Section 319 Non-Point Source Pollution Control Program

Watershed Project Final Report

Lower Bear River

By
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Bear River Watershed Coordinator

December 30, 2014

This project was conducted in cooperation with the State of Utah and the United States Environmental Protection Agency, Region 8.

Grant Numbers:
UDAF Contract # 13-6005  UACD Job # 113-08
UDAF Contract # 13-6005  UACD Job # 113-09

9/3/2015  1
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1.0 EXECUTIVE SUMMARY

The Bear and Malad Rivers need substantial water quality improvement to sustain future designated uses. Erosion, excessive sediment loading, and nutrient enrichment have impaired the river and caused the Bear River to exceed TMDL guidelines. The original Lower Bear River project proposal intended to address streambank stability, erosion control, and nutrient loading from various agricultural practices. However, as more attention was given as to how various agricultural practices within the Lower Bear River watershed impact water quality, the majority of the needs related to this project were connected to excessive nutrient loading to the Bear River from animal feeding operations (AFOs) and agricultural field drains.

The matter of streambank stability and erosion control within the Lower Bear River watershed has not become abandoned. An emphasis on the need to address this form of nonpoint source pollution continues, as is evident by the 319 funds that have been secured in the FY09 and FY10. These grants both have goals pertaining to erosion control and streambank stability. Currently, there are two projects of this nature in the planning stages, and their successes will be reported on in the future.

The primary goals of this grant have been to reduce nutrient and sediment loading to the Lower Bear watershed from animal feeding operations and other agricultural inputs such as field drains and to improve vegetation to enhance streambank stability and erosion control. These goals have largely been accomplished through the implementation of the following Best Management Practices (BMPs):

- Partially relocating an animal feeding operation
- Providing off-stream watering facilities for livestock
- Constructing dikes to prevent animal waste from entering waterways
- Fencing off riparian areas
- Rerouting agricultural field drains in order to reduce pollutant input to waterways

The primary informational and educational activities for the Lower Bear River project area have been the distribution of educational materials such as fact sheets, staffing convention booths to inform stakeholders, and carrying out of the Northern Utah Mini Water Conference. Also, over the past few years, there has been a substantial push in conservation efforts that address grazing management as way to reduce erosion and sediment introduction to waterways. Several events, including the Grazing Management Field Day, have been held that offered producers and landowners the opportunity to see how improved grazing practices could improve the yields within their operations while improving water quality.

The above goals were achieved through several resilient partnerships. The Northern Utah Conservation District has been very vocal in their support of projects that target water quality and they have continually encouraged local producers to make water quality a priority within their operations. The Utah Division of Water Quality has been a strong supporter in this cause through supplying monitoring equipment and lab analysis support. Natural Resources Conservation Service (NRCS) provided planning and engineering support where needed, as well as promoted improved grazing practices. Utah State University Extension has worked side by side with the conservation district and NRCS to provide technical support and outreach education in an effort to raise awareness of the impacts that agricultural practices has on water quality.
2.0 BACKGROUND
The Lower Bear River watershed is located in Box Elder County, Utah. The watershed encompasses approximately 260,000 acres. Land within the watershed is used primarily for small grains production, row crops, livestock feed production, grazing, and wildlife. Average annual precipitation in the drainage ranges from 11-16 inches, with most of that falling as snow during the winter months. The soils are mostly silt loam, silty clay loams, and are moderate to poorly drainage. Permeability range is from 0.06 to 2 inches per hour. Agricultural water supply and secondary contact recreation are designated beneficial uses for the Lower Bear River and all its tributaries throughout the watershed. A major use of the river and its tributaries is irrigation diversion, with much of the water in the Lower Bear and its tributaries diverted through irrigation canals. Fishing and recreation are important. The river floodplain is used intensively for agricultural purposes such as animal watering, pasture, and irrigated or non-irrigated cropland.

The Lower Bear River watershed includes the main Bear River from Cutler Dam to its confluence with the Great Salt Lake, the Malad River from the Utah–Idaho state line to its confluence with the Bear River, Box Elder Creek from its headwaters to its confluence with Black Slough and the Bear River, along with numerous springs and other small tributaries.

Figure 1: Lower Bear River Total Budget.

<table>
<thead>
<tr>
<th>Lower Bear River Project Funding</th>
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</thead>
<tbody>
<tr>
<td><strong>Start Date:</strong> October 1, 2008</td>
</tr>
<tr>
<td><strong>Completion Date:</strong> September 30, 2014</td>
</tr>
<tr>
<td><strong>Total Budget by Funding Year:</strong></td>
</tr>
<tr>
<td><strong>FY08</strong></td>
</tr>
<tr>
<td>• 319</td>
</tr>
<tr>
<td>• Match Accrued</td>
</tr>
<tr>
<td>• Federal (EQIP)</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
</tr>
<tr>
<td><strong>FY09</strong></td>
</tr>
<tr>
<td>• 319</td>
</tr>
<tr>
<td>• Match Accrued</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
</tr>
<tr>
<td><strong>Total FY 2008 &amp; 2009 Budget Combined</strong></td>
</tr>
<tr>
<td>• 319</td>
</tr>
<tr>
<td>• Match Accrued</td>
</tr>
<tr>
<td>• Federal (EQIP)</td>
</tr>
<tr>
<td><strong>Total Funds Spent:</strong></td>
</tr>
</tbody>
</table>
As required by 26-11-6 of the Utah Code Annotated 1953, Utah state waters are classed to protect against controllable pollution. The Lower Bear River from Cutler Reservoir to the confluence with the Great Salt Lake has been identified as a “High Priority” watershed, 303d list Unified Assessment Category IB. The designated uses for the main Bear in this section are 2B, 3B, 3D, and 4. Use designations for the associated tributaries are as follows: the Malad River from the Utah–Idaho state line to the Bear River confluence is designated 3C; Box Elder Creek from its headwaters to Brigham City is designated 3A, and 4; and Box Elder Creek from Brigham City to Black Slough and confluence with Bear River is designated 3C, and 4. See Figure 3 for descriptions of each beneficial use classification.

Figure 3: Beneficial Use Classifications.

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B</td>
<td>Protected for boating, water skiing, and similar uses excluding swimming.</td>
</tr>
<tr>
<td>3A</td>
<td>Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.</td>
</tr>
<tr>
<td>3B</td>
<td>Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.</td>
</tr>
<tr>
<td>3C</td>
<td>Protected for non-game fish and other aquatic life, including the necessary aquatic organisms in their food chain.</td>
</tr>
<tr>
<td>3D</td>
<td>Protected for water fowl, shore birds and other water-oriented wildlife not included in 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.</td>
</tr>
<tr>
<td>4</td>
<td>Protected for agricultural uses including irrigation to crops and stock watering.</td>
</tr>
</tbody>
</table>
The Utah Department of Water Quality found the Lower Bear River and its tributaries to be only partially supporting their designated beneficial use as warm water fisheries. High sediment loads in the river impair fisheries and the river’s ability to support macro-invertebrates and other aquatic life. High turbidity also impacts the water’s value for recreational uses. Sediment accumulates in the river during spring runoff, during summer storm events, and in canal return flows. Nutrient contamination has also impacted the overall quality of the Lower Bear River. It is believed that excessive algal growth and elevated water temperatures have resulted in lower oxygen concentrations and higher stress to the aquatic community. Oxygen levels decline to harmful concentrations during the nighttime, particularly during the summer when flows are low and temperatures are highest. Nutrients associated with poor land management are most likely to enter during spring runoff or storm events.

Bacterial contamination in the river and its tributaries is a health concern for recreational users of the system. Bacterial contaminants are found in the same reaches with high nutrient levels. Coliforms and nutrients from animal feeding operations are often concentrated during spring runoff, although these contaminants may also enter at a lower level continuously throughout the year.

The Lower Bear River has the poorest water quality in the entire drainage system due to the cumulative upstream impacts. High levels of total dissolved solids, sediments, and phosphorus are the major identified water quality problems. Below Cutler Reservoir, concentrations of sediment and phosphorus increase as the Bear River travels south.

Several concerns emerge from the water quality and other assessment data on the Lower Bear River. Animal waste entering the river from animal feeding operations appears to be a source of nutrient loading and coliform. The Lower Bear River valley bottom from Cutler Reservoir to its confluence with the Great Salt Lake is in cropland and hay meadow, with animal grazing occurring throughout this reach. Improper fertilization may also contribute to nutrient loading. Cutler Reservoir acts as a sediment sink in the Lower Bear River watershed. However, below the reservoir outlet, sediment gains are seen from Honeyville to Corrinne, which is the region of the Malad River confluence. Higher sediment levels are maintained from this point on downstream to the Great Salt Lake. Total suspended solids were higher in the Lower Bear from spring through fall with 96% of the annual sediment load occurring from March through June suggesting some sediment loading from irrigation return flow. Additional sources of sediment appear to come from stream bank erosion.

Recently, more attention has been given to how agricultural operations within the Lower Bear River have impacted water quality. This project sought to address the potential sources of sediment, phosphorus and nitrogen loading from these agricultural operations through the implementation of Best Management Practices (BMPs) that might reduce these loads. The implementation of BMPs will continue to increase the integrity of the Bear River system. By demonstrating various types of BMPs to landowners, producers, and stakeholders, it is the hope of this project that these individuals will want to adopt and implement similar activities to address their own water quality problems.

3.0 GOALS

3.1 FY08

There were several primary goals of the Lower Bear River FY08 grant. One of these goals was to improve vegetation and upland wildlife habitat through the implementation of streambank stability projects. A second goal was to reduce nutrient and sediment loading within the Lower Bear/Malad Watershed from animal feeding operations and other agricultural inputs such as field drains. A third goal was to inform and educate producers and landowners Lower Bear/Malad Watershed about erosion control and sediment reduction to improve water quality. The final primary goal of the FY08 grant was to provide planning and administrative services to project sponsors. The implementation of the following Best Management Practices (BMPs) assisted in meeting these goals:
Partial relocation of an animal feeding operation
- provide off-stream watering facilities for livestock
- construct dikes to prevent animal waste from entering waterways
- fence off riparian areas
- reroute agricultural field drains in order to reduce pollutant input to waterways
- inform and educate the community about non-point source pollution
- promote water quality improvement projects within the watershed

### 3.2 FY09

As with the FY08 grant, there were several primary goals of the Lower Bear River FY09 grant. One of these goals was to reduce nutrient and sediment loading within the Lower Bear/Malad Watershed from animal feeding operations. A second goal was to improve vegetation and upland wildlife habitat through the implementation of streambank stability projects. A third goal was to inform and educate producers and landowners Lower Bear/Malad Watershed about erosion control and sediment reduction to improve water quality. The final primary goal of the FY09 grant was to provide planning and administrative services to project sponsors. The implementation of the following Best Management Practices (BMPs) assisted in meeting these goals:

- provide off-stream watering facilities for livestock
- construct dikes to prevent animal waste from entering waterways
- construct an animal waste storage facility and waste transfer pipeline
- fence off riparian areas
- inform and educate the community about non-point source pollution
- promote water quality improvement projects within the watershed

Along with the stated goals of FY08 and FY09 project, there was an unspoken goal that was hoped to be accomplished. It was hoped that through the implementation of water quality improvement projects within the Lower Bear River project area, that local producers and landowners would embrace the idea of responsible stewardship within their operations in regards to protecting water quality. In turn, having this mentality, they would act as the best ambassadors to those who had apprehensions to implement projects of their own. It was believed that personal testimony from their peers would help move others to action.

When reviewing the tasks of this grant, it is evident that progress is being made concerning water quality. It is also evident that there is still a lot of work that needs to be done. Success was not only measured by the number of projects implemented but was also measured by the way attitudes were changed. It was fully agreed that things are starting to head in the right direction and that more and more support is being given to the protection and enhancement of water resources within the Lower Bear River project area.
4.0 MAPS

4.1 FY08

FY08 Lower Bear River Project Location Map

Legend
- FY08 Project Locations
- Bear River

Tremonton
Agricultural Field Drain Project
Honeyville
Bear River City
Animal Feeding Operation Project
Crawfords
4.2 FY09

FY09 Lower Bear River Project Location Map

Legend
- FY09 Project Locations
- Bear River
- Malad River

River Width Enhanced to Show Detailed Location

Tremonton
Honeyville
AFO #1
Bear River City
AFO #2
Corrine

9/3/2015
5.0 ACTIVITIES

5.1 FY08

**Goal #1:** Improve vegetation and upland wildlife habitat to enhance streambank stability and provide cover to control erosion. STEPL Model calculations estimate that an average streambank project could potentially reduce sediment by 38.2 tons/year.

**Objective 1:** Provide options for effective plant selections and implement improved riparian vegetation projects. All money for this objective is to go toward already existing NRCS contracts and toward future funded NRCS contracts. All stand-alone contracts that do not involve NRCS will be designed and implemented by UACD engineer and planners.

**Task 1:** Contract with landowners and identify a plan to improve existing conditions.

**Actual Output:** 319 funds from this grant were not used for this task. However, currently there are two riparian improvements projects being planned in the Lower Bear River project area that will accomplish this goal. As part of the project planning, options for effective plant selections and implement will be provided. Funds from the FY10 grant will go towards these projects.

319: $0 Match: $0 Total: $0

**Task 2:** Implement plot section of the Malad River

**Actual Output:** 319 funds from this grant were not used for this task. However, the local watershed coordinator did work with local extension agents to try and identify what types of plants could grow on the Malad River for future stabilization projects implemented on the Malad River. The findings from the study found that no native species are able to grow on the Malad River due to the high salt concentrations in the river.

319: $0 Match: $0 Total: $0

**Task 3:** Maintain, observe, and document results from trial plots.

**Actual Output:** 319 funds from this grant were not used for this task. However, the local watershed coordinator did work with local extension agents to try and identify what types of plants could grow on the Malad River for future stabilization projects implemented on the Malad River. The findings from the study found that no native species are able to grow on the Malad River due to the high salt concentrations in the river.

319: $0 Match: $0 Total: $0

**Goal #2:** Reduce nutrient and sediment loading to the Lower Bear/Malad Watershed from animal feeding operations and other agricultural inputs such as field drains. STEPL model calculations estimate that an average AFO project could potentially reduce between 5,727.9 to 9,991 lbs/year of nitrogen and between 1,039.8 to 2,381.6 lbs/year of phosphorus.

**Objective 1:** Limit livestock access along Lower Malad River and improve grazing management practices next to waterways to decrease sediment/nutrient runoff. All money for this objective it to go toward already existing NRCS contracts and toward future funded NRCS contracts. All stand-
alone contracts that do not involve NRCS will be designed and implemented by UACD engineers and planners.

**Task 4**: Install fencing to limit livestock access to the streambank.

**Actual Output**: Initially there were two projects planned to limit livestock access along the Bear River. The first project was planned and a cultural resource inventory was conducted by USU Archaeological in the amount of $1,668.08. These funds came out of the Technical Assistance portion of this grant. After multiple failed attempts to work with the producer, the project and contract was canceled. Future efforts will be made to reengage the producer and renew their interest in conservation efforts.

The second project, an animal feeding operation located on a small tributary to the Bear River, developed a plan to assist it in meeting state water quality standards. The major concern on the operation was that a large animal feeding operation was located right on a small waterway that ran straight to the Bear River. To fix the issue, the water that was flowing through the feedlot was piped under the corals, and a berm was constructed to prohibit any runoff from the feedlot to enter into the waters of the state. Additional watering facilities were installed to provide water for the cattle, and a nutrient management plan was developed for the operation. 319 funds in the amount of $3,271.89, and EQIP funds in the amount of $4,510.88, were used to install 2 dikes (700 feet long in total), to control direction of runoff flow and a 220 feet long irrigation water conveyance pipeline to deliver water to a watering facility for livestock. These funds also went towards the installation of a 625 foot long fence to restrict livestock from the small waterway and towards nutrient management of 225 acres. Technical assistance for this project was provided by USU Extension, UACD, and NRCS. 319 funds for technical assistance in the amount of $1,331.92 came out of this grant. See figures 11-15 in section 11.0 of this report for photographic documentation of this project.

```
319: $6,271.89  
Match: $4,181.26  
NRCS: $4,510.88  
Total: $14,964.03
```

**Task 5**: Implement grazing land best management practices (BMPs) next to waterways.

**Actual Output**: Although the producer from task 4 had all of his land in crop production and did not have any grazing land that BMPs could be implemented on, grazing management has become a major focus in conservation efforts. As part of this focus, producers are being encouraged to implement rotational grazing strategies that promote maximum plant growth and minimum disturbance to reduce the impacts that livestock have on the plants and the soil. In operations next to waterways where riparian areas exist, these strategies help to reduce compaction of the soil, promote infiltration, and reduce sediments from entering waterways. As part of educating and informing producers of these best management practices, Utah State University Extension and the USU Agricultural Department held a Grazing Management Field Day, which allowed producers to see first-hand the positive impacts that rotational grazing can have on their operations. Research professors were on site to give presentations on crop production increases, soil health, infiltration increases, and nutrient run reduction. This field day was sponsored by USU, therefore there were no 319 funds spent on this outreach effort.

```
319: $0  
Match: $0  
Total: $0
```

**Task 6**: Identify agricultural field drains that may be contributing nutrients, sediments, or coliform to waterways within the Lower Bear/Malad Watershed and install BMP’s to address these inputs.

**Actual Output**: As a result of an extensive agricultural field drain mapping project, and a Division of Water Quality funded study, an agricultural field drain within the Lower Bear River project area was found to have very high levels of E.coli and optical brighteners. Additionally this field drain
had phosphorus concentrations that were four times the state standards for instream phosphorus concentrations of 0.075 mg/L, which was resulting in phosphorus loading of 3.45 pounds of total phosphorus per day. Knowing that optical brighteners are not naturally occurring, and that within recent years a housing development with septic systems was built on top of this field drain, it was believed that contamination from the development might be entering the field drain and contributing to the degraded water quality. Conversations were held with the field drainage district that oversaw this field drain and it was determined that the best thing to do was to reroute the field drain around the housing development in an attempt to prevent anthropogenic pollution. 319 funds in the amount of $12,728.11 went towards the installation of 975 feet of HDPE pipe, 3 cleanout structures, and safety grates to prevent accidental entry. This project was installed according to NRCS specifications and standards by a certified NRCS engineer. Technical assistance for this project was provided by USU Extension, UACD, and NRCS. See Figures 7-10 in Section 12.1 of this report for photographs of the project installation.

319: $12,728.11  Match: $8,485.41  Total: $21,213.52

**Goal #3:** Inform and educate landowners in Box Elder County, and other areas throughout the state, about erosion control and sediment reduction to improve water quality.

**Objective 1:** Develop information and provide educational opportunities for local landowners and support agencies to encourage the implementation of similar projects. This is a stand-alone contract that does not involve NRCS. UACD engineers and planners will implement tasks associated with this objective.

**Task 7:** Document and photograph before and after photo points.

**Actual Output:** Where possible, before and after photographs have been taken to document project improvements. These photographs have been used at various meetings and events to encourage the implementation of similar projects. Although this task had good intentions in concept, other efforts have been much more effective in promoting erosion control and sediment reduction to improve water quality.

These efforts include encouraging irrigation water management to reduce runoff and return flows, the installation of filter strips to catch sediments transported by overland flow, reduced tillage practices to promote soil health and stability, laser leveling of flood irrigated fields to help better manage water application and runoff reduction, and discontinuing the practice of burning stubble fields in order to keep crop residue in place to prevent soil erosion. All of these erosion reduction practices have been promoted and encouraged by planners who work for and on behalf of UACD, NRCS, USU Extension, and the local conservation districts. When meeting with landowners and producers to address resource concerns within their operations, conservation planners discuss these practices and make every effort possible to implement them into the conservation plans being developed.

In addition to these efforts, an educational outreach booth was organized and staffed at the 2010 Annual UACD State Convention. This booth provided an opportunity for landowners, producers, and other stakeholders to talk with the local watershed coordinator about potential erosion control and sediment reduction projects within the Lower Bear River project area, as well as within the entire state. 319 funds in the amount of $1,890.00 went towards the vendor fee and booth supplies.

319: $1,890.00  Match: $1,260.00  Total: $3,150.00
Task 8: Provide educational opportunities that highlight project accomplishments through:

- state-wide conservation field day tentatively scheduled for summer 2008 or 2009
- Informational publications as local newspapers, news articles, and local conservation districts websites.
- Northern Utah Mini Water Conference highlighting sediment reduction and erosion control efforts on the Bear River.

Actual Output: A great effort has been put forth to bring attention to project accomplishments and to provide educational opportunities to the public within the Lower Bear River project area. Over the period of the FY08 grant, 8 newsletter articles were produced and published to the public. These articles covered a wide range of topics from nutrient enrichment within waterways to what it takes to develop a TMDL. Additionally, the Northern Utah Mini Water Conference has been held each year to bring producers, landowners, and other stakeholders together as a way to discuss water topics that are facing them at the time. Many of the presentations at this conference address water quality, as well as water quantity, and what can be done to improve both. Presentations have also been given on the various funding opportunities that are available for landowners and producers to implement sediment reduction and erosion control practices within their operations.

<table>
<thead>
<tr>
<th>319</th>
<th>Match</th>
<th>Total</th>
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<tbody>
<tr>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

Goal #4: Provide administrative services to project sponsors.

Objective 1: Track match and prepare reports.

Task 9: Utah Association of Conservation Districts will document matching contributions, track individual project progress, coordinate team efforts and generate mid-year, annual and final reports in a timely manner.

Actual Output: Utah Association of Conservation Districts and the local watershed coordinator have worked together to document matching contributions and to track individual project progress. The local watershed coordinator has generated the mid-year, annual and final reports.

<table>
<thead>
<tr>
<th>319</th>
<th>Match</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3,210.00</td>
<td>$2,140.00</td>
<td>$5,350.00</td>
</tr>
</tbody>
</table>

Total 319: $24,100.00  Total Match: $16,066.67  Total NRCS: $4,510.88  Total: $44,677.55

5.2 FY09

Goal #1: Reduce nutrient and sediment loading to the Lower Bear/Malad Watershed from animal feeding operations. STEPL model calculations estimate that an average AFO project could potentially reduce between 5,727.9 to 9,991 lbs/year of nitrogen and 1,039.8 to 2,381.6 lbs/year of phosphorus.

Objective 1: Decrease the amount of nutrients that are entering the Malad and Bear Rivers from animal feeding operations by keeping livestock out of rivers, thus decreasing the amount of animal waste deposited directly into the waterway.
Task 1: Improve or move animal feeding operations that pose a risk to water quality due to nutrient runoff.

Actual Output: In the PIP for the FY09 grant, there were three proposed projects that were going to be the center focus. However, only one of these projects was implemented as originally planned and will be reported on in Task 2 below. Although the other two proposed projects fell short of implementation, another very similar project, well in need of attention, was able to be implemented in their place. This was AFO #2, as shown on the map titled “FY09 Lower Bear River Project Location Map” in section 4.2 of this report.

This project was aimed at addressing animal waste management and runoff on a 100 cow family dairy just south of Honeyville, Utah. Due to its location, which is at the base of the Wellsville Mountains, the dairy experiences a large amount of runoff from precipitation that falls at higher elevations and flows through the dairy (see Figures 16 and 17 in section 12.2). Previous to project implementation, runoff that fell directly on the dairy was uncontrolled as well. This runoff would flow through the solid waste storage facility and overflow during even moderate rain events. This runoff would then flow off of the producer’s property, on to his neighbor’s land, where it would pond up and flow over the highway that is located downslope of the dairy, and run into a ditch on the other side. Needless to say, this was a mess that needed to be addressed.

Prior to the project, the producer approached NRCS in hopes of addressing the runoff concerns. After meeting with an NRCS and UACD planner, it was agreed that the NRCS planning procedure would require a substantial amount of time and that action needed to be taken right away to address the issue of runoff leaving the producers property. Therefore, this project was installed as a stand-alone 319 funded project, with the producer providing the required match.

The first thing that was done within this project was to bring in 118 tons of crushed road base in order to reshape the slope in areas where runoff would flow uncontrolled. After doing this, runoff now flows to the solid waste storage facility, where it can accumulate and then flow out through a newly installed drainage system (see Figures 18 and 19 in section 12.2). This drainage system was installed to transport runoff and liquid waste from the solid waste facility, through a 150 foot long waste transfer pipeline, under the highway, to an existing storage location. See Figure 20 in section 12.2 for location of waste transfer pipeline. In addition to sloping areas of the dairy to control runoff direction and the new drainage system, a new concrete wall was installed along the scrape pad that leads to the solid waste storage facility to prevent manure from overflowing on to the neighbor’s property when scraping manure. Figures 21 and 22 in section 12.2 of this report show the location of the newly installed concrete scrape wall in relation to where the new drainage system is located.

Now that these improvements have been made, this dairy can function within compliance to state and local water quality standards. No longer is liquid animal waste runoff leaving the producers property and being delivered to any waterway within the watershed. The producer has repeatedly expressed gratitude for the 319 cost share program and is extremely relieved that they no longer are contributing to degraded water quality. This has been something that they have been concerned about for a very long period of time and look forward to properly managing animal waste and preventing nutrient movement off of their operation. The Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet was used to help estimate the effectiveness of this project. Nutrient reduction loading figures can be found in section 9.2 of this report. The following is a breakdown of project cost:

| 319: $16,735.16 | Match: $11,156.77 | Total: $27,891.93 |
**Task 2**: Exclude livestock from river ways by limiting access and protecting source water.

**Actual Output**: As previously mentioned, in the PIP for the FY09 grant, there were three proposed projects that were going to be the center focus. However, only one of these projects was implemented. This was AFO #1, as shown on the map titled “FY09 Lower Bear River Project Location Map” in section 4.2 of this report. This 400 cow feedlot is located directly on the Malad River in the Bear River City area. Because of its location, runoff from large storm events have high potential to enter the river, carrying with it nutrients that are detrimental to the health of the aquatic system. Previous to this 319 project, the producer had fenced off approximately 12,000 feet of riverbank and riparian area along the river, had abandoned a 2 acre corral right on the river, and had installed a runoff containment pond to collect all runoff from their operation, except for one last 3 acre feedlot at the south end of his property. This 3 acre feedlot is located on a slope and was in dire need of improvement. See Figures 23-26 in section 12.2 of this report for pre project photographs. Although the riverbank and riparian area had been mostly fenced off, livestock still had access to the river as a drinking source at several locations along this fenced stretch, which still contributed to erosion and nutrient introduction through animal waste. Often livestock would walk around the fence and enter the riparian and graze. The fence was in place but was not functioning in a way to protect water quality. Project implementation consisted of installing BMPs that insured full containment of all runoff and animal waste produced on the operation, along with improving the efficiency of the fence that the producer had already installed to protect the riverbanks and riparian area. A 400 feet long diversion was installed at the downslope end of the 3 acre feedlot on the south end of the operation as a way to prevent runoff from entering the Malad River. Also, a runoff retention pond was created where runoff was directed to by the diversion. A 450 feet long fence was also installed in this area to protect the riparian area and retention pond from livestock access. See Figures 27-29 in section 12.2 of this report for photographs of the newly installed diversion and riparian fence. In addition to the new fence at the 3 acre feedlot, several other smaller fences were installed where livestock had previously had access to the river, thus providing 100% restriction to the Malad River. See Figures 30-32 in section 12.2 of this report for photographs of these places where access is now eliminated. In order for livestock to have needed water, yet insure the protection of water quality and the riparian areas along the river, 3 off site watering facilities were installed at various locations within the operation, which required the installation of 3,500 feet of pipeline to deliver water to the watering facilities. See Figures 33 and 34 in section 12.2 of this report for photographs of these newly installed watering facilities. Now that these BMPs are installed, the producer is very pleased how the project turned out. He is very active in promoting the implementation of similar projects to those who operate within his community and is very willing to allow others to come and see what he has done, while offering ideas to anyone who asks. The Malad River within his stretch now has a protected riparian area and water quality is a major aspect in the producers operation. The Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet was used to help estimate the effectiveness of this project. Nutrient reduction loading figures can be found in section 9.2 of this report. The following is a breakdown of project cost:

| 319: $14,366.12 | Match: $9,577.41 | Total: $23,943.53 |

**Goal #2**: Improve vegetation and upland wildlife habitat to enhance streambank stability and provide cover to control erosion. STEPL Model calculations estimate that an average streambank project could potentially reduce sediment by 38.2 tons/year.

**Objective 1**: Improve riverbank stability by replanting vegetation, fencing off the river, installing buffer and filter strips, and installing rock structures.

**Task 3**: Install fencing to limit livestock access to streambanks.

9/3/2015
Actual Output: Other than the improvements made to the AFO in Task 2, 319 funds from this grant were not used for this task. All project funds were used to implement BMPs on AFO #1 and AFO #2, as reported on in Goal #1. However, a stream restoration project is currently being engineered and planned within the Lower Bear Watershed that will specifically address Goal #2 and Tasks #3, 4, and 5. Project implementation will be in spring 2015 and funds for the project will come out of the FY10 grant, which will be reported on next year.

Task 4: Stabilize streambanks using willow plantings or installing buffer strips.

Actual Output: 319 funds from this grant were not used for this task. All project funds were used to implement BMPs on AFO #1 and AFO #2, as reported on in Goal #1. However, a stream restoration project is currently being engineered and planned within the Lower Bear Watershed that will specifically address Goal #2 and Tasks #3, 4, and 5. Project implementation will be in spring 2015 and funds for the project will come out of the FY10 grant, which will be reported on next year.

Task 5: Stabilize streambanks using reinforcing structures.

Actual Output: 319 funds from this grant were not used for this task. All project funds were used to implement BMPs on AFO #1 and AFO #2, as reported on in Goal #1. However, a stream restoration project is currently being engineered and planned within the Lower Bear Watershed that will specifically address Goal #2 and Tasks #3, 4, and 5. Project implementation will be in spring 2015 and funds for the project will come out of the FY10 grant, which will be reported on next year.

Goal #3: Inform and educate landowners in Box Elder County, and other areas throughout the state, about erosion control and sediment reduction to improve water quality.

Objective 1: Develop information and provide educational opportunities for local landowners and support agencies to encourage the implementation of similar projects.

Task 6: Document and photograph before and after photo points of implemented projects described in Goals #1 and #2.

Actual Output: Before and after photographs have been taken to document project improvements. These photographs have been used at the Northern Utah Conservation District meetings to encourage the implementation of similar projects.
Task 7: Provide educational opportunities that highlight project accomplishments through:
- Informative seminars that highlight successful projects.
- Local informational publications as newspapers, news articles, and local conservation districts websites.
- Northern Utah Mini Water Conference highlighting sediment reduction and erosion control efforts on the Bear River.
- Provide seminars that highlight soil erosion control and stream restoration.

Actual Output: Several steps have been taken to inform and educate the public on the need to address sediment reduction and erosion control within their operations as a way to improve water quality within the Lower Bear River Watershed. One of these steps includes the organizing and carrying out of the annual Northern Utah Mini Water Conference. This event brings producers, landowners, and other stakeholders together to discuss water topics that are facing them at the time. Many of the presentations at this conference address water quality, as well as water quantity, and what can be done to improve both. The local watershed coordinator has given several presentations that cover topics such as the various funding opportunities that are available for landowners and producers to implement sediment reduction and erosion control practices within their operations, and how water quality standards have been developed and designated. Funds in the amount of $224.64 from this grant were towards sponsoring this event and helped pay for lunch that was provided to those who attended. Additionally, funds in the amount of $134.59 from this grant went towards supplies that were needed to staff a booth and participate in the Bear River Celebration, an annual event that coincides with the state of Utah’s free fishing day. This booth provided an educational opportunity to educate the youth and their parents about water quality within the Lower and Middle Bear River Watersheds. Currently an educational event is being planned for the summer of 2015 for the sole purpose of informing and educating landowners within the Lower Bear River Watershed about erosion control and sediment reduction to improve water quality. The projects from Tasks #1 and #2 will be highlighted at the event and the producers will be invited to speak on their experience with the 319 program and how it has positively impacted their operations. In preparation for this event, $1,139.49 of I&E funds out of the FY09 grant went towards the purchase of hats and leather work gloves with the words “Helping Improve Water Quality” printed on them. These items will be used to give out to those who attend the event this upcoming summer.

| 319: $1,498.72 | Match: $999.15 | Total: $2,497.87 |

Goal #4: Provide administrative services and technical services.

Objective 1: Track match, prepare reports, and provide technical assistance.

Task 8: Utah Association of Conservation Districts will be paid for contract administration, processing cooperator reimbursements, tracking match and related accounting. They will also provide mid-year and annual progress reports on the implementation of proposed projects.

Actual Output: Utah Association of Conservation Districts and the local watershed coordinator have worked together to document matching contributions and to track individual project progress. The local watershed coordinator has generated the mid-year, annual and final reports.

| 319: $4,200.00 | Match: $2,800.00 | Total: $7,000.00 |

9/3/2015
**Task 9:** Technical assistance will be a function of the watershed coordinator job description with assistance from UACD staff as requested. This includes planning and establishment of nutrient management plans. This also includes the use of the UACD engineer on projects that are not eligible for EQIP dollars, as requested by the watershed coordinator.

**Actual Output:**

<table>
<thead>
<tr>
<th>Task</th>
<th>319:</th>
<th>Match:</th>
<th>Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$4,200.00</td>
<td>$2,800.00</td>
<td>$7,000.00</td>
</tr>
</tbody>
</table>

| Total | $41,000.00 | Total Match: | $27,333.33 | Total: $68,333.33 |

**6.0 PARTNERS**

**6.1 FY08 and FY09**

The Northern Utah Conservation District was the sponsor for the Lower Bear River Advisory Committee and has been the leading sponsor. This district provided oversight of cooperator selection, volunteer work, and information sharing generated by this project. The Lower Bear River Advisory Committee directed the Utah Association of Conservation Districts and NRCS to oversee project development, planning, implementation, and approval, along with administration and reporting efforts. The agencies listed below helped carry out these projects by providing support in the following areas:

- Northern Utah Conservation District: approval, project implementation progress
- Department of Environmental Quality: oversight, project management, monitoring
- Utah State University Extension Service: I&E, technical assistance
- Utah Association of Conservation Districts: administer contract, implementation, education, reporting, technical assistance
- Utah Department of Agriculture and Food (UDAF): I&E, technical assistance
- Box Elder County: advisory assistance
- Cooperators: provide match for cost share, implementation of water quality plans
- EPA: NPS program oversight, financial assistance
- Utah Division of Wildlife Resources: advisory and monitoring assistance
- U.S. Fish and Wildlife Service: advisory and monitoring assistance
- Bear River Water Conservancy District: Technical Advisory Committee coordination
- Box Elder County: advisory assistance
- Bear River Irrigation Company: advisory assistance

The following state environmental programs supported these projects in the following areas:

- Utah Division of Water Quality: standard program monitoring, technical assistance, 319 grant management
- Utah Division of Water Rights: permits, advisory, and monitoring assistance
- Utah Division of Water Resources: advisory assistance

The following federal agencies made key contributions to these projects:

- EPA: financial assistance, Clean Water Act Section 319
- USDA: coordination with NRCS
7.0 COMPLICATIONS

7.1 FY08
One of the biggest challenges was keeping projects on schedule when implementing BMPs and meeting project deadlines. It is our hope that cooperators will continue to maintain their projects, and discover the benefits that they can provide for them.

7.2 FY09
The FY09 grant provided funding for two very effective projects that directly impacted water quality within the Lower Bear River watershed. Both projects provided examples of efficient use of 319 funds that can be showcased in future outreach and educational efforts. The only complication that comes to mind regarding the FY09 grant was that both of these projects were installed within the last year of the grant contract timeframe, which provided little time or opportunity to plan any type of project highlighting or project tour. It was also felt that Goal #3, the Information and Education part of this grant, somewhat lacked in effectiveness. However, this will not result in a lost opportunity, as plans are already being made to carry out an event in the summer of 2015 that will provide an educational opportunity for the producers, landowners, and public of the Lower Bear River watershed. The two projects implemented within this grant will serve as a foundation of the event and will involve the producers of these projects. It is still the intent of this grant to follow through with the commitment to educate and inform the public and local stakeholders, who are the most effective tool available in insuring the protection and improvement of water quality.

8.0 RECOMMENDATIONS

8.1 FY08
We would hope that future projects would adhere more closely to the proposed PIP. While the project implemented will have an impact on water quality, we feel that following the proposed PIP more closely will help address the water quality issues identified by local and state agencies.

8.2 FY09
The only major recommendation that is provided here is to stress the importance of project implementation early within the time frame of any grant. This will allow for any unforeseen complications or roadblocks that may come up along the way, as they always do. This will also allow for highlighting the projects once they are installed and give ample time to wrap up loose ends and for submittal of the final report. Also, early project installation will allow for more visual pictures of post project conditions.

9.0 ENVIRONMENTAL RESULTS

9.1 FY08
The monitoring goals of this project were to document progress in achieving improved water quality conditions as non-point BMP practices were implemented, and to document and review effectiveness of these BMPs. Monitoring on this project supplements the state of Utah’s ongoing
overall water quality monitoring program. The Utah Division of Water Quality will continue to monitor several sites on the Lower Bear River and its tributaries as part of its long-term water quality monitoring efforts.

As for Task 4, the improvements made to an animal feeding operation, the implementation of the dike, fence, watering facility, and nutrient management for proper manure application has allowed the animal feeding operation to contain and use animal waste more effectively. They are able to apply and incorporate nutrient into the soil in a timely manner. Odor has decreased and pest management practices are in check. The animals are cleaner and production has increased.

To help estimate the effectiveness of the feedlot repairs and relocation, the Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet was used. This worksheet estimates the amount of nutrients taken out of the system through the implementation of BMPs. The table below shows these calculations:

Figure 4: Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet results.

<table>
<thead>
<tr>
<th>Project</th>
<th>Risk Before</th>
<th>Risk After</th>
<th>Nitrogen Reduction (lbs./year)</th>
<th>Phosphorous Reduction (lbs./year)</th>
<th>BOD Reductions (lbs./year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear River AFO</td>
<td>Medium</td>
<td>Very Low</td>
<td>33</td>
<td>16</td>
<td>144</td>
</tr>
</tbody>
</table>

In terms of monitoring water quality and BMP effectiveness of Task 6, the rerouting of an agricultural field drain to reduce anthropogenic influences that have reduced water quality, efforts are in the early stages. Although pre-project monitoring included nutrient and E. coli sampling, due to this project being implemented at the very end of the grant timeline, the only post-project monitoring that has taken place has been that of E. coli analysis.

All rivers, streams, irrigation canals, and ditches within the state of Utah are designated, explicitly or implicitly, as Class 2B waters. Under this classification, these waterways are protected for infrequent primary contact and secondary contact recreation such as boating, wading, or similar uses. The agricultural field drain in this project drained to the Bear River; therefore, the Class 2B water standard was used when making the E. coli concentrations analysis. E. coli concentrations from the agricultural field drains were assessed using the Colilert Quanti –Tray 2000 method, which was approved by the United States Environmental Protection Agency in 2000. The detection limit for this test ranges from 1 Most Probable Number (MPN) per 100mL sample to >2419.6 MPN per 100mL sample. With a Beneficial Use Classification of 2B for the Lower Bear River, if the agricultural field drain tested higher than the State Standard of 668 Maximum MPN / 100mL, it would be in violation of water quality standards.

Figure 5 shows the pre-project E. coli concentrations. From this graph, it is evident that the agricultural field drain had been in violation of state water quality standards five out of the six times that it was sampled. Figure 6 shows the post-project E. coli concentrations. From this graph, the E. coli concentrations are well below the State Standard of 668 Maximum MPN / 100mL. When comparing these two graphs, it is important to notice the y-axis of each graph to truly understand the E. coli concentration reduction.

After viewing these two graphs, it is evident that a dramatic reduction in E. coli concentration has occurred. It is acknowledged that these results may be somewhat skewed due to the seasonality in which the post-project samples were collected. Often times E. coli concentrations will be greater during the warmer months of the year. However, when comparing the two graphs with just the results from winter month sampling, a substantial reduction is still observed. It is also acknowledged that a more complete sample set is needed to draw any concrete conclusions. Future monitoring plans call for a more comprehensive data set of both E. coli concentrations and nutrient loadings.
In addition to the E. coli analysis, a phosphorus load reduction has also been estimated. When analyzing the agricultural field drain maps, it was estimated that about 10% of the acreage that the agricultural field drain serviced is no longer accessible to drainage. According to pre-project monitoring, this agricultural field drain contributed 3.41 lbs/day, or 1,245.58 lbs/year of total phosphorus to the Bear River system. With a 10% reduction in acreage after project
implementation, an estimated 10% reduction in total phosphorus is anticipated. This results in a total phosphorus reduction of .34 lbs/day, or 124.5 lbs/year that is no longer reaching the Bear River system.

![Phosphorus Loading Graph](image)

### 9.2 FY09

The monitoring goals of this project were to document progress in achieving improved water quality conditions as non-point BMP practices were implemented, and to document and review effectiveness of these BMPs. Monitoring on this project supplements the state of Utah’s ongoing overall water quality monitoring program. The Utah Division of Water Quality will continue to monitor several sites on the Lower Bear River and its tributaries as part of its long-term water quality monitoring efforts.

To help estimate the effectiveness of AFO #1 and AFO #2 project implementation, the Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet was used. This worksheet estimates the amount of nutrients taken out of the system through the implementation of BMPs. The table below shows these calculations:

<table>
<thead>
<tr>
<th>Project</th>
<th>Risk Before</th>
<th>Risk After</th>
<th>Nitrogen Reduction (lbs./year)</th>
<th>Phosphorous Reduction (lbs./year)</th>
<th>BOD Reductions (lbs./year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFO #1</td>
<td>High</td>
<td>Low</td>
<td>435</td>
<td>212</td>
<td>1580</td>
</tr>
<tr>
<td>AFO #2</td>
<td>High</td>
<td>Low</td>
<td>165</td>
<td>32</td>
<td>585</td>
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</table>

Both of the projects implemented within the FY09 grant have had positive environmental impacts and have gone a long ways in improving water quality within the Lower Bear River watershed. Both projects were installed on operations where the producers want to be proactive in protecting water quality and are strong advocates for the 319 program.

As for AFO #1, the improvements to the feedlot have resulted in a protected riparian zone that can now begin to heal and function in a manner that will contribute to improved water quality. With livestock removal, the riverbanks can begin to stabilize and anthropogenic nutrient introduction will cease. Post project management operation will insure that proper animal waste and runoff will be controlled and contained. The landowner has received additional education on the importance of protecting water quality within his operation and now makes it a priority.
As for AFO #2, the implementation of this project has had positive impacts to both the dairy and the producer’s outlook on making water a priority within his operation. The dairy now functions on a manure management plan and is able to properly handle and contain all animal waste that it produces, along with processing runoff in an effective and efficient manner. The producer no longer has to worry about upsetting his neighbor or falling into violation of federal, state, or local water quality standards.

10.0 DELIVERABLES AND FINANCES

10.1 FY08

<table>
<thead>
<tr>
<th>TASK</th>
<th>DELIVERABLES</th>
<th>319/NPS FUNDING</th>
<th>ADDITIONAL FUNDING</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: Contract with landowners to enhance streambank stability and control erosion.</td>
<td>None</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Task 2: Implement plot section on a project from Task 1.</td>
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<td>$0</td>
<td>$0</td>
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<tr>
<td>Task 3: Monitor, observe, and document results from plot trial in Task 2.</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Task 4: Install fencing to limit livestock access to streambank.</td>
<td>1 project contracted, designed, and implemented.</td>
<td>319:$5,069.47 Match: $3,379.65 EQIP: $4,510.88</td>
<td>$12,960.00</td>
<td></td>
</tr>
<tr>
<td>Task 5: Implement grazing land BMPs next to waterways.</td>
<td>None</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Task 6: Identify agricultural field drains that may be contributing to waterway impairment.</td>
<td>1 project contracted, designed, and implemented.</td>
<td>319:$12,728.11 Match: $8,485.41</td>
<td>$21,213.52</td>
<td></td>
</tr>
<tr>
<td>Task 7: Document and photograph before and after points.</td>
<td>Use project documentation as a tool in outreach efforts.</td>
<td>319:$1,890.00 Match: $1,260.00</td>
<td>$3,150.00</td>
<td></td>
</tr>
<tr>
<td>Task 8: Provide educational opportunities that highlight project accomplishments</td>
<td>8 newsletter articles, Carrying out of the Northern Utah Mini Water Conference.</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Task 9: Track match and project progress. Prepare reports.</td>
<td>Match documentation, annual and final report.</td>
<td>$3,210.00</td>
<td>$2,140.00</td>
<td>$5,350.00</td>
</tr>
<tr>
<td>PROJECT TOTALS:</td>
<td>319: $24,100.00 Match: $16,066.67 EQIP: $4,510.88</td>
<td>$44,677.55</td>
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</table>
## 10.2 FY09

<table>
<thead>
<tr>
<th>TASK</th>
<th>DELIVERABLES</th>
<th>319/NPS FUNDING</th>
<th>ADDITIONAL FUNDING</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task 1</strong>: Improve or move existing animal feed lots</td>
<td>1 project contracted, designed, and implemented.</td>
<td>$16,735.16</td>
<td>Match: $11,156.77</td>
<td>$27,891.93</td>
</tr>
<tr>
<td><strong>Task 2</strong>: Exclude animals from the river by limiting river access and protecting source water</td>
<td>1 project contracted, designed, and implemented.</td>
<td>$14,366.12</td>
<td>Match: $9,577.41</td>
<td>$23,943.53</td>
</tr>
<tr>
<td><strong>Task 3</strong>: Install fencing to limit livestock access to the streambank</td>
<td>None</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Task 4</strong>: Stabilize streambanks using willow plantings or installing buffer strips</td>
<td>None</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Task 5</strong>: Install in-stream structures to increase bank stability.</td>
<td>None</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Task 6</strong>: Document and photograph before and after photo points</td>
<td>2 projects documented.</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Task 7</strong>: Provide educational opportunities that highlight project accomplishments</td>
<td>Use project documentation as a tool in outreach efforts. Carrying out the Northern Utah Mini Water Conference. Plan and carry out summer 2015 event.</td>
<td>319:$1,498.72</td>
<td>Match: $999.15</td>
<td>$2,497.87</td>
</tr>
<tr>
<td><strong>Task 8</strong>: Administrative Support (UACD)</td>
<td>Match documentation, annual and final report.</td>
<td>$4,200.00</td>
<td>$2,800.00</td>
<td>$7,000.00</td>
</tr>
<tr>
<td><strong>Task 9</strong>: Technical assistance</td>
<td>UACD engineering and staff support</td>
<td>$4,200.00</td>
<td>$2,800.00</td>
<td>$7,000.00</td>
</tr>
<tr>
<td><strong>PROJECT TOTALS:</strong></td>
<td></td>
<td><strong>319: $41,000</strong></td>
<td><strong>Match: $27,333.33</strong></td>
<td><strong>$68,333.33</strong></td>
</tr>
</tbody>
</table>
11.0 CONCLUSIONS

11.1 FY08
In conclusion, as increased attention has come to how various agricultural practices within the Lower Bear River project area impacts water quality, these 319 grants have proved to be critical to producers and landowners. There is still much to do in the Lower Bear River project area in terms of non-point source pollution improvement projects. Many great partnerships have come about as a result of these projects and will be vital in the future. Great interest has come from the projects implemented with this grant and as a result, 2 animal feeding operation projects and 2 streambank stabilization projects are currently in the development stages. The efforts that have been made to inform, educate and inspire stakeholders to make water quality a priority within the Lower Bear River watershed have been fruitful but can still be improved upon. Information and education will play a major role in the future and are believed to be the key to permanent change.

11.2 FY09
In conclusion, the FY09 grant provided cost share for two very good AFO improvement projects. Although each project was different in scope, they both served a unified purpose, which was to improve and protect water quality. In addition to this, these projects represent the need for sound stewardship and ethical management to be at the forefront of everyday operational decisions within agricultural production. This grant was also a great example of what can be done when willing producers and water quality conservation efforts come together to improve an existing condition.

AFO #1 was a case of a producer who had already begun to make improvements on his own but was in need of additional education and funding to complete what he previously started out to do. The implementation of this project now allows the landowner to remain in production, while being in compliance with state and local water quality standards. The landowner has received additional education on the importance of protecting water quality within his operation and now makes it a priority in his everyday decision making.

AFO #2 was a case where the producer knew that he had a problem regarding water quality and responsible animal waste management, but wasn’t sure where to start or how to seek out cost share opportunities. Through partnering with UACD and NRCS for technical assistance, and the 319 program for cost share funding, a plan was created and implemented that resulted in the dairy now functioning according to federal, state, or local water quality standards. Both of these projects exemplify exactly what was in mind when the PIP for this grant was developed. Both producers are now advocates for the 319 program and are eager to promote water quality protection and improvement whenever given the opportunity. It is the hope and expectation that future projects and improvement efforts will maintain such a standard.
12.0 ATTACHMENTS

12.1 FY08

Figure 7: Installation of the new agricultural field drain that will bypass a residential development.

Figure 8: Looking down the cleanout access manhole. This is where the new field drain is rerouted to go around the housing development.

Figure 9: Connection point of the agricultural field drain and the clean out manhole.

Figure 10: Safety grate covering the agricultural field drain clean out access.

Figure 11: This pre-project picture shows the potential for uncontrolled runoff to enter waters of the state.

Figure 12: This picture shows the slope of the feedlot and the need for a berm to prevent animal waste from entering waters of the state.
Figure 13: This post-project picture shows where the water running through the feedlot was piped to prevent the introduction of animal waste.

Figure 14: The picture was taken during construction to show how the pipe was installed to allow water to bypass the feedlot.

Figure 15: This picture shows another angle of the installation of the pipe that transports water without animal waste introduction and maintains good water quality.
Figure 16: AFO #2. Previous to project implementation, uncontrolled runoff flowed through the dairy and off of the producer's property.

Figure 17: AFO #2. Another photo of uncontrolled runoff that flowed through the dairy and off of the producer's property.

Figure 18: AFO #2. The newly constructed drainage basin that collects runoff out of the solid waste facility and delivers it to a waste transfer pipeline.

Figure 19: AFO #2. When full, liquids will run into this drainage basin and will then be delivered under the highway to a storage location.
Figure 20: AFO #2. This shows where 150 feet pipeline was installed for the waste transfer pipeline. The highway runs between here and the house in the background.

Figure 21: AFO #2. This photo shows where the new wall was installed to prevent manure from being pushed on to the neighbor’s property when scraping manure into the solid waste storage facility.

Figure 22: AFO #2. This photo shows the solid waste storage facility with the newly constructed drainage basin and scrape wall.
Figure 23: AFO #1. This photo shows the 3 acre feedlot on the south end of the operation that had no system in place to capture runoff from storm events.

Figure 24: AFO #1. This photo shows the Malad River and the lack of runoff containment of the feedlot. This is the area where runoff would enter the river.

Figure 25: AFO #1. This photo shows one of the locations where livestock still had access to the river. This gate was often left open and did very little to contain livestock.

Figure 26: AFO #1. This photo shows another location where runoff would enter the Malad River. Runoff would flow the low topology and make its way to the river. Dark areas denote manure accumulation.
Figure 27: AFO #1. This photo shows the newly installed 400 feet long diversion and fence that prevents runoff from entering the Malad River and protects the riparian area.

Figure 28: AFO #1. This photo shows another angle of the newly installed diversion and fence.

Figure 29: AFO #1. This photo shows the height of the newly installed 400 feet long diversion that will act to prevent runoff from entering the Malad River.

Figure 30: AFO #1. This photo shows the old watering access that has been abandoned and livestock are now 100% prevented from entering the river.
Figure 31: AFO #1. This photo shows a new section of fence that has been installed to prevent livestock from accessing the Malad River now that watering facilities have been installed.

Figure 32: AFO #1. This photo shows an abandoned watering access point where livestock used to erode riverbanks and cause excessive nutrient and sediment introduction to the Malad River.

Figure 33: AFO #1. This photo shows a new watering facility that has been installed to prevent livestock access to the river and to protect the riparian area.

Figure 34: AFO #1. This photo shows another new watering facility that has been installed to prevent livestock access to the river and to protect the riparian area.