

Yellow River / Direct Drain Project

#7008-002

January 1, 2008-April 30, 2010

Final Project Report



Lynn Stock
Allamakee SWCD Commissioner Chairman

Financial Accountability

A total of \$71,940.58 of the \$138,000 Watershed Improvement Funding awarded to the Yellow River – Direct Drain Project has been spent during the two-year and four-month term of the project on the installation of grade stabilization structures. This total is \$66,059.42 less than the \$138,000 that was awarded to the project (Table 1). This difference can be attributed to having constructed 11 of the estimated 15 structures and the varied cost of building different sized structures. The locations of the 11 structures can be seen in Figure 1. Also, three of the 11 structures were paid for with EPA funds rather than WIRB funds. This amounted to \$20,979.40 not financed by WIRB. The size and cost of each structure is dependent on the drainage area that it is treating. The initial funding request was based on a \$9,200 per structure estimate. The average cost of the WIRB funded structures was \$8,992.57, which is \$207.43 lower per structure.

Topographic and soil maps were used to determine locations for several potential structures. After the proposed sites were field checked and soil probe samples were taken, many sites were found to be unsuitable for grade stabilization structures due to having rocky conditions or too many sinkholes within the drainage area. This finding limited the number of structures that were able to be built. Initially, potential sites were to be ranked so that the highest priority areas could be targeted with structures. Due to the rocky conditions found on many of the proposed sites, ranking was not a feasible way to determine which structures should be funded. Also, some landowners decided not to build structures even though their sites had suitable conditions.

Of the \$138,000 awarded to the project, \$80,000 of the funds were requested. Since only \$71,940.58 were spent, \$8,059.42 are left to be returned to WIRB.

Table 1: WIRB budget for the Yellow River – Direct Drain Project

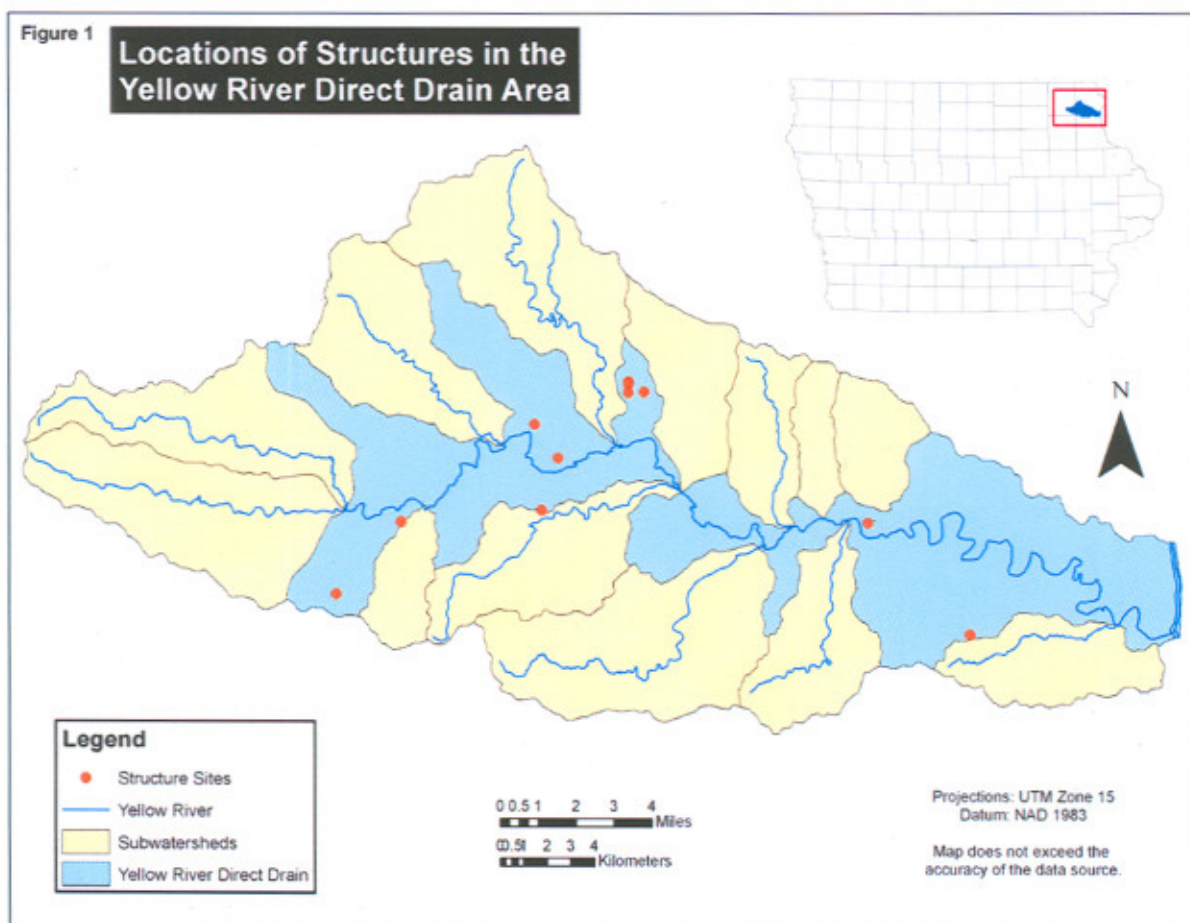
Watershed Improvement Funds			
Grant Agreement Budget Line Item	Total Funds Approved (\$)	Total Funds Expended (\$)	Available Funds (\$)
Grade Stabilization Structures	138,000	71,940.58	66,059.42
Totals	138,000	71,940.58	66,059.42
Difference			66,059.42

Total Project Funding

The total cost of the Yellow River – Direct Drain Project was \$220,306.33, which is \$136,852.67 less than the original estimated cost of \$357,159 (Table 2). The initial application stated that the total project budget was \$345,180, which did not include the \$11,979 budgeted to come from EQIP. The actual WIRB funds spent totaled \$71,940.58, which was 32.7% of the total project

cost. Based on the initial funding application, 39% of the total project funds, \$138,000, were budgeted to come from WIRB. The application called for approximately 60% of WIRB funding if matched with 15% from EPA funding and 25% of WIRB funding if matched with 50% from Federal EQIP funds. Approximately 27% of the budget was planned to come from EPA funding but instead the EPA funds accounted for 39.7% of the total funds spent. No WIRB funds were spent on the three EPA funded structures because the EPA funds had to be spent by the end of 2008 and there was enough money to provide 75% cost-share without other funding sources. Federal EQIP funds were budgeted to account for 3.4% of the total project funds and actually accounted for approximately 3.9% of the total project cost. EQIP dollars were pursued on two of the structures. Additional EQIP funds were not pursued because all other structures were constructed after EQIP funds had been allocated for the year. These structures were built during the extension periods (October 1, 2009 – December 31, 2009 or January 1, 2010 – April 30, 2010). Because the WIRB funds were available for a limited time during these extensions and EQIP applications are only accepted in January, EQIP funds could not be pursued for these six structures.

Figure 1. Locations of structures in the Direct Drain area of the Yellow River Watershed.



The Iowa DNR provided funding for water sampling. Fewer dollars were spent than initially projected because fewer parameters were tested and fewer samples were taken due to the

cessation of monitoring while the State Hygienic Lab and the Iowa Geological Survey Bureau worked out a new contract. The initial estimate of \$48,080 for the cost for water monitoring was higher than the amount that would have been needed in the initial one-year and nine-month time frame for the project. Because less than 20% of the total water monitoring funding was used, funds from the Northeast Iowa Citizens for Clean Water were not expended.

NRCS contributed an in-kind donation of time to develop Comprehensive Nutrient Management Plans (CNMPs) on six sites. The CNMPs that were written for each site provided the landowner with information about the management and treatment necessary to protect soil and water resources.

Table 2: A pre-project and post-project breakdown of the funding sources for the entire project and the percentages of funding that each source contributed.

Funding Source	Cash		Total			
	Approved Application Budget (\$)	Actual (\$)	Approved Application Budget (\$)	Approved Percentage of Funds (%)	Actual (\$)	Actual Percentage of Funds (%)
WIRB	138,000	71,940.58	138,000	38.6	71,940.58	32.7
EPA	98,000	87,479.02	98,000	27.4	87,479.02	39.7
EQIP	11,979	8,544.9	11,979	3.4	8,544.9	3.9
Landowners	57,500	40,341.83	57,500	16.1	40,341.83	18.3
NRCS	3,600	3,600	3,600	1	3,600	1.6
IaDNR	23,080	8,400	23,080	6.5	8,400	3.8
NE IA citizens for clean water	25,000	0	25,000	7	0	0
Totals	357,159	220,306.33	345,180	100	220,306.33	100

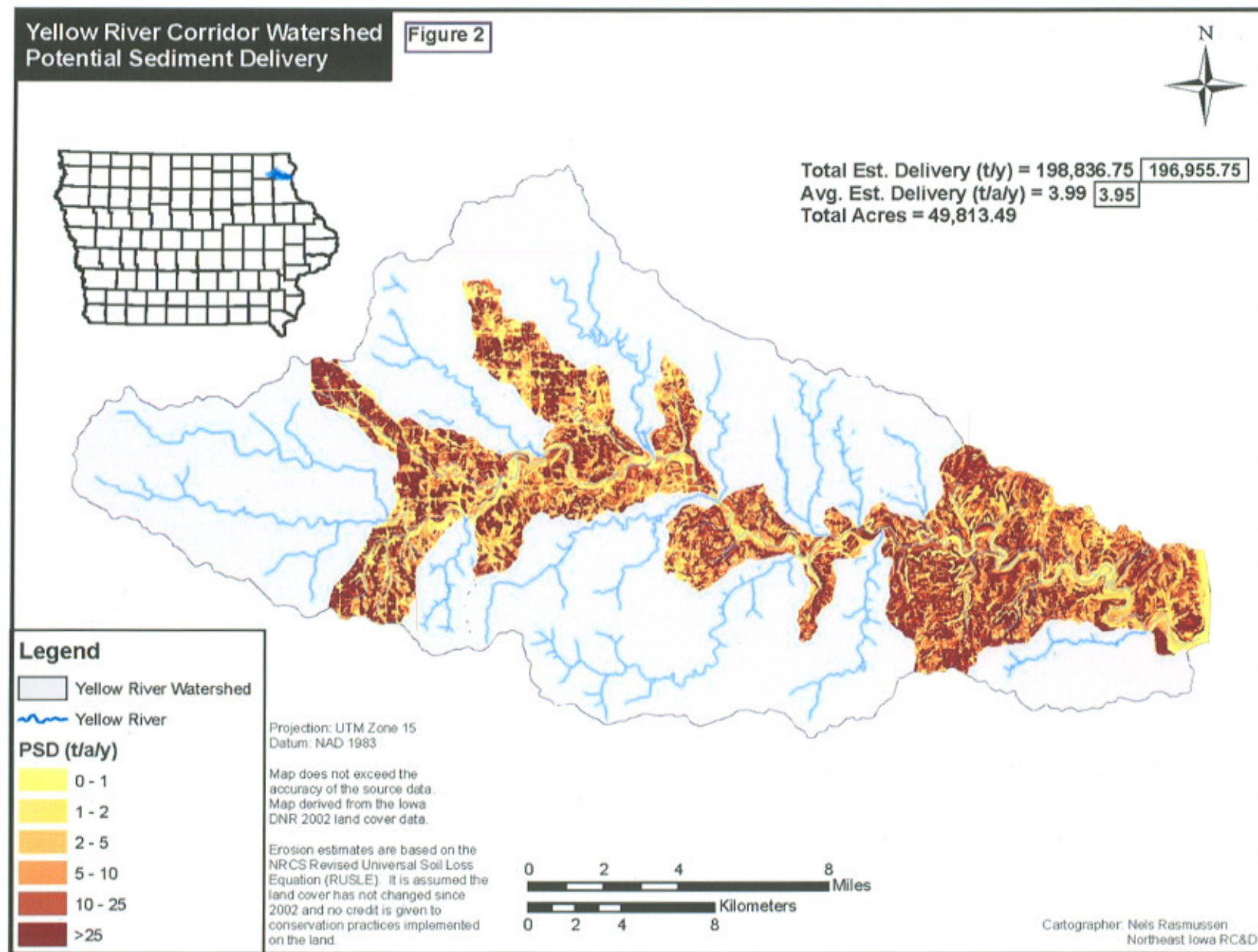
Watershed Improvement Fund contribution: Approved application budget: 38.6%
Actual: 32.7%

Environmental Accountability

Installed Practices

The main goal of the Yellow River – Direct Drain Project was to install 15 grade stabilization structures. Eleven grade stabilization structures were installed during this project. These structures will stabilize grade (slope), reduce gully erosion, and trap sediment, which will reduce the sediment and nutrient loads that enter the Yellow River. The original goals of the project stated that 15 grade stabilization structures treating 100 acres each would reduce sedimentation and associated nutrients entering the Yellow River by 10,800 tons/year, assuming an average soil loss of 8 tons/ac/year. This initial estimate of sediment reduction in the Yellow River was unrealistic considering the estimated average sediment delivery, according to **Figure 2** from the initial application, was approximately 4 tons/ac/year. The 11 structures built are treating a total of 327 acres and are reducing sediment in the Yellow River by 1,310 tons/year and phosphorus by 1,703 lbs/year. The average area treated by each structure was 42 acres. The targeted large structures that would treat 100 acres each could not be built due to shallow soils and smaller drainage areas based on topography.

Figure 2. Map showing sediment delivery estimates for the Yellow River Direct Drain area. The numbers in the boxes indicate the estimate of sediment delivery after the structures were installed.

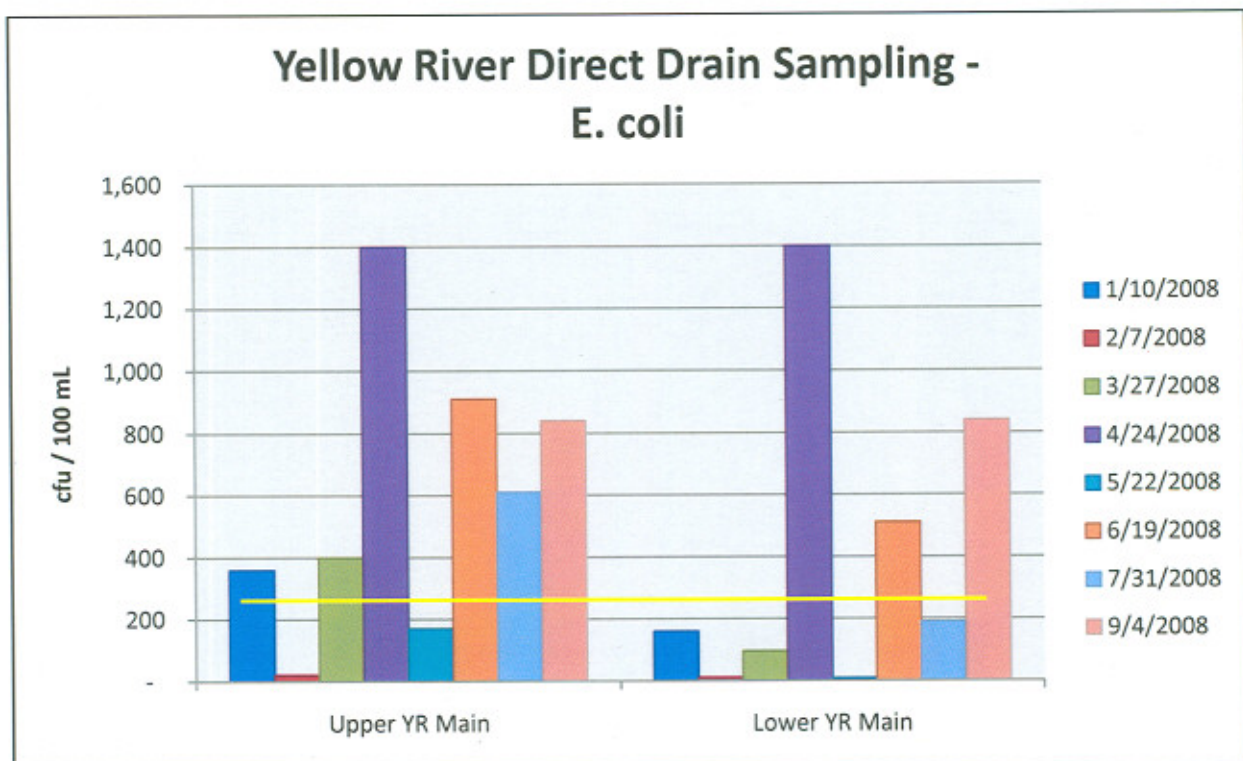


Water Monitoring

Water quality was monitored for four years before the start date of this project. Two of the monitoring sites for the entire Yellow River watershed were located within the Direct Drainage area. During the project, water quality was monitored monthly in 2008 between January and July, and again in September. Monitoring ceased after this point until a new contract could be worked out between the State Hygienic Lab and the Iowa Geological Survey Bureau. Monitoring did not resume during the remainder of the project. The intense monitoring effort before and during the project provides baseline water quality data for long-term monitoring of the entire watershed. This data could aid in the development of a Total Maximum Daily Load (TMDL) plan to resolve identified water quality impairments.

E. coli levels on segments of the Yellow River designated for primary recreational use exceeded the one-time standard of 235 cfu/100mL in approximately 66% of all samples during the four years of water sampling and ranged from <10 – 380,000 cfu/100mL. During this project, the *E. coli* samples ranged from <10 to 1,400 cfu/100mL and exceeded the one-time standard 56% of the time (Figure 3). The presence of *E. coli* may indicate a higher risk of pathogens in the water. This indicates a need for livestock manure management systems to adequately store and apply manure resources.

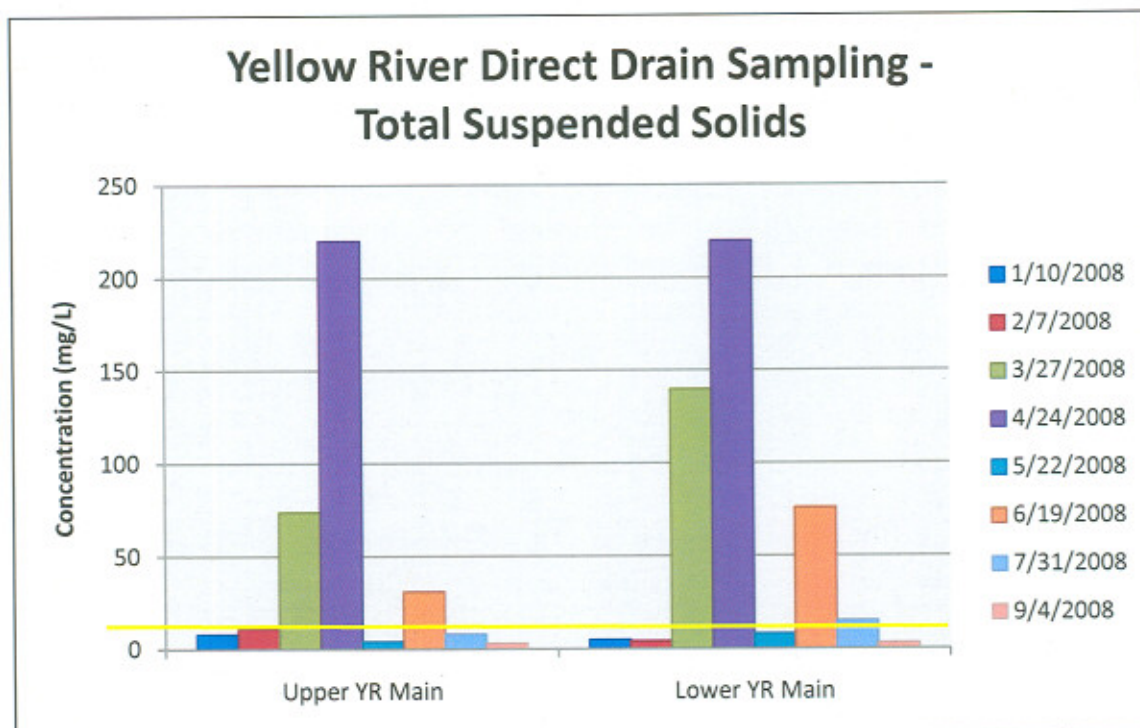
Figure 3. Water sample results for *E. coli*. The line represents the one-time standard of 235 cfu/100mL.



Measurements of Total Suspended Solids (TSS) in this region are expected to be low, less than 10 mg/L for baseflow conditions. Out of all samples taken over the four years, 61% were higher than 10 mg/L and ranged from <1 – 6300 mg/L. During this project, 50% of the samples taken

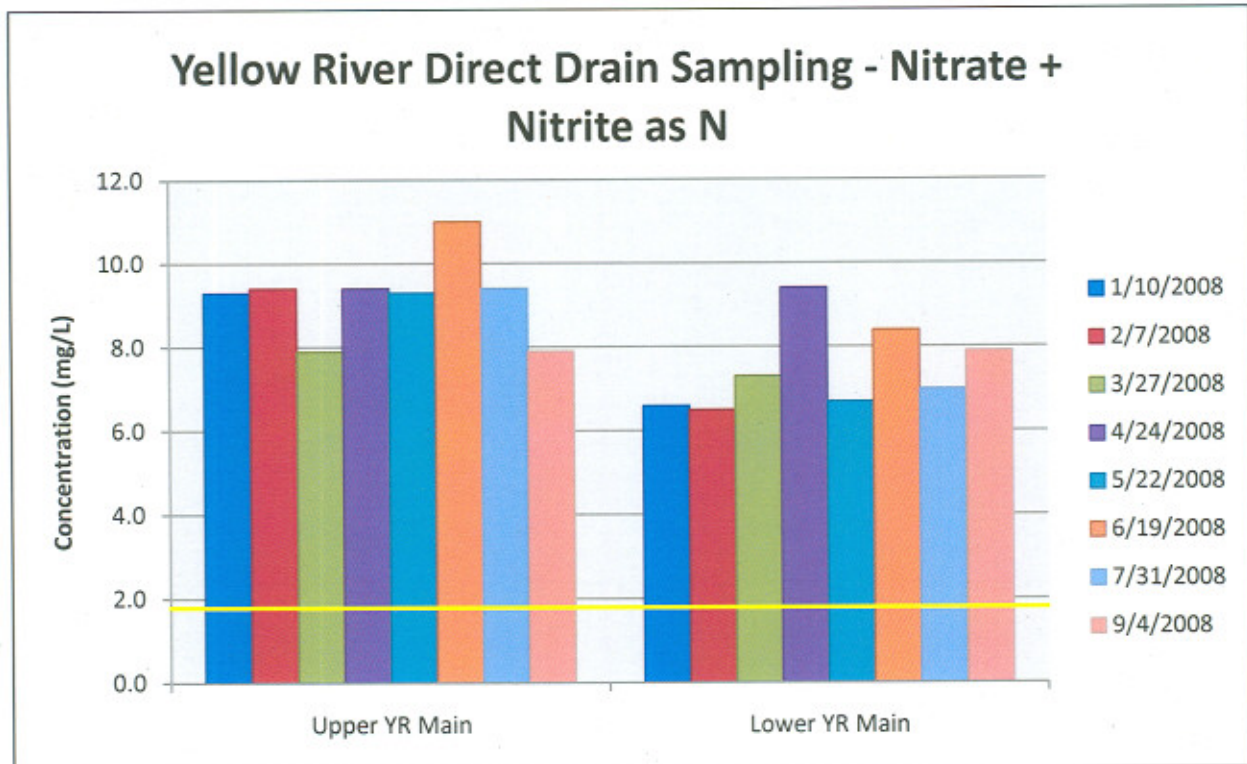
were higher than 10 mg/L and ranged from 3 – 220 mg/L (Figure 4). High TSS levels cause water to absorb more light and thus increase water temperature. High levels also decrease photosynthesis by aquatic vegetation, which then reduces dissolved oxygen. Areas with higher TSS levels were generally related to livestock having access to the stream or a tributary. In order to alleviate the problem, livestock restriction from the stream was encouraged.

Figure 4. Water sample results for Total Suspended Solids (TSS). The line represents the expected TSS level, 10 mg/L.



The state of Iowa currently does not have a water quality standard for nitrate. The EPA has recommended 1.73 mg/L as the nitrate+nitrite-N criteria for this sub-ecoregion. During the four years of water sampling in the Direct Drainage area, the nitrate+nitrite-N levels ranged from 1.8 to 14.0 mg/L. None of the samples taken were below the recommended level. During the reporting period for the Yellow River – Direct Drain project, the nitrate+nitrite-N levels varied between 6.5 mg/L and 11.0 mg/L (Figure 5). Statewide and regionally, there is a strong relationship between the percentage of the watershed area in row crops and the stream nitrate concentration. In portions of the watershed that had a low percentage of area in row crops but had higher nitrate levels (relative to other sites), it was determined that the nitrogen may have been coming from other sources, such as livestock. These areas were prioritized for CNMP preparations. Nitrogen can cause excessive plant and algae growth which can increase water temperatures and reduce dissolved oxygen content.

Figure 5. Water sample results for nitrate+nitrite-N. The line represents 1.73 mg/L, the recommended criteria for this sub-ecoregion.



Landowner Education

Meetings were held with over 20 landowners interested in the project to discuss grade stabilization structures, to learn about their concerns, and to discuss other Best Management Practices that might be implemented on their sites. A landowner/contractor meeting was held at the Farmers and Merchants Savings Bank Community Room on January 16, 2008 (Figure 6) to discuss the project and practices. Yearly newsletters were mailed to all the landowners and operators starting in December 2007 to inform people about the project and in December 2008 detailing the activities and accomplishments in the watershed. Articles on the project were included in the Allamakee County Soil and Water Conservation District yearly newsletter (January, 2008) and the Annual Report (October, 2008).

A pre-project survey was sent to landowners and operators to understand their attitudes and knowledge about the watershed and conservation practices. A post-project survey was not sent out because the last structures were not completed until a few weeks before the end of the project. This left little time for surveys to be sent, received, and for data to be summarized. In addition, the person who was coordinating this project retired in January of 2010, which limited the work force to send and evaluate the surveys.

Figure 6. Table of Landowner Education/Activity.

December 2007	Newsletter mailed to landowners/operators about project
January 2008	Landowners/contractors meeting to discuss the project/practices
January 2008	Article in SWCD yearly newsletter
October 2008	Information in SWCD Annual Report
December 2008	Newsletter mailed to landowners/operators about project activities
January 2009	Landowners/contractors meeting to discuss the project/practices

Program Accountability

This project impacted many people by educating them on grade stabilization structures and the site conditions necessary for building them. Many people were interested in installing grade stabilization structures but were unable to do so due to rocky conditions at the proposed sites. These people were advised on other conservation practices that they might establish to protect water and soil quality such as filter strips, cover crops, stream bank stabilization, and livestock management systems.

The main challenge of the project was finding sites that had suitable conditions for grade stabilization structures. There was a lot of interest in the project, but unfortunately, many of the proposed sites had shallow soils or had too many sinkholes in the drainage area. These challenges did not make the project any less valuable because several grade stabilization structures were established. A lesson to be learned from this study is that a more intensive evaluation of the soils in the area should be done before applying for funding in order to have a better understanding of the number of potential sites. This would also help the project coordinator by knowing some of the restrictions before the start of the project.

Due to continued concern about water quality in the Yellow River, the Allamakee SWCD acquired funding to study the Ludlow Creek Watershed, a tributary of the Yellow River, from January 2009 – December 2011. Practices included in this project include stream bank stabilization, grade stabilization structures, manure management systems, pasture management, sinkhole and stream grass filter strips, and livestock use exclusion. These practices will help to address some of the water quality issues found during the water sampling of the Yellow River.