



# Wisconsin Water Science Center



## Capabilities Summaries

## Database Applications

Contact Harry House (608 821-3876, hrhouse@usgs.gov); Nate Booth (608 821-3822, nlbooth@usgs.gov); or <http://infotrek.er.usgs.gov> for more information.

### Database Applications for Science Support

The Middleton Data Center (MDC) Team in the USGS Wisconsin Water Science Center (WI WSC) office in Middleton, Wisconsin is dedicated to the deployment of high-end information technology products to enhance data storage and access methods against natural resources datasets. The MDC emphasizes out-of-the box solutions whenever practical, and browser-based access to database servers via the World Wide Web. Currently, the MDC is involved in projects on a local, regional, and national scope, with cooperators both inside and outside of the USGS. Specific areas of expertise include:

### Data Warehousing

The MDC is experienced in all aspects of small to medium-size data warehouse projects. This includes requirements gathering, data modeling, data cleansing and loading, application development, and user support. Data loading is typically performed via Informatica Power-center technology. The MDC has experience with data reporting through Oracle Discoverer and Oracle Developer Reports. Additionally, seamless interactions between ad-hoc query, mapping, and charting can be built into a single application.

### Transactional Data Systems

The MDC provides transactional data system support for a variety of regional and national level projects. The MDC has expertise in creating data entry forms with technologies including Oracle Developer Forms, Oracle Designer Webserver Generator forms, Oracle Applications Express, and custom-coded Java.

### Geospatial Applications

The MDC uses Oracle Spatial technology to create dynamic mapping applications that run in a browser window and require no special software. Oracle Spatial technology places geospatial data directly in the database alongside measured result values, allowing spatial criteria, such as the intersection of a watershed and management area, to be used as selection criteria for statistical data

analysis. Unlike traditional spatial systems, geospatial data and analytical operations are accessed via SQL, opening the data to any application that can pass SQL to the database.

### Charting and Graphing

The MDC is experienced in developing dynamic, scientific-style charts and graphs against data warehouse content available on the Web. Visual Mining's Netcharts Pro is used as an underlying technology in this regard.

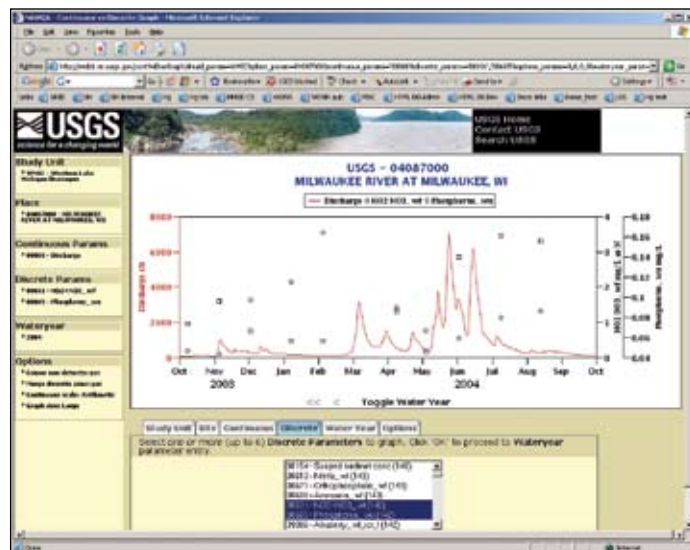
### Oracle Coordination within the USGS

#### Oracle Database Security

The MDC Director is the lead coordinator of the USGS efforts to secure all Oracle Databases within the USGS. This includes development of a nationwide monitoring network based on Oracle Grid Control.

#### Oracle Technologies

The MDC Director is the leader of the USGS Oracle Technologies program. In that role, he is expected to maintain an awareness of current Oracle technologies, as well as be aware of how individual USGS personnel or groups are using various Oracle technologies. He acts as a point-of-contact to facilitate Bureau-wide Oracle initiatives, as well as disseminate timely information to the USGS Oracle community.



## Geographic Information Systems

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### Geographic Information Systems and spatial data

The USGS Wisconsin Water Science Center (WI WSC) office in Middleton, Wisconsin includes staff with expertise in using geographic information systems (GIS) for scientific investigations. Our expertise includes the creation and publication of spatial data as well as spatial data analysis and mapping at local, regional and national scales. The WI WSC staff has the expertise to convert spatial data into model input for many of the surface-water and ground-water models used in scientific investigations. They also have the expertise to link spatial themes to regional and national databases that can be displayed and queried via the Web.

### *Spatial data development, mapping, analysis, and publishing*

Spatial data are used routinely by WI WSC staff in scientific investigations for characterizing and understanding hydrologic and ecological resources in relation to natural and anthropogenic factors. WI WSC staff has expertise with a variety of software programs that can be used for spatial data creation, mapping, analysis, and modeling including the widely used ArcGIS programs (ArcInfo Workstation, ArcMap, Arcview). WI WSC staff has extensive experience with creating maps for use in USGS and non-USGS publications as well as experience in preparing and publishing spatial data and associated metadata as USGS Digital Data Series reports.

### *Spatial data and modeling*

Many of the scientific investigations undertaken by the USGS include models that simulate the environment. These models typically require a variety of spatial data for input. The WI WSC staff has the expertise to quickly and efficiently process spatial data to create input for local and regional ground-water models such as MODFLOW and GFLOW as well as surface-water models such as PRMS

and SWAT. The staff also has expertise to process spatial data at regional and national scales for use with large-scale surface-water-quality models such as SPARROW and SPARTA, and for regional ecological and landscape models, such as those used as part of the Great Lakes Aquatic GAP project.

### *Display and query spatial data via the Web*

The WI WSC Middleton Data Center staff develops web-based GIS data discovery and model-based decision support tools for local, regional and national cooperators. These interfaces generally follow an approach where project specific information is anchored in a data warehouse and supporting spatial information is provided through web services from the USGS National Map. This design allows for extending existing applications for a broad user base or into new areas of spatial information and leverages the USGS investment in a national seamless spatial data catalog. Current WI WSC projects that use these tools include: USGS NAWQA Data Warehouse, USGS NAWQA Watershed Regressions for Pesticides (WARP) Model and USGS NAWQA SPATIally Referenced Regressions On Watershed attributes (SPARROW) Decision Support Tool, WDNR Wisconsin Fish Mapper, Wisconsin Beach Health program, and Milwaukee Metropolitan Sewerage District water quality database.

