

9008-005 Hewitt Creek Watershed Improvement Project

Project sponsor: Hewitt Creek Watershed Improvement Association, Inc.

Final Project Report: January 2010 - December 2014

In 2009, following a successful three-year watershed improvement project that concluded in 2008, the Hewitt Creek Watershed Improvement Association (watershed council) decided there was more left to do to improve their watershed. To guide their effort, the watershed council outlined an extensive list of benchmarks that, if met, could move them toward their primary goal of having Hewitt-Hickory Creek removed from the Iowa impaired waters list. This report will detail the progress toward achieving the 10 benchmarks outlined in the project proposal and provide financial, environmental and programmatic accountability for the funds received from the Iowa Watershed Improvement Review Board (WIRB).

The short-term benchmarks of success identified by the watershed council are as follows:

- 1) Watershed participation rate of 85%
- 2) Watershed average Phosphorus Index of 2.00, Soil Conditioning Index of 0.6 and cornstalk nitrate test of 2,000 ppm
- 3) Reduce annual sediment delivery to Hewitt-Hickory Creek by an additional 8,000 tons (between 2006-2008 annual sediment delivery was reduced 4,033 tons)
- 4) Reduce annual phosphorus delivery by an additional 10,400 pounds (annual phosphorus delivery was reduced 5,054 pounds between 2006-2008)
- 5) Improve feedlot runoff control systems at 25 priority livestock feeding sites
- 6) Install 5 sub-surface denitrifying bioreactors in priority tile-drained fields
- 7) A macroinvertebrate Family Biotic Index of 5.00 (good) at monitoring site 3
- 8) Two consecutive years of season-long, rain event, average total phosphorus water analysis of less than 1.00 mg/L at monitoring site 3
- 9) Three consecutive years of season-long total nitrogen water analysis of less than 10 mg/L at monitoring site 3
- 10) Access additional cost-share funding for cooperators through programs such as EQIP, IDNR Section 319 and the Agricultural Water Enhancement Program to implement high-cost feedlot runoff control improvements, sediment control basins and stream bank stabilization projects

The Hewitt Creek watershed improvement project is a farmer-led effort that is based on an incentive structure tying stream impairments such as phosphorus, sediment and nitrogen to field and farm-level practices through the use of the Iowa Phosphorus Index, Soil Conditioning Index and end-of-season cornstalk nitrate test. The incentive structure used for this project was developed during the previous WIRB-funded watershed improvement effort. To promote action by local cooperators, the watershed council evaluated progress annually and made adjustments to the incentive structure based on whether or not cooperators were adopting practices that would benefit the local water quality impairments. It was important to residents that the incentive program sign-up form be designed to fit on one side of one sheet of paper, so little used incentives might be dropped to add new incentives or incentives levels increased to promote producer participation. The 2014 incentive program sign-up form is shown in Figure 1.

Approved 1/28/14

2014 HEWITT CREEK PERFORMANCE-BASED FARM and WATERSHED ENVIRONMENTAL MANAGEMENT PROGRAM

Please check activities you wish to complete. (Deadline May 1/first-come subject to funding). [Payments near December 1 may be prorated if participation exceeds \$45,000].

PHOSPHORUS INDEX (PI) Maximum \$10.00/A. See P Index explanation on back of this page.

- \$500 first year payment if the weighted whole farm P Index is less than a phosphorus loss risk of 3 (2-5 is medium risk). All field scores weighted by the field size and risk of P loss from each field to attain a weighted average farm P-index.
- \$100 paid for annual data and P-index review after the first year.
- \$150 bonus if the P-index is 2 or less (low) or for each 0.3 reduction in P Index.
- \$10 per management area or field tested for soil test P, at least 10 acres per sample (max 4/yr for 5 years). Not to be included with grid sampling.

SOIL CONDITIONING INDEX (SCI) Maximum \$10.00/Ac. See back for SCI explanation.

- \$200 first year payment per 0.1 SCI above 0 for whole farm weighted average of all fields. Example: A weighted average farm SCI of 0.4 will provide a payment of \$800.
- \$100 per 0.1 SCI for annual data and SCI review after the first year.
- \$200 paid for each 0.1 improvement in the annual SCI.

NITROGEN PERFORMANCE MANAGEMENT (Corn Stalk Nitrate-Nitrogen analysis)

- \$400 payment if the farm weighted average analyses does not exceed 1,700ppm.
- \$200 bonus if the weighted average (Max. 50 acres/field) is less than 1,300ppm.
- \$100 for the first two NO₃N samples and \$40 for each additional sample (max 4 samples).

OTHER INCENTIVES

- \$200 First time manure application calibration and manure analysis.
- \$50 Additional manure analyses taken and results reported by project cooperators (first time calibration required).
- \$20 Per acre up to 40 acres for fall cover crop on corn silage or soybean stubble.
- \$300 Grid sampling and variable rate fertilizer application (40 acres/year for 5 years).
- \$500 Install a below-feedlot grass filter, pre-lot water diversion or roof gutters.
- \$200 Managed grazing (5 or more paddocks).
- \$200 Septic system up-grade. Low interest revolving fund loans available (515-242-6043).
- \$200 Farmstead or Streambank Assessment (first time self assessment or changes-improved assessment).
- \$0.65/ft., maximum 1,200 ft., new, repaired or reconstructed waterways, headlands, or buffers, minimum 30' width. Must be maintained for 5 years, may be hayed or grazed, minimum 25# brome/acre or comparable seeding.
- \$200 Install fabric during waterway installation and repair.
- \$4000 New or improved feedlot runoff controls –consulting with Extension Ag Engineer.

WATERSHED ENVIRONMENTAL PERFORMANCE

- \$200 Bonus for achieving 85% of the land in the watershed enrolled in performance program. Payable to cooperators earning \$500 or more watershed improvement incentives per farm operation.

Name	Address	Phone
	Email address	Cell Phone

Figure 1. Hewitt Creek watershed 2014 incentive program form.

A vital part to achieving success is widespread participation in the watershed improvement effort and the building of a watershed community. By using an innovative incentive program structure, the council has been able to encourage 68 watershed landowners and operators to participate in the watershed project since 2005 for a participation rate of 82%, just shy of the goal of 85% outlined in the funding proposal. It could be argued that there has been some consolidation of farms within the watershed during the life of the project, so the calculated participation might be slightly understating the actual rate. During the past 5 years, an average of 40 cooperators has participated annually, with 52 unique operations receiving incentive payments.

Financial Accountability

The watershed council took its role as the fiduciary agent for the project very seriously as it administered the budget allocated from WIRB. The budget was reviewed at each watershed council meeting and cooperator enrollments were usually approved during spring and summer meetings. During the first 4 years of the project, when funding was advanced semi-annually, the watershed council approved and made incentives payments one time per year, typically in January. Enrollments generally far exceeded the incentives line item budget; however, the council operated with the understanding that if the incentives for completed activities exceeded the budget, the incentives for the soil conditioning index was be prorated for all cooperators. Prorating of payments for all cooperators increased the opportunity for a higher participation rate, ultimately spreading the financial incentives further. Payments to producers for incentives and demonstration practices accounted for 62% of the WIRB funds expended. The balance of the funds went for project administration (travel, supplies, office support, salaries) and water monitoring efforts.

Figure 2. Watershed Improvement Funds

Grant Agreement Budget Line Item	Total Funds Approved (\$)	Total Funds Approved—Amended (\$)	Total Funds Expended (\$)	Available Funds (\$)
Field Demonstrations	5,000	5,000	2,000	3,000
Water Quality Monitoring	12,500	12,500	12,174	326
Supplies and Office Support	10,950	10,950	8,767	2,183
Project Administration	148,585	148,585	148,585	0
Travel Expenses	5,000	5,000	4,785	215
Engineering - Design	10,000	10,000	400	9,600
Incentives - Producers	225,000	225,000	248,841	(23,841)
Bioreactors	15,000	15,000	14,814	186
Animal Waste Facilities	50,000	50,000	16,000	34,000
Total	482,035	482,035	456,366	25,669
Difference				25,669

Actual WIRB expenditures came within 5% of the amount budgeted in the project proposal, but varied significantly on five specific line items. Only 40% of the field demonstrations line item was spent during the project even though field demonstrations were promoted throughout the project. Cooperators, while interested in trying different practices, preferred to just try new strategies such as cover crops or no-till planting on a small scale without formal demonstration

sites. Demonstration funds were used to incent cooperators into installing 2 denitrifying bioreactors.

Unplanned inkind support provided the opportunity to utilize just 80% of the Supplies and Office Support line item.

The largest variance in actual and budgeted expenditures came in the Animal Waste Facilities and Engineering line items with just 32% and 4% of budgeted dollars expended. With a very successful Mississippi River Basin initiative going on in the watershed at the same time, cooperators were able to utilize USDA-EQIP funds to install large manure storage structures which would not be possible with WIRB funds. Dubuque County NRCS reports that 10 manure storage structures have been installed and 8 more are planned in the MRBI area, with more than 1/3 in the Hewitt Creek watershed. The incentive for Animal Waste Facilities was doubled in year 5 of the project with 3 cooperators taking advantage of the added funding opportunity.

Actual expenditures for Producer Incentives exceeded the budgeted amount by 10.6%. The watershed council watched this line item closely each year, staying close to the budgeted funding while trying to maximize participation. Each year, except the final year, incentives for Soil Conditioning Index were prorated for all producers, sometimes up to 60% of the enrolled incentive payment. The council determined early in the project that providing smaller incentives to as many as possible was more important than bigger incentives for fewer cooperators. To implement this strategy in years 1 to 4, the executive committee would meet, approve and make the payments at the end of the year. This method of prorating payments proved more difficult to implement in year 5 when producer reporting of information seemed to occur much slower and IDALS ultimately approved and made incentive payments. As of the writing of this report, we are still unsure what payments might or might not be approved by WIRB/IDALS funds administration for year 5.

Figure 3. Cumulative producer incentives by year.

Incentives for Producers, Demonstrations and Animal Waste Facilities (Feedlot Runoff)						
	2010 (\$)	2011 (\$)	2012 (\$)	2013 (\$)	2014 (\$)	Total (\$)
Phosphorus Index	5,240	7,435	10,055	8,170	7,820	38,720
Soil Conditioning Index	18,710	17,788	12,379	16,771	20,774	86,422
Nitrogen Performance	9,120	5,900	4,660	5,835	7,160	32,675
Grassed Waterways	6,380	7,205	6,198	4,855	4,170	28,808
Cover Crops	2,390	3,590	9,040	11,320	11,180	37,520
Feedlot Runoff	200	2,200	2,000	400	14,000	18,800
Demonstrations	0	1,000	0	1,000	0	2,000
Other Incentives	3,730	4,850	5,250	4,776	3,290	21,896
Total Incentives	\$45,770	\$49,968	\$49,582	\$53,127	\$68,394	\$266,841

One of the most difficult things to honestly track in a watershed improvement project with multiple agencies and 60+ cooperators involved is in-kind and cash contributions. Figure 3, highlights the cash and in-kind contributions to this project. However, actual contributions to the watershed-wide effort from USDA-NRCS through MRBI-EQIP and CSP funds, Dubuque SWCD and their WIRB funding, Farm Bureau promotion of watershed activities and unreported producer expenditures, through time and cash, far exceed what we can accurately report.

Experience shows that the vast majority of cooperators under report the time, equipment and cash they invest to implement practices through a locally-developed incentive program. Effort was made to explicitly ask cooperators to document their contribution to implementing on-farm practices and new management strategies. Mixed results were received, but we can conservatively say the \$348,000 reported in figure 4 is less than the cooperators’ actual in-kind and cash contributions.

A significant shortfall is noted in the actual Iowa State University in-kind contribution. There was little documented support for engineering for denitrifying bioreactors, field day speakers, feedlot runoff consulting and campus and local office administrative support. Without the documentation, we are reluctant to report in-kind values, although all of those contributions occurred during the project.

Upper Iowa University provided tremendous support to the project through water monitoring sample collection and analysis throughout the project which was at a cost through WIRB funds and through in-kind contributions.

Figure 4. Total Project Funding

Funding Source	Cash		In-Kind Contributions		Total	
	Approved Application Budget (\$)	Actual (\$)	Approved Application Budget (\$)	Actual (\$)	Approved Application Budget (\$)	Actual (\$)
WIRB	482,035	456,366			482,035	456,366
ISU - in kind			93,722	8,658	93,722	8,658
UIU - in kind			17,500	20,932	17,500	20,932
Cooperators - in kind/cash		137,005	287,500	211,103	287,500	348,108
Council - in kind			15,250	16,980	15,250	16,980
Totals	482,035	593,371	413,972	257,673	896,007	851,044

Watershed Improvement Fund contribution: Approved application budget: % 54
 Actual: % 54

Environmental Accountability

A special emphasis in the watershed council’s benchmarks of success was placed on environmental water quality improvements. To gauge progress, the council partnered with the Upper Iowa University (UIU) Biology Department to conduct water monitoring. UIU has provided monitoring support for several northeast Iowa watershed projects and the council members like the idea of a local, independent lab to do and manage sample analyses.

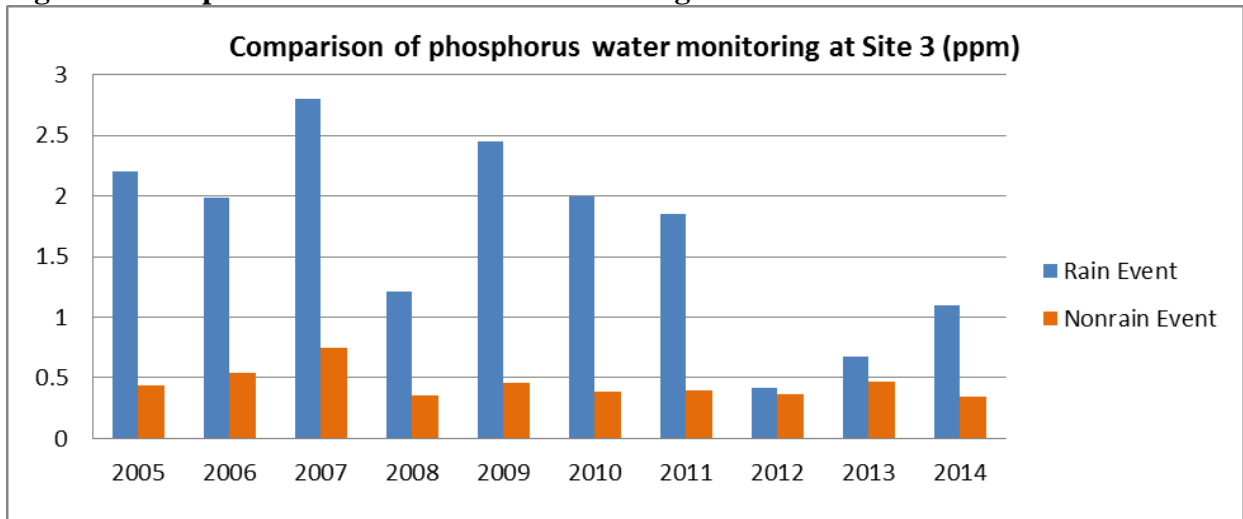
Progress toward environmental benchmarks has been positive for three measured variables: Family Biotic Index (FBI), phosphorus and nitrogen. The FBI is a measurement of the quantity and quality of macroinvertebrates found in the stream. The benchmark goal of a FBI score of 5.00 or less was achieved in 2010, however, the score rose slightly in 2011. The FBI calculation was discontinued in 2012 due to time and staff limitations. The 2010 FBI of 4.74 (good) was significantly better than the initial score of 5.83 (fairly poor) in 2005.

Figure 5. Site 3 Annual Monitoring Results

Year	FBI	Season-long rain event P (mg/L)	Season-long N (mg/L)
2010	4.74	2.00 (0.62 – 4.45)	9.8 (7.1 – 14.8)
2011	5.15	1.85 (0.20 – 5.16)	10.8 (9.2 – 16.1)
2012	not conducted	0.42 (0.34 – 0.55)	6.5 (5.8 – 7.6)
2013	not conducted	0.68 (0.24 - 1.49)	9.9 (7.2 - 13.0)
2014	not conducted	1.10 (0.28 - 1.91)	8.5 (6.2 - 13.3)

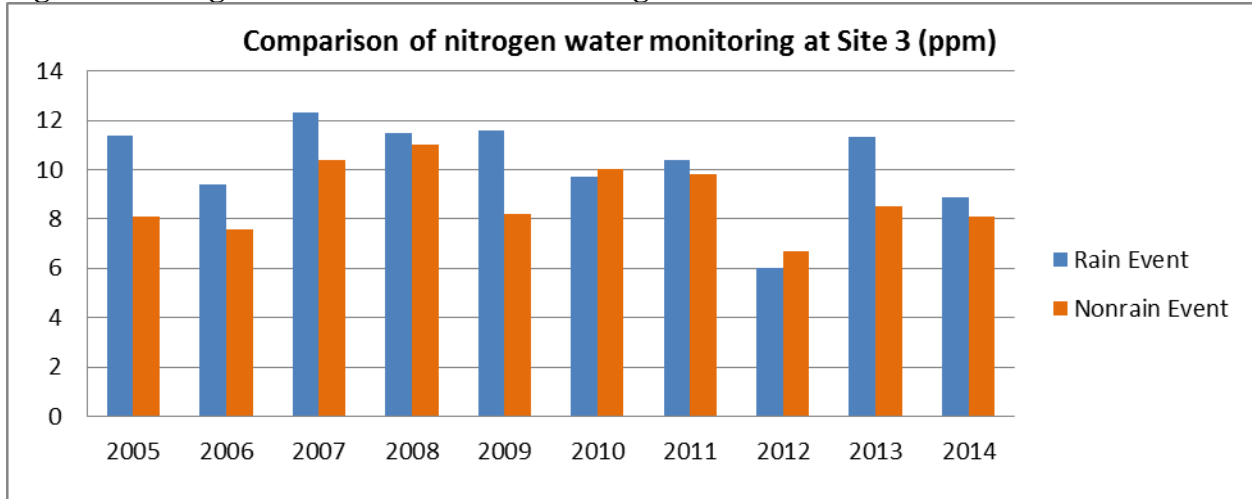
Two consecutive years of season-long rain event phosphorus (P) concentration below 1.00 mg/L was achieved in 2012 and 2013. Average rain event P rose in 2014, but was influenced by one event. Recent year’s monitoring results show great improvement over results from early on in the watershed improvement efforts. Figure 6 highlights average results for each year since 2005 for rain and nonrain event sampling. Sampling each year occurred at least monthly and following rain events greater than 0.6”.

Figure 6. Phosphorus concentration at monitoring site 3.



The nitrogen benchmark of measuring three years of season-long nitrogen concentration less than 10 mg/L was achieved in 2012, 2013 and 2014 at Site 3. Figure 7 shows nitrogen concentration for split into rain and nonrain event samples.

Figure 7. Nitrogen concentration at monitoring site 3.



Ambitious benchmark goals for Phosphorus Index (PI), Soil Conditioning Index (SCI) and cornstalk nitrate test (CNT) were not reached, however, progress toward PI and SCI goals was promising for the future. Watershed-wide and individual results were reported to cooperators annually, allowing cooperators and the watershed council to use the results for targeting of conservation management strategies and refining the annual incentive program structure.

Figure 8. Watershed average Phosphorus Index and Soil Conditioning Index values

Year	Cooperators enrolled	Farm indices calculated	Number of fields	Total acreage	Average PI	Average SCI
2010	37	34	383	9,910	2.36	0.57
2011	41	36	395	10,219	2.25	0.58
2012	45	39	390	10,121	2.19	0.59
2013	45	39	384	10,198	2.11	0.60
2014	47	39	393	10,419	2.13	0.58

A coordinated effort to complete cornstalk nitrate sampling was conducted each year and completion depended on the seasonal variation in field conditions, harvest progress and labor supply. The council typically hired a single individual to collect the samples so that results were uniform across the watershed. The CNT was one great way to get new cooperators interested in participating in the project because it provided an opportunity to collect actionable data from their farms. One challenge of using the CNT is that it can provide variable results depending on the growing season. Cooperators were encouraged to use multiple years of data before making big nitrogen management changes. When cooperators did make changes, commercial nitrogen applied to fields receiving manure was reduced.

Figure 9. Watershed-wide average cornstalk nitrate test results

Year	Cooperators enrolled	Farms sampled	Number of samples	Average CNT	Estimated N application	Estimated average yield
2010	33	20	67	1,976	174	189
2011	35	22	86	2,943	168	183
2012	37	17	66	2,741	173	164
2013	25	21	56	3,457	--	--
2014	29	23	77	3,175	208	197

Calculated sediment and phosphorus delivery reductions associated with WIRB funding were approximately 75% of targeted levels, however, this does not account for reductions made with MRBI, EQIP or CSP funding efforts. Utilizing WIRB funds cooperators reduced sediment delivery by 6,000 tons per year and phosphorus delivery by 7,800 pounds per year. Targeted levels were 8,000 tons 10,400 pounds per year, respectively. About 50% of sediment and phosphorus delivery reductions came from grassed waterways. Early sediment and phosphorus delivery reductions were not recalculated using the Sediment Delivery Calculator for cover crop acres after the Iowa Nutrient Reduction Strategy was released showing a 50% phosphorus reduction for overwintering cover crops like cereal rye.

Figure 10. Sediment and phosphorus delivery reduction

Practice	Acres or Feet	Sediment Delivery Reduction (lbs)	Phosphorus Delivery Reduction (t)
No-till planting (A)	1,776	1,526	1,982
Cover crop planting (A)	4,314	801	1,041
Contour planting (A)	8	11	14
Buffer strips (Ft)	8,810	510	663
Waterways/headlands (Ft)	66,875	3,173	4,127
TOTAL		6,021	7,827

Feedlot runoff and manure use was addressed at 10 locations with a mix of vegetative filters, rain gutters, manure spreader calibration, manure storage pads and manure holding structures. In hindsight, the goal of installing practices to address manure runoff at 25 locations with WIRB funding was unrealistic. It was a great benefit to have a MRBI project operating simultaneously as this project, but since another agency, NRCS, was leading that effort it was difficult to track implementation as closely as desired.

Two of five planned denitrifying bioreactors were installed. The reduced number was primarily due to a higher cost per site and limited interest in dedicating a location to demonstration the practice. Iowas State University researchers have been tracking water quality results from these two sites and a third one in the neighboring North Fork Headwaters watershed.

Program Accountability

The watershed council took their responsibility for managing WIRB funds seriously throughout the life of the project. The council met 4-5 times per year to review water monitoring results, plan and evaluate the incentive program, approve the budget and expenditures and provide an opportunity for cooperators to share experiences. Meeting notices/invitations were mailed to 60 watershed residents early each year and then the mailing list was pared to active participants. The council felt it important to engage the Dubuque SWCD at watershed meetings, especially with the ongoing MRBI project, so representatives were invited to each watershed meeting to do better at promoting both projects within the watershed.

The watershed council contracted with the Iowa State University Extension and Outreach to administer the project, facilitate watershed council meetings and coordinate water sampling efforts. The Extension team was responsible for developing all mailings, program forms, educational materials and promotional items. A website was developed to promote watershed activities and provide the public with more detailed information. Water monitoring reports, educational materials and administrative reports can be found on the website, along with press releases, photographs and videos.

Ten years of watershed improvement project activity have provided many opportunities for successes and challenges. A significant success from focusing an effort on water quality improvement is the development of a watershed community. The uses of water quality benefiting practices like cover crops, no-till planting and grassed waterways are evident across the watershed. The MRBI project brought funds for new and improved manure storage structures that lead to better manure management. Phosphorus Index, Soil Conditioning Index and annual cornstalk sampling provided cooperators information needed to make informed decisions about tillage, nutrient management and conservation practice strategies.

Compared to pre-project (2005) anecdotal information, Hewitt Creek watershed farmers are more likely to utilize USDA-NRCS programs, leveraging federal and state funding to implement nutrient reduction and soil saving strategies to improve water quality.

Challenges for this project included keeping cooperators motivated to expand conservation practice use or try a new soil saving or nutrient reduction strategy when the incentive payments to do so are relatively small. WIRB administrative changes imposed on the watershed council in year 5 provided additional challenges for project administration, leading to significant increases in paperwork and delays in making incentive payments. Watershed project staff do take responsibility for delays due to learning and implementing new system expectations and requirements.

All physical project records and reports are on file at the ISUEO Watershed Projects office in 201 E Clark, Ste 112, Fayette, IA. Project contacts are Chad Ingels, project coordinator and Jeff Pape, chairman, Hewitt Creek Watershed Improvement Association.

Electronic copies of watershed summaries, project reports, and educational materials can be found on the on the Hewitt Creek Watershed website: <https://hewittcreek.wordpress.com/>.

