

**Duck Creek Watershed
“Duck Creek Buffer Program”**

Final Project Report

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Financial Accountability

The Duck Creek Buffer Program exceeded its best management practices goal with less cost than originally anticipated. As shown in Table 1, fewer funds were expended than those approved in all expenditure categories except for Personnel – the entire pool of Personnel funds was required to fully administer the grant. In total, approximately half of the WIRB funds were required to complete the Duck Creek Buffer Program. Several reasons for this outcome are discussed below.

Expense Category	Approved Funds	Expended Funds	Available Funds
Davenport Buffer Implementation	\$50,000	\$17,199	\$32,801
Bettendorf Buffer Implementation	\$50,000	\$29,243	\$20,757
Print Materials for Public Meetings	\$5,750	\$1,543	\$4,207
Media Campaign	\$2,500	\$1,080	\$1,420
Mailings/Workshops/Public Meetings	\$2,500	\$602	\$1,898
Personnel	\$10,000	\$10,000	\$0
Water Quality Testing Kits	\$3,625	\$725	\$2,900
TOTAL:	\$124,375	\$60,392	\$63,983

Table 1: WIRB Funds Expended.

The implementation costs of the Duck Creek Buffer Program were budgeted in anticipation of the many challenges that can rise in selecting locations for and installing buffers, including engineering hurdles, site pre-cleanup, erosion control, and excavation. As the program commenced, the initial buffer installed at Brady Street in Davenport experienced many of these challenges and likewise resulted in the largest cost per acre installed. Thereafter, however, additional buffers were placed on turf grass areas that required minimal effort, and thus little cost, to prepare for seeding.

Non-implementation costs, including Print Materials, Media Campaign, Mailings, Workshops, Public Meetings, and Water Quality Testing Kits were budgeted higher than necessary. River Action is well equipped to issue press releases, post information on our website - www.riveraction.org, and utilize our membership magazine to inform the public about our projects at no or very little cost. Workshops were predominately completed in 2009 along with a public mailing to pave the way for the buffer program, and together were much less expensive than anticipated. After the buffers were installed, signage was

designed and placed at the buffers to delineate and educate about their purpose. Signage was the largest Media Campaign cost. Furthermore, River Action has advocated for and will continue to promote Best Management Practices through other in-house programs, including our long-running “Retain the Rain” campaign, and thus other printings and media formats outside of the scope of this grant have supported water quality education without deducting from project funds.

The grant also provided funds for a volunteer water-testing campaign. An initial batch of water quality testing kits was ordered in May 2010 to test public response. This was considered phase one in anticipation of expanding the campaign through additional phases. During phase one, a letter was sent to all landowners along Duck Creek to inform them about the Buffer Program and to invite volunteers to obtain water-quality testing kits from River Action as a cooperative effort to assess Duck Creek water quality. The letter detailed the goals of having participants’ data compiled, analyzed, and displayed on the River Action “Retain the Rain” web page. Around the same time, nearly three dozen kits were directly distributed to a Bettendorf Scout group in association with a presentation about water quality. Unfortunately, the participant response from these efforts was very poor. We later learned that Partners for Scott County Watersheds and Scott County Soil and Water Conservation District were working with IOWATER Volunteer Water Quality Monitoring to develop a water quality testing campaign in Scott County, inclusive of Duck Creek. For these reasons, we found no justification to expend more WIRB grant funds on additional Water Quality Testing Kits or the marketing and administrative costs required to seek out and place them in the hands of volunteers.

Funding Source	Cash		In-Kind Contributions		Total	
	Approved Budget	Actual	Approved Budget	Actual	Approved Budget	Actual
WIRB	\$124,375	\$60,392	\$0	\$0	\$124,375	\$60,392
River Action	\$74,375	\$48,817	\$0	\$0	\$74,375	\$48,817
City of Davenport	\$0	\$0	\$25,000	\$13,999	\$25,000	\$13,999
City of Bettendorf	\$0	\$0	\$25,000	\$200	\$25,000	\$200
Total:	\$198,750	\$109,210	\$50,000	\$14,199	\$248,750	\$123,408
WIRB Contribution Percentages			Approved		50%	
			Actual		49%	

Table 2: Cash, In-Kind contributions, and Contribution Percentage by source.

As shown in Table 2, the total matching funds that were utilized were adequately proportionate to the requested WIRB funds. However, River Action exceeded its proportion and the City of Davenport provided robust in-kind contributions in order to make up for low in-kind installation contributions by the City of Bettendorf. The City of Bettendorf insisted that their contribution be considered as long-term maintenance in lieu of contributing taxpayer dollars up-front. This was primarily because the Parks and Recreation Department recently had a similar buffer project fail on park property. In contrast, it was soon learned that Bettendorf’s Public Works department was hard at work doing stream bank stabilization and naturalization projects at several other locations in

the Duck Creek Watershed (these are described in more detail in the next section). River Action found the tradeoff of increasing its monetary proportion to secure additional buffer acreage in Bettendorf’s parklands worth while. Ultimately, this concession led to the inclusion of buffers at Palmer Hill’s Golf Course.

Environmental Accountability

In 2006 and 2008 Section 305(b) water quality assessments reported *E. coli* levels that exceeded state standards for Duck Creek’s designated use classification. These results were cause for concern since *E. coli* bacteria correlate with fecal contamination and increased prevalence of related human illnesses. The standard for *E. coli* levels in Duck Creek is a geometric mean (GM) of 126 organisms/100mL and a single sample maximum (SSM) of 235 organisms/100 ml. Some water samples from Duck Creek had *E. coli* values as much as 10 to 100 times greater than these standards.

River Action spearheaded the creation of the Duck Creek Watershed Plan in 2008, which resulted in a comprehensive watershed management plan. Around this time, the Iowa Department of Natural Resources Watershed Improvement Section began assembling a Water Quality Improvement Plan for Duck Creek (completed in 2010) detailing a Total Maximum Daily Load (TMDL) for *E. coli* bacteria. The TMDL analyzed the previously acquired water sample data and detailed a long-range plan for monitoring and correcting the *E. coli* problem. These two plans were key proponents of the Duck Creek Buffer Program.

The Duck Creek Buffer Program was designed to improve water quality in Duck Creek. Native vegetation buffers were recommended by the Duck Creek Watershed Plan 2008 as a best management practice and were also recommended by the Duck Creek TMDL to help correct the *E. coli* problem. Native vegetation buffers offer several benefits to water quality, including reduction of the priority pollutant, *E. coli* bacteria. The Duck Creek Buffer program located most of its buffers on pet-friendly parklands in the cities of Davenport and Bettendorf. These buffers can reduce the amount of bacteria entering Duck Creek by creating areas that not only deter use by pets, but are also avoided by common and prolific *E. coli* carriers like ducks and geese. In addition, buffers intercept bacteria in contaminated runoff that flows into them from adjacent mowed areas where these and other animals typically leave bacteria-ridden feces. Other buffer benefits include their natural abilities to absorb and filter fertilizers, pesticides, and other chemical contaminants, as well as reduce erosion and create wildlife habitat.

Practice	Unit	Approved Application Goal	Amount Accomplished	% Complete
Riparian Buffer Strips (*and Upland Buffer Strips following amendment)	Acres	16	19	119%

Table 3: Approved versus accomplished practices.

The Duck Creek Buffer Program established approximately 19 acres of short stature (generally less than 4 feet) native grasses and forbs in the Duck Creek Watershed, or nearly 20% more than the original goal (see Table 3). Some of these buffers were

streamside while others were on adjacent uplands, but all were installed on areas that contribute and intercept runoff flowing directly into Duck Creek or indirectly via one of its major tributaries. Where possible, the buffers were constructed at least 30 feet wide perpendicular to the flow across the topography. Please view the Duck Creek Buffer Map and photographs accompanying this report for a comprehensive view of the project scope and accomplishments.

Clare Kerofsky at Scott County Soil and Water Conservation District calculated a conservative estimate of the total amount of acreage treated by these buffers. This analysis yielded approximately 49 acres of treated drainage area, including the 19 acres of buffers plus 30 acres of adjacent mowed open space and residential neighborhoods. Though in-field data is not yet available to calculate actual pollutant load reductions, estimated reductions for total nitrogen (TN), total phosphorous (TP), and total suspended solids (TSS) were calculated using the IL EPA's Urban Runoff spreadsheet. The BMP category selected for the calculation was "Vegetated Filter Strips" and the treated drainage areas were estimated as 29 acres of open space and 20 acres of residential. Similarly, *E. coli* reductions were estimated using existing data related to bacteria loads and the effectiveness of filter strips in residential settings. According to the Duck Creek Water Quality Improvement Plan/Total Maximum Daily Load, residential areas receive approximately 1.77E+10 bacteria per acre per day from pet waste. This document also suggests that vegetated filter strips can reduce bacteria by approximately 43-57%. For the bacteria calculation, all acres were assumed to have residential bacteria loads and the buffers were assumed to perform the median reduction effectiveness of 50%. The estimated yearly load reductions calculated from the IL EPA spreadsheet and TMDL for the 49-acre project drainage area are shown in Table 4.

	Pre-BMP Loading	Post-BMP Loading	Load Reduction
TN	68 lbs./yr.	41 lbs./yr.	27 lbs./yr.
TP	12 lbs./yr.	6 lbs./yr.	5 lbs./yr.
TSS	3,660 lbs./yr.	988 lbs./yr.	2,672 lbs./yr.
<i>E. coli</i>	3.17E+14 bacteria/yr.	1.58E+14 bacteria/yr.	1.58+14 bacteria/yr.

Table 4: Estimated pollutant loading and reductions for 19 acres of buffers plus 30 acres of contributing drainage areas.

It should be noted that the Duck Creek Buffer Program was not alone in its efforts to improve water quality in the Duck Creek watershed. The City of Davenport made citywide policy changes in 2011 to significantly reduce mowing on parklands, including the ceasing of mowing within 50 feet of center stream. In total, over 300 acres of Davenport parkland associated with the Duck Creek watershed were pulled from mowing in 2011. Similarly, the City of Bettendorf's Public Works Department oversaw significant strides in stabilizing and naturalizing the banks of a portion of Duck Creek as well as two of its primary tributaries: Stafford Creek and Greenway Creek. The City of Bettendorf spent nearly \$2 million to conduct these projects as part of their NPDES storm water permit.

The combination of best management practices stemming from the Duck Creek Buffer Program and the independent city initiatives are expected to result in measurable in-field pollutant reductions in Duck Creek, especially reduction of *E. coli*. Unfortunately, good baseline loads for pollutants besides *E. coli* were not documented in the TMDL and useable data from Scott County Soil and Water Conservation District is still lacking. To remedy this, the Partners of Scott County Watersheds and Scott County Soil and Water Conservation District have been working to enact a water-monitoring plan based on the TMDL recommendations. Duck Creek will continue to be monitored for a total of 3 years by the Scott County Soil and Water Conservation District with support from the Iowa Department of Natural Resources Watershed Monitoring & Assessment Program and municipalities. Future water monitoring will focus on better understanding the *E. coli* bacteria impairment, and will also measure flow, turbidity, chloride levels, dissolved oxygen, pH, and temperature. Municipalities will support the overall Duck Creek effort by measuring *E. coli*, optical brighteners, and chloride levels in targeted subwatersheds of Duck Creek.

Program Accountability

The primary challenge for this project was finding locations for buffers that were agreeable to landowners and of significant enough size to warrant installation. The private landowner response to the initial recruitment campaign was poor, and thus the focus for the project was shifted to installing buffers on public lands owned by the cities of Davenport and Bettendorf. This approach quickly manifested in several acres of buffers on park managed property in Davenport and Bettendorf. This initial selection was installed in late 2009 through 2010. As additional sites were considered, Davenport was quick to aid in buffer site selection while Bettendorf was reluctant (due primarily to the issues stated above in the Financial Accountability section). By the end of 2010, it was expected that the project would end in June 2011 with approximately 7.56 acres of buffers installed in Davenport and just over 2 acres installed in Bettendorf. Combined, these buffers would have been 6 acres short of the 16-acre goal.

Fortunately, grounds management at the City of Bettendorf's Palmer Hills Golf Course learned of the buffer program near the end of 2010 and were quick to request enrollment in the Duck Creek Buffer Program. Palmer Hill's southern extent is adjacent to Duck Creek, though the golf course first drains to Stafford Creek, a major tributary. In early 2011, over 9 acres of buffers were designed and planned for the golf course. The buffers were installed at Palmer Hills in June following WIRB approval to extend the grant through the end of 2011.

In the end, the Duck Creek Buffer Program was a success. It was particularly successful in relation to its efficient use of funds to achieve more acreage of buffers than the original goal. However, this outcome was not the result of well-laid plans, but rather patience and persistence in the face of ever-present uncertainty. Perhaps this heightened uncertainty is to be expected when executing a regional program as opposed to a site-based project, but this program would have benefited from additional time spent doing reconnaissance and building relationships with landowners prior to submitting the grant application.

The Duck Creek Buffer Program relied on the assumption that the cities of Davenport and Bettendorf and perhaps private landowners would readily commit land to the program once money was made available by the grant. In reality, this was not the case. Contrary to expectations, the cities were relatively slow to respond to their commitment and the Duck Creek Buffer Program education campaign did not persuade private property owners to enroll land in the program.

Even though Davenport and Bettendorf had offered in-kind match at the time the grant was written, shifting that commitment to establishing actual project sites proved difficult. This was the result of several factors, including changes in city personnel and lack of communication between different departments within the cities. Some city personnel voiced concerns over public perception of native plants versus mowed turf grass, and thus these folks were particularly conservative in authorizing buffer areas in high profile areas. However, note that the new “no mow” policy established in Davenport in late 2011 is a significant departure from the policies under which the Duck Creek Buffer Program operated and presents newfound future partnership opportunities. Likewise, as evident by the significant stream stabilization projects spearheaded by Bettendorf’s Public Works, there are certainly folks within the City of Bettendorf that may serve as future partners to lobby for additional buffers on property managed by Parks and Recreation.

In hindsight, the lack of involvement by private landowners might have been predicted since most private landowners along Duck Creek and its main tributaries have relatively small lot sizes. It follows that committing land of sufficient size for a proper buffer was either not feasible for most landowners or not perceived worth their loss in useable outdoors space. Perhaps a program focused on rain gardens and other BMP’s in the Duck Creek watershed would be better suited for private residents.

In conclusion, the Duck Creek Buffer Program exceeded its buffer acreage goal and did so more cost effectively than expected. Admittedly, however, parts of the education campaign, such as the water quality testing kits, were as poorly received as the invitation for landowners to receive compensation for putting buffers on their land. In total, we believe the Duck Creek Buffer Program was a success and one worthy of replication, with tweaking, in the future. It would seem public opinion of best management practices is improving and that programs such as this will have even greater reception and impact in years to come. However, unlike the relatively controlled circumstances of well-delineated site-based projects, we emphasize the necessity of patience and persistence in proportion with the ambitions of regional programs to overcome the inescapable uncertainties that come with the territory.