



Statewide Parcel Map Inventory 2004

Project Background

Minnesota is struggling to modernize its land records, particularly to create digital parcel maps within each local unit of government for local purposes. Mn/DOT needs data about parcel ownership for right-of-way acquisition and maintenance, but other state agencies also need data about parcel ownership; e.g., Minnesota Department of Natural Resources, Department of Agriculture, Pollution Control Agency, Board of Water and Soil Resources and Department of Revenue.

Previously, there was only anecdotal evidence of which counties and other local governments are working with digital parcel data. This project updated an original inventory of digital parcel data development in Minnesota conducted between September 2002 and March 2003. The previous survey results were pre-populated into a server-side database the survey results were updated utilizing a web-based survey instrument. Final responses from the updated survey are being used to drive an online mapping and query tool.

The Statewide Parcel Map Inventory 2004 (SPMI) survey was conducted for the Minnesota Department of Transportation, Office of Land Management by the Land Management Information Center at the Minnesota Department of Administration. The survey canvassed all 87 of Minnesota's counties, 6 cities identified in the original survey, tribal governments in Minnesota and the Superior and Chippewa National Forests.

Purpose

The Minnesota Department of Transportation interfaces with landowners across the state as it acquires and maintains road rights-of-way. The process of identifying who those landowners are is difficult and labor intensive, since until recently, many local governments primarily maintained records of ownership in systems that are not spatially oriented or involve linked computer databases. Increasingly however, more local government entities and other organizations are developing GIS-based cadastral maps. This inventory helps to update the previous information collected about these activities and serves as a central repository of that information. It helps to identify those organizations with digital parcel data, describe the quality of those data, data distribution policies and methods and primary contacts within each organization.

The major goal of both the original and this updated SPMI was to create an inventory of existing GIS/LIS cadastre systems in Minnesota. A complete survey of all counties, cities outside the metro area and other units of government conducting independent parcel data development was undertaken. A secondary goal of the inventory involves identifying the method of parcel data development, the frequency of maintenance, data development standards and distribution practices, remonumentation efforts and other key information.

The graphic features a light green background with a faint, stylized map of Minnesota showing various parcel boundaries and road networks. The text "Statewide Parcel Map Inventory 2004" is centered in a bold, black, sans-serif font.

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Benefits

The resulting information was captured through a web-based survey instrument. Responses from the previous inventory were pre-loaded into each survey form. The results are being made available through an on-line mapping and reporting interface. Because of this effort Mn/DOT personnel will be able to access updated information about properties and landowners more efficiently.

It is hopeful that in cases where the necessary specifications are met, Mn/DOT could use the county or local unit of government's data directly. The desired benefits of the survey will be to reduce redundant data creation efforts between agencies, and foster cooperation between Mn/DOT and other agencies with improved working relationships and increased knowledge exchange. There is a potential for increased uniformity of data, standardized information and outlining common methods for data access and exchange.

Another benefit of inventorying, maintaining and distributing information about parcel data development in Minnesota is that all branches of local government will be able to use the information for better informed decision making and more efficient and effective daily operations. In Minnesota counties, digital parcel data has been invaluable for resident notification when doing preliminary right-of way design or requests for permits, conditional uses and variances. In addition, the efforts to improve water quality of our lakes have proven the value of spatial parcel data to manage lakeshore. The ability to distribute spatial parcel data via easy to query databases and spatial maps (internal to an organization or on the internet) reduces counter traffic and telephone calls to local units of government and others that have developed spatial parcel data. Township boards, lakeshore associations, neighborhood associations, and similar organizations involved in support and planning have been able to use spatial parcel data to develop long range plans, highlight problem properties, plan for residential development and protect the quality of area natural resources.

Essentially, all parcels possess access to a transportation network, many being transportation corridors under Mn/DOT authority. To facilitate the exchange of information on state transportation rights-of-way Mn/DOT has put together a brochure about the products and services available from Mn/DOT. A .pdf format brochure is available via the internet at:

http://rocky.dot.state.mn.us/Forms___Publications/Publications/LIS_Brochure.pdf

Survey Design

The survey instrument was divided into 6 sections; development status, data lineage, database design, software and formats, data distribution, survey control and organizational contacts. This methodology allowed for multiple individuals within an



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organization to access the portion of the survey most applicable to their area of expertise. For example, counties with a surveyor and land records manager might choose to have those professionals complete sections three and six of the survey, while a GIS specialist might be the best person to complete the remainder of the questions. In other counties, one person might be tasked with completing all seven sections. A section was added to collect the names of each individual who contributed responses at the end of the survey, though this section was often left empty so was not found particularly effective. In future reiterations, it would be recommended to collect this information for each section or at the beginning of the survey, as each person contributing to the survey may not see the final page.

The survey questions were developed primarily from combining 3 separate questionnaires used in the original survey; “Non-digital Parcel Data Questionnaire”, “Digital Parcel Data Questionnaire”, and “Surveyor’s Questionnaire”. Original survey questionnaires can be found on Mn/DOT’s SPMI website at: http://rocky.dot.state.mn.us/inside_lm/LIS_New/Statewide_Parcel_Map_Inventory/state_wide_parcel_map_inventory.html

The original survey was developed after reviewing the Wisconsin Land Information Association questionnaire regarding land information data in general, and parcel data specifically. Additional questions were developed based on needed information for Mn/DOT land management operations. Previous questions were the primary basis for the current survey, though in the project design process, each question was reviewed. A few questions were added, some questions were reworded for clarity and graphics were added to 3 questions to help the respondents clearly understand the intent of the question. These questions all related to parcel identification number (PIN) coding and proved to change the survey results significantly. Using the existing survey was important to compare responses over time. While some of the questions proved cumbersome while creating the digital survey form and in the subsequent mapping applications, many of those problems have now been solved and specific recommendations will be made as appropriate in this report.

Survey Methodology

The original SPMI survey, conducted between September 2002 and March 2003 collected contact information for each unit of local unit government responding. A primary contact was established along with a land-records contact, a surveyor contact and information about the person completing the survey if different those already mentioned. The survey attempted to collect information including name, address, phone, fax and email for each organization. While nearly half of those surveyed supplied nearly all of this information, many contact fields were not complete or contained out-dated or inaccurate information. Because email was selected as the primary contact vehicle, an advance message was developed to announce the survey update. All available contact

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emails were included on this initial announcement to help identify bad or missing addresses. Phone calls were placed to organizations where no functional email address was identified. In these follow-up conversations it was apparent that some of the respondents who did not initially supply an email address were concerned about making that information available publicly for various reasons. In those cases, most respondents supplied an email contact to the interviewer for communication purposes, but were not required to supply that information in the survey itself.

Once the survey instrument was fully developed, an email was prepared with instructions for accessing and completing the online survey instrument. This message was sent to only the identified "primary contact". The respondent was asked to assess who within their organization would be most appropriate to answer each section of the survey and was requested to coordinate the survey's completion internally. Data was collected through the survey instrument and stored in a MySQL database. Each organization was supplied a URL containing a unique ID that allowed access only to that organization's information. They were encouraged to share that unique URL within their organization if more than one person was identified to complete the survey. A list was generated in the database that tracked when each organization had accessed or altered their "portion" of the database. After two weeks a follow-up email was sent to those who hadn't yet accessed the survey as a reminder. Continued follow-up email communication was repeated again in approximately two more weeks. If the survey still hadn't been completed, a follow-up telephone call was made to encourage the respondent to complete the survey. In a few cases, additional research was necessary to locate the appropriate person to coordinate completion of the survey.

Although each organization was eventually contacted, using email as the primary communication vehicle proved difficult. In some cases, it was not apparent that the emails were not reaching their intended target. In other cases, due to the proliferation of email abuse, messages were ignored or deleted. Although using emails at the onset did serve to identify the majority of faulty contact information, it did not prove particularly effective for follow-up. The contact phase of the project proved to be more time consuming than originally suspected and phone contact seemed far more effective. An initial phone call to the primary contact to obtain a verbal agreement to complete the survey and verifying contact information during the early project phase would be advisable in the future. Each organization initially contacted did complete the updated survey, with the exception of one county.



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Respondents

Counties: Each of Minnesota's 87 counties were contacted, one declined to complete the survey.

Cities: Despite efforts to increase the level of participation by cities using advertisements and other known sources, only those originally surveyed responded. One of the original six cities reporting in the 2003 survey was found to be not creating digital parcel data independent of the county and was dropped from the survey at the request of the city contact. Subsequently, five cities were resurveyed. There was some ambiguity concerning the question in the survey relating to cities (and other entities) developing digital parcel data independently of the county. As the survey instrument is refined, it is recommended that this question be stated more implicitly. Despite this problem, 40 additional cities were identified as using digital parcel data. It remains to be seen if any or all of those identified are developing digital parcel data independently of the county or another organization already identified in the inventory. Increased effort to include wider city participation may be a priority in the future, perhaps at the MN GIS/LIS conference or through more intensive research.

Tribal Governments: A list of 9 tribal governments in Minnesota, including contact information was obtained from the Bureau of Indian Affairs. All 9 were contacted. Of those, one had completed the survey previously and did update their entry. Three additional tribal governments completed the survey and the rest need to obtain further approval from tribal councils to contribute to the survey. Time did not allow for the remaining contacts to be able to complete the survey, however, a record for each has been developed in the survey and can be updated as further efforts allow.

National Forests: The two largest national forests in Minnesota were contacted, Superior and Chippewa. Both completed the survey.

Database Design and Data Input

The existing database created from the 2003 survey results was used as the primary data structure for collecting updated responses. Significant changes were made to field names to accommodate web-based data collection and the mapping and query tool. A new data dictionary describing attribute fields, corresponding questions and field descriptions was created and is being made available via the SPMI website at LMIC. Additional records were also added to accommodate new and potential survey participants.

The existing access database was converted into MySQL, stored on an Apache Web Server and altered as necessary. Additionally a number of free text fields were added for respondents to enter expanded responses. A significant amount of information was

The logo features a green background with a faint, light-colored map of parcel boundaries. Overlaid on this background is the text "Statewide Parcel Map Inventory" in a bold, black, sans-serif font, with "2004" centered below it in a larger, bold, black, sans-serif font.

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collected through these fields and will prove valuable in interpreting the survey results and refining the survey instrument in successive efforts.

Previous survey responses were “seeded” into the web form and respondents were directed to access the survey site using their unique URL. As respondents updated their records, changes were written to the MySQL database and used as the data source for the mapping and query application.

Early in the data collection phase, minor problems were detected in the data collection process due to inconsistencies between the survey form and the database. Also, using the initial tracking function, it was difficult to know if respondents had accessed the survey if no changes had been made and subsequently, no new data written to the database. These problems were corrected early in the process and respondents were notified and urged to review their submissions for accuracy. All affected respondents have been recorded as having accessed the survey form at least once following that correspondence. However, due to these issues and data manipulation that has taken place following the closing of the survey, there is a small chance that slight degradation of the data may have occurred. It is recommended that respondents be given an opportunity to review their records using the online mapping and query tool and given a window of time in which to correct any errors that may have occurred. This would also serve to correct any errors resulting from incomplete or incorrect responses.

Sharing the results

Using the final survey responses, a mapping and query tool has been developed for online access to survey results. This site allows users to access the inventory in a variety of ways. A Mapserver application has been developed for spatial display of survey results. Users can choose which layer (county, city, tribal or forest) to display and using a menu selection, create custom maps reflecting inventory results. The menu which calls the maps was developed using dynamic HTML/CGI coding and is organized according to the 7 survey “sections” and further sub-divided by topic. Though only a subset of the entire dataset is accessible through the mapping function, it is those data identified as most appropriate for spatial display. A “print-friendly” function is available for users to print and 8 ½ x 11 map including legend and title.

Survey results are also available through the SPMI site in text format. All fields are available for each geographic area represented in the inventory using a customizable report function of the website. Users are directed to a secondary page where they can choose a combination of survey fields and respondents. A tabular report of the requested information is displayed and can be printed using a print friendly option, or saved as an HTML page. Users can also copy and paste the results into a word processing application, PowerPoint presentation or other program as applicable.

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PDF maps of selected inventory results along with the data dictionary and other supporting project documentation are also available for download from the site.

Selected County Findings

Percent Digital

Of the 86 counties that responded to the survey, 31 counties did not have any parcel data in a digital format while 56 counties had developed digital parcel data. One county was added that had not been previously surveyed and one county reported digital parcel data that previously had reported none. A slight increase over last years numbers.

Do you develop, create or maintain digital parcel data?			
2003		2004	
Yes	No	Yes	No
54	32	56	31

More indicative of increased digital parcel mapping in the increased number of counties with greater than 75% of their parcel data in digital format as described below.

Counties with greater that 75% digital parcel data			
2003		2004	
Yes	No	Yes	No
33	53	46	41

Compilation Methods

Digitize existing paper/mylar/linen maps with no adjustment to known geographic reference network			
2003		2004	
11		10	

Digitize existing paper/mylar/linen maps with adjustment to known geographic reference network			
2003		2004	
12		20	

Can a linkage be made between digital parcel mapping and tax roll/assessment databases?					
2003			2004		
Yes	No	By Project	Yes	No	By Project
36	3	14	39	4	25

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COGO from property descriptions into a geographic reference network

2003	2004
27	37

Digitize existing maps using orthophotos/aerial photography to adjust the boundaries

2003	2004
9	16

Incorporate digital data from an outside source

2003	2004
8	9

Other Method

2003	2004
4	6

Positional Accuracy

	2003	2004
Less than 1 foot	11 Counties	15 Counties
1-3 feet	12 Counties	19 Counties
3-10 feet	10 Counties	12 Counties
10-20 feet	7 Counties	40 Counties
20-30 feet	6 Counties	11 Counties
30-40 feet	9 Counties	10 Counties
Greater than 40 feet	5 Counties	7 Counties

PIN Numbers

Digital parcels are coded with a unique PIN

2003	2004
54	33

Do all parcel polygons have an identification number?

2003	2004
34	27

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Are R-O-W parcels assigned a PIN?	
2003	2004
21	12

Update Frequency	2003	2004
Daily	7 Counties	10 Counties
Weekly	7 Counties	5 Counties
Monthly	11 Counties	12 Counties
Quarterly	1 County	2 Counties
Bi-Annually	3 Counties	3 Counties
Yearly	0 Counties	0 Counties
Other	3 Counties	8 Counties
Varies	18 Counties	16 Counties
I don't know	0 Counties	0 Counties
Never	1 County	0 Counties

Remonumentation Efforts

Does your county have an active remonumentation program?	
2003	2004
35	44

What percentage of PLSS corners have been remonumented?		
	2003	2004
0 – 25 %	8 Counties	8 Counties
26 - 50%	8 Counties	6 Counties
51 – 75%	7 Counties	7 Counties
76 – 100%	7 Counties	16 Counties

Are remonumented corner coordinates tied to the HARN survey control network?		
	2003	2004
0 – 25 %	8 Counties	8 Counties
26 - 50%	4 Counties	5 Counties
51 – 75%	3 Counties	3 Counties
76 – 100%	2 Counties	6 Counties

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What percentage has a Location of PLS Corner Certificate completed?		
	2003	2004
0 – 25 %	5 Counties	3 Counties
26 - 50%	7 Counties	10 Counties
51 – 75%	3 Counties	4 Counties
76 – 100%	7 Counties	10 Counties

Method for handling gaps and overlaps

How are gaps and overlaps in parcel handled?		
	2003	2004
Ignored	3 Counties	5 Counties
Shown in their entirety	12 Counties	15 Counties
Graphically only	2 Counties	5 Counties
Line/area labeling using text only	1 County	2 Counties
Both graphically and line/area label	7 Counties	7 Counties
Shown if greater than		
1 Foot	8 Counties	1 County
3 Feet	7 Counties	3 Counties
Other	9 Counties	13 Counties



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Conclusion

The Statewide Parcel Map Inventory data survey has many opportunities to be a valuable information resource to Minnesota agencies in addition to Mn/DOT. The Minnesota Governor's Council on Geographic Information is taking a leadership role in developing a Strategic Plan for Minnesota's Spatial Data Infrastructure (MSDI), formerly the I-Plan, as part of a nationwide effort to create state plans for data needs assessment and development. Of the eight data layers identified in Minnesota, parcel data ranks among one of the top needs for counties, cities and other units of government. The Statewide Parcel Map Inventory (SPMI) is providing needed statistics on parcel data development in the state for developing the parcel layer of the MSDI. The SPMI will also serve as a resource for government organizations to facilitate sharing data or cooperative data development. In order for the SPMI to be of assistance to Mn/DOT and other government organizations it must be maintained in an efficient, effective and consistent manner. The most accessible means of updating the survey information on a yearly basis is to continue to make it available on the internet.

Due to the dynamic nature of the web-based survey instrument and mapping and report functions developed during this project, it is possible to update this inventory at any time. Institutional decisions need to be made regarding an ongoing update cycle. It is technically possible to accommodate ongoing updates or schedule a regular update cycle. New organizations could be allowed to contribute to the inventory with minimal effort. However, it should be noted that a systematic update would require a dedicated effort to communicate with and encourage survey completion. Additional time and effort would be required to expand the participant base.

The Land Management Information Center has agreed to host the SPMI mapping and query tool, which will require ongoing monitoring and maintenance on an as-needed basis.

Several suggestions have been made in this report and in the data dictionary regarding further enhancements to this survey and the associated reporting tool that will help guide future development.

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The counties, cities, tribal governments and national forests participating in the survey contributed a great deal of their time to complete the survey and provide us with insight as to necessary changes and priority topics for their organizations. Thank you for your efforts. Your comments and responses will help to continue to improve the inventory.

Andrew Koebrick , Brent Lund and Dan Liu at the Land Management Information Center are to be acknowledged for their excellent programming skills in developing the on-line survey instrument and mapping and query tools. Sally Wakefield, also at the Land Management Information Center is acknowledged for her project management.

A survey of this breadth required a great deal of coordination, organizing, documenting and reporting to create a comprehensive compilation of all the information. Every one contributing deserves the appreciation of anyone who finds this inventory useful.