



Clean Water Act
Section 319 Non Point Source Pollution
Control Program
Watershed Project Final Report

Bear River Basin (Little Logan Creek) (FY-2001)

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

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EXECUTIVE SUMMARY

Project Title: Bear River, Little Logan Creek, demonstration project (FY-2001)

Start Date: January 15, 2002 **Completion Date:** September 30, 2006

Funding:	Total Budget:	\$78,307.53
	Total EPA Grant:	\$46,550.00
	Total expenditures of EPA funds:	\$46,550.00
	Total Section 319 Match accrued:	\$31,757.53
	Total expenditures:	\$78,307.53

Summary Accomplishments

The Little Logan Creek project was designed to demonstrate reduction of non-point source pollution through the use of best management practices (BMPs) for managing animal waste. Jenson Dairy, an animal feeding operation (AFO) located on the Little Logan, was chosen for the demonstration project to implement BMPs for proper storage and application of animal manure. The plan for Jenson dairy included the construction of two storage structures, an evaporation pond, and a pump transfer station to control animal waste. The Jenson's also installed a berm and livestock enclosure fencing along the Little Logan Creek.

A formal tour of the Jenson Dairy was held in 2004 to display the animal waste system design and proper manure application techniques. Tours and information sharing continued in 2005 with one formal tour and one tour for out-of-state Natural Resources Conservation Service (NRCS) professionals. Fact sheets and articles about the project were developed to help inform the public and other potential cooperators. The project was identified in the Cache Conservation Newsletter and was included with other projects in comprehensive fact sheets.

The Little Logan Creek contract also included a streambank improvement project. Boy Scouts planted trees as a protective barrier along the Logan River on the Logan River Ranch. Additional trees were planted along the banks of the Blacksmith Fork River to stabilize the stream bank and prevent erosion into a nearby canal system.

1.0 INTRODUCTION

The Little Logan Creek, HUC Middle Bear 16010202, diverts from the Logan River near the "Island" area of Logan city, meandering through Logan for approximately four miles before reentering the Logan River west of town. Much of the water is diverted for irrigation purposes, reducing the flows through town. Several small springs increase flows west of town maintaining a permanent stream year round. The Little Logan also provides storm water drainage to portions of Logan city. Determining the exact watershed size is difficult due to the numerous inflows and outflows from the system. Most of the Little Logan's four miles of stream would be considered part of Logan's in town irrigation system. A more natural appearing stretch of stream begins along 1000 West from which point the Little Logan meanders another mile to its confluence point with the Logan River.



Jenson Dairy is located on 1000 West along the Little Logan Creek. Cordell Jenson owns the dairy and Tony, Scott, and Bruce Jenson, Cordell's sons, run the operation. The dairy consists of 100 milking cows, 200 calves and heifers, and several housing facilities. An estimated 2750 tons of manure are produced annually. The facilities are located within 100 feet of Little Logan Creek with a 2-3% slope, allowing the potential for manure nutrients to drain into the waterway near the confluence with the Logan River. In the past, this has resulted in elevated levels of sediment, phosphorous and nitrogen ultimately entering the Bear River System from the Logan River tributary as identified in the Lower Bear River Water Quality Plan (ERI, Nov. 1995).

Though the Logan River is not a major contributor to sediment and nutrient loading in the Bear River System, monitoring data on the Logan River indicates a decline in water quality as the river enters the valley floor and winds its way to Cutler Reservoir (ERI, 1995). Several feeding operations, including Jenson Dairy on 1000 West, are located along the lower segments of the Logan River and its tributaries. Nutrient contamination from these sources contributes to the overall impairment of the Cutler Reservoir and the Middle Bear as a whole. The Middle Bear River from Cutler Reservoir to the Idaho State line has been identified as a "High Priority" watershed, 303d list Unified Assessment Category IA. The Logan River and tributaries are classified as 2B, 3A, and 4, (see Table 1).

Table 1: Utah Beneficial Use Classification and Description

- 2B- Protected for boating, water skiing and similar uses excluding recreational bathing (swimming).
- 3A- Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
- 4- Protected for agricultural uses including irrigation of crops and stock watering.

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

The Jenson Dairy is highly visible to the public; 1000 West is a major road in Logan City. Also, Woodruff Elementary School and a new subdivision are located across the street. Project staff discussed the long-term plans for the Dairy to determine if the project was viable for the foreseeable future. The family plans to continue dairying into the future.

The Little Logan Creek project has demonstrated reduction of non-point source pollution for nitrogen from an estimate of 144 lbs/yr to 5 lbs/yr and for phosphorus from 29 to 1 lb/yr by applying best management practices (BMPs) to animal waste containment. Estimates were derived using the UAFRRRI model shown in the Appendix of this report. This demonstration project highlights proper storage and application practices for animal manure. If implemented area-wide these practices will improve water quality to down stream users. Additional efforts are being made to encourage other animal feeding operation (AFO) producers to adopt and implement similar activities to address their own water quality problems. Producers are increasingly aware of the need to contain animal waste, but are reluctant to implement high cost solutions. Producers also need assistance developing proper application and utilization methods for liquid and solid manure. Successful projects combine a voluntary approach with cost-share assistance to identify key system components that properly contain manure while allowing management flexibility.

2.0 PROJECT GOALS, OBJECTIVES, AND TASKS

GOAL 1: To assist Jenson Dairy in implementing proper application and storage of animal manure to reduce non-point source pollution in Little Logan Creek. Project includes total containment of manure along with proper application and utilization.

Objective 1: Finalize design and conservation plan on the Jenson Dairy to ensure total containment of animal manure and reduce pollutants entering the Little Logan River.

Task 1: Complete Comprehensive Nutrient Management Plan (CNMP) on Jenson Dairy

Task 2: Implement CNMP:

- Build manure storage bunkers
- Construct an evaporation pond
- Install a transfer pump station and pipeline
- Create berm and install fence
- Plant trees as a vegetative buffer

Task 3: Test water quality in project area

GOAL 2: Inform and educate community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed.

Objective 1: Conduct tour of project cooperators demonstrating: animal waste system design with comprehensive nutrient management plans

Task 4: Conduct animal waste system and land application tour

Objective 2: Share general and technical information with producers and stakeholders.

Task 5: Develop, produce and distribute fact sheet and newspaper articles to area producers and stakeholders (40 hrs. + supplies)

Task 6: Track match (60 hrs). Prepare and File Reports (60 hrs).

Task 7: Prepare and file reports

2.1 Planned and Actual Milestones, Products, and Completion Dates

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
GOAL 1: Objective 1				
Task 1: Complete Comprehensive Nutrient Management Plan (CNMP)	CNMP designed	1	1	FY 02
Task 2: Implement BMP's designated by CNMP	CNMP implemented	1	1	FY 02- FY 03
Task 3: Monitor water quality	Water quality data samples	4	4 samples	FY 02 & FY 03
GOAL 2: Objective 1				
Task 4: Conduct tour of Jenson Dairy	Tour	1 tour	3 tours	FY 04—05
GOAL 2: Objective 2				
Task 5: Develop fact sheet and articles	Article, fact sheet	1,1	Bear River Water Quality Pamphlet, Cache Conservation Newsletter	FY 03
Task 6: Track Match	Records	Ongoing	File kept with UACD	FY 02- FY 07
Task 7: Prepare and file reports	Semi-annual, annual, and final reports	5	3 quarterly reports 3 semi-annual reports 2 annual reports 1 final report	FY 02- FY 07

2.2 Evaluation of Goal Achievement and Relationship to the State Non-Point Source (NPS) Management Plan

The Jenson family completed all tasks outlined in the CNMP for their dairy. All goals and objectives outlined in the PIP were met. By December of 2002, the Jenson's had finalized construction of the large waste storage structure, the small waste transfer station and the evaporation pond. By June 2006, the berm and fence were installed and trees were planted along the Logan River. The project achieved its main goal of properly containing and storing animal manure to reduce nutrient loading in to Little Logan Creek by an estimate of 96% for nitrogen and phosphorus.

Formal and informal tours of Jenson Dairy were conducted in 2004-2005, helping producers become more aware of water quality concerns. The tours also gave producers ideas for improved

management to eliminate animal manure entering the Logan River. The Cache Conservation Newsletter and brochures highlighted water quality improvement practices that were demonstrated in this project.

2.3 Supplemental Information



Figure 1: Proximity of Jenson Dairy to public road

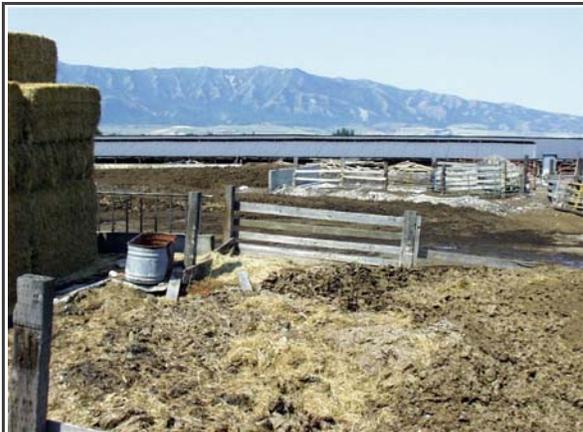


Figure 2: Jenson Dairy corrals before project implementation



Figure 3: Jenson Dairy corrals after project implementation



Figure 4: Manure storage bunker



Figure 5: Pump transfer station



Figure 6: Tree plantings



Figure 7: More tree plantings

3.0 BEST MANAGEMENT PRACTICES DEVELOPED AND/OR REVISED

The Jenson Dairy project was designed to demonstrate proper storage and application methods for animal manure. Best management practices (BMPs) for the project included: use of manure storage structures; manure application; nutrient and pest management; and stream bank stabilization. The implementation of these BMPs achieved the project's goal of total containment and proper application of animal waste.

4.0 MONITORING RESULTS

The monitoring goals of this project were to document progress in achieving improved water quality conditions as non-point source control programs were implemented. Monitoring goals were also set to document and review effectiveness of BMPs. Monitoring on this project supplements the State's ongoing overall water quality monitoring program. Utah Division of Water Quality will continue to monitor several sites on the Middle Bear River and its tributaries as part of its long-term water quality monitoring efforts.

4.1 Total Maximum Daily Load (TMDL) Implementation Effectiveness

The Cutler Reservoir TMDL identifies a need to reduce the phosphorus loading for agricultural sources by 45% in the irrigation season and 61% in the non-irrigation season. The realization of the TMDL endpoints will only come about as a result of cumulative impacts from several operations achieving similar results. The BMP's installed for this project are characteristic of the ones identified in the Cutler Reservoir TMDL.

4.2 Best Management Practice (BMP) Implementation Effectiveness

The implementation of the manure management system has made managing animal manure much easier for the Jensen Dairy. They are able to apply and incorporate nutrients into the soil in a timely manner. Odor has decreased and pest management practices are in check. Animal are cleaner and production has increased.

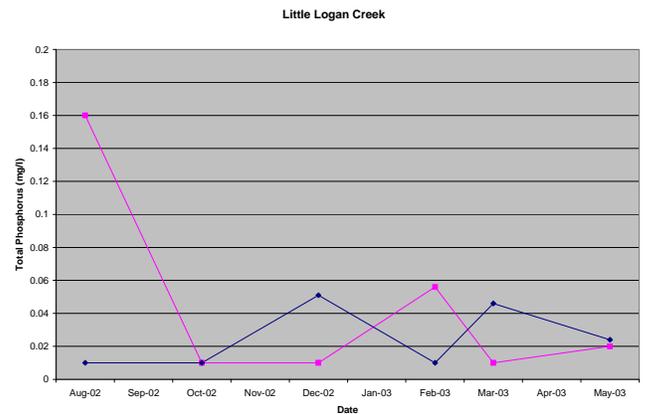
4.3 Surface Water Improvements

To reduce the risk of nutrient loading from the Jensen Dairy lot into the Little Logan, the project's CNMP called for the construction of two manure storage structures, a large evaporative liquid pond, and a transfer station with electric pump. The plan also required a vegetative barrier and a fence to be installed between the lot and Little Logan Creek. The completion of these tasks on Jensen Dairy significantly reduced the potential for nutrient and sediment loading from animal waste into Little Logan Creek. The following sections discuss in greater detail the surface water improvements achieved by this project.

4.3.1 Chemical, Biological and Physical/Habitat

The Little Logan River was monitored above and below the project site from August 2002 to May 2003 following project implementation. The figures below show the flow and the total phosphorus levels in the Little Logan River above and below the project. Flow in the Little Logan varied from a high of 5.6 cfs to a low of 0.25 cfs. Total phosphorus concentrations were consistently low with a high of 0.051 mg/l below the dairy showing little or no impact from the Dairy. No instream water samples were taken prior to project implementation so all before conditions are evaluated using the UAFRR data. The Little Logan River will be monitored again during the next scheduled intensive monitoring cycle for the Bear River.

The biological and physical parameters of water quality have improved as a result of the animals being fenced out of the riparian area and the addition of vegetative plantings along the streambank. The riparian vegetation has grown back and is providing a buffer along the stream. The plantings will improve the habitat and provide shade for the stream.



Flow

Total Phosphorus

4.4 Other Monitoring

Natural Resources Conservation Service (NRCS) was responsible for conducting a project implementation check. Utah Association of Conservation Districts (UACD) continues to follow-up with the cooperator to make sure proper management practices are implemented and to resolve any additional management problems.

4.5 Results of BMP Operation and Maintenance Reviews

No long term funding was planned for the operation or maintenance of the Jenson Dairy project. Maintenance of this project is the responsibility of the private landowner. UACD and NRCS have inspected the project. The operation and maintenance of the designed systems have been thoroughly explained to the landowner who has signed a document acknowledging his understanding.

5.0 COORDINATION EFFORTS

The North Cache and Blacksmith Fork Conservation Districts are the sponsors of the Cache County Local Work Group and were the lead sponsors for this project. The Cache County Local Work Group provided oversight of project planning, cooperator selection, volunteer work, and information sharing generated by this project. The Local Work Group directed the North Cache Conservation District to oversee project development, planning, implementation, approval, creation of fact sheets and educational materials, administration, and reporting. Specific duties (listed below) were transferred, as per Memoranda of Understanding, to the following agencies:

- North Cache Conservation District: approval
- Natural Resources Conservation Service: technical assistance, follow-up
- Department of Environmental Quality: oversight, project management
- Utah State University Extension Service: Information and education
- Utah Association of Conservation Districts: administer contract, implementation, education, reporting, technical assistance

UACD handled project administration, match documentation and contracting with agencies and individuals. They also provided staffing assistance at the direction of the Districts.

5.1 Coordination with State and Local Agencies

The state and local agencies listed below helped carry out the project by providing support in the following areas:

- Utah State University Extension: Information and Education (I&E), technical assistance
- Utah Department of Agriculture and Food (UDAF): I&E, technical assistance
- Utah Association of Conservation Districts (UACD): Administration, contracting, staff and technical support
- Cache County: Advisory assistance
- Bear River Resources Conservation and Development (Bear River RC&D): Additional funding and coordination of volunteers

5.2 Coordination with State Environmental Programs

The following State Environmental Programs supported the project in the following areas:

- Utah Division of Water Quality: Standard program monitoring, technical assistance and 319 grant management
- Utah Division of Wildlife Resources: Advisory and monitoring assistance
- Utah Division of Water Rights: Permits, advisory and monitoring assistance
- Utah Division of Water Resources: Advisory assistance

5.3 Coordination with Federal Agencies

The following federal agencies made key contributions to the project:

- EPA: Financial assistance - CWA Section 319
- USDA: Coordination with NRCS
- NRCS: Technical planning, design, and oversight

5.4 Accomplishments of Agency Coordination Meetings

The Cache County Local Work Group offered to coordinate resource management planning efforts to improve water quality within the entire Middle Bear River watershed. Because of on-going educational efforts within the area, numerous owners of AFOs are seeking technical and financial support to address the impacts of their operations on water quality. Various state and federal agencies are working together to try and meet the increasing demands for assistance.

5.5 Other Coordinated Resources

The project also benefited from contributions by the following organizations:

- PacifiCorp: Volunteer hours, advisory
- Ecosystems Research, Inc.: Advisory
- Boy Scouts: Volunteer hours

6.0 SUMMARY OF PUBLIC PARTICIPATION

Water quality in the Bear River and its tributaries has received considerable attention over the past ten years. The website for the Bear River Watershed Information System, <http://www.bearriverinfo.org/>, highlights implementation projects within the watershed that have improved water quality and reduced non-point source inputs. Two symposiums sponsored by the Tri-State Bear River Water Quality Task Force have brought together participants from three states to discuss water quality concerns and potential solutions.

Boy Scouts planted trees as a protective barrier along the Logan River, on the Logan River Ranch. Additional trees were planted along the banks of the Blacksmith Fork River to stabilize the stream bank and prevent erosion into a nearby canal system. Native trees and shrubs that benefit wildlife were used for the plantings.

7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

An error in calculation of the depth of material to be removed in the corral resulted in a low spot in the concrete. This low spot accumulates liquids when there is precipitation. We are concerned that ice may form in this area and cause cows to slip and fall. There is no additional funding for errors and omissions to correct this problem, so we hope the operators use management practices to keep this area clean and free of shallow standing water that could freeze and create slick areas.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

It would be wise to add a visual barrier to the front of the dairy because it is highly visible from a public road. More than 1,000 people drive by the front of the operation daily. The Jenson's could

also re-grade the lot, increase the frequency of manure hauling and increase storage capacity to further reduce the potential for nutrient loading into the Little Logan Creek.

9.0 APPENDICES

1. ERI, Nov. 1995. Ecosystem Research Institute, with Bear River RC&D. *Lower Bear River Water Quality Management Plan*. Report prepared for Department of Environmental Quality and Department of Water Quality.

2. Summary of UACD contracts

Project	UDAF contract #	From	To	EPA	Matching	Total	Projects
Little Logan FY 01	02-1683	Jan 15, 2002	Sept 30, 2006	\$46,550.00	\$31,757.53	\$78,307.53	2

*Utah Animal Feedlot Runoff Risk Index Worksheet

Landowner:	Cordell Jensen
Location:	Logan
Planner:	JDB
Date:	March 30, 2010

Weather Station:	Logan Radio
HUC:	16020201
Precipitation:	16.6

Lot Description:	dairy			
Planning Scenario:	Before	After	Before	After
Lot Size (Sq. Ft.):	30000	30000		
Surface Type:	75% Paved/Concrete	100% Paved/Concrete		
Animal Type:	Dairy (Lact)	Dairy (Lact)		
No. of Animals:	150	150		
Avg. Weight:	1400	1400		
Days Confined:	365	365		
Sq.Ft./Animal:	200.0	200.0		
Feedlot Features				
Runoff Containment	20	0		
Distance to Water	16	16		
% Slope	0	0		
Vegetation	1	1		
Clean H₂O Diversion	4	0		
Index and Risk Level				
Index:	41.0	17.0		
Risk Level:	Medium	Low		
Manure Management and Conservation Practices				
Haul/Scrape Frequency	Weekly	Daily		
Practices to be implemented	bunker, pond, pipeline,pump			
Loading Calculations				
Fresh Manure (tons)	3,065	3,065		
Total N Available (lbs)	463	66		
Total P Available (lbs)	93	13		
Total BOD₅ Available (lbs)	1,646	235		
Precipitation Factor	0.84	0.84		
Lot Surface Factor	0.93	0.94		
Risk Factor	0.40	0.10		
Total N Loading (lbs)	144	5		
Total P Loading (lbs)	29	1		
Total BOD₅ Loading (lbs)	513	19		

*Individual high risk features should be evaluated and conservation practices applied where possible. All runoff from a 25-year, 24-hour storm event must be contained on the lot.

Practices that might be implemented:

Move Lot	Install Dike	Install Filter Strip
Regrade Lot	Install Diversion	Roof Runoff System
Build Storage	Increase Sq.Ft./Animal	Change Hauling Frequency
Increase Storage		