



Wisconsin's Land Information Program encompasses the efforts of all 72 counties in the state, shown here superimposed on a photograph of Barneveld in Iowa County.

2013 WLIP Report

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EXECUTIVE SUMMARY

The Wisconsin Land Information Program (WLIP), administered by the Division of Intergovernmental Relations within the Wisconsin Department of Administration (DOA), provides over \$10 million annually in public funding to Wisconsin counties for the modernization of local land records. This report discusses how this funding is invested in county geospatial infrastructure, the 2013 WLIP county survey results, and the challenges and opportunities for the aggregation of county map data into statewide map layers.

COUNTY LAND RECORDS MODERNIZATION FUNDING

In 2012, counties retained a statewide total of \$9.7 million in local register of deeds recording fees for land information and received \$740k in WLIP grants.

In order to retain fees and receive grants, counties must meet several WLIP requirements, including submitting annual expenditure reports that categorize how WLIP funds have been spent. Analysis of expenditure reports for 2012 shows that counties mainly spent funds on activities related to parcel mapping and GIS (Geographic Information System) hardware and software. WLIP funding also supported acquisition of aerial imagery and LiDAR, as well as the development of zoning, emergency service districts, and address point map layers, among other land records modernization activities.

Act 20, the state's biennial budget enacted July 1, 2013, has significant implications for WLIP funding:

- It created the *Land Information Fund*, a segregated appropriation for state program revenue with statutory direction not to lapse funds from this appropriation
- WLIP Base Budget grant eligibility was raised so that Base Budget grants are projected to total \$2.2 million statewide by 2015 and will be available to an additional 11 counties (44 total)
- WLIP Training & Education grant eligibility was raised from \$300 to \$1,000 per county
- In 2015, WLIP program revenue will rise from an annual average of \$2.4 million to approximately \$8.4 million

2013 WLIP SURVEY RESULTS

DOA and the State Cartographer's Office (SCO) collaborated on a county survey effort in 2013. This report reviews the status by county for several base map layers, including PLSS, parcels, orthoimagery, LiDAR, and address points. It also discusses county willingness to share data, the provision of register of deeds documents online, and county priorities for training and education.

STATEWIDE FRAMEWORK DATA LAYERS

In order to gain a greater return on investment in county land information systems, aggregating county map data into statewide GIS layers has long been a vision of the WLIP. Certain challenges, such as lack of governance for guidelines, standards, and models to facilitate data sharing, have hindered progress in this area. Yet there are several emerging opportunities to accomplish goals for statewide layer creation, such as Act 20's initiative to create a statewide digital parcel map.

INTRODUCTION

About the Wisconsin Land Information Program

Wisconsin currently has \$456 billion in taxable real estate assets and tens of billions more in public properties, as well as priceless natural, historical, and cultural assets.¹ County land information systems provide digital base map information characterizing the natural, built and jurisdictional landscape, as well as digital legal land records necessary to protect property rights and facilitate efficient operation of the real estate market.

The high cost of pre-digital local land records management in Wisconsin was first documented in a 1978 report entitled *Land Records: The Cost to the Citizen to Maintain the Present Land Information Base*, also known as “The Larsen Report.” In 1989, a public funding mechanism was created whereby a portion of county register of deeds document recording fees collected from real estate transactions would be devoted to land information through a new program called the Wisconsin Land Information Program. Currently, the program is governed by state statutes 16.967 and 59.72, as well as Administrative Rule Adm 47.

Since the WLIP was created, Wisconsin has spent about \$185 million for the creation and maintenance of modern land information systems. Currently, the program provides over \$10 million per year in public funding to Wisconsin counties for land information.

In order to be eligible for WLIP funding, each county must have a land information plan that addresses development of framework data layers according to referenced standards, historically referred to as the *WLIP Foundational Elements*:

WLIP Foundational Elements

- 1 Geographic Positioning Reference Frameworks
- 2 Orthoimagery and Georeferenced Image Base Data
- 3 Elevation Data Products and Topographic Base Data
- 4 Parcel Mapping
- 5 Parcel Administration and Assessment Information
- 6 Street/Road Centerlines, Address Ranges and Address Points
- 7 Hydrography, Hydrology and Wetlands Mapping
- 8 Soils Mapping, Land Cover and Other Natural Resource Data
- 9 Land Use Mapping
- 10 Zoning Mapping
- 11 Election and Administrative Boundary System
- 12 Critical Infrastructure and Facilities Management
- 13 Database Design and System Implementation

¹ Wisconsin Department of Revenue. *Statement of Changes in Equalized Values by Class and Item*. Accessed November 1, 2013, <https://ww2.revenue.wi.gov/EqValue2/application>

Accountability and Transparency

In order to collect and retain a portion of document recording fees for land information activities and be eligible for WLIP grants, counties must meet certain requirements:

Requirements for County Participation

- Update the county's plan for land records modernization at least every three years
- Meet with the county land information council to review expenditures, policies, and priorities of the land information office at least once per year
- Report on expenditure activities each year
- Submit detailed applications for WLIP grants
- Complete the annual WLIP survey
- Subscribe to DOA's land information listserv
- Meet a June 30, 2017 deadline to post certain types of parcel information online

Update the County's Plan for Land Records Modernization Every Three Years

Per state statute 59.72(5)(3), counties must spend their WLIP funding for land records modernization consistent with their county land information plan. DOA's land information plan instructions lay out a detailed plan template that lists the minimum plan elements to be included, but leaves flexibility as to how counties may choose to address them.

Act 20 requires counties to more frequently update and submit their plans to DOA for approval—every *three* years, instead of every five years as in the past. The first post-Act 20 required update deadline is not until January 1, 2017.

Meet With the County Land Information Council

State statute 59.72(3m) requires county boards to establish a land information council of not less than eight members. The council is to consist of the following:

County Land Information Council Composition

- Register of Deeds
- Treasurer
- Real Property Lister or designee
- Member of the County Board
- Representative of the land information office
- A realtor or member of the Realtors Association employed within the county
- A public safety or emergency communications representative employed within the county
- County surveyor or a registered professional land surveyor employed within the county
- Any other members of the board or public that the board designates

The county land information council is tasked with reviewing the priorities, needs, policies, and expenditures of a land information office and advising the county on matters affecting the land information office. DOA has made it a requirement for councils to meet at least once a year for WLIP grant eligibility.

Report on Expenditure Activities Each Year

Since 2011, counties have been required to report on how WLIP retained fees and grants were utilized in the previous year, according to s. 59.72(2)(b). The *Retained Fee/Grant Report* asks counties to classify their expenditure information by various categories. Each county's *Retained Fee/Grant Report* is posted online at www.doa.state.wi.us/WLIP. Reporting on 2012 expenditures is summarized in a later section of this document.

Submit Application Detailing Grant Projects in Order to Receive WLIP Grants

Although all counties are eligible for Training & Education grants and Base Budget grant eligibility is determined by how much land information revenue is collected at the county level, counties must still submit detailed applications in order to receive grant funding. Both applications ask counties to confirm adherence to program requirements as a prerequisite to receive funding. The Base Budget grant application requests detailed project descriptions, itemized costs, and references demonstrating that grant projects are consistent with a county's land information plan.

Complete the Annual WLIP Survey

Completing the annual WLIP survey is a requirement of the program. In 2013, DOA and the State Cartographer's Office collaborated on the annual WLIP survey utilizing the survey tool GISinventory.net. The results are summarized in a later section of this document.

Subscribe to DOA's Land Information Listserv

DOA manages a land information listserv with over 300 members in which all county land information officers are required to participate. Others on the listserv are active in the land information/GIS fields and are employees of other units of government or companies providing GIS services.

Meet a 2017 Deadline for Posting Parcel Information Online

With Act 20 came new requirements to s. 59.72. Key among these is the direction for counties to provide certain information related to individual parcels of land online by June 30, 2017, in a searchable format established by DOA. This will include property tax assessment data, zoning information, property address information, and acreage information maintained by the county.

A county must meet the 2017 deadline for posting parcel information online, or they will lose WLIP grant eligibility, will lose 25% of the fees retained at the county level for land information, and will have to dedicate the remaining retained fee revenue to meeting these requirements.

The remainder of this report focuses on county land records modernization funding, 2013 WLIP survey results, and challenges and opportunities that lie ahead for the production of statewide framework data layers.

COUNTY LAND RECORDS MODERNIZATION FUNDING

Since 1990, Wisconsin counties have retained a total of \$153 million for land information activities and received a total of \$32 million in grants. Counties currently collect retained fees and receive grants totaling over \$10 million annually through participation in the WLIP.

Under state statute 59.43(2)(ag)1 and (e), county register of deeds are authorized to collect a fee for recording real estate documents. Of the \$30 fee, counties may use \$20 at their discretion, and \$10 is designated for land information. Of that \$10, counties are enabled to retain \$8 for land information activities if they meet the statutory program requirements of the WLIP.

The remaining \$2 of the \$10 retained for land information is submitted to DOA. This state program revenue, averaging \$2.4 million in recent years, funds WLIP grants. It has also funded local government comprehensive planning grants from 2002-2010 and was partially diverted into the state's general fund (as discussed on page 12).

Beginning January 1, 2015, counties will be required to submit \$7 per document recorded to the state Land Information Fund. A \$5 portion of this \$7 is a repurposing of the revenue originally collected for social security number redaction. The \$7 contribution to the state Land Information Fund will increase state program revenue to approximately \$8.4 million per year in 2015.

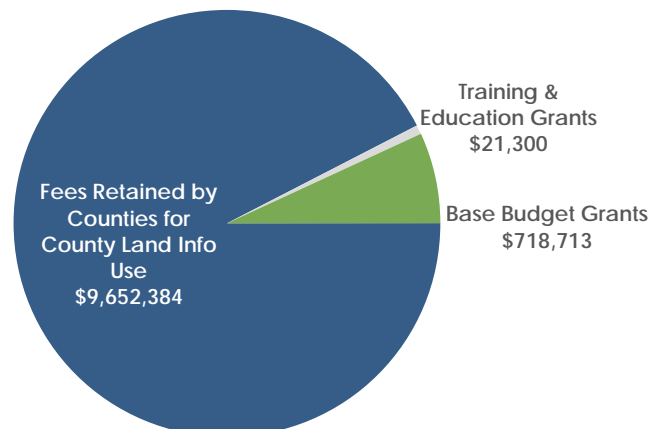
ROD Document Recording Fee

\$20	County Undesignated
\$8	County Retained for Land Information
\$2	State Land Information Fund
\$30	

ROD Document Recording Fee After Jan 1, 2015

\$15	County Undesignated
\$8	County Retained for Land Information
\$7	State Land Information Fund
\$30	

2012 County Land Information Funding: Fees Retained and WLIP Grants Awarded



County Disparity in 2012 WLIP Funding

2012 BASE BUDGET COUNTIES

Milwaukee	1,039,332
Dane	928,228
Waukesha	755,620
Brown	426,532
Outagamie	310,268
Racine	284,684
Winnebago	270,028
Rock	242,764
Washington	241,244
Kenosha	231,860
Marathon	215,540
La Crosse	198,716
Walworth	195,092
Sheboygan	181,644
St. Croix	177,684
Fond du Lac	174,988
Ozaukee	172,884
Sauk	170,292
Eau Claire	152,700
Jefferson	147,340
Dodge	144,876
Manitowoc	128,716
Chippewa	111,564
Columbia	111,268
Portage	110,348
Wood	110,220
Polk	107,180
Oneida	102,876
Waupaca	97,460
Calumet	96,364
Door	86,724
Barron	86,532
Oconto	86,488
Marinette	81,796
Monroe	79,124
Shawano	78,972
Grant	77,012
Vilas	74,340
Green	71,740
Pierce	71,160
Douglas	68,060
Trempealeau	67,710
Clark	66,646
Dunn	66,620
Juneau	66,604
Burnett	66,466
Lincoln	66,308
Washburn	65,808
Adams	65,766
Waushara	65,536
Vernon	64,542
Jackson	63,702
Sawyer	63,464
Iowa	62,994
Langlade	62,300
Green Lake	62,090
Richland	61,858
Bayfield	61,486
Lafayette	61,090
Marquette	59,634
Rusk	59,136
Crawford	58,986
Price	58,812
Taylor	57,276
Ashland	57,158
Kewaunee	56,874
Forest	55,216
Buffalo	55,034
Pepin	54,300
Florence	53,444
Iron	53,155
Menominee	52,122

It is important to note that not all counties receive the same level of funding from document recording fees. Counties with high levels of real estate market activity receive more funding. Eleven counties retained more than \$200k for land information in 2012.

Rural counties with smaller populations typically have fewer real estate transactions, generating less revenue from retained fees. Yet their land areas and land information system costs are not in direct proportion to their smaller revenue levels.

WLIP Base Budget grants are meant to assist counties that retain small amounts in document recording fees. Despite Base Budget grant awards, there is still a wide disparity in funding levels across counties.

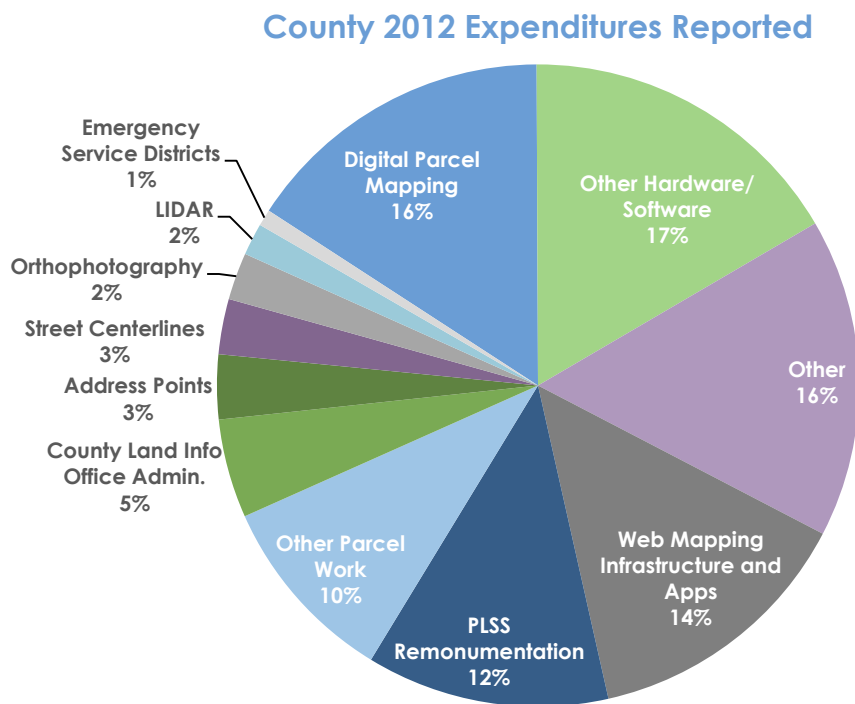
The graph to the left illustrates each county's total WLIP funding in 2012—that is, retained fees and grants combined. Total funding available to counties ranges from over \$1 million in Milwaukee County to just over \$50k for several smaller counties. Cumulatively since 1990, total WLIP funding has ranged from \$20.8 million for Milwaukee County to a total of \$0.7 million for Menominee County.

Before 2013's Act 20, WLIP Base Budget grants provided funding to counties that retained less than \$50k in document recording fees for land records modernization. However, this grant eligibility formula did not count the \$2 per document recorded that was retained specifically for the provision of land information on the Internet. Hence, counties that received Base Budget grants in 2012 had WLIP funding levels (total retained fees and grants combined) up to \$71k.

Expenditure of Retained Fees and Grants in 2012

Counties are required to report on how WLIP retained fees and grants were utilized in the previous year, in a *Retained Fee/Grant Report*, according to s. 59.72(2)(b).

As part of the *Retained Fee/Grant Report*, counties are asked to categorize their expenditures. According to these reports, the statewide total of \$10.4 million in 2012 WLIP funding was devoted to a few key areas as depicted below.



The graph above illustrates that over one-third of WLIP funding in 2012 was used for the development and maintenance of county parcel map datasets, including digital parcel mapping, land surveying activities for PLSS remonumentation, and other parcel work. About another third of funding was used to purchase computer hardware and software, including Web infrastructure and applications that provide convenient access to land records on the Internet through searchable databases and online interactive maps.

The remaining third of WLIP funding supported a diverse range of activities, including acquisition of LiDAR and orthoimagery, as well as the development of GIS layers for address points, street centerlines, and emergency service districts. Additional activities falling under the “Other” category in the chart above include:

- Developing and integrating zoning, floodplain, and land use map data
- Custom map projects for other county departments, such as snowmobile trails and ice rescues
- Processing data and map reproduction requests from state agencies and the public
- Training and education activities

County Administrative Costs

In some counties, the number of real estate transactions creates significant land information budgets, as illustrated by the graphic on page 6. Such large land information budgets may warrant the use of a portion of WLIP funds for administration and management activities at the county level. According to *Retained Fee/Grant Reports* and follow-up with counties by WLIP staff, 5% of the total amount of WLIP funding provided to counties was directly utilized for land information office administrative activities, management, and coordination in 2012.

Register of Deeds Office Expenditures

Land information offices are often not physical offices, especially in smaller counties. Other county offices, such as the register of deeds, real property lister, and/or the county surveyor's office, may carry out the land information duties for the county. Whether serving as the land information office or simply coordinating with it, the register of deeds office is integral to land records modernization.

A significant amount of WLIP funding is spent by register of deeds offices. *Retained Fee/Grant Reports* reveal that Wisconsin counties estimate spending a statewide total of \$1.17 million in 2012 for register of deeds offices. This includes posting register of deeds documents online, scanning and indexing documents describing parcel information, hardware/software, and land information systems integration projects. Because ROD expenditures fall into several categories, the \$1.17 out of \$10.4 million in total 2012 WLIP funding spent by ROD offices is not depicted as a separate category in the chart on page 7.

Wisconsin Land Information Program Grants

According to Administrative Rule Adm 47, the WLIP may award four primary types of grants—*Base Budget, Training & Education, Strategic Initiative, and Contribution-Based*.

Strategic Initiative and Contribution-Based Grants

Strategic initiative grants and contribution-based grants have not been awarded since 2003. In 2015, state program revenue will increase. Much of this new revenue is expected to be targeted for local investment, likely in the form of strategic initiative grants associated with the Act 20 initiative to create a statewide digital parcel map, described in the final section of this document.

Training & Education Grants

Training & Education grants are intended to provide a county's land information officer or designee with training for the design, development, and implementation of a land information system. Grant funds may be used to participate in courses, workshops, and conferences provided by institutions of higher education, land information system vendors, and professional land information organizations, such as the Wisconsin Land Information Association.

In the past, Training & Education grants were capped at a maximum level of \$300 per county. As a result of Act 20, there will be an increase in county Training & Education grant eligibility to a minimum of \$1,000 for every county. For all 72 counties combined, this will amount to an increase in total Training & Education grant eligibility from \$21,600 in previous years to at least \$72,000 annually, beginning in 2014.

Base Budget Grants

Because counties with modest real estate market activity do not generate substantial program revenue, WLIP Base Budget grants are provided in order to enable eligible counties to develop, maintain, and operate a basic land information system and advance towards completion of framework data map layers.

Prior to Act 20, counties were eligible for grants if they retained less than \$50k in register of deeds document recording fees. In the old formula, Base Budget grant eligibility was equal to \$50k minus the register of deeds document recording fees a county retained for land records modernization. The old eligibility formula was calculated at \$6 per document recorded, because s. 59.72 designated \$2 of the \$8 retained for land information specifically for provision of land information on the Internet.

Act 20 changed the formula for calculating Base Budget grant amounts by increasing Base Budget grant eligibility from a \$50k to a \$100k retained fee threshold. Beginning with 2014 grants, Base Budget grant eligibility will equal \$100k minus the register of deeds document recording fees a county retains for land information at \$8 per document recorded, as depicted below.

WLIP Base Budget Grant Eligibility Formula

\$100k – ROD document recording fees @ \$8 per document recorded

Example: County records 5,000 documents

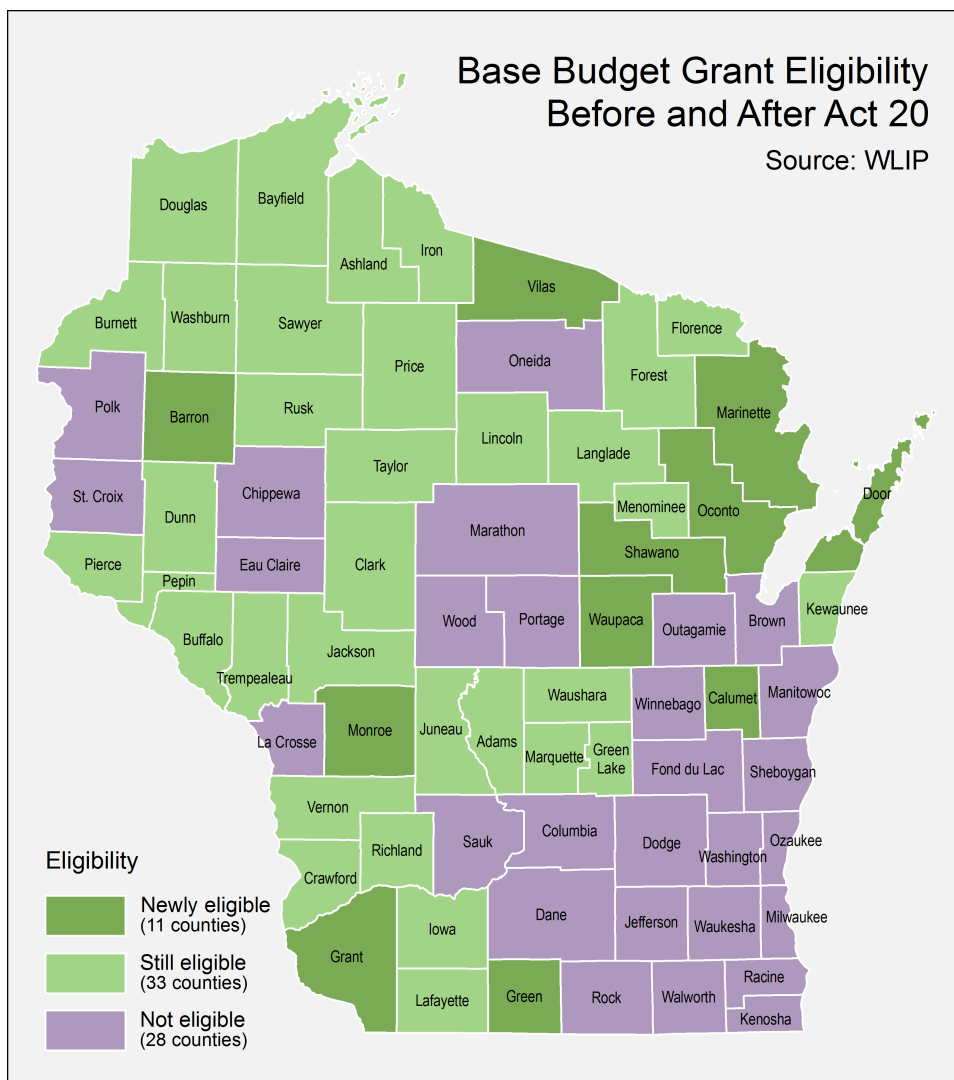
$\$100k - (5,000 \times \$8)$

$\$100k - (\$40k)$

$\$60k = \text{minimum level of Base Budget grant eligibility}$

In 2013, 33 counties received Base Budget grants totaling \$720k, with amounts calculated based on the old formula.

Due to Act 20's changes to the Base Budget grant eligibility formula, 44 counties are eligible for 2014 Base Budget grants, as depicted in the map below. Base Budget grants for 2014 are expected to total \$1.2 million statewide.²



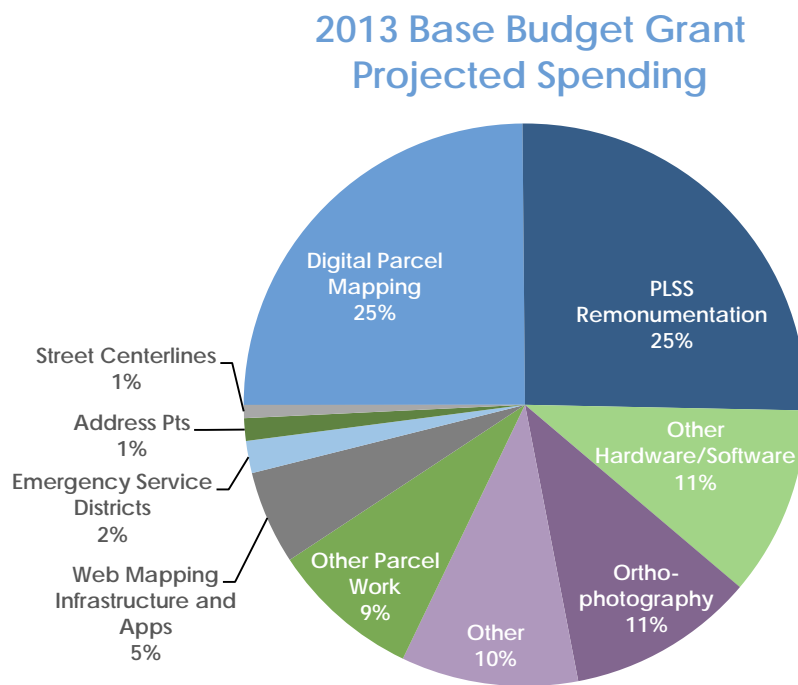
² According to s. 16.967(7)(5)(am)(3), DOA may prorate Base Budget grants for 2014 based on funding available.

Projected 2013 Base Budget Grant Expenditures and Future Grants

DOA distributed a total of \$720k in county Base Budget grant payments in August 2013. The chart below displays projected expenditure areas based on 2013 Base Budget grant applications. It is similar to the “County 2012 Expenditures Reported” chart on page 7, but it differs in that it shows projected future spending for Base Budget grants and does not include retained fee spending.

Counties eligible for Base Budget grants have significantly smaller land information office budgets than most counties not eligible. This may be a determining factor in funding priorities for Base Budget counties.

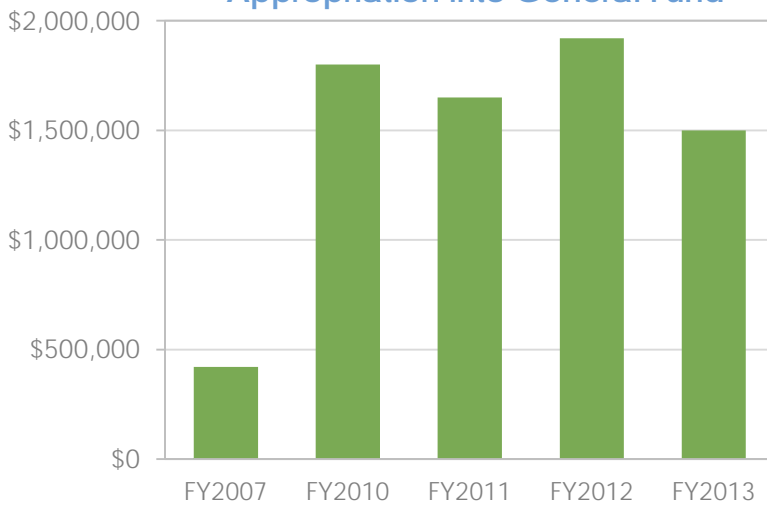
Over half of Base Budget funding is expected to be spent on digital parcel mapping, PLSS remonumentation, and other parcel work. Other Base Budget funding priorities are depicted below.



Base Budget Grant History and Projected Base Budget Grant Increase

Although the WLIP has awarded \$32 million in grants since 1990, funding available for grants has varied from year to year. For example, from 2007-2011, Base Budget grants were not fully funded in four of the five years, because state program revenue funded comprehensive planning grants or was diverted (lapsed) into the general fund. Recent lapses into the general fund are depicted on the following page.

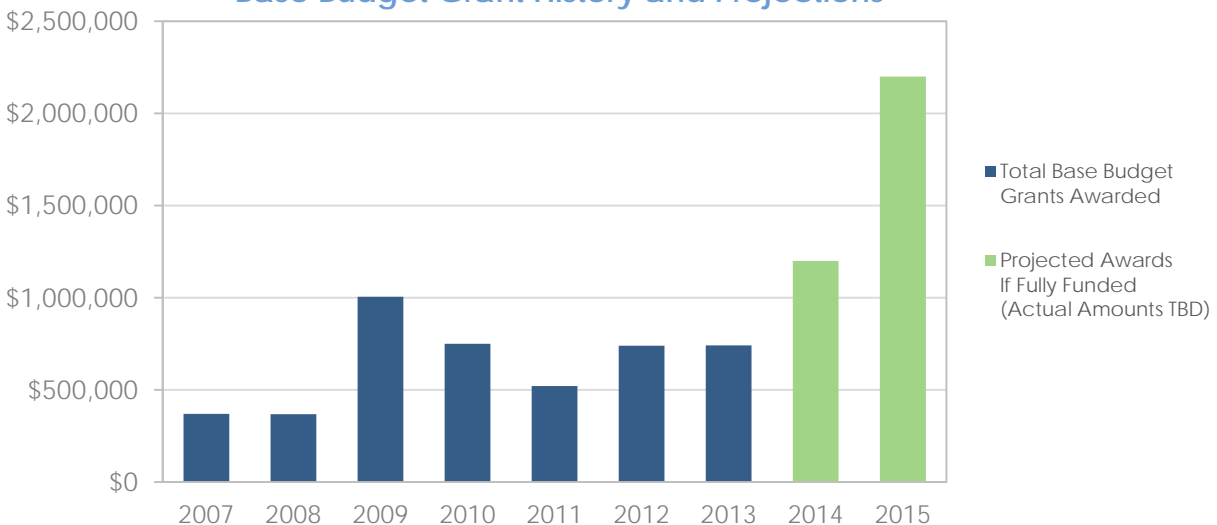
Transfers from WLIP State Program Revenue Appropriation into General Fund



In spite of these lapses, 2012 and 2013 Base Budget grants were awarded at the full eligibility threshold, ensuring a minimum of \$50k in land records modernization funding for every Wisconsin county. Significantly for the future, Act 20 places legislative barriers to lapsing program funds.

By raising the eligibility level for Base Budget grants beginning with grants for 2014, Act 20 increases grant projections. Base Budget grants are projected to total \$1.2 mil in 2014 and \$2.2 mil in 2015, which would be a \$1.5 million increase in total Base Budget grant funding over 2013.

Base Budget Grant History and Projections



Not only do counties stand to benefit from the projected increase in Base Budget grant awards in the future, but DOA has also adjusted the grant application period to allow counties to more efficiently budget and plan their land information projects for the upcoming fiscal year. The 2014 Base Budget and Training & Education grant applications were released on October 1, 2013.

2013 WLIP SURVEY RESULTS

In 2013, staff from the State Cartographer's Office (SCO) and WLIP collaborated to conduct the annual WLIP survey, which functions to document county progress towards achievement of complete and maintained GIS map layers. The survey is based on self-reported statistics provided by representatives of land information offices in each of Wisconsin's 72 counties, and has precedents in the survey effort reported on in the *2009 Report on County GIS Data Systems* and the *2012 WLIP Report*.

The *GIS Inventory*—a national online survey tool composed by the National States Geographic Information Council (NSGIC)—was used to conduct the WLIP survey, including a special set of questions specific to Wisconsin counties.

This chapter focuses on survey results pertaining to certain base map layers and particular programmatic areas of interest:

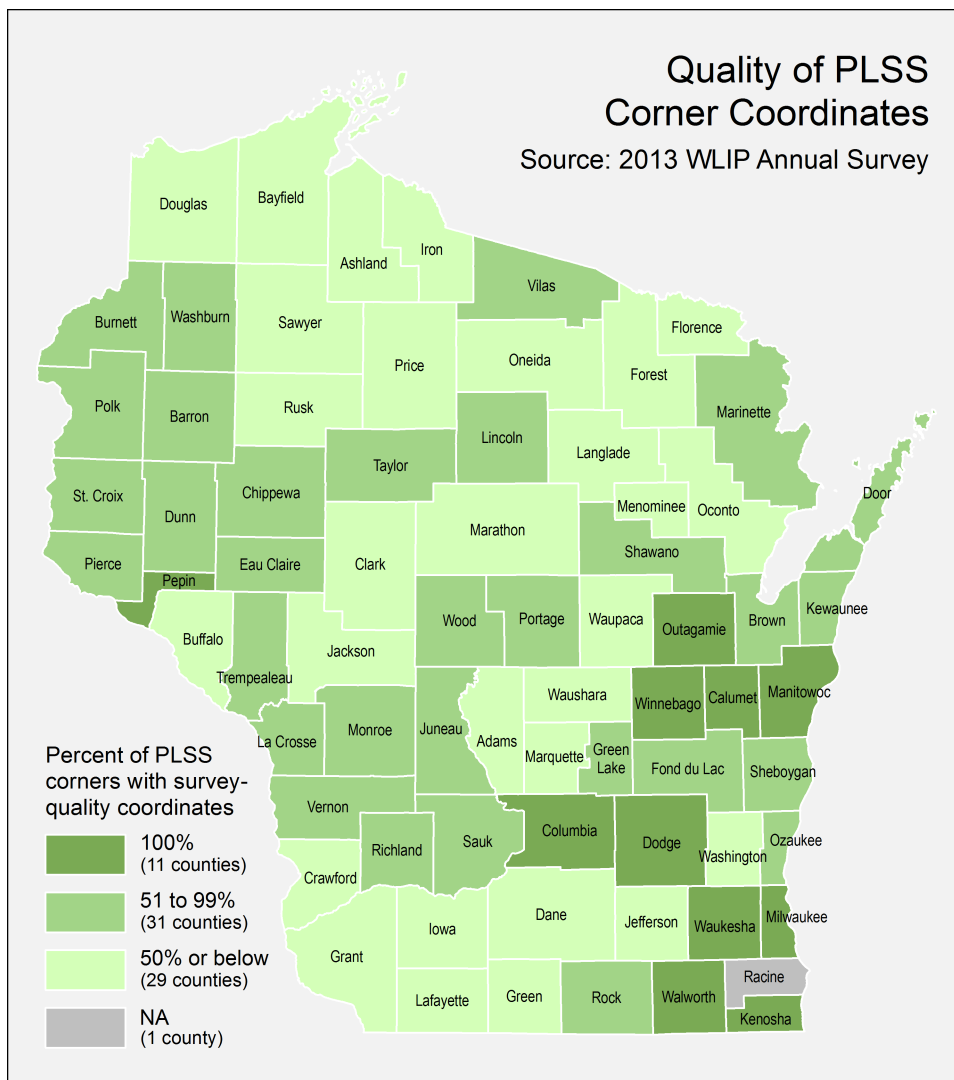
- Public Land Survey System
- Parcel Mapping
- Orthoimagery
- LiDAR
- Address Points
- Geospatial Data Sharing
- Register of Deeds Documents Online
- Training and Education Priorities

Public Land Survey System

The Public Land Survey System (PLSS) is a way of subdividing and describing land in the United States dating back to the days of independence following the Revolutionary War. The PLSS was used to divide up and sell territory acquired during westward expansion. The PLSS typically divided up land into 36 square-mile townships. Each square mile is referred to as a section and a monument (marker) was placed at least at each section corner. Property within the each section was further divided into parcels, for such uses as farm homesteads.

Remonumentation consists of finding the original section corner monuments and marking their location with precise GPS coordinates and replacing the original monument with a more permanent marker, such as an iron rod or concrete. Originally the section corners were marked with wooden stakes or posts, marked trees, or piles of rock, some of which prove difficult to find many decades later. Finding old section corners can be an archaeological process that utilizes current and historic aerial imagery, historic deed documentation, and an experienced surveyor's ability to find clues of prior human alteration of the ground. Much remonumentation was completed after the original land survey of the mid-1800s, with one such period in the 1930s, but many section corners have yet to be found and measured with modern GPS coordinates in order to improve the accuracy of county parcel mapping in GIS systems.

By Wisconsin state statute, the county is the custodian for PLSS corners within its boundaries. Progress towards updated PLSS monuments and coordinates varies widely across the state, with some counties having completed remonumentation with survey-level coordinates, while others are at various stages of completion, as illustrated on the map below.

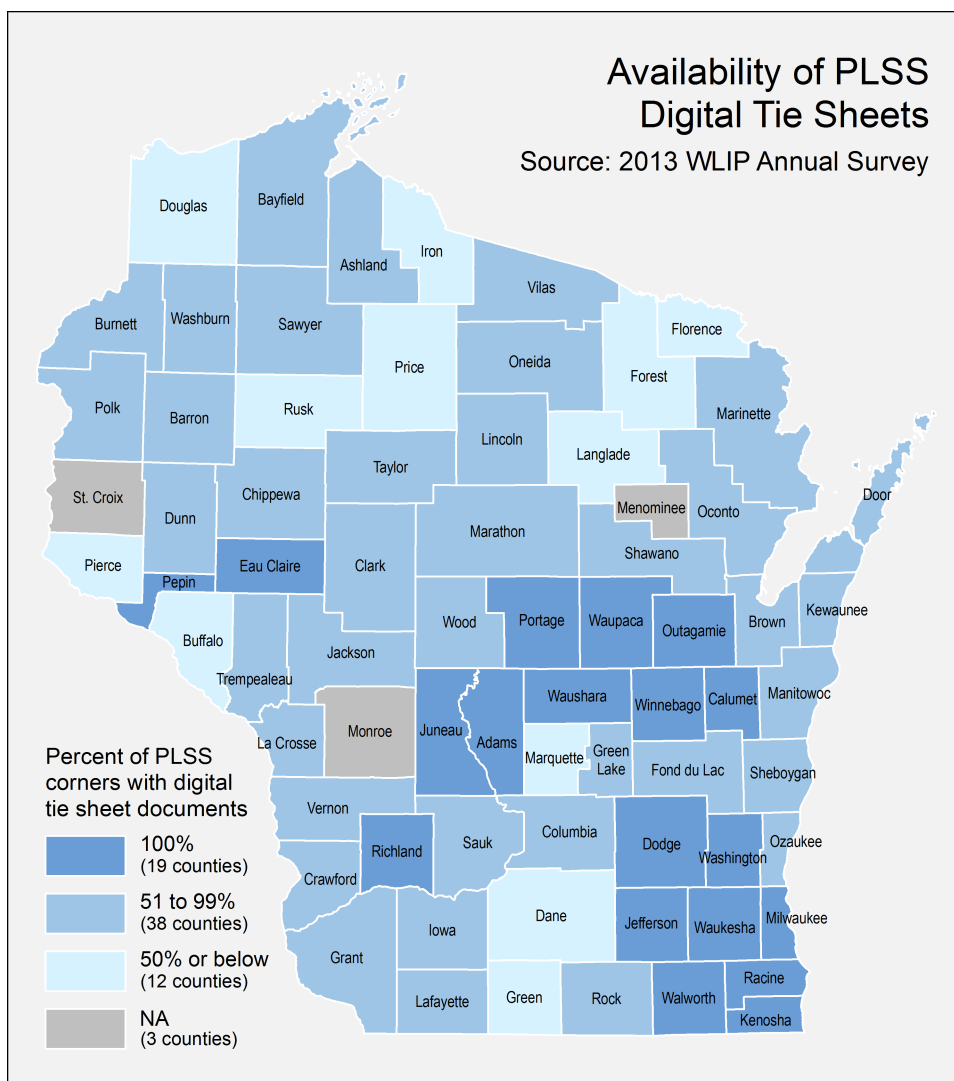


According to the 2013 WLIP survey, statewide, there are over 200,000 PLSS corners (section, quarter-section, meander) set in the original government survey. About 57% of the state's corners (for all counties combined) are estimated to have survey-quality coordinates associated with their locations.

Access to quality in-ground survey control and evolving GPS positioning technology has facilitated much work across the state in recovering, re-monumenting and/or collecting high quality local coordinates on corners of the PLSS. The WLIP recognized early on that quality PLSS data would augment quality development of other land tenure and boundary layers that depend upon PLSS definition, as well as provide a quality measure of accurate parcel mapping.

Another aspect of PLSS corners is whether they have digital tie sheet documents associated with each corner. A tie sheet legally identifies the corner as referenced to the PLSS and its location. It is a description of any evidence considered by the surveyor and notation of whether the monument was found or replaced.

The map below shows that most counties do not have digital tie sheet documents for all of their section corners.



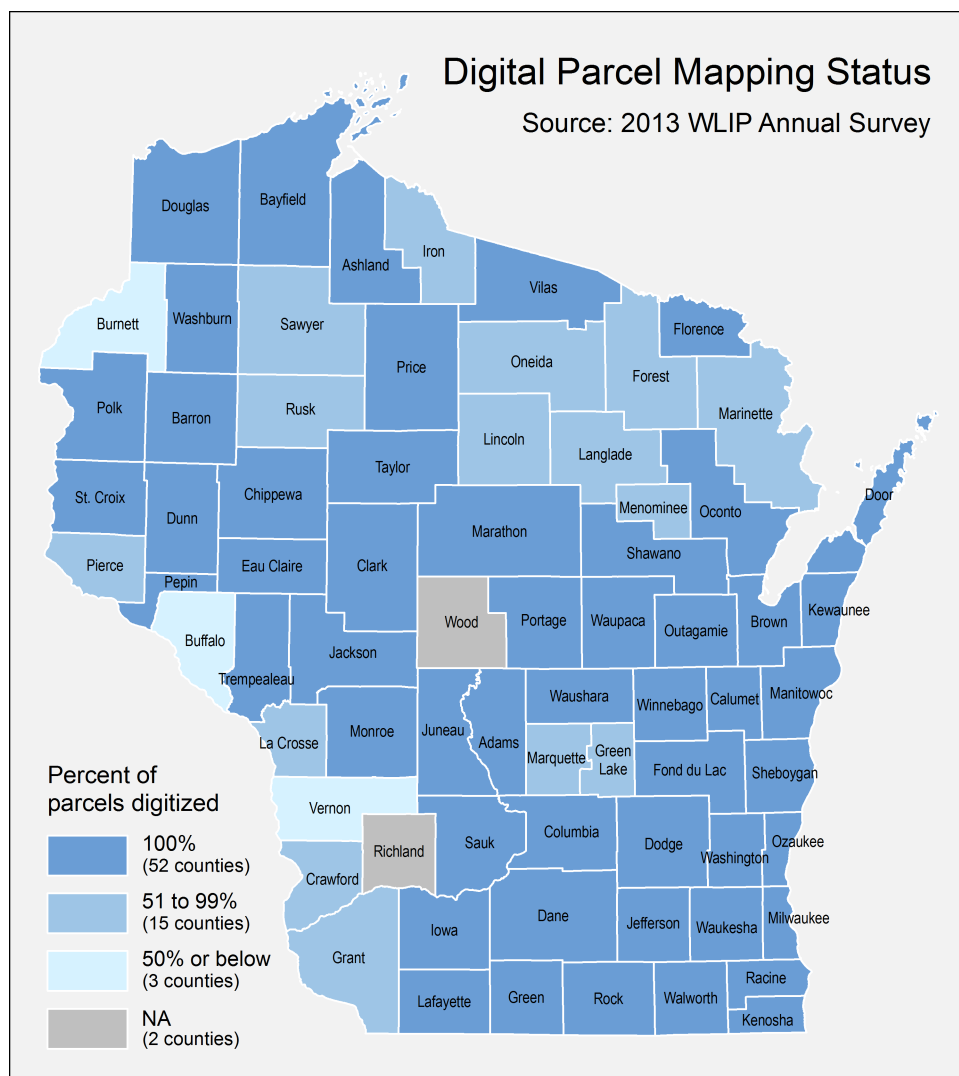
SCO maintains “PLSSFinder,” a free, online catalog designed to help users locate current information about PLSS corners and tie sheets in Wisconsin. To date, SCO hosts records of corner information for over 34 Wisconsin counties with an additional 16 counties pending or in progress.

Parcel Mapping

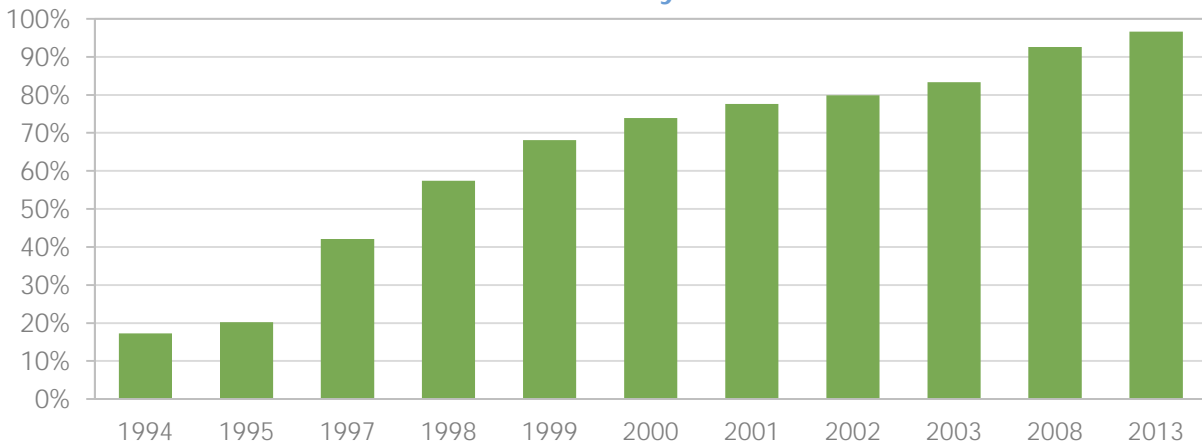
Parcel mapping may be said to lie at the heart of county GIS operations, serving as a mapped representation of land ownership. Parcels are locally surveyed, recorded, assessed, taxed, and regulated, pointing to the central nature of parcels to the business of local government. Many other data layers are based on parcel boundaries, such as zoning, land use, school districts, managed forest lands, and utility districts.

According to the county responses to the 2013 WLIP survey, counties manage a total of 3,289,612 parcels. This figure does not account for the 18 municipalities and tribes that manage their own parcel datasets identified in the survey.

Of the total parcels in the state, only 110,316, or 3.4 percent, were reported not to be in a digital format suitable for mapping and analysis. Fifty-two counties reported having a complete parcel and land ownership layer, with the qualification that a parcel layer requires maintenance and updates, thus, continued funding.



Statewide Percent of Parcels Digitized and
Maintained by Counties



Although 96.6% of parcels in the state are digitally mapped, they may not have accurate parcel lines. Some counties maintain parcel maps that are not based on PLSS section corners with survey-level coordinates, resulting in inaccuracy and a need for future investment in parcel mapping.

This year's WLIP survey did not assess county parcel attributes. However, the 2012 survey did, and revealed that county parcel attributes range widely. Some county land information offices maintain a small number of attributes and join these fields to a tax/land records database maintained by the real property lister on an as-needed basis.

It is difficult to report in detail on parcel status without an empirical analysis of county parcel datasets, an undertaking in clear view with the forthcoming implementation plan for a statewide digital parcel map discussed on page 29 in the following chapter.

Orthoimagery

An orthophotograph is an aerial photograph that is geometrically corrected to account for the relief of the Earth's surface, topography, and camera/platform distortions and is known more generally as aerial imagery.

Orthophotography has great value in creation, maintenance, and quality assurance of other framework data GIS layers, such as wetlands, floodplains, land cover, land use, road centerlines, and parcels. As orthoimagery is a snapshot of what exists on the ground, aerial images are used for innumerable local government purposes, such as emergency response, watershed management, zoning enforcement, site planning, flood plain mapping, public meeting displays, and more.

There are many variations of orthophotography other than pixel resolution, including leaf-on or leaf-off and black/white, color, or color infrared. Oblique imagery is another important variation that provides a better view of the sides of buildings, structures, and landforms. It is aerial imagery taken at an angle to the ground rather than conventional vertical aerial imagery. Oblique imagery has become a tool for government infrastructure inventory, real property evaluation, and emergency response, as well as other private sector uses.

Most local governments in Wisconsin acquire orthophotography on a five-year cycle. The Wisconsin Regional Orthophotography Consortium (WROC) is a multi-entity group that organized statewide aerial imagery acquisition in 2010 and is organizing a similar effort for 2015 with Ayres Associates/Aero-Metric Team contracted to collect and rectify the imagery.

WROC lists the following benefits for participation in its consortium:

- Economy of scale
- Partner funding
- Efficiency in implementation
- Data-sharing among members
- Specifications and standards support
- Online data hosting
- Web-based quality control

In 2010, a minimum of 18" leaf-off imagery was collected statewide, and statewide 1 meter leaf-on NAIP imagery was also acquired. The data is available for download at www.wisconsinview.org.

Aerial Imagery Business Plan

In February 2011, the State Cartographer's Office received funding from the Federal Geographic Data Committee Cooperative Agreements Program to create a business plan for a Wisconsin Aerial Imaging Program.

The project examined existing models used to manage aerial photography projects in the state and analyze the lessons learned from these past projects, based on considerable community input. The expected outcome is a formal implementation plan for an aerial photography program that meets the needs of the widest possible audience of users in the state.

The aerial imagery business plan, which is currently in the final stages of editing, makes the following high-level recommendations:

Identify a source of sustainable funding

A critical issue will be sustainable annual funding for the aerial imagery business plan. Wisconsin has opportunities based on existing programs to provide the necessary funds without requiring an increase in taxes or user fees. Potential sources of funds with a direct relationship for funding statewide geospatial programs include WLIP funding and the Enhanced 911 charges that are designed to support the implementation and maintenance of that system.

Establish a participatory governance structure and identify a program administrator

Any program that is implemented will require extensive participation from the user community to be effective and to make sure that over time the imagery produced by the program meets their needs. The business plan presents several models for implementation of the program, but constant to each is the need for the user community to be directly involved in determining imagery standards and schedules. Additionally, an organization must be identified as the permanent home of the aerial imagery program. This administrative home should have a tradition of working cooperatively with local and county governments and administering cooperatively funded programs.

Identify an aerial imagery services organization

To maximize the efficiencies possible from technical specialization, an organization in government should be identified and accept responsibilities for providing the technical services to support the statewide program.

Establish a state minimum imagery standard

Once a governance structure has been identified and established by the imagery user community, a state minimum imagery standard should be established. This standard would then drive the collection of statewide imagery.

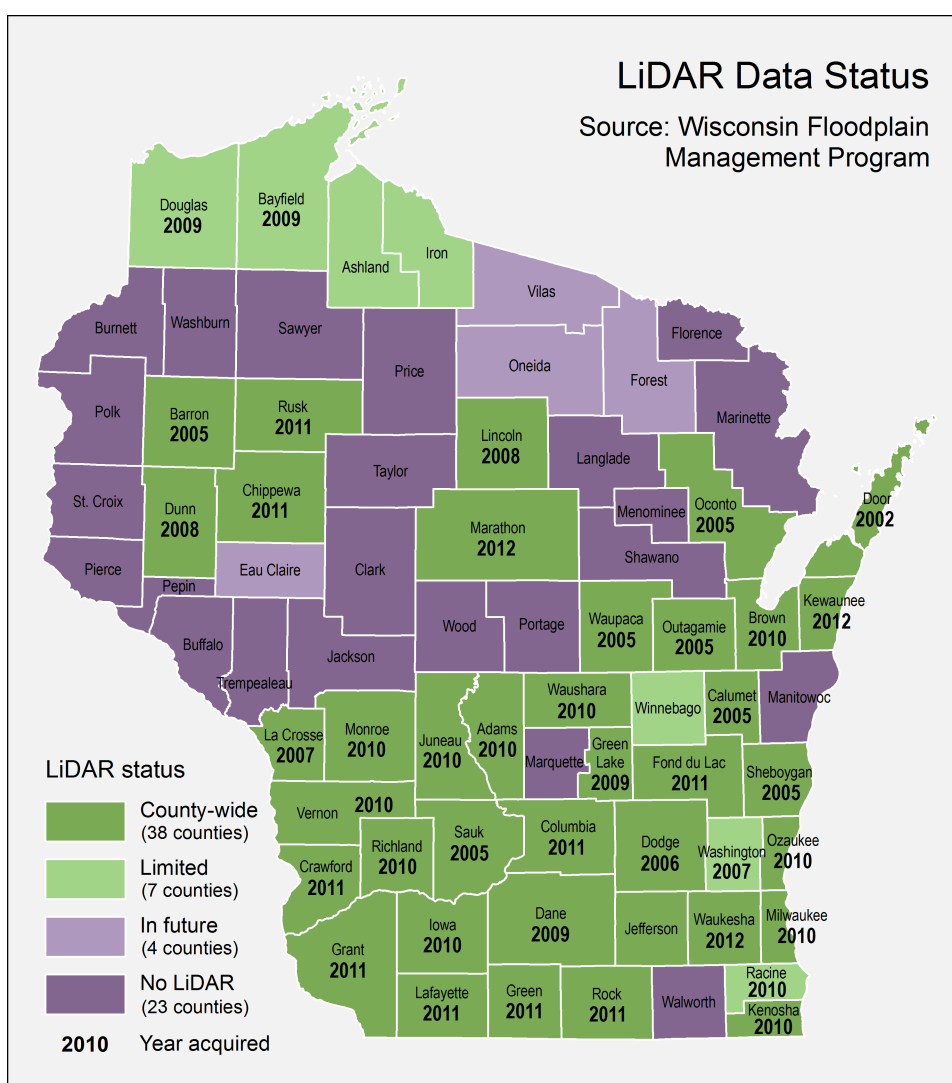
The diversity of the imagery user community in Wisconsin requires that any program implemented be structured to allow participants the flexibility to purchase optional products and services such as higher resolution imagery, imagery-derived data products, variable projections, or other upgrades from the standard product.

In consideration of the information provided by the user community through the business planning process, the aerial imagery business plan recommends that Wisconsin move forward to implement a statewide program of aerial imagery that is sustainably funded, provides a predictable and regular update of aerial imagery, and is governed with input from the user community.

LiDAR

Elevation data can be created through a variety of methods, but LiDAR is now considered the most desirable technology for accurate elevation mapping. LiDAR works by illuminating a target with a laser and analyzing the reflected light to measure the distance. Thousands of these point measures can be used to precisely and accurately map topography.

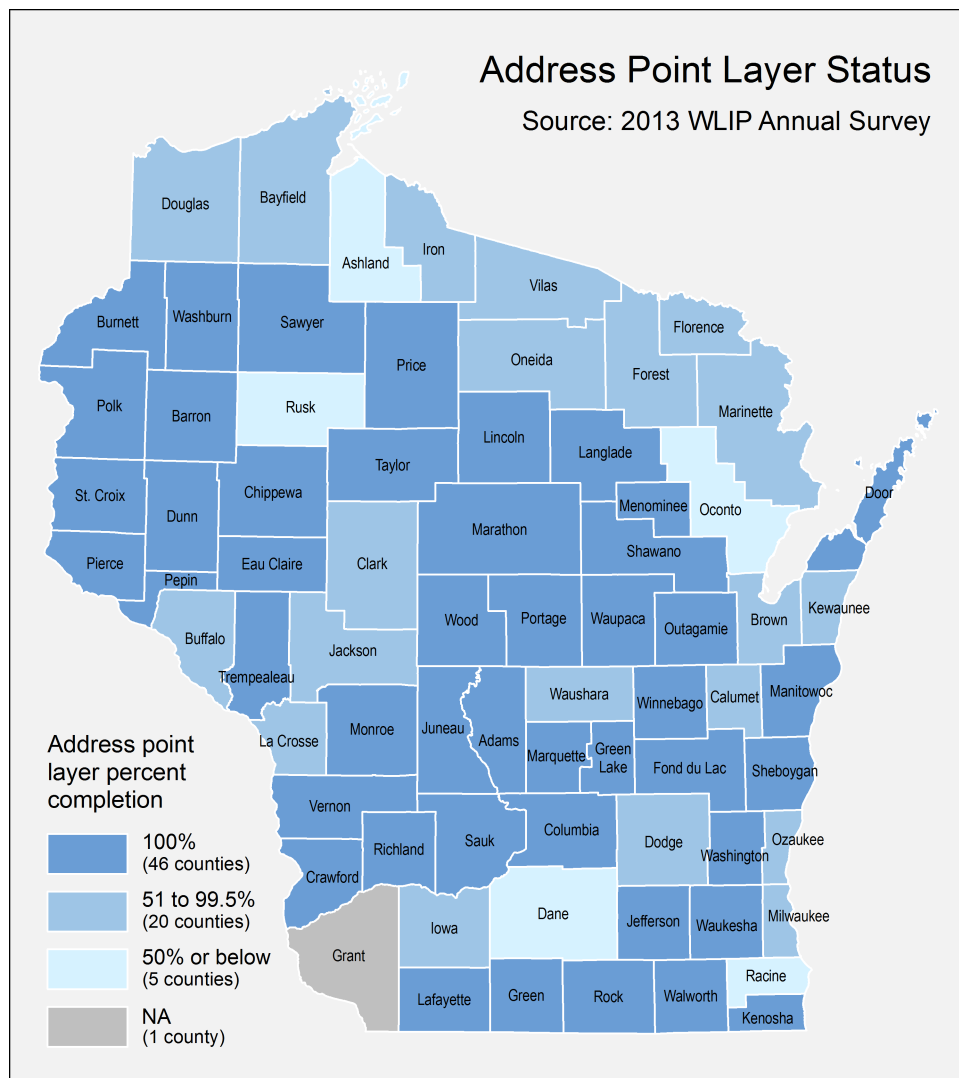
Nearly all of Wisconsin's southern counties have countywide LiDAR datasets. This is in part due a federal disaster declaration in 2008 following major flooding, which made 31 counties eligible to apply for Community Development Block Grant Emergency Assistance Program in order to improve their floodplain mapping with LiDAR technology. Twenty-three counties remain without LiDAR data or plans to acquire it, as illustrated below.



Address Points

In years past, addresses were typically mapped and listed as address ranges combined with road centerline layers. As Enhanced 911 technology has been promoted and funded, address point data as a unique GIS layer has gained importance. Geocoding of address points also has other benefits, such as better identifying need for expansion of internet broadband infrastructure.

Forty-six counties reported having a complete address point layer, with the caveat that all map layers require continual and ongoing maintenance.



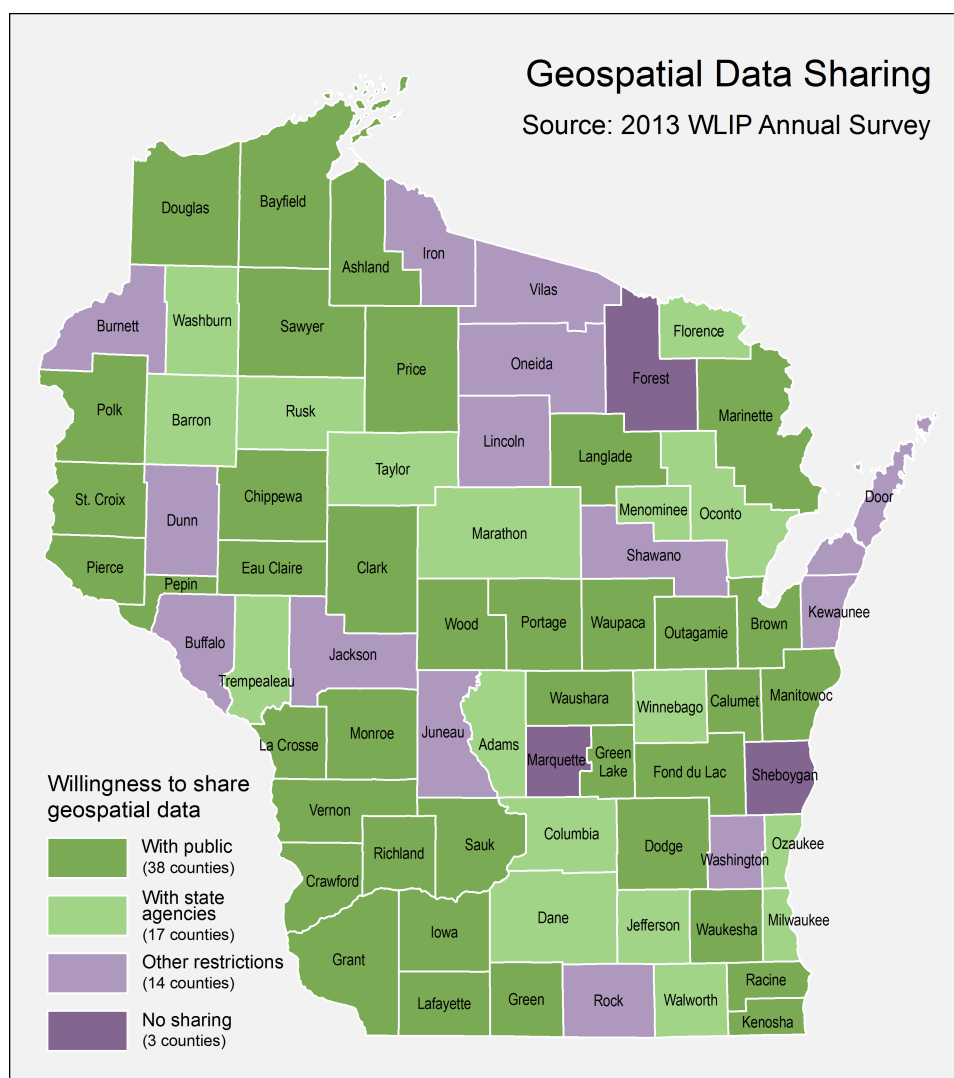
Geospatial Data Sharing

Overall, counties are willing to share data for the purpose of a statewide geospatial repository, a future vision which would function as a centralized mechanism for sharing county GIS datasets and possibly be aggregated and integrated into statewide layers. When asked if their county is willing to contribute data to a statewide central repository for GIS data access, only three counties responded “no.”

A total of 69 counties indicated some degree of willingness to share GIS data in a state repository. Of this total, 38 reported they would allow public access to their data.

Fourteen counties indicated conditions they would place on a possible participation in a statewide repository, such as:

- Dependent on type of data or format
- Dependent on council approval
- If data is not searchable by name
- If the county is credited and referenced as the authoritative data source



There seems to be a trend toward greater willingness among Wisconsin counties to share GIS data with state government. It is possible to compare the 2013 WLIP survey results with results from 2012 and 2008, although the data sharing questions were not worded exactly the same.

In the 2012 WLIP survey, 67 counties indicated they would be willing to share their digitized parcel data with the state, but of those, only 17 counties indicated that they would be willing to share their data with no restrictions or charges.

In the 2013 WLIP survey, 69 counties indicated willingness to share GIS data in a state repository, and 37 indicated that they would be willing to share their data with no restrictions or charge—in other words, even if the repository allowed public access.

Assessing the level of free and open access to geospatial data across the state remains difficult. As such, there is a need for a thorough case study documenting county responses to a statewide GIS data request.

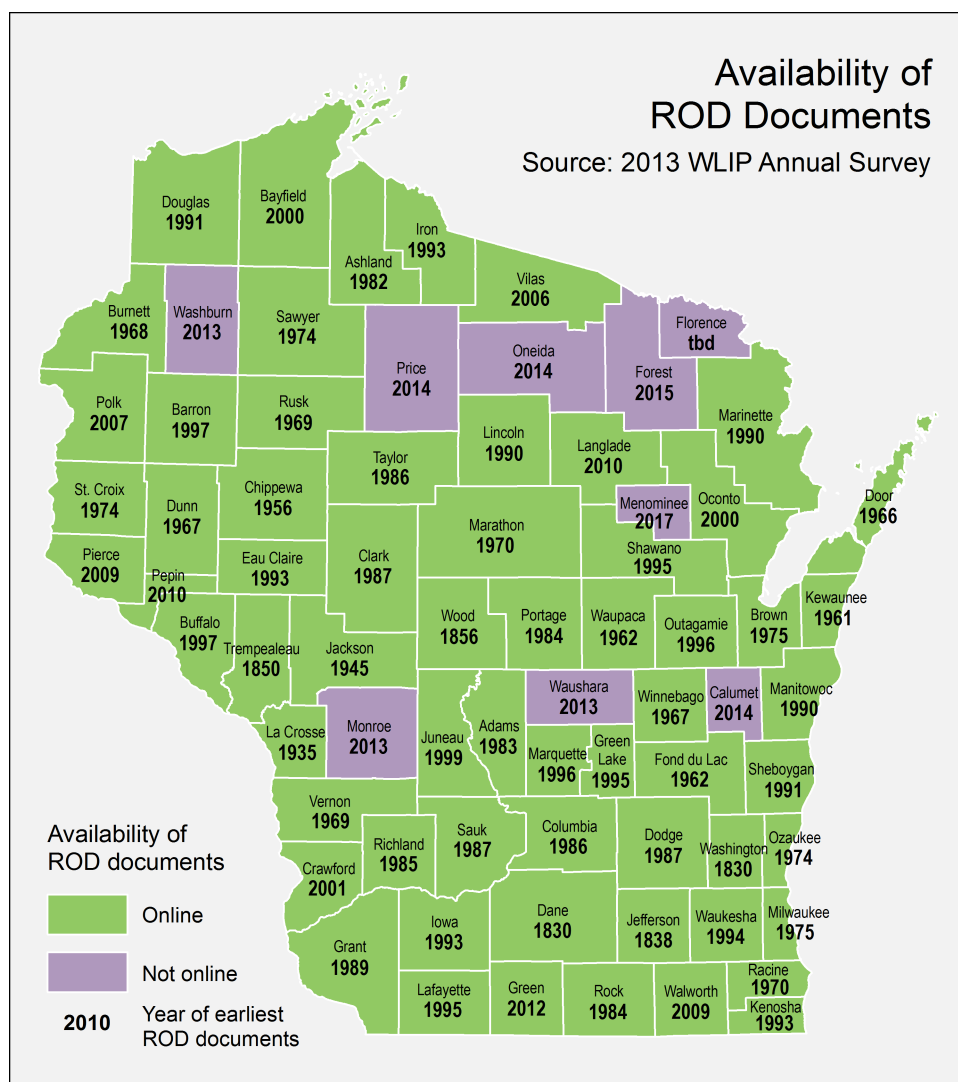
Register of Deeds Documents Online

The vast majority of Wisconsin counties make documents recorded in their register of deeds office available online—these are the documents recorded under s. 59.43(2)(ag)1 and (e) for which the \$30 recording fee is charged. The map below displays the year to which this online documentation dates back, ranging from 1830 to 2012.

According to 2013 WLIP grant applications, nine counties do not have recorded documents available online. Counties “not online” provided a projected year in which they plan to make documents available online, also depicted in the map below.

Providing access to documents online does not mean they are free of charge, as register of deeds offices are enabled by state statute to charge a fee for copies of recorded documents. The ability to electronically record documents online (in addition to the ability to view documents already recorded) was not assessed in this year’s survey, but is a service becoming increasingly common among register of deeds offices.

One concern with posting documents online that has likely held up progress in this area is that social security numbers must be redacted from documents posted online. The register of deeds recording fee was raised from \$25 to \$30 to provide funding from 2010 through 2014 for completion of these register of deeds redaction projects.



Training and Education Priorities

The 2013 WLIP survey assessed training and education needs by asking counties to list their top three educational priorities related to GIS and/or land records modernization for the next year, quantified and grouped in the table below.

Training and Education Priorities	
Category	Responses
GENERAL STAFF DEVELOPMENT (24)	
General staff training	11
Conference attendance	7
Staff professional development/accreditation	4
Locating funding	2
PUBLIC RELATIONS (23)	
Public outreach, promotion of county services/website	10
Grow county GIS user group (departments, agencies)	9
Educate policy makers/council	4
ESRI TECHNOLOGY (20)	
ESRI/ArcGIS	11
Geodatabase	3
ArcGIS Server	2
ArcSDE	2
3D Analysis	1
ArcGIS Online	1
WEB TECHNOLOGY (16)	
Website training/development	6
Web Mapping	5
Mobile	4
Map services	1
KEEPING CURRENT WITH NEW TECHNOLOGY (11)	
PARCELS (9)	
Parcel fabric	7
Parcel mapper	2
ASSORTED TECHNOLOGY (9)	
Multi-user/-editor environment	2
Autodesk	1
E911	1
GPS	1
Pictometry	1
PostgreSQL/PostGIS, QGIS, Scripting for GeoMoos	1
Server data storage	1
Server data storage	1
SURVEYING (8)	
PLSS	3
Surveyor training	3
Survey software	2
PROGRAMMING (5)	
JavaScript	2
Python	2
General programming	1
LIDAR DATA (3)	

STATEWIDE FRAMEWORK DATA LAYERS

The Federal Geographic Data Committee defines framework data categories, similar to the WLIP categorization of *Foundational Elements*. Since its inception in 1989, a key goal of the WLIP has been to establish maintained statewide framework data map layers. Integrated digital map layers are important for the quality and efficient delivery of services by state agencies to Wisconsin citizens, for such purposes as emergency response and infrastructure planning.

Although GIS map layers have been developed to various levels of completion at the county level, the various types of county map data have generally not been brought together at a statewide level and maintained so that the usefulness and authority of such statewide GIS layers is sustained. Pursuing the goal of achieving complete and maintained statewide layers will be met with challenges, but will also be enabled by the various opportunities described below.

Challenges

As documented by the 2012 *Status of Selected Wisconsin Foundational Layers* report³, some challenges to statewide framework data layers include the lack of a comprehensive catalog of statewide layers completed or desired, gaps in local source data, a lack of emphasis on statewide layers, and problems aggregating source data into statewide layers.

Lack of a Comprehensive Catalog of Statewide Layers

Identifying the status of framework data layers statewide and developing a plan for their continued development and aggregation into statewide layers is impossible without a comprehensive understanding of what data exists where. The current report is one step toward documenting land information modernization and integration activities, but further efforts to arrive at a catalog of statewide layers are in order. In the past, various tools, such as the GIS Inventory Survey, WiscLINC, and the state agency Land Information Integration and Modernization Survey have been employed in an attempt to describe the status of existing framework data layers statewide. Despite all these efforts, Wisconsin still lacks a single, comprehensive, current catalog of all statewide framework data layers, including the status of their source data, layer completion status, and other vital information such as steward, sharing restrictions, costs, format, and access methods.

Gaps in Local Source Data

A major challenge standing in the way of statewide layers is that some counties have yet to complete source data at the county level. Several issues contribute to these gaps:

- Municipalities within a county may not have funding to help them complete municipal data for aggregation into the county dataset.
- The county may have difficulty acquiring and/or integrating municipal data into their county data for technical, political, or other reasons.
- Vast differences in WLIP related retained fees among counties support different levels of resources, timelines, priorities, and levels of data completeness within counties.

³ Wisconsin Land Information Association Technical Committee. *Status of Selected Wisconsin Foundational Layers*, December 2012. Accessed November 1, 2013, <http://www.wlia.org>

- WLIP grants have assisted counties that have retained less in fees, but the grants have generally not been strategic. Instead, the bulk of WLIP grant funding has been in the form of Base Budget grants.

Lack of Emphasis on Statewide Layers

Historically, WLIP retained fees and grants have been used to create and maintain local source data, but the funding has generally not been targeted to complete layers statewide in a specified timeframe. Also, not all statewide layers are created from local source data. WLIP grant funds are known to have been used only twice to directly support a regional or statewide initiative— for completion of soil survey field mapping and a project revamping county coordinate systems statewide.

In 2010, the Wisconsin Regional Orthophotography Consortium (WROC), an effort led by seven regional planning commissions, organized the creation of statewide layer of aerial imagery at 18" resolution. The creation of a statewide layer was an explicit goal of this consortium, but similar projects for other framework data layers have not been undertaken.

Aggregating Source Data Into Statewide Layers

While significant gains in the completion and maintenance of county data have been made, the aggregation of local data into statewide framework data lags woefully behind. The vast majority of issues that contribute to the lack of statewide foundational layers in Wisconsin are not technical in nature, but rather institutional barriers to aggregation.

Framework data layers not recognized as critical infrastructure by most decision-makers

The importance of WLIP source data and statewide foundational layers seems obvious to GIS and land information professionals, but they have historically failed to gain the support of executives, governing boards, administrators, legislators, and other decision-makers in creating statewide layers. However, Act 20's initiative to create a statewide digital parcel map and update land cover data does show promise for new importance placed on statewide layers.

Local data sharing restrictions on source data created with WLIP funding

Wisconsin has never realized a full return on its \$185 million WLIP investment since 1990, in part, due to data sharing restrictions, such as county licensing, copyrighting, and/or restricting redistribution of data. These restrictions create government inefficiencies, increase costs for private businesses, and inhibit "open source" innovation. The map of Geospatial Data Sharing on page 22 shows that this trend is reversing itself, but local data sharing restrictions remain an obstacle in some counties.

Lack of database design and standards to help integrate data from different sources

The WLIP area of emphasis "Database Design and System Implementation" does not refer to a specific framework layer. Instead, it encompasses data and database standards, policies, coding schemas, security, and other specifications intended to improve source data consistency and quality, as well as facilitate integration of source data into statewide foundational layers. Historically, Wisconsin government entities (at all levels) have adopted their own internal data and database standards and models to support specific business needs. Another level of standards and models must be developed and adopted to integrate the geometry (e.g., survey points and boundaries) and attributes from multiple disparate source datasets into statewide framework layers.

Lack of interoperability guidelines for GIS Web mapping applications and Web services

As with data and databases, Wisconsin has not adopted standards and guidelines regarding the interoperability of Web-based geospatial services and applications. These services and applications are one way of providing access to statewide foundational layers. Without interoperability standards, bringing Web-based services from different counties together to create a statewide view can be difficult or impossible.

Lack of clearly identified stewards for statewide foundational layers

The term “steward” refers to an entity with primary authority or responsibility to create and manage source data or a statewide foundational layer, and/or is the primary owner of the source data or statewide layer. Some entities are clearly identified as stewards via federal or state statute or rule (e.g., DNR—Wisconsin Wetlands Inventory). Other stewards are not clearly identified, and, in some cases, an entity may become the steward of a statewide foundational layer out of practical necessity (DATCP—statewide soils layer) or other reasons (e.g., SCO—PLSSFinder). Each statewide foundational layer *must* have a clearly identified steward with a specific business need or general coordination role to provide the incentive and resources necessary to create, manage, and distribute that statewide layer.

Lack of governance structure for statewide framework data layers

Wisconsin lacks an entity with true authority and adequate resources to address statewide foundational layer governance issues. Data governance is especially critical where data from multiple sources may be aggregated into statewide layers. A robust, non-volunteer structure must exist for identifying priorities, coordinating resources, adopting standards and models, resolving conflicts, negotiating data sharing arrangements, and other activities associated with the creation, maintenance and distribution of statewide framework data layers.

Lack of individual business plans for each statewide framework data layer to be created

A business plan can provide accurate cost estimates and a roadmap for the development and maintenance of a statewide framework data layer. Business plans should include or reference specific business use cases not already adequately or cost-effectively met in order to justify the creation of the statewide framework data layer. The planning process should include experts and stakeholders to advise on the creation of the statewide layer and its end-product uses. Without this sort of documented analysis of business problems and a convincing solution in the form of a professional business plan, it is difficult to get the “buy-in”—and accompanying support and resources—of executives, governing boards, administrators, and other decision-makers.

Lack of centralized geospatial “system” for integrating, maintaining and disseminating statewide foundational layer

If all challenges above were resolved, Wisconsin would still lack a centralized physical “system” where 1) integration of source data into statewide layers, 2) maintenance of statewide layers, and 3) access to and distribution of statewide layers would be managed and administered. This need was most recently identified in the 2012 Deer Trustee report. In it, Deer Trustee James Kroll recognized the value of GIS for deer herd management. Beyond that, he identified Wisconsin’s GIS deficiencies for other purposes, such as forestry and economic development. Kroll recommended development of a “statewide geospatial information system” that “provides seamless support to all state resource managers across agencies, which also supports economic development, emergency planning and response, and a host of citizen services.”

Opportunities

Despite challenges, there are a number of emerging opportunities to make statewide foundational layers a reality, including the Act 20's initiative to create a statewide digital parcel map, the Enhanced Broadband Mapping Project, data sharing, and coordination amongst various groups.

Act 20 Initiative to Create a Statewide Digital Parcel Map

Online digitized parcel maps enable decision-makers, investors, and developers to quickly assess information vital to policy and business decisions. Creating this sort of resource statewide, in a complete, accurate, and continuously maintained digital statewide parcel map, would presumably protect and grow Wisconsin's \$456 billion in taxable real estate assets, improve governmental services, and enhance the state's economic competitiveness.

The biennial state budget for state fiscal years 2014 and 2015, Act 20, directs DOA to create an implementation plan for a statewide digital parcel map and directs counties to coordinate their digital parcel mapping activities with the state.

Furthermore, Act 20 provides additional state program revenue for additional WLIP grant funding, which could help all Wisconsin counties achieve a high standard of digital parcel mapping to be integrated into a statewide parcel map.

The statewide digital parcel map implementation planning process will likely feature the following objectives:

- Establishment of a statewide parcel GIS layer by aggregating existing county parcel datasets and process for at least quarterly updates
- Analysis of current county parcel datasets
- Creation of a standard for county digital parcel datasets that meets stakeholders' business needs and maximizes benefits to the public, determined through a participatory process with stakeholders
- Determination of grant eligibility criteria for strategic grants to local governments for local source data development related to the statewide digital parcel map initiative
- Update of Administrative Rule Adm 47, which governs WLIP grant administration.
- Creation of a searchable format standard for digital parcel information related to individual land parcels to be posted online:
 1. Property tax assessment data, as provided to the county by municipalities, including the assessed value of land, the assessed value of improvements, the total assessed value, the class of property, as specified in s. 70.32(2)(a), the estimated fair market value, and the total property tax
 2. Any zoning information maintained by the county
 3. Any property address information maintained by the county
 4. Any acreage information maintained by the county

Enhanced Broadband Mapping Project

In 2009, the Public Service Commission of Wisconsin (PSCW) launched a statewide broadband planning and mapping initiative, which includes an interactive map to track broadband availability, speed, and providers. In order to improve the accuracy of this map, SCO, the WLIP, the PSCW, and county land information offices are collaborating on a project to add statewide address and parcel layers. The project, which runs from July 2013 until June 2014, will aggregate county address point and parcel data into statewide map layers with \$168,000 in federal funding awarded by the National Telecommunications and Information Administration.

How parcels and address points will enhance the State's broadband map

Address information would greatly enhance the accuracy of broadband maps, improve the identification of underserved areas, and may increase the reliability of delivery cost and economic impact models. Overlaying GIS parcel data onto a state address point layer provides additional capabilities for broadband mapping efforts. First, parcels can be used to substitute for address point information where the latter is lacking at the local level. Second, parcels provide a useful quality check on address points, especially in rural areas. Finally, parcels may allow for more advanced analyses, such as determination of the spatial relationships between property boundaries and broadband infrastructure.

Objectives of the Enhanced Broadband Mapping Project

- Establish statewide address point and parcel GIS layers by integrating county-level data sets
- Build on experience of 2012 Wisconsin Land Information Association parcel mapping demonstration project
- Provide training and technical assistance to counties for statewide geospatial data integration
- Facilitate and refine process for data sharing between counties and state agencies
- Report on analysis of county parcel datasets, process for integrating county parcel datasets at county boundaries, and lessons learned
- Create a roadmap for sustainability and improvement of the address point and parcel GIS layers beyond the project

Relationship to Act 20

The broadband mapping project will complement, not duplicate, the Act 20 initiative to create a statewide digital parcel map. Whereas the broadband mapping project will compile existing local parcel and address point data into statewide GIS layers in order to increase broadband mapping accuracy, Act 20 will improve local source GIS data and focus on a much broader array of state, local, and private sector business needs. County eligibility for grants related to Act 20's initiative to create a statewide digital parcel map will be determined by DOA separately from the broadband mapping project.

Data Sharing

Data-sharing is not just an obstacle, it is an opportunity. It has remained an important topic among land information professionals, particularly at meetings and conferences. Added importance was placed on this issue by the state Homeland Security Council, which tasked an information sharing working group comprised of geospatial professionals to report on the status of data sharing between governmental units for the purposes of emergency response.

WLIP survey data on county willingness to share geospatial data, as depicted in the previous chapter, shows that the vast majority of counties are willing to share their data. Yet some local governments remain unwilling and have to be encouraged to share their data.

The benefits of sharing have the potential to be multiplied when sharing is extended beyond governmental entities to sharing with the public. According to the organization MetroGIS⁴, private usage of public data is becoming integral to the development and advancement and growth of the digital economy. Better data availability enables businesses to make quicker decisions on investments and enhancements in the community.

Moreover, providing consistently available authoritative data ensures that all derivative products, maps, services, analyses, and publications accurately reflect current conditions. The demand from the general public, private sector and other sectors of society for accurate and readily consumable data continues to increase along with availability of GIS tools and other analytical tools. Making public data easily available in readily consumable format to a wide variety of audiences enables them to query and utilize the data in ways not in common practice, yielding new tools, applications, analyses, and understanding.

Since 2006, the WLIP Base Budget grant agreement has enabled DOA to obtain data from counties. The grant agreement (below) stipulates that, while the county maintains custodial rights, DOA can obtain a free copy of geospatial data created or maintained by grant funds, reproduce, publish, and authorize others to use that data for government purposes.

Article 4. PUBLICATIONS: All materials produced under this Agreement shall become the property of the Grantee and may be copyrighted in its name, but shall be subject to the Wisconsin Public Records Law, Wis. Stat. 19.21 et seq. The Department reserves a royalty-free, nonexclusive and irrevocable license to reproduce, publish, otherwise use, and to authorize others to use the work for government purposes.

Communication and Coordination

The unanimous, bi-partisan approval of Act 20's provisions for the WLIP by the state legislature's Joint Committee on Finance was the result of communication, coordination, and outreach. After the introduction of Governor Walker's budget proposal in February of 2013, a wide array of stakeholder groups came together to discuss the proposal's potential effect on land information systems.

A main event during the budget process was a March summit of various groups, facilitated by guest moderator and GIS expert Learnor Dalby from Arkansas. The product of the summit was a collection of letters sent to the members of the Joint Committee on Finance from various groups, including the Wisconsin Land Information Association, Land Information Officers Network, Wisconsin County Surveyors Association, Wisconsin Realtors Association, Wisconsin Real Property Listers Association, and the Wisconsin Geographic Information Coordinating Council. The letters emphasized support for the initiative to create a statewide parcel map, the land cover map update, an increase in WLIP state program revenue, and an amendment to raise the Base Budget grant eligibility level.

On May 15, 2013, the legislature's Joint Committee on Finance unanimously passed the GIS initiative with an omnibus amendment that addressed many of the stakeholder concerns. Stakeholder groups, counties, and state agencies continue to engage in efforts to make statewide layers a reality, so that there are positive prospects for statewide layers to become a reality in the near future.

⁴ MetroGIS Data Producers Work Group. *Making Public Data Open and Freely Available*, April 2013. Accessed November 1, 2013, http://www.metrogis.org/teams/pb/meetings/13_04_24/SinglePageSummarySheet.pdf