Third Crop Phosphorus Reduction Effort

Final Report

Jan Voit
October 23, 2017

Project Sponsor:
Heron Lake Watershed District

Contributing Sponsors:
Jerry and Nancy Ackermann
Dave Christoffer
Jerry and Terry Perkins
Tim Hansberger
Extended Ag Services, Inc.
Grant Project Summary

Project title: Heron Lake Third Crop Phosphorus Reduction Effort

Organization (Grantee): Heron Lake Watershed District

Project start date: 7/1/2014  Project end date: 9/30/2017  Report submittal date: 9/30/2017

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Basin (Red, Minnesota, St. Croix, etc.): Des Moines  County: Nobles, Jackson, Murray, and Cottonwood

Project type (check one):
- [ ] Clean Water Partnership (CWP) Diagnostic
- [ ] CWP Implementation
- [ ] Total Maximum Daily Load (TMDL) Development
- [ ] 319 Implementation
- [x] 319 Demonstration, Education, Research
- [ ] TMDL Implementation

Grant Funding

Final grant amount: $32,898.80  Final total project costs: $72,881.89

Matching funds: Final cash: $0.00  Final in-kind: $39,983.09  Final Loan: $0.00

Contract number: 69593  MPCA project manager: Katherine Pekarek-Scott

Executive Summary of Project (300 words or less)

The Heron Lake watershed encompasses approximately 472 square miles and is located in portions of Nobles, Jackson, Murray, and Cottonwood Counties in southwestern Minnesota. North and South Heron Lake were added to the impaired waters list in 2002 for nutrient/eutrophication biological indicators. Point and nonpoint source pollution, intensive tillage, non-compliant septic systems, feedlots, and urban stormwater runoff are all problems that must be addressed in order to reduce phosphorus loading in North Heron Lake and South Heron Lake.

The Heron Lake Watershed District (HLWD) looks for avenues to provide landowners and operators opportunities to incorporate new techniques in their farming operations. Landowners rarely can independently afford to implement new conservation practices. This problem...
permeates the entire watershed and affects any residents interested in improving and protecting the environment and wildlife habitat through responsible farming practices.

Third crops are any crops other than corn and soybeans that are not row crops. Small grains, hay, pasture, and cover crops are considered third crops. The main goal of implementing third crops is to reduce nonpoint source pollution loading from agricultural lands that are in annual tillage.

In the Third Crop Phosphorus Reduction effort, four cooperators successfully seeded 200 acres of cover crops on an annual basis in four cropping seasons. Soil samples were collected each year. Infiltration tests and tillage transects were conducted. According to the US Department of Agriculture’s Revised Universal Soil Loss Equation 2 (RUSLE2), sediment was reduced by 33.7 tons per year was reduced by implementing cover crops on these four fields.

In addition, a Cover Crop Steering Committee (Committee) was formed. This Committee created its own meeting schedule, determined educational opportunities for themselves and the general public, and created a program for a five-year cover crop research project that is being implemented by the Board of Managers of the HLWD.

**Goals (Include three primary goals for this project.)**

1st Goal: Engage farmers that will implement cover crops for water quality improvement as well as their own farm’s sustainability

2nd Goal: Seed 200 acres of cover crop on an annual basis during the three-year grant period

3rd Goal: Establish a Cover Crop Steering Committee

**Results that count (Include the results from your established goals.)**

1st Result: Four farm families were engaged in cover crop implementation

The same 200 acres of cover crops were seeded in four 50-acre fields over four continuous growing seasons, resulting in a reduction of 33.7 tons of sediment annually

2nd Result: A Cover Crop Steering Committee was established. Members participated in several meetings that included brainstorming sessions, first-hand information from farmers implementing cover crops, and a presentation from an expert in the field. The Committee identified the need for further education and local research and recommended the implementation of side-by-side field trials along with annual field days over a five-year period.

3rd Result: Their recommendation is being implemented by the HLWD.
Description/location: Cover Crops after Corn Harvest; Christoffer site, fall 2016

Acronyms (Name all project acronyms and their meanings.)
- HLWD – Heron Lake Watershed District
- RUSLE2 – Revised Universal Soil Loss Equation 2
- Committee – Cover Crop Steering Committee
- UM – University of Minnesota
- MPCA – Minnesota Pollution Control Agency
- SWCD – Soil and Water Conservation District
- NRCS – Natural Resources Conservation Service
- QAPP – Quality Assurance Project Plan
- MDA – Minnesota Department of Agriculture
- CSD – Corn + Soybean Digest

Partnerships (Name all partners and indicate relationship to project)
- Heron Lake Watershed District: project sponsor, project staff, project administration, and inkind contribution
- Jerry and Nancy Ackermann: cooperators
• Dave Christoffer: cooperator
• Jerry and Terry Perkins: cooperators
• Tim Hansberger: cooperator
• Extended Ag Services, Inc.: soil sample analysis
Contents

1. Work Plan Changes .................................................................................................................. 7
  1.1. Work Plan Change #1: June 22, 2015 ............................................................................... 7
  1.2. Amendment #1: December 16, 2016 ............................................................................... 7
2. Activities and Tasks ................................................................................................................. 7
Objective 1: Cover Crop Project Implementation .................................................................... 7
  Task A: Cover Crop Establishment ........................................................................................... 7
  Obstacles and Lessons Learned .............................................................................................. 9
  Task B: Site Monitoring ........................................................................................................... 10
  Obstacles and Lessons Learned ............................................................................................. 11
Objective 2: Cover Crop Steering Committee ....................................................................... 11
  Task A: Steering Committee Establishment ........................................................................... 11
  Task B: Semi-Annual Meetings ............................................................................................. 12
  Task C: Website ....................................................................................................................... 14
  Task D: Outreach .................................................................................................................... 14
  Obstacles and Lessons Learned ............................................................................................. 15
Objective 3: Grant Administration ......................................................................................... 15
  Task A: Administer grant and complete reporting requirements. ........................................... 15
  Obstacles and Lessons Learned ............................................................................................. 16
7. Measurements ......................................................................................................................... 17
8. Products .................................................................................................................................. 20
  8.1. Appendix 1 – Partner Correspondence ........................................................................... 20
  8.2. Appendix 2 – Monitoring Data ....................................................................................... 20
  8.3. Appendix 3 – Steering Committee ................................................................................. 20
  8.4. Appendix 4 – Website .................................................................................................... 22
  8.5. Appendix 5 – Outreach .................................................................................................. 22
9. Public Outreach and Education ............................................................................................ 22
10. Long-term Results ................................................................................................................ 25
11. Final Expenditures ................................................................................................................. 25
Figures
Figure 1. Jackson County Fall Infiltration Rates VS Rainfall Averages .................................................. 18
Figure 2. Nobles County Fall Infiltration Rates VS Rainfall Averages ...................................................... 18
Figure 3. Nobles and Jackson County Tillage Transect Results................................................................. 19

Tables
Table 1. Final Expenditures.......................................................................................................................... 26
Work Plan Review

1. Work Plan Changes

1.1. Work Plan Change #1: June 22, 2015
The HLWD requested expanding the number of committee members and allowing the members to set the timing for meetings as described in Objective 2 Tasks A and B.

- Objective 2. Task A. Subtask 1. In order to get a better perspective on cover crops, the number of committee members will be increased from five up to 15 members representing watershed landowners, agency personnel, private industry, and conservation organizations.
- Objective 2. Task B. Subtask 1. Instead of meeting on a semi-annual basis, steering committee members will determine the meeting schedule.

1.2. Amendment #1: December 16, 2016
Due to lower than estimated budget expenditures for seed, seeding, and soil sampling, a fourth year of cover crop establishment and flexibility to choose the seeding method were requested as described in Objective 1 Task A. In addition, a request was made to use funds to have the Committee assist in selecting landowners for the cover crop recommendation as described in Objective 2 Task D.

- Objective 1. Task A. Subtask 1: Due to lower than estimated budget expenditures for seed, seeding, and soil sampling, a fourth year of cover crop establishment will be done.
- Objective 1. Task A. Subtask 3: Broadcast or aerial seeding will be done.
- Objective 2. Task D. Outreach: Develop Committee Recommendation. Letters will be sent to Committee members informing them that the HLWD has adopted their recommendation for side-by-side cover crop field trials. Each committee member will be asked to submit two names of people that might be interested in participating in the field trials. Once submitted, the names will be put into a database and mailing labels will be created. A brochure regarding the side-by-side trials will be created. Cover Crop Field Guides will be ordered. A cover letter will be developed. The cover letter, brochure, and field guide will be mailed to each prospective cooperator.
- Funds were moved from Objective 1 to Objective 2 in the sum of $828.40.

2. Activities and Tasks

Objective 1: Cover Crop Project Implementation

Task A: Cover Crop Establishment
- Project partners met on July 15, 2014. Time was spent reviewing the objectives and tasks in the work plan. Katherine Pekarek-Scott, Minnesota Pollution Control Agency (MPCA); Jerry Perkins, Jerry and Nancy Ackermann, Andy Nesseth, Extended Ag
The cover crop seed was secured from LaCrosse Seed on August 4, 2014.

The cover crop was aerially seeded on the Ackermann property on August 6 and 7, 2014. The seeding was done by Loren Greenhof, Leading Edge Aerial Spraying LLC. Loading and fueling, as well as takeoff and landing were done at the Nauerth air strip. Assisting with the seeding were Brian and Terry Post, Dave Christoffer, Jerry and Nancy Ackermann, Kevin Schmid, Rod Dicks, and John and Phyllis Nauerth. Also in attendance were Chris Bauer and Aaron Crowley, Jackson Soil and Water Conservation District (SWCD); Stephanie McLain, Nobles Natural Resources Conservation Service (NRCS); and Jan Voit, HLWD.

The Christoffer property was seeded on August 7, 2014. The seeding was done by Loren Greenhof, Leading Edge Aerial Spraying LLC. Loading and fueling, as well as takeoff and landing were done at the Nauerth air strip. Assisting with the seeding were Terry Post, Dave Christoffer, Jerry and Nancy Ackermann, Kevin Schmid, and John and Phyllis Nauerth.

The Perkins and Hansberger properties were seeded on August 7, 2014. The seeding was done by Loren Greenhof, Leading Edge Aerial Spraying LLC. Loading and fueling, as well as takeoff and landing were done at the Worthington airport. The Hansbergers and Perkins worked together and loaded the seed bags into the seed tender and assisted with loading the plane.

Jan Voit sent a memo to cover crop partners on April 1, 2015. The purpose of the memo was a reminder about cover crop termination, seeding, soil samples, tillage transects, and infiltration measurements.

Cover crop termination was done on the Christoffer site on April 28, 2015; the Ackermann site on April 29, 2015; the Perkins site on May 1, 2015; and the Hansberger site on May 22, 2015.

On August 26, 2015, Jerry Ackermann contacted Jan Voit regarding cover crop seeding.

Nancy Ackermann contacted Jan Voit on August 29, 2015. The cover crops on their property and the Christoffer property were seeded that day. The Perkins and Hansberger sites were seeded on August 30, 2015.

Jan Voit sent a memo to cover crop partners on April 18, 2016. The purpose of the memo was to serve as a reminder about cover crop termination, seeding, soil samples, tillage transects, and infiltration measurements.

Cover crop termination was done on the Christoffer site on April 22, 2016; on the Ackermann site on April 16, 2016; the Perkins site on May 21, 2016; and the Hansberger site on May 16, 2016.

The seeding was done at the Christoffer site on August 25, 2016. The seeding was done on the Ackermann site on August 26, 2016. The seeding was done on the Perkins site on August 29, 2016. Twenty-five acres of the Hansberger site were seeded on August 29, 2016. The remaining 25 acres were seeded on September 13, 2016.
• Cover crop termination was done on the Christoffer site on April 27, 2017; on the Ackermann site on May 11, 2017; and the Perkins and Hansberger sites on May 8, 2017.
• Cover crop seeding was done on the Hansberger site on September 7, 2017 and on the remaining sites on September 28, 2017.

Obstacles and Lessons Learned
Over the course of the grant there was good success with seeding and growth of the cover crop mixes. Timing of cover crop seeding and moisture were issues in past years. Throughout the grant period, earlier seeding times were implemented and adequate rainfall was received.

Instead of cereal rye, farmers might want to look at annual ryegrass to help with spring termination. Adjusting their seed mixes from year to year would be beneficial. Seed costs fluctuate annually, so substituting different cover crop species might be advantageous for cost as well as soil health.

Dave Christoffer: Good germination and soybean growth I have noticed begins the fall before during the harvesting of the corn crop. I no-till my soybeans so having the residue from the corn crop spread as evenly as possible aids getting the bean crop off to a faster start. This provides for a canopy sooner to help with weed suppression. Leaving the corn stalks standing means less residue to get through to get the beans planted as evenly as possible. Anything that can be done such as crushing the stalks that lie on the ground to aid in faster decomposition helps promotes faster growth. After having said that, spots that were impacted by heavier residue this year did end up with growth the same as areas that had less residue.

Jerry and Terry Perkins:
• Rain is critical to germinate unincorporated cover crop seed.
• Narrow row (7 ½ inch) soybeans require a later cover crop seeding date to result in an acceptable stand.
• Total cost of cover crop establishment needs to be reduced.
• Need for more third party independent research, such as universities, on cover crop practices, economics, and benefits.
• Economic value of cover crop use would be ideal, for example, with spring grazing.
• Timely termination of the cover crops is critical.
• It is challenging to have successful cover crops in a corn/soybean rotation in this northern climate. However, results were encouraging enough to continue the effort.

Tim Hansberger: When I signed up for the grant to learn more about cover crops, my main goal was to reduce soil erosion. I learned there are many species that can be used as cover crops. It is important to know what you want the covers to do so you are using the correct species in the mix. The next obstacle is getting the covers to grow. The fall seeding worked very well when spread on bare ground, there was significant growth from all species and I experienced yield bumps the following year. The challenge with fall seeding is having the
weather cooperate. I learned that I need to wait until corn is turning color or soybeans are dropping leaves to have success with stand establishment. Timely rains are also essential. I have experienced more consistent stands in corn by using a ground rig to ensure the seed is dropped below the canopy. Cereal rye is wonderful at suppressing weed growth the following year, well worth the extra management stress of timely termination. Having spring growth has been essential to achieving my main goal of reducing soil erosion. There has been less surface water leaving my fields and drown out spots were fewer in number and smaller in size. I believe this is due to the rye slowing down water movement and the different species working together to improve infiltration.

Jerry and Nancy Ackermann: One item that has become apparent is the tremendous amount of water infiltration with a cover crop as compared with no cover crop. When they did the one hour test on the grant area we found that it could rain eight inches in one hour without any run-off. The technician said they had compared it to a conventional tillage system at a different location and after one hour one inch of rain had not soaked in. Weed control also seem to be easier where a cover crop has been used as compared to no cover crop. We really haven’t had any drawbacks or obstacles to deal with.

Task B: Site Monitoring

- The Quality Assurance Project Plan (QAPP) was revised on August 4, 2014. The QAPP was sent to Katherine Pekarek-Scott and Andy Nesseth for review. It was approved on August 27, 2017.
- Infiltration measurements were taken at the Perkins and Ackermann sites on October 20, 2014; the Hansberger site on October 22, 2014; and the Christoffer site on November 3, 2014.
- Infiltration measurements were taken at the Perkins, Ackermann, and Christoffer sites on June 2, 2015 and the Hansberger site on June 10, 2015.
- Tillage transects were conducted at the Perkins and Hansberger sites on May 13, 2015; the Christoffer site on May 21, 2015; and the Ackermann site on June 1, 2015.
- Soil samples were collected at the Ackermann, Christoffer, and Perkins sites on May 21, 2015 and the Hansberger site on May 27, 2015.
- Infiltration measurements were taken at the Perkins site on June 9, 2016 and the Hansberger, Christoffer, and Ackermann sites on June 8, 2016.
- Tillage transects were conducted at the Perkins site on June 9, 2016 and the Hansberger, Christoffer, and Ackermann sites on June 8, 2016.
- Soil samples were collected at the Perkins, Ackermann, and Christoffer sites on June 9, 2016 and the Hansberger site on April 12, 2016.
- Infiltration measurements were taken at the Christoffer, Perkins, and Hansberger sites on November 2, 2016. The measurements were taken at the Ackermann site on November 3, 2016. Soil sampling at all sites took place in November 2016.
- Soil samples were collected at all four sites on April 17, 2017.
- Infiltration measurements were taken at the Ackermann and Christoffer sites on May 31, 2017 and the Hansberger and Perkins sites on June 1, 2017.
• Tillage transects were conducted at the Ackermann and Christoffer sites on May 31, 2017 and the Hansberger and Perkins sites on June 1, 2017.
• Infiltration measurements were taken at the Christoffer site on September 6, 2017. Infiltration measurements were taken at the Perkins, Ackermann, and Hansberger sites on September 7, 2017.

Obstacles and Lessons Learned
The first year of the grant, southwest Minnesota received below average precipitation which depleted moisture throughout the soil profile. Infiltration tests reflected this, resulting in more permeable soils in the years following.

The data collected was very useful to cooperators. Going forward, monitoring for soil bulk density is something that might be useful to better measure increased infiltration in cover crop fields.

The HLWD received additional funding to do more cover crop research with the same cooperators and field plots that were implemented in the Third Crop Phosphorus Reduction Effort. Because of the additional data being collected through multiple organizations, there was some confusion on how many soil samples needed to be taken at each site and resulted in fewer samples being taken than were budgeted. In future endeavors, better communication is needed to ensure that all parties know exactly what needs to be done.

Objective 2: Cover Crop Steering Committee

Task A: Steering Committee Establishment
• Jan Voit and Catherine Wegehaupt met on March 4, 2015 to brainstorm about steering committee membership. It was determined that membership should include a person who has cover crops and livestock, a crop consultant, a crop insurance agent, someone who will be planting cover crops in 2015, and someone who has not planted cover crops.
• A letter was drafted and distributed to prospective committee members.
• Contact was made with potential committee members on March 30, 2015, April 14, 2015, and May 28, 2015.
• The Civic Engagement Support Group met on June 8, 2015. One of the breakout sessions focused on the Committee. The group suggested that the committee should have a larger membership that could include a conservation organization, young farmer, UM agronomist, NRCS, SWCD, farmer cooperative, banker, county commissioners, and HLWD board member. They also suggested that the committee members should choose the meeting schedule.
• On June 16, 2015, Jan Voit contacted Katherine Pekarek-Scott, MPCA regarding the possibility of a change order for the grant.
• The change order was approved on June 22, 2015. Through this change order, the number of steering committee members will be increased from five to a maximum of 15. The steering committee members will determine the meeting schedule. Through this process, the steering committee will be meeting to brainstorm about needs,
wants, and perceptions of watershed landowners as they relate to water quality improvement, focusing on cover crops. They will be putting together recommendations for the HLWD. The board was made aware that there are expectations that the board will consider and implement the recommendations made.

- A letter was sent to prospective committee members on June 22, 2015.
- On July 2, 2015, contact was made with potential committee members. A memo was sent to the members on July 7, 2015.
- The Committee consisted of local farmers, a banker, a crop insurance agent, a crop consultant, a local nonprofit conservation group, and county and federal government agency personnel.

Task B: Semi-Annual Meetings

- Catherine Wegehaupt and Jan Voit met on July 16, 2015 to plan the steering committee meeting. The meeting agenda and detailed agenda were drafted. The agenda was sent to committee members on July 17, 2015.
- The Crop Steering Committee met on July 28, 2015. Following an evening meal and an ice breaker, introductions were given. An explanation of the grant and description of expectations were discussed. A snow card activity was done for the question, “what does water quality mean to you?” Discussion was held regarding meeting dates and times, the Cover Crop Learning Tour, expectations, and the end result of the steering committee efforts.
- The Committee set the meeting date in conjunction with the Cover Crop Learning Tour on September 15, 2015. A memo and information about the tour was sent to committee members on August 25, 2015.
- Catherine Wegehaupt and Jan Voit met on September 1, 2015 to plan the next Committee meeting. The meeting was held on September 15, 2015 in conjunction with the Cover Crop Learning Tour. There were six committee members in attendance.
- The Cover Crop Learning Tour was held on September 15, 2015 at the Ackermann farm. Registration was held from 8:30 a.m. to 9:00 a.m. Participants were divided into four groups and attended rotating stations that included a research plot tour, soil health evaluations, experiences with cover crop programs, and managing risk. Following lunch six UM graduate students gave an overview of their individual projects. An update on crop insurance implications with cover crops was given. The tour ended with the Pennsylvania State Interseeder, high-clearance drill, strip till, and RowBot equipment demonstrations.
- The Committee met over the noon hour at the Cover Crop Learning Tour. The Committee asked for an opportunity to visit cover crop fields after harvest. They also suggested that area farmers also be invited. On October 8, 2015, Catherine Wegehaupt and Jan Voit met with Jerry and Nancy Ackermann to begin planning the event. It was decided to begin with a few short presentations and then visit harvested
cover crop fields. An agenda and flyer were drafted. The documents were distributed to project partners for comments.

- On October 21 and 22, 2015, time was spent revising the flyer and press release for the cover crop field day. A mailing list was developed. The flyers were mailed on October 26, 2015.
- On October 22, 2015, the press release for the Conversations about Cover Crops was drafted and distributed. A flyer and mailing list were created. The flyer and press release were mailed on October 26, 2015.
- Information about the cover crop event was published in *The Farmer Morning Update* on November 5, 2015.
- The flyer and press release were mailed to additional addresses that were provided on November 2, 2015. PowerPoint presentations were created for Christoffer, Ackermann, Brunk, and Post on November 5, 2015. Revisions were made on November 9 and 10, 2015.
- The HLWD hosted Conversations about Cover Crops on November 10, 2015 from 8:30 a.m. to 11:30 a.m. Participants met at the American Legion Hall in Okabena. Coffee and cookies were served during registration. The event included presentations about 2015 cover crop results from Bryan Biegler, Brian Post, Bruce Brunk, Tim Hansberger, Dave Christoffer, Jerry Ackermann, and Darwin Roberts. Following the question and answer session, attendees made a site visit to harvested cover crop fields. In addition, a map was provided that contained the locations of cover crop fields in Jackson and Nobles Counties. There were 36 people in attendance. Of those, four were Committee members.
- On November 16, 2015, an article regarding the Conversations about Cover Crops was published in the *Daily Globe*.
- On November 24, 2015, an article regarding the Conversations about Cover Crops was published on the Minnesota Corn Growers Blog.
- On February 16, 2016, Catherine Wegehaupt drafted an invitation to the Committee. The invitation was sent to all committee members. It was also sent via email to cover crop farmers in the surrounding area.
- The Committee meeting was held on February 24, 2016 at the Heron Lake Community Center. The event began with a brief overview of the grant. Justin Fruechte, Millborn Seeds in Brookings, South Dakota was the featured speaker. Justin covered topics that included: soil benefits of using cover crops, research that has been completed, timing of application, cover crop mixes, and herbicide use. There were 14 people in attendance, most of them being local farmers. Three Committee members were present.
- After the presentation, a majority of the farmers stayed for another hour. Discussion was held about their cover crop experiences - what has or hasn’t worked.
- The Committee met on August 17, 2016. The committee was established to brainstorm about the needs, wants and perceptions of watershed landowners,
focusing on cover crops. Their overall goal was to develop a cover crop project or program for the HLWD to implement.

- Committee members agreed that a program for side by side trials, maximum of 10 plots within Nobles, Jackson, Murray, and Cottonwood Counties should be pursued. Field size would be a minimum of 40 acres, with a three to five-year commitment. Catherine Wegehaupt and I will draft a budget and work plan to distribute to committee members. Committee members would like this program to begin in 2017.
- During the month of September, the work plan and budget were developed for the program recommended by the Committee. The information was sent to the committee for review on September 27, 2016.
- On October 18, 2016, the board of managers reviewed the recommendation for side-by-side cover crop trials that was made by the Committee. The board unanimously approved this project.
- In October 2016, Jan Voit received notice of a request for proposals for implementation funds through the Laura Jane Musser fund. A grant application was drafted. It was submitted on October 26, 2016. On December 19, 2016, the HLWD was notified that funding was not awarded.
- On January 11, 2017, a memo was sent to the Committee regarding their program recommendation and the need to select potential participants.
- While the grant work plan called for six committee meetings, the recommendation was made with holding only five meetings since they met their objectives. Instead of convening the sixth meeting, a project update was sent.

Task C: Website

- On September 30, 2014, Jan Voit created a webpage for the Third Crop Phosphorus Reduction Effort on the HLWD website. A summary of the grant effort was posted. The 2014 cover crop seeding document was uploaded.
- The partner meeting summary was uploaded to the webpage on December 22, 2014.
- The cover crop seeding summary was drafted on September 10, 2015. The document was uploaded to the website on September 14, 2015.
- A summary of the Committee meeting was drafted and uploaded to the webpage.
- The webpage was updated on July 18, 2016.
- The annual report was uploaded to the website on March 22, 2017.

Task D: Outreach

- Cover Crop Field Guides were ordered on December 19, 2016.
- Catherine Wegehaupt drafted a memo to Committee members on January 11, 2017.
- Catherine Wegehaupt created a database of potential research plot cooperators during the month of January.
- An article regarding the research plots was drafted and distributed to local news media in January of 2017.
- The memo, cover crop field guides, and brochure were sent to potential cooperators on February 9, 2017.
Catherine Wegehaupt developed the cooperator contract on February 13, 2017.

**Obstacles and Lessons Learned**

The steering committee had a lot of success. Because the group of people was so large, there never was a meeting when they were all together at the same time. It was beneficial to have diversity in the committee makeup, allowing for differing viewpoints.

Multiple civic engagement strategies were used, which helped the committee members to talk and give feedback. From these meetings, the committee identified the need for further education and local research. Their recommendation was the implementation of side-by-side field trials along with annual field days over a five-year period at four farm sites, one in each county – Nobles, Jackson, Murray, and Cottonwood. The HLWD adopted this recommendation in October of 2016.

The website was updated with grant information as needed. Cooperators did not take photos when the cover crops were seeded in 2016, so there was no way to post a summary on the website.

In order to begin the implementation of the side-by-side trials project, each Committee member was asked to recommend two possible cooperators. They were reminded that one site would be established in Nobles, Jackson, Murray, and Cottonwood County, and asked to keep that in mind when making recommendations. Only a few names were received.

HLWD staff drafted a newspaper article regarding the five-year project as an outreach effort for potential cooperators. The names submitted by the committee, those that showed interest as a result of the article, as well as others gathered from agency personnel were used to develop a list. HLWD staff contacted these individuals regarding the program and their willingness to participate.

Keeping committee interest in the process once the recommendation was made was difficult. Very few committee members submitted names for the implementation of their recommendation. HLWD staff has no suggestions for how to improve participation for future endeavors.

**Objective 3: Grant Administration**

**Task A: Administer grant and complete reporting requirements**

- On July 2, 2014, project partners were contacted regarding a partner meeting. An agenda was created and distributed. The partner meeting was held on July 15, 2014.
- The QAPP was revised and sent to MPCA on August 4, 2014. The QAPP was approved by MPCA on August 27, 2014.
- Jan Voit began updating the budget on September 22, 2014. Additional information was added on September 25, December 2, December 18, and December 22, 2014.
- The annual report was submitted on December 22, 2014.
• An article regarding the Third Crop Phosphorus Reduction Effort was published in the Tr-State Neighbor on August 7, 2015.
• On October 5, 2015, the Corn+Soybean Digest (CSD) article regarding the cover crop grant was distributed to project partners.
• Work began on the annual report on December 10, 2015.
• Revisions were made to the annual report on January 21, 2016. It was approved by MPCA on that date.
• Work began on the semi-annual report on June 27, 2016.
• The semi-annual report was submitted on July 12, 2016. It was approved on July 14, 2016.
• On August 23, 2016, a memo was sent to the cooperators to remind them of their commitments for the fall of 2016.
• On September 1, 2016, a memo was sent to Extended Ag Services to remind them about the soil sample collection requirements for fall of 2016.
• Work was done on the reimbursement request for the Third Crop Phosphorus Reduction Effort on October 13, 2016. There is about $9,000 remaining. Contact was made with MPCA regarding the possibility of an extension. It can be extended one month – to September 30, 2017. Landowners were contacted regarding their interest in continuing cover crop implementation for an additional year. All four responded positively.
• On October 20, 2016, Jan Voit met with Katherine Pekarek-Scott, MPCA to discuss an amendment to this grant. Discussions were held with all the cooperators to determine estimated seed and seeding costs for 2017. The budget was updated and sent to Katherine for review. On October 26, 2016, Katherine and Jan met via conference call for further discussion. There will be approximately $800 remaining after the 2017 input costs are paid. This money may be used for work related to securing landowners for participation in the Cover Crop Research Plots.
• On October 31, 2016, the Daily Globe published an article regarding the Perkins family. This article was distributed to managers, staff, and the HLWD Advisory Committee.
• An amendment for this grant was submitted to MPCA on November 17, 2016. Details regarding the amendment are contained in item seven below. The amendment was approved on December 16, 2016.
• On July 20, 2017, Catherine Wegehaupt and Jan Voit reviewed the grant work plan. A reminder was sent to cooperators regarding the remaining work plan activities and the necessary deadlines.
• On August 14, 2017, a follow-up email was sent to cooperators regarding work plan activities and deadlines.

Obstacles and Lessons Learned
There were no problems with reporting procedures during the grant period. Both the change order and amendment processes went well.
Grant Results

7. Measurements

Successful implementation of a grant program requires an extensive effort in recordkeeping. Section 2 summarized the activities completed during the grant period. The methods of measured results and success are varied and dependent upon the tasks. The measurements are described below by objective and task as presented in the work plan.

Objective 1: Cover Crop Project Implementation

Seeding
- The cover crops were seeded at all four sites in August of 2014 and 2015.
- The cover crop was seeded on all four sites in August and September of 2016.
- Cover crop seeding was done on the on September 7 and 28 of 2017.
- According to the US Department of Agriculture’s Revised Universal Soil Loss Equation 2 (RUSLE2), sediment was reduced by 33.7 tons per year was reduced by implementing cover crops on these four fields.

Termination
- Cover crop termination was done on the Jackson County sites in April and the Nobles County sites in May of 2015.
- Cover crop termination was done on the Jackson County sites in April and the Nobles County sites in May of 2016.
- Cover crop termination was done on one site in Jackson County in April and the remaining sites in May of 2017.

Infiltration Measurements
- Infiltration measurements were taken at all four sites in October and November of 2014.
- Infiltration measurements were taken at all four sites in June and October of 2015.
- Infiltration measurements were taken at all four sites in June and November of 2016.
- Infiltration measurements were taken at all four sites in May, June, and September of 2017.
- Comparing fall infiltration results, 2014 data showed faster rates because of the lack of moisture throughout the soil profile. Excluding the 2014 data, all sites had an increase in infiltration over a three-year grant period (See Figures 1 and 2).
- The more water that was added to the soil profile, the slower water infiltrated.
- A document summarizing the infiltration measurements can be found in Appendix 2.
Figure 1. Jackson County Fall Infiltration Rates VS Rainfall Averages

Figure 2. Nobles County Fall Infiltration Rates VS Rainfall Averages
Tillage Transects

- Tillage transects were conducted at all four sites in May and June of 2015.
- Tillage transects were conducted at all four sites in June of 2016.
- Tillage transects were conducted at all four sites in May and June of 2017.
- Over the grant period, all tillage transect recordings with a previous crop of corn have had an average of 82 percent residue cover and an average of 56 percent following a crop soybeans. These readings are very good and indicate good cover.
- A document summarizing the tillage transects can be found in Appendix 2.

Figure 3. Nobles and Jackson County Tillage Transect Results

Soil Samples

- Soil samples were collected at all four sites in May of 2015.
- Soil samples were collected at one Nobles County site in April of 2016. The remaining four sites were sampled in June of 2016.
- Soil sampling at all sites took place in November 2016.
- Soil samples were collected at all four sites on April 17, 2017.
- Overall, there were very small changes in soil fertility characteristics that are likely the result of sampling variability and/or soil mineralization. They cannot be attributed to the cover crops.
- Documents summarizing the soil sampling data can be found in Appendix 2.

Objective 2: Cover Crop Steering Committee

- The Crop Steering Committee met on July 28, 2015.
- The Cover Crop Learning Tour was held on September 15, 2015 at the Ackermann farm.
- The Committee met over the noon hour at the Cover Crop Learning Tour.
• The HLWD hosted Conversations about Cover Crops on November 10, 2015. Four Committee members attended.
• The Committee met on February 24, 2016. Three Committee members were present.
• The Committee met on August 17, 2016 to develop a cover crop project or program for the HLWD to implement.
• On October 18, 2016, the board of managers reviewed the recommendation and unanimously approved this project.

**Objective 3: Grant Administration**

- Semi-annual and annual reports were submitted and approved as described in Section 2 above. The reports were uploaded to the web page.

**8. Products**

There have been several products produced through this grant. Below is a list of the products created and the appendices in which the products are located.

8.1. Appendix 1 – Partner Correspondence
- Partner Meeting Agenda 2014
- Partner Meeting – July 15, 2017
- Memo to Cover Crop Partners
- Memo to Cover Crop Partners Fall 2016
- Memo to Ag Services Fall 2016
- Maps
- *Daily Globe* article
- Email to Cover Crop Partners – July 2017
- Email to Cover Crop Partners – August 2017
- Email to Cover Crop Partners – September 2017

8.2. Appendix 2 – Monitoring Data
- HLWD Soil Test Booklet Fall 2014
- HLWD Soil Test Booklet Spring 2015
- Maps
- HLWD Soil Test Booklet 2016
- Ackermann Soil Test Booklet 2017
- Christoffer Soil Test Booklet 2017
- Hansberger Soil Test Booklet 2017
- Perkins Soil Test Booklet 2017
- Soil Sample Results 2014-2017
- Infiltration Test and Tillage Transect Results 2014-2017

8.3. Appendix 3 – Steering Committee
- Letter to prospective steering committee members
- Steering Committee Info
- Memo to Steering Committee
• Detailed Agenda
• Agenda July 28
• Ground Rules
• Meeting Summary July 28, 2015
• Memo – August 2015
• Cover Crop Learning Tour Brochure
• Cover Crop Learning Tour Summary
• Detailed Agenda
• Committee Meeting – September 15, 2015
• Steering Committee mailing labels
• Conversations about Cover Crops news release
• Conservations about Cover Crops flyer
• Watershed Connections article
• The Farmer Morning Update
• Agenda
• Biegler Presentation
• Post Presentation
• Brunk Presentation
• Hansberger Presentation
• Christoffer Presentation
• Ackermann Presentation
• Local Cover Crops Map
• Photo 1
• Photo 2
• Photo 3
• Photo 4
• Photo 5
• Photo 6
• Photo 7
• Photo 8
• Photo 9
• Photo 10
• Conversations about Cover Crops summary
• CSD article
• Daily Globe article
• Minnesota Corn Growers Blog
• Tri-State Neighbor article
• Steering committee meeting invitation
• Chemical Conversions
• Herbicide Rotation Restrictions
• Steering Committee Meeting – February 16, 2016
9. **Public Outreach and Education**

The following section summarizes the public outreach and education efforts undertaken.

Establishing a Committee was a major component of this grant. Jan Voit and Catherine Wegehaupt brainstormed about membership. They determined that membership should include a person who has cover crops and livestock, a crop consultant, a crop insurance agent, someone who will be planting cover crops in 2015, and someone who has not planted cover crops.

After the committee makeup was determined by HLWD staff, an opportunity arose to gather input from others regarding this subject. At the Civic Engagement Support Group meeting, one of the breakout sessions focused on the Committee. The group suggested that the committee should have a larger membership that could include a conservation organization, young farmer, UM agronomist, NRCS, SWCD, farmer cooperative, banker, county commissioners, and HLWD board member. They also suggested that the committee members should choose the meeting schedule. As a result of this effort, a change order was approved that allowed the committee size to be increased from five to a maximum of 15. The steering committee members will determine the meeting schedule. They will be put together recommendations for the HLWD. The board was made aware that the expectation was that they will implement the recommendations made.

At the first meeting of the Committee, participants wanted to learn more about cover crops. The HLWD was already in the process of planning the Cover Crop Learning Tour. A request
was made to meet in conjunction with that event. The Committee met over the noon hour at the Cover Crop Learning Tour. They asked for an opportunity to visit cover crop fields after harvest. They suggested that area farmers be invited. They also asked for a presentation from a cover crop expert.

Based on this suggestion, Conversations about Cover Crops was developed. Catherine Wegehaupt and Jan Voit met with Jerry and Nancy Ackermann to begin planning the event. An agenda and flyer were drafted. A press release was drafted and distributed to the Tri County News, Daily Globe, CSD, The Farmer Morning Update, Minnesota Corn Growers Association, MPCA’s Watershed Connections, and the Tri-State Neighbor.

The press release was published in the Tri County News. In speaking with TCN staff, the main coverage for this newspaper is Jackson and Nobles County. Subscriptions total about 575, with about 150 store copies available for purchase at various locations in the immediate area.

The Watershed Connections contained information regarding Conversations about Cover Crops. Watershed Connections is a periodic e-newsletter with updates on Total Maximum Daily Load projects in the Minnesota, Crow, and Lower Mississippi river basins. It’s free and users can manage their subscription preferences and can make changes as needed.1

Information about the cover crop event was posted on The Farmer Morning Update. This page includes the day’s ag headlines, breaking news, marketing and critical information, editor blogs, and additional content for Minnesota farmers and producers. There are 3,982 subscribers.2

The HLWD hosted Conversations about Cover Crops at the American Legion Hall in Okabena. The event included presentations about 2015 cover crop results from Bryan Biegler, Brian Post, Bruce Brunk, Tim Hansberger, Dave Christoffer, Jerry Ackermann, and Darwin Roberts. Following the question and answer session, attendees made a site visit to harvested cover crop fields. In addition, a map was provided that contained the locations of cover crop fields in Jackson and Nobles Counties. There were 36 people in attendance. Of those, four were Committee members.

An article regarding the Conversations about Cover Crops was published in the Daily Globe. It is a regional daily newspaper headquartered in Worthington, Minnesota. It covers ten counties, six in Minnesota (Pipestone, Murray, Cottonwood, Rock, Nobles, and Jackson) and four in Iowa (O’Brien, Osceola, Dickinson, and Lyon).3

An article regarding the Conversations about Cover Crops was published in the CSD. CSD is the definitive production resource for United States growers who produce the country’s two

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1 http://content.govdelivery.com/accounts/MNPCA/bulletins/11f9b3c?mnpca_98=
2 http://agriculture.penton.com/brands/state-regional/the-farmer
3 https://www.facebook.com/pg/dailyglobe/about/?ref=page_internal
largest agricultural crops. CSD covers the practical aspects of production including input selection, production practices, regulatory impacts, and the latest in production research from both the public and private sectors. Content is often approached on a first-person basis to highlight the human side of these cropping practices. There are 113,000 subscribers.4

An article regarding the Conversations about Cover Crops was published on the Minnesota Corn Growers Blog. With nearly 7,000 members, Minnesota Corn Growers Association is one of the largest grassroots farm organizations in the United States.5

An article regarding the Conversations about Cover Crops was published in the Tri-State Neighbor. Tri-State Neighbor is received every two weeks by approximately 23,000 qualified farm and ranch subscribers in all of South Dakota, Southwest Minnesota, Northwest Iowa, and Northeast Nebraska.6

Based on input from the Committee, another steering committee meeting was planned. An invitation was sent to the Committee and via email to cover crop farmers in the area. The Committee meeting began with a brief overview of the grant. Justin Fruechte, Millborn Seeds in Brookings, South Dakota was the featured speaker. Justin covered topics that included: soil benefits of using cover crops, research that has been completed, timing of application, cover crop mixes, and herbicide use. There were 14 people in attendance, most of them being local farmers. Three Committee members were present. After the presentation, a majority of the farmers stayed for another hour. Discussion was held about their cover crop experiences - what has or hasn’t worked.

The Committee was asked to nominate potential participants in the HLWD Cover Crop Research Plots. In additional, a newspaper article was sent to the Tri County News and Daily Globe.

Since this grant began, there have been articles written, field days hosted, and research done on cover crops. The challenge is trying to get farmers to hear about events or see this research in order for them to incorporate it into their farming operations. Over the past couple of years, many local farmers have stepped up and hosted their own field days. The HLWD has learned that this is the best type of outreach because farmers learn from other farmers. Neighboring farmers have started to reach out and help each other experiment with changing their farm operations to include cover crops. There has been a large increase in the use of cover crops since this grant started and the research done in this grant has helped immensely.

4 http://agriculture.penton.com/brands/crop/corn-soybean-digest
5 http://www.mncorn.org/2015/11/24/growers-of-the-third-crop-share-results/
6 http://www.tristateneighbor.com/site/about/
10. Long-term Results

As a result of the working relationship between the cooperators and the HLWD, three grants were secured.

- **Cover Crop Champions.** Funding received from the National Wildlife Federation provided information and education about cover crops to farmers, agronomists, local conservation offices, and the general public.
- **Soil Health Research in Southwest Minnesota.** With funding from the MDA, research is being conducted through the Haney Soil Test and Soil Nitrate Test on cover crop fields established through the Third Crop Phosphorus Reduction Effort.
- **Increasing Soil Health and Infiltration with Cover Crops.** With funding from the North Central Region Sustainable Agriculture Research and Education Farmer Rancher Grant, a member of the Committee is measuring the benefits of cover crops focusing on increasing soil health and infiltration by using the Haney Soil Test and infiltration test.

As a result of the efforts of the Committee, the following program was adopted by the HLWD in 2016 for implementation in 2017.

- Side by side cover crop field trials along with annual field days over a five-year period.
- Four farm sites within the watershed.
- Funded by the HLWD for water quality education, not enforcement. Estimated annual cost is $9,274.00.

If a project like this is done in the future, a longer grant period is needed. Data gathered over a five-year or longer period would be helpful. In addition, the flexibility to use different seed mixes would be beneficial.

In addition, recognition for cooperators’ efforts on a broader scale should be done. The amount of work that was expended, not only on the cover crop fields, but on all of the events that arose during the grant period, was tremendous. Finding a way to let the public know about the commitment and dedication of the cooperators would be worthwhile.

These efforts help HLWD staff with efforts for education and implementation as described in the HLWD WMP. Staff will continue to seek funding to assist with water quality improvement efforts.

11. Final Expenditures

**Table 1** on page 26 contains a summary of the cash and inkind expenditures that were made to assist in these efforts during the Third Crop Phosphorus Reduction Effort grant period.
### Table 1. Final Expenditures

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