southern Michigan Land Cover, Gap Land Stewardship, and DNR Administrative Units. Individuals without GIS software may view custom maps of many DNR data layers in Adobe PDF format through the DNR's Maps and Publications link available at http://www.michigan.gov/dnr.

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donovanm@michigan.gov

Member News

R.A. Smith & Associates, Inc. - civil engineering, surveying and technical services consultants - Brookfield, Wisconsin, is providing geographic information systems (GIS) to Wisconsin Rapids Water Works & Lighting Commission. R.A. Smith will prepare a GIS needs assessment and project implementation plan for a new GIS to house all of the commission's water system information.

Did you miss the Annual ESRI User Conference in California?

ESRI is bringing the highlights from the ESRI 2002 User Conference to Lansing Michigan. This is your chance to get up to date information about ESRI software and get a preview of ArcGIS 8.3, topology in the Geodatabase, ArcIMS 4.0, ArcReader, and a lot more. We hope you will be able to join us.

ESRI User Conference Highlights Seminar
Monday, September 23, 2002 • 1:00 - 4:00
Michigan Library and Museum, Forum Room
717 West Allegan St., Lansing MI

Everyone is welcome, please share this announcement with other GIS users. No registration fee! No need to register! Just mark you calendar for the afternoon of September 23.

For more information contact:

Steve Miller, Michigan DEQ at
MILLERS6@michigan.gov or by calling 517-241-1407
or
Chad Anderson, ESRI Minneapolis at
canderson@esri.com or by calling 651-454-0600 ext 8319

Driving Directions:
http://www.libofmich.lib.mi.us/welcome/maps/lansingarea.html

Join URISA **in** Chicago **(October 26-30) as it celebrates**
40 years **of remarkable achievements in** government GIS.
Learn from those who brought it to the forefront **of GIS technology and**
those who are going to catapult it into the future, **with educational sessions on:**

- **e-Government**
- **Data Integration: Data Standards, Policy Issues, Software**
- **GIS in Public Health and Human Services**
- **Forty Years of Vision: URISA in Hindsight**

Considerations

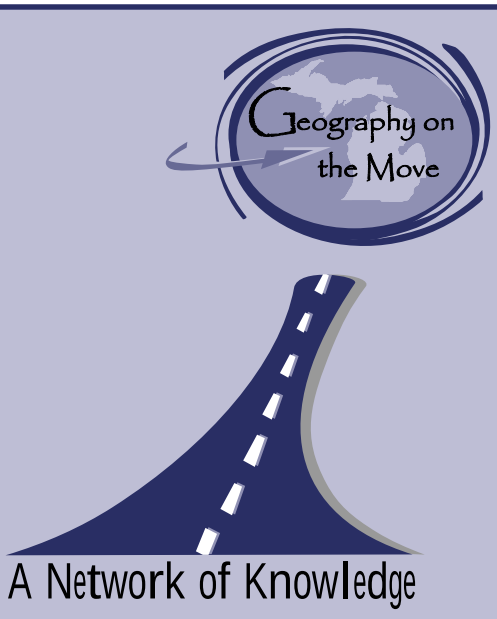
- Enterprise Operations
- G/IS in Transportation
- Making Connections
- Emergency Management & Security (September 11-One Year Later)
- Beyond Maps
- Hot Topics

Jack Eichenbaum, New York City Assessor, will deliver the keynote address.

He will underscore the importance of an accessible municipal GIS that can easily integrate data from diverse sources and the critical need for lateral communication among GIS practitioners.

Another conference highlight will be a Town Hall Meeting on GIS Certification.

For more information, visit www.urisa.org



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Complete final digital datasets (along with FGDC-compliant metadata at the CU level) will be submitted to the USGS national repository and to the USFS.

NEW INITIATIVES

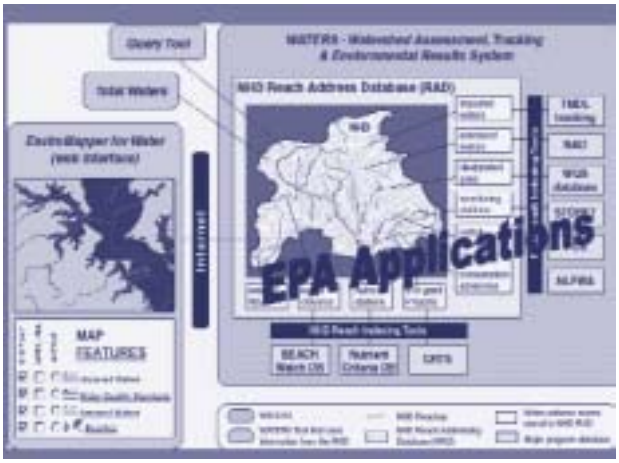
Recent events have solidified the need for a coordinated statewide program to create and maintain a digital hydrography dataset to meet state needs. The State of Michigan, under the leadership of the Michigan Center for Geographic Information (CGI), has begun the process of addressing this need with several new initiatives either planned or underway. These initiatives include,

1) Repositioning and enhancing hydrography and related data to provided an improved framework product useable in the NHD process
2) Production of high resolution NHD for watersheds not completed in other projects
3) Review and correction of NHD-HR on watersheds completed by the Fisheries Institute before repositioning
4) Review by experienced hydrologists to ensure the product is usable and correct from a hydrologic perspective
5) Development of a process for updating the NHD to incorporate detailed local information.

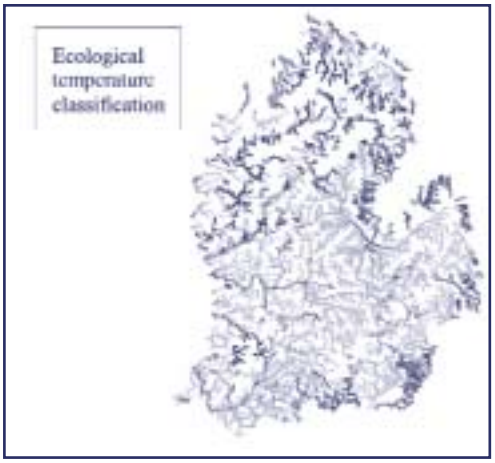
The final product will be a hydrography dataset that is positionally consistent with transportation and other framework categories. This product will be maintained as a critical part of the State's framework products. The CGI is applying for an Innovative Partnership with the USGS to support the NHD-HR development portion of this process.

The CGI has recently completed repositioning and conflation of the transportation features and has experienced staff to assign to this process. The efforts will also benefit from work being done at the Fisheries Institute for the USFS. Visit the CGI website for more details.

There are numerous applications that will benefit from NHD-HR including surface water quality, source water assessment and protection, fisheries management, and floodplain mapping.



Applications such as ecological temperature classification use NHD for unique reach identification.



CREDITS:

Some text and graphics in this article are from the USGS. EPA Applications Figure is from USEPA.

Questions and comments regarding NHD efforts should be directed to Steve Miller at millers6@michigan.gov or (517) 241-1407.

Questions and comments on repositioning should be directed to Rob Surber at surberr@michigan.gov or (517) 373-7910.

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IMAGIN is a non-profit 501(c)3 organization comprised of individuals and organizations interested in the use and application of geographic information system (GIS) technology in Michigan. Our members are committed to improving the quality and availability of digital data necessary to make good use of GIS. We believe that cooperation and open communication are necessary to achieve these objectives.

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Jim Bennett, IMAGIN President

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