

2008 Project Abstract

For the Period Ending June 30, 2011

PROJECT TITLE: Easement Inventory and Application/Database Development

PROJECT MANAGER: Kevin J. Lines

AFFILIATION: Board of Water and Soil Resources

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: ML 2008, [Chap. 367], Sec. 2, Subd. 5(g).

APPROPRIATION AMOUNT: \$180,000

Overall Project Outcome and Results

Since collection of digital easement data within the Minnesota Board of Water & Soil Resources (BWSR) first began in the late 1990's, every effort had been made to keep the database accurate and complete. However, over a decade later, and with over 5,000 easements and growing it became prudent (particularly with the advent of more advanced technology) to reexamine, update and enhance that database.

Attributes and boundaries for easements and conservation practices (planned land cover types based on the NRCS Field Office Technical Guide) that previously only existed in paper format were scanned and digitized, then added to a Geographic Information Systems (GIS) database for the RIM Reserve easement program. The GIS database is flexible enough to implement future easement monitoring technology that can capture stewardship data such as easement condition and compliance, habitat quality, easement maintenance and enhancement.

Prior to this undertaking, it would have been impossible to implement a modern long-term conservation easement stewardship plan. Easement boundaries only existed on paper and an outdated database placed limitation on reporting and analysis. As a result of this project, the framework is in place for implementing such a plan. A modern database is being implemented. 220,329 acres of conservation practices within 5,882 easements have been digitized into a GIS database, and a GIS-based monitoring field application has gone through pilot testing.

BWSR now has increased capabilities to target new easement projects using GIS reporting and analysis, as well as ensure the quality of past projects through easement stewardship and monitoring. This maximizes the return of each dollar spent, benefitting Minnesotans through better water quality, reduced soil erosion, and enhanced wildlife habitat.

Project Results Use and Dissemination

As a result of this project, a conservation easement database that is more streamlined has been implemented, giving BWSR staff the ability to edit and update easement boundaries and attributes, conduct geospatial reporting and analysis using GIS technology, create online delivery applications available via BWSR's website, and develop and test future easement stewardship and monitoring applications.

Conservation easement data has been made publically available as both an interactive online web map and a GIS shapefile download, both available at BWSR's web site:

<http://www.bwsr.state.mn.us/easements>

Environmental and Natural Resources Trust Fund 2008 Work Program Final Report

Date of Report: September 1st, 2011 – Final Report

Date of Work program Approval: June 10, 2008

Project Completion Date: June 30, 2011

I. PROJECT TITLE: Easement Inventory and Application/Database Development

Project Manager: Kevin J. Lines
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Location: Statewide

Total Trust Fund Project Budget:	Trust Fund Appropriation:	\$180,000
	Minus Amount Spent:	\$129,449.76
	Equal Balance:	\$ 50,550.24

Legal Citation: ML 2008, [Chap. 367], Sec. 2, Subd. 5(g).

Appropriation Language: \$180,000 is from the trust fund to the Board of Water and Soil Resources to enhance long-term stewardship, oversight, and maintenance of conservation easements held by the board and to update the current easement database. This effort must be done in cooperation with the Department of Natural Resources. This appropriation is available until June 30, 2011, at which time the project must be completed and final products delivered, unless an earlier date is specified in the work program.

II. and III. FINAL PROJECT SUMMARY:

Since collection of digital easement data within the Minnesota Board of Water & Soil Resources (BWSR) first began in the late 1990's, every effort had been made to keep the database accurate and complete. However, over a decade later, and with over 5,000 easements and growing it became prudent (particularly with the advent of more advanced technology) to reexamine, update and enhance that database.

Attributes and boundaries for easements and conservation practices (planned land cover types based on the NRCS Field Office Technical Guide) that previously only existed in paper format were scanned and digitized, then added to a Geographic Information Systems (GIS) database for the RIM Reserve easement program. The GIS database is flexible enough to implement future easement monitoring technology that can capture stewardship data such as easement condition and compliance, habitat quality, easement maintenance and enhancement.

Prior to this undertaking, it would have been impossible to implement a modern long-term conservation easement stewardship plan. Easement boundaries only existed on paper and an outdated database placed limitation on reporting and analysis. As a result of this project, the framework is in place for implementing such a plan. A modern database is being implemented. 220,329 acres of conservation practices within 5,882 easements have been digitized into a GIS database, and a GIS-based monitoring field application has gone through pilot testing.

BWSR now has increased capabilities to target new easement projects using GIS reporting and analysis, as well as ensure the quality of past projects through easement stewardship and monitoring. This maximizes the return of each dollar spent, benefitting Minnesotans through better water quality, reduced soil erosion, and enhanced wildlife habitat.

IV. OUTLINE OF PROJECT RESULTS:

Result 1: *Easement Inventory, Database Development and Field Application*

Description: Since collection of digital easement data within the Minnesota Board of Water & Soil Resources (BWSR) first began in the late 1990's, every effort had been made to keep the database accurate and complete. However, over a decade later, and with over 5,000 easements and growing it became prudent (particularly with the advent of more advanced technology) to reexamine, update and enhance that database.

This involved assessing the spatial database accuracy and completeness, e.g. by searching for missing easements or correcting easements with spatial inaccuracies. This also involved restructuring the tabular database to allow for procedures that are more streamlined for editing and updating, e.g. migration of the tabular database into an Oracle database and structuring the spatial data through ArcSDE (GIS spatial database) to work dynamically with tabular easement data. This restructured data made it possible to develop online delivery applications available via BWSR's website. These applications allow users dynamic viewing and selection capability as well as online map creation and printing capability using a variety of layers currently available through GIS technology (see Attachment D).

Subsequently, in order to make the easement data more useable and meaningful for future monitoring and management efforts, data for 220,329 acres of conservation practices (planned land cover types based on the NRCS Field Office Technical Guide) that previously only existed in paper format for 5,882 easements have been scanned and digitized and added to a GIS database for the RIM Reserve easement program (see Attachment C). The GIS database is flexible enough to capture other data pertinent to potential future monitoring efforts as well, such as updated easement conditions, easement compliance data, easement condition/habitat quality and easement maintenance and enhancement needs.

A GIS field application (see Attachment E) was developed and tested that runs on a field tablet PC and utilizes the aforementioned GIS database to collect data pertinent to potential future monitoring and field data collection efforts, while enhancing data quality and accuracy. While positive feedback was received from local field staff during the testing phase, funds were not sufficient to deploy, train and support local field technicians on a statewide basis. Additional funds are necessary to implement and support this technology at the state and local levels.

Budget balance:

In order to properly utilize the newly created RIM database, a new data entry client was built and has undergone testing. Although the database that feeds the data entry client is completed, implementation of the new database and new data entry client has been delayed due to work flow considerations (including complications brought about by the state government shutdown in June 2011). Implementation of the new "system" is expected to take place in early fall 2011, and all additional implementation costs for client software will be borne by BWSR.

Spending was less than budget projections due to less than expected hardware and software needs associated with the testing phase of the field application. This was done by completing the work in-house instead of contracting it out, as well as conducting a smaller-scale pilot test in order to meet project deadlines that had been affected by the state government shutdown of June 2011.

Final Report Summary:

Summary Budget Information for Result 1: Trust Fund Budget: \$180,000
Amount Spent: \$129,449.76
Balance: \$ 50,550.24

Deliverables

1. Inventoried and updated RIM Reserve easement database to allow for better integration with other data (such as soils information) as well as viewing and querying data online. (See LCMR approved project entitled Soil Surveys: Their Completion and Web-based Delivery; Greg Larson, Project Manager.) Scanned and digitize conservation plan practice layers (i.e., easement land cover) for integration with a RIM Reserve easement GIS database.

Completion Date: June 30, 2009

Budget: \$85,000

Status: Complete

2. Develop GIS database for easement and plan practice data as well as data pertinent to future potential monitoring and field data collection efforts, which will be integrated with the Oracle easements database and data entry application. Create and field test a GIS field application that utilizes this database.

Completion Date: June 30, 2011

Budget: \$95,000

Status: database complete; field application and pilot testing complete; data entry client complete (to be implemented by end of 2011).

V. TOTAL TRUST FUND PROJECT BUDGET: LCCMR Budget: \$180,000
Other Funds : \$0
Total Budget: \$180,000

Staff	Equipment	Other	Total
\$117,000	\$15,000	\$48,000	\$180,000

Staff

BWSR GIS staff and student interns

Cost

\$ 117,000

Equipment

Hardware – (2) GIS workstations	\$	5,000
Software – (7) ArcPad 8.0/10.0 licenses	\$	4,500
Hardware – (7) Trimble Juno handheld GPS units	\$	5,500

Other

Contract to develop oracle database	\$	23,000
SWCD Staff - field application pilot testing (5 districts)	\$	25,000

VI. OTHER FUNDS & PARTNERS

A. Project Partners: DNR, SWCDs, Attorney General's Office, Legislative Auditor

B. Other Funds Budget and Sources: None.

C. Past ETF Spending: 2001: \$0; 2003: \$0; 2005: \$0

Past Other Funds Spending: BWSR received general revenue appropriations earmarked by the legislature each session for SWCD Service Grants that included money for marketing, administrative and monitoring. From 1986 through 2004 that amount was \$750,000. Beginning in 2005, that amount was reduced by half to \$345,000 per year.

D. Time: Funds must be available through June of 2011.

VII. DISSEMINATION: The newly restructured data and software developed as a result of this project is being utilized in current and future online delivery applications available via BWSR's website. These applications allow users dynamic viewing and selection capability, as well as online map creation and printing using a variety of layers currently available through GIS technology.

Conservation practice data (planned land cover types based on the NRCS Field Office Technical Guide) that previously only existed in paper format for each easement have been scanned, digitized and added to a GIS database for the RIM Reserve easement program. The GIS database has been designed to capture other data pertinent to potential future monitoring efforts as well, such as updated easement conditions, easement compliance data, easement condition/habitat quality and easement maintenance and enhancement needs.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports have been submitted not later than July 31, 2010, and January 31, 2011. A final work program report and associated products will be submitted between June 30 and August 15th, 2011 as requested by the LCCMR.

Attachments:

- **Attachment A:** Budget Sheet
- **Attachment B:** Statewide Conservation Easement Map
- **Attachment C:** Easement Inventory and Digitizing
- **Attachment D:** RIM Online (Easements Web Map)
- **Attachment E:** RIM Field Application for Easement Stewardship

Attachment A: Budget Detail for 2008 Projects

Project Title: *Easement Inventory and Application/Database Development*
Minnesota's Habitat Conservation Partnership (V)

Project Manager Name: Kevin Lines

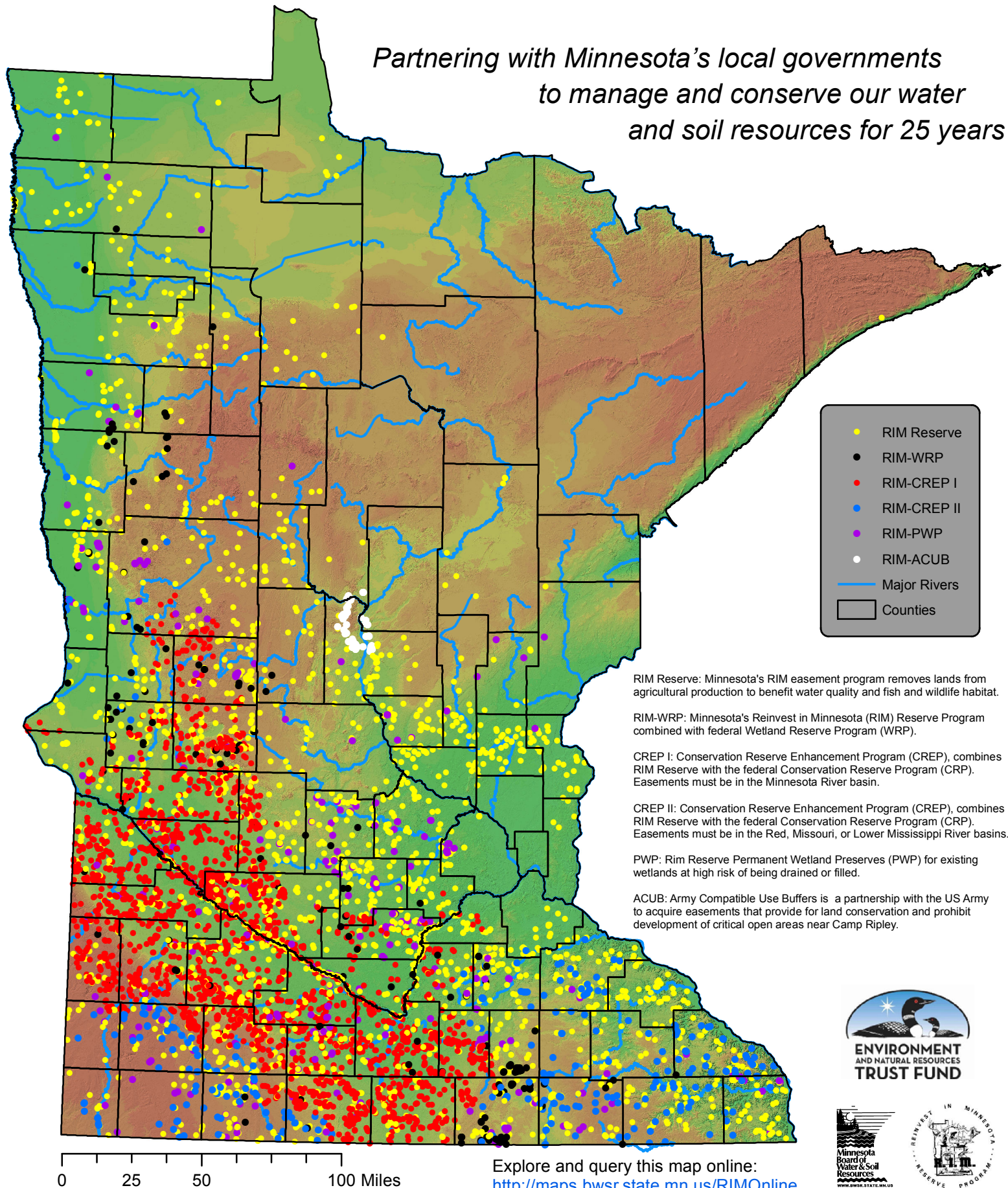
Trust Fund Appropriation: \$180,000

2008 Trust Fund Budget	<u>Result 1 Budget:</u>	<u>Revised Result 1</u> <u>Budget 06/11/2010</u>	<u>Amount Spent</u> <i>(06/30/2011)</i>	<u>Balance</u> <i>(06/30/2011)</i>	TOTAL BUDGET	TOTAL BALANCE
	<i>Easement Inventory and Database Development</i>					
BUDGET ITEM				0		
PERSONNEL: (3) student interns, (1) GIS Technician.	\$100,000	\$117,000	\$101,965.95	\$15,034.05	117,000.00	15,034.05
CONTRACT: easement database development and deployment; field testing of mobile application.	\$60,000	\$48,000	\$20,506.19	\$27,493.81	48,000.00	27,493.81
Office equipment & computers: GIS workstations, handheld GPS units, software licenses.	\$20,000	\$15,000	\$6,977.62	\$8,022.38	15,000.00	8,022.38
COLUMN TOTAL	\$180,000	\$180,000	\$129,449.76	\$50,550.24	180,000.00	50,550.24

Reinvest in Minnesota (RIM) Reserve

Conservation Easements (5,882 total): 1986 - 2011

*Partnering with Minnesota's local governments
to manage and conserve our water
and soil resources for 25 years*



Attachment C – Easement Inventory and Digitizing

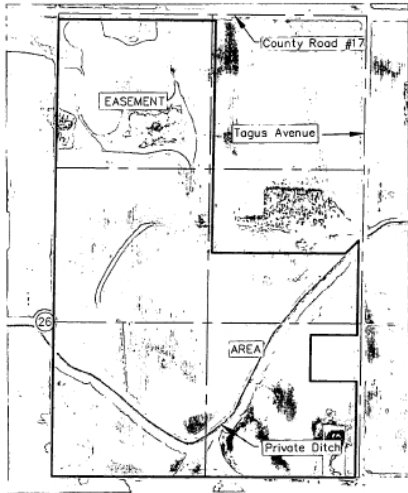


Fig. 1: Easement boundaries for 5,882 easements totaling 220,329 acres were imported into a geodatabase from existing CAD files or digitized using existing Exhibit A easement maps (pictured).

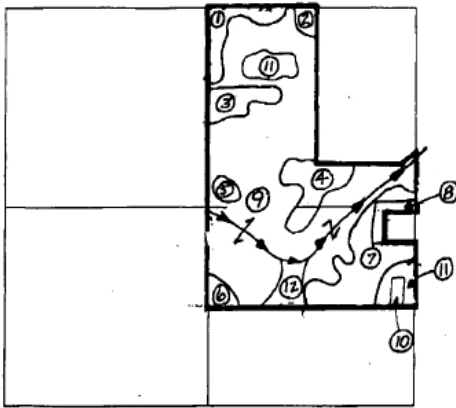


Fig. 2: Interns then digitized 20,719 conservation practices using practice plan maps (pictured) from the original easement plan, as well as associated practice type and acreage values. During this process, inaccuracies and errors were corrected as well.



Fig. 3: Data for each easement was then assigned to each record, allowing for querying, reporting and mapping based on various characteristics, such as easement and conservation practice type (wetland restoration, grassland restoration, etc.), program type (RIM, RIM-WRP, CREP, etc.), duration (limited or perpetual), cost, size and other program and geographic criteria.

The final product, in shapefile format, is available for download at: <http://www.bwsr.state.mn.us/easements>.

Attachment D – RIM Online Easements Web Map

An easements website has been developed which provides easement location and attribute information online via an interactive web mapping application (Fig. 1). Examples of data provided are easement location and boundary (Fig 2.), type of easement (e.g. RIM, RIM-WRP, CREP, PWP, etc.), funding source, paid acres, easement cost, and easement duration (Fig. 3).

The map can be access at: <http://maps.bwsr.state.mn.us/RIMOnline/>

Fig. 1 – Statewide Easements Map

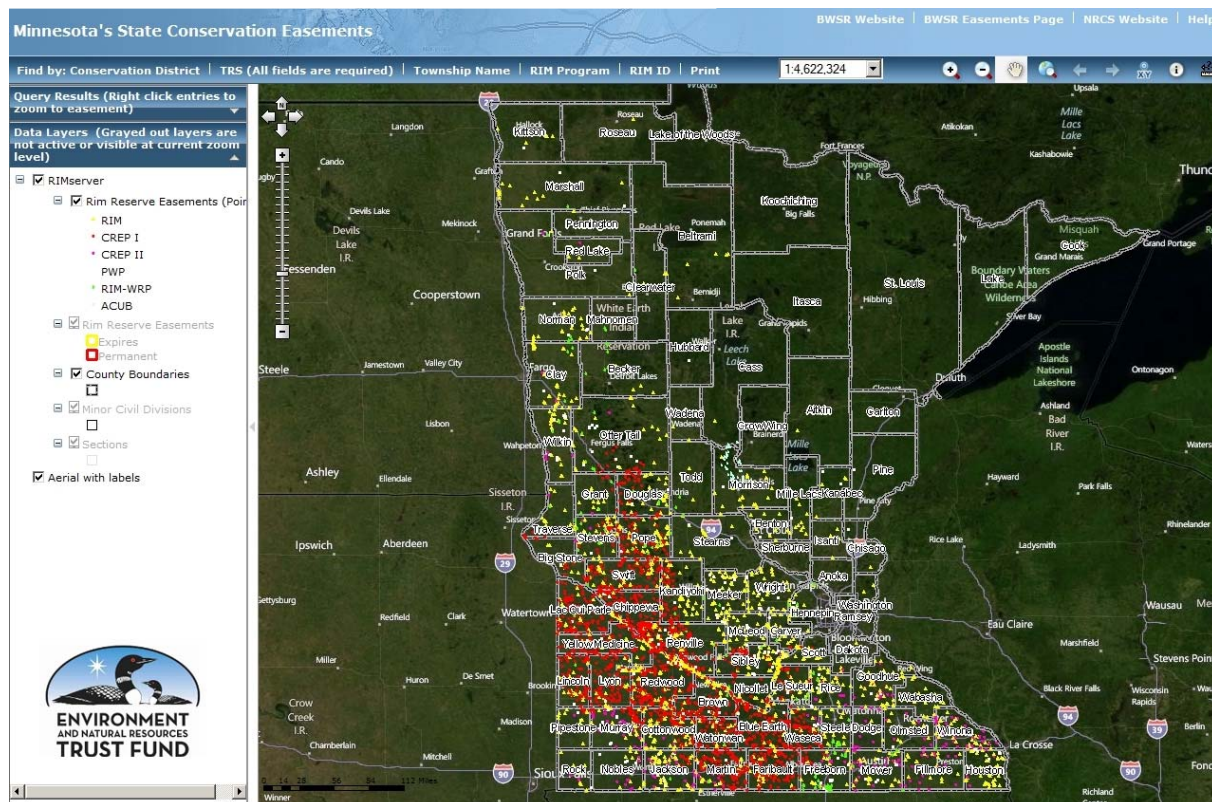


Fig. 2 – Easement Boundary



Fig. 3 – Easement Attributes

☒ SWCD: McLeod - Township: ROUND GROVE

RIM ID	43-06-02-01- -
Start Date	3/3/2003
Description	CREP WR
SWCD	McLeod
Funding Source	BONDING
Township Name	ROUND GROVE
Township	114
Range	30
Section	26
Acres	176.4
Cost	122853.59
Easement Year	2002
Expiration Date	Null
Duration	Permanent
Expiration Range	Permanent
Easement Program	CREP I: 1998 - 2003

Attachment E – RIM Field Application for Easement Stewardship

Easement stewardship is a critical component of a successful conservation easement. To aid in these efforts, a GIS field application has been developed and tested that runs on a mobile device which utilizes the aforementioned GIS database to collect data pertinent to monitoring and field data collection, while enhancing data quality and accuracy.

The field application leverages mobile GIS and GPS technologies to give technicians the capability to locate and view an easement and its associated conservation practices (Fig. 1), view past and present satellite imagery, adjust easement and/or conservation practice boundaries, collect inspection information (Fig. 2) and take georeferenced photos of possible violations or areas of concern. Any data collected through the field application is then readily available to BWSR staff, giving them better capability to report on past projects and target future projects while ensuring successful conservation easements.

This portion of the project made it through the pilot phase, which received positive feedback from local field staff. However, additional funds are needed to deploy, train and support local field technicians to implement the system on a statewide basis.

Fig. 1 – Easement & Practice Boundaries



Fig. 2 – Easement Inspection Data

