**M.L. 2010 Projects Completed in 2015-2016**

**MN Laws 2010, Chapter 362, Section 2 (beginning July 1, 2010)**

NOTE: For all projects, contact us to obtain the most up-to-date work programs for current projects (project updates are required twice each year) or the final reports of completed projects.

The following documents are short abstracts for projects funded during the 2010 Legislative Session. The final date of completion for these projects is listed at the end of the abstract. When available, we have provided links to a project's web site. The sites linked to this page are not created, maintained, or endorsed by the LCCMR office or the Minnesota Legislature.

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| **Subd. 05** | **Water Resources** |
| **Subd. 05d** | **Agriculture and Urban Runoff Water Quality Treatment Analysis** |

**Agricultural and Urban Runoff Water Quality Treatment Analysis**
Subd. 05d $485,000

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**Appropriation Language**
$485,000 is from the trust fund to the Board of Water and Soil Resources for an agreement with the Blue Earth County Drainage Authority to reduce soil erosion, peak water flows, and nutrient loading through a demonstration model evaluating storage and treatment options in drainage systems in order to improve water quality. This appropriation is available until June 30, 2014, by which time the project must be completed and final products delivered.

**PROJECT OVERVIEW**
Rising crop prices and the deterioration of old, existing agricultural drainage systems have led to increased demand for new and improved drainage systems. As these new drainage systems are constructed there is a unique and valuable opportunity to implement a fundamental shift in the way drainage systems interact with the landscape by integrating conservation practices that balance with agricultural economics considerations. The Blue Earth County Drainage Authority is using this appropriation to demonstrate a community-based water quality and treatment system in which landowners, local government, and state agencies will collaboratively implement an approach to drainage systems that improves water quality and wildlife habitat while replacing outdated drainage systems. This approach has the potential to be a model for future drainage projects across the state.

**OVERALL PROJECT OUTCOME AND RESULTS**
This project provided proof to landowners and agencies that conditions for agricultural production were

enhanced and water quality was improved by implementing a combination of Best Management Practices on Blue Earth County Ditch No. 57 (CD57) in the Mapleton area of south central Minnesota. These results surpassed expectations and overwhelmingly proved that water quality was improved by reducing sediment and nutrient loading throughout the system. Water storage and drainage capacity were increased, which reduced flooding and improved field conditions for crop yields.

A combination of BMPs included two water storage basins, buffer strips, two-stage ditch, and a rate control weir. The two storage basins significantly increased storage capacity, with the Klein Pond providing 26.3 acre-feet of storage and the City Pond providing 23 acre-feet. Peak flow rates were reduced with reductions ranging from 10% to 50% at Klein Pond and the rate control weir averaging 6% in reduction for monitored rain events.

Water quality results show dramatic improvements for Total Suspended Solids, Total Phosphorus and Nitrates. Reductions for each pollutant ranged between 15% and 50% for the Klein Pond, averaging nearly 25%. The two-stage ditch and rate control weir had reductions between 2% and 10%, averaging nearly 5%. The Klein Pond was most effective at removing trapped sediments: 230,000 pounds of sediment, 415 pounds of phosphorus, and 23,000 pounds of nitrogen. Of the three BMPs monitored, results showed they removed a total of 251,000 pounds of sediment, equivalent to nearly 75 dump truck loads. Unexpected baseflow water quality improvements include reductions in TSS by more than 33% and TP concentrations reduced by more than 16%. Baseflow water quality also improved and increased habitat for wildlife. This project had a significant improvement in water quality and makes the CD 57 system a thriving place for a variety of species to live.

**PROJECT RESULTS USE AND DISSEMINATION**

The information from this project has been shared and disseminated in a variety of ways, including the following:

1. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2012
2. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2014 (165 in attendance)
3. Event: Agricultural Drainage & the Future of Water Quality Workshop 2015 (175 in attendance)
4. Multiple Site Visits: Blue Earth County, Minnesota Department of Agriculture, ISG and interested parties
5. Website: http://www.is-grp.com/ag
6. Presentations: By Chuck Brandel and/or Craig Austinson
    - Minnesota State University Mankato, Department of Civil Engineering (2010)
    - American Society of Civil Engineers (2011)
    - Faribault County Drainage Authority (2013)
    - Minnesota Water Resources Conference (2015)
    - Iowa Water Conference (2014)
    - Blue Earth County Soil and Water Conservation District (2014)
    - County Drainage Authority (2015)
    - Article: Conservation Drainage article, DIRT Magazine (Gislason and Hunter Law Firm publication)
7. CD 57 Fun Facts Brochure: Distributed at various events and activities
8. Final Report: Summarizes the entire CD 57 project
9. Water Quality Report: Quantitative data and methods used in the water quality analysis and all results

**Project Publications:**

- Mapleton Area Agricultural & Urban Runoff Analysis - Final Analysis (PDF - 48.6 MB)
- Mapleton Area Agricultural & Urban Runoff Analysis - Water Quality Report (PDF - 41.7 MB)

**FINAL REPORT**

**Project completed:** 06/30/2015

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| **Subd. 06** | **Aquatic and Terrestrial Invasive Species** |
| **Subd. 06b** | **Ecological and Hydrological Impacts of Emerald Ash Borer** |

**Ecological and Hydrological Impacts of Emerald Ash Borer**
Subd. 06b $636,000

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**RESEARCH**

**Appropriation Language**
$636,000 is from the trust fund to the Board of Regents of the University of Minnesota to assess the potential impacts of emerald ash borer on Minnesota's black ash forests and quantify potential impacts on native forest vegetation, invasive species spread, and hydrology. This appropriation is available until June 30, 2015, by which time the project must be completed and final products delivered.

**PROJECT OVERVIEW**
The Emerald Ash Borer is an invasive insect that has been decimating ash trees throughout the Great Lake states and is currently advancing into Minnesota, where it threatens ash forests that occur across much of the state. Of particular concern is the impact Emerald Ash Borer will have on the ecology and functioning of black ash swamps, which cover over one million acres in Minnesota and represent the state's most common ash forest type. Scientists at the University of Minnesota's Department of Forest Resources are using this appropriation to conduct a five year study that will assess the likelihood of this invasive insect extending into the black ash forests in the northern part of Minnesota and its potential impact on these marshy forest areas. Findings will inform management recommendations for mitigating the potential impacts of Emerald Ash Borer.

**OVERALL PROJECT OUTCOME AND RESULTS**
The Emerald Ash Borer (EAB) has been decimating ash throughout the Lake States and is currently threatening the future of the ash forests that occur across much of Minnesota. Of particular concern is

the impact of EAB on black ash swamps, which cover over one million acres. This project was designed to increase our understanding of the impacts of EAB through the establishment of a network of research sites in black ash forests. Treatments simulating EAB-induced mortality (all trees girdled in 4-acre areas) and associated management responses (i.e., clearcutting and group selection harvests) were implemented at eight, large-scale (20 acre) research sites on the Chippewa National Forest. Each treatment included two levels of planting (planting or no planting) to evaluate the potential for planting non-host species to increase the resilience of these areas to EAB. Planted seedlings included American elm, white cedar, yellow birch, tamarack, and swamp white oak. Results from this project indicate that loss of black ash will have significant impacts on the hydrology of these areas with clearcut and girdled (EAB mortality) plots experiencing flooded conditions that extended six to eight weeks longer than other areas. Estimates of black ash's contribution to the water budget indicate it accounts for 40-80% of total evapotranspiration, reinforcing the important role it plays in ash swamp hydrology. Three-year survival of planted seedlings also reflect its hydrologic influence, with lowest overall survival rates in clearcuts due to flooded, marsh-like conditions in these areas. Swamp white oak, hackberry, and American elm had the greatest survival rates of planted species (>80% in non-clearcut areas) with the lowest rates observed for black spruce, northern white cedar, and tamarack (<20%). Collectively, these results underscore the importance of maintaining black ash canopies in these areas to increase the success of plantings aimed at reducing vulnerability to EAB.

**PROJECT RESULTS USE AND DISSEMINATION**

The results of this project have been shared on numerous occasions with resource professionals, policy makers, citizens, and scientists over the past five years in efforts to inform forest conservation decisions regarding the impacts of emerald ash borer on black ash forests in Minnesota. These dissemination activities have included the development of a fact sheet for LCCMR members that was distributed on the LCCMR tour of Itasca State Park on July 18, 2013. In addition, we have shared the results from this project with private forest landowners, and county, state, tribal and federal natural resource managers on multiple occasions, including at the Aitkin County Land Department Ash Workshop on March 9, 2012, Forest Health Workshop in Walker, MN on February 12, 2013, and North Central Forest Pest Workshop in Frontenac, MN on September 24, 2013. We organized and led a Black Ash Field Day at our research sites on August 21, 2013 for 38 field foresters, loggers, and landowners and also included several stops at our research sites as part of a Climate-Informed Forest Management field tour of the Chippewa National Forest on May 8, 2014 for 100 participants. We have developed a "silviculture case study" of the five-year results of this project that will posted online on the "Great Lakes Silviculture Prescription Library" website this fall. Result of the project have also been presented at the Midwest-Great Lakes Society for Ecological Restoration Chapter Meeting in St. Paul, MN on March 28, 2014, Midwest Invasive Species Conference in Duluth, MN on October 22, 2014, Black Ash Symposium in Orono, ME on November 4, 2014, and Sustainable Forests Education Cooperative Wildlife and Forest Research Review in Cloquet, MN on February 24, 2015. Finally, the project PI has served on the Minnesota DNR black ash management guideline committee since the inception of this project and has shared project results to influence the current recommendations for managing MN black ash forests in the face of EAB. Publications resulting from this work are available for download from the Department of Forest Resources web site (www.forestry.umn.edu). Additional publications from this work that are currently in development will also be posted on this site and shared with LCCMR staff for dissemination.

**FINAL REPORT**

**Project completed:** 6/30/2015