Ludlow Creek Watershed Project

#8011-007

January 2009 – December 2011

Final Project Report

X Lynn Stock

Lynn Stock, Allamakee SWCD Chairman

Financial Accountability

A total of $405,304.08 of the $496,300 Watershed Improvement Funding awarded to the Ludlow Creek Watershed Project has been spent during the three-year term of the project on the installation of sinkhole filter strips, grade stabilization structures, agricultural waste structures, and terraces (Table 1) in the 9,827 acres watershed. The total amount of funds requested during the project was $420,870, which leaves $75,430 that were never requested and $15,565.92 that are left to be returned to WIRB.

Table 1. WIRB budget for Ludlow Creek Watershed Project

Grant Agreement Budget Line Item	Total Funds Approved ($)	Total Funds Approved – Amended ($)	Total Funds Expended ($)	Available Funds ($)
Travel/Training	$900	$900	$900	$0
Information/Education	$1,350	$1,350	$640.12	$709.88
Salary/Benefits	$150,000	$150,000	$132,213.77	$17,786.23
Streambank Stabilization	$10,500	$10,500	$0	$10,500
Pasture/Hayland Mgmt	$33,750	$21,513	$0	$21,513
Grade Stab. Structures	$45,000	$56,387	$58,537.75	($2150.75)
Manure Mgmt Systems	$110,000	$110,000	$115,450.00	($5450.00)
Terraces	$38,000	$54,500	$33,812.44	$20,687.56
Filter Strips	$78,000	$63,750	$63,750	$0
Livestock Exclusion - Timber	$9,000	$7,600	$0	$7,600
Livestock Exclusion – Stream	$3,000	$3,000	$0	$3,000
Livestock Exclusion – Flash Grazing	$1,800	$1,800	$0	$1,800
No-Till	$15,000	$15,000	$0	$15,000
Totals	$496,300	$496,300	$405,304.08	$91,014.26

The total cost of the Ludlow Creek Watershed Project was $1,123,236.63, of which $923,950.74 was for practice installation. The approved application originally called for leveraging WIRB funds with EQIP and WHIP. In the initial application, 37% of the total project funds, $496,300, were budgeted to come from WIRB (Table 2). The actual WIRB contribution to the project was 36.1%. Of the money budgeted for practice installation ($1,091,700 when including landowner contributions), 31.5% was planned to come from WIRB funding. The application called for 15% - 25% of WIRB funding if matched with EQIP or WHIP. WIRB funding accounted for 29.4% of the project's practice costs ($271,550.19). Approximately 41.5% of the practice budget was planned to come from EQIP funding and 22.4% from landowners. EQIP accounted for 42.1% ($389,156.28), and landowners accounted for 28.5% of the practice payments ($263,244.27).

The biggest differences between the approved budget and actual amounts expended from WIRB funds were due to a lack of implementation of stream bank stabilization, livestock/pasture practices, and new no-till acres. At the start of the project, a few landowners expressed interest in doing stream bank stabilization, but then decided not to. Because this is a smaller watershed (Figure 1) with many 1st-order stream segments, many of the stream lengths would not be appropriate sites for stream bank stabilization.

At the start of the project, there were goals of having many pasture management and livestock exclusion practices installed, but many of the livestock producers reduced their herd sizes or sold their herds and also reduced their pasture acres (Figure 2). In 2008, there were an estimated 582 acres of pasture, but in 2011 there were 459 acres of pasture, a reduction of 123 acres. Only 8.9 acres of pasture management were conducted, and all of the funding came from EQIP, so no additional WIRB funds were spent on these acres.

The pre-project survey identified several landowners that were interested in receiving no-till cost-share dollars and as a result the no-till practice incentive was included as part of the Ludlow Creek Watershed Project. Unfortunately, the majority of the interest in the no-till incentive was received from landowners that were already implementing no-till. These landowners felt that they should receive an incentive to help them continue with their no-till systems.

The no-till funds set aside in this project were not used because there was difficulty determining how to fairly administer the dollars to landowners because the farmers already utilizing no-till would not be eligible for the cost-share unless they implemented no-till on new crop acres. This was discussed with other watershed coordinators through an email sent on the watershed coordinator web server. They agreed that funds could only be used for new no-till acres to be able to report a reduction in sediment delivery. Several thought that the funds should be used for structural practices rather than incentive payments, because the structural practices are there longer and there would be no guarantee that a producer would stick with no-till past the contract requirements. The Allamakee SWCD commissioners voted instead to use the no-till incentive dollars to fund a no-till field day that would educate farmers about no-till systems, provide a tour of current no-till fields, and facilitate a no-till question/answer session. However, the Allamakee SWCD ultimately decided not to hold a field day because the Winneshiek SWCD held a no-till field day on June 28, 2011 and invited producers from Allamakee to attend. Around 60 producers from Winneshiek and Allamakee Counties attended the field day.

Table 2. Pre-project and post-project breakdown of the funding sources for the entire project.

Funding Source	**Cash**		**In-Kind Contributions**		**Total**	
	Approved Application Budget ($)	Actual ($)	Approved Application Budget ($)	Actual ($)	Approved Application Budget ($)	Actual ($)
WIRB (administrative /practices)	$496,300 ($152,250/ $344,050)	$405,304.08 ($133,753.89/ $271,550.19)	$0	$0	$496,300 ($152,250/ $344,050)	$405,304.08 ($133,753.89/ $271,550.19)
WHIP	$42,000	$0	$0	$0	$42,000	$0
EQIP	$453,500	$389,156.28	$0	$0	$453,500	$389,156.28
Landowners	$244,250	$263,244.27	$0	$0	$244,250	$263,244.27
NRCS	$0	$0	$60,000	$60,000	$60,000	$60,000
IA DNR	$7,900	$0	$0	$0	$7,900	$0
Citizens for Clean Water	$25,000	$0	$0	$0	$25,000	$0
SWCD	$0	$432	$5,100	$5,100	$5,100	$5,532
Totals	$1,268,950	$1,058,136.63	$65,100	$65,100	$1,334,050	$1,123,236.63

Watershed Improvement Fund contribution – Approved application budget: 37.2%

Actual: 36.1%

The total amount of funds contributed by the funding sources for the implementation of the grant was $210,813.37 less than we had anticipated spending (Table 2). This is due to several factors. The difference between the approved application amount and the actual amount spent from WIRB is explained in the previous paragraphs. Because EQIP and WHIP funds were meant to be paired with WIRB funds, the practices that were eligible for WIRB funds but were not installed, i.e. pasture management and stream bank stabilization, also reduced the amount of EQIP and WHIP dollars spent. The DNR funds would have been spent when stream bank stabilization practices were installed. The Citizens for Clean Water had planned to fund water sampling, but they disbanded soon after the project started. Approximately $19,000 more landowner dollars were spent than we had estimated in the initial application. This is likely because one grade stabilization structure cost more than we had anticipated and so the landowner didn't receive 75% cost-share. Also, one manure management structure was built using only WIRB funds because the landowner had difficulty finding a site that would work based on sinkholes and wells and so did not want to pay the EQIP penalty in case he could not find an appropriate site.

Environmental Accountability

Water sampling was conducted before this project started near the mouth of Ludlow Creek from May 20, 2004 – September 4, 2008. Samples were taken weekly during the warmer months and then monthly during the winter months from 2004-2007. In 2008, monthly samples were taken. Many of the samples over these four years were "event" samples, meaning that they were taken after rainfall events of more than an inch of rain in 24 hours. Water samples were taken at two locations in the watershed from March 21, 2011 to October 25, 2011. One site was near the mouth of the river and the second site was about halfway up the watershed. The upper site was dry from July to October due to lower than normal rainfall. It is unknown how frequently this site dries up on an annual basis. Water quality values were compared between the original site (from the 2004-2008 sampling) and the lower site on Ludlow Creek (2011 sampling). Comparing the 2011 sites, the upper site did not have dramatically different water quality values than the lower site. No event samples were taken during the 2011 sampling.

Results of past sampling have shown a varied range of *E. coli* values. In 2004, 62% of the samples were greater than the suggested 265 cfu/100ml. In the following years through 2008, 62%, 59%, 73%, 56%, and 50% respectively were greater than the suggested amount. The average *E. coli* value for the previous years of sampling , including event samples, was 10,320 cfu/100ml. In the 2011 sampling, 38% of the samples from the lower site had *E. coli* values that were greater than 265 cfu/100ml with an average of 899 cfu/100ml. Based on this data alone, it would appear that the *E. coli* values have reduced since the previous water sampling. Not enough data has been obtained to determine if this is actually the case because event samples were not taken during 2011 and it was only one year of data. More years of data and more frequent sampling would be needed to determine if *E. coli* values have actually been reduced.

Practices and Activities

The practices that were planned to be completed in comparison to what was installed can be seen in Table 3. Also shown are the estimated reductions in sediment delivery and phosphorus as well as the acres treated by the different practices.

Table 3. Planned and completed practices.

Practice or Activity	Unit	Approved Application Goal	Accomplishments	Percent Completion	Acres Treated	Sediment Reduction (t/y)	P Reduction (lb/y)
Streambank Stabilization	Ft.	1400	0	0%	0	0	0
Pasture/Hayland Mgmt	Ac	500	8.9	2%	8.9	30	39
Grade Stabilization Structures	No.	12	7	58%	761	1759	2288
Manure Management System	No.	4	3	75%	1	-	-
Terraces	Ft.	28,000	47,360	169%	244	805	1046
Filter Strips	Ac.	260	77.3	30%	149	497	646
Livestock Exclusion - Timber	Ac.	102	0	0%	0	0	0
Livestock Exclusion – Stream	Ac.	21	0	0%	0	0	0
Livestock Exclusion – Flash Grazing	Ac.	30	0	0%	0	0	0
No-Till	Ac.	500	0	0%	0	0	0
Total					1163.9	3091	4019

The main goals of the project were to install practices that will reduce field run-off and to treat manure to protect this fragile and unique karst watershed. One specific goal was to reduce the sediment loading of Ludlow Creek by 40% annually, which is an estimated 4,534 tons/year. The practices that were identified to reach this goal were stream bank stabilization, grade stabilization structures, terraces, no-till, sinkhole and stream filters, livestock use-exclusion, flash grazing, and pasture management. The sediment delivery calculator was used to calculate loading reductions for the different practices. As displayed in Table 3, the practices in this project treated a total of 1163.9 acres, and reduced sediment loading by 3091 tons/year and phosphorus loading by 4019 lbs/year.

Seven grade stabilization structures (Figures 3, and 4) were built to trap sediment and reduce gully erosion. These grade stabilization structures are treating run-off from 761 acres of crop ground and are reducing sediment delivery by 1,759 tons/year and phosphorus by 2288 pounds/year. The original goals of the project stated that 12 grade stabilization structures would be built treating 1,200 acres and reducing 9,800 tons of soil loss per year , assuming an average soil loss of 8 tons/ac/year. This initial estimate of sediment reduction may have been unrealistic considering the estimated average sheet and rill erosion, according to Figure 5 from the initial application, was approximately 4.71 tons/ac/year. The average area treated by each structure was 109 acres, which met and exceeded the expected average treatment area.

The planned length of terraces to be installed was 28,000 feet. The installed length of terraces was 47,360 feet. Funding was moved from other ledger lines to be able to install a greater length of terraces due to high landowner interest. The initial estimate of cost per foot of terrace from the WIRB budget was $1.36 per foot. The actual WIRB cost was $0.71 per foot. The WIRB amount totaled $33,812.44, which covered 16% of the total terrace cost. EQIP paid 59% rather than the initially estimated 50%. The terraces will be treating 244 acres and reducing 805 tons of sediment delivery per year with an associated 1046 pounds of phosphorus.

Seventy-seven acres of filter strips were installed around sinkholes during this project to trap sediment in surface run-off before it enters groundwater through the sinkholes. The filter strips are treating run-off from 149 acres of crop ground and are reducing sediment delivery by 497 tons/year and phosphorus by 646 pounds/year. The original goals of the project stated that 260 acres of sinkhole and stream filter strips would be installed. A few other producers showed interest in installing grass filter strips, but then

The planned amount of pasture management was 500 acres. This was a very ambitious estimate because there were only 582 acres in pasture at the start of the project. As stated previously, the amount of pasture acres was reduced by 123 acres due to livestock producers reducing their herd size or selling their herds. Even if we had more interest in doing pasture management, we could not have reached our goal. Four fields were returned to row-crop production. Of the remaining pastures, 57% were less than 10 acres in size and 37% were less than 5 acres in size, which may explain why there were not many pasture management applications. We had two applications for pasture management, but one was cancelled and EQIP covered the 75% cost-share on the other application.

An additional practice, not funded by the WIRB was installed by three landowners. Approximately 22 acres of CP22 (Riparian Forest Buffer) were installed through I-Jobs funding. These buffers will help to protect the stream by reducing sediment delivery by an estimated 88 tons per year and phosphorus by 114 pounds per year. If these figures are added to those shown in Table 3, we see that there has been a reduction in sediment loading by 3179 tons per year and a reduction in phosphorus loading by 4133 pounds per year. This is 70.1% of our goal in sediment reduction of 4,534 tons per year.

Another specific objective of the project was to reduce animal waste runoff, including *E. coli* and nutrients, by 40%. Three manure management structures were built through this project. One was a manure pit and the other two were bedded-pack buildings. With the livestock under a roof and bedded, the manure is contained within the building and not allowed to enter surface or ground water. Comprehensive Nutrient Management Plans (CNMPs) were written for each of the installed systems. The two buildings were located outside of the watershed boundary, but cattle from the watershed were moved to the buildings and the lots they were previously on were shut down. For one of the buildings, only 1/3 of the cattle came from the watershed, so project funds were only used on those cattle and nutrient/sediment reductions were only reported for them as well.

These three structures are designed to capture approximately 10,370 tons of manure per year and prevent 9,850 tons of manure runoff using an Iowa State University figure of 95% animal waste runoff reduction for each structure. Adjusting these numbers to represent only the reductions relevant to Ludlow Creek Watershed, the designed storage would be 9,185 tons of manure per year with a runoff reduction of 8,726 tons/year. This manure is then applied to crop fields so that the nutrients can be used by the plants, which reduces the need for additional inputs to the system. The manure is planned to be applied to 390 acres of land based on the CNMPs and will contain 107,500 lbs of nitrogen, 23,650 lbs of phosphorus, and 55,800 lbs of potassium. Two of the structures were within 1000 feet of a sinkhole, and so were required to have secondary containment around the structures as a further precaution to keep manure from running off and entering the sinkholes.

As stated in the project application, there were 779 AU dairy cattle and 425 AU beef cattle at the start of the project. While we do not know how many cattle are currently in the watershed, we feel that we have likely achieved our goal of reducing animal waste runoff and associated *E. coli* and nutrients by

40% based on the runoff reduction numbers from our three structures and the fact that the pasture acres were reduced by 123 acres, which likely also means a reduction in the number of cattle in the watershed as no other manure management structures were known to be built during the project duration. Using estimates of manure and the associated nitrogen and phosphorus for the cattle at the start of the project, it was determined that there were approximately 24,920 tons of manure, 241,840 lbs of nitrogen, and 43,000 lbs of phosphorus generated per year. By installing these three structures, there was a 35% reduction in manure runoff, a 44% reduction in nitrogen, and a 55% reduction in phosphorus in comparison to these initial estimated values.

Based on a comparison of the pre-project survey and the end-of-project survey, there was not a significant change in human behavior or opinion because of the watershed project. In the end-of-project survey (p 13-19), the people were asked what they considered to be the most important resource concerns in the watershed. In descending order, the respondents felt that groundwater quality (61%), soil erosion (45%), and surface water quality (30%) were the most important resource concerns in the Ludlow Creek Watershed. The majority of respondents (79%) felt that this watershed project had a positive impact on these specific resource concerns. None felt that it had a negative impact, and the remaining 21% felt that the project had either no impact, were undecided, or left the question blank.

Many of the practices installed as part of this project should have had an impact on the three resource concerns mentioned in the survey by filtering out pollutants in surface water (sinkhole filter strips), capturing surface runoff and allowing sediment and other pollutants to settle out before the water enters tile or pipe (terraces/grade stabilization structures), and containing manure so that it does not enter surface runoff (manure management systems).

In both the pre-project and end-of-project surveys, respondents answered a question regarding whether water quality in Ludlow Creek is improving or worsening. A comparison between the two surveys showed similar beliefs on the subject. Just over half the respondents felt that the water quality in Ludlow Creek is getting better (55% and 51% respectively), 15% felt that it is getting worse, and the remainder were unsure or did not respond. In the end-of-project survey, the majority of respondents felt that changes in agricultural practices (60%) and changes in rural land use (57%) were the main reasons for changes in Ludlow Creek water quality. The majority of these people (48% and 42%) thought that water quality has improved because of these reasons; others (12% and 15% respectively) thought that water quality has worsened because of these things, and the remainder were undecided or left the question blank. Without further explanation from these people, it is difficult to know their reasoning for these answers or their frame of reference for the stream, e.g., how long they have been associated with land in the watershed.

Program Accountability

News articles covering project accomplishments appeared in the Waukon Standard newspaper, the Allamakee County Soil and Water Conservation District annual report, and the district's annual newsletter. Monthly reports were presented to commissioners at each meeting of the Allamakee SWCD. Semi-annual reports were submitted to the WIRB at the appropriate times.

Letters were sent to landowners at the start of the project explaining the goals of the project and the different practices that had available funding. Additional letters were mailed out regarding specific practices and a postcard was sent encouraging landowners to sign-up during one of the general CRP

sign-ups. Introductory packets were handed out to 11 landowners at the start of the project containing information about the project and suggestions on which practices might be most suited to their specific land. Packets were prepared for all landowners/operators who were interested. Between 14 and 15 landowners were also on an email list to receive information about the project as well as other pertinent area agricultural news.

The impact of this project is still evident from the additional interest that the installed practices have created among landowners in the Ludlow Creek Watershed. In the last few months of the project, when all the terrace funds were spent or obligated and expected to be spent, a couple of landowners showed interest in installing terraces. Although there was no longer funding available to offer them through this project, several still signed up for EQIP and/or state cost-share. Therefore, there will be a continuation of the installation of conservation practices in this watershed.

One challenge that we ran into with this project was that several sites were deemed unsuitable for grade stabilization structures or terraces due to shallow bedrock and the location of sinkholes. Where possible, alternative sites were suggested. The current economic climate also influenced the numbers of people who signed up as well as those who cancelled practices.

Several lessons were learned during this 3-year project. One lesson was that landowners need to make sure to get bids on practices, especially larger ones. One grade stabilization structure was billed at a much higher rate than we had anticipated. Unfortunately for the landowner, that meant that they did not get 75% cost-share. The Allamakee SWCD did not feel justified in bringing the cost-share amount (when combined with EQIP) up to the 75% rate because the increased cost did not seem warranted to us. The landowner had not worked with cost-share very much, so the lesson learned is to encourage landowners to get bids before starting projects and to remind them that **up to 75%** cost-share is available, but that we cannot guarantee that rate.

Another lesson learned is to send out more project letters and make more calls or visits to landowners/operators. A few people stopped in near the end of the project hoping to get money for terraces, but the terrace funds had already been obligated/expended. Their tardiness may not have been related to the amount of contact they had with us, but increased communication might help to get people signed up in the early stages of the project rather than waiting until the last minute.

A lesson learned about writing surveys is that giving people the space to write their reasoning for an answer after a multiple choice question might be beneficial. This would allow them, if they choose, to explain why they answered the way they did. It would give us more insight into their thinking and might help us design projects better suited to what the landowners/operators want to accomplish in the watershed.

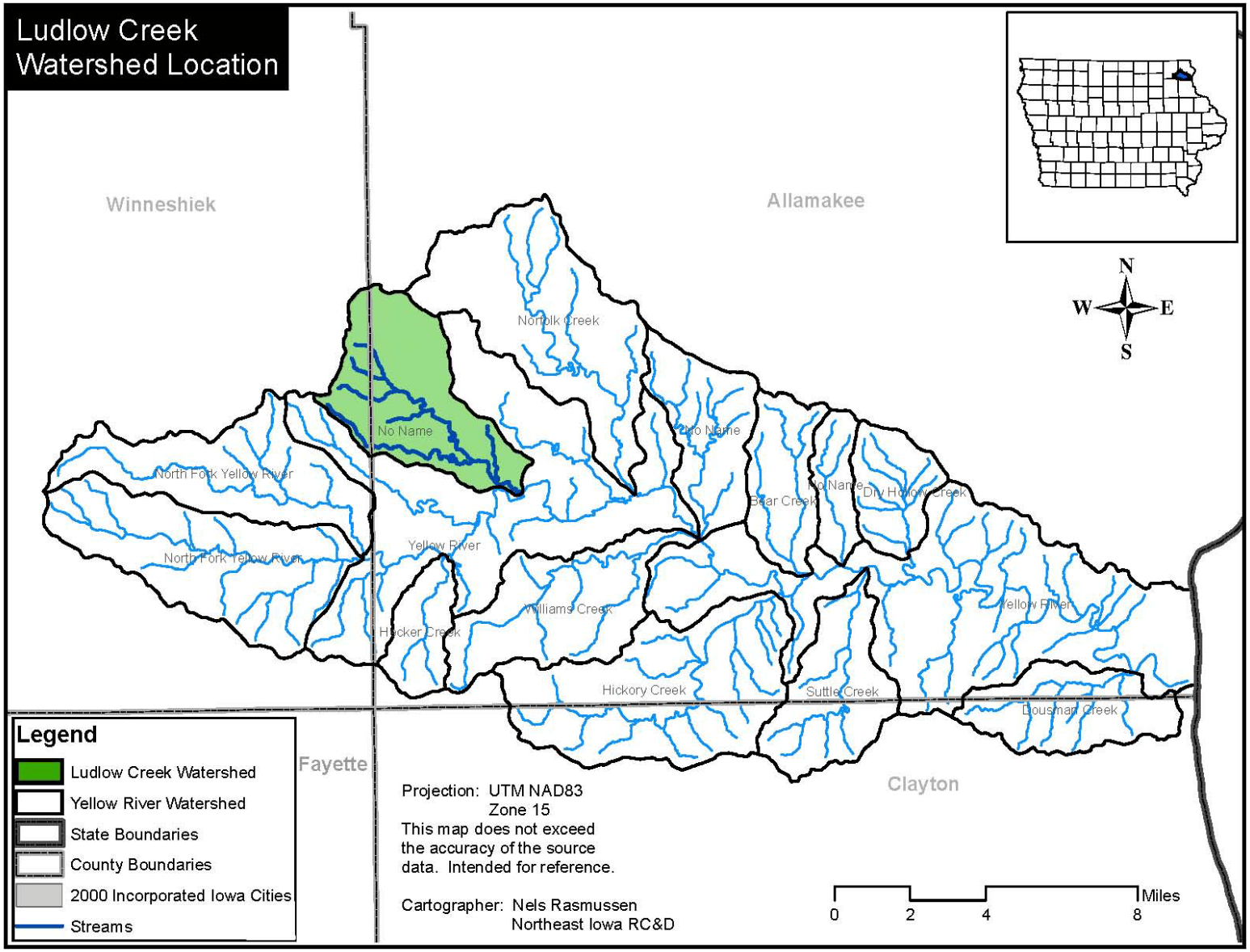
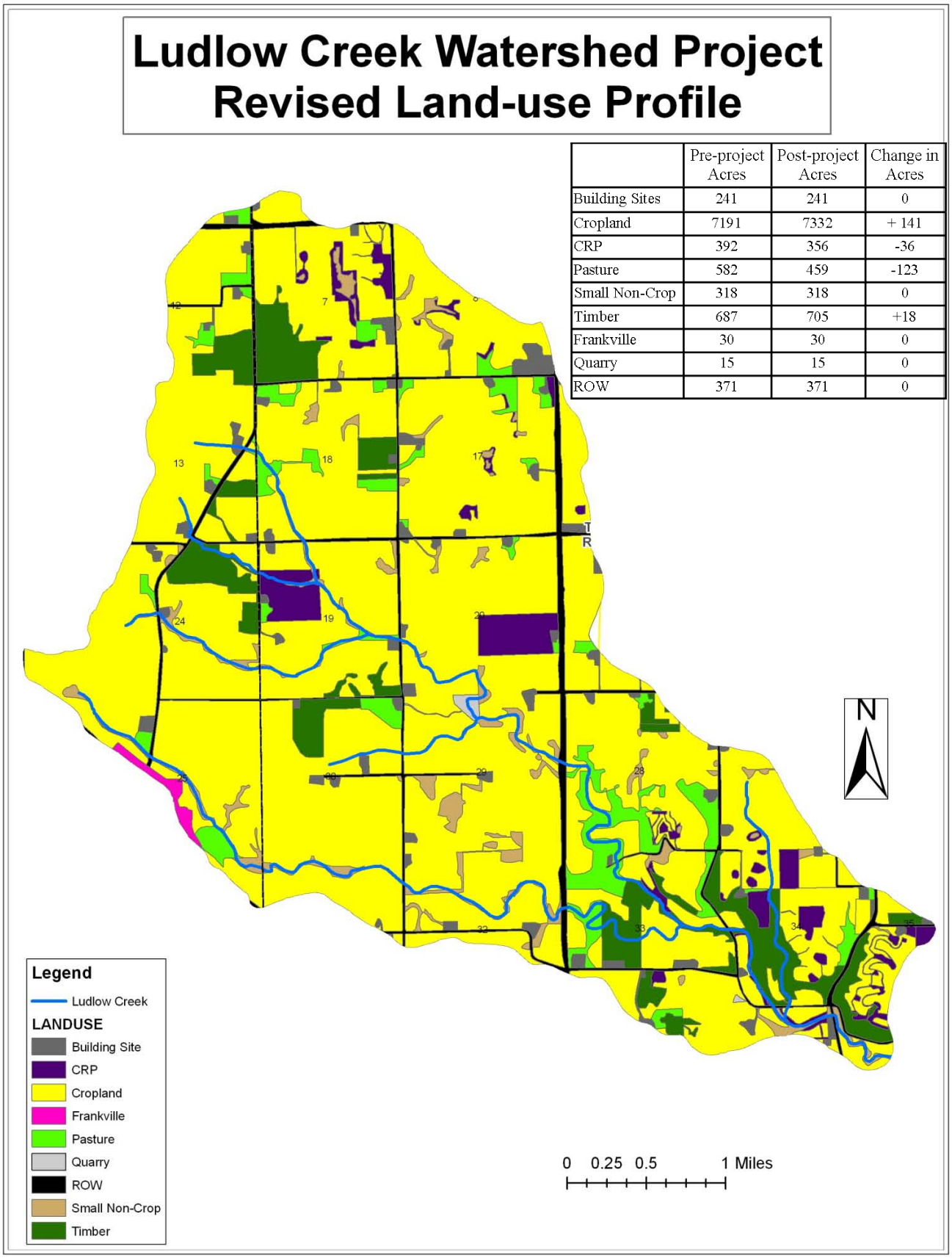


Figure1. Ludlow Creek Watershed location within the Yellow River Watershed.



	Pre-project Acres	Post-project Acres	Change in Acres
Building Sites	241	241	0
Cropland	7191	7332	+ 141
CRP	392	356	-36
Pasture	582	459	-123
Small Non-Crop	318	318	0
Timber	687	705	+18
Frankville	30	30	0
Quarry	15	15	0
ROW	371	371	0

Figure 2. Revised land-use in the Ludlow Creek Watershed.

Figure 3. Photos of two grade stabilization projects and an agricultural waste pit during construction and after completion.

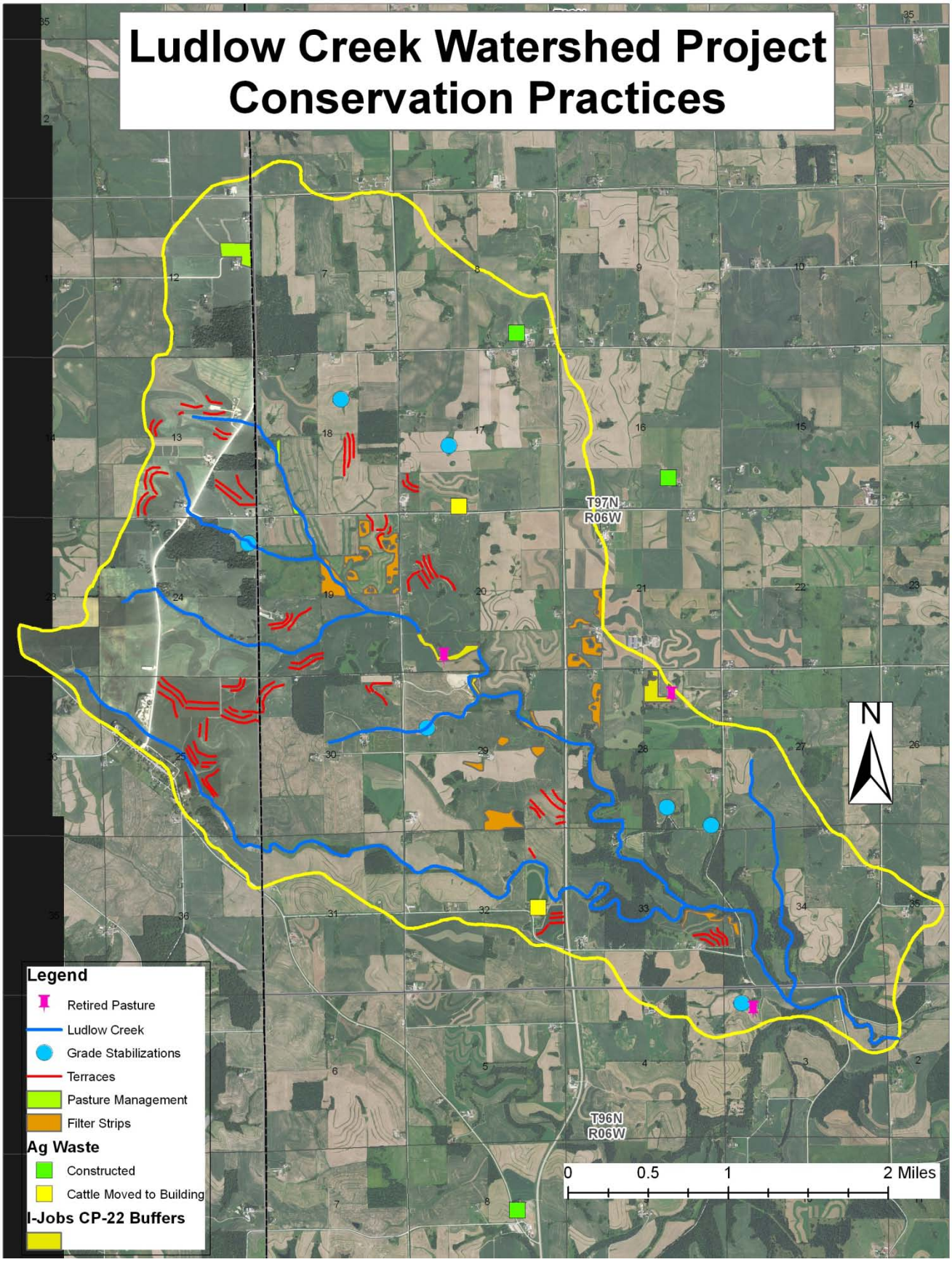


Figure 4. Locations of conservation practices installed during the Ludlow Creek Watershed Project.

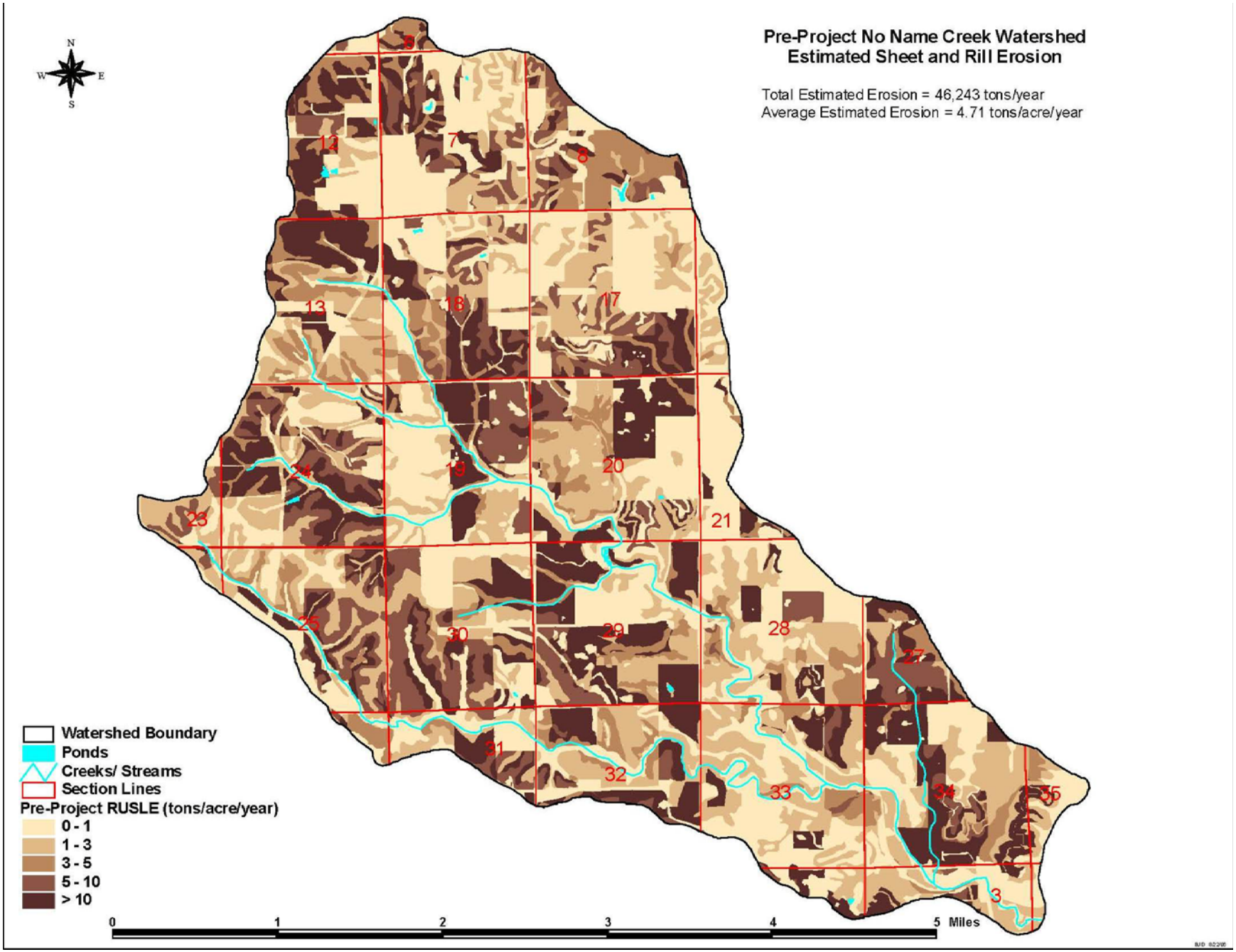
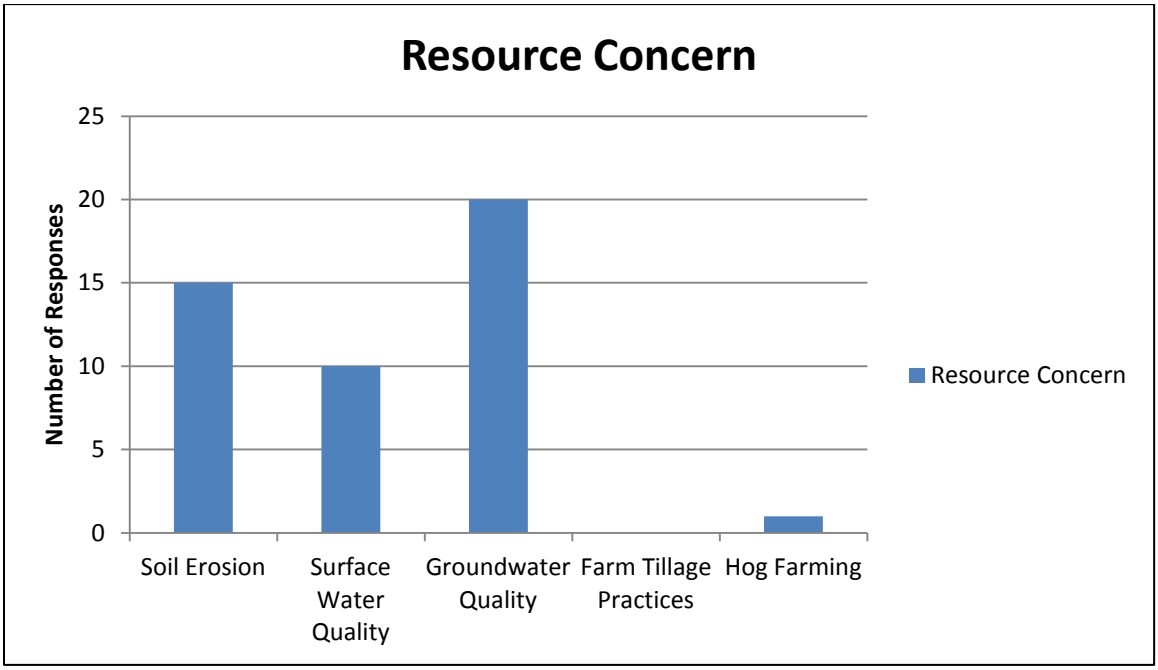


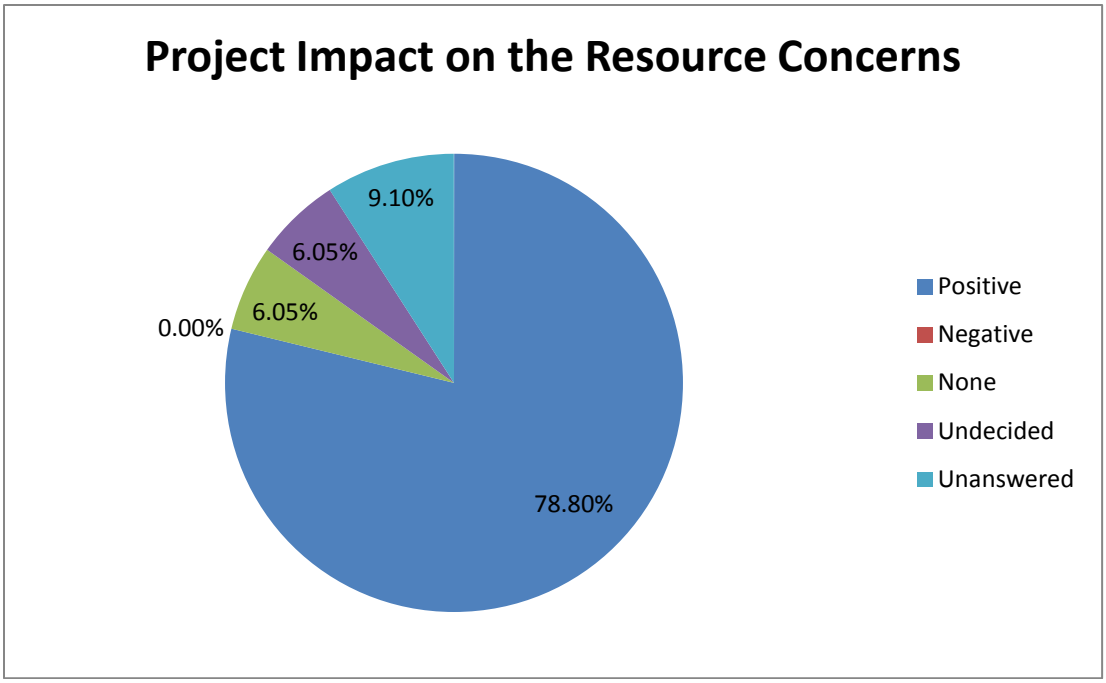
Figure 5. Pre-project estimated sheet and rill erosion for the Ludlow Creek Watershed.

Ludlow Creek Final Survey
Results from 33 surveys

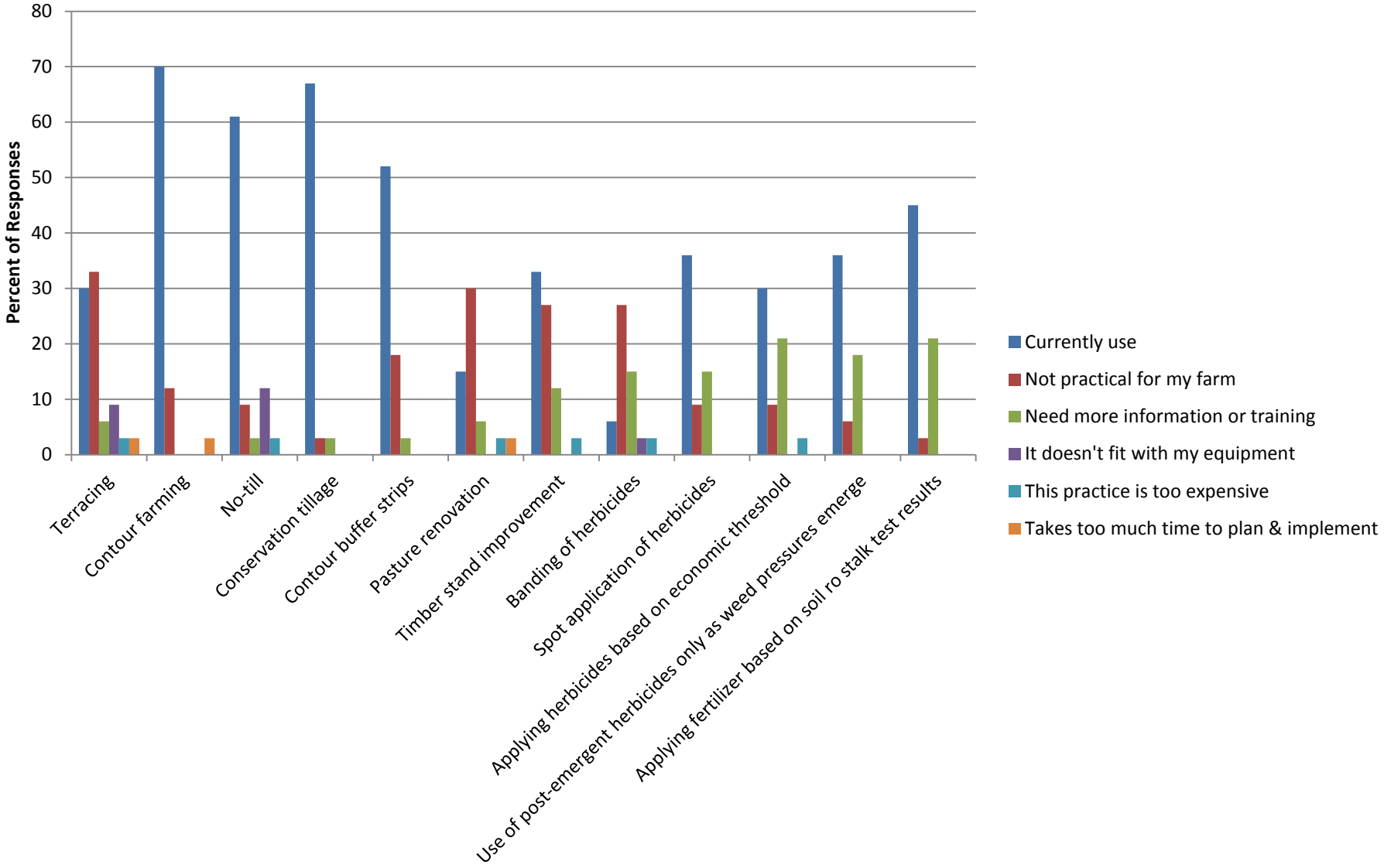
1. What is the most important resource concern in this watershed?



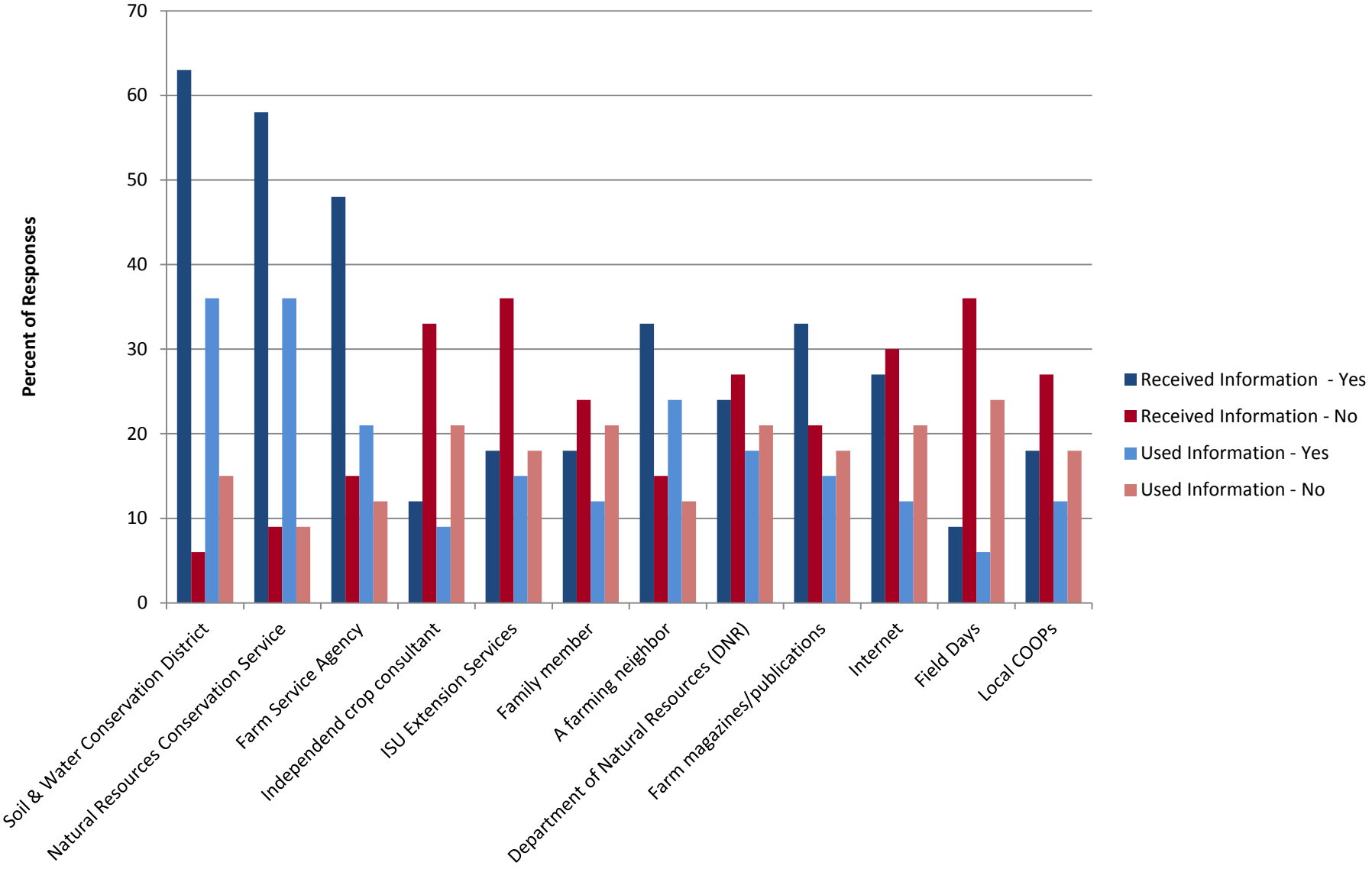
2. Do you feel that this watershed project has had an impact on that concern?



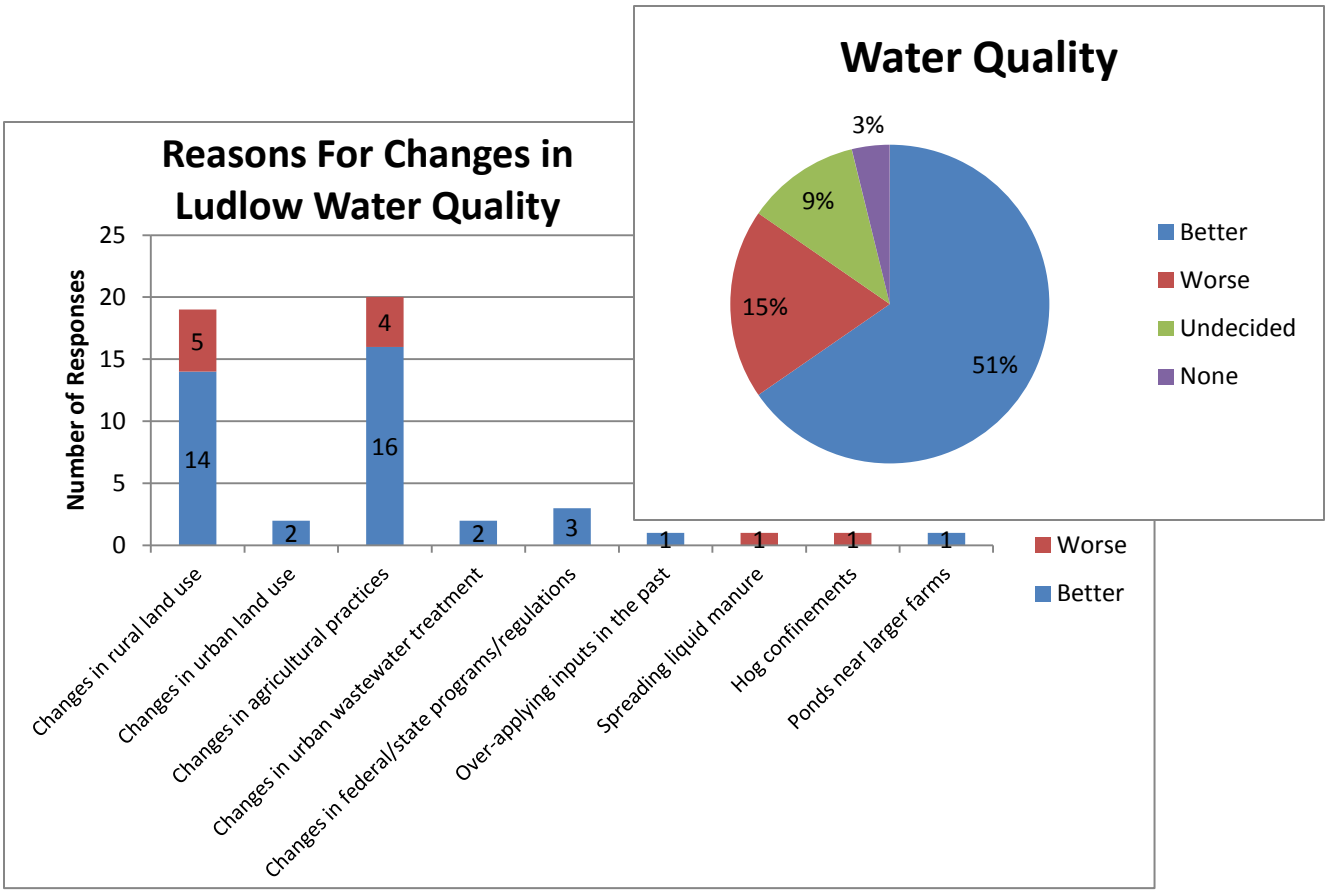
3. What factors *limit* adopting or expanding the following practices on your farm? (*For each practice, check all that apply.*)



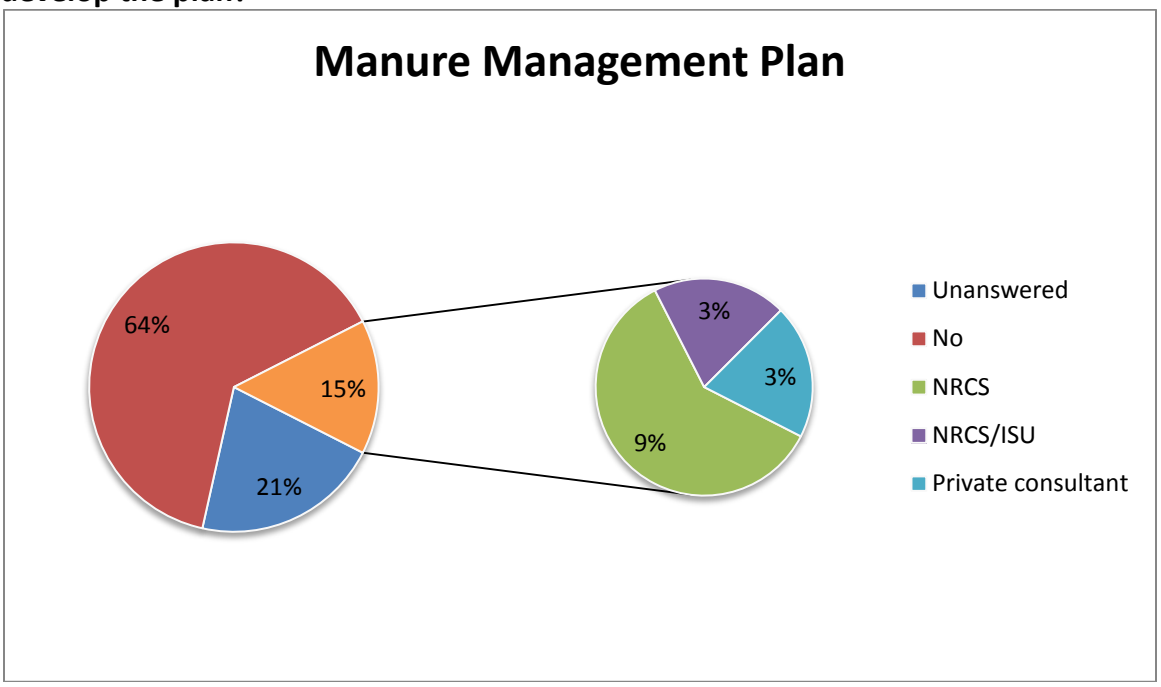
4. When making conservation decisions in the <u>last three years</u>, have you <u>received or used</u> information from the following sources? (Please check all that apply).



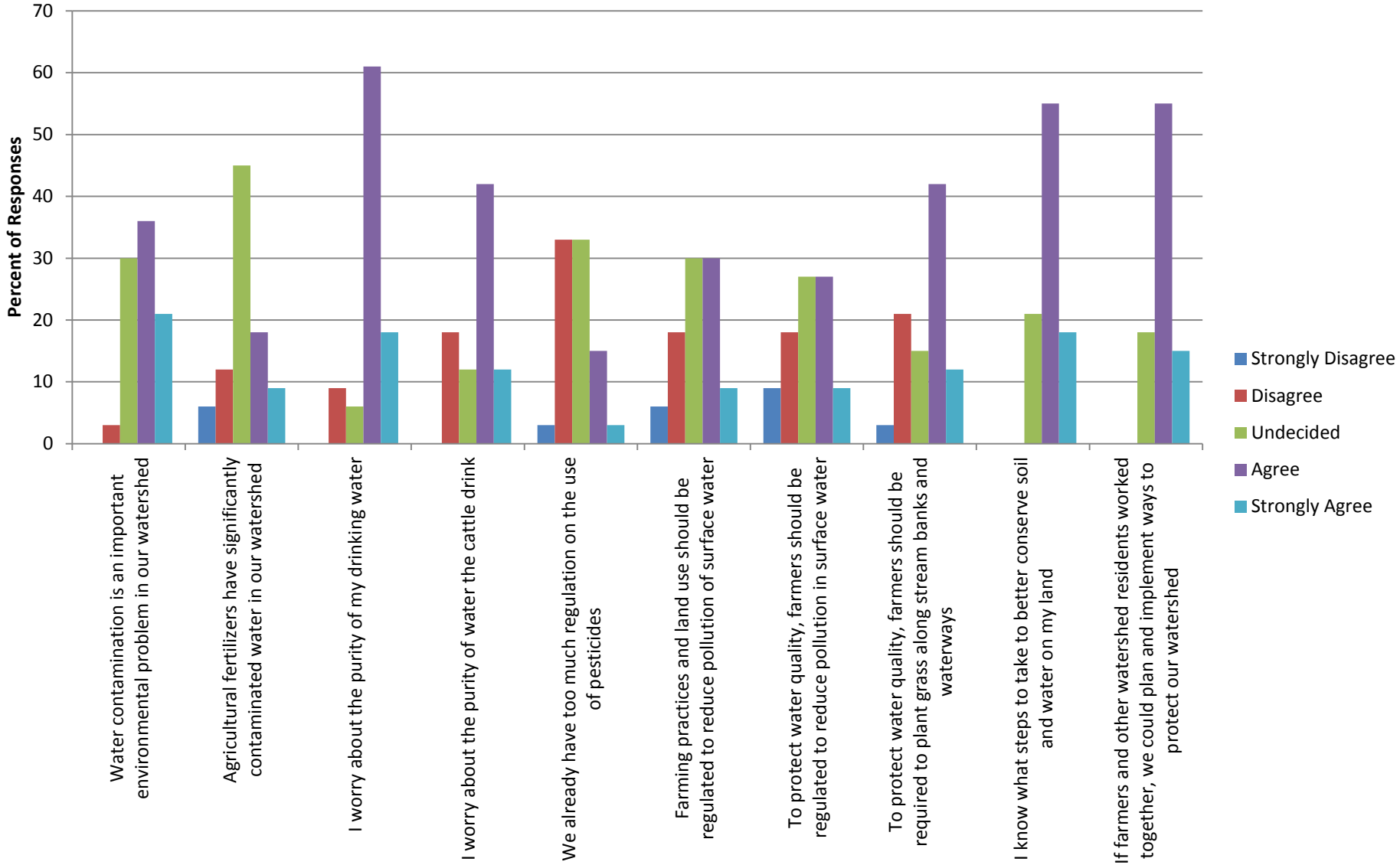
5. **Do you believe that the water quality of Ludlow Creek is getting better or worse currently?**



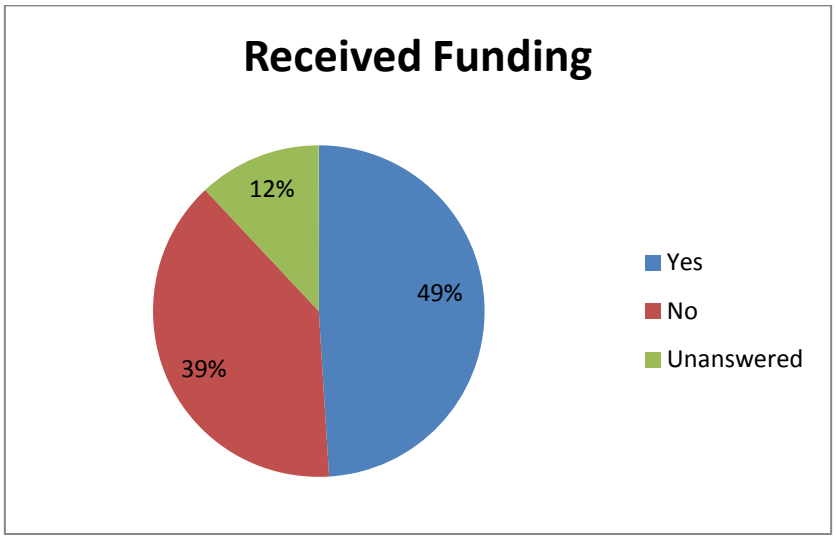
6. **Do you have an approved manure management plan? If yes, whose guidelines or assistance did you use to develop the plan?**



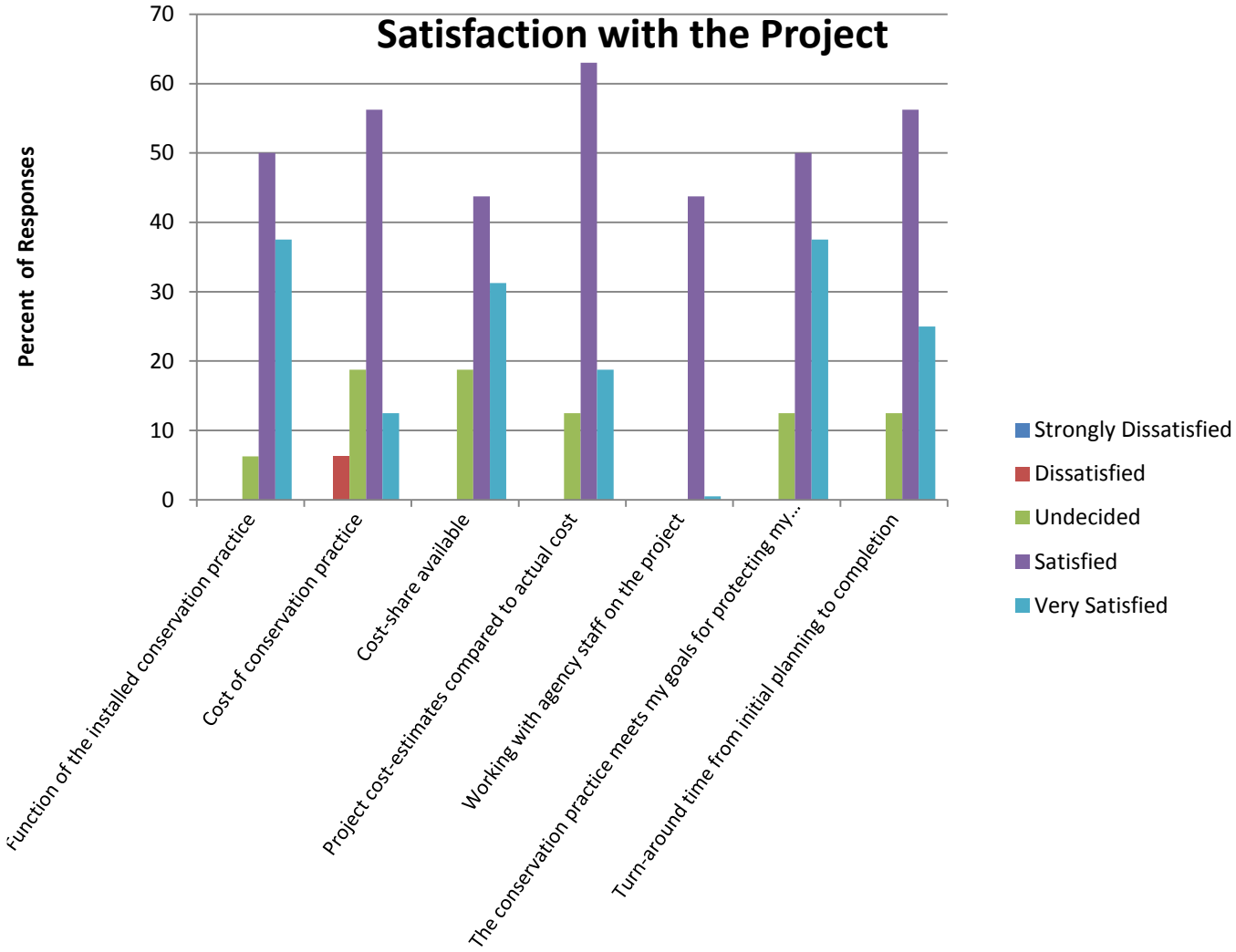
7. Please indicate your level of agreement or disagreement with the following statements.



8. **Did you receive funding for a conservation practice through this project?**



9. **If you received funding through this project, please indicate your opinion about the following topics.**



10. **If you chose not to receive funding for a conservation practice through this project, please explain why not.** "Renter no-tills already"

"Wasn't contacted" – although the same mailing list was used for all mailings"
"Not practical for my farm"
"Not enough time to do the project."
" There are a lot of my neighbors who lose soil that I felt needed it more than me. Too many games."

11. **What changes would you suggest for a watershed/water quality project in the future in your watershed or another watershed?**

"Clean-up of sinkholes. They are a direct source of contamination to our water supply. I would like to see the abuse of them stop. However, much progress has been made."
"Incentives and educate producers for no-till practices."
"There is too much corn and beans. Need more hay."
"Funding being more flexible between different projects."
"Do something about the hog setups and the hog smell, terrible."
"Better weed control."
"Would like to investigate, repair, or upgrade washing below terrace outlets and older pre-terrace structures."
"More CRP acres."
"Disallow spreading of liquid manure."
"Seed down grass along waterways, creeks, ponds."