# Clean Water Act

# Section 319 Nonpoint Source Pollution Control Program

# Watershed Project Final Report

## LITTLE BEAR RIVER WATERSHED IMPROVEMENT

## CACHE COUNTY, UTAH

## MAY 1992 – OCTOBER 2006

## Updated May, 2010

### PROJECT SPONSOR

**Blacksmith Fork Soil Conservation District**
**Utah Association of Conservation Districts**
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This project was conducted in cooperation with the State of Utah and the United States Environmental Protection Agency, Region VIII.

Grant #: C9998187-91 thru C9998187-96 and C9998187-01

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# Executive Summary

| **Project Title:** | **Little Bear River Watershed Improvement** | | |
|---|---|---|---|
| **Start Date:** | May 1, 1992 | **Completion Date:** | September 30, 2009 |
| | | | |
| **Funding year** (UDAF contract #) | | **EPA 319 Funds:** | **EPA + 319 match:** |
| | **FY 91** (92-3266) | **$90,000** | **$150,000** |
| | | *(2 contract amendments, see appendix C)* | |
| | **FY 92** (93-3379) | **$120,000** | **$200,000** |
| | **FY 93** (94-2701) | **$157,000** | **$261,667** |
| | | *(1 contract amendment, see appendix C)* | |
| | **FY 94** (95-1993) | **$408,855** | **$681,425** |
| | **FY 94** (95-1963) | **$19,200** | **$32,000** |
| | **FY 95** (96-1259) | **$564,000** | **$940,000** |
| | **FY 96** (97-1032) | **$204,000** | **$340,000** |
| | **FY 01** (02-1681) | **$119,000*** | **$198,333** |
| | | *(4 contract amendments, see appendix C)* | |
| | | **Total Budget:** | **$2,803,425** |
| | | **Total EPA 319 Grant:** | **$1,682,055** |
| | | **Total expenditures of EPA funds (to date):** | **$1,682,055** |
| | | **Total 319 Match accrued:** | **$1,121,370** |
| | | **Total expenditures:** | **$2,803,425** |
| | | **Non-disbursed 319 Grant funds by contract number:** | **0** |
| | | **Total non-disbursed 319 Grant:** | **0** |
| | | **Total non-disbursed 319 Grant with 319 Match** | **0** |

* figure includes transfer of $50,000 FY-01 funds from Cub River PIP

## SUMMARY ACCOMPLISHMENTS

Watershed improvement activities, using Section 319 funding on the Little Bear River, began in May of 1992 and are still in progress with the goal of reaching identified TMDL targets. To date, the Little Bear River Watershed Project has received $1,682,055 of Section 319 funds from EPA and has obligated these funds in individual landowner contracts. The current TMDL (2000) produced by the Utah Department of Environmental Quality has been submitted to the U.S. EPA and has been approved. The TMDL identified an existing load for total phosphorus (TP) above

Hyrum Reservoir of 8.4 kg/day and a load above Cutler Reservoir of 22 kg/day. The TMDL target load (based on 0.05 mg/L TP) above Hyrum Reservoir is 6.0 kg/day and 9.0 kg/day into Cutler Reservoir. Defined Targets/Endpoints are listed both in terms of water chemistry and activities predicted to reduce inputs of pollutants: Not to exceed a concentration of 0.05 mg/l TP in stream; 14 Animal Waste Management Systems; 10 miles of stream bank restoration; 25% reduction in sediment associated with irrigation runoff; and installation of Best Management Practices (BMPs) on 7,500 acres of critical lands as identified by the PSIAC assessment.
The overarching project goals for the Little Bear River were to reduce non-point source pollution by:

- Reducing the amount of pollutants entering the watershed from animal feeding operations.
- Improving the stability of the stream channels and enhancing the riparian corridor to reduce sediment and nutrient loading.
- Informing and educating the community concerning non-point source pollution and the importance of managing natural resources within the watershed.

More than 100 conservation projects have been planned and implemented with cooperators that address water quality problems. These funds have been used to implement Best Management Practices that have improved water quality of the Little Bear River.

Cropland Practices included: irrigation water management, crop sequencing, field borders, conservation tillage and filter strips.

Riparian practices included: streambank protection, fencing, filter strips, livestock exclusion, channel stabilization, clearing and snagging, off-site stock watering, and forest riparian buffers.

Grazing land practices included: off-site stock watering, range seeding, fencing, prescribed grazing and pasture plantings.

Manure management practices included: manure management and utilization systems, nutrient management, and runoff management systems.

In 2004 the segment of the Little Bear River above Hyrum Reservoir was found to be in compliance with state water quality standards and meeting its beneficial use designation. This section of river was subsequently removed from the 303d list. The lower segment from Cutler Reservoir upstream to Hyrum Reservoir, although showing improvement, is still not meeting the water quality standards for the designated beneficial uses. It is anticipated that due to an inter-basin irrigation transfer into the lower Little Bear River from the Spring Creek drainage that as the Spring Creek TMDL is implemented the lower portion of the Little Bear River will also attain the endpoints of its TMDL.

All projects included BMPs and were planned to the level of a total resource management system in accordance with NRCS standards and specifications. Additionally, all project BMPs adhered fully to all state, local and federal regulations and permitting requirements regarding wetlands, cultural resources, and sensitive aquatic habitats.

# 1.0 Introduction

The Little Bear River Watershed, HUC Middle Bear 16010202, is located in Cache County, Northern Utah. The watershed encompasses 196,432 acres and includes irrigated cropland, irrigated pasture, meadow pasture, non-irrigated cropland and pasture, and rangeland. Land use is approximately 70% range/forest/wildlife, 19% irrigated cropland, 7% dry cropland, and 4% other. Land ownership is 88% private, 10% national forest, and 2% state lands (See Figures 1 and 2 for land ownership and land use depictions).

Land within the watershed is primarily used for livestock feed production and as grazing land for livestock and wildlife. There are approximately 36,807 acres of irrigated cropland and 14,682 acres of non-irrigated cropland within the watershed. Crops that are produced in the watershed include silage corn, small grains, alfalfa and pasture/hayland. There are some of these acres set aside under Highly Erodable Lands (HEL) and Conservation Reserve Program (CRP) and some minor crops like apples, and raspberries. The remaining 144,943 acres include range, forest, water bodies and towns.

The Little Bear River has two main sub-drainages. The South Fork originates in the low elevation foothills of the Wellsville Mountains in the Bear River Range. The East Fork drains an extensive area of National Forest land and is stored in the upper basin behind Porcupine Reservoir. Porcupine Reservoir's outflow is regulated for irrigation and flood control. Only about two percent of the area above the confluence of the two sub-drainages is in agricultural use. The proportion of agricultural land uses increase below the outflow of Porcupine Reservoir to about forty percent. A second reservoir, Hyrum Reservoir was originally constructed for irrigation and flood control and now supports additional uses such as fishing, waterskiing, boating and ice fishing in the winter. The Little Bear River below Hyrum dam conveys mainly irrigation return flows in summer, but may receive high flushing flows in the spring and early summer during runoff events. The river passes through the towns of Hyrum, Wellsville and Mendon, and receives the effluent from the Wellsville Sewage lagoons.

Spring Creek is considered a tributary to the Little Bear River but enters so close to Cutler Reservoir that it may be considered a tributary to Cutler Reservoir instead. Much of the runoff from Hyrum City drains into this creek and the area is heavily used for agriculture and related industries (feedlots, a rendering plant, a meat packing plant, and a butter packaging plant). Spring Creek has a TMDL developed for it separately that was approved by EPA in 2002.

The waters of the State of Utah are grouped into beneficial use classes to protect against controllable pollution. The Middle Bear River from Cutler Reservoir to the Idaho State line has been identified as a High Priority watershed for improvement, 303(d) list Unified Assessment Category IA. The Little Bear River is a tributary to the Bear River just upstream (to the South) of Cutler Reservoir. The designated uses for the main Bear River in this middle section are 2B, 3B, and 4. The Little Bear River and other tributaries include classifications of 2A, 2B, 3A, 3B, 3D and 4 and are described more specifically in Tables 1 and 2.

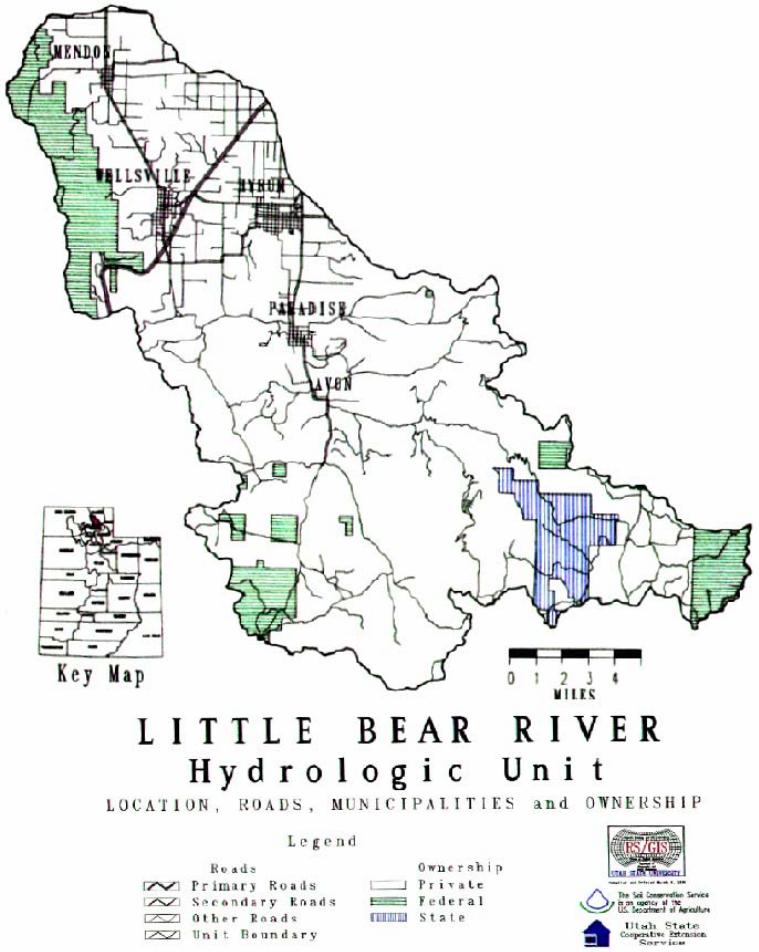


Figure 1 - Little Bear River Watershed / Land Ownership

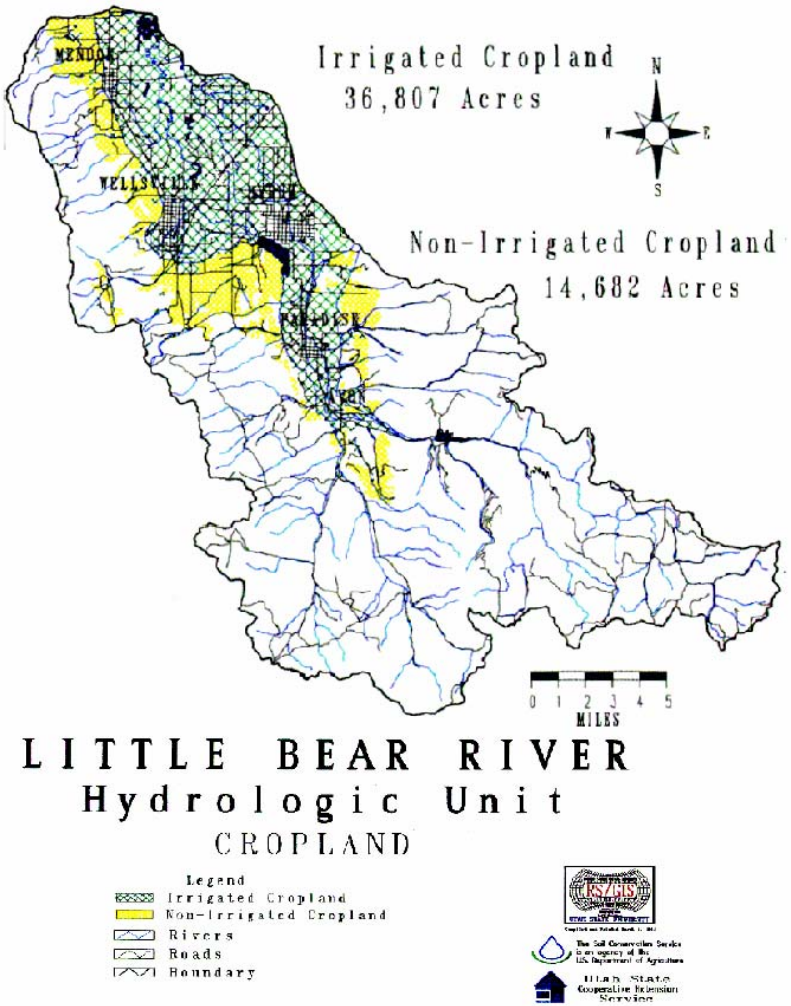


Figure 2 – Little Bear River Watershed / Cropland

Table 1 - Utah Beneficial Use Classification and Description

2A – Protected for primary contact recreation such as swimming.
2B – Protected for boating, waterskiing 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.
3B – Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
3D – Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
4 – Protected for agricultural uses including irrigation of crops and stock watering.

Table 2 – Beneficial Use Classification of waterbodies in the Little Bear River Watershed area.

| **Water body** | **Beneficial Use Classification** |
|---|---|
| Little Bear River, Cutler Reservoir to Hyrum Reservoir and Hyrum Reservoir to East Fork confluence. | 2B, 3A, 3D, 4 |
| Spring Creek, confluence with Little Bear River to headwaters including tributaries | 2B, 3A, 3D, 4 |
| Hyrum Reservoir | 2A, 2B, 3A, 4 |
| Cutler Reservoir | 2B, 3B, 3D, 4 |

The Little Bear River is divided into two segments for Utah's 303(d) list. The first is the Little Bear River from Cutler Reservoir South (upstream) to Hyrum Reservoir. This segment is 28.1 miles in length and is listed as impaired for Class 3A (cold water aquatic species) due to high total phosphorus concentrations and hydrologic modification. The stream channel was straightened in several places which resulted in actively eroding streambanks. The second segment is the Little Bear River from Hyrum Reservoir to the East Fork Confluence. This segment is 6.87 miles in length and has the same impairment of total phosphorus but is not listed for total suspended solids from bank erosion. Additional problem areas include several tributary drainages to the Little Bear River approximately four miles upstream from Hyrum Reservoir. These small drainages are heavily impacted by severe erosion of the main and tributary channels during peak flow events. Sediment and nutrient loading to the river system may also result from road damage, poorly managed upland grazing and cropland erosion. Phosphorus inputs are primarily from soil-bound phosphate and from animal manure that may enter the system after being flushed from concentrated animal feeding operations (CAFOs) and pasture and cropland immediately adjacent to the river. A major portion of the river corridor is used for livestock grazing and crop production. Also along the western and southern shorelines of Hyrum Reservoir wave action erodes the toe of highly erosive bluffs causing sloughing that results in additional sediment deposition to the reservoir.

The current TMDL (2000) produced by the Utah Department of Environmental Quality has been submitted to the United States Environmental Protection Agency (U.S. EPA) and has been accepted. It indicates the load for total phosphorus above Hyrum Reservoir is 8.4 Kg/day and the cumulative load above Cutler Reservoir is 22 kg/day. The TMDL target load (based on 0.05 mg P/l) above Hyrum is 6.0 kg/day and above Cutler Reservoir is 9.0 kg/day. Defined Target/Endpoints are listed both in terms of water chemistry and activities predicted to reduce input of pollutants: Not to exceed 0.05 mg P/l concentration in stream; 14 Animal Waste Management Systems; 10 miles of stream bank restoration; 25% reduction of cropland runoff; and installation of Best Management Practices (BMPs) on 7,500 acres designated as critical.

Watershed improvement activities, using Section 319 funding on the Little Bear River, began in May of 1992 and are still in progress with the goal of reaching these TMDL targets. This Final Report summarizes work completed from 1992 – 1997 that was done as part of a multi-agency effort as well as work that was conducted from 1997 through 2006.

To date the Little Bear River Watershed Project has received $1,616,055 of Section 319 funds from EPA and has obligated these funds in individual contracts. These funds have been used to implement Best Management Practices that have improved water quality of the Little Bear River. Funds were received in fiscal years 1991, 1992, 1993, 1994, 1995, 1996 and 2001. Funding has come from EPA Region VIII through the Utah Department of Environmental Quality and the Utah Department of Agriculture and Food. More than 100 conservation projects have been planned and implemented with cooperators that address water quality problems.

# 2.0 Project Goals, Objectives, and Activities

The overarching project goals for the Little Bear River were to reduce non-point source pollution by reducing the amount of pollutants entering the watershed from animal feeding operations; improving the stability of the stream channels and enhancing the riparian corridor to reduce sediment and nutrient loading; and informing and educating the community concerning non-point source pollution and the importance of managing natural resources within the watershed. Please note that the number of project items that follow in the narrative Goals and Objectives sections are cumulative from the start of the Hydrologic Unit Area (HUA) project in 1992 to the present.

Through the efforts of the Little Bear River Project (LBRP) Steering Committee and LBRP Technical Advisory Committee the following three goals were established to address the identified resource concerns and problems. Two more goals were added in subsequent years of work in the watershed. The following are descriptions of the Objectives and Tasks developed to meet the identified Goals.

GOAL #1 – Reduce the amount of water pollutants entering the Little Bear River from non-point sources and improve water quality within the Little Bear River Hydrologic Unit Area. *In subsequent years this goal was reworded to the following:* Improve the quality of water in the Little Bear River to meet state water quality standards for the designated water uses by reducing the amount of non-point source pollutants entering the Little Bear River.

OBJECTIVE: 1 Reduce the amount of Agricultural NPS pollutants, (sediment, phosphorus, and nitrogen) that enter the Little Bear River, Hyrum Reservoir and Cutler Reservoir from 12,000 acres of irrigated cropland by 25 percent as estimated using the EPIC computer model, PSIAC method, Direct Volume method, USLE and Above/Below Water Samples.

Activities included developing Resource Management System Plans that utilized Best Management Practices to resolve NPS water quality problems; implementing better irrigation water and nutrient management practices on cropland; and installing efficient irrigation systems that minimize water runoff and transport of nutrients.

OBJECTIVE: 2. Reduce coliform count and nutrient inputs into the Little Bear River from concentrated animal feeding operations (CAFOs) to meet acceptable water quality levels for the designated uses. The Bear River Health Department has found coliform counts too numerous to count in several locations.

Activities included; design and installation of animal waste management facilities; and design and construction of wetlands to evaluate and demonstrate their use in animal waste management systems.

GOAL #2 - Achieve long term stability of stream channels, streambanks and shorelines throughout the watershed and restore a quality fishery.

OBJECTIVE: 1. Reduce streambank erosion and channel headcutting by improving streambank stability along 10 miles of the Little Bear River and its' tributaries. (Implementation of BMPs is under the direction of the Little Bear River (LBR) HUA Interagency/Interdisciplinary work group.) Section 319 funds will only be used to address streambank and channel problems that are related to agricultural activities, not hydrologic modification, until the Hydro-modification Addendum to the Utah NPS Plan has been approved by EPA.

Activities included: installation of streambank protection and stream channel stabilization BMPs according to NRCS designs and specifications; installation of vegetative plantings; implementation of livestock grazing management BMPs and riparian exclusion.

GOAL #3 - Reduce sediment build up and nutrient loading into Hyrum and Cutler Reservoirs (*Added in later years)*.

OBJECTIVE: 1. Reduce sediment and associated nutrient input to Hyrum and Cutler Reservoirs coming from rangeland by 22,800 tons (sediment) and 35% (nutrients) annually by reducing erosion on 62,600 acres: apply related BMPs as found in 2.2.1 of the FY-93 PIP. (Refer to Rangeland Report of the LBR HUA Plan and the FY-93 PIP priority map for identification of these areas.)

Activities included: Designing and applying grazing management BMPs (deferred grazing, planned grazing systems, and rotational grazing); application of BMPs to control erosion and restore rangelands to good hydrologic condition; and installation of cross fencing and off stream watering facilities.

GOAL #4 - Gain public acceptance of NPS activities by informing and educating the community, (general public, landowners, water users, environmental awareness groups, etc.) concerning NPS pollution and the importance of managing natural resources within the watershed.

OBJECTIVE: 1. Inform and educate landowners and the public of the need for everyone to be involved in efforts to improve water quality.

Activities included: preparation of a video in 1994 to show at meetings and on TV; preparation and publishing of newspaper and/or magazine articles on NPS problems and solutions each year; publishing newsletters; and conducting training sessions to demonstrate the need for and methods of achieving improvements in the Little Bear River Watershed to the general public residing there; conducting informational tours for the general public,

schools and agencies; and evaluation of the effectiveness of BMP implementation on water quality.

GOAL # 5 - Document use of 319 funds and evaluate program effectiveness. *(Added in later years)*.

OBJECTIVE: 1. Maintain a system of record keeping so that costs and the effectiveness of implemented practices can be determined and provide the required EPA documentation.

Activities included: monitoring activities; developing contracts with cooperators for use of 319 funds and tracking expenditures of 319 and matching funds; maintaining records of all NPS practices implemented by cooperators and UACD reimbursement payments to cooperators; And evaluation of monitoring records and determination of the effectiveness of implemented BMP practices.

## 2.1 Planned and Actual Milestones, Products, and Completion Dates

Table 3 - Milestones

| GOAL/OBJECTIVE/TASKS | PLANNED OUTPUT/PRODUCT | PLANNED AMOUNT | ACTUAL OUTPUT | COMPLETION DATE |
|---|---|---|---|---|
| **GOAL 1: Objective 1** | | | | |
| Task # 1 NRCS and UACD will assist cooperators in developing Resource Management System Plans (RMSs) and in implementing them using applicable Best Management Practices (BMPs) to resolve NPS water quality problems. | RMS Plans | 90 plans | 115 plans | FY 91 – FY 05 |
| Task # 2 NRCS and UACD will assist cooperators in obtaining higher irrigation water management (IWM) and nutrient management on 12,000 acres. | Product: Technical assistance.<br>Output: Reduce the nutrient losses coming from 12,000 acres of cropland by 25% as estimated using the EPIC computer model and baseline information. | 59 projects | This work tracked by NRCS | FY 91 – FY 05 |
| TASK # 3 NRCS, FSA, and UACD will assist cooperators to install more efficient irrigation systems on 2,250 acres. | Product: Technical assistance.<br>Output: Improved irrigation efficiency and reduction of nutrient input from 2,250 acres of irrigated cropland. | 59 projects | 625’<br>2460’<br>1861’<br>Pumps, rain gutters | FY 91 – FY 05 |
| **GOAL 1: Objective 2** | | | | |
| TASK # 4 FSA (HUA funds) and USU Extension (separate PIP) will design animal waste management facilities. | Product: Designs for animal waste facilities - 35 ea. | 35 projects | All projects designed under other contracts | FY 91 – FY 05 |
| TASK # 5 NRCS, UACD, FSA, and USU Extension will assist cooperators in installing animal waste management systems within critical treatment areas. | Product/Output: Animal waste management systems installed and operating to reduce nutrient and coliform input to LBR, Hyrum Reservoir and Cutler Reservoir. | 35 projects | 4<br>4<br>11<br>18<br>22 (59 projects) | FY 91 – FY 05 |
| TASK # 6 NRCS, DEQ and USU Extension will design and assist cooperators to install demonstration constructed wetlands to demonstrate effectiveness of this practice as part of an animal waste management system. | Product/Output: Demonstration constructed wetlands operating and evaluated as part of animal waste management systems. | 2 | This work tracked by USU Extension | FY 91 – FY 05 |
| TASK # 7 NRCS, DEQ, USU Extension and cooperators will evaluate effectiveness of constructed wetlands as part of animal waste management systems. | Product/Output: Report on effectiveness of wetlands. | 1 | This work tracked by USU Extension | FY 91 – FY 05 |

| GOAL/OBJECTIVE/TASKS | PLANNED OUTPUT/PRODUCT | PLANNED AMOUNT | ACTUAL OUTPUT | COMPLETION DATE |
|---|---|---|---|---|
| **GOAL 2: Objective 1** | | | | |
| TASK # 8 Install streambank protections and stream channel stabilization BMPs according to NRCS design and specifications in areas designated as critical. | Product/Output: Sediment reduction of 7375 tons/year and stabilization of 1.5 miles of stream channel and banks. | 1.5 mi | 7100' 1750'<br>1600' 3500'<br>3500' 2700'<br>2700' 1050'<br>1050' 700'<br>700' 250'<br>6800' 1050'<br>4350' 700'<br><br>(39,500' total)<br>350' relocation<br>14 drop structures<br>19 barbs | FY 91 – FY 05 |
| TASK # 9 Install vegetative plantings according to NRCS design and specifications on critical streambank. | Product/Output: Sediment reduction of 3770 tons/year, a 50% reduction of baseline nutrient pollutants and 180 acres of critical area planting. | 180 acres | 1850'<br>3 ac<br>1 ac (some acres captured in tasks 12, 13, and 14 below) | FY 91 – FY 05 |
| TASK # 10 Implement livestock grazing management BMPs and/or restrict livestock access to the channel and riparian area along stream by fencing and providing off-stream livestock watering facilities. | Product/Output: Livestock exclusion and/or grazing management | 10 miles streambank; 300 acres | 750'<br>1000'<br>3861'<br>12466'<br>1297'<br>3930'<br>28 ac exclusion<br>22.5 ac<br>2 ac<br>22 ac<br>.5 ac<br>0.5 ac<br>22 ac (23,304' and 283 ac total) | FY 91 – FY 05 |
| TASK # 11 Implement BMPs listed in tasks #1-10 above in a manner that will result in an improvement to the fisheries within the watershed. | Product/Output: An increase in fish production to 200 pounds per acre along approximately 20 miles of stream. | 200 mi | Fish habitat was improved. See UDWR study of East Fork of LBR final report | FY 91 – FY 05 |

| GOAL/OBJECTIVE/TASKS | PLANNED OUTPUT/PRODUCT | PLANNED AMOUNT | ACTUAL OUTPUT | COMPLETION DATE |
|---|---|---|---|---|
| **GOAL 3: Objective 1** | | | | |
| TASK # 12 Planned Grazing System. Apply grazing management BMPs (deferred grazing, planned grazing systems, rotation grazing and etc.) on rangeland to reduce sheet and gully erosion and the resulting sediment and associated nutrients yield. | Product/Output: Planned grazing systems and reduced erosion. Reduced sediment (and associated nutrient) loading. | 62,600 acres; 8,400 tons/year | 2000 ac<br>33 ac<br>92 ac<br>450’<br>450’<br>(900’ and 2,125 ac total)<br>13 grade stabilization structures | FY 91 – FY 05 |
| TASK # 13 Apply BMPs to control erosion and restore good hydrologic condition on poor condition rangeland to reduce sediment and associated nutrients. | Product: Reduction in sediment and associated nutrient loading. | 7,200 acres; 14,400 tons/year | 38 ac<br>105 ac<br>63 ac<br>530 ac<br>63 ac<br>33 ac<br>63 ac<br>33 ac<br>(335 ac funded by 319, other USDA/FSA programs paid for other acres) | FY 91 – FY 05 |
| TASK # 14 Proper Grazing Use. Implement fencing and water development BMPs to facilitate implementing the grazing management BMPs above. | Product: Proper grazing use on of rangeland to improve vegetative cover by implementing grazing management BMPs. | 62,600 acres | 623 ac<br>46 ac<br>2000 ac<br>2000 ac<br>(4,669 ac funded by 319, other USDA/FSA programs paid for other acres) | FY 91 – FY 05 |

| GOAL/OBJECTIVE/TASKS | PLANNED OUTPUT/PRODUCT | PLANNED AMOUNT | ACTUAL OUTPUT | COMPLETION DATE |
|---|---|---|---|---|
| **GOAL 4: Objective 1** | | | | |
| TASK # 15 Information Specialist (UDA) and Project Coordinator (USU Extension) will prepare video to show at meetings and on TV. | Product: Video tape | 1 | 1 video produced | FY 91 – FY 05 |
| TASK # 16 Information Specialist (UDA) and Project Coordinators (USU Extension & NRCS) will prepare and publish newspaper and/or magazine articles on NPS problems and solutions. | Product: Newspaper and/or magazine articles | 36 | Many produced | FY 91 – FY 05 |
| TASK # 17 Information Specialist (UDA) and Project Coordinator (USU Extension) will prepare and publish newsletters to keep the public informed of water quality progress. News letters will be distributed to all agricultural land owners in the watershed. | Product: Newsletters | 9 | Many produced | FY 91 – FY 05 |
| TASK # 18 Project Coordinator (USU Extension) will develop and conduct training sessions to demonstrate the need for and methods of achieving improvement in the Little Bear River Watershed to the general public residing there. | Product: Training sessions | 2 | Several including riparian restoration with bioremediation techniques. | FY 91 – FY 05 |
| TASK # 19 The Project Coordinator (USU Extension) will work with NRCS to expand the GIS data base for use in information program and tracking of BMP implementation. | Product: GIS data base | 1 | 1 | FY 91 – FY 05 |
| TASK # 20 The Project Coordinators (USU Extension & NRCS) in cooperation with other cooperating agencies, organizations and groups will conduct information tours or general public, schools and agencies. | Product: Better informed public through information tours: Land owner tour, Cache County Schools Field Day, General Public Tour, and Agency Tour. | 4 | Numerous tours have been conducted (12+) School groups have conducted volunteer monitoring twice a year for 15 years. | FY 91 – FY 05 |
| TASK # 21 USU Extension and NRCS will use computer models (EPIC, AGNPS and other as appropriate) to evaluate the effectiveness of BMP application on water quality. | Product: Report on EPIC, AGNPS and other computer model results to obtain estimated savings in the project. | 1 | 1 | FY 91 – FY 05 |

| GOAL/OBJECTIVE/TASKS | PLANNED OUTPUT/PRODUCT | PLANNED AMOUNT | ACTUAL OUTPUT | COMPLETION DATE |
|---|---|---|---|---|
| **GOAL 5: Objective 1** | | | | |
| TASK # 22 Carry out work monitoring activities in 1993 PIP, section 3.1. | Product: Monitoring data obtained of water quality improvement and Annual Reports. | 1 | Performed for HUA report then transferred to DWQ | FY 91 – FY 05 |
| TASK # 23 UACD will develop contracts with cooperators for use of 319 funds and track expenditures of 319 and matching funds. | Product: Individual contracts for each cooperator and a record of matching funds to 319 funds. Quarterly reports. | 84 | 115 | FY 91 – FY 05 |
| TASK # 24 UACD will maintain a record of all NPS practices implemented by cooperators and UACD reimbursement payments to cooperators. | Product: Record of BMP practices implemented and reimbursement payments to cooperators. Quarterly reports. | 84 | 115 | FY 91 – FY 05 |
| TASK # 25 NRCS, USU Extension, UDA and DEQ will work together to evaluate monitoring records and determine the effectiveness of implemented BMP practices. | Product: Evaluation of BMPs applied, summarized in annual & final reports. | 14 | 30+ | FY 91 – FY 05 |

## 2.2 Evaluation of Goal Achievement and Relationship to the State NPS Management Plan

To date the Little Bear River HUA Watershed Project has received $1,616,055 of Section 319 funds from EPA and has obligated these funds in individual contracts. These funds have been used to implement Best Management Practices that have improved water quality of the Little Bear River to achieve identified TMDL endpoints. Funds were received for Fiscal Years 1991, 1992, 1993, 1994, 1995, 1996 and 2001. Funding comes from EPA Region VIII through the Utah Department of Environmental Quality and the Utah Department of Agriculture and Food. More than 100 conservation projects have been planned and implemented with cooperators that address water quality problems.

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**FY-1991** 319 funding. Best Management Practices (BMPs) installed using FY-91 319 funding of $90,000 included the following:
1. Clearing and snagging (to prevent accelerated bank cutting) - 7,100 feet.
2. In-river channel stabilization structures (to stop channel down-cutting related to agricultural activities)-12 drop structures.
3. Rock barbs (to protect streambanks)-17 barbs.
4. Streambank stabilization (dormant willow planting, toe revetment, riprap, seeding and erosion matting) - 1,850 feet.
5. Riparian fencing (to prevent 200 head of livestock from having direct access to the Little Bear River) - 750 feet.
6. Feed lot windbreak (as an initial animal waste project provides protection for animals thus reducing feed intake and waste output, uptake of nutrients, protection to area thus reducing nutrient runoff) - 1000 feet (1 ac).
7. Clearing and snagging old car bodies (used for rip-rap) and other debris that cause bank erosion - 1600 feet.
8. Open channel relocation - 350 feet.
9. Critical area planting - 3 ac.
10. Livestock exclusion - 28 ac.
11. Range seeding - 38 ac.
12. Pesticide management - 105 ac. UACD tracked these projects, expenses, and matching contributions of time and funds.

At the completion of this contract, $90,000 of FY-91 319 funds has been paid out to thirteen (13) cooperators for BMPs that have been applied on the land. A total of $60,000 of in-kind match provided by project participants brings the total value of EPA funded projects to $150,000 for FY-91.

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**FY-1992** 319 funding from EPA totaled $120,000. BMPs completed with this funding include the following:
1. Clearing and snagging (to prevent accelerated bank cutting) - 3,500 feet.
2. Channel stabilization structures (Little Bear River) to protect channel from additional down-cutting-2,700 feet.
3. Stream bank stabilization - 1050 ft.

4. Open channel protection of the Little Bear (to keep the river away from severely eroding banks and cropland) - 700 ft.
5. Animal waste control facilities - 4 ea.
6. Fencing - 3861 ft.
7. Filter strip - 0.5 ac.
8. Livestock exclusion - 22 ac., 120 AUMs/y.
9. Range seeding - 63 ac.
10. Pasture planting - 33 ac.
11. Proper grazing use - 2000 ac.

Refer to the FY-92 and FY-93 HUA Annual Report for additional information on practices applied. UACD tracked these projects, expenses, and matching contributions of time and funds.

At of the completion of this contract, $120,000 of FY-92 319 funds have been paid out to seventeen (17) cooperators for BMPs that have been applied on the land. A total of $80,000 of in-kind match was provided by project participants that brings the total value of EPA funded projects to $200,000 for FY-92.

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**FY-1993** 319 funding from EPA totaled $157,000. BMPs completed with this funding include the following:

1. Clearing & snagging - 6,800 ft.
2. Water conveyance pipeline (through feedlot) - 625 ft.
3. Animal waste management control structures - 4 ea.
4. Streambank protection - 4,350 ft.
5. Windbreak around feedlot - 1 ac.
6. Brush management - 92 ac.
7. Deferred grazing - 530 ac.
8. Fencing - 12466 ft.
9. Proper grazing use - 623 ac.
10. Pasture management - 46 ac.
11. Filter strip - 2 ac.
12. Livestock exclusion - 150 AUMs/y.
13. Grade stabilization structures - 13 ea.
14. Stream channel stabilization - 1750 ft.

Refer to the 1993 and 1994 Little Bear River HUA Annual Reports for more detailed information concerning other applied BMPs.

As of the completion date of this contract, $157,000 of FY-93 319 funds has been paid out to fourteen (14) cooperators for BMPs that have been applied on the land. UACD received $10,000 for tracking and reporting. A total of $104,667 of in-kind match provided by project participants brings the total value of EPA funded projects to $261,667 for FY-93.

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**FY-1994** 319 funding from EPA totaled $408,885. BMPs completed with this funding include the following:

1. Clearing and snagging (to prevent accelerated bank cutting) - 3,500 feet.
2. Channel stabilization structures (Little Bear River) to protect channel from additional down-cutting-2,700 feet.
3. Stream bank stabilization - 1050 ft.

4. Open channel protection of the Little Bear (to keep the river away from severely eroding banks and cropland) - 700 ft.
5. Animal waste control facilities - 11 ea.
6. Fencing - 1,297 ft.
7. Filter strip - 0.5 ac.
8. Livestock exclusion - 22 ac., 120 AUMs/y.
9. Range seeding - 63 ac.
10. Pasture planting - 33 ac.
11. Proper grazing use - 2000 ac.
12. Brush management - 450 feet.
13. Waste transfer pipeline - 2,460 feet.

Refer to the FY-92 and FY-93 HUA Annual Report for additional information on practices applied. UACD tracked these projects, expenses, and matching contributions of time and funds.

As of the completion date of this contract, $408,885 of FY-94 319 funds has been paid out to thirteen (13) cooperators for BMPs that have been applied on the land. UACD received $19,200 for tracking and reporting. A total of $285,370 of in-kind match provided by project participants brings the total value of EPA funded projects to $713,425 for FY-94.

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**FY-1995** 319 funding from EPA totaled $504,800. BMPs completed with this funding include the following:

1. Clearing and snagging (to prevent accelerated bank cutting) - 250 feet.
2. Channel stabilization structures (Little Bear River) to protect channel from additional down-cutting-2 barbs, 2 drop structures.
3. Stream bank stabilization - 1050 ft.
4. Open channel protection of the Little Bear (to keep the river away from severely eroding banks and cropland) - 700 ft.
5. Animal waste control facilities - 18 ea.
6. Fencing - >3,930 ft.
7. Vegetated waterway - 1 ea. (0.5 ac.).
8. Livestock exclusion - 22 ac., 120 AUMs/y.
9. Range seeding - 63 ac.
10. Pasture planting - 33 ac.
11. Proper grazing use - 2000 ac.
12. Brush management - 450 feet.
13. Waste transfer pipeline and pumps - > 1,861 feet.
14. Runoff management - 2 rain gutters.

Refer to the FY-92 and FY-93 HUA Annual Report for additional information on practices applied. UACD tracked these projects, expenses, and matching contributions of time and funds.

As of the completion date of this contract, $504,800 of FY-95 319 funds has been paid out to twenty four (24) cooperators participants for BMPs that have been applied on the land. UACD received $19,200 for tracking and reporting. A total of $376,000 of in-kind match provided by project participants brings the total value of EPA funded projects to $940,000 for FY-95. Some $40,000 was transferred from Otter Creek PIP.

Note: In 1995 the State of Utah received approval from EPA for a Hydrologic Modification Addendum to the State NPS Plan. Included in Task 8 of this PIP is a project to restore a section of the East Fork of the Little Bear River to a more natural condition. In 1983, during

severe flooding conditions, this section of the stream was straightened and altered by the land owner using heavy equipment. Since that time the Utah Department of Wildlife Resources (DWR) purchased the land surrounding this stream segment. The DWR developed a plan to improve the fish and wildlife habitat in this area by restoring stream meanders and native vegetation. Project sponsors anticipate that this action will provide significant benefit to demonstrate the results that can be obtained for water quality improvement. The unaltered sections of this stream segment meet the criteria of a class II stream and provide habitat with large populations of brown, cutthroat, and rainbow trout species. The section of stream that has been altered does not meet the criteria of a class II stream and has few if any of the above named species of trout. Funding for this restoration project is provided for in the CPO agreement between the DWR and the Blacksmith Fork Soil Conservation District.

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The **FY-1996** PIP was accepted for funding in the amount of $204,000 in EPA 319 funds for pollution reduction project design, planning, and implementation. The projected completion date for this funding was May, 2000. We requested an extension in September, 2001 to finalize projects in progress. The PIP included $16,000 that was contracted to UACD for project administration, tracking, and reporting. Eighty thousand dollars ($80,000) of these funds were returned to the project, monies that were transferred to Otter Creek/Koosharem Watershed in FY-95. A contract modification in March of 2001 added $40,000 towards Goal 1, Objective 2, and Task #5 Implementation of Animal Waste Management Systems. These additional Task elements allowed us to eliminate non-point pollution from two additional animal feeding operations in the watershed bringing the number of cooperating landowner projects to 23 using FY-96 funds. A total of $136,000 of in-kind match provided by project participants brought the total value of EPA funded projects to $340,000 for FY-96.

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**FY 2001** 319 funds for $69,000 were requested and approved in June of 2001 for the continuation of water quality improvement projects. Specifically, funds were allocated to add two more animal waste management projects, one streambank improvement project and administrative funds to finish reports and tracking of project activities. The project ending date for this contract was modified three times with the final amended date set for September 30, 2009. Funding for this contract was also amended with an increase of $50,000 in EPA funds transferred from the Cub River PIP, for a total EPA grant of $119,000. Best Management Practices completed with these funds include the following:

1. One irrigation project on twenty-five acres was installed to reduce irrigation induced erosion.
2. Stream bank restoration project - 300 linear ft.
3. Animal waste control facilities for three operations.
4. Stream bank restoration- 900 ft.
5. Protective/exclusion fencing -1150 ft.

## 2.3 Supplemental Information (representative photos)

Figure 3: Proj #10 Streambank restoration before

Figure 4: Proj #10 Streambank restoration after

Figure 5: Proj #15 Animal feedlot restoration before after

Figure 6: Proj#15 Animal feedlot restoration

Figure 7: Proj#13 Off-stream watering facility

Figure 8: Proj#13 Waste storage pond

Figure 9: Proj#12 Riparian Restoration Before

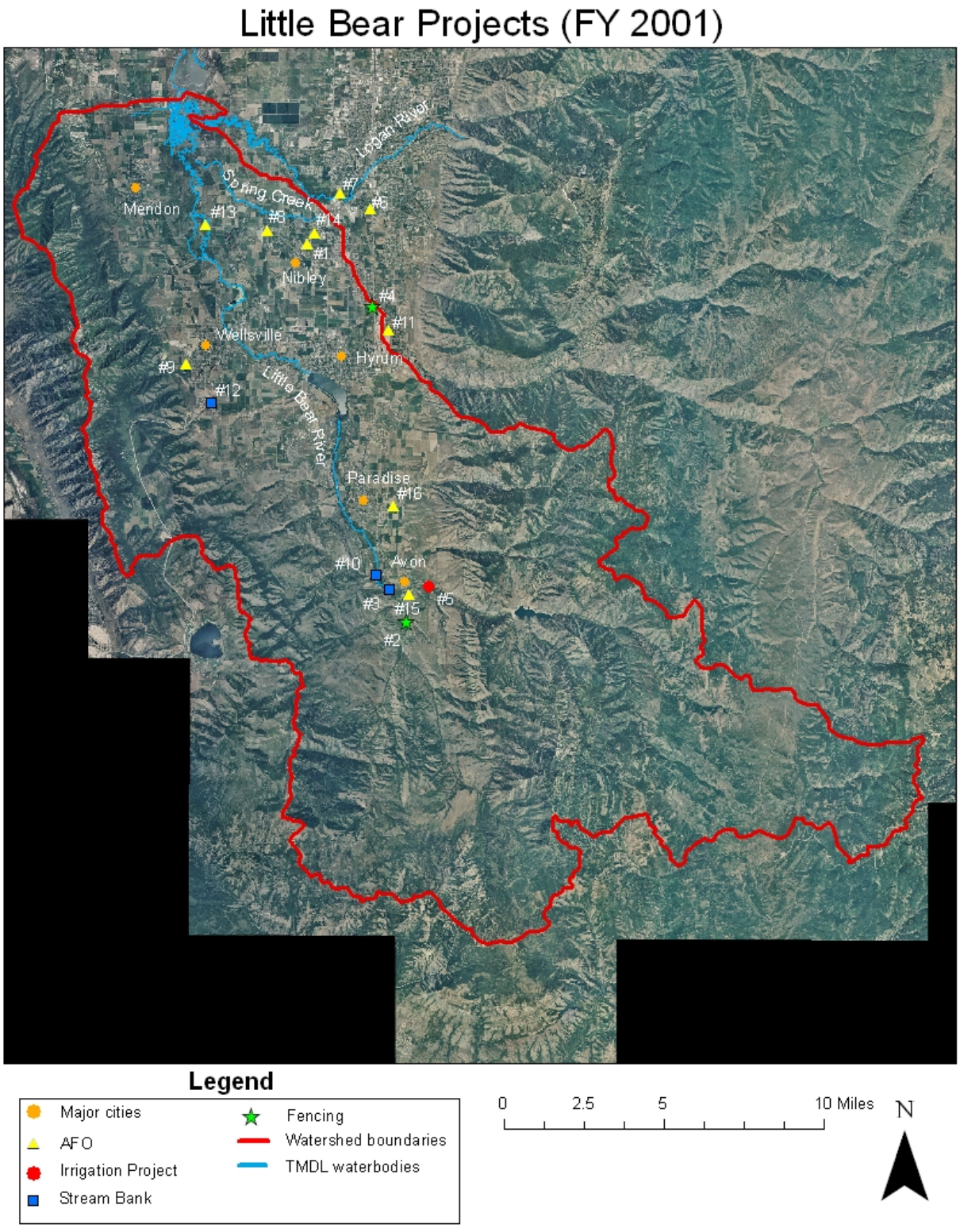
Figure 10: Proj12 Riparian Restoration After

Figure 11: Proj#16 Animal Feedlot Restoration Before

Figure 12: Proj#16 Animal Feedlot Restoration After

Figure 13: Riparian Restoration Training


Figure 14: Adopt-A-Waterbody Volunteers


Little Bear Projects (FY 2001)
Logan River
Spring Creek
Mendon
#13
#6
#7
#5
#14
#1
Nibley
#4
#11
Wellsville
Hyrum
#9
#12
Little Bear River
Paradise
#16
#10
Avon
#3
#15
#5
#2
Legend
Major cities
AFO
Irrigation Project
Stream Bank
Fencing
Watershed boundaries
TMDL waterbodies
0
2.5
5
10 Miles
N

# 3.0 Best Management Practices Developed and/or Revised

The Best Management Practices used on this project were selected from the USDA Field Office Technical Guide (FOTG). Please also refer to the Utah Nonpoint Source Pollution Management Plan for a comprehensive list of BMPs that have been accepted for use by the State of Utah. The following practices were used in the Little Bear River Watershed Project area:

Cropland Practices included: irrigation water management, crop sequencing, field borders, conservation tillage and filter strips.

Riparian practices included: streambank protection, fencing, filter strips, livestock exclusion, channel stabilization, clearing and snagging, off-site stock watering, and forest riparian buffers.

Grazing land practices included: off-site stock watering, range seeding, fencing, prescribed grazing and pasture plantings.

Manure management practices included: manure management and utilization systems, nutrient management, and runoff management systems.

All projects included BMP's and were planned to the level of a total resource management system in accordance with NRCS standards and specifications. Additionally, all project BMPs adhered fully to all state, local and federal regulations and permitting requirements regarding wetlands, cultural resources, and sensitive aquatic habitats.

## 4.0 Monitoring Results

### 4.1 TMDL Implementation Effectiveness

In 2004 the segment of the Little Bear River above Hyrum Reservoir was found to be in compliance with state water quality standards and meeting its beneficial use designation. This section of river was subsequently removed from the 303d list. The lower segment from Cutler Reservoir upstream to Hyrum Reservoir, although showing improvement, is still not meeting the water quality standards for the designated beneficial uses. It is anticipated that due to an inter-basin irrigation transfer into the lower Little Bear River from the Spring Creek drainage that as the Spring Creek TMDL is implemented the lower portion of the Little Bear River will also attain the endpoints of its TMDL. It is also recognized that lag times and cumulative effects can have a large impact on the chemical assessment of the stream.

### 4.2 BMP Effectiveness Evaluations

Utah's Interagency Nonpoint Source Monitoring Workgroup was organized in 1992 to monitor BMP effectiveness in selected impaired watersheds. In addition to water quality, several measures of aquatic habitat, channel morphology and riparian stability and plant community characteristics were performed. Water quality data were collected approximately monthly for several years. Monitoring has shown declines in nutrients and suspended sediment and most of our site-specific surrogate sampling (e.g. riparian greenline and channel geomorphology) that is performed on actual project sites have also shown positive trends (see Section 4.3 below).

## 4.3 Surface Water Improvements

### 4.3.1 Total Phosphorus and Total Suspended Solids

The TMDL for the Little Bear River states a goal of total phosphorus (TP) concentration not in exceedence of 0.05 mg/L, and a reduction in load of 13 kg/day above Cutler Reservoir and 2.4 kg/day above Hyrum Reservoir. Additionally, hydrologic modification is listed as a concern for the lower section (from Hyrum Reservoir to Cutler Reservoir) of the Little Bear. Since there is a correlation between the amount of total suspended solids (TSS), bank stability and hydromodification, criteria for TSS is used to demonstrate the problem with hydrologic modification. Phosphorus is adsorbed to sediment particles, so a reduction in TSS will also lead to a reduction in TP.

Data exists for the study sites from 1977-2009, with varying degrees of depth and completeness. Table 5 displays all years of available data for all sites in both the upper and lower sections, and Figure 9 presents a map of the Little Bear River watershed, with the monitoring sites labeled.

| STORET Sites | Years Available |
|---|---|
| 4905740 | 1991-93, 1998-99, 2003-05 |
| 4905750 | 1990-93, 1997-99, 2003-09 |
| 4905700 | 1981-2009 |
| 4905670 | 1990-93, 1998-99, 2003-2009 |
| 4905660 | 1993 |
| 5901650 | 1998-99 |
| 4905650 | 1990-93, 2003-06 |
| 4905640 | 1993-97, 1999 |
| 4905590 | 1990-95 |
| 4905000 | 1977-2009 |

Table 5. Sites along the Little Bear River, and years data was collected.

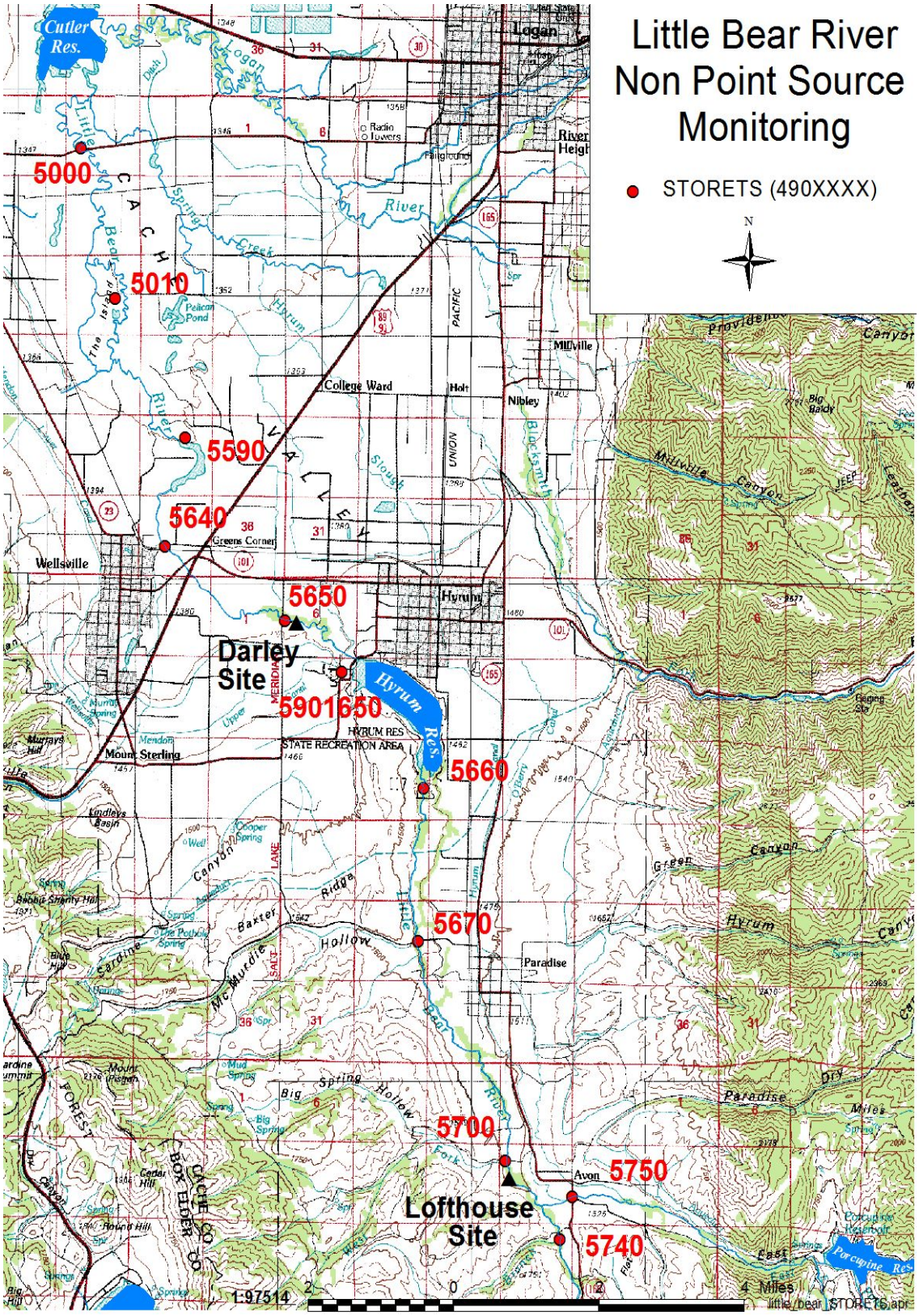
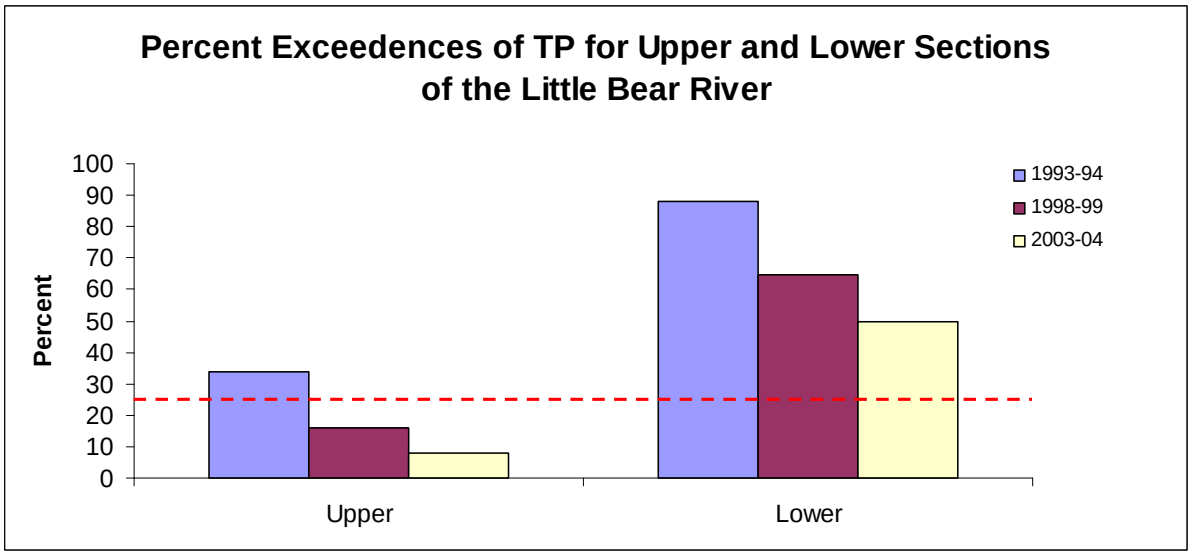



Figure 9 Site map of the Little Bear River watershed, with STORET sites and NPS sites labeled.

A stream was listed as non-supporting when 25% or more of its samples exceed the pollution indicator value. Figure 10 presents the percentage of samples exceeding the indicator value for TP during the intensive monitoring periods of 1993-94, 1998-99, and2003-04, separated between upper and lower sections of the Little Bear River. Both sections have shown major improvements over the course of the study, with the upper portion decreasing from 34% exceedence in the 1993-94 intensive monitoring cycle to 8% in the 2003-04 intensive monitoring cycle. The lower portion has decreased from 88% exceedence in the 1993-94 cycle to 50% in the 2003-04 cycle. The steady decrease indicates that, although the lower section is still non-supporting, the BMPs in place are positively affecting the watershed. An assessment of the 2008-2009 intensive sampling shows a slight increase in the number of samples exceeding the 0.05 criteria however the trend associated with the concentration in the site above Hyrum Reservoir continues in a downward pattern. The loading to Hyrum Reservoir also continues to decrease.

Figure 10. Graph presenting the percent exceedence concentrations of TP for the upper and lower sections of the Little Bear River. Data obtained during the intensive monitoring cycles of 1993-94, 1998-99, and 2003-04.




Figures 10a and 10b show total phosphorus and suspended sediments respectively from 1990 through 2009. Note that the spikes in phosphorus coincide with high sediment and occurs during spring runoff (April samples). This suggests sediment attached phosphorus as a result of plant material decay under the snow pack and in the upper portion of the watershed should be considered background naturally occurring.

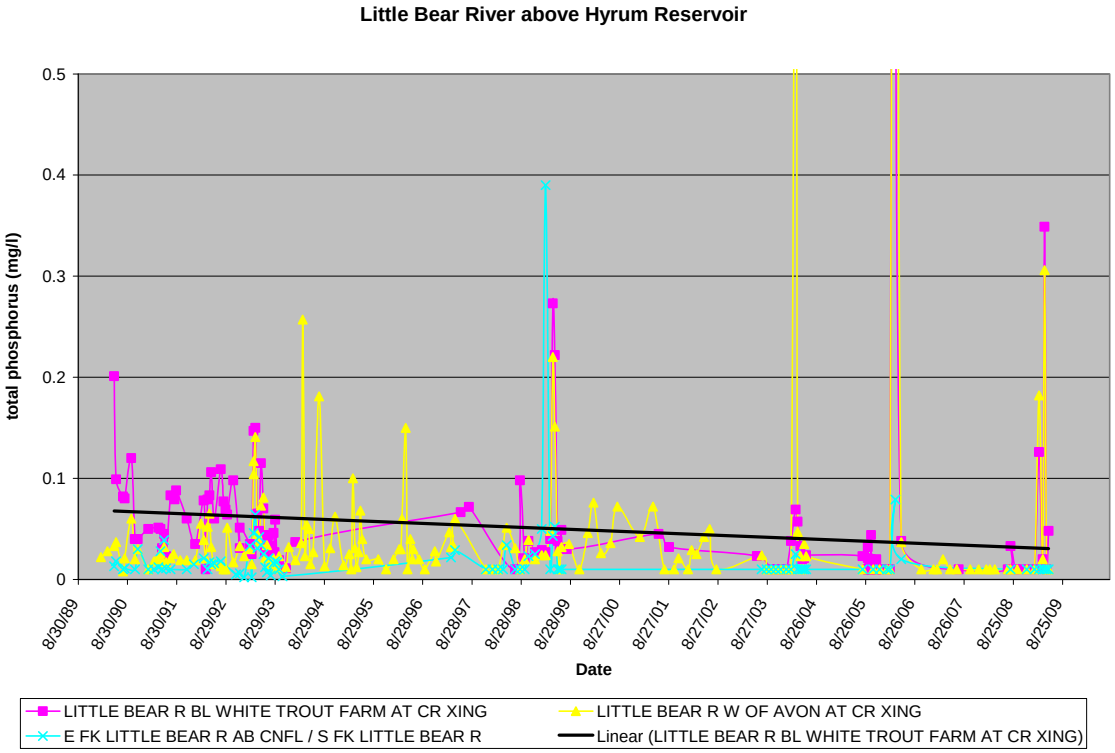



Figure 10a. Total Phosphorus in Little Bear River above Hyrum Reservoir

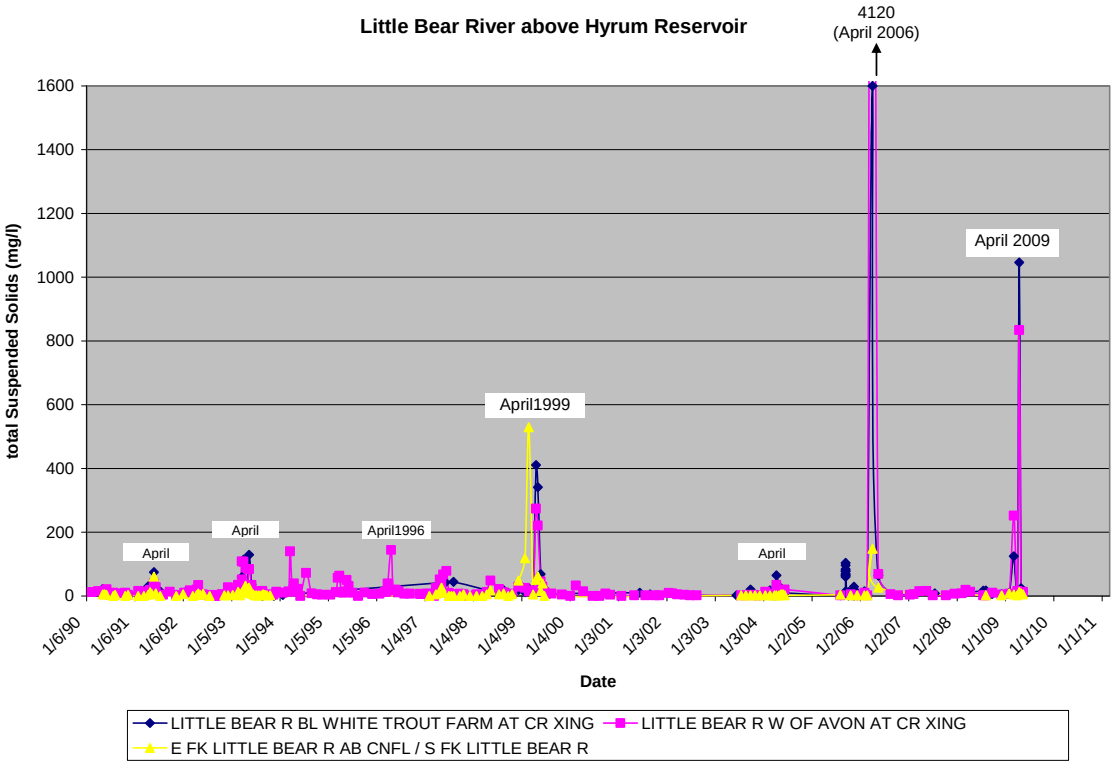



Figure 10b TSS in Little Bear River above Hyrum Reservoir

Concentrations of TSS have also decreased over the course of the study. Figure 11 presents the percentages of samples exceeding the old indicator value of 35 mg/L during each of the three intensive monitoring cycles. The upper section of the Little Bear River decreased from 19% to 4% over the course of the study. The lower section decreased from 36% to 15% during the same time frame. Both sections are within supporting status, and the decrease in TSS has had an effect on the levels of TP concentrations. Figure 11a shows an enlarged scale of figure 10b to illustrate the decline in TSS above Hyrum Reservoir with the exception of the outliers.

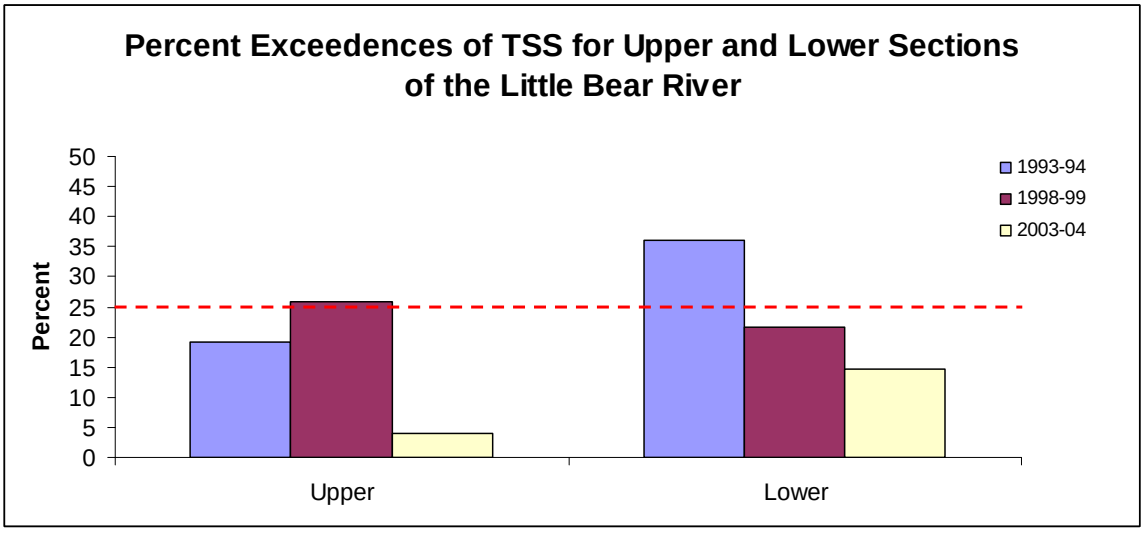



Figure 11. Graph presenting the percent exceedence values for the upper and lower sections of the Little Bear River. Data obtained during the intensive monitoring cycles of 1993-94, 1998-99, and 2003-04.

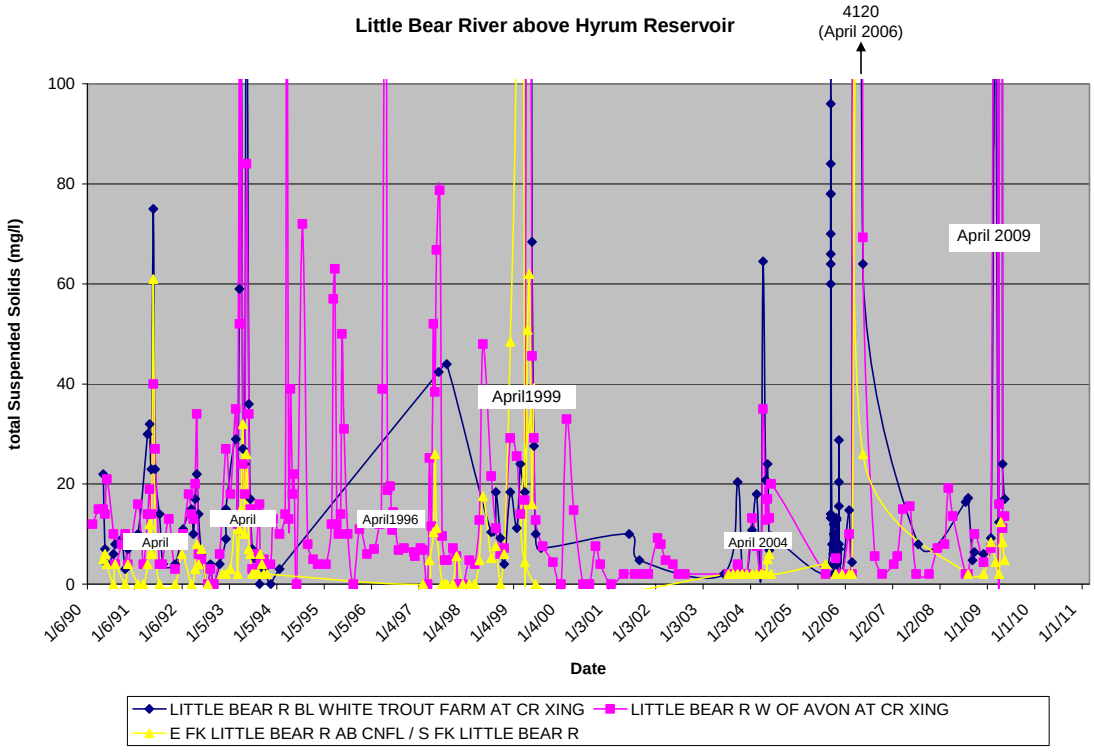



Figure 11a

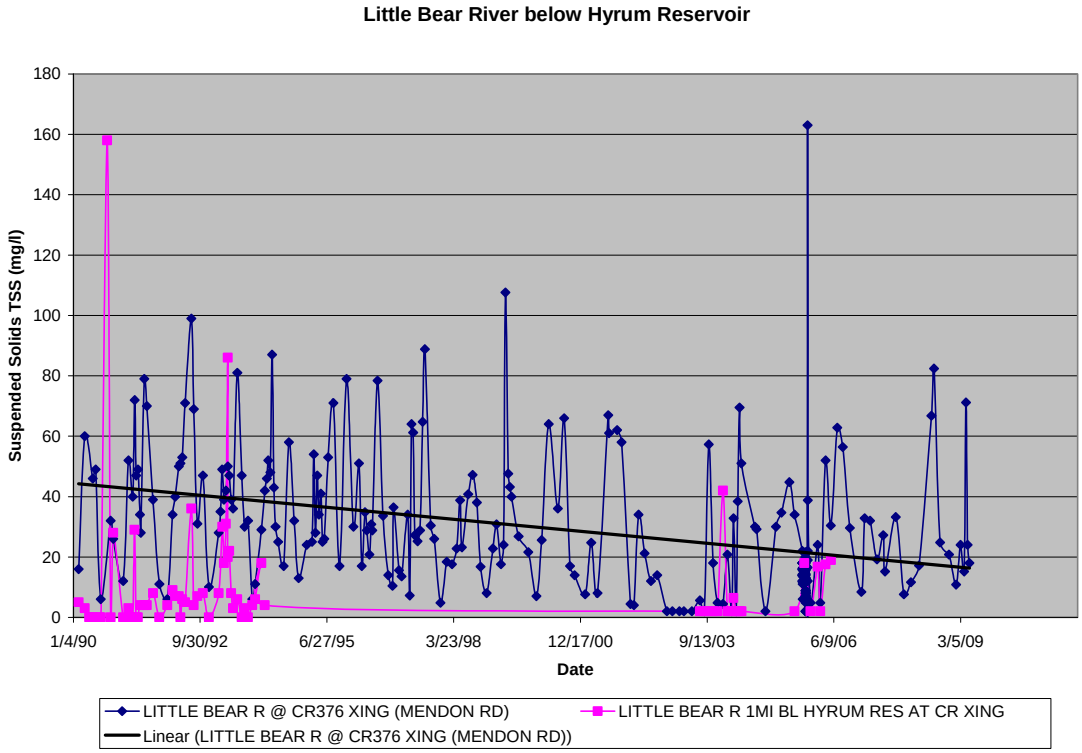



Figure 11 b TSS in the Little Bear River below Hyrum Reservoir

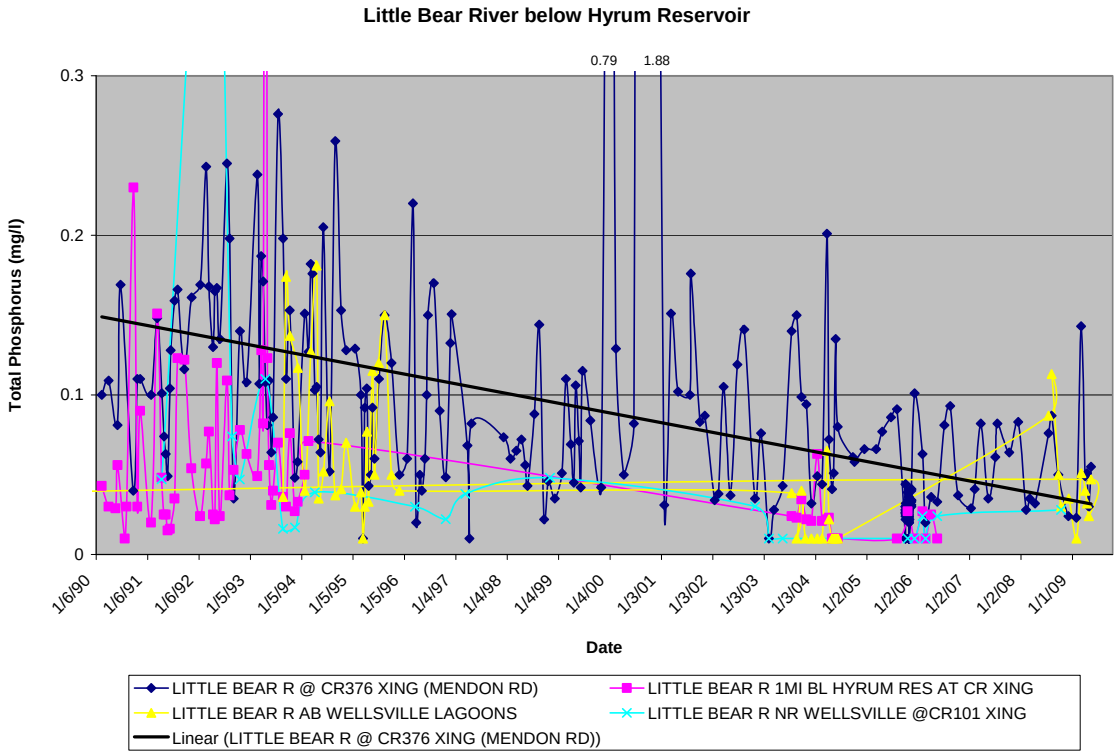



Figure 11c Total Phosphorus in the Little Bear River below Hyrum Reservoir

In the Little Bear River below Hyrum reservoir TSS and TP has continued to decline as can be seen in figures 11b and 11c. Average TP for the 08-09 intensive cycle was 0.05 mg/l, the median was 0.49. Unlike in the upper watershed the correlation between TP and TSS in the lower watershed is very poor.

Figure 12 presents the calculated daily load of TP in kg for Site 4905000 above Cutler Reservoir, and Site 4905700 above Hyrum Reservoir. The TMDL target loads for the upper and lower portions are 6.0 and 9.0 kg/day, respectively. Site 4905700, located in the upper portion, has achieved 6.0 kg/day twice in the last 3 years of the study, and 3 times since the TMDL was implemented. Overall load values have been reduced. Site 4905000, located in the lower section of the Little Bear River, has also shown some decrease in load values, but has achieved the target load once in the last 3 years, and once since the TMDL was implemented. This trend has continued through the 2008-2009 monitoring results.

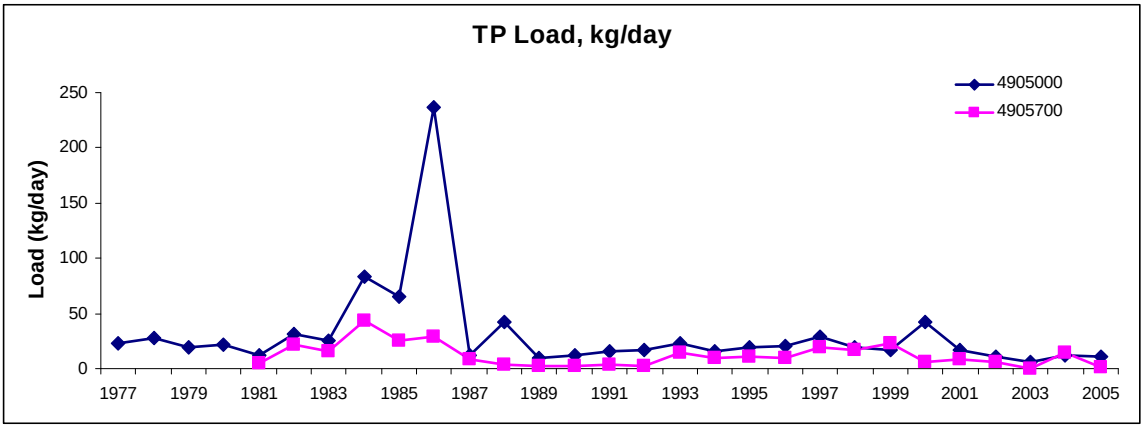



Figure 12. Graph presenting the daily load values for 2 sites along the Little Bear River for the period of record.

### 4.3.2 Macroinvertebrate Analysis

Figure 13 presents the various metrics used in this study to determine the health of the macroinvertebrate community. BCI (Biotic Condition Index) values show improvement over time in both the upper and lower sections of the Little Bear River. The upper portion, sampled at Site 4905700, ranges in values from poor to fair with values ranging from 59-78, while the lower portion, sampled at Site 4905000 shows some improvement, but remains poor with values from 50-55. Total abundance of organisms has remained relatively stable through the study period, with a spike for both upper and lower portions in the years 1998 and 1999. The two diversity indexes (Shannon's and Simpson's) present somewhat contradictory data, with the Shannon's index indicating an upward trend at both sites, and the Simpson's index values indicating a downward trend. A review of the taxa identified also indicates a community dominated by sediment tolerant macroinvertebrates. While most of the metrics show improvements in the macroinvertebrate populations, there is still room for improvement.

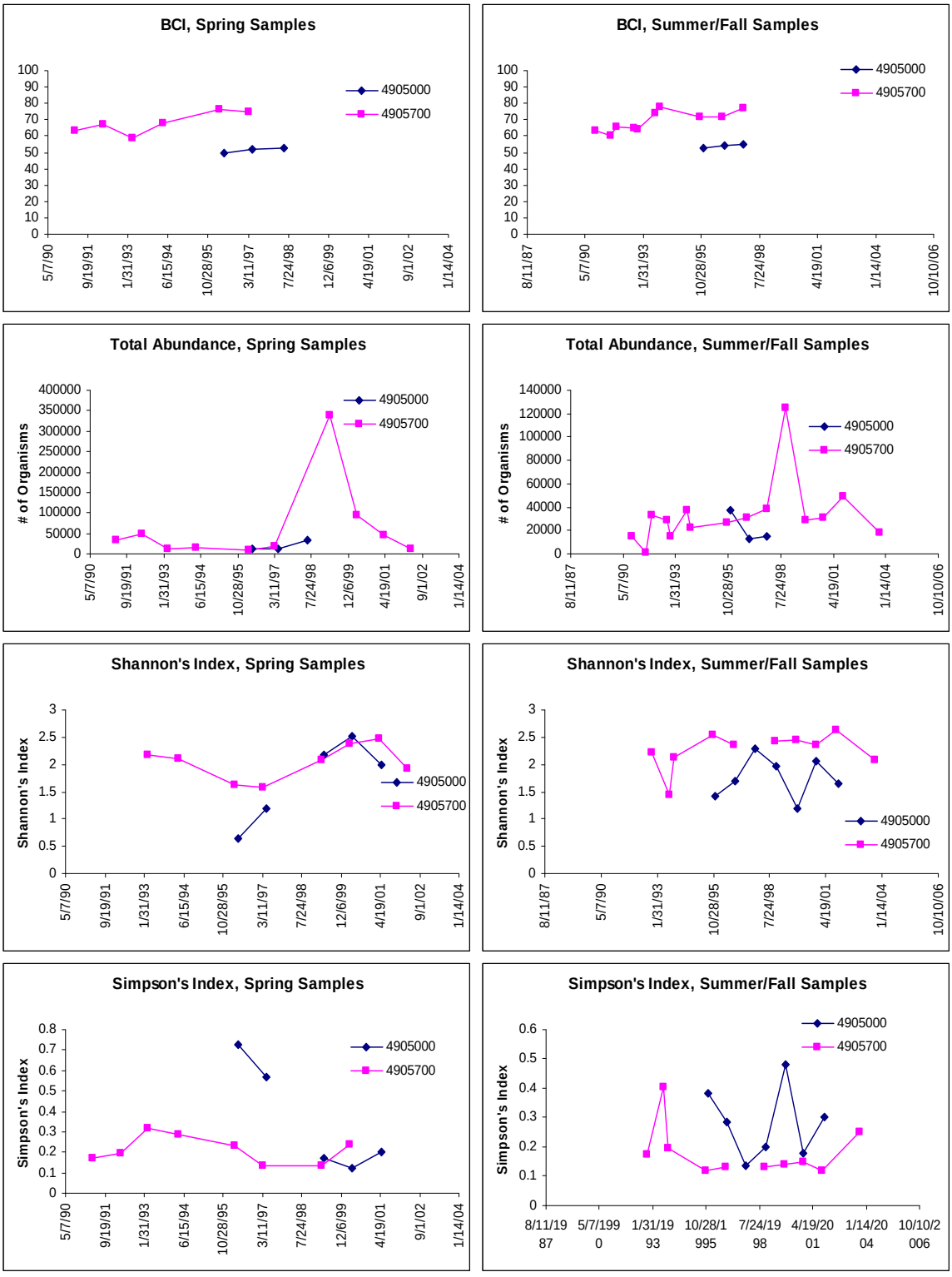



Figure 13. Various metrics of macroinvertebrate data collected at upper (4905000) and lower (4905700) sections of the Little Bear River.

### 4.3.3 Riparian Vegetation

Green-line transects were completed at the Darley site for 1993, 1994, 1997, and 2001. These transects are used to indicate the ability of the present riparian vegetation to resist erosion. The results of percent plant communities and stability indexes are presented in Tables 6 and 7. The results show a general improving trend and an increase in stability from moderate to good.

Hydrologic Moisture Regime, Darley Site

| | 1993 | 1994 | 1997 | 2001 |
|---|---|---|---|---|
| Hydroriparian | 43 | 58 | 75 | 85 |
| Mesoriparian | 24 | 26 | 15 | 12 |
| Xeroriparian | 16 | 0 | 0 | 0 |
| Other (Rip-Rap, Bare Ground, etc.) | 17 | 16 | 10 | 2 |

**Table 6**

Green-line Stability Index, Darley Site

| | 1993 | 1994 | 1997 | 2001 |
|---|---|---|---|---|
| Numeric | 5.85 | 6.45 | 6.54 | 6.80 |
| Descriptive | Moderate | Good | Good | Good |

**Table 7**

Tables 8 and 9 present the results of percent plant communities and stability indexes at the Lofthouse site. While the percentage of hydroriparian communities has increased, the green-line stability index shows very little improvement.

Hydrologic Moisture Regime, Lofthouse Site

| | 1994 | 1996 | 1997 | 2001 |
|---|---|---|---|---|
| Hydroriparian | 22 | 44 | 53 | 65 |
| Mesoriparian | 76 | 47 | 39 | 34 |
| Xeroriparian | 0 | 0 | 0 | 0 |
| Other (Rip-Rap, Bare Ground, etc.) | 2 | 9 | 18 | 1 |

**Table 8**

Green-Line Stability Index, Lofthouse Site

| | 1994 | 1996 | 1997 | 2001 |
|---|---|---|---|---|
| Numeric | 4.86 | 4.06 | 4.44 | 5.63 |
| Descriptive | Moderate | Poor | Poor | Moderate |

**Table 9**

### 4.3.4 Stream Channel Geomorphology

Cross-sections at several points along the Little Bear River were surveyed throughout the 1990's to measure changes in the stream channel shape. An improving stream is exhibited by a narrowing and deepening of the channel. The Lofthouse site, located in the upper section of the watershed, was surveyed in 1993, 1994, 1995 and 1997. The results of the surveys are shown in Figure 14. The Lofthouse site was used as a control and as such, had no BMP's or restoration work done on it. Data does not conclusively show a narrowing and deepening of the channel, but rather the stream changing position within the channel. Any improvements must be inferred from other data, such as green-line transects indicating an improvement in stream bank stability.

Figure 15 displays the stream profile at the Darley site, located in the lower section of the watershed. Surveys were completed in 1991 and 1997. BMP's and restoration work done on the Darley site included grazing management and the placing of a vortex rock weir. Data indicates a narrowing and deepening of the channel, and some deposition on a point bar. These are both signs of an improving stream channel.

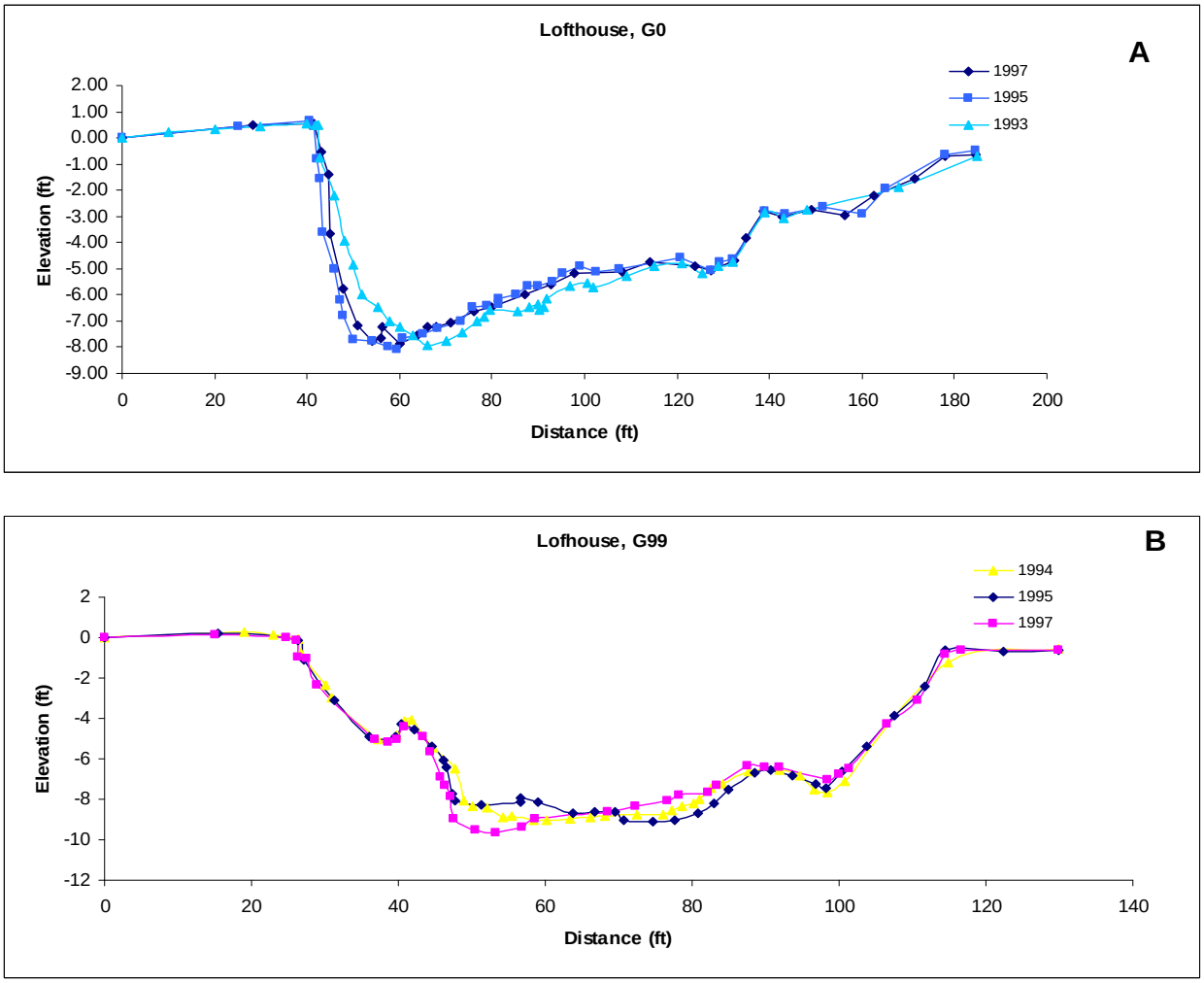



Figure 14. Two stream profiles at the Lofthouse Site, located in the upper section of the Little Bear River.

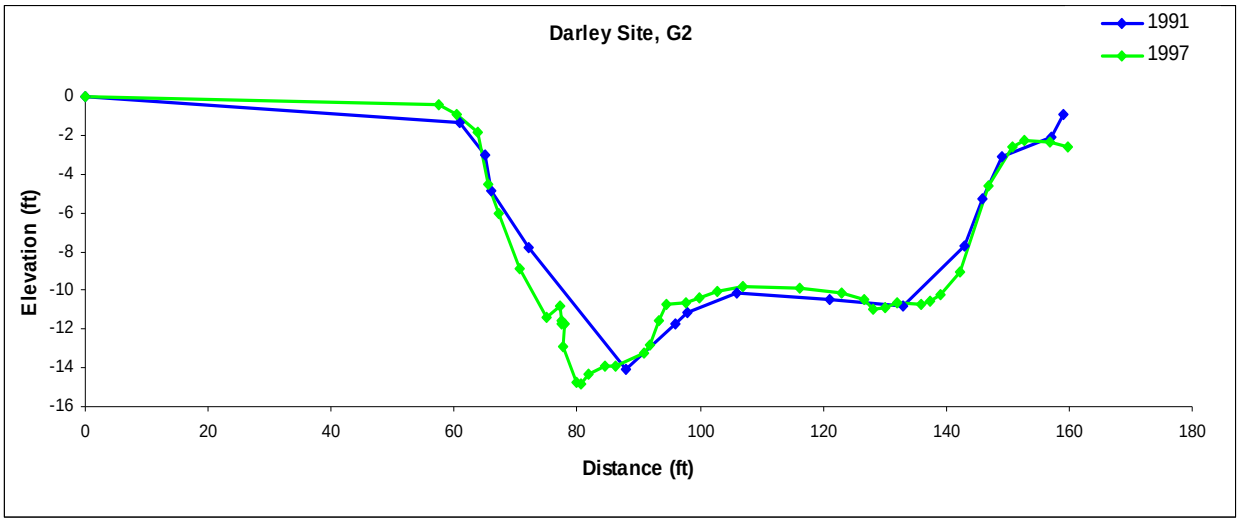



Figure 15. Stream profile at the Darley Site, located in the lower section of the Little Bear River.

## 4.4 Quality Assurance Reporting

All nonpoint source monitoring and assessment work has been completed under the quality control a Quality Assurance Project Plan (QAPP). This document was originally written in 1997 and was updated in 2004. It includes standard operating procedures for all nonpoint source monitoring tasks and cites the QAPP currently in force at the Utah State Health Lab for water quality analysis. In addition, where local sponsors (e.g. Utah Association of Conservation Districts or local offices of the NRSC), take responsibility to perform monitoring, each sponsor provides a project-specific QAPP to DEQ for review and approval which is then forwarded to EPA for review and comment.

## 4.5 Results of BMP Operation and Maintenance Reviews

All BMPs were designed according to NRCS FOTG technical specs. NRCS, UACD, and the local Soil Conservation District monitored these projects during the construction phase. Each landowner signed an operating and maintenance plan agreement that commits them to operating the system in the proper manner and performing regularly scheduled maintenance. At the completion of the construction phase of all projects, an inspection was conducted to evaluate the accuracy of billing for materials, correctness of facility construction and proper operation of management systems. An inspection report of each project component is kept in the "cooperator file" located in the NRCS office in Logan Utah. Additionally, any projects that also used State ARDL loan funds are inspected at periodic intervals by the UACD Zone Coordinator. Reports of the condition of the facilities and the management being conducted are filed with the UDAF ARDL administration office.

To help estimate the amount of pollutants removed from each animal feeding operation Utah Animal Feedlot Runoff Risk Index (UAFRRI) data was used. The UAFRRI model was developed by the NRCS and can estimate how much nitrogen, phosphorus, and BOD were reduced in the water. To generate numbers, the number of animals, proximity to water, slope of the feedlot, size of the feedlot, animal type, time between scraping, and vegetation type between the feedlot and the river are all used. The following table shows reductions made by various projects.

| Project # | Phosphorus (lbs/ yr) | Nitrogen (lbs/ yr) | BOD (lbs/ yr) |
|---|---|---|---|
| #1 | 2 | 13 | 46 |
| #8 | 7 | 36 | 128 |
| #14 | 5 | 25 | 86 |
| #9 | 193 | 397 | 1444 |
| #6 | 18 | 87 | 307 |
| #15 | 83 | 171 | 622 |
| #7 | 27 | 167 | 702 |
| #13 | 181 | 372 | 1354 |
| #16 | 3 | 15 | 38 |
| #11 | 36 | 172 | 933 |
| **Total** | **555** | **1455** | **5660** |

# 5.0 Coordination Efforts

This project benefited from a strong partnership of Federal, State, and local agencies. The local citizens participated in all phases of this work and greatly enhanced the design, implementation and continuation of stewardship and resource improvement in the watershed.

## 5.1 Coordination with State Agencies

The Utah Department of Agriculture and Food (UDAF) provided contracting services for funds from the Utah Department of Environmental Quality, project review and assistance with many other aspects of the project, including planning, monitoring and evaluation of BMPs. The Agricultural Resource Development Loan was made available through UDAF and the Utah Soil Conservation Districts for landowners to buffer their portion of the costs of individual projects. The availability of low interest conservation loans enabled participation by a much greater number of landowners than would have otherwise participated. Utah State University (USU) participated in this project in a number of ways. Through USU Extension's Water Quality Branch assistance was provided with public outreach, information, education and evaluation of BMP impacts. A new USDA program, Conservation Effects Assessment Project (CEAP), is being conducted through a multidisciplinary team of USU partners, State agencies and Federal agencies. Further information about this program is available through http://bearriverinfo.org

## 5.2 Other State Environmental Program Coordination

Other environmental programs coordinated through this project include fishery and fish habitat improvements conducted by Utah Division of Wildlife Resources personnel and Utah State University. Also, upland bird and big game management programs were enhanced by efforts associated with this project. Better livestock grazing management on rangelands also provided better forage and habitat for deer and elk. Off stream watering facilities benefited both livestock and wildlife species. Improved riparian corridors provide improved habitat for many different game and non-game species.

## 5.3 Federal Coordination

This project benefited from the cooperation of several Federal Agencies. The Natural Resources Conservation Service provided technical assistance to plan, design, implement BMPs, and evaluate BMP effectiveness. The Environmental Protection Agency, Region VIII provided funding, and technical review of project implementation proposals as well as offering valuable advice on many project aspects while touring and meeting with project sponsors. The Farm Service Agency provided financial assistance to the landowners and for most of the project coordinated Federal Farm Bill co-payments. The US Fish and Wildlife Service offered review and advice on streambank design, fish habitat improvement projects, stream channel design parameters and other habitat related project components.

## 5.4 USDA Programs

Many landowners were able to utilize USDA (Farm Bill) programs with their Resource Management System plans that focused on a holistic approach to farm and environmental improvement; EPA funds were used to improve water quality problems, other USDA funds were used to improve habitat or agricultural production. By using funds from multiple agencies we were able to extend some level of assistance to many more land owners in the area, gaining more local participation and local "buy-in." In the beginning of the project, Hydrologic Unit Funding (HUA) was used, Highly Erodable Land (HEL) and Conservation Reserve Program (CRP) funds

were used to take fragile land areas out of production and place them into productive functions. Environmental Quality Incentives Program (EQIP) was used to further environmental improvements, and Wildlife Habitat Improvement Program (WHIP) funds were used specifically to improve upland and riparian habitat areas.

## 5.5 Accomplishments of Agency Coordination Meetings

Coordination meetings on this project occurred at the local level with Steering Committee and Technical Advisory Committee Meetings. Also USDA/NRCS is mandated to facilitate County level Local Work Group meetings. All stakeholders/decision makers in the watershed were included. The steering committee and Technical Advisory committee met regularly in the beginning phases of the project, set program policies, guidelines, and goals. The Cache County local workgroup and Blacksmith Fork Soil Conservation District continued to meet and to make the day to day implementation decisions. UACD performed contract oversight reporting and administration.

## 5.6 Resources/Coordination from Federal Land Management Agencies

There is no Bureau of Land Management land within the project area. The project did benefit from the US Forest Service input on Technical Advisory Committees regarding lands in the uppermost parts of the watershed. Also the Bureau of Reclamation provided input on water facilities related to Hyrum Reservoir.

## 5.7 Other Sources of Funds

In addition to the 319 funding received from EPA, other funding was provided by FSA (formerly ASCS), the Bureau of Reclamation (BOR), USDA Farm Bill Programs, private donations, and loans from the State of Utah. These funds have been used to support the implementation of many BMPs within the watershed. Some of the BMPs installed with these funds include:

Table 4 – Improvements from additional funding sources

| | |
|---|---|
| 1. 965 acres of deferred grazing | 9. 1,471 acres of crop residue use |
| 2. 17,652 feet of riparian/cross fencing | 10. 2,623 acres of proper grazing |
| 3. 15 grade stabilization structures | 11. 336 acres of range seeding |
| 4. 19 irrigation systems | 12. 2,064 acres of planned grazing systems |
| 5. 400 acres of livestock exclusion | 13. 5 livestock watering facilities |
| 6. 18,041 feet of irrigation water conveyance | 14. 197 acres of irrigation water management |
| 7. 92 acres of brush management | 15. 93 conservation plans written. (68 LTA & 25 WQIP Plans) |
| 8. 233 acres of conservation tillage | |

Additional project funding received is estimated as follows:

1. USDA Funding.
   - ACP = $602,000
   - EQIP = $203,700
   - HUA = $681,478

2. Private Funding.
   - Cooperator and ARDL = $ 1,077,370
   - Donation = $ 4,800

3. Department of Interior.
   - BOR = $ 67,000

# 6 Summary of Public Participation

Over the course of the 15 years of this project, the public has been informed and interested in the outcome of this work. From the initial formation of the Little Bear River Steering Committee which gave rise to the operating structure of this project, to periodic annual review by the Cache County Local Work Group, to monthly oversight by the local Soil Conservation District, there has been active involvement from the local community. Collaborating groups not mentioned earlier include the Little Bear Water Users Association, Cache Society of Fisheries, South Cache Middle School Green Team, South Cache Freshman Center, Ecosystems Research Institute, Boy Scouts of America, Bear River RC&D, Bridgerland Audubon Society, Spring Creek Middle School, Cache Valley Anglers, and many volunteer work groups.

# 7 Aspects of the Project that did not Work Well

While 14 years of work have been completed in this watershed, we are only recently seeing improvements in measurable water chemistry. We know that our efforts have reduced the source loading potential of agricultural pollutants, reduced or eliminated the mechanism of transfer to the water body, and reduced or eliminated input of large quantities of pollutant load to the river. Why then did the Utah Division of Water Quality continue to identify the Little Bear River as a river of high concern on the current 303d list of impaired waters? And why did the 2000 TMDL continue to find parameters that were not meeting their beneficial uses?

The land uses that make up the Little Bear River Watershed are changing rapidly. Over the last 14 years we have seen a shift from agricultural uses to urban and industrial uses. Growth rates in the south end of Cache Valley approach 30% annually. With each new home or subdivision, increased surface hardening occurs, preventing rainfall infiltration to a greater degree each year. With increased development comes increased runoff and the associated pollutants that these areas generate. Also over the last 14 years this area has experienced increased industrial development.

And finally, we believe that the phosphorous laden sediments that were eroded and washed into the Little Bear Watershed before we began restoration work are still present in increased amounts along the streambed of the river. These sediments continue to be available for re-suspension to the water column and periodically move from upstream locations to downstream depositional areas. We believe there will be a lag in water chemistry improvement until the availability of these sediments is resolved.

# 8 Future Activity Recommendations

This project has made a tremendous impact in water quality to the life of the residents of the Little Bear River watershed area. Section 319 of the Clean Water Act provided land owners with direct financial and technical assistance through multi-agency cooperation and guidance. With changing standards and animal management practices, waters of the Little Bear River are cleaner because animal manure is now being prevented from entering the river, streambanks have been restored and wildlife habitat is improved. The educational message delivered through this project and the ongoing efforts of the AFO/CAFO team have made a real change in the way animal feeding operations are managed near water resources. Improper grazing of upper watershed rangelands is now rare and isolated.

Our ongoing challenges in the Little Bear River watershed are shifting to urban, industrial, and new "rural" landowners. Although much work has been accomplished, pristine waterways require maintenance in a climate where heavy snow accumulations are followed by spring runoff and summer-time drought impacts are eminent. Urban, industrial, and new rural landowners bring additional impacts and have not been adequately addressed from a restoration or from an educational perspective. Those new to the area may not be familiar with the stewardship techniques that have been honed by long-term residents.

We hope our ongoing efforts to educate and involve area youth in watershed stewardship will result in citizens that think about environmental impacts as well as economic growth.

The city of Hyrum has been a leader in proactively addressing phosphorous levels in their sewage effluent and has built a tertiary treatment facility with the ability to reduce concentration levels of P to 0.1 ppm. Growth rates have and will in the future add to the impacts on water quality. A combination of additional watershed/riparian restoration and education will keep the Little Bear River a healthy waterway. Additional funding and education will help control the impacts from improperly designed subdivisions and expanding urban areas with large areas of impervious surfaces.

# Literature Cited

1997 Utah – Little Bear River Hydrologic Unit Area Annual Report. Attached in the Appendix as a linked file.

Progress narratives, Annual and Semi Annual reports from Project Implementation Plans – on file with GRTS system.

Field Office Technical Guide (FOTG) and related information can be found at the Utah USDA/NRCS website: http://www.ut.nrcs.usda.gov/

Http://Bearriverinfo.org

# List of Tables and Figures

# Appendices

A. 1997 Utah – Little Bear River Hydrologic Unit Area Annual Report
Available upon Request

B. Little Bear River Watershed TMDL
http://www.waterquality.utah.gov/TMDL/Little_Bear_River_TMDL.pdf

C. Summary of UACD contracts

| PROJECT | UDAF CONTRACT NUMBER | EFFECTIVE DATES FROM | TO | EPA 60% | MATCHING FUNDS | TOTAL FUNDING | PROJECTS |
|---|---|---|---|---|---|---|---|
| LBR FY 91 | **92-3266** | **5/1/1992** | **4/30/1996** | **75,000** | **50,000** | **125,000** | |
| **AMENDMENT #1** | | | **10/20/1992** | **15,000** | **10,000** | **25,000** | |
| **AMENDMENT #2** | | | **7/1/1994** | **6,000** | **4,000** | **10,000** | |
| **TOTAL CONTRACT** | | | | 96,000 | 64,000 | 160,000 | **13** |
| LBR FY 92 | **93-3379** | **4/1/1993** | **3/31/1997** | 120,000 | 80,000 | 200,000 | **17** |
| LBR FY 93 | **94-2701** | **4/1/1994** | **3/31/1998** | **126,000** | **84,000** | **210,000** | |
| **AMENDMENT #1** | | **7/1/1994** | | **25,000** | **16,667** | **41,667** | **14** |
| **TOTAL CONTRACT** | | | | 151,000 | 100,667 | 251,667 | |
| LBR FY 94 | **95-1993** | **10/15/1994** | **10/14/1998** | 408,855 | 272,570 | 681,425 | **13** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LBR FY 94 | **95-1963** | **10/15/1994** | **10/14/1998** | 19,200 | 12,800 | 32,000 | |
| LBR FY 95 | **96-1259** | **5/15/1995** | **5/14/1999** | 524,000 | 349,333 | 873,333 | **24** |
| LBR FY 96 | **97-1032** | **6/1/1996** | **5/31/2000** | **204,000** | **136,000** | **340,000** | |
| **AMENDMENT #1** | | | **9/30/2001** | | | | |
| **AMENDMENT #2** | | | **9/30/2002** | | | | |
| **AMENDMENT #3** | | **3/22/2001** | | **40,000** | **26,667** | **66,667** | **23** |
| **TOTAL CONTRACT** | | | | 244,000 | 162,667 | 406,667 | |
| **CONTINUATION** | **02-1681** | **6/1/2001** | **9/30/2005** | 69,000 | 46,000 | 115,000 | |
| LBR FY 2001 | | | | | | | |
| **AMENDMENT #1** | | | **9/30/2006** | | | | |
| **AMENDMENT #2** | | | **9/30/2007** | | | | |
| **AMENDMENT #3** | | | **9/30/2008** | **50,000** | **33,333** | **83,333** | |
| **AMENDMENT #4** | | | **9/30/2009** | | | | |
| | | | | 119,000 | 79,333 | 198,333 | **17** |
| TOTAL CONTRACTS | | 5/1/1992 | 9/30/2009 | $1,682,055 | $1,121,370 | $2,803,425 | 121 |

D. Invertebrate study

Mangum, Fred A. Aquatic Ecosystem Inventory – Macroinvertebrate Analysis. State of Utah, Department of Environmental Quality, Division of Water Quality, Non-Point Source 319 Watershed Project, Fall 1996. (Included in linked Little Bear River HUA Annual Report)

E. List models developed

EPIC computer model, PSIAC method Direct Volume method, USLE and Above/Below Water Samples. Data relevant to these models can be found in the HUA 1997 Annual Report.

F. Print copies of public education materials, newsletters, articles, and fact sheets developed for this project are available upon request (contact Utah Association of Conservation Districts).

G. List "A river runs through us" monitoring program
http://extension.usu.edu/waterquality/htm/volunteermonitoring/riverruns
http://www.cnr.usu.edu/bearrivered/project/index.html

H. List AFO/CAFO effort and UMARI and UAFFRI evaluative tool
Available upon request