1248-023 Dry Run Creek Watershed Improvement Project

Project sponsor: Dry Run Creek Watershed Improvement Association, Inc.

Final Project Report: July 2013 - December 2015

In 2010, a group of farmers in the Dry Run Creek sub-watershed of the Upper Iowa River came together to form the Dry Run Creek Watershed Improvement Association, Inc. (DRCWIA or watershed council) after learning that their watershed was listed on the Iowa DNR 303(d) Impaired Waters List and hearing about similar watersheds in northeast Iowa where farmers took the lead on water quality improvement. The impaired waters listing was due to high levels of indicator bacteria that exceeded state water quality criteria for Class A3 (children's recreation) uses. While the impairment information was not widely known in the area, the farmers involved with DRCWIA wanted to be leaders on the issue, rather than followers, especially since their stream flowed through the popular Will Baker Park located on the southwest side of Decorah in Winneshiek County. During the summer, the park is a popular destination for families and children who spend a significant amount of time playing in Dry Run Creek. To determine the scope of the bacteria issue, the watershed council partnered with specialists from Luther College, the Iowa Department of Natural Resources Watershed Monitoring and Assessment Section (IDNR) and Iowa State University Extension and Outreach (ISUEO) to develop and implement a water monitoring and stream assessment plan. The resulting monitoring and assessment strategy produced a thorough data set that affirmed the impaired waters listing and identified potential sources during rain event and non-rain event sampling. With two years of data, the watershed council believed they had adequate information to understand the impairment, coordinate with the previously mentioned partners plus the Winneshiek Soil and Water Conservation District (SWCD) and implement locally-prioritized solutions to reduce the level of indicator bacteria in their stream.

The primary goal of the watershed council is to have their stream removed from the Iowa DNR 303(d) impaired waters list so that children can safely play in Dry Run Creek. To pursue this long-term goal, the watershed council identified the following short-term benchmarks of success and requested $99,750 from the Iowa Watershed Improvement Review Board (WIRB) to implement a two-year watershed improvement project.

Benchmarks of success:

1) Improve runoff controls at 5 feedlots.
2) Install vegetative filter strips or seed cover crops on 20 fields receiving manure applications.
3) Restrict livestock stream access or provide an off-stream watering source at 6 of 17 watershed locations where livestock currently access the stream.
4) Complete 10 manure spreader calibrations.
5) Achieve a recreation season indicator bacteria (E. coli) geometric mean less than the Class A2 criterion of 630 orgs/100 ml at monitoring site DRC 19.
6) Attain project participation rate of 50% of farm operators along Dry Run Creek.

Approved 3/26/2015

2015 DRY RUN CREEK PERFORMANCE-BASED WATERSHED ENVIRONMENTAL INCENTIVE PROGRAM

Please check activities you wish to complete. The watershed council encourages project cooperators to access funding from NRCS. Watershed council funding can be used to supplement any NRCS funding.

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 NO_3N 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).
____$25 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).
____$200 Managed grazing (5 or more paddocks).
____$200 Farmstead or Streambank Assessment.
____$0.75/ft., maximum 3,000 ft., new, repaired or reconstructed waterways, headlands, buffers or below feedlot grass filter - min. 30' width. Must be maintained for 5 years, may be hayed or grazed, min. 25# grass-legume mix/acre or comparable seeding.
____$5000 New or improved feedlot runoff controls –consulting with Extension Ag Engineer.
____$3000 Livestock stream crossing - per stream access point (max 2/landowner or operator)

WATERSHED ENVIRONMENTAL PERFORMANCE

____$200 Bonus for achieving 50% 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

Received by Dry Run Creek Watershed Improvement Association

Figure 1. Dry Run Creek watershed 2015 incentive program form.

To create interest in the watershed improvement project, the watershed council developed an innovative incentive program based on incentives sponsored by a handful of other farmer-led watershed projects in northeast Iowa. The 2015 incentive program is shown in Figure 1. The watershed council reviewed the incentive structure annually to evaluate incentives that were or were not being utilized and adjusted payment levels accordingly, based on the benchmarks of success detailed in the project proposal.

During the two and one-half years of the project, 22 farmers participated in the watershed improvement effort. Cover crop seeding was the most popular incentive used by cooperators, probably due to increased emphasis on the practice through state-wide cost-share efforts and publicity about the Iowa Nutrient Reduction Strategy.

Performance measures like the Phosphorus Index, Soil Conditioning Index and Cornstalk Nitrate Test were included in the program, but not used extensively by participants. Livestock exclusion incentives had limited use, primarily to implement stream crossings, while feedlot runoff control incentives were not used despite an offered incentive rate up to $5,000 per location.

Financial Accountability

The watershed council gave serious consideration to incentives levels as they reviewed the payment rates annually. The initial incentive offering in 2013 was comprised of just a cover crop seeding incentive rate of $25 per acre for up to 40 acres per cooperator. Twelve cooperators seeded 473 acres of cover crops in the fall of 2013. A mini-grant from the Heartland Water Quality Project (HWQP) aided cover crop seeding the first year, in addition to WIRB funding.

The full incentive program was offered in 2014 with rates similar to the 2015 incentive program shown above. The only difference was that the feedlot runoff incentive in 2014 was $3,750. The rate was increased in 2015 to promote practice implementation. Most watershed council members and potential cooperators said that payment rate was still too low or they didn't have enough time to plan or gather more information about how they might be able to use the incentive along with EQIP funding.

Figure 2. Watershed Improvement Funds

Grant Agreement Budget Line Item	Total Funds Approved ($)	Total Funds Approved—Amended ($)	Total Funds Expended ($)	Available Funds ($)
Water Monitoring	$ 8,000		$ 8,000	$ 0
Manure Spreader Calibration	2,000		1,400	600
Travel Expenses	4,000		889	3,111
Feedlot Runoff Controls	18,750		0	18,750
Field Practice Incentives	40,000		38,027	1,973
Livestock Exclusion	27,000		9,450	17,550
Total	$99,750		$57,766	$41,984

Figure 2 shows the proposed budget and expenditures for WIRB funds. Cooperator incentive payments are included in the following line items: manure spreader calibration, feedlot runoff

controls, field practice incentives, livestock exclusion. A breakdown of cooperator incentives is included in Figure 3. The watershed council was disappointed with the limited use of livestock exclusion and feedlot runoff control incentives. However, they believe a longer project, with more education for producers would have increased adoption. Manure spreader calibration use increased in 2015 with better outreach to livestock producers.

Figure 3. Cumulative cooperator incentives by year.

Financial Incentives for Cooperators (WIRB & Heartland WQP Funding)				
	2013 ($)	**2014 ($)**	**2015 ($)**	**Total ($)**
Phosphorus Index			2,950	2,950
Soil Conditioning Index			7,040	7,040
Nitrogen Performance		1,140	2,630	3,770
Manure spreader calibration		400	1,000	1,400
Cover Crops	7,990	4,484	5,978	18,451
Grid sampling			600	600
Managed grazing		200	200	400
Farmstead or Stream Assessment				0
Grassed waterways		5,310	1,856	7,166
Feedlot runoff control				0
Livestock crossing/exclusion		6,000	3,450	9,450
Total Incentives	$7,990	$17,534	$25,704	51,227

A highlight of the project was the significant water monitoring program that Luther College students implemented with leadership from Jodi Enos-Berlage. Two years of additional data was collected during the project at 11 sites throughout the watershed. The stream water quality data compiled prior to and during the project is arguably the most comprehensive stream monitoring dataset for an Iowa HUC 12 watershed outside the IDNR water monitoring network.

This watershed improvement project was a true cooperative effort with funding from WIRB and led by watershed council leaders, Luther College faculty and ISU Extension specialists. The small funding allowance by HWQP also helped to get water monitoring started early in 2013. Direct and in-kind funding from contributors is included in Figure 4. Complete in-kind contributions from Luther College, ISUEO and watershed council leaders and cooperators were difficult to track during the project, but best efforts were made to provide accurate accounting of these sources.

Chad Ingels and Charles Wittman from ISUEO provided administrative and programmatic support to the project through grant writing and reporting, preparation of reimbursement requests, meeting facilitation, preparation of education information, and communication to watershed residents and to the general public through mailings, news releases and the council's website. In-kind support provided by ISUEO came through the Sustainable Corn project, more formally known as the Climate Change, Mitigation, and Adaptation In Corn-Based Cropping Systems Project, funded by USDA-NIFA. By design, Ingels and Wittman were able to dedicate limited time to the project, with approximately 3 days and 1 day per month, respectively.

Council chairman, Paul Hunter, did a significant amount of outreach to promote the project by encouraging participation in the incentive program and attendance at council meetings. During 2015, he also led the effort to calibration manure spreaders in the watershed, meeting the annual goal. Several other farmers also regularly attended council meetings and their in-kind additions to the project have been recorded.

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	99,750	57,766			99,750	57,766
ISU - in kind			16,600	30,666	16,600	30,666
Luther - in kind			4,000	10,000	4,000	10,000
Cooperators - in kind/cash			49,250	50,884	49,250	50,884
Council - in kind			2,750	4,084	2,750	4,084
Heartland WQP - cash		5,251				5,251
NRCS-EQIP		2,937				2,937
Totals	$99,750	$65,954	72,600	$94,634	$172,350	$161,588

Watershed Improvement Fund contribution: Approved application budget: % 58
Actual: % 36

While the council was disappointed at the participation rate, the tracking of project funding shows there was great support for the project, nearly reaching the total budget amount with a substantially smaller contribution from WIRB than initially budgeted. Extending the project timeline would have most certainly led to more participation from farmers.

Environmental Accountability

As mentioned previously, the water monitoring effort led by Luther College was tremendous in providing data for the watershed council. During the years of monitoring, 14 sites have been monitored, with 11 sites being regularly sampled during 2015. A mix of sites included ones with and without direct livestock. Additionally, the northern part of the watershed did not previously show high delivery of nutrients or bacteria, so more intense sampling was done in the southern subwatersheds. Figure 5 shows water monitoring locations across the watershed.

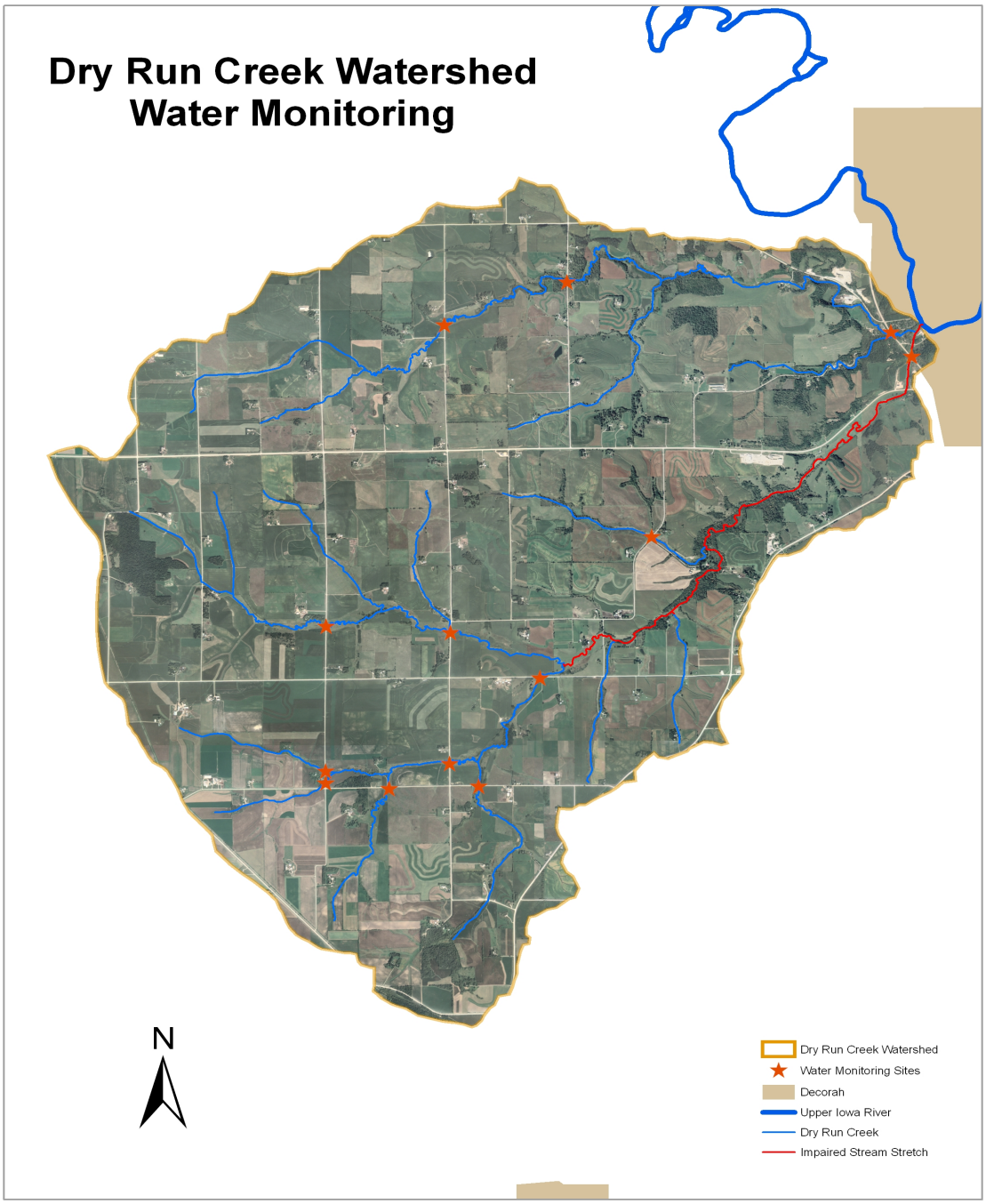


Figure 5. Water Monitoring Locations

Stream sites were monitored 1-2 times/month during non-rain periods and within 24-hr of substantial rain events (>0.5 in). Equipment purchases by Luther College allowed for all collection and sample analysis by Luther College students and their faculty advisor during 2013

and 2015. Twenty-four samples were collected at each of 10 locations during 2013 and twelve samples were collected at each of 11 locations during 2015. Four main points from the Dry Run Creek Water Monitoring 2015 Report highlight findings from the E. coli monitoring:

- Monitoring data identified segments of the watershed that were more prominent contributors of E. coli, and correlations were observed between levels of E. coli and several nutrient parameters.
- Interestingly, distinct sites emerged as more prominent contributors of E. coli during rain vs. non-rain events, suggesting different types of sources. Dry weather E. coli sources include direct deposition of fecal matter by livestock or wildlife and/or disturbance of fecal bacteria in stream sediment reservoirs, while wet weather sources would include field applied manure or feedlots that lack sufficient runoff controls.
- Significant variability was observed for E. coli levels during the monitoring period. Both the rainfall amount and the time elapsed between the rain event and the sampling influenced E. coli levels during wet weather conditions.
- Unfortunately, significant decreases in average E. coli levels were not observed during the monitoring period, for either rain or non-rain event sampling. [Significant increases were also not observed.] However, these results should be evaluated in the context that conservation practice implementation goals for at least some areas specifically targeted for incentive improvement practices were not realized.

The Luther College monitoring team regularly updated the council with results and trends they were seeing. Results showed stark differences between non-rain and rain event sampling.

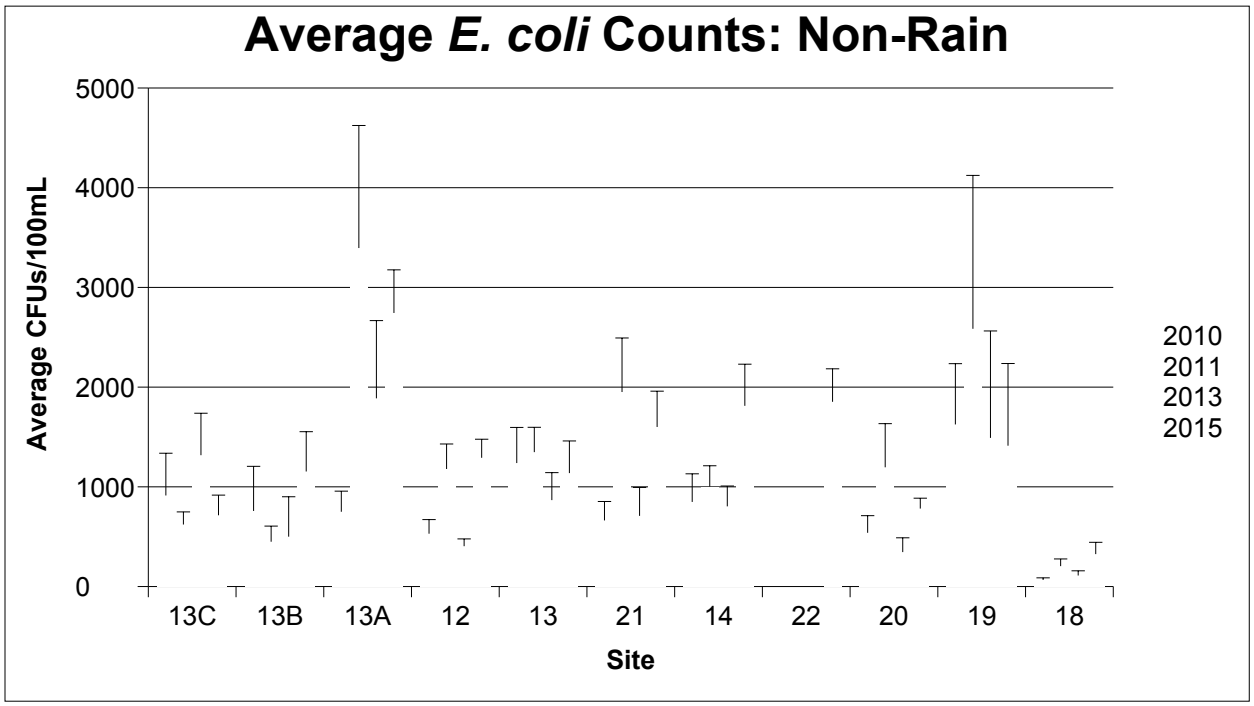


Figure 6. Average E. coli counts (CFU/ml) during non-rain sampling.

Findings from non-rain sampling include:

- Most sites have average E. coli levels higher than the Iowa State water quality standard (single sample maximum) for primary recreational use (235 CFU/ml), but lower than the standard for secondary recreational use (2880 CFU/ml). Site 19 is classified as primary, while other sites have not been classified.
- There is substantial variability among sites and sampling years, but sites 13A and 19 appear to have consistently higher E. coli averages.
- Although most sites showed a decrease in average E. coli levels in 2013, 2015 levels returned to those approximating 2012 (or above, as in site 13B and site 14). Hypothesis: 2013 was a flood year, and high water levels may have had a diluting effect on E. coli levels, and/or E. coli reservoirs may have been 'flushed out'.

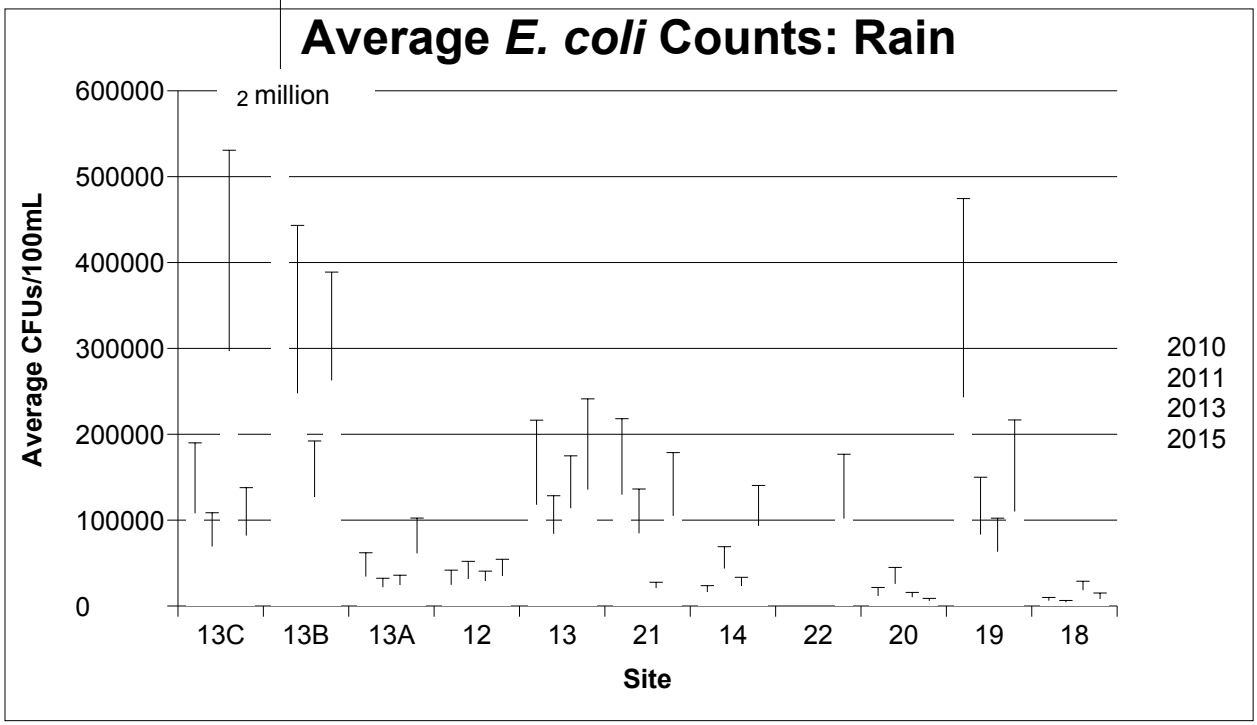


Figure 7. Average E. coli counts (CFU/ml) during rain event sampling.

As can be seen in Figure 7, average E. coli levels during rain events increase substantially, and are consistently higher than state standards. Additional findings include:

- There is greater data variability during rain events, with analysis suggesting that E. coli levels are strongly influenced by amount of rain, timing of sampling, pre-rain soil moisture, and site location.
- Sites 13C, 13B, 13, 21, and 19 have consistently higher averages. These sites are all connected.
- Data do not show major differences over the study period. 2015 data may be inflated due to low sample size (four) and a 'mega-rain (~ 3 in) being one of these.

The full report, prepared by Jodi Enos-Berlage, Ellen Badger and Joel Denney, includes data on turbidity, nitrate+nitrite nitrogen, total phosphorus, ammonia nitrogen, and macroinvertebrates. The water monitoring report is available upon request.

As noted above, significant decreases in E. coli were not observed during the project, however, progress was made toward achieving other benchmarks of success. Figure 8 shows the cover crop benchmark and progress documented each year where cooperators received incentives from WIRB or HWQP funding. Cooperators could receive incentives on up to 40 acres annually.

Figure 8. Cover crop seeding by year

Benchmark	Year	Cooperators enrolled	Number of fields	Total acreage	Avg. acreage per farm
Install vegetative filter strips or seed cover crops on 20 fields	2013	12	32	473	39.4
	2014	7	25	305	42.9
	2015	9	29	239	26.5
	Unique cooperators	16		1012	

As shown in the table, cooperators quickly surpased the cover crop seeding goal and also added to it when four cooperators seeded 7,080 feet of grassed waterways during 2014.

Cooperators restricted livestock stream access at 4 locations along Dry Run Creek. This was two-thirds of the goal of protecting 6 locations. Three of the sites included stream crossings, while the fourth site was stream-side fencing.

There was no progress on the benchmark of adding feedlot runoff controls during the project, as mentioned earlier. However, seven of 10 planned manure spreader calibrations were completed that should lead to better manure management planning in the future.

Project participation fell short of 50% of watershed farmers, however, when measuring targeted producers closer to the stream it came very close to that rate as the project came to a close.

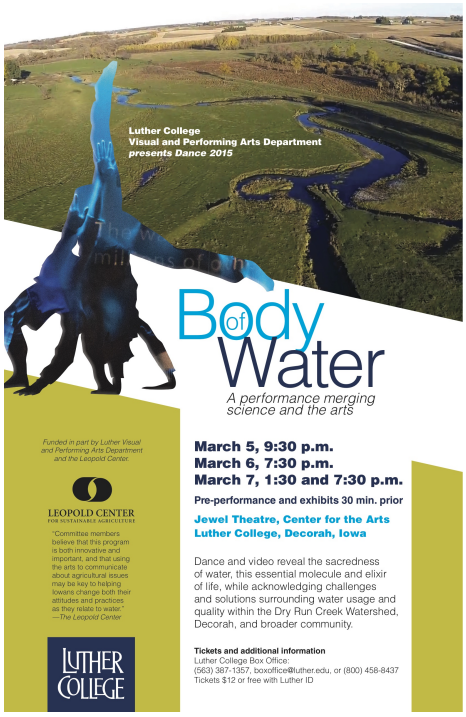
Five cooperators utilized cornstalk nitrate testing during the project, with four receiving bonuses for achieving optimal levels of stalk nitrate at the end of the season (less than 1,700 ppm).

Six cooperators completed Phosphorus Index (PI) and Soil Conditioning Index (SCI) calculations on a total of 1,768 acres. The farm average PI results were all in the low or very low category (less than 2.00), ranging from 0.72 to 1.54. Farm average SCI results were all positive (higher is better), ranging from 0.09 with high tillage, organic management on more fragile soils to 0.84 in a notill system. Incentives for these two measurements were based farm average values achieved due to management practices.

Program Accountability

The watershed council took responsibility for managing WIRB funds through the incentive program seriously throughout the life of the project and spent considerable time at watershed council meetings evaluating incentive payment rates. The council met 2 to 3 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 invitations were mailed to approximately 115 watershed residents each year. In 2015, a brochure highlighting the incentive offerings and project progress was mailed to the full mailing to encourage participation. The "working list" of targeted farmers included about 45 farm operations as there are quite a number of nonfarming rural residents in the watershed.

Chairman Paul Hunter and Jodi Enos-Berlage, water monitoring leader and watershed resident, took the lead in promoting farmer participation through personal contacts in the watershed. ISUEO staff supported those efforts through preparing news releases and mailings to the watershed.



A great opportunity that highlighted the watershed came from *Body of Water*, a dance and educational performance presented by the Luther College Visual and Performing Arts department in March of 2015. Four presentations of the performance were sold out locally and the performance received coverage from the Des Moines Register. The performance was later presented at the 2016 Iowa Water Conference.

The Dry Run Creek resident-led watershed improvement showed many methods of leadership and cooperation between the watershed council, Luther College and Iowa State University Extension that proves there are opportunities to implement a larger, more broadbased watershed improvement effort in the future. A brief, two-year project provided a firm based for additional work in the watershed. There is a core group of leaders willing and ready to move to the next step by setting even more ambitious and targeted goals. Water monitoring data is available to show specific areas of concern that remain and the local farmers already have ideas for water quality solutions.

All physical project records and reports are currently on file at ClearWater Ag Strategies, LLC., 13298 130th St, Randalia, IA. Project contacts are Chad Ingels, project coordinator; Paul Hunter, chairman, Dry Run Creek Watershed Improvement Association; and Jodi Enos-Berlage, Luther College faculty.

Information about the watershed improvement project can be found online at the Dry Run Creek Watershed Council website: https://dryrunwinneshiek.wordpress.com/.