

# Wisconsin Department of Natural Resources 2011 Plan to Integrate Land Information

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## I. EXECUTIVE SUMMARY

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The DNR is required by statute to provide an annual Plan to Integrate Land Information to the Wisconsin Department of Administration (WDOA). The DNR 2011 Land Information Integration Plan follows the standard format called for by the DOA. An electronic (.pdf-format) version of this Plan can be accessed on the DNR Internet website, at: <http://dnr.wi.gov/maps/gis/liip.html>.

Preparation of this plan was led by staff in the DNR Bureau of Technology Services, GIS Services Section, with input from other DNR program GIS application and data owners.

## Summary of DNR Land Information-Related Plans or New Initiatives

- **GIS Server Replacement** – DNR’s “dedicated” GIS web and application servers hosted by DOA/DET are being replaced. The new servers will run ArcGIS Server (AGS) and ArcIMS in a virtual environment based on Windows 2008. This project coincides with the server software upgrade described below.
- **GIS Server Upgrades in the DNR/DET Shared Information Services (SIS) Environment** – In FY11 DNR, working with WDOA’s Division of Enterprise Technology (DET), is in the process of upgrading DNR’s GIS server software (ArcGIS Server, ArcSDE and related hardware components in Development, User Acceptance/Test and Production environments) to version 10.0.
- **Migration of DNR Web Mapping Applications off of ArcIMS** – In 2010, ESRI accelerated plans to drop support for ArcIMS by about a year, and indicated that ArcIMS will likely not be compatible with their next database software release. Since ArcIMS is DNR’s primary web mapping software, it has become a priority for DNR programs to migrate their web mapping applications to other solutions, particularly ArcGIS Server map service-based applications. DNR has set a target date of October 2012 to fully migrate off of ArcIMS. This effort is expected to be one of the most critical GIS initiatives for the agency during FY12-13.
- **Development of DNR Basemap Caches and Map Services** – In FY11 DNR/BTS staff began developing Image and Vector Basemap Caches intended to be consumed as map services by the next generation of DNR web mapping applications. Caches planned for BTS development in FY11-12 include:
  - **Vector Basemap Caches** – Including roads, public lands, etc.
  - **Image Basemap Caches** – DNR Internal version with high-resolution digital orthophotos, and External versions with 2010 USDA National Agricultural Imagery Program (NAIP) 1-meter resolution digital orthos, and 2010 WI Regional Orthophoto Consortium (WROC) 18-inch resolution imagery.
  - **Terrain/Topo Basemap Cache** – Initially including USGS Digital Raster Graphics (DRGs). BTS staff will be seeking to obtain higher-quality topographic or terrain data to upgrade this basemap cache.

The initial series of Basemap Caches use a tiling scheme based on the WTM83, NAD83 (1991) coordinate reference system and custom map scale thresholds based on input from DNR programs. In the future DNR may develop alternative Basemap Caches based on the WGS Web Mercator tiling scheme adopted by Esri, Google Earth and Bing Maps.

- **New DNR-Managed Lands Web Mapping Application** – In FY11 the DNR Bureau of Lands and Facilities developed and deployed the agency’s first web mapping system based on ArcGIS Server and utilizing DNR map services ([http://dnr.wi.gov/org/land/facilities/dnr\\_land\\_mapping.html](http://dnr.wi.gov/org/land/facilities/dnr_land_mapping.html)). The map viewer for the New DNR-Managed Lands application is based on JavaScript, and provides the ability to quickly find or browse for DNR properties near specific areas of interest.

- **Wisconsin Forest Inventory & Reporting System (WisFIRS)** – WisFIRS is a web-based, integrated system featuring ArcGIS Server technology, which will allow foresters to visually track and report on a variety of forestry activities. WisFIRS will enable foresters to store data collected in the field, plan and track completed forest management practices (e.g. timber sales), report accomplishments, calculate the financial aspects of the programs (e.g. millions of dollars collected and dispersed to towns and counties), and track Managed Forest Law lands open for such activities as hunting and recreation. WisFIRS will serve hundreds of DNR staff and our partners (county forests and cooperating foresters). WisFIRS is being implemented in a series of releases that are being delivered to its users in a step-by-step manner. The First release (Release 1) went into production on June 4, 2007, and focused on forest stands, treatments and planning on state and county lands. WisFIRS activities in FY11 involved testing and deployment of Release 2, focusing on GIS Public Lands Management. Development of Release 3, focusing on private lands management, will take place during FY11-12.
- **DNR Land Management System** – The Wildlife Management program currently manages over 700,000 acres, with ownership expected to increase significantly over the next 10 years under the re-authorized Knowles-Nelson Stewardship program. Integral to land management is the creation, inventory, management and reporting of tabular and geospatial information associated with master planning, fish and wildlife habitat, user recreation, land use agreements, biotic inventories, pesticide use, invasive species, prescribed burn plans, wetland restoration, climate change adaptation and many other activities. Limited staff resources for IT, combined with a continual increase in lands acquired, associated management responsibilities and user demands, has created a need for the Wildlife Program to achieve greater efficiencies in order to fully realize the Ecological and recreational potential of DNR-owned lands. To help address this need, in FY11 the DNR Bureau of Wildlife Management initiated a project to develop a web-based Land Management System. The goal of the project is to provide tools and automated processes in a consistent workflow to assist staff in making informed decisions on land management activities.

## II. THE FIVE TECHNOLOGY ARCHITECTURES

### A. Applications Architecture

#### A.1. Identify and characterize the major applications which incorporate land information or GIS/LIS.

##### ➤ **DNR Web Mapping Services**

DNR web mapping applications have experienced a large and steadily increasing level of use by internal and external customers over the past several years, growing from more than 3 million hits in May 2007, to over 5 million hits in May 2008, to over nearly 6 million hits in November 2009, to over 7 million hits in May 2010. In the month of November (historically the agency's peak month for traffic on our web mapping applications), total hits peaked at over 6 million in 2007, over 10 million in 2008, and over 12 million in 2010. The clear trend is for sustained and growing public demand for web mapping applications to access a wide range of DNR information.

The following DNR web mapping services can be accessed via the "List of GIS Interactive Web Applications" page on the DNR Internet website: <http://dnr.wi.gov/maps/gis/applist.html> :

- **Air Monitoring Network ("WISARDS")** <http://dnrmaps.wi.gov/imf/imf.jsp?site=wisards>  
Wisconsin's ambient air quality monitoring network provides the public with timely access to air quality information, supports planning for air quality improvements, and establishes a mechanism for program accountability. Our network focuses on EPA's list of the most serious health-related air pollutants: ozone, particle pollution, sulfur dioxide, nitrogen dioxide, and carbon monoxide. Using continuous monitoring data, DNR informs the public quickly when air pollution concentrations reach certain thresholds. Based on these notices, people sensitive to air pollution may adjust their daily activities to minimize adverse health effects.

- **Boat and Developed Shore Fishing Access Sites** <http://dnr.wi.gov/org/land/facilities/boataccess/index.html>  
The DNR created a statewide inventory containing over 2,000 identified public boat access sites and over 100 developed shore fishing sites. Currently, approximately half these sites have been verified by DNR staff and are available for viewing. We provide our inventory information visually through a mapping application and through a text listing by County.
- **Chronic Wasting Disease Status Maps** [http://dnrmaps.wi.gov/imf/imf.jsp?site=cwd\\_imf](http://dnrmaps.wi.gov/imf/imf.jsp?site=cwd_imf)  
The DNR Bureau of Wildlife Management sponsors the CWD web mapping application, which allows the public and DNR staff to find up-to-date information on the status of the disease in Wisconsin. The application integrates ArcIMS, ArcSDE, and Oracle technologies to help meet a critical public information need.
- **Designated Waters:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer.deswaters>  
The data layers in this map theme of the Surface Water Data Viewer help users find waters and waterways with special resource or habitat designations, such as Areas of Special Natural Resource Interest (ASNRI), Public Rights Features (PRF), and Priority Navigable Waters (PNW).
- **DNR-Managed Lands:** [http://dnr.wi.gov/org/land/facilities/dnr\\_lands\\_mapping.html](http://dnr.wi.gov/org/land/facilities/dnr_lands_mapping.html)  
The ArcIMS version of this application includes four map themes: “DNR Lands”, providing a map view of properties that the DNR has acquired in fee, easement or lease; “Recreation Lands”, displaying information on deer or turkey management units, trout streams, parks, wildlife areas, natural areas, fisheries, etc.; “Acquisition History”, displaying property information about acquisition date, stewardship funding, federal funding, etc.; “Stewardship Grants”, displaying property purchases with stewardship grants to non-profit organizations and municipalities. The new ArcGIS Server-based DNR-Managed Lands application uses a JavaScript viewer and map services to enable users to quickly find or browse for DNR properties near specific areas of interest.
- **DNR WebView** <http://dnr.wi.gov/maps/gis/appwebview.html>  
This general-purpose online GIS data viewer includes map themes for Digital Orthophoto Tracker, Geodata Download, and Digital Raster Graphics (scanned topographic maps) download:
- **RR Sites Map:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=brrts.gisregistry>  
The DNR Bureau of Remediation & Redevelopment sponsors this web-based mapping system which provides information about contaminated properties and other activities related to the investigation and cleanup of contaminated soil or groundwater in Wisconsin. RR Sites Map includes map themes for Contaminated and Cleaned-Up Sites, the GIS Registry of Closed Remediation Sites, Liability Limitations & Clarifications, and DNR Financial Actions. RR Sites Map is part of the DNR’s [Contaminated Lands Environmental Action Network](#) (“CLEAN”), an interlinked network of DNR databases tracking information on various contaminated land activities.
- **State Natural Area Map Viewer:** [http://dnrmaps.wi.gov/imf/imf.jsp?site=sna\\_ext](http://dnrmaps.wi.gov/imf/imf.jsp?site=sna_ext)  
This application, sponsored by the DNR State Natural Areas Program, displays the locations of Wisconsin’s 609 State Natural Areas (SNAs). SNAs protect outstanding examples of Wisconsin’s native landscape of natural communities, significant geological formations and archeological sites. Encompassing over 330,000 acres, SNAs are valuable for research and educational use, the preservation of genetic and biological diversity, and for providing benchmarks for determining the impact of use on managed lands. They also provide some of the last refuges for rare plants and animals; more than 90% of the plants and 75% of the animals on Wisconsin’s list of endangered and threatened species are protected on SNAs.
- **Stewardship Grant Acquisitions:** <http://dnr.wi.gov/org/caer/cfa/LR/Stewardship/mapping.html>  
This application, sponsored by the DNR Bureau of Facilities & Lands, provides a way to locate and obtain information on lands acquired by local units of government and non-profit conservation organizations with the assistance of a grant from the Knowles-Nelson Stewardship Grant Program.

- **Surface Water Data Viewer:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer>  
The DNR Surface Water Data Viewer (SWDV) is an interactive mapping tool featuring a wide variety of water-related data. The SWDV includes five different map themes: a general theme in which users manually select the data layers for viewing; wetlands; dam safety; floodplain; and designated waters (critical habitat and other sensitive aquatic resource areas)
  - **Dam Safety:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer.damsafety>
  - **Floodplain Analysis Database:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer.floodplain>
  - **Wetlands & Wetland Indicators:** <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer.wetlands>
  - **Designated Waters:** <http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=SurfaceWaterViewer.deswaters>

➤ **DNR Migration Off of ArcIMS**

Over the past decade the DNR built nearly 30 web mapping applications using a shared GIS web application development environment (“framework”), based largely on ArcIMS and the MoxiMedia framework, which is implemented and supported by staff in multiple programs. This approach enabled the agency to significantly reduce application development and maintenance costs, improve quality, and provide a means of support as staff have moved into, out of, and within the agency. In 2010, ESRI accelerated plans to drop support for ArcIMS by about a year, and indicated that ArcIMS will likely not be compatible with their next database software release. Since ArcIMS is DNR's primary web mapping software, it has become a priority for DNR programs to migrate their web mapping applications to other solutions, particularly ArcGIS Server map service-based applications. DNR has set a target date of October 2012 to fully migrate off of ArcIMS. This effort is expected to be one of the most critical GIS initiatives for the agency during FY12-13.

In FY11 the DNR Bureau of Lands and Facilities developed and deployed the agency's first web mapping system based on ArcGIS Server and utilizing DNR map services ([http://dnr.wi.gov/org/land/facilities/dnr\\_lands\\_mapping.html](http://dnr.wi.gov/org/land/facilities/dnr_lands_mapping.html)). The map viewer for the New DNR-Managed Lands application is based on JavaScript, and provides the ability to quickly find or browse for DNR properties near specific areas of interest. As of March 2011, DNR staff were in the process of identifying other potential technical solutions migrating off of ArcIMS within the next 18 months.

➤ **Evaluation & Recommendations for New GIS Visualization Tools**

During FY10/11, WDNR GIS Services Section completed an evaluation of web mapping visualization tools ArcGIS Explorer, Google Earth, Google Earth Pro, Bing Maps, and Google Maps. The results are summarized in a database listing use case functions and compatibility to complete each function by mapping software. This information can be considered an initial comparison of these GIS visualization packages. Use cases continue to evolve as the knowledge base of each web mapping software package improves in functionality. Success and limitations of software will further enhance the summary database and help provide a foundation for completing a broad-based GIS solutions profile of information for use in the future.

ESRI's ArcGIS Explorer (currently version 1500) is currently recommended as the optimal geographic information visualization tool for use within the agency. Many factors contribute to this recommendation, such as minimal cost investment through the Wisconsin State Government master purchasing agreement with ESRI, DNR data compatibility, support system, extensibility, and data storage and sharing through ArcGIS Online.

The complete GIS Visualization Tools document is available on the DNR Intranet: <http://intranet.dnr.state.wi.us/itworks/webmap/GISVisualizationTools.html>  
<http://dnr/gis/Giscommon/geo/GISVisualizationToolsEval/GISVisualTools-May2010.pdf>

➤ **ArcWorks**

“ArcWorks” consists of an ArcGIS-based extension and associated software components that provide staff with core data discovery and data loading functions. ArcWorks is designed to improve efficiency in creating quality GIS products, and to support the business needs of DNR programs. In FY11-12, BTS/GIS staff plan to deploy a version of ArcWorks compatible with ArcGIS Desktop 10.0.

➤ **Wisconsin Forest Inventory & Reporting System (WisFIRS)**

WisFIRS is a web-based, integrated system featuring ArcGIS Server technology, which will allow foresters to visually track and report on a variety of forestry practices. The initial WisFIRS release (Release 1) went into production on June 4, 2007, and focused on forest stands, treatments and planning on state and county lands. During FY11 the Division will continue to work on the deployment of a mapping portal (Release 2) to capture spatial content (e.g., Forest Stands / Completed Treatments) and link that content to existing or new business records (e.g., Forest Stand Condition). This Forestry GIS portal will use a number of ancillary layers to help field foresters determine various boundaries for forest management activities.

➤ **RR Edit Tool**

The DNR Bureau of Remediation and Redevelopment geolocates any property of program involvement, due to contamination or redevelopment efforts. The software supporting this geolocation editing was sunsetted, requiring a rewrite. The bureau defined a workflow and built a tool, implemented as an extension to ArcGIS. The tool allows staff throughout the state to edit spatial data directly into SDE databases. The spatial data edits are integrated with tabular data, utilizing database constraints for uniqueness. These updates are immediately available to external users through our external web mapping application, RR Sites Map.

➤ **Drinking Water & Groundwater Mapping Applications**

DNR's Bureau of Drinking Water and Ground Water (DG) worked with BTS to develop three internal DNR business applications to support the needs of the Source Water Assessment Program (SWAP), which is now completed. This work now continues as part of the Vulnerability Assessments.

1. **The ArcView VA (Vulnerability Assessment) Tool** was developed to allow DG staff to digitize potential contaminant sources around public drinking water wells.
2. **The SWAP/VA Form** automatically creates a map of the site area to enable DG staff to complete SWAP Assessments as well as Vulnerability Assessments.
3. **The Drinking Water Intranet Mapping Application** allows DG staff to quickly view wells, contaminant sources, and source water areas.

➤ **Surface Water Integration System (SWIS) Embeddable Locator Tool (eLT)**

The Embeddable Locator Tool (eLT) is a web based locational data editing tool developed as part of the SWIS initiative. This tool allows staff to locate surface water related activities on or along features in the DNR 1:24,000-scale Hydrography geodatabase. The eLT has been incorporated into seven applications in the Water Division to provide users with a better method for capturing water-related location information.

➤ **Surface Water Integrated Monitoring System (SWIMS) / Surface Water Assessment, Tracking and Electronic Reporting System (WATERS)**

SWIMS and WATERS are managed by DNR's Water Division. SWIMS is a water monitoring data system which holds primarily surface water monitoring results and various program-related datasets including Rivers, Lakes and Nonpoint Source Grant data, Watershed and Fisheries station locations, sensitive area designations and aquatic invasive infestation sites.

The Water Assessment, Tracking and Electronic Reporting System (WATERS) is also a tabular/GIS integrated assessment database which supports watershed planning and implementation, as well as water quality reporting under the federal Clean Water Act. WATERS holds:

- Water Division Objectives, Goals, Performance Measures, and Success Stories
- Clean Water Act Use Designations and Classifications (NR102, NR104)
- Outstanding and Exceptional Resource Waters Designations (NR102)
- Clean Water Act assessment data, including decisions regarding a waterbody meeting its attainable use or whether or not the waterbody is considered "impaired"
- Fisheries Trout Classifications (Administrative Code, NR 1.02(7))
- Watershed Planning

➤ **Wetlands Digital Data Compilation using an Ortho-Rectified Base**

DNR's Bureau of Watershed Management (WT) sponsors this project to re-compile wetland information onto digital orthophotography. A goal of this project is to modernize processes and improve data quality to create a statewide seamless digital Wetlands database.

**A.2. Include a discussion of high-level and agency-wide land information integration efforts.**

➤ **Data Management**

A major ongoing activity of BTS/GIS Services is to update, manage, and provide access to DNR's GIS Data Repository. This centralized repository contains collections of standardized enterprise geographic framework data that support a wide range of business needs related to: resource management, compliance monitoring and enforcement, permitting, public health and safety; outdoor recreation; wildlife management, Smart Growth and Comprehensive Planning; and U.S. EPA and Forest Service activities. DNR's enterprise geographic data management activities promote data integration and integrity within the agency, and provide DNR staff, partners, and customers with reliable access to core GIS Data Repository contents, in standardized formats. The contents of the GIS Data Repository include framework geographic data, non-spatial tables containing attributes of geographic data, non-spatial reference tables containing standard codes and information used by multiple DNR programs, metadata, supporting documents, and related materials.

The DNR has undertaken a multi-year transition from agency use of file-based GIS data structures to ArcSDE geodatabases. Although most of the DNR's core GIS data sets reside in ArcSDE and are accessed in ArcSDE by web mapping applications and desktop clients, many staff lacking a reliable network connection continues to rely on file-based GIS data sets (i.e., shapefiles and MrSID files).

- ***Development of DNR Basemap Caches and Map Services***

In FY11 DNR/BTS staff began developing Image and Vector Basemap Caches intended to be consumed as map services by the next generation of DNR web mapping applications. The initial series of Basemap Caches use a tiling scheme based on the WTM83, NAD83 (1991) coordinate reference system and custom map scale thresholds based on input from DNR programs. In the future DNR may develop alternative Basemap Caches based on the WGS Web Mercator tiling scheme adopted by Esri, Google Earth and Bing Maps.

- ***2010 Digital Orthophotography***

In FY11 DNR/BTS staff expect to convert 2010 NAIP digital orthophotos and imagery from the 2010 Wisconsin Regional Orthophoto Consortium (WROC) to WTM-referenced compressed MrSID county mosaics, and to use these data sets to upgrade the DNR's Internal and External Image Basemap Caches.

- ***Metadata Management Issues***

BTS/GIS staff seek to prepare and maintain metadata for GIS Repository data, and to provide guidance to DNR staff preparing metadata for program geospatial data. BTS/GIS staff are in the process of evaluating major changes in metadata management tools in ArcGIS version 10. The goal is to determine the preferred approach using ArcGIS tools to preserve the value of agency investments in metadata over the past 15 years, and to communicate the new metadata management processes to agency staff. Improving metadata consistency among various formats (i.e., ArcSDE geodatabases and shapefiles) of the same data sets also continues to be ongoing goal for DNR/BTS.

- ***Adoption of Direct Connections to ArcSDE/Oracle Databases***

As part of the DNR's GIS Server upgrades in FY11, we are planning to discontinue maintenance of ArcSDE Services, and will be switching to agency-wide use of Direct Connections for ArcSDE/Oracle database access. This will require a significant amount of coordination with all GIS users at the DNR, as well as assistance to agency staff needing to change the database connection properties embedded in ArcMap map and service definition files (mxd's and msd's).

➤ **Data Administration**

Reliance on ArcSDE by DNR's GIS and Oracle users and applications continues to increase. In FY11-12 the GIS Data Administrator will be working with the agency's Data Architect and Oracle Database Administrator to development, implement, and maintain core geospatial and tabular data architecture components and related activities.

- ***Adoption of the ST\_GEOMETRY Data Type***

Data Administration goals for FY11-12 include migrating from the LONGRAW data type currently used in DNR ArcSDE/Oracle GIS databases to ST\_GEOMETRY (an ESRI spatial data type that provides access to SDE tables in several DBMS environments, including Oracle). Oracle no longer supports LONGRAW, and for several years ESRI has encouraged ArcSDE/Oracle users to migrate from LONGRAW to ST\_GEOMETRY. Successful adoption of ST\_GEOMETRY will require collaboration with the WDOA staff who administer the DNR's Oracle databases in the shared server environment.

➤ **DNR Land Use Team**

Several laws give the Wisconsin DNR responsibility and authority to address land use issues. The agency is authorized to directly purchase and manage land for purposes of resource conservation, environmental protection, or recreation. Sections 30.26, 30.27, and 30.275, Wisconsin Statutes give DNR the responsibility to preserve, protect, and enhance urban and wild and scenic rivers. Activities carried out under this chapter have land use implications. DNR's Land Use Team integrates the agency's land use related policy activities, to ensure that all department actions promote and work toward the achievement of sound land use. For more information, see DNR's Community Planning and Land Use Management web pages: <http://dnr.wi.gov/org/es/science/landuse/>.

DNR is involved in a variety of planning efforts. Making the link between these state agency planning activities and local community planning efforts can enhance local resource stewardship and foster intergovernmental cooperation. Example activities include: Statewide Forest Planning, DNR Property Master Planning, Land Legacy, Sewer Service Area Planning, Wellhead Protection Planning, Source Water Assessment, Wisconsin Statewide Comprehensive Outdoor Recreation Plan, Wisconsin State Trails Network Plan, Landfill Siting, Nonmetallic Mining Reclamation, and Metallic Mine Permitting.

Additionally, DNR Land Use staff coordinates with the State Agency Resource Working Group (SARWG) to provide support for comprehensive planning. SARWG is comprised on many state agencies with an interest in the Comprehensive Planning Law sometimes referred to as "Smart Growth". The SARWG group conducts training, writes guidance and provides technical support for local units of government, their consultants and citizen planning groups.

**A.3. Identify any major GIS/LIS application interfaces developed at the DNR.**

This information is provided in Section I.A.1.

**A.4. Identify business needs which can benefit from the proposed Wisconsin Enterprise GIS capabilities. In particular, identify agency business needs for leveraging local governments' investment in Parcel Mapping and Parcel Attributes.**

DNR programs have a need for access to up-to-date, statewide framework GIS data in standardized formats and accompanied by data documentation (metadata). These framework GIS data sets include Administrative & Political Boundaries, Digital Orthophotos, Elevation, Land Cover, Land Ownership (parcels), Public Land Interests, Soils, and Transportation. Shared access to these framework data sets in a Wisconsin enterprise spatial data repository would be very helpful in meeting DNR program business needs.

In specific regard to Land Parcel Mapping and Parcel Attribute data, in FY08 over 30 DNR staff from more than a dozen programs completed the Wisconsin Land Information Association (WLIA) Parcel Task Force Survey. Responses

from these and other agencies will be used to build the business case for an integrated statewide view of parcel mapping, locally generated and maintained, and synthesized for statewide use; a WLIA report on this is forthcoming. As examples, the DNR Forestry, Remediation and Redevelopment and Wildlife Management programs could benefit greatly from access to statewide parcel attribute data.

The DNR Wildlife Management's (WM) Chronic Wasting Disease (CWD) management involves land managers annually contacting landowners within certain CWD zones for purposes of information sharing and land access. DNR/WM currently acquires the needed land ownership (parcel) data from individual counties, and integrates the varying county standards into one multi-county layer to meet this need. County restrictions on the use of these data limit DNR's use of the data, and prohibit the DNR from re-distributing the parcel data outside of the agency.

The DNR Remediation and Redevelopment program oversees the investigation and cleanup of contaminated properties. As part of public notification, they maintain a map-based website of showing properties in Wisconsin which are or were contaminated. Due to the implications for property owners, staff may use county based web mapping systems showing parcel boundaries to assist them in accurately geo-locating a site.

The DNR Forestry program's mission is to work in partnership to protect and sustainably manage Wisconsin's forest ecosystems to supply a wide range of ecological, economic and social benefits for present and future generations. As part of this mission, the Division is developing a web based application which will be used to help DNR staff and our partners identify areas of the state where the planning and implementation of sustainable management activities are occurring on state, county and private properties. When working cooperatively with county partners our goal is to (whenever possible) integrate local data to ensure that field foresters are making informed decisions, and that any financial impacts on landowners (through programs such as the Managed Forest Law) are being associated with the proper land owners.

## **B. Information Architecture**

### **B.1a Identify the major land information data sets, and the corresponding metadata, developed, enhanced, or currently used within your agency. Particularly, identify any land information for which your agency has assumed custodianship.**

DNR/BTS GIS Services manages an extensive GIS Data Repository to help meet the business needs of DNR programs. The GIS Data Repository includes data obtained from data producers and partners outside of the agency, as well as data for which DNR programs are the custodians. Additional information is posted on DNR/BTS Internet web pages: <http://dnr.wi.gov/maps/gis/dataoverview.html> .

An ongoing task of DNR/BTS is to develop and maintain metadata for the contents of the DNR GIS Data Repository. As metadata becomes available, it accompanies requested data sets. Examples of these metadata are also accessible on the DNR Internet site: <http://dnr.wi.gov/maps/gis/metadata.html>. In some cases, metadata describing DNR program GIS data is also available on web pages maintained by the custodial DNR program elsewhere on DNR's website. The following is a description of land information for which DNR has custodial responsibilities:

#### **Contaminated Lands**

The Bureau of Remediation & Redevelopment (RR) is the custodian for DNR's Contaminated Lands data, which includes locations for the vast majority of contaminated sites in Wisconsin. The data is part of the DNR's Contaminated Lands Environmental Action Network ("CLEAN"), an interlinked network of DNR databases tracking information on various contaminated land activities. For additional information contact:

Janet Sausen, RR/5; [Janet.Sausen@Wi.gov](mailto:Janet.Sausen@Wi.gov), 608.267.7570

#### **County Forests**

The DNR Division of Forestry (FR) is the custodian for the state's county forest GIS layer, which was created by

extracting quarter-quarter sections from the 1:24,000-scale Landnet data layer. An ORACLE database identifies PLSS quarter-quarter-sections containing County Forests. Due to the fact that Fractional and Government lots are not identified by Quarter-Quarter section in the ORACLE database, it was not possible to include them in this layer. These excluded areas account for approximately 2% of the total County Forest areas. For additional information contact:

Janel Pike, FR/4; [Janel.Pike@Wi.gov](mailto:Janel.Pike@Wi.gov), 608.266.2050

### **Dams Inventory**

The DNR Bureau of Watershed Management (WT) is the custodian for the state's dam inventory, which is maintained in a state-wide relational database. For additional information contact:

Meg Galloway, WT/3; [Meg.Galloway@Wi.gov](mailto:Meg.Galloway@Wi.gov), 608.266.7014.

### **DNR-Managed Lands**

The DNR Bureau of Facilities and Lands (LF) is the custodian for DNR-Managed Lands data. The statewide DNR-Managed Lands data is available for download from the DNR ftp site in zipped personal geodatabase format, under: <ftp://ftp.wi.gov/DNR/public/Lands/>. DNR/LF staff make updates to the DNR-Managed Lands data on an ongoing basis; the version on the FTP site is updated periodically. For more information, contact:

Ann Runyard, LF/6; [Ann.Runyard@Wi.gov](mailto:Ann.Runyard@Wi.gov), 608.267.7471.

### **Fire Occurrences**

The DNR Division of Forestry (FR) has been working on collecting the location of each fire occurrence as represented by a point at either, (1) the center of the "forty" (quarter-quarter section) in which the fire occurred, (2) the center of the section in which the fire occurred where the DNR, Division of Forestry has primary fire suppression responsibilities.

For additional information, contact:

Janel Pike, FR/4; [Janel.Pike@Wi.gov](mailto:Janel.Pike@Wi.gov), 608.266.2050.

### **Forest Tax**

The purpose of Wisconsin's forest tax laws is to encourage sustainable forestry on private lands by providing property tax incentives to landowners. For additional information, contact:

Janel Pike, FR/4; [Janel.Pike@Wi.gov](mailto:Janel.Pike@Wi.gov), 608.266.2050.

### **Floodplain Zoning**

The DNR Bureau of Watershed Management (WT) is the custodian for the state's Floodplain Zoning data. For additional information, contact:

Amanda Schwoegler, WT/3; [Amanda.Schwoegler@Wi.gov](mailto:Amanda.Schwoegler@Wi.gov), 608.267.2376.

### **Hydrography from 1:24,000 Scale Sources**

A statewide 1:24,000-scale Hydrography GIS data layer was completed in 2001 as the result of a cooperative project initiated by DNR. A Geodatabase version of the 24K Hydrography layer was released in 2009. DNR is currently evaluating the federal National Hydrography Database (NHD), recently completed nationwide at 1:24,000 scale. DNR continues to work with federal partners (USGS and USFS) to determine a long-term plan for maintaining a statewide hydrography layer for Wisconsin. Contact information and user documentation for this data layer is posted on the DNR website: <http://dnr.wi.gov/maps/gis/datahydro.html>. For more information, contact:

Ann Schachte, DG/5; [Ann.Schachte@Wi.gov](mailto:Ann.Schachte@Wi.gov), 608.267.2301.

### **Landnet**

BTS/GIS Service is the custodian for the Landnet geographic data layer, which is a representation of the Public Land Survey System (PLSS), automated primarily from sources compiled at 1:24,000 scale. Technical documentation for the 1:24K Landnet data set can be downloaded from the following DNR web page: <http://dnr.wi.gov/maps/gis/dataacd.html>.

For additional information, contact:

John Laedlein, TS/1; [John.Laedlein@Wi.gov](mailto:John.Laedlein@Wi.gov), 608.264.8914.

### **Natural Heritage Inventory**

The DNR Bureau of Endangered Resources (ER) Program plays a critical role in the development and maintenance of data on Wisconsin's rare resources. ER's Natural Heritage Inventory (NHI) program leads the Bureau's efforts to collect, store and interpret these data. For additional information, contact:

Julie Bleser, ER/4; [Julie.Bleser@Wi.gov](mailto:Julie.Bleser@Wi.gov), 608.266.7308

### **Recreational Trails**

The DNR Bureau of Parks and Recreation (PR) is the custodian for Recreational Trails data. DNR/PR is in the process of updating locational information for state trails, but no statewide GIS data layer representing existing and proposed recreational trails in Wisconsin is available at this time. For information about the potential availability of Wisconsin recreational trails GIS data, or additional information, contact:

Brigit Brown, PR/6; [Brigit.Brown@Wi.gov](mailto:Brigit.Brown@Wi.gov), 608.266.2183.

### **State Natural Areas**

The DNR Bureau of Endangered Resources' State Natural Areas Program tracks and maintains a wide assortment of Natural Areas' data including management history, information on plant and animal species, rigorous baseline data, site inspection information, research and educational project data, acquisition information, and GIS project and site boundaries. For additional information about State Natural Area data, contact:

Dawn Hinebaugh, ER/6; [Dawn.Hinebaugh@Wi.gov](mailto:Dawn.Hinebaugh@Wi.gov), 608.266.5243

### **Wildlife Management**

The DNR Bureau of Wildlife Management (WM) is the custodian for several statewide data layers: Deer Management Units (DMUs), Bear Management Zones (BMZs), Turkey Management Zones (TMZs), and management units related to Chronic Wasting Disease (CWD). In addition, DNR/WM also collects and maintains the statewide sampling results for CWD Deer Sampling data. For additional information, contact:

William Ceelen, ET/1; [William.Ceelen@Wi.gov](mailto:William.Ceelen@Wi.gov), 608.267.7690.

### **Watersheds**

The DNR Statewide Watershed Boundary Geographic Data Layer was developed cooperatively by the DNR Bureau of Watershed Management and the GIS Services Section. The data custodian is the DNR Bureau of Watershed Management (WT). For additional information about this data set, contact:

Matt Rehwald, WT/3; [Matt.Rehwald@Wi.gov](mailto:Matt.Rehwald@Wi.gov), 608.266.0164.

Note that the USDA/NRCS Watershed Boundary Dataset (WBD) is an alternative source of Hydrologic Units more detailed than those in the DNR's statewide Watersheds layer. For more information about the WBD Hydrologic Unit Codes (HUCs), including a comparison of HUCs with DNR's 1:24K Watersheds layer, see [http://dnr.wi.gov/org/gmu/sidebar/About\\_new\\_HUC\\_2008.doc](http://dnr.wi.gov/org/gmu/sidebar/About_new_HUC_2008.doc).

### **WISCLAND Land Cover**

The WISCLAND Land Cover data layer was the result of a 5-year work effort to interpret the state's land cover (primarily vegetation) from 1992-1993 satellite images. The WISCLAND data and documentation can be accessed on the BTS web pages: <http://dnr.wi.gov/maps/gis/datalandcover.html>. For additional information, contact:

John Laedlein, TS/1; [John.Laedlein@Wi.gov](mailto:John.Laedlein@Wi.gov), 608.264.8914.

### **Wisconsin Wetland Inventory**

The DNR Bureau of Watershed Management (WT) is the custodian and sole distributor for the Digital Wisconsin Wetland Inventory (WWI) geographic data layer. WT has implemented a process using Orthomapper software to create digital orthophotos from the interpreted aerial photos, using existing digital orthophotography for control

The DNR public Surface Water Data Viewer application includes a Wetlands theme that portrays the state's wetlands and related information: <http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=SurfaceWaterViewer.wetlands>). Also, the DNR WWI program has an agreement with the federal government under which all the digital WWI data available for

Wisconsin may be viewed and downloaded using the USFWS National Wetlands Inventory (NWI) "Wetlands Mapper" application: <http://www.fws.gov/wetlands/Data/Mapper.html> .

The DNR WWI program shares digital WWI data upon request and at no cost with all Wisconsin counties and municipalities that have made provisions for the state's Shoreland Wetland Zoning program in their ordinances (administrative rules contained in Chapters NR115 and NR117, Wisconsin Administrative Code, set minimum statewide standards for shoreland-wetland ordinances). For more information about the WWI data, contact:

Lois Simon, WT/4; [Lois.Simon@Wi.gov](mailto:Lois.Simon@Wi.gov), 608.266.0756.

#### **Other Geographic Data Managed by the DNR Water Division**

In addition to the major data sets described above, the DNR Water Division has custodial responsibilities for several other water-related data. For information about potential points of contact for these data layers, refer to the DNR Water Division web pages: <http://dnr.wi.gov/environmentprotect/water.html>

- Aquatic Invasive Infestations (Zebra Mussel, Eurasian Water Milfoil, etc.)
- Contaminant Source Inventory (sources located inside delineated protection areas around public wells ONLY!)
- Designated Use Classifications (Water Quality Standards, State Admin. Code, ch. NR102)
- Eurasian Water Milfoil sites
- Fish Contaminant/ Advisory sites
- Impaired waters (303d) (Water Quality Standards, State Admin. Code, ch. NR102)
- Outstanding and Exceptional Resource Waters (Water Quality Standards, State Admin. Code, ch. NR102)
- Sediment Contamination sites
- Sport Fish Waters (Trout, Walleye, Muskellunge, Smallmouth Bass, Sturgeon)
- Subwatersheds (statewide, patchwork created for Non-Point Priority watershed project areas)
- Surface Water, Wisconsin Pollutant Discharge Elimination System (WPDES) Outfalls
- Surface Water and Fisheries Monitoring Stations
- Variance Waters (Water Quality Standards, State Admin. Code, ch. NR104)
- Water Boundary Data – in 2007, newly delineated 12-digit Hydrologic Unit Codes were certified. HUC 10 digit and HUC 12 digit boundaries were also derived.
- Watershed Program Grant Locations (Rivers, Lakes, Runoff, Aquatic Invasive Species, etc.)
- Watershed Planning Areas
- Waterway and Wetland Permits (Chapter 30)
- Wells – Private, public, and monitoring wells
- Wetlands – Potentially Restorable
- Wisconsin Lakesheds (lake watersheds for lakes/ponds and reservoir/flowages 5 acres in size or larger)
- Wisconsin Wetlands Inventory

#### **Other Geospatial Data Managed by the DNR Forestry Division**

In addition to the data sets described above, the DNR Forestry Division has custodial responsibilities for several other forest-related data, some of which are available for download from our website. For information about potential points of contact for these data layers, refer to the DNR Forestry Division web pages:

<http://dnr.wi.gov/forestry/GIS/Data%5FMaps/data%5Fdownload/> .

- Dispatch Groups
- Fire Response Units
- Fire Protection Areas

#### **Geospatial Data Available through DNR Science Services and Research**

As part of ongoing research to evaluate web-based and desktop tools to support comprehensive land use planning, natural resources management, and watershed planning, DNR Science Services and Research have investigated and made available a suite of data resources. DNR Forestry and Watershed Management have also participated in investigating these data resources:

- National Land Cover Data – 1992, 2001, 2001: % Impervious, 2001 % Canopy, 1992-2001 Change Product
- National Hydrologic Data Plus – Enhanced 100,000-scale NHD with catchments around every reach; land cover; temperature; precipitation attributes for water catchments, flow direction and flow accumulation grids.
- USDA National Agricultural Statistical Service Cropland Data Layer – 2006, 2007: derived from Indian Remote Sensing Satellite AWIFS, detailed agricultural land cover classes augmented with NLCD 2001 data.
- USGS NED 30m derivatives – statewide % Slope and Aspect Grids.

**B.1b. Identify mechanisms of access or distribution of land information and metadata, e.g., via the Internet, WISCLINC, standard or custom CD-ROM products, FTP (file transfer protocol), zip file, etc.**

- Metadata accessible on the DNR website: <http://dnr.wi.gov/maps/gis/metadata.html>
- Various statewide geospatial datasets, mostly managed by BTS/GIS, are available for download at no cost from the DNR Public GIS FTP site: <ftp://dnrftp01.wi.gov/geodata/> . The data are provided under the terms described on the DNR Legal Notices web page: <http://dnr.wi.gov/org/legal/> .
- Internet Map Service-based data download: Several DNR web mapping applications include an "Extract Shapefile" function that can be used to extract and download data (mostly in zipped shapefile format) for a user's area of interest.
- BTS/GIS and DNR program GIS staff provided geospatial metadata to the Wisconsin (Ramona) GIS Inventory Survey as required under the 2009 Land Information Integration and Modernization Survey (LIIMS) plan, and intend to provide updates or new metadata to the GIS Inventory in the future: <http://www.sco.wisc.edu/wisclinc/survey/> .

**B.1c. Identify all major land information or metadata, if any, that your agency makes available through your agency web site(s), and any land information data or metadata your agency plans to make available later either through your agency web site(s) or through WISCLINC. Include a discussion of that land information necessary for local comprehensive planning under Wisconsin ss. 66.1001(2).**

BTS GIS Services currently provides access to a variety of agency land information data through FTP, the BTS/GIS web pages (<http://dnr.wi.gov/maps/gis/>), and through web mapping services such as DNR WebView (see Section II.A.1).

**B.1d. Identify any policies, content or technical standards your agency utilizes for the collection and use of land information or metadata.**

- The DNR's "Locational Data Standards" are posted on the DNR Internet site: <http://dnr.wi.gov/maps/gis/location.html>
- DNR also maintains the following documents for internal use: "ArcSDE User Guide" and "ArcSDE Database Objects: Naming and Structure Conventions".
- DNR's de facto standard for geographic metadata is the "Content Standards for Digital Geospatial Metadata" (CSDGM) of the U.S. Federal Geographic Data Committee; <http://www.fgdc.gov/metadata/contstan.html>. In cases where CSDGM metadata are not available from DNR custodial programs, available informal documentation accompanies requested data.
- DNR defined the de facto statewide coordinate system used by all state agencies, Wisconsin Transverse Mercator, based on the 1991 adjustment to the North American (Horizontal) Datum of 1983. This coordinate

system, known as WTM83, NAD83 (1991), has been registered with the European Petroleum Survey Group, and is a standard part of the suite of ESRI ArcGIS products. See <http://www.dnr.state.wi.us/maps/gis/wtm8391.html> .

**B.1e. Identify major land information that may relate to or depend upon other State Agency land information (from yours or another agency) for technical integration.**

BTS GIS Services frequently shares requested land information with federal, state, and county or regional government agencies for purposes of technical integration. Commonly requested DNR land information include those data cited in Section II.B.1c.

Individual DNR programs may have technical relationships with other government agencies which involve integration of land information to meet programs' business needs. Information about these relationships can be obtained by contacting the responsible DNR program directly (for contact information, refer to the listing of DNR custodial data in Section II.B.1a, or to the DNR Internet site: <http://dnr.wi.gov> ).

**B.1f. Identify and describe land information from outside sources, for which the agency has a need and requires access to carry out day-to-day responsibilities, functions and statutory requirements. Identify any barriers or obstacles to accessing such data. This may include federal, state, regional, local, tribal or municipal data. Include a discussion of the agency's intended use and application for such data.**

BTS GIS Services seeks to obtain land information from sources outside DNR needed to help agency programs meet their business requirements. BTS plays a key role in converting externally produced land information to standardized formats that facilitate integration with DNR program data.

An ongoing obstacle is a lack of funding to acquire the data from producing agencies which view the sale of land information as a revenue source. BTS/GIS's ability to obtain these data from federal agencies, state agencies, regional planning commissions, tribal governments, and local units of government depends on data sharing or other inter-agency cooperative relationships. Federal agencies are currently preparing national level data sets (NRCS soils as an example) that can be distributed and used collectively by state agencies in the future. Further cooperation through the OGIO and related coordination groups should advance these efforts. In many cases, BTS has been successful in building inter-agency data sharing relationships as a means of obtaining needed data so that it can be made available throughout the DNR and to partners and other customers. Information exchanges also take place between other DNR programs and local governments. Examples of land information needed by DNR and produced by outside sources include:

- **Address Data / Centralized address standardization and geo-coding services**
- **Census Data**
- **Digital Orthophotos**
- **Elevation**
- **Land Parcels**
- **Minor Civil Divisions (dynamically updated to reflect incorporations, etc.)**
- **Soils**
- **Structures**
- **Transportation Data**
- **Tribal Lands**

At this time, the future level of resources available to BTS to support spatial data acquisition, conversion and management on behalf of the DNR, its partners and customers, is unknown.

**B.2. Identify the software used to develop and provide access to geospatial metadata (e.g., ArcCatalog, Spatial Metadata Management Software (SMMS), U.S. Geological Survey-developed tools...). State whether the software generates metadata consistent with the FGDC Content Standard for Digital Geospatial Metadata, adopted by WLIP.**

Software used to develop and provide access to geospatial metadata varies within DNR, but include: ArcCatalog; Microsoft Word, and Notepad. BTS encourages DNR programs to develop, maintain and provide access to geospatial metadata in a consistent form (i.e., CGDSM-compliant) regardless of the tools used.

BTS/GIS staff are in the process of evaluating major changes in metadata management tools in ArcGIS version 10. The goal is to determine the preferred approach using ArcGIS tools to preserve the value of agency investments in metadata over the past 15 years, and to communicate the new metadata management processes to agency staff. Improving metadata consistency among various formats (i.e., ArcSDE geodatabases and shapefiles) of the same data sets also continues to be ongoing goal for DNR/BTS.

**B.3. For any metadata or land information on the agency's web site(s), please provide the title, Internet URL's, which include the CSDGM abstract, and the purpose. For metadata not accessible via the agency's web site(s) or Internet, please provide a list of all major metadata and the access method that is or would be applied for outside-agency use.**

Sample metadata for many DNR GIS Repository datasets can be accessed on the DNR Internet site: <http://dnr.wi.gov/maps/gis/metadata.html> .

In many cases, metadata describing DNR program geospatial data is available elsewhere on the DNR website, on web pages maintained by the custodial DNR program. A large quantity of DNR metadata for natural resources-related information has also been entered into the Wisconsin EcoAtlas (<http://ecoatlas.wiatri.net>) as part of the Aquatic and Terrestrial Resources Inventory (ATRI). Refer to Section II.A.1.d for ATRI contact information.

**B.4. Identify the agency's plans for future metadata collection and maintenance.**

BTS/GIS will continue to promote metadata collection and consistency. BTS/GIS staff are in the process of evaluating major changes in metadata management tools in ArcGIS version 10.

The Aquatic and Terrestrial Resources Inventory (ATRI) will continue to work with data custodians to create and collect metadata for natural resources related information. These metadata are inventoried and updated through the ATRI Wisconsin EcoAtlas: <http://ecoatlas.wiatri.net/> .

BTS/GIS and DNR program GIS staff provided geospatial metadata to the Wisconsin (Ramona) GIS Inventory Survey as required under the 2009 Land Information Integration and Modernization Survey (LIIMS) plan, and intend to provide updates or new metadata to the GIS Inventory in the future: <http://www.sco.wisc.edu/wisclinc/survey/> .

## **C. Technology Architecture**

**Address the agency's approach to GIS technology implementation and include a discussion of the agency's vision of future technology architecture, software purchases and upgrades. Include a discussion of Enterprise-standard GIS/LIS workstation/desktop software, and related software.**

DNR's GIS technology architecture provides the foundation that supports land information development and use throughout the agency. The Department's vision of technology architecture for GIS implementation provides for:

- Multi-tier levels of functionality and capability appropriate for staff needs.
- More web-based and distributed architecture.
- Optimize server-based GIS systems by utilizing new and improved virtual hardware technology.
- User-authentication capability, to grant levels of use and access permissions.
- Expanded ability to access geographic data and functions with a variety of interfaces, including GIS clients, web browsers and other lightweight clients.
- Acceptable performance serving large GIS data sets and digital map data to the standard desktop.
- Enterprise database serving and management to enable staff access to current data from remote locations.
- Adequate performance when linking GIS data with Oracle data tables from the standard desktop.
- Improved data management options which implement effective transactional update capabilities for geographic and related data.

### **DNR Strategic Planning for Technology Services and Infrastructure & Architecture**

Following the Shared Information Services (SIS) migration during 2006-2007, DNR's server-based IT resources are now substantially managed by the WDOA Division of Enterprise Technology (DET). This has effectively resulted in the outsourcing of most of the networking and server components of the agency's architecture to an enterprise oriented services. These operational changes have required DNR to comply with policies and procedures set for the state enterprise by DET, as well as relinquishing considerable control over its capacity to change the architecture to meet its business needs.

During the past year, the DNR Bureau of Technology Services (BTS) has been further realigned to provide increased support services coordination and productivity response support to agency staff, and served as intermediary on technical problem resolution activities that relate to enterprise server and network performance capabilities. The role of the BTS Delivery Services Section (DSS) and Support Services Section (SSS) has continued to become increasingly important as the agency moves from individual technology solutions to "architected" solutions designed to be stable and improve the technology infrastructure of the state enterprise. This will require DSS and SSS - in conjunction with the other sections of BTS and DNR programs - to continue providing leadership in defining technology directions and standards for the agency that will enable the DNR to maximize the capacity of IT to satisfy its business needs within the restrictions imposed by reliance on a state enterprise architecture. This will be accomplished based on strategic initiatives already started that include realignment of staff and other resources, and in close cooperation with and integration of the architecture standards defined by DET. Likewise, within these standards, DSS will continue to work with DET to achieve implementation of any changes in the enterprise architecture needed to meet DNR's IT requirements.

Within BTS, staff will align closely with the Systems Development Framework (SDF) to optimize standardization of key systems deliverables for the agency. This approach will allow us to better integrate the GIS activities of the agency and enterprise GIS resources into DNR's architecture and support processes.

### **Standard GIS/LIS Workstation/Desktop Software**

ArcGIS Desktop is the standard professional desktop GIS software at the DNR. ArcGIS Desktop users were in the process of upgrading to version 10.0 during FY11. DNR ArcView 3.x users may continue to use that software, although it is no longer supported by DNR as a standard software tool. Following the DNR's upgrade to Windows 7 in

FY11-12, all agency users of Arcview 3.x are expected to upgrade to desktop ArcGIS 10.0, or will transition to alternative web-based GIS tools such as ArcGIS Explorer.

### **GIS Server-based Software**

1. **ArcSDE** - ESRI Spatial Database Engine (ArcSDE) is DNR's enterprise geographic data service. Following the DNR SIS migration, DNR currently runs ArcSDE on Windows blade servers, with links to the Oracle 11g database on Linux servers. Separate "development", "user acceptance test" (UAT) and "production" SDE/Oracle database instances are maintained. DNR was scheduled to upgrade to ArcSDE version 10.0 during early 2011.
2. **ArcIMS** - ESRI ArcIMS Internet map serving software is used for new web mapping application development. ArcIMS utilizes SDE for geospatial data serving. In 2010, ESRI accelerated plans to drop support for ArcIMS by about a year, and indicated that ArcIMS will likely not be compatible with their next database software release. Since ArcIMS is DNR's primary web mapping software, it has become a priority for DNR programs to migrate their web mapping applications to other solutions, particularly ArcGIS Server map service-based applications. DNR has set a target date of October 2012 to fully migrate off of ArcIMS. This effort is expected to be one of the most critical GIS initiatives for the agency during FY12-13.
3. **ArcGIS Server (AGS)** - ESRI ArcGIS Server is a GIS enterprise application server that provides geospatial analysis and mapping capabilities throughout the organization while maintaining centralized data management and application support.

### **Address Standardization & Geocoding software**

The DNR currently has no standard address standardization or address geocoding solution. We are hopeful that these services will become available through DOA in the future.

### **Image processing/remote sensing tools**

1. **GeoExpress** - This software (a product of LizardTech, Inc.) is used for scanned airphoto mosaicking, compression, and re-projection. Digital orthophotos in Multi-Resolution Seamless Image Database (MrSID) compressed image format are used extensively by DNR staff using desktop GIS software.
2. **OrthoMapper** - This software (a product of Image Processing Software, Inc.) is used for soft-copy photogrammetry by the DNR Wetlands Inventory program.

### **GPS (Global Positioning Systems) tools**

BTS/GIS Services continues to promote the effective use and integration of field data collection, global positioning systems (GPS) and other devices into the technology infrastructure. Trimble Pathfinder GPS desktop software is used for post-processing and analysis. Staff training and enhanced technical consulting support services have been provided to DNR programs during the last year. Basic information about GPS tools and technology can be accessed on the BTS GPS web page: <http://dnr.wi.gov/maps/gis/gps.html>. BTS/GIS has developed additional tools such as the DNR Garmin GPS Tool, which allow DNR staff to upload and download GPS data in WTM coordinates. BTS intends to continue to support agency development and use of mobile GPS tools as DNR program user requirements for this technology continue to grow.

### **Large-format plotting/other output capabilities tools**

Hewlett-Packard large format roll-feed plotters and various color laser printers are in use.

### **Metadata-collection tools**

This information is provided in Section B.1f.2 .

## **D. Organizational Architecture**

### **D.1 Identify the Agency's plans for GIS/LIS training and include a discussion of any specific GIS/LIS-related training activities you wish to see offered for State employees.**

GIS training-related issues and trends at DNR include:

- A need for more affordable GIS training.
- A need for GIS instructors from ESRI and other geospatial technology vendor training services.
- Use of Wisconsin DNR land information as part of the training.
- Requests from DNR staff for GIS training that is customized to meet their specific business needs.
- Staff who do receive training often do not have an opportunity to use it in a timely manner to retain skills learned.
- Staff are making increasing use of on-line or computer-based training.

Other prospects for GIS training for DNR staff are unknown at this time.

### **D.2 Describe any formal or informal land information sharing or development agreements your agency currently supports or is a party to (e.g., Memoranda of Understanding/Agreement, other cooperative agreements, consortia agreements, etc.). Include a description of potential partners and mutual projects of this nature, which your agency either plans to pursue or would be interested in pursuing.**

#### ***Formal Data Sharing Agreements & Consortia:***

- Memorandum of Agreement between DNR, the Wisconsin Department of Transportation, and Wisconsin Power and Light: "Natural Resource Regulatory Permitting & Information"
- 1999 Memorandum of Agreement between DNR and the Department of Administration "to ensure optimal accuracy of Geographic Information Systems (GIS) data between the agencies and to develop procedures for resolving errors in data".
- Agreements between DNR and various Counties in which DNR acknowledges restrictions that the Counties have placed upon their digital orthophotography or other data products.
- Agreements between the DNR Bureau of Wildlife Management or the DNR Bureau for Remediation and Development, and various Counties for land ownership (parcel) data.
- WISCLAND (the Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data, a partnership of public and private organizations seeking to facilitate landscape GIS data development and analysis). Although the WISCLAND consortium has been largely inactive since completion of the statewide Land Cover data set several years ago, WISCLAND remains a potential mechanism for cooperative inter-agency GIS/LIS data development or improvement.
- During 2001, a Cooperative Technical Partners Memorandum of Agreement between DNR and the Federal Emergency Management Agency (FEMA) for Digital Flood Insurance Map data was initiated.
- In 2005, the DNR became a participant in the WisconsinView consortium: <http://www.wisconsinview.org/>. WisconsinView is one of several "StateView" members of AmericaView, a nationwide program that focuses on remote sensing and related geospatial technologies in support of applied research, K-16 education, workforce development, and technology transfer.

#### ***Cooperative & Collaborative Arrangements:***

The DNR BTS and GIS Services Sections maintain informal data sharing arrangements with:

- Federal Agencies – These include the USGS, USDA/NRCS, US EPA, US Park Service, and the USFWS.
- State Agencies – These include the Wisconsin Departments of: Administration; Agriculture, Trade and Consumer Protection; Emergency Management; Health and Family Services; Public Service Commission; Transportation.

- Departments & Programs of the University of Wisconsin System – These include the UW-Madison Department of Forestry; UW Land Information and Computer Graphics Facility; UW Environmental Remote Sensing Center (ERSC); UW-Milwaukee American Geographical Society Collection; Wisconsin Geological & Natural History Survey
- Wisconsin Regional Planning Commissions
- The Wisconsin State Cartographer's Office

DNR is an active participant in interagency and intergovernmental data sharing and standards development efforts. Groups in which DNR participates and intends to continue to pursue GIS/LIS integration and cooperation include:

- Wisconsin Land Information Program – The DNR is an active participant in the activities of the Wisconsin Land Council, and the Wisconsin Land Information Association (WLIA).
- WLIA Workgroups – The DNR actively participates in the Digital Elevation Task Force and Wisconsin County Coordinate Systems Task Force of WLIA.
- WISCLAND – The DNR was a co-founder, active participant, and supporter of WISCLAND (the Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data), a partnership of public and private organizations seeking to facilitate landscape GIS data development and analysis. WISCLAND is currently inactive.
- USGS/FGDC – Potential participant in standards and framework data development for metadata and transportation data models, and geodetic, cadastral, and transportation framework data for the National Spatial Data Infrastructure (NSDI).
- Interagency GIS coordination meetings and common interest activities, fostering cooperative efforts and knowledge sharing.
- Wisconsin Geographic Information Coordination Council (WiGICC) – Creation of a Wisconsin Geographic Information Coordination Council (WIGICC) provides a new opportunity for geographic information governance and sharing. WNDR GIS has participated in the WIGICC planning team efforts during 2007-2011, and will continue to support this important activity into the future: <http://wigicc.org/>.
- Natural Heritage Inventory (NHI) – Being exempt from the Wisconsin Open Records Law, the NHI program is only able to share specific locational information through data sharing agreements, such as Cooperative Agreements and License Agreements. The Heritage Program currently averages 20-30 active agreements with various state, local, and federal government agencies as well as limited agreements with several state utility companies.

DNR's Division of Forestry participates in a Wisconsin partnership that developed the Landtype Association (LTA) layer of the National Hierarchical Framework of Ecological Units (NHFEU) for the entire state.

Interagency workshops are conducted regularly for planners from local units of government, consulting firms and citizen planners to impart information on data and resources important for completion of comprehensive plans from each respective agency. Participating agencies include: DNR, WDATCP, WDOT, WDOR, PSC, WNHS, UW-LICGF. The list of participating agencies continues to grow.

### **D.3 Identify any internal agency GIS/LIS-related groups.**

- DNR/BTS staff participate in quarterly DNR GIS User Group Meetings in cooperation with other DNR programs active in GIS/LIS.
- DNR Regional GIS User Groups meet periodically.
- The DNR Land Use Team provides access to land use-related publications and other information about DNR activities with land use implications: <http://dnr.wi.gov/org/es/science/landuse/plan/pubs.htm>.

#### **D.4 Identify any other organizational needs you anticipate.**

- There is an ongoing need to align GIS/LIS and Information Technology budgets with agency business requirements; the information provided in the Land Information Plans should be used to re-prioritize land information funds to accomplish this alignment across State Agencies.

### **E. Security Architecture**

#### **E.1 Provide any policy or statutory provisions related to privacy, cost recovery, liability, legal disclaimers, copyright or licensing related of land information, mapping, data distribution, usage, and the Internet. Address any open records laws issues that relate to the data distribution needs of the agency.**

- DNR reviews and maintains its overall IT security model, including security components related to its Oracle databases (including SDE) and application development and deployment procedures. As DNR develops more Internet-based applications, including those that allow external update of internal databases, its security model must take additional steps to protect data from unauthorized access and use.
- BTS is also increasing its security resource staff to play a more active role in security coordination, implementation and enforcement, and will increase the number of staff working on security issues under current plans.
- DNR is continuously evaluating and addressing “Homeland Security” concerns as new data sets and applications are built or existing ones are enhanced.
- DNR complies with the Open Records Law when handling requests for data and applications, including those involving land information. Depending on the context, DNR uses various disclaimers to notify users of appropriate uses of and support for requested data and applications. The legislature has granted Open Records Law exemptions to certain DNR that manage environmentally sensitive information, such as the Natural Heritage Inventory of rare and endangered species, and the Wisconsin Wetlands Inventory. Under these exemptions, the custodial program may be allowed to restrict access to certain information, or to charge fees.
- DNR adheres to all legal and other requirements for computer matching of personally identifiable information; Act 88 “opt out” related to facility contacts, recreational licenses, park vehicle admissions, and boat, ATV, and snowmobile registrations; and other applicable state and federal laws and rules designed to protect the privacy of individuals and the habitats of endangered species.
- DNR employs standard database administration practices, through the use of virus-checking software, password-protected logins, and establishment of an Internet firewall, to establish secure systems as appropriate.
- DNR/BTS GIS Services includes a statement of legal information with all BTS distributions of DNR geographic data to requesters outside of the agency. The legal information statement was downloaded from the following DNR Internet Legal Notices web page: <http://dnr.wi.gov/org/legal/>.