



# imaginNEWS

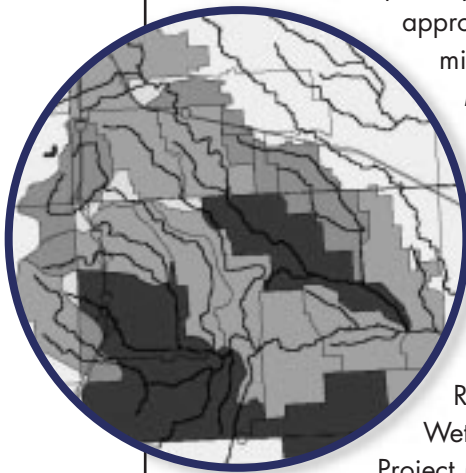
## what's inside

Who is Doing What in GIS and Spatial Technology—Macomb County

GEOGRAPHIC FRAMEWORK—Project Brief

## Rouge River Project GIS Applications

by Colleen Hughes and Charlie Bristol  
Camp Dresser & McKee



The Rouge River Watershed serves as the primary drainage basin for approximately 435 square miles of Southeastern Michigan covering parts of three counties and 48 communities. The river is on the Act 307 list as one of the most contaminated water bodies in the State. In 1992, the Rouge River National Wet Weather Demonstration Project (Rouge Project) was established with a mission to restore the water quality of the Rouge River. To help support this mission, a GIS and DBMS system was created. The system utilizes ESRI ArcInfo, ArcView, and Map Objects GIS software and Oracle and Microsoft Access databases. Over 50 different base map and environmental map layers have been compiled for the region in addition to numerous project specific layers such as sampling site locations. The sampling database contains over 7 million records of water quality, quantity, habitat, sediment, and biological data collected to help understand and monitor pollution problems

and their sources. Since the project's inception many watershed restoration activities have been undertaken and are being monitored to assess their benefit while planning of further improvement projects continues. Therefore, the information management system must be continually maintained to support these on-going activities. To this end, the Rouge Project has developed a suite of GIS and database applications for processing, analyzing, and disseminating the data available. This article provides a brief overview of these applications.

### DATAVIEW

DataView is a tool developed to support routine analysis of large time series data sets and for data dissemination. The tool was originally developed for internal use by Rouge Project staff as a user-friendly data query tool with basic data analysis functions such as plotting, mapping, and summary statistics. In addition, DataView has proved to serve as an excellent means of distributing the data and has become our primary data dissemination vehicle. The data and stand-alone application are distributed free of charge on CD upon request. Requests are processed via the Rouge Project web site, rougeriver.com. DataView's flexible data structure allows it to work with a

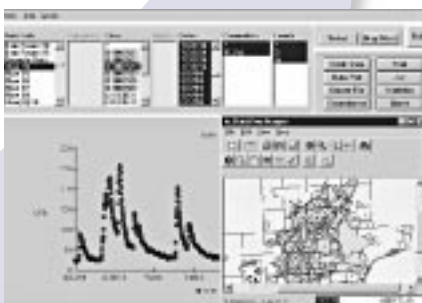


Figure 1: DataView Application

MAIN STORY continued on page 4

## Who is Doing What in GIS and Spatial Technology

**Name of Municipality/Agency:** MACOMB COUNTY

**Population:** 775,000

**Geographic Coverage:** 482 Sq. Miles

**Number of Staff:** 2 Full Time, 7 Part Time

### 1. Give a status of your program.

The Macomb County Department of Planning and Economic Development has been involved in GIS since 1994. Growing out of a need for customized Census data and demographic market analyses to support the Department's Economic Development division, GIS was the natural choice for managing and mapping these data.



Subsequently, staff provided mapping support and digitizing for the Macomb County Michigan State University Extension's Gypsy Moth Suppression Program. Additionally, staff built a countywide drains coverage and utilized GIS to develop the Department's 1995 Land Use Survey. Other applications soon followed which included providing GIS support for the County's Emergency Management Agency and the Environmental Health Division's Clinton River watershed pollution monitoring program.

In 1998, the Macomb County Board of Commissioner's designated the Department of Planning and Economic Development as the County's lead agency for spatial data and mapping services. In that same year the County became an ESRI based shop. In 1999, the board authorized the acquisition of countywide 6" pixel resolution B/W digital orthophotography (DOP) and established an Enhanced Access policy.

In that same year, the Macomb County Sheriff's Department joined Courts and Law Enforcement Management Information System (CLEMIS) becoming a partner in the emerging regional Computer Aided Dispatch/Automated Vehicle Locator System (CAD/AVL) and records management system. The Sheriff and County's Management Information Services department enlisted the assistance of GIS staff to develop and maintain street centerline and polygonal dispatch/service area coverages to support their CAD/AVL efforts.

### 2. Describe any new projects or activities.

The County is currently in the process of three GIS projects: DOP quality assurance and quality control (QA/QC), parcel conversion, and network/server upgrades. In 1997, work began on in-house conversion of the County's 2,600 parcel base maps. Initial work included scanning, heads-up digitizing, and PIN placement of over 300,000 parcels. Numerous custom programs (AMLs) and batch processes were developed by staff to automate time consuming tasks such as PIN orientation and permanent parcel number verification. Presently, the parcel conversion program is awaiting completion of the DOP project since orthophotography will be used to transform and edge match each of the existing 2,600 parcel maps.

At the same time, staff is also performing quality assurance review of DOP acquired in the spring of 2000. This process includes visual inspection of the captured imagery, as well as verification of street centerline vectors, hydrography vectors, and the conflation of existing coverages to newly captured features. Deliverables from this project will include B/W DOP imagery at 6" pixel resolution, a conflated county maintained drains layer, newly captured hydrography, 10' (NMA) contours, and a new street centerline coverage containing conflated attributes from the Macomb County portion of the Michigan Geographic Framework coverage. The County's DOP project is scheduled for completion in 2001.

The Department is currently in the process of migrating our spatial coverages and imagery to a newly acquired Dell 6300 Windows NT server. Providing over 500 GB of RAID storage, this new box will provide centralized storage and distribution for all the County's spatial data sets.

### 3. What would you do differently if you had to start over?

If Macomb County were to restart its GIS program again, we would initiate a high accuracy remonumentation grid from the outset. Initially, the importance of the County's remonumentation program to its GIS efforts were not understood. Better placement of GPS control points in the initial years of the program would have reduced the time it took to densify a three mile countywide control grid capable of supporting DOP production

### 4. If you had the GIS guru standing in front of you—what questions or problem would you have him/her solve?

We are currently analyzing what the best coverage size/tiling scheme is for Macomb County's parcel coverage. Staff is attempting to assess what coverage tiling is optimal for maintenance, display, distribution and hardcopy output. Thirdly, parcel annotation is providing some real challenges to staff. Presently, all of our PIN data are contained within the parcels polygon attribute table (.pat). Insertion point, rotation, text size and color are derived from fields in the .pat. Custom AMLs regenerate this annotation as parcels are updated. A similar approach for dimension data that places the data in the parcels arc attribute table (.aat) is desirable, yet developing a standardized method to handle the "many to one" and "one to many" relationships that can exist has been difficult.

### 5. What valuable piece of information have you learned that you would you like to share with the GIS community?

Starting out small and building upon the successful results of individual GIS projects provided GIS with the initial exposure and support needed to grow into a parcel-based system. By selecting high visibility projects with rapid turn around times, staff was better able to educate key department heads and policy makers in the importance of GIS as a legitimate business tool. By functioning as a service agency for spatial data and mapping services, the utility of GIS was demonstrated to a broad range of County departments and agencies through the production of GIS based products that directly aided their programs. It was this approach that made all the difference when the time came to gather support for DOP and the expansion of our GIS hardware and software capabilities.

**Name:** Jeff W. Schroeder, AICP

**Title:** Project Coordinator - GIS

**Organization:** Macomb County Department of Planning and Economic Development

**Address:** One South Main Street, 7th Floor

**City:** Mount Clemens, Michigan

**Telephone:** 810.469.5285

**E-mail:** jschro@co.macomb.mi.us

A variety of data types including analytical, continuous water quality, flow and rain. DataView (Figure 1) is composed of six major functional components:

1. Tabular Data Viewing - displays data in a cross tabulated spreadsheet like grid.
2. Data Plotting - creates on-screen plots of selected data.
3. Summary Statistics - displays summary statistics including mean, minimum, maximum, sum, standard deviation and variance.
4. Spatial Display - displays base map showing sampling site locations and other GIS map layers selected by the user.
5. Non-numeric Data Association - provides for the spatial association and display of non-numeric (graphics, photographs and text files) information.
6. Data Export - allows for the creation of ASCII text files to facilitate the movement of data to other software.

## SITE MANAGEMENT

The site management application is a tool used internally by sampling staff for establishing new sampling sites and identifying the types of data being collected at each site. The tool was developed with ArcView and MS Access and links directly to our Oracle database and ArcInfo GIS coverages. The user identifies the location for a new site using ArcView and enters the required site information directly into the Oracle database to create a new site.

## LOADER

The Loader application is an MS Access interim database used internally by Rouge Project sampling staff for reformatting field data downloaded from electronic data loggers and uploading it into the permanent Oracle sampling database. The interim database provides field sampling staff with immediate quality control and assurance feedback so that field equipment problems can be identified and corrected as soon as possible.

## FLAGGER/EDITOR

The Flagger/Editor application is an MS Access application that is used internally by field sampling staff for performing their quality control and quality assurance procedures which includes the flagging of all data records quantifying the accuracy of the data collected. In some cases data may be rejected due to equipment malfunctions or adjusted due to calibration error or drift.

## QUERY

The Query application is a tool used internally for querying data from the Oracle sampling database. Options are available for selecting data type, sampling sites, date ranges, sample types, and parameters. Queried data can be viewed on screen or exported to an MS Access database, an Excel spreadsheet or to a text file.

## WATERSHED MANAGEMENT MODEL

The Watershed Management Model (WMM) is a storm water runoff loading model developed to support municipal NPDES storm water management planning. The model estimates annual or seasonal pollutant loads from many sources within a watershed and simulates the relative benefit of proposed watershed management strategies. The tool has been applied to Rouge Project subwatersheds as part of our water quality and quantity modeling program and is also distributed on CD free of charge as a stand-alone application for Rouge Project communities or other interested parties.

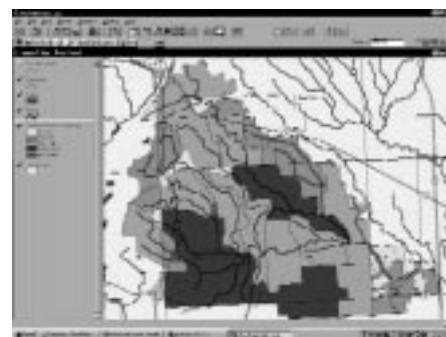


Figure 2

## ILLICIT DISCHARGE ELIMINATION PROGRAM

The Illicit Discharge Elimination Program (IDEP), shown in Figure 3, assists in the tracking, management, display and reporting of information relating to the identification and elimination of illicit discharges to rivers, streams and storm water conveyance systems. Non-spatial data are managed through an MS Access database while spatial data (complaint, investigation, and sampling locations) are managed using ArcView. The application is currently being used by Wayne County and other Rouge communities to help satisfy their requirements for the Michigan Department of Environmental Quality National Pollutant Discharge Elimination System General Wastewater Discharge Permit - Storm Water Discharges from Separate Storm Water Drainage Systems.



Figure 3

## DEPARTMENT OF STATE POLICE

- Crime locations
- Emergency management sites
- Crash locations

## LIBRARY OF MICHIGAN

- Library facilities

## DEPARTMENT OF STATE

- Ward/precinct boundaries
- Voters
- County commissioner district boundaries
- School precincts (planned)
- Village precincts (planned)
- State House/Senate and US Congressional District boundaries

## DEPARTMENT OF AGRICULTURE

- Regulated food establishments
- Regulated pesticide firms, sellers and storage locations

## DEPARTMENT OF TRANSPORTATION

- Right-of-way map images defined by control section on the MGF (planned)
- MDOT managed facilities

## DEPARTMENT OF MILITARY AND VETERANS AFFAIRS

- DMVA managed land and facilities

## DEPARTMENT OF MANAGEMENT AND BUDGET

- State facilities
- Census tabulation areas to block group

Further information on the Michigan Spatial Data Warehouse Initiative will be made available as the program progresses. If you want more information on this initiative, please contact Rob Surber of the Michigan Information Center at 517-373-7910.

# Welcome new IMAGIN members

## INDIVIDUALS ADDED TO EXISTING SUPPORTING ORGANIZATIONS

Michael Wee  
Assistant Planner  
City of Muskegon  
933 Terrace St.  
PO Box 536  
Muskegon, MI 49443-0536  
616-724-6702 voice  
616-724-6790 fax  
michael.wee@postman.org

## NEW INDIVIDUAL MEMBERS

Steve May  
Drain Commissioner  
Lenawee County Drain Commission  
320 Springbrook Ave.  
Adrian, MI 49221  
517-264-4696 voice  
517-264-4785 fax

Ed Scheffler  
Lenawee County Drain Commission  
320 Springbrook Ave.  
Adrian, MI 49221  
517-264-4696 voice  
517-264-4785 fax

Robert Peven  
Principle Planner  
Monroe County Planning Department  
125 E. Second Street  
Monroe, MI 48161  
734-240-7383 voice  
734-240-7385 fax  
robert\_peven@monroemi.org

Larry Sullivan  
Planning Director  
Charlevoix County Planning  
301 State Street  
Charlevoix, MI 49720  
231-547-7234 voice  
231-547-7217 fax  
lsulliva@nwm.cog.mi.us

# Michigan Geographic Framework Forms Basis for the Michigan Spatial Data Warehouse

Many GIS professionals in the state are familiar with the Michigan Geographic Framework (MGF) Program — the state initiative to map and maintain core information that the majority of agencies need for their business. This base map consists of all transportation, hydrography, jurisdictional boundaries and the PLSS 40 acre grid for the state.

What many may not be as familiar with is the wealth of information that is being referenced to the base map as part of the Michigan Spatial Data Warehouse initiative.

The Michigan Spatial Data Warehouse Initiative is a centralized/decentralized spatial data collaborative program among state agencies being administered through the Michigan Information Center. It is designed to maximize the value of state geo-referenced information by establishing and enforcing geo-referencing standards, common definitions and data custodial responsibility, and providing the hardware and software for efficient information access, query and dissemination. Aside from the benefits to state government, the Warehouse is being designed to increase the access and use of spatial data for agencies outside of state government.

The Warehouse is currently under development. Spatial data sets are being compiled, geo-referenced and catalogued. The Michigan Information Center will be establishing a web site that can either serve up the data directly or point to the respective custodial agency for access. Metadata will also be provided that identifies the quality of spatial referencing of the data set with respect to the MGF. Currently, data sets in the Spatial Data Warehouse are being referenced either by address, PLSS grid or Linear Referencing System. However, with the termination of the GPS selective availability and the increased availability/usability of GPS, state agencies are beginning to consider GPS as a viable field collection device along with laptop and palm-based computers. As more data are collected via GPS, the MGF will continue to serve as a “geo-crossroads” for spatial data integration.

Aside from the wealth of attribute information being collected on the MGF map features, the following is a sample list of the spatial data types being collected in the Warehouse and their respective custodial agencies:

## DEPARTMENT OF COMMUNITY HEALTH

- Birth Records 1990 — 1999 (confidential)
- Death Records 1990 — 1999 (confidential)
- Cancer Cases 1990 — 1999 (confidential)
- Regulated medical facilities

## DEPARTMENT OF ENVIRONMENTAL QUALITY

- Air Pollutant Point Sources (EPA’s AIRS/AFS)
- Toxic Release Inventory (EPA’s TRIS)
- Site and non-site data from the Comprehensive Environmental Response, Compensation and Liability Information System (EPA’s CERCLIS)
- National Pollutant Discharge Elimination System Facilities for Permit Compliance (PCS)
- Hazardous sites from the Resource Conservation and Recovery Information System (EPA’s RCRIS)
- Aboveground storage tanks
- Underground storage tanks

## FAMILY INDEPENDENCE AGENCY

- Customer database (confidential)
- ATM locations

## DEPARTMENT OF EDUCATION

- K-8/12 School District Boundaries
- K-8/12 School Facilities

## DEPARTMENT OF NATURAL RESOURCES

- State Park asset inventory
- State land as defined by 40 acre grid
- Subdivision Control Act plan drawings defined by 40 acre grid (planned)
- Other DNR managed facilities and infrastructure





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IMAGIN is a nonprofit 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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You may contact the editor at:

IMAGIN  
27300 Haggerty Road, Suite F-30  
Farmington Hills, MI 48331  
(248) 489-3972  
(248) 489-3973 fax

Bill Enslin, IMAGIN President

Deborah K. Schutt, Executive Director

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