



Clean Water Act

Section 319 Non Point Source Pollution Control Program

Watershed Project Final Report

Bear River (Amalga-Benson) Project, Cache County, Utah

By

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

Grant #s: C9998187-00, C9998187-01 and C9998187-02

State (UDAF) Contract #s: 01-1909, 02-1680, 03-0604

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EXECUTIVE SUMMARY

Project Title: Bear River (Amalga-Benson)

Start Date: 10/01/2000

Completion Date: 09/30/2009

Funding:

Total Budget: \$253,100.00 (original)

Budget revisions: Job #550: \$78,000 increase transferred from Cub River PIP FY-03 (09/17/07)

Total EPA Grant:	FY-2000	\$ 36,400
	FY-2001	\$105,000
	FY-2002	\$111,700
	Cub River transfer	\$ 78,000
		<hr/>
		\$331,100

Total expenditures of EPA funds:	\$331,100
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Total Section 319 Match accrued:	\$220,733
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Total expenditures:	\$551,833
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Non-distributed 319 funds	Cub River Transfer	\$0
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Summary Accomplishments

Watershed improvement activities, under UDAF contracts 01-1909, 02-1680, 03-0604 in the Amalga-Benson area, began in summer of 2002. By implementing these projects we hope to decrease the Phosphorus in the rivers so that they do not exceed .075 mg/L, and that the dissolved oxygen will not drop below 4 mg/L. These reductions are according to the TMDLs established for the rivers and tributaries in the basin. Section 319 funding for these contracts was combined with Farm Bill funds where possible to increase the number of watershed improvement projects. The overarching goal of these projects has been to build on the successes of prior cost-share projects to further reduce non-point source (NPS) pollution in the Amalga-Benson area by:

- Reducing the amount of pollutants entering the watershed from animal feeding operations
- Improving the stability of stream channels and enhancing the riparian corridor to reduce sediment and nutrient loading
- Installing improved irrigation systems

- Informing and educating the community concerning NPS pollution and the importance of maintaining and improving water quality within the watershed

Thirteen cooperators received 319 funds to assist in the planning and implementation of conservation projects. The majority of these projects focused on proper animal waste storage and application to prevent nutrient runoff into the Bear River and its tributaries. One project involved relocating an entire dairy. Cooperators moved a feedlot from the banks of the Bear River, built new holding facilities, developed a CNMP, and began using new management systems to improve irrigation and manure application. All projects in the Amalga-Benson area have implemented Best Management Practices (BMPs) to improve water quality in the Bear River:

- Cropland practices: irrigation water management, crop sequencing, field borders, conservation tillage, and filter strips.
- Riparian practices: Stream bank protections, fencing, filter strips, livestock exclusion, channel stabilization, off-site stock watering, and forest riparian buffers.
- Grazing land practices: off-site stock watering, range seeding, fencing, prescribed grazing and pasture plantings.
- Manure management practices: manure management and utilization systems, nutrient management, and runoff management systems.

All projects 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. Implementation of these projects will also help achieve the TMDL endpoints mentioned above.

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1.0 INTRODUCTION

The Amalga-Benson Water Quality Project area includes the reach on the main Bear River from the bridge on Hwy 228 to Cutler Reservoir, and Cutler Reservoir from the bridge at Benson Marina (County address 3000 North Road) to Section line between Sec. 32 & 33, T13NR1W (see Figure 1, below).

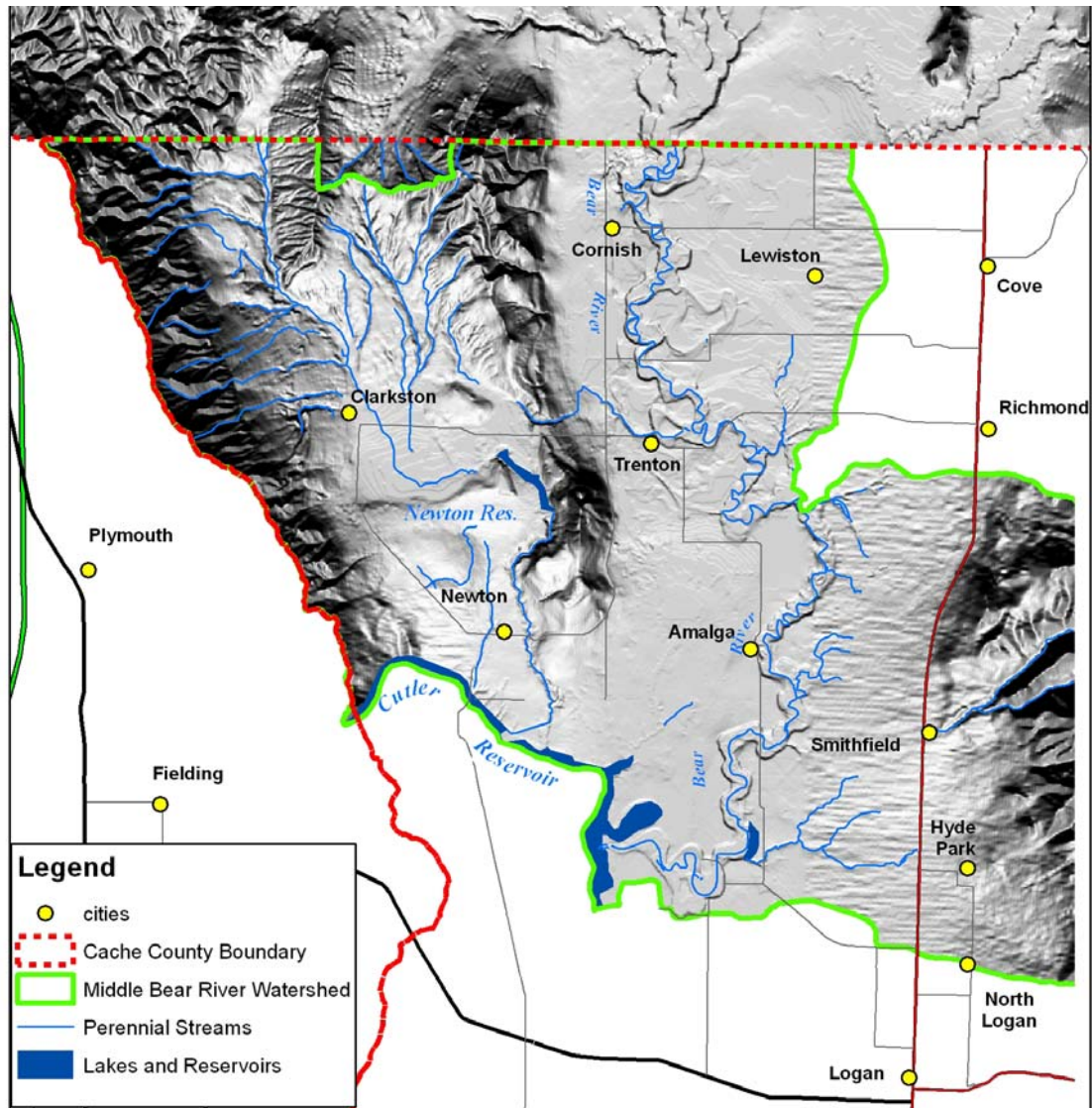


Figure 1: Map of Middle Bear Watershed

The project area covers approximately 12,000 acres of privately owned land comprised of 8,000 acres cropland, 800 acres pasture and 3,000 acres water or river bottom land. There are approximately 30 livestock operations directly on or adjacent to the Bear River with an estimated 6,000 animal units producing nearly 85,000 tons of waste per year. Animal waste is washed directly into the Bear River or Cutler Reservoir during spring snowmelt and rainstorm events. Land within the watershed is used primarily for livestock feed production, hog feed operations, dairy operations, and grazing. The majority of the agricultural land within the watershed is under irrigation. Typical crops grown include alfalfa, small grains, corn, and grass hay.

Principle native vegetation is big sagebrush, western wheat grass, Great Basin wildrye, and other associated grasses, forbs and shrubs. Riparian species within the drainage include cottonwood, booth willow, golden willow, river birch, red osier dogwood, coyote willow, saltgrass, sedges, foxtail, and wood rose.

Agricultural water supply and secondary contact recreation are designated beneficial uses for the Middle Bear River and all its tributaries throughout the watershed. Current uses of the river and its tributaries include irrigation diversion, with much of the water in the Middle bear and its tributaries diverted through irrigation canals. Fishing and recreation are important. The river floodplain is used intensively for agricultural purposes: animal watering, pasture, and irrigated/non-irrigated cropland.

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 1A. The designated uses for the main stem Bear in this section are 2B, 3B, 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).
3B	Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
4	Protected for agricultural uses including irrigation to crops and stock watering.

Utah Division of Water Quality has found the Middle Bear River and its tributaries to be partially supporting their designated beneficial use as a warm water fishery. High sediment loads in the river impair fisheries and the river's ability to support macroinvertebrates and other aquatic life. High turbidity also impacts the water's value for recreational uses. Sediment is delivered to the river during spring runoff, during summer storm events, and in canal return flows.

The Amalga-Benson project area has a high concentration of livestock operations, mostly situated on steep banks adjacent to the Bear River or Cutler Reservoir. These waters receive runoff from adjacent cropland and pastures that are treated with substantial applications of animal waste. This results in high levels of sediment, phosphorous, and nitrogen, as identified in the Lower Bear River Water Quality Plan, (ERI, Nov. 1995). Identified concerns in the Amalga-Benson area of the Bear River include temperature modification and high loads of sediment, nutrients, and bacteria in the waterways. The lower Bear River Water Quality Management Plan (LBRWQMP, 1995) reported high loadings of dissolved nutrients and sediment in the lower basin (below the Idaho-Utah state line). Animal waste from animal feeding operations (AFOs) appears to be one source of coliforms and some of the nutrient loading to the river. The Middle Bear River valley bottom is in cropland and hay meadow, with animal grazing occurring throughout this reach. Improper fertilization may be another source nutrient loading to the river.

2.0 PROJECT GOALS, OBJECTIVES, AND TASKS

The purpose of this project was to build on the successes of prior cost-share projects to further reduce non-point source (NPS) pollution in the Amalga-Benson project area by reducing runoff erosion from uplands and stabilizing critical riparian habitats. The following goals were set to support the project's comprehensive plan to reduce NPS pollution:

GOAL 1: Assist animal feeding operations in the Amalga-Benson Project Area of the Middle Bear River Watershed to implement containment and application of animal manures using Best Management Practices (BMPs).

Objective 1: Develop animals waste management (AWM) systems to ensure total containment of animal manure and reduce pollutants entering the Middle Bear River drainage.

Tasks: select project cooperators, design AWM systems with comprehensive nutrient management plans (CNMPs), implement CNMPs, Monitoring water quality. **(See milestone table 2.1 for specific information on these tasks).**

GOAL 2: Improve stability of the stream channel and enhance the riparian corridor to reduce sediment and nutrient loading to the river and its tributaries.

Objective 1: Develop projects that reduce sediment and nutrient loading to the river through improved function of the stream bank and riparian area.

Tasks: select cooperators, develop streambank and riparian improvement plans, implement projects, monitor water quality.

GOAL 3: Improve upland management practices to reduce sediment and nutrient runoff to the river and its tributaries.

Objective 1: Demonstrate a reduction in NPS pollution from upland/pastureland with improved management.

Tasks: selecting cooperators, developing upland/pastureland management plans, implementing projects, and monitoring water quality

Goal 4: Inform and educate the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed.

Objective 1: Conduct tours focusing on 1) animal waste system designs and proper manure application, and 2) functioning riparian areas, stable streambanks, and properly managed uplands/pasture lands.

Tasks: Plan and conduct tours.

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

Task: Develop fact sheets and newspaper/newsletter articles.

Goal 5: Provide administrative services to project sponsors.

Objective 1: Track match and prepare reports.

Tasks: Document matching contributions, track individual progress reports, coordinate team efforts, and generate reports in a timely manner.

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—Construct corrals and feedlots to move heifers away from the river bank to a sight north of Headquarters	Feedlots/waste storage structures	2	2	11/02
Task 2—Construct stalls for the dairy heifers in the new feedlots	Stalls/Animal waste storage structure	1	1	11/02
Task 3—Construct a facility to store liquid and/or solid waste on a temporary basis	Waste storage facility	7	8	08/03, 11/03, 08/06
Task 4—Construct a solid waste storage structure to hold solid animal wastes according to NRCS specifications	Solid waste storage structure	4	4	06/02, 12/04, 03/08, 11/08
Task 5—Install a concrete structure to store liquid and solid waste generated from concentrated animal feeding areas. Drawings, specifications, and O&M plan will be provided by the SCS prior to installation.	CAFO waste storage facility	7		11/03, 08/04, 11/06, 03/08, 11/08
Task 6—Construct and earthen pond to store liquid and/or solid waste on a temporary basis	Evaporation pond/ Liquid waste storage facility	8	6	05/03- 12/05
Task 7—Install pump and all components	Pumping plant	5	5	08/06, 10/04, 01/05, 11/03, 11/08
Task 8—Install pipeline to move liquid wastes from supply source to various destinations	Conveyance pipeline	200 ft. 2500 ft. 160 ft. 170 ft.	200 ft. 2500 ft. 170 ft. 160 ft.	10/04 (200 ft. of this was cost-shared with EQIP dollars), 10/08
Task 9—Construct fences as barriers to wildlife, livestock, or people	Fence	200 ft. 357 ft.	357 ft.	08/05
Task 10—Construct fence around feedlots to contain dairy heifers and their wastes	Fence	580 ft. 346 ft.	930 ft.	11/02
Task 11—Install pipeline to water livestock	Stock water pipeline	400 ft. 300 ft.	400 ft. 300 ft.	11/02
Task 12—Install concrete watering troughs for livestock and/or wildlife	Watering troughs	2	4	11/02

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
GOAL 2: Objective 1				
Task 13—Establish vegetation on severely eroded areas or other areas requiring extraordinary measures to establish vegetation	Critical area planting	.5 acres 2.5 acres 1 acre	0	N/A
Task 14—Establish wind break along road to provide screen and wildlife habitat	Windbreak/Shelterbelt	1100 ft. (Reese)	0	N/A
Task 15—Install fencing	Livestock exclusion fence	1276 ft	1276	09/09
Task 16—Stabilize a stretch of streambank	Streambank stabilization	N/A	Animals relocated	Jan-Jun '03
Task 17—Complete volunteer riparian restoration project as part of Bear River Watershed Celebration	Riparian restoration	1 project	1 project	Spring 02
GOAL 3: Objective 1				
Task 18—Reshape field to planned grades to improve water application efficiency, reduce erosion, and provide adequate surface drainage.	Irrigation land leveling	18 acres	0	N/A
Task 19—Design and install a pipeline to convey water to improved irrigation systems to reduce water loss, soil erosion, and salinity	Irrigation Water conveyance pipeline	800 ft. 750 ft. 550 ft. 340 ft.	560 ft. 500 ft.	08/03, 12/03
Task 20—Install a subsurface pipe to collect and safely remove water collected from rain gutters and convey the clean water to the Bear River	Underground outlet	1020 ft. 150 ft.	1022 ft.	11/02
Task 21—Construct and install systems to collect, control, and dispose of roof water runoff	Roof runoff management (rain gutters and downspouts)	1 system	400 ft. 200ft	11/02, 11/08
Task 22—Construct channel across an embankment slope to divert water from its natural flow	Channel diversion	100 ft.	0	N/A
Task 23—Install irrigation sprinkler system	Irrigation pivot with pipeline	1,320 ft.	12,108 ft.	FY 04-09/09

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
Task 24—Manage application of nutrient on fields to reduce contamination	Nutrient management system	500 ac 392.6 ac 385 ac 75.5 ac 18.2 ac 5 ac	500 ac 392.6 ac 385 ac 75.5 ac 18.2 ac 5 ac	Ongoing
Task 25—Manage the amount, timing, and placement of water on the land to reduce erosion and runoff	Irrigation water management system	500 ac 385 ac 105.6 ac 75.5 ac 18.2 ac 5 ac 200ac	500 ac 385 ac 105.6 ac 75.5 ac 18.2 ac 5 ac 200ac	Summer 2009
Task 26—Manage land to reduce infestations of weeds and pests	Pest management system	500 ac 392.6 ac 385 ac 75.5 ac 37.9 ac 18.2 ac 5 ac	500 ac 392.6 ac 385 ac 75.5 ac 37.9 ac 18.2 ac 5 ac	Ongoing
GOAL 4: Objective 1				
Task 27—Conduct animal waste system tours and proper manure application tours. Tours conducted by NCCD	Tours	2, 2, 2	2, 2	Spring '04 Fall '04 Oct. '06 Summer '07 Fall '09
Task 28—Prepare and publish newsletters to keep the public informed of water quality progress.	Newsletters (e.g., Cache County Newsletter focusing on agricultural water quality)	Quarterly Occasional water quality brochure	1500 +	
Task 29— Educate local residents about how to reduce non-point source pollution	Grill Your District Day	Annual event	Annual event 100-125 participants attended	Sept. 2006 Sept. 2007
Task 30—Educate school children about soil composition (by providing soil tubes to local 4 th graders to build soil profiles using soil tubes)	Natural Resources Field Day, Logan Canyon	Annual event	Annual event attended by 1700 fourth-graders	Fall 2006
Task 31—Educate the public about water quality as a community responsibility and complete a riparian restoration project.	Bear River Watershed Celebration	Annual event	Annual event: 1 riparian restoration project ('02)	Spring 2002-07

GOAL/OBJECTIVE/TASK	PLANNED OUTPUT/PRODUCT	PLANNED AMOUNT	ACTUAL OUTPUT	COMPLETION DATE
GOAL 5: Objective 1				
Task 32—UACD will develop contracts with cooperators for use of 319 funds and track expenditures of 319 and matching funds	Individual cooperator contracts and records of matching funds to 319. Quarterly reports.	Throughout contracting period	Completed	09/09
Task 33—UACD will maintain a record of all NPS practices implemented by cooperators and UACD reimbursement to cooperators	Record of BMP practices implemented and reimbursement payments to cooperators. Quarterly reports.	Throughout contracting period	Completed	09/09
Task 34—NRCS, USU, UDA and DEQ will evaluate monitoring records and determine effectiveness of implemented BMPs.	Written evaluations of BMP implementation, summarized in annual and final reports	Throughout contracting period	Completed	09/09

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

The State of Utah nonpoint source management plan stresses several elements necessary to achieve orderly and comprehensive planning. Private landowners, water right owners, public interest group, and local, state, and federal government agencies all play a role in the process. Coordinated Resource Management Group has met monthly for a number of years looking at the management of natural resources and the management practices to improve them.

The North Cache Conservation District has played a key role in the leadership of locally-led conservation and directing local work group meetings. They have focused on providing direct communication between landowners and federal agencies. Considerations of resource concerns have been developed. A resource assessment was developed and a long-range plan implemented.

Supplemental Information

Benson and Amalga Projects

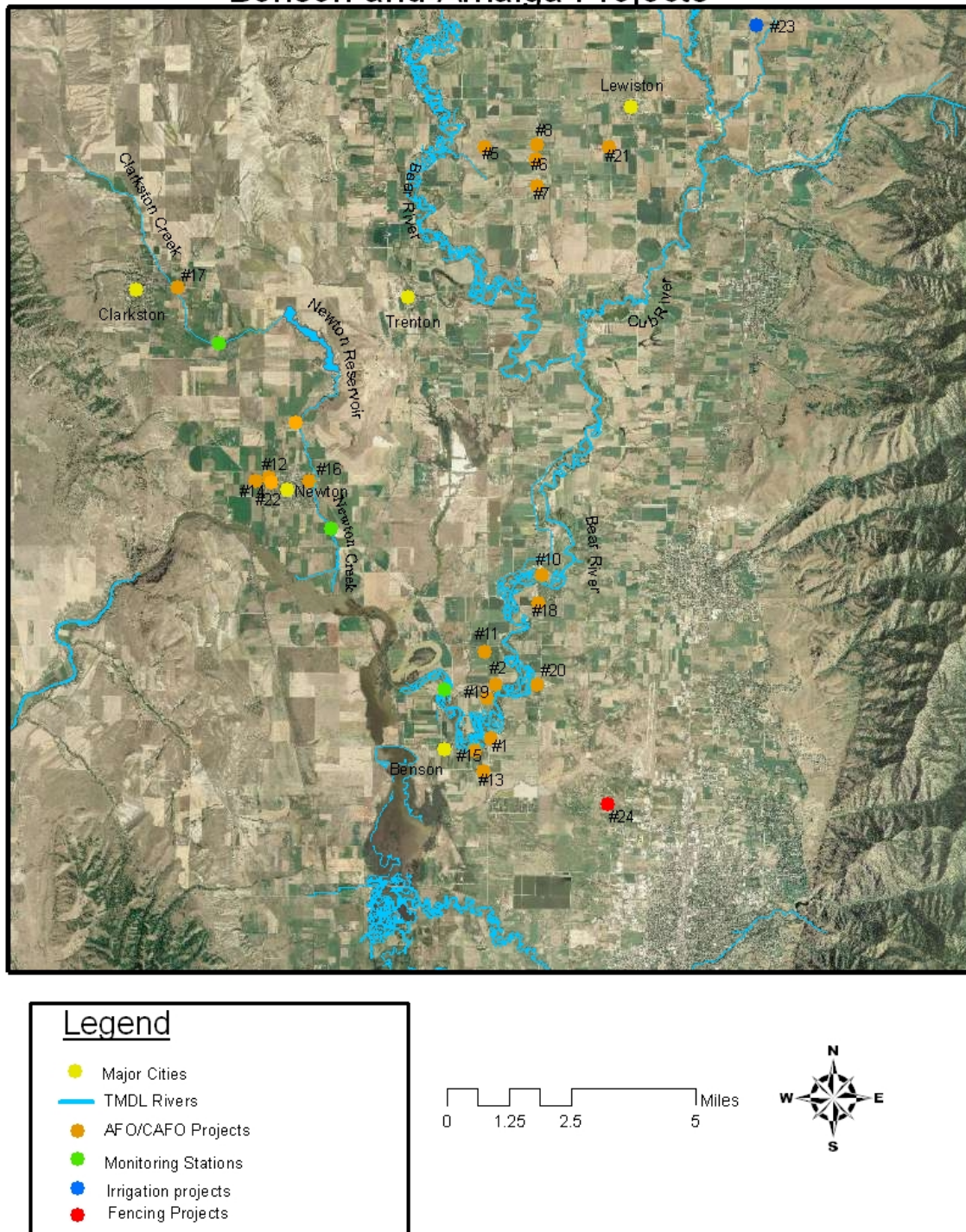


Figure 2: Map of Amalga-Benson project sites

Table 3: Best Management Practice (BMP) implementation according to site

Project location/site # (See Figure 2)	BMPs implemented
Site 1	Solid waste storage structure
Site 2	Concrete waste storage structures Conveyance pipeline Pumping plant
Site 3	Evaporation ponds Solid waste storage structures Pumping plants Conveyance pipeline Fencing
Site 4	Solid waste storage structures CAFO waste storage structures Liquid waste storage facility Irrigation water conveyance pipeline
Site 5	Construct corrals and feedlots Solid waste storage structure Fencing Livestock water trough Stock water pipeline Roof runoff management Underground outlet Stalls, animal waste structures
Site 6	Waste storage facilities
Site 7	Pond sealing/compacted clay Waste storage pond CAFO storage facility
Site 8	Waste storage facility
Site 9	Waste storage facility
Site 10	CAFO waste storage facilities

Site 11	Waste storage structures Fencing Pumping plants Pipeline
Site 12	Earthen pond, pump, pipeline
Site 13	Waste storage facility
Site 14	Waste storage facility, pipeline, pump, fence
Site 15	Waste Storage Facility
Site 16	Waste Storage Facility
Site 17	Waste storage facility, pump and pipeline
Site 18	Waste storage structure and pipeline
Site 19	Waste storage facility, pipeline fence, and sump pump.
Site 20	Pipeline, diversion, corral fence, and roof runoff diversions.
Site 21	Installation of diversions and access road to new corals.
Site 22	Installation of pump and pipeline to divert wash water from barn and runoff from feedlot

Site 23	Installation of rain gutters and pipelines to divert rain water
Site 24	Irrigation System installed to reduce erosion
Site 25	Fencing animals from riparian areas



Figure 3: Fencing from rivers and streams



Figure 4: Riparian restoration projects



Figure 5: Animal waste management



Figure 6: Watering improvements for animal feeding operations



Figure 7: Run off management and berms.



Figure 8: Irrigation systems

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 Non-point Source Pollution Handbook for a comprehensive list of BMPs that have been accepted for use by the State of Utah. The following type of practices were used in the Benson-Amalga Middle Bear River Watershed Project area:

- Cropland Practices: irrigation water management, crop sequencing, field borders, conservation tillage and filter strips.
- Riparian practices: streambank protection, fencing, filter strips, livestock exclusion, channel stabilization, clearing and snagging, off-site stock watering, and forest riparian buffers.
- Grazing land practices: off-site stock watering, range seeding, fencing, prescribed grazing and pasture plantings.
- Manure management practices: 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

The monitoring goals of this project have been 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.

Tasks associated with these goals will generally include the following:

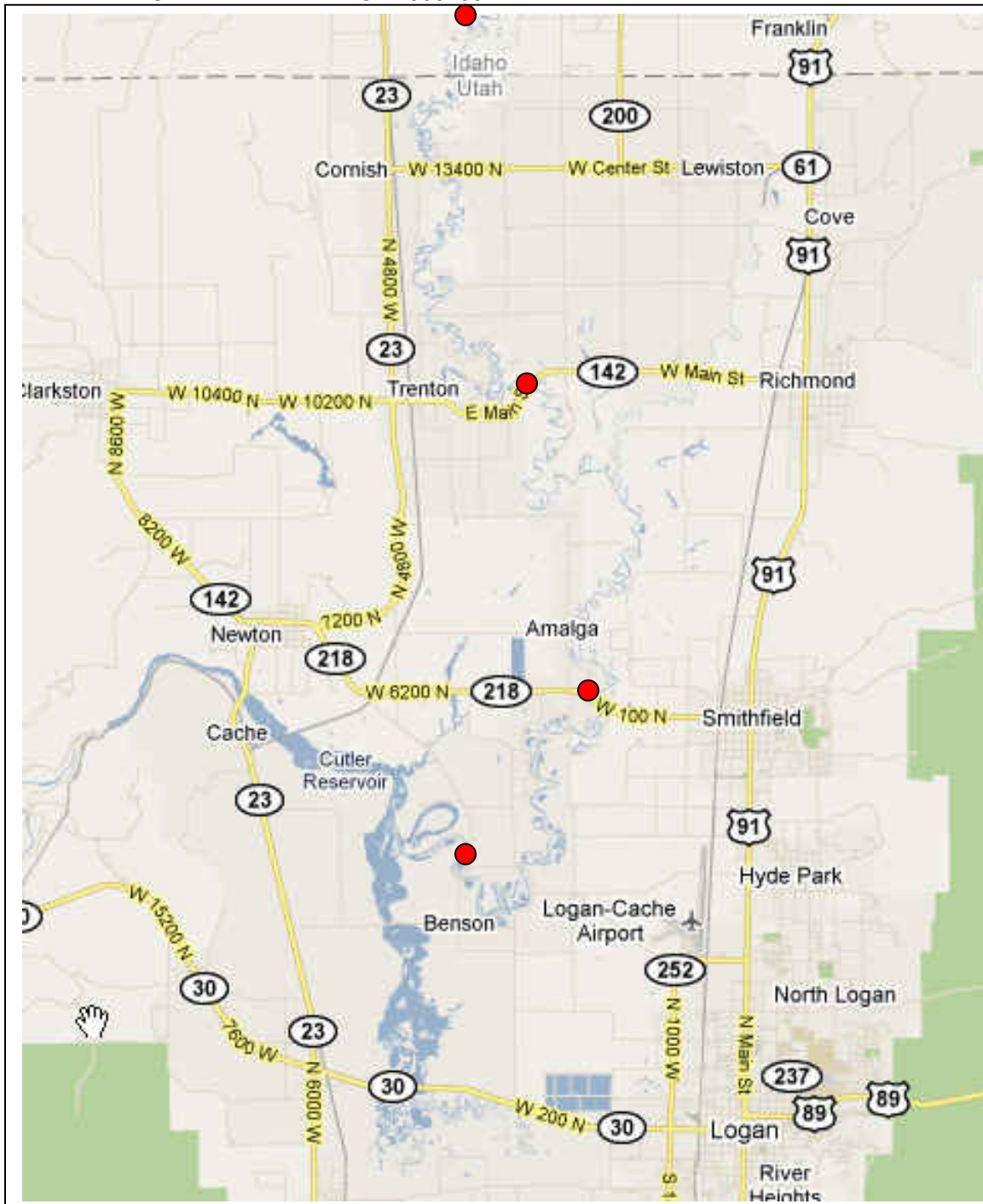
1. Monitor above and below the sites to demonstrate reduced pollutants loads and environmental improvements. This will be conducted by DEQ-DWQ.
2. Monitor long-term sites (established and maintained by Utah Division of Water Quality) for water quality and macro invertebrates to demonstrate sustained and overall improvements in water quality.
3. Qualitatively monitor fisheries for overall improvement in habitat and population responses.
4. Monitor riparian areas for overall improvement of vegetation, and riparian structure and function.
5. Maintain a common database of all data collected pertaining to the projects. Will be maintained by UT-DEQ.

Utah Department of Environmental Quality (UDEQ) has established a water quality monitoring and UCASE survey programs for the waters of the State of Utah. UDEQ will carry out the water chemistry and macroinvertebrate monitoring program for this project. Baseline conditions for water quality are monitored by UDEQ. These data will provide information needed to evaluate the watershed treatment plan or PIP.

The main stem Bear River from the Utah-Idaho border downstream to Cutler Reservoir includes four monitoring locations. See Map below.

1. BEAR R AB CUTLER RES AT BRIDGE 1 MI W OF BENSON - 4903260
2. BEAR R W OF RICHMOND AT U142 XING - 4903820
3. BEAR R AT AMALGA AT CR 218 - 4903560

4. BEAR R W OF FAIRVIEW IDAHO - 4906100

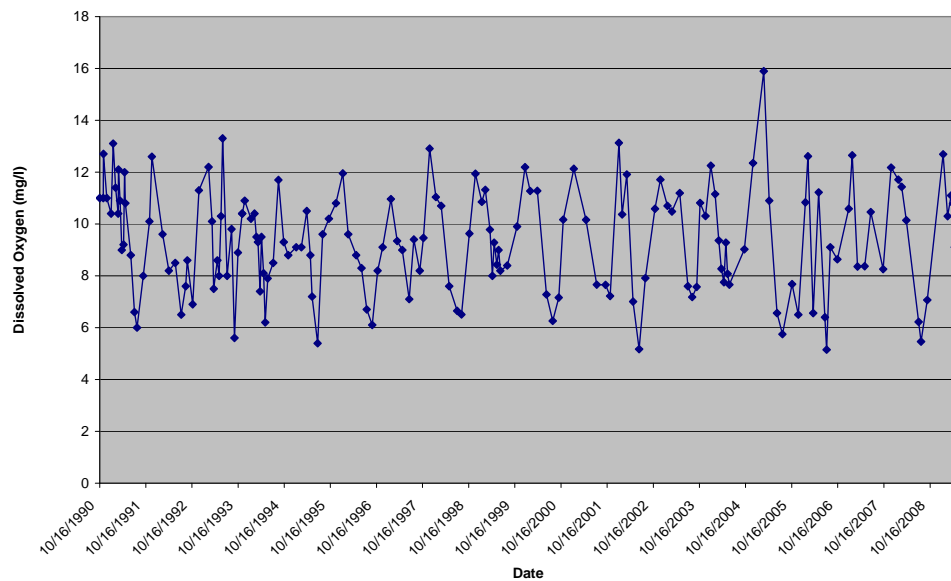


The following charts show the dissolved oxygen and the total phosphorus in four sites from the Utah/Idaho border downstream to Cutler Reservoir. As can be seen dissolved oxygen has not been seen to fall below the standard for a warm water fisheries of 3 mg/l for adults and 5 mg/l for juveniles. Trends in the total phosphorus concentration can be seen to be improving. The magnitude of fluctuations in the TP concentration is also decreasing. Average concentration for the most recent intensive monitoring cycle 2008-2009 was 0.06 mg/l only slightly above the TMDL recommendation of 0.005 mg/l.

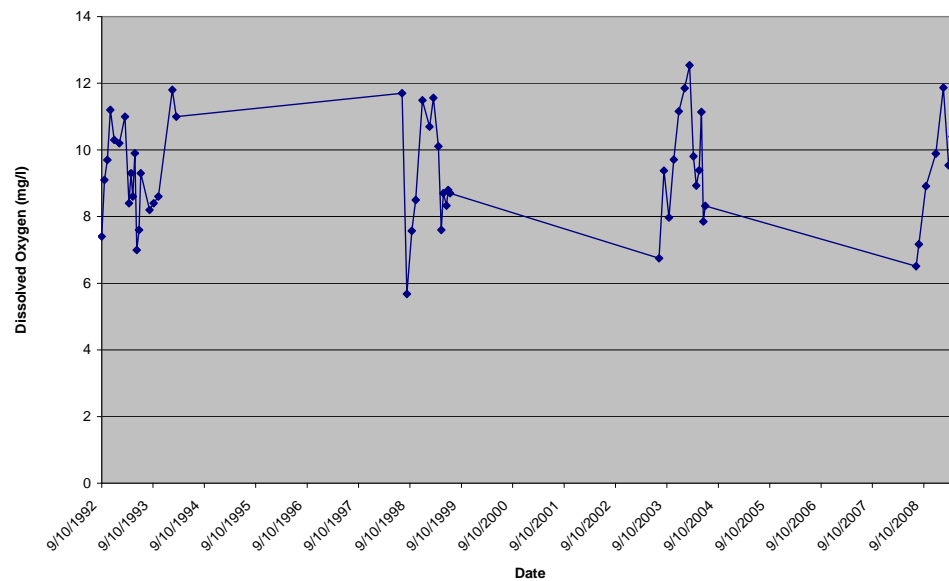
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Bear River (Amalga-Benson)

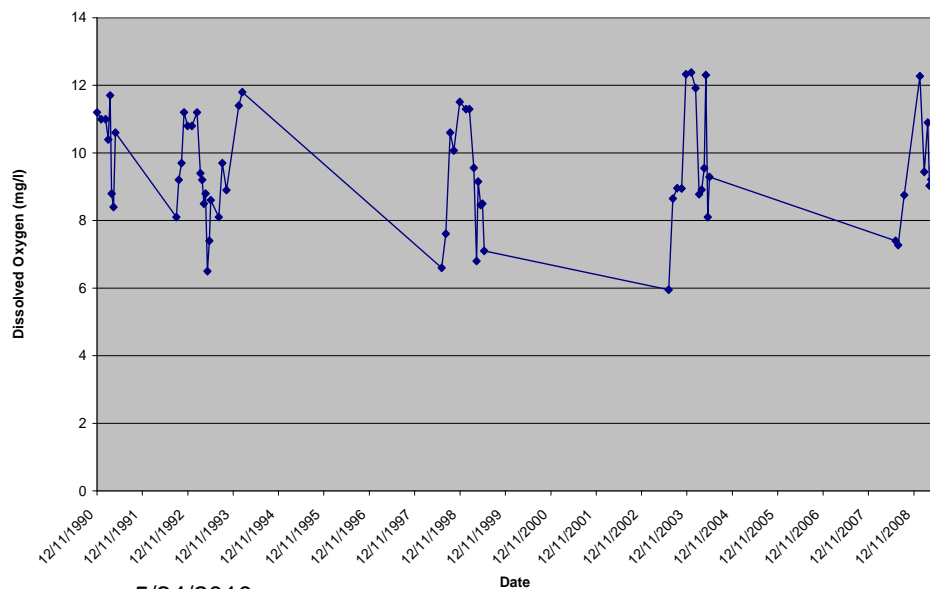
Bear River West of Fairview, ID



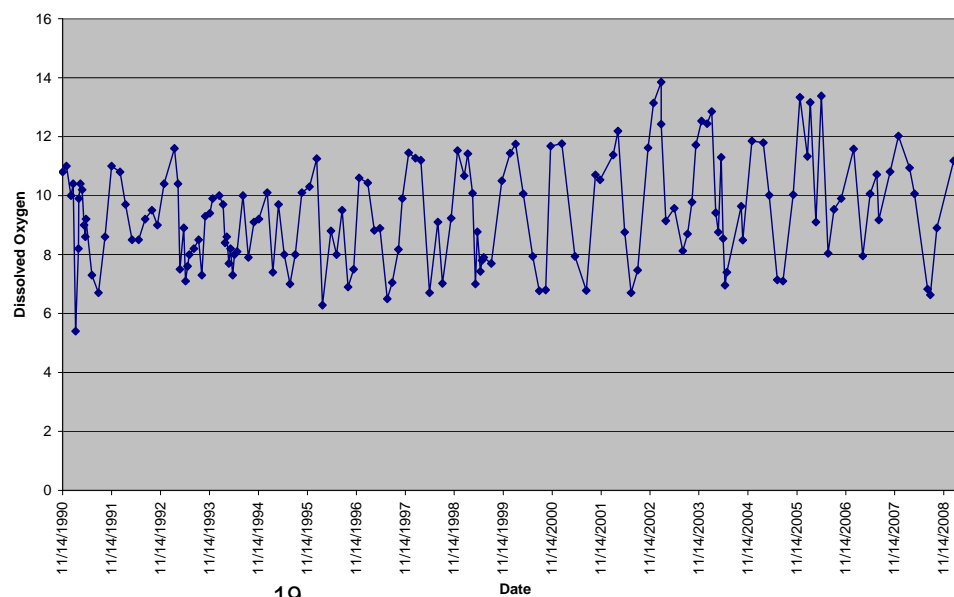
Bear River at Amalga CR218



Bear River West of Richmond



Bear River above Cutler Reservoir

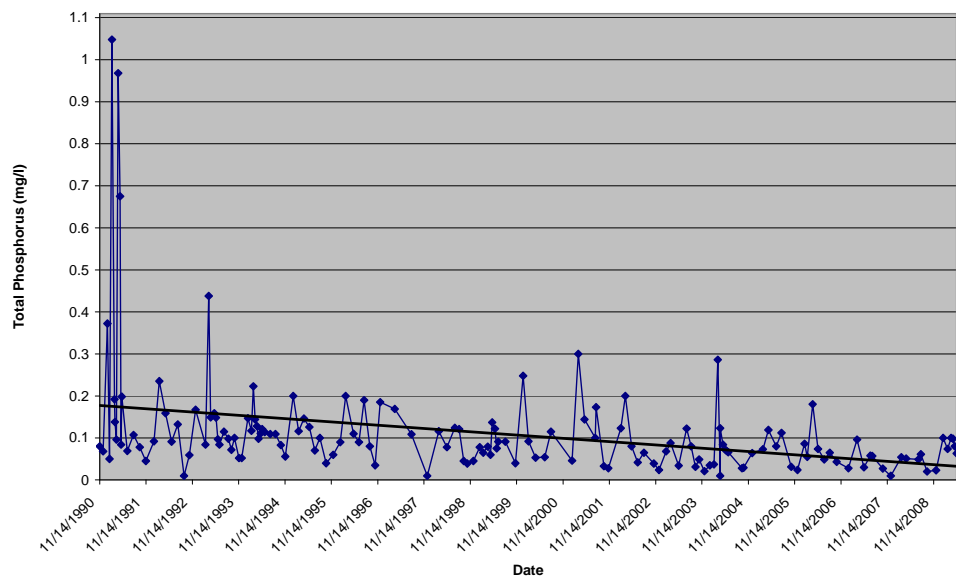


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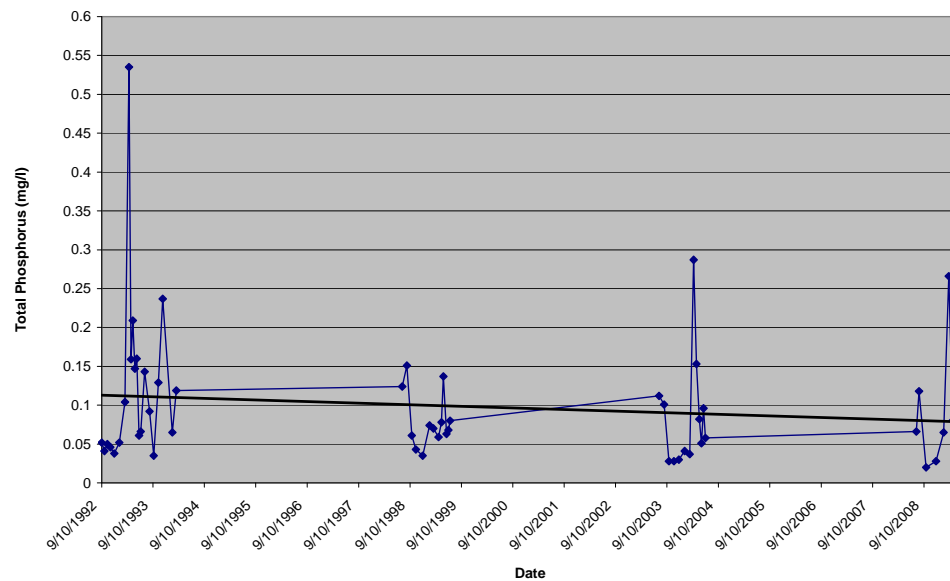
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Bear River (Amalga-Benson)

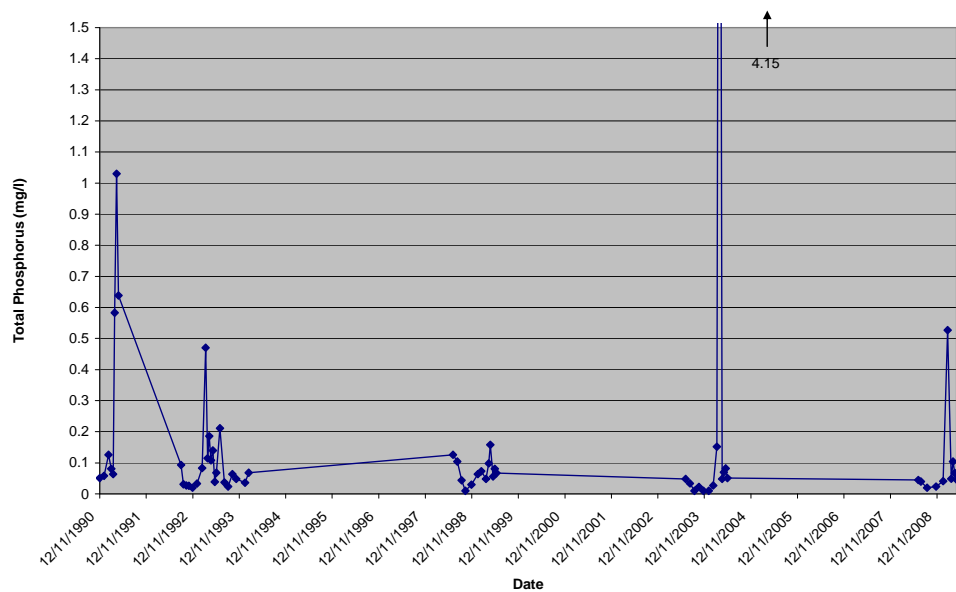
Bear River above Cutler Reservoir



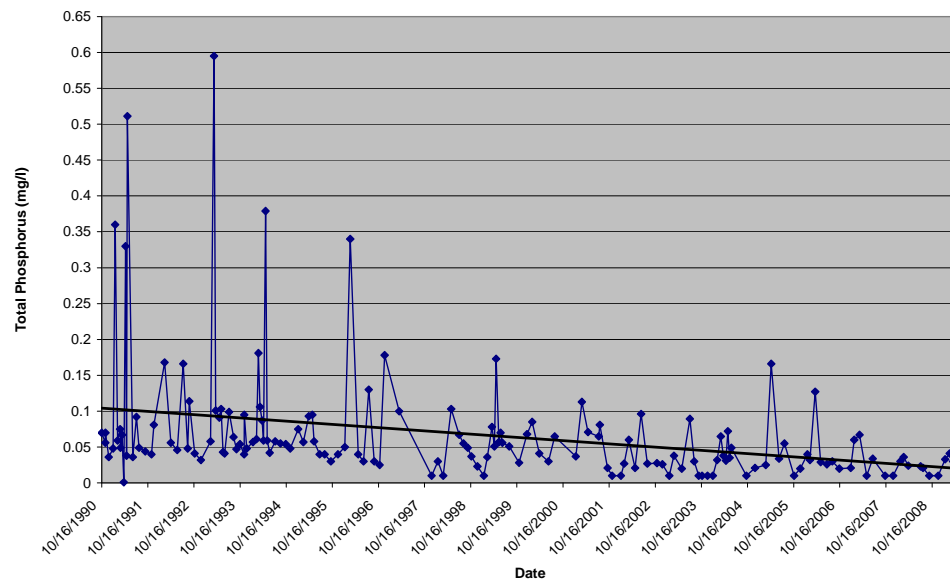
BearRiver at Amalga CR218



Bear River West of Richmond



Bear River West of Fairview, ID



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4.1 Total Maximum Daily Load (TMDL) Implementation Effectiveness

In the Benson Amalga area it can be difficult to see the effectiveness of the individual BMPs that have been installed. There are several tributaries that feed into the Bear River in Cache Valley including the Cub River, Summit Creek, and Logan River. In some cases we only have data for a few years. In many cases it takes upwards to ten years to actually see the water quality results from the installation of BMPs. From the data there appears to be a reduction in nutrients in the Bear River. Continued monitoring and evaluation of Cutler Reservoir and the Bear River should supply validation of the improvements observed. For more information on the effects of the Bear River on Cutler Reservoir see the recently completed Phase I TMDL for the Middle Bear River and Cutler Reservoir located on the Utah DWQ website <http://www.waterquality.utah.gov/TMDL/index.htm>.

4.2 Best Management Practice (BMP) Implementation Effectiveness

The implementation of BMPs such as use of manure storage structures, proper manure application, and nutrient and pest management helps animal feeding operations to contain and use animal waste more effectively. They are able to apply and incorporate nutrient into the soil according to nutrient management plans (NMP). Odor has decreased and pest management practices are helping. The animals are cleaner and production has increased.

4.3 Surface Water Improvements

4.3.1 Chemical

As animals are removed from the corridor and stream banks are stabilized the amount of nutrients in the system will continue to decrease. With this decrease in nutrients other water quality standards will also improve such as dissolved oxygen.

4.3.2 Biological

With the implementation of the projects that have taken place the nutrients in the system should decrease. This decrease in nutrients should decrease algal blooms and improve dissolved oxygen conditions for other living organisms such as macroinvertebrates and fish.

4.3.3 Physical/Habitat

By stabilizing the banks of the rivers and allowing for vegetation to increase along the banks of the rivers, the habitat for fish and other riparian dwelling organisms will improve. Water temperatures could possibly decrease due to better shading along the river

To help estimate the effectiveness of the feedlot repairs or replacements we used the Utah Animal Feedlot Runoff Index worksheet. This Worksheet estimates the amount of nutrients taken out of the system through the improvements. The following table shows these calculations:

Project	Risk before	Risk after	Nitrogen Reduction (lbs/year)	Phosphorous Reduction (lbs/year)	BOD Reductions (lbs/year)
#1	High	Low	1677	288	5591
#2	High	Low	195	72	830
#5	High	Low	107	21	380
#6	High	Low	187	31	784
#7	High	Low	38	8	133
#8	Low	Low	0	0	0
#9	High	Low	2040	900	8947
#10	High	Low	523	104	1859

#11	Medium	Low	47	10	170
#12	High	Very Low	2203	359	9297
#13	High	Low	167	27	702
#14	High	Low	125	46	534
#15	Medium	Low	283	47	1190
#16	Medium	Low	122	60	443
#17	Medium	Low	72	26	305
#18	High	Low	610	122	2170
#19	High	Low	112	23	398
#20	High	Low	610	26	305
#21	High	Low	630	307	2292
#22	High	Low	354	129	1240

Footnote: Explanation for project #8: This project was an animal waste storage facility. Although the project shows there is no load reduction, there was a potential that the facility could contaminate waters of the state. Previously the structure contained the solids but the liquids could drain at times into a gulley that could reach the Bear River during a 25-year storm event. The UAFRRRI model did not equate all these factors in estimating the load reductions. The project was mostly funded with EQIP with a small amount of 319 revenue.

4.4 Other Monitoring

Natural Resources Conservation Service (NRCS) conducted project implementation checks and certified that all practices were appropriately put into operation before reimbursement was made to cooperators. Utah Association of Conservation Districts (UACD) continues to follow-up with cooperators to make sure proper management practices continue to be implemented and to resolve any problems.

4.5 Results of BMP Operation and Maintenance Reviews

No long term funding was planned for the operation or maintenance of these projects. Maintenance of these projects is the responsibility of the private landowners. UACD and NRCS have inspected and approved 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 these projects. 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: cooperator and project approval
- Natural Resources Conservation Service: technical assistance, follow-up
- Department of Environmental Quality: oversight, 319 grant management, water quality (WQ) monitoring
- Utah State University Extension Service: Information and Education (I&E), technical assistance
- 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: (I&E), technical assistance
- Utah Department of Agriculture and Food (UDAF): I&E, technical assistance, contract management
- 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, 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, 319 grant oversight
- 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
- Volunteer hours provided during Bear River Watershed Celebration

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, 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.

Section 319 funds allocated for information and education were used to supply soil tubes for the Natural Resources Field Day that was held in Logan Canyon during the fall of 2006. Local 4th graders attended the event and were able to build soil profiles in the soil tubes to learn about different soil horizons.

Bear River Watershed Celebration (Apr-Jun 2002-2007):

In spring of 2002, The Celebration was held at the American West Heritage Center. It was attended by the general public and approximately 100 school children that were participating in volunteer water quality monitoring of the Bear River system from Wyoming to the Great Salt Lake. Volunteers completed a riparian restoration project at the site.

The Watershed Celebration has become an annual event. In April of 2006, the Utah Association of Conservation Districts, in a combined effort with the Boy Scouts of America, conducted a planting service project along the banks of the Bear River and entertained and educated over 1000 members of the public and our regional schools.

7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

The Amalga/Benson area of the Bear River watershed has many animal feeding operations (AFOs) along its banks. The projects have reduced the sources loading potential of agricultural pollutants, reduced or eliminated the mechanism of transfer to the waterbody, and reduced or eliminated input of large quantities of pollutant load. It is estimated that due to the projects implemented that the yearly loads have been reduced by 8909 lbs of nitrogen and 2337 lbs of phosphorus. However, the Bear River still has areas of concern with nutrient and sediment loading. Additional funding is needed to improve water quality.

Land use in the Amalga/Benson watershed is changing rapidly. Over the past decade, there has been a shift from agricultural use to urban and industrial use. Growth rates in the Cache Valley approach 30% annually. With each new home or subdivision, increased surface hardening occurs, preventing rainfall infiltration which leads to increased runoff and associated pollutants that these areas generate.

Finally, we believe that the phosphorous laden sediments that were eroded and washed into the Middle Bear River just below the confluence with the Cub River (prior to restoration work) are still present in increased amounts along the streambed. These sediments continue to be available for re-suspension in the water column and periodically move from upstream locations to downstream depositional areas. We believe that there will be a lag in water chemistry improvement until the presence of these sediments is reduced.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

It appears this project has had a beneficial impact on water quality in the Bear River Watershed. Section 319 of the Clean Water Act provided landowners with direct financial and technical assistance through multi-agency cooperation and guidance. With changing standards and animal management practices, waters of the Bear River are cleaner because animal manure is now being prevented from entering the river. Streambanks have been restored and wildlife habitat has 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 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 heavy 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 restoration or educational perspectives. 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.

There is currently a study to determine the Bear River Cutler Reservoir's health and to develop TMDLs. Fish studies indicate that we need to look at temperature and sediment in more detail. The Bear River/Cutler Reservoir Advisory Committee has been established to address the facts and to determine loading maximums and improvement plans.

Literature Cited

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.

List of Tables and Figures

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9.0 APPENDICES

1. Cache Conservation Newsletter archives

Summer 2002: http://www.uacd.org/districts/north_cache/newsletter/archives/ccnsum02.pdf

Summer 2004: http://uacd.org/districts/north_cache/newsletter/archives/ccnsum04.pdf

Fall 2005: http://www.uacd.org/districts/north_cache/newsletter/archives/CCNews_fall_05.pdf

Summer 2006: http://www.uacd.org/districts/north_cache/newsletter/archives/CCNews_summer_06.pdf

Fall 2006: http://www.uacd.org/districts/north_cache/newsletter/archives/ccnews_fall06.pdf

2. Summary of UACD contracts

Project	UDAF contract #	From	To	EPA	Matching	Total	Projects	EPA Remaining
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Bear River (Amalga-Benson)

BR Amalga-Benson FY00	01-0909	06/01/01	09/08/05	36,400	24,267	60,667	4 projects	\$0
BR Amalga-Benson FY01	02-1680	01/10/02	12/15/06	105,000	70,000	175,000	3+projects	\$0
BR Amalga-Benson FY02	03-0604	09/05/02	09/25/07	111,700	74,467	186,167	9 projects	\$0
Ammendment #1 Transfer from Cub River	Cub River 03-0603	09/17/07	09/30/09	78,000	51,999	129,999	4 projects	\$0
Total contract:				331,100	220,733	551,833	24 projects	\$0