# CLEAN WATER ACT
# SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM
# TECHNICAL ASSISTANCE / INFORMATION/EDUCATION PROJECT
# FINAL REPORT

## UPPER WEBER RIVER
## TECHNICAL ASSISTANCE/INFORMATION PROJECT

**BY**

**SUMMIT CONSERVATION DISTRICT**
**UTAH ASSOCIATION OF CONSERVATION DISTRICTS**
**30 SOUTH MAIN**
**COALVILLE, UTAH 84017**

**August 2009**

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

State (UDAF) contract # 040979
Grant # C9998187-03

EXECUTIVE SUMMARY

PROJECT TITLE Upper Weber River Technical Assistance/I & E Project

PROJECT START DATE 5//03 PROJECT COMPLETION DATE 8/09

| | | |
|---|---|---|
| FUNDING: | TOTAL BUDGET | $79,097 |
| | TOTAL EPA GRANT | $40,000 |
| | TOTAL EXPENDITURES OF EPA FUNDS | $40,000 |
| | OTHER FEDERAL FUNDS | $10,875 |
| | TOTAL SECTION 319 MATCH ACCRUED | $27,289** |
| | BUDGET REVISIONS | +$933 * |
| | TOATAL EXPENDITURES | $79,097 |

* *The budget revision consists of $933 transferred from the remaining balance in the completed Rees Creek Project contract number #040949. The Rees Creek project is located in the Upper Weber River Watershed. The transfer of funds provided additional funding for the Upper Weber River Technical Assistance /I&E Contract #040979.*

** The match for this project came from the Weber Basin Water Conservancy District which has provided water quality monitoring and lab work since the projects inception.

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## SUMMARY ACOMPLISHMENTS

This project had a two pronged emphasis of providing technical assistance to the Natural Resources Conservation Service (NRCS) and also providing a multifaceted information and education program to the general public and producers in the watershed. The project provided technical assistance with conservation planning work on 15 different cooperators in the Upper Weber River Watershed. Assistance was provided on existing projects as well as assisting in the development of new conservation projects. The Echo Creek Stream Visual Assessment (SVAP) document was produced based upon data collected during the summer of 2003. This document provided an assessment of watershed condition and water quality challenges that exist in the Echo Creek watershed, a sub watershed of the upper Weber River. Sixteen news releases were published in county, regional newspapers and conservation district newsletters on various water quality issues in the watershed. One article was published in Utah Watershed Review magazine published by the Utah Department of Agriculture and Food. Television coverage also spotlighted efforts in the watershed to improve water quality. Some 1000 color non-point source pollution pamphlets focusing on issues in the Upper Weber River Watershed were designed, published and distributed to producers and stake holders in the Weber River watershed. Eight water quality tours were conducted in the watershed during the course of the project to inform and demonstrate to landowners, and a variety of agency personnel of the efforts initiated to improve water quality in the watershed.

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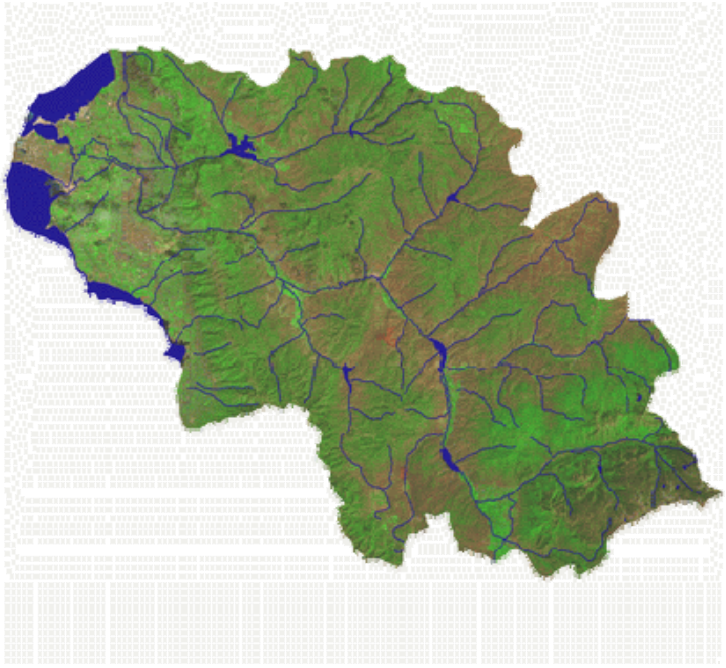
## 1.0 INTRODUCTION

The purpose of this project was to provide additional technical support to state and federal agencies for implementing water quality work in the Upper Weber River Watershed. A second purpose was to inform and educate the general public and specifically target landowners within the watershed as to the need to address water quality issues and remediate practices that compromise water quality.

The Weber River Watershed covers 1.5 million acres of land. It is bordered by the Wasatch Mountains on the west and the Uintah Mountains on the east. Much of the land is privately owned and is used for rangeland, crop production, recreation and wildlife habitat. The state or federal government owns about 20% of the lands in the form of national forests, state owned wildlife habitat areas and state parks. Much of the rural valleys consist of agricultural lands which in some areas are rapidly being developed. The Weber River provides culinary water for over 415,000 people living on the Wasatch Front. In addition the river is heavily used for recreation such as fishing and commercial river float trips. The Weber River is classified and protected by the Utah Division of Water Quality and protected for the following designated uses :( 1) 1C-domestic purposes; (2) 2B-recreation; (3) 3A-cold water species of game fish and other cold water aquatic life, (4) 4-agricultural uses, including irrigation of crops and stock watering. The Upper Weber River is located within HUC 16020101.

**Wasatch Mtns.** **Weber River Watershed**



**Uinta Mtns.**

The Weber River Watershed is located in Northern Utah. It is situated between the Wasatch Mountains on the west and the Uinta Mountains on the east. The river system collects water from the slopes of the Wasatch and Uinta Mountain ranges.

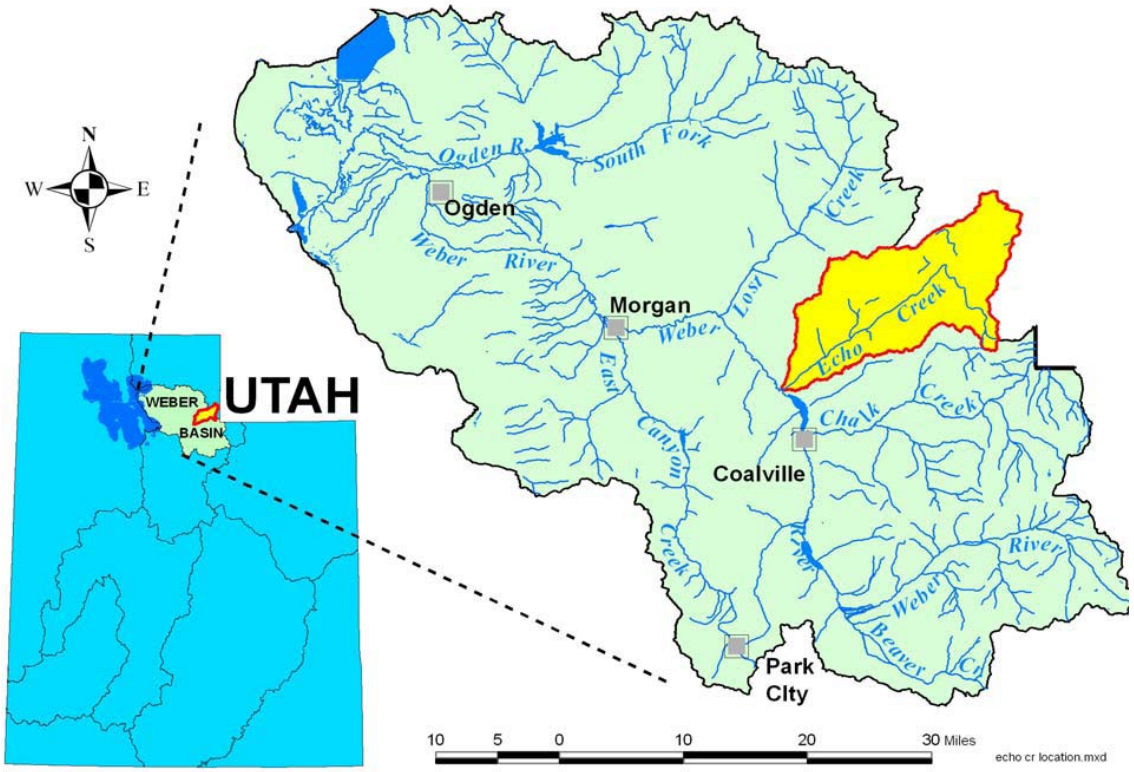
Major problems in the watershed include sedimentation, high levels of total phosphorus and low levels of oxygen resulting from increased human produced contaminants, impacts from agricultural non-point sources and hydrological/habitat modification.

Six water bodies in the watershed are listed on the 2006 303(d) list of Utah's waters not supporting one or more of their beneficial uses. These include Echo Creek, Chalk Creek, East Canyon Creek, Silver Creek, Echo Reservoir, and East Canyon Reservoir.

Technical assistance has been focused primarily on the Echo Creek and Chalk Creek sub-watersheds. Both of these sub watersheds have been primary contributors of NPS pollution in the form of sediment yields and total phosphorous. Information and education efforts have been focused over the entire Upper Weber River Watershed.

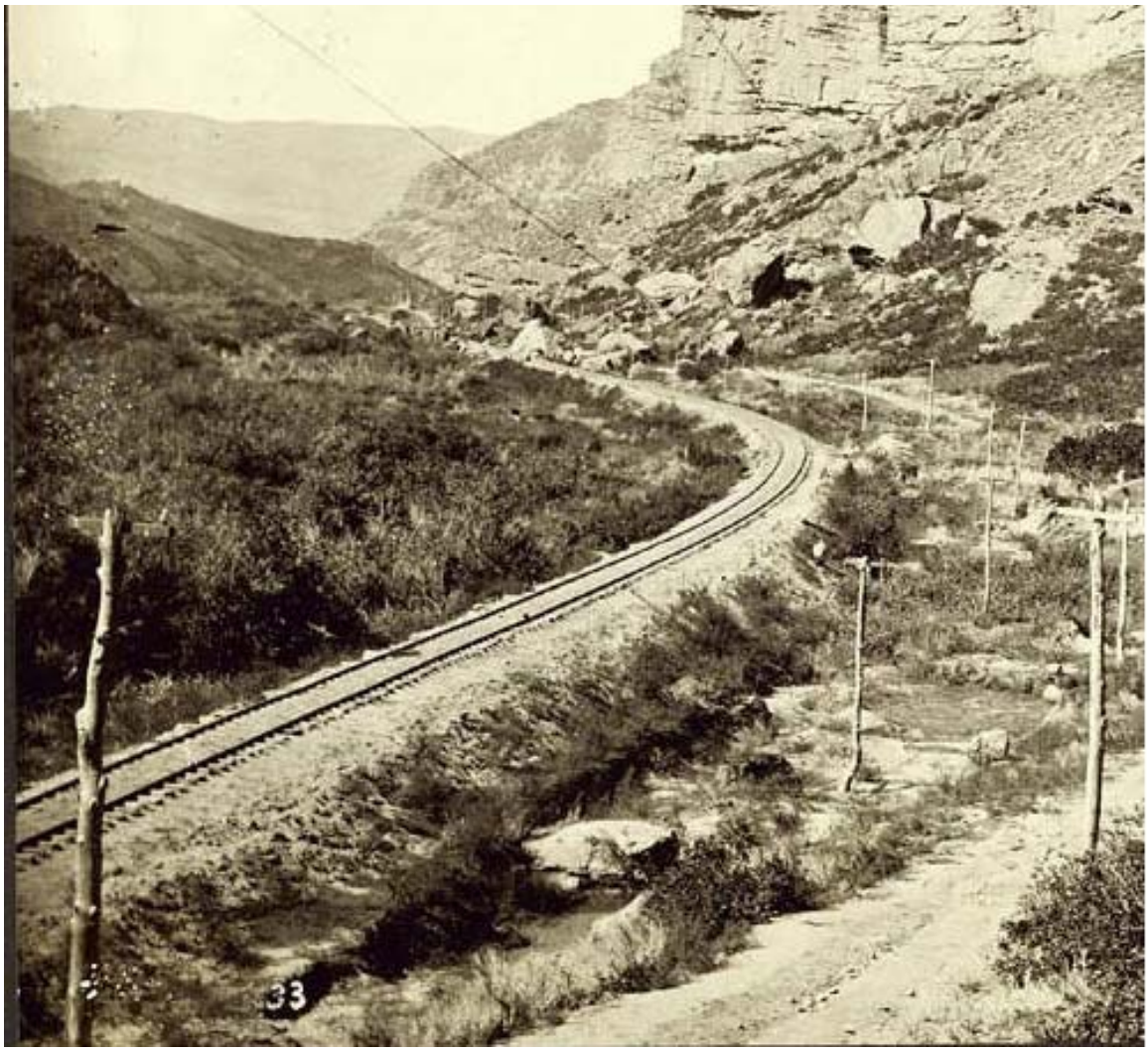
The Echo Creek watershed lies in northwestern Summit County and begins near the Wyoming/Utah state line. Echo Creek flows southwest for 43 miles to join the Weber River at Echo Junction. The watershed encompasses 146,086 acres of land. Most is held in private ownership. Echo Creek does not meet its beneficial use for class 3(A) waters due to sediments. A TMDL (Total Maximum Daily Load) for Echo Creek was submitted and approved in 2006.

Echo Creek Watershed Location Within the Weber River Basin, Utah




Historically Echo Creek had a woody, well vegetated riparian area. Historical photos from 1869 show the newly completed Trans continental railroad descending through a thickly wooded canyon bottom next to Echo Creek.

Echo Creek has been altered throughout much of its reach due to the construction of I-80 and the Union Pacific Railroad. Overgrazing, indiscriminate weed spraying and construction alteration caused a total loss of woody vegetation and a destabilization of the stream and some of its tributaries resulting in sediment loading into Echo Creek.



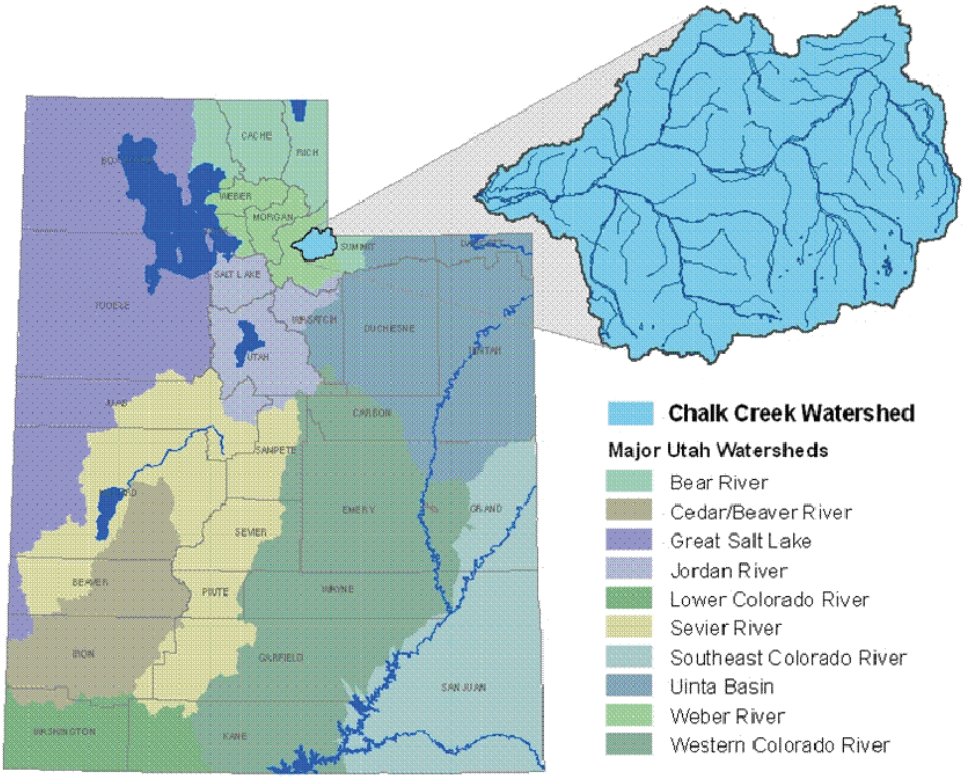

Photograph of Echo Canyon and well vegetated Echo Creek to the left of the tracks in 1869.
(Courtesy of Brigham Young University)

One of the primary sources of sediment in the Echo Creek watershed has been Rees Creek. Efforts to reduce sediments inputs from Rees Creek have been ongoing with a separate 319 demonstration grant that was implemented in 2003 and completed in 2008. The project focused on the construction of eleven sediment retention basins constructed in two phases. This has resulted in dramatic reduction of sediment inputs into Echo Creek from Rees Creek. Those efforts have dovetailed with this 319 grant and much of the information and education outputs of this grant have focused on the Rees Creek project and its benefits to water quality.

**This photo shows the confluence of Echo Creek and the Weber River at Echo Junction, Utah. This photo was taken the day following a June 1999 rain event in the Echo Creek Watershed. This is typical of the sediment loading into the Weber River system during high spring flows and during summer rain events. Work completed in the watershed is now removing significant amounts of this sediment.**

A second area of focus for the grant was the Chalk Creek watershed a major tributary to the Upper Weber River.

**Chalk Creek Watershed Location Within the Upper Weber River Basin, Utah.**




The Chalk Creek watershed is located in western Summit County, Utah. The watershed encompasses more than 208,616 acres of rangeland, forest, irrigated cropland, meadow pasture and small urban areas. Land ownership is more than 99% private. Chalk Creek, which flows into Echo Reservoir in northern Utah, was placed on the 303(d) list in1997, and was considered the third most polluted stream in the state. Chalk Creek does not meet its beneficial use for class 3(A) waters and is impaired as a cold water fishery due to sediments/phosphorus. Chalk Creek has been a significant source of sediment to the Weber River. This is due to overgrazing, indiscriminate weed spraying, stream alteration, construction associated with oil/gas exploration, and a loss of riparian vegetation.

Since the mid 1990's when the Chalk Creek Water Quality Project was implemented information/education efforts in the watershed have been ongoing as there has been an intensive effort to address water quality and reduce sediments in Chalk Creek. A TMDL for sediments was developed in 1997. This grant looked to continue with that effort and maintain momentum to allocate the remaining 319 funds for additional work in the Chalk Creek watershed. A secondary goal was to broaden the focus of additional water quality issues that existed throughout the Upper Weber River Watershed, not just in Chalk Creek.

Information and education efforts have focused on informing landowners through various forms of media of problems that exist in the watershed and practices that can be used to address them. Committed to improving the watershed, more than 90 local landowners have worked with project partners to successfully restore the creek. Some landowners have installed riparian fencing to keep livestock out of the creek and planted willows and other native vegetation along the stream to help stabilize the stream channel. Another major effort included a pressurized sprinkler system along lower Chalk Creek to reduce sediment and phosphorous inputs being carried back into the stream from flood irrigation return flows. These efforts significantly improved Chalk Creek. The most recent evaluations of total phosphorus indicate that the total phosphorous loading has decreased, but not to the extent that it can be not considered impaired. There are two segments within the Chalk Creek watershed that are being considered for de-listing because of improved habitat. Preliminary benthic macro-invertebrate data indicate that these segments are supporting their beneficial use for aquatic life.

**This photo illustrates a typical bank erosion reach on Chalk Creek.**

Water quality work is still ongoing in Chalk Creek, though not at the levels that occurred in the last decade. Some of the remaining work consists of small stream bank restoration projects and conversion from flood to sprinkler irrigation projects. Additional work remains with the South Fork of Chalk Creek being listed for habitat alterations, sediments and phosphorous in 2008.

This picture of upper Chalk Creek shows a recently restored riparian/stream bank area on Chalk Creek during high water.

This picture shows the same location a year later and riparian vegetation recovery typical of restored sites.

Echo Reservoir is currently listed on Utah's 303(d) list of impaired waters for elevated total phosphorus and low dissolved oxygen. Chalk Creek empties into the Weber River, which then immediately flows into Echo Reservoir. A TMDL is in progress for this reservoir. This will include an assessment of source tributaries, including Chalk Creek and the upper Weber River. Chalk Creek has been identified as a primary source of phosphorus for Echo Reservoir.

**Echo Reservoir**

The Upper Weber River Technical Assistance / Information and Education project sponsor was the Summit Conservation District. Additional support was provided by the Utah Association of Conservation Districts, Utah Department of Agriculture, the Natural Resource Conservation Service, Utah Division of Water Quality, Utah Division of Wildlife Resources, and the Weber Basin Water Conservancy District.

## 2.0 PROJECT GOALS, OBJECTIVES, AND ACTIVITIES

There were two primary goals for this project. First, provide additional technical assistance (conservation planning) to landowners in the upper Weber River Watershed to reduce NPS pollution. This would occur under the direction of the NRCS.
Second, develop and implement a media campaign that would increase public awareness of NPS pollution problems in the Upper Weber Watershed. This program would use a variety of ways to generate public interest and awareness and target stakeholders of the need to address water quality issues in the watershed. It would dovetail with the existing Chalk Creek Water Quality Project as well as focus on other areas in the upper Weber where problems existed.

Objective 1: Provide additional technical assistance to landowners in the Upper Weber River Watershed and submit 319 reports tracking project progress.

Task 1: Provide technical assistance to develop 15 RMS plans implementing BMPs on private lands.

Products: 15 RMS plans

Task 2: Utah Association of Conservation Districts will submit tracking/progress reports of Upper Weber 319 project.

Products: 10 reports

Objective 2: Develop and implement a media campaign, thus increasing public awareness of NPS pollution problems in the Upper Weber Watershed.

Task 3: UACD planner/I&E specialist will prepare and publish newspaper articles, concerning NPS activities in the watershed in local and state newspapers.

Products: 15 articles

Task 4: UACD planner/I&E specialist will produce, publish and distribute an Upper Weber River Watershed NPS pollution pamphlet illustrating problems and potential solutions.

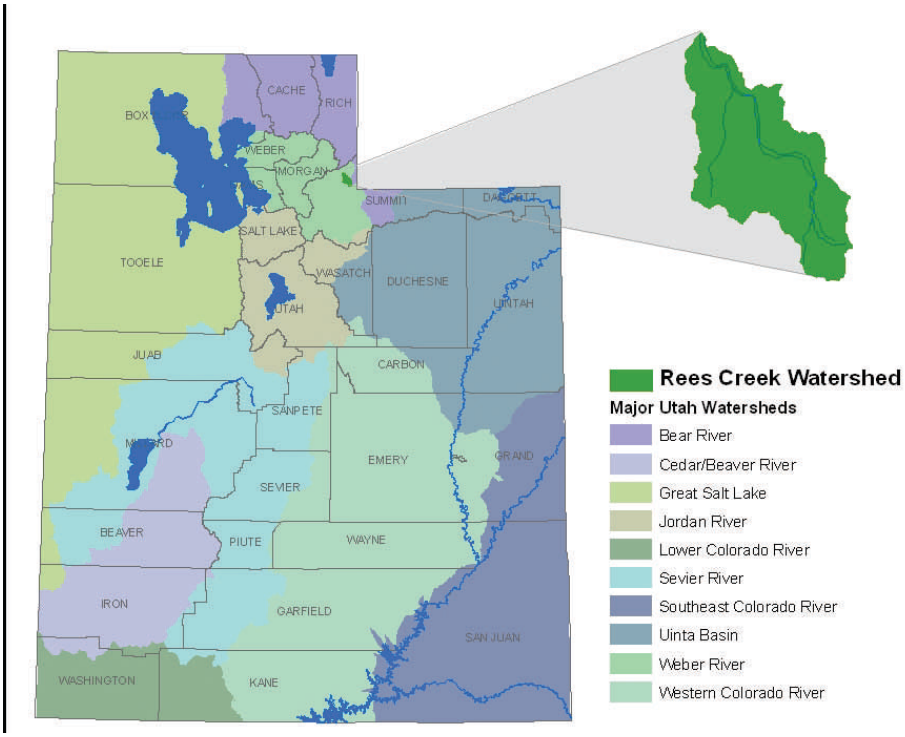
Products: 1000 color pamphlets

Task 5: UACD planner/I&E specialist will, organize and direct tours of the Upper Weber River watershed to inform landowners, operators and the public of planned and implemented improvements for control of NPS pollutants.

Products: 3 Watershed tours

Technical assistance proved to be the most challenging objective of the project. These challenges will be addressed in section 2.2. Conservation planning involved a total of 15 cooperators over the span of the project. Conservation planning took place in the Echo Creek, Chalk Creek, and main Weber River watersheds. Conservation planning work consisted of resource assessments, range inventory, pasture inventory, cropland inventory, conservation plan maps, trend photos, engineering and design. This work involved cooperators with existing conservation plans and those who were contemplating developing a conservation plan. The majority of the time was spent on two projects located in Rees Creek, a sub watershed of Echo Creek on the Rees Creek project phases 1 & 2. The Rees Creek project ran simultaneously with the Upper Weber Tech. Asst. /I&E project.

**The Rees Creek Watershed**




**Rees Creek Project: A Case Study**

The Rees Creek Project was initiated in the summer of 2004 and completed in 2008. Projects goals included restoring hydrologic function to a series of historically wet meadows, trapping sediment and monitoring project effectiveness at reducing sediment inputs into Echo Creek.

Confluence of Echo Creek (clear-left) and Rees Creek (turbid). Rees Creek has long been a major contributor of sediment to Echo Creek. Photo (UDWQ)

This photo was taken sometime in the early 1980's showing the degraded condition of Rees Creek in its lower reaches. Once the stream became entrenched the surrounding meadows began to dry up and tremendous amounts of sediment were transported from Rees Creek into Echo Creek. Photos on the following 2 pages show the same location after restoration.

Rees Creek Phase 1 began in 2004 and consisted of the construction of 7 sediment retention basins, the excavation of 4,531ft. of new sinuous stream channel and the installation of an automated water quality station at the mouth of Rees Creek.

Rees Creek Phase 1 project photos

Aug. 2004 shows pond 1 under construction.

Pond 1 filled in spring of 2005, note old incised channel above pond.

April 2006 photo shows pond 1 spilling into excavated meandering channel and flowing into pond 2. The ponds allow for settling of sediments with the filtered water flowing out into meandering channels. The water flowing between ponds allows infiltration of water into meadow for release gradually through the summer.

Pond 1 in July of 2008

Pictures taken in July of 2008 show how much sediment deposition has occurred in pond 1 since the pond was finished in the fall of 2004. Survey rod was pushed down into the accumulated sediment near the inlet of pond 1 in what used to be the deeply incised channel. Approximately 4.5 ft of sediment has been deposited in the old channel. The incised channel is filling and aggrading, as wetland vegetation colonizes the sediment bed. Data since the projects inception show an average of 14,688 lbs. of sediment are captured each day during peak flow periods. The filtration rate is 96% for phase 1.

Picture at left shows old incised channel where it flows into pond 1 in July of 2008. Eventually this will grass over and the stream will have been brought back up to a level consistent with what once existed on the meadow.

View of the Rees Creek Project phase 1 site and the seven sediment retention basins that Are currently removing sediment from Rees Creek.

Upper left photo shows newly installed water quality monitoring station in the fall of 2004 at the mouth of Rees Creek near its confluence with Echo Creek. This enabled the project to collect accurate flow data and thus determine the projects effectiveness at reducing sediment inputs into Echo Creek. Picture above right shows the quantity of flows Rees Creek is capable of producing during the spring high flow season. Photo was taken in March of 2006.

A second phase of the project was implemented during the summer of 2007 approximately 3 miles downstream from the phase 1 demonstration project site. Data from the Rees Creek phase 1 site showed very positive results for sediment capture, the primary goal for the project. Monitoring, however, indicated that large amounts of additional sediment were entering Rees Creek below the phase 1 site. It was determined that constructing a second phase of the project near Rees Creeks confluence with Echo Creek was needed to capture the additional inputs of sediment below the phase 1 site. It consists of 4 additional basins of slightly different design. The second phase was funded by an additional 319 grant.

The objectives of this phase of the project were similar to the first phase.

1) Construct a series of sediment retention basins to catch, retain and settle suspended sediments.

2) Restore natural hydrologic function to the stream channel and restore historic wet meadow conditions.

Rees Creek phase 2 project photos

This is a composite of two photos of Pond 1 at phase 2 site in June 2007 prior to construction of water spreading dikes. Deeply incised channel is visible in center of photo.

This is composite of two photos of the Pond 1 site in May 2008 after construction. Water is backed up behind dike settling sediment and filling the old incised channel. Spillway is located in the center of the dike.

Photos show Pond 3 at phase 2 site before project implementation in 2007 and 1 year later in 2008 after project completion. Over time it is expected the same results will be achieved in phase 2 as produced in phase 1 as the water table is raised and wet meadow conditions return.

After project completion, phase 1 is trapping an average of 96% of the sediment entering the project site, which far exceeds our initial expectations. Phase 2 is removing 81% of the sediment entering the project site which is still excellent results. Looking at both phases collectively, the project is averaging an 88.5% removal of sediment between the two project sites for a total of 16,506.3 lbs. /day removed by the Rees Creek project. In addition the two projects have restored approximately 80 acres of wet meadow conditions. For more detailed information on the Rees Creek Project consult the Rees Creek Final report 2008.

The Rees Creek project has been a focus of technical assistance and I&E efforts in the Upper Weber for a couple of reasons. First, Echo Creek is one of the major causes of degraded water quality in the Weber River. Second, the project has been highly effective at what it was designed to do.

It must be emphasized that this sediment retention project is not applicable to all areas with sediment problems. Practical application in other watersheds is feasible where conditions warrant and permit these methods. Considerations as to stream type, flow, slope, soil type, and available area must be considered carefully. Technical assistance helped provide site selection, surveying, engineering, construction oversight, data collection, trend analysis and reporting.

Additional technical assistance was provided during the summer of 2004 in producing the Echo Creek SVAP Report in cooperation with the Upper Weber River Watershed Coordinator. This 28 page document reported on and summarized the conditions assessed in 2003 on the Echo Creek Watershed and was submitted to the Utah Division of Water Quality. The cover page of that document follows on the next page.

# Echo Creek Stream Visual Assessment Protocol

**A Report of the Echo Creek Watershed Committee**

February 2005

Prepared By: Doug Garfield (Summit SCD)
Lee P. Duncan (Upper Weber River Watershed Coordinator)

**Information & Education Activities**

Task 3 specified the preparation and publication of media releases informing and educating the general public as to NPS issues in the Upper Weber River Watershed. Beginning in June of 2004 a minimum of 3 news articles were published each year in the local Summit County and Morgan County papers. Articles were also published in the Ogden Standard Examiner Outdoors section which has circulation throughout northern Utah, the Park Record and the Watershed Review published by the Utah Department of Agriculture and Food. In addition, articles were published in the Kamas/Summit conservation newsletter which is distributed to producers throughout the watershed. Articles focused on a variety of NPS pollution and water quality issues in the upper Weber River. Article topics included the Chalk Creek NPS project, the Rees Creek Project, riparian areas, willow planting, biological sampling of fish species in the upper Weber, Echo reservoir and local conservation awards. A total of 16 media releases were published from 2004-2008. Examples of I & E products can be found in Section 8.1 Information and Education Outputs.

A television news story focusing on the Chalk Creek Project and its benefits to water quality in the Upper Weber River watershed was aired by KUTV Channel 2 News in 8/2004.

Task 4 specified the production of 1000 NPS informational pollution pamphlets which would be distributed throughout the watershed informing the public as to water quality issues that existed in the Upper Weber River Watershed and strategies that be used to improve water quality.
A mailing list of agricultural producers, stock owners, and landowners was compiled and 500 brochures were target mailed throughout Summit County. Brochures were also distributed to federal, state, county and city offices in Coalville, Kamas and Park City. 200 pamphlets were also mailed to members of the Weber River Water Users Association. See section 8.1 for the pamphlet.

Task 5 specified the planning and organization of tours in the Upper Weber River Watershed. The plan specified 3 tours over 5 years. A total of 8 tours were conducted over the 5 year period. Tours were focused primarily in the Echo Creek watershed because it was a 303(d) listed watershed. A great deal of interest was generated by the Rees Creek Demonstration Project located in the Upper Echo Creek Watershed. Tour participants consisted of federal, state, county, corporate and private individuals. They were interested in the methods used and results achieved towards improving water quality, and how it could be applied in other watersheds of similar nature.

A photo taken during a tour in 2004 of the Rees Creek Project showing the newly installed Parshall flume to measure stream flows at the monitoring station.

Other printed media produced for the public included the Rees Creek Tour fact sheet. This was used from 2005-2008 as an informational supplement providing back ground information and project results and was updated annually.
See section 8.1.

Additionally, I & E activities have focused on informing the public of sensitive aquatic species status in the watershed and the importance water quality plays in their distribution in the Weber River.

The Upper Weber River supplies critical habitat for two species of native fish, the Bonneville Cutthroat trout and the Bluehead Sucker. Bonneville Cutthroat trout, *Oncorhynchus clarkii utah*, are a subspecies of the cutthroat trout native to the Bonneville Basin of Utah, Wyoming, Idaho and Nevada. Pure Bonneville cutthroat trout are rare throughout their historic range, but several Utah populations exist. Chalk Creek, Echo Creek and the upper Weber River support critical populations of Bonneville Cutthroat trout. They are included on the Utah Sensitive Species List because of their low numbers and limited distribution. Bonneville cutthroat trout require a functional stream riparian zone that provides structure, cover, shade and bank stability.
The water quality improvement/ I & E efforts completed in the watershed take on greater significance in light of a recent evaluation of Chalk Creek's importance to this fish species.

Utah Division of Wildlife Resources fisheries biologist Paul Burnett stated.
"We consider Chalk Creek one of the last well-connected strongholds for Bonneville cutthroat trout. The mainstem of Chalk creek supports lower numbers than some of the tributaries such as the South Fork, but it is important to recognize the importance of the mainstem as a migration corridor for subpopulations to disperse and mix. Habitat conditions have improved, but I think some of the historic impacts have been so dramatic that there is still plenty of potential for large-scale restoration projects. Things to consider would be channel reconstruction in areas with historic channel disturbance as well as beaver reintroduction to retain fine sediment. Overall the riparian vegetation seems to be recovering well in many places, which is encouraging."

**Bonneville Cutthroat trout**

The Bluehead sucker, *Catostomus discobolus*, is native to parts of Utah, Idaho, Arizona, New Mexico, and Wyoming. The species is native to the Lake Bonneville basin. In Utah, Bluehead suckers have been reduced in numbers and distribution due to flow alteration, habitat loss/alteration, and the introduction of nonnative fishes. Consequently, the Bluehead sucker is included on the Utah Sensitive Species List. Fast flowing water in high gradient reaches of mountain rivers has been identified as important habitat for Bluehead sucker. The Upper Weber River watershed provides critical habitat for this fish. Various individuals have been located in sampling on the Upper Weber.

**Bluehead sucker**

The Utah Division of Wildlife Resources conducts annual monitoring of native fish populations in the Upper Weber River Watershed. A cooperative effort between the UDWR and the Upper Weber River project enabled us to inform the public about ongoing research on fish populations in the watershed.

These photos show a fish trapping project in Echo Creek. Here biologists from Trout Unlimited and UDWR capture, tag and release native Bonneville Cutthroat trout to determine fish migration patterns into and out of Echo Creek.

Education efforts in the form of news paper articles and the Upper Weber NPS pollution pamphlet were used to emphasize the importance of maintaining or improving water quality in the watershed for the benefit of not only people but for fish and wildlife as well.

2.1 Planned and Actual Milestones, Products and Completion

**MILESTONE TABLE FOR UPPER WEBER RIVER TECHNICAL ASSISTANCE / I & E PROJECT**

(Revised project implementation dates 7-31-03)

| TASK / RESPONSIBLE ORGANIZAT | OUTPUT | QTY | YEAR 1 | | | | YEAR 2 | | | | YEAR 3 | | | | YEAR 4 | | | | YEAR 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 01/04 | | | 12/04 | 1/05 | | | 12/05 | 1/06 | | | 12/06 | 1/07 | | | 12/07 | 1/08 | | | 12/08 |
| OBJECTIVE 1<br>Task 1 - Provide technical assistance to develop Individual Resource Management plans reducing NPS pollution.<br>Task 2 – UACD tracking of 319 funds & Submission of reports.<br>Group 1, 2, 3, 4, 5 | RMS plans to implement BMPs on private lands | 15 | | X<br>X | X | | | X<br>X | X | | | X<br>X | X | | | X<br>X | X | | | X<br>X | X | |
| OBJECTIVE 2<br>Task 3 - UACD planner/I & E specialist will prepare and publish newspaper articles, concerning NPS activities in the watershed, for publication in local and state newspapers.<br>Group 3 & 4 | Three news/ feature stories per year | 15 | | X | X | | | X | X | | | X | X | | | X | X | | | X | X | |
| Task 4 - UACD planner/I & E specialist will work with Echo Creek project coordinator to produce, publish and distribute an Echo Creek Watershed NPS pollution pamphlet illustrating problems, TMDL status and potential solutions.<br>Group 1, 3, 4 | Color NPS pollution pamphlet on Echo Creek | 1000 | | | | | | X | | | | X | | | | X | | | | | | |
| Task 5 – UACD planner/I & E specialist will plan, organize and direct tours of the upper Weber River watershed to inform landowners, operators and the public of improvements for the control of NPS pollutants within the watershed and the expected benefits.<br>Group 1, 3, 4 | Watershed tours | 3 | | | X | | | | X | | | | X | | | | | | | | | |

**Group 1- <u>Natural Resource Conservation Service</u> - Provide technical assistance to plan, design, and implement BMPs.**

**Group 2- <u>Landowners in the Upper Weber River Watershed</u> - Make land management decisions and provide cash and in-kind match for BMPs.**

**Group 3- <u>Utah Association of Conservation Districts</u> – Responsible for administration, project coordination, reimbursement payments, match tracking, and progress reporting to the State DEQ.**

**Group 4- <u>Summit Soil Conservation District</u> - Local project manager and sponsor.**

**Group 5- <u>Weber Basin Water Conservancy District</u> – Provide technical assistance and cash match.**

The milestone table on the previous page shows planned milestones. The outline below shows actual milestones and products.

| Task | Planned Milestone | Actual Milestone | | Products |
|---|---|---|---|---|
| Task 1 | 2008 | 2009 | 15 | Conservation Plan assistance |
| Task 2 | 2008 | 2009 | 10 | Completed Reports |
| Task 3 | 2008 | 2008 | 17 | News Stories |
| Task 4 | 2007 | 2007 | 1000 | NPS Pamphlets |
| Task 5 | 2006 | 2006 | 8 | Tours |

2.2 Evaluation of Goal Achievement

Goal 1: Provide technical assistance (conservation planning) to land owners in the Upper Weber River Watershed to reduce NPS pollution. The goal was to work with the Natural Resource Conservation Service (NRCS) in working with 15 cooperators to develop conservation plans addressing NPS pollution. The project worked with 15 different cooperators on a variety of conservation planning including, resource assessment, pasture inventory, range inventory, cropland inventory, conservation plan mapping, and fence and sprinkler certification.

A large amount of time and effort was utilized during the implementation of the Rees Creek projects phases 1 and 2. These projects spanned five years and involved project site selection, surveying, engineering, construction oversight, data collection, trend analysis and reporting. Both phases of the project required more time and effort than initially planned. Significant strides were made with an 88.5% reduction of NPS pollutants into Echo Creek from Rees Creek as a result of these projects.

Logistical support for technical assistance provided by NRCS during years 06-08 in the form of office space, computer access, and training dwindled due to a lack of NRCS stability and employee turnover in the Coalville office. Four different district conservationists were rotated through the office during this time slot. This lead to a lack of continuity, communication and understanding in regards to the Upper Weber projects goals and the cooperative effort that existed between the conservation district and NRCS. The seasonal nature of the position added to the communication challenges that existed while the project was active during the months of June-August. This stabilized during the summer of 2008 with the appointment of the most recent district conservationist. He has worked to facilitate goal achievement with the district.

Goal 2: A second goal was to develop and implement a media campaign that would increase public awareness and generate public interest in NPS pollution problems that exist in the Upper Weber River Watershed.

As detailed in section 2.1, all objectives were completed. A broad spectrum of methods including newspaper articles, pamphlets, television coverage, and watershed tours were used to inform and educate the general public and resource professionals of the ongoing efforts to reduce NPS pollution in the Upper Weber River watershed. The result has been a greater awareness of water quality conditions within the watershed and the efforts underway to improve them.

One example of this occurred after the targeted mailing of the water quality pamphlets to producers in the county. The board chairman of the Weber River Water Users inquired if there were more of the pamphlets available. They were provided and an additional 200 were mailed out to the water users.

## 3.0 LONG TERM RESULTS IN TERMS OF BEHAVIOR MODIFICATION, STREAM/LAKE WATER QUALITY PROTECTION CHANGES, AND/OR WATERSHED PROTECTION CHANGES.

For the technical assistance portion of the gran,t 9 of 15 cooperators assisted have completed conservation projects or are in the process of completing them, the largest of these being the Rees Creek project. As a result of the Rees Creek project, an average of 8.2 tons/day of sediment are being captured during the high flow period of March-June. This now prevents this sediment from entering Echo Creek, thus progressing towards of the goal of Echo Creek eventually sustaining its beneficial uses. Greater awareness of water quality conditions within the watershed has occurred as a result of this project. Water quality project interest has escalated over the life of the project. Evidence for this came in the number of requests for tours of the Rees Creek Project. Initially 3 tours were planned over 5 years. A total of 8 tours were conducted during the project.

## 4.0 BEST MANAGEMENT PRACTICES (BMPS) DEVELOPED AND/OR REVISED

Best management practices for Rees Creek phase 1 were developed by the Natural Resource Conservation Service. Best management practices for Rees Creek phase 2 were developed by Desert Rose Environmental, a private environmental engineering firm. Rees Creek project practices included sediment retention basins, design and layout of new stream channel, overflow structures for water control and reseeding of disturbed areas. BMPS for all other projects associated with the Upper Weber River technical assistance were developed by the Natural Resources Conservation Service. Those practices included resource assessments, range, pasture and crop inventories, as well as sprinkler and fencing certification.

## 5.0 MONITORING RESULTS FOR DEMONSTRATION/I&E PROJECTS

Monitoring for the information education portion of the project was based on public feedback, information requests and watershed tour attendance. Requests for information consisted of 200 Upper Weber River Watershed NPS pamphlets from the Weber River Water Users Association to be distributed to their constituents. An article on the Rees Project was published in the Utah Department of Agriculture's Utah Watershed Review magazine in September of 2004 at their request. Five additional tours of the watershed were requested and completed. Average tour attendance was approximately 20 individuals/tour. The Utah Division of Water Quality also requested assistance in developing a Rees Creek success story poster for display at the National NPS conference held in Park City, Utah in 2006.

## 6.0 PUBLIC INVOLVEMENT AND COORDINATION

The Summit Conservation District provided the leadership on this project. The district has been involved and supportive since the beginning of the project. They have been active in promoting water quality awareness and enhancement through support for publication of newspaper articles, the Upper Weber NPS water quality pamphlet and tour coordination.

### 6.1 State Agencies

Utah Department of Agriculture and Food (UDAF) – Contracting, project management, planning, and information and education assistance.

Utah Division of Water Quality/Utah Department of Environmental Quality (UDWQ/DEQ) – Statewide section 319 program management including of local 319 planning and expenditures and water quality monitoring in the Upper Weber River Watershed.

Utah Division of Wildlife Resources (UDWR) – Monitoring of fisheries in the upper Weber River watershed. The UDWR provided cooperation on the information & education portion of the project.

### 6.2 Federal Agencies

Natural Resources Conservation Service (NRCS) – Provided office space, technical assistance to plan, implement BMPs, and evaluate BMP effectiveness.

Environmental Protection Agency (EPA) - Financial assistance – CWA Section 319.

### 6.3 Local Governments and Others

Utah Association of Conservation Districts (UACD) – Approval of funding requests, match documentation, technical assistance.

Summit Conservation District – Provided project oversight.

### 6.4 Other Sources of Funds

Match for this project was provided by the Weber Basin Water Conservancy District in the form of monitoring and lab analysis.

## 7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

The technical assistance portion of the project did not progress as well as planned. Reasons for this were discussed in section 2.2 Evaluation of Goal Achievement. These included a lack of logistical support for technical assistance provided by NRCS during years 06-08 in the form of office space, computer access, and training in conservation planning. This was caused by a lack of NRCS stability, understanding of the project goals, and NRCS employee turnover in the Coalville office. Four different district conservationists were rotated through the office during this time slot. This lead to a lack of continuity, communication and understanding in regards to the Upper Weber projects goals and the cooperative effort that had existed between the conservation district and NRCS during years 04-05. Thus the amount of conservation planning planned for was not achieved because it was heavily dependant on NRCS support. The seasonal nature of the position also added to the communication challenges that existed while the project was active during the months of June-August, and not active from September-May.

This has since stabilized during the summer of 2008 with the appointment of the most recent district conservationist. He has worked to understand and facilitate the projects goal achievement in regards to technical assistance with the district.

Another unanticipated aspect of the project that caused delays in engineering technical assistance on stand alone 319 projects was the result of a change in NRCS policy. Prior to 2005 NRCS had worked cooperatively with UACD to provide engineering on 319 projects that were not coupled with farm bill programs. In 2005 the NRCS engineer was called to active duty in Iraq. This resulted in a two year engineering backlog. Upon his return NRCS would no longer provide technical assistance to standalone 319 projects that did not have a farm bill funding component. Rees Creek phase 2 was this type of project. UACD had to secure private engineering to get the project on the ground which caused a delay in the project.

All other aspects of the project have progressed as planned.

8.0

## 9.0 FUTURE ACTIVITY RECOMMENDATIONS

The need still exists for technical assistance and I&E NPS pollution work in the upper Weber River watershed. All six water bodies in the Upper Weber are still listed on the 303(d) list. It should be noted that improvements have been made in reducing sediment inputs, stabilizing stream banks and restoring riparian vegetation.

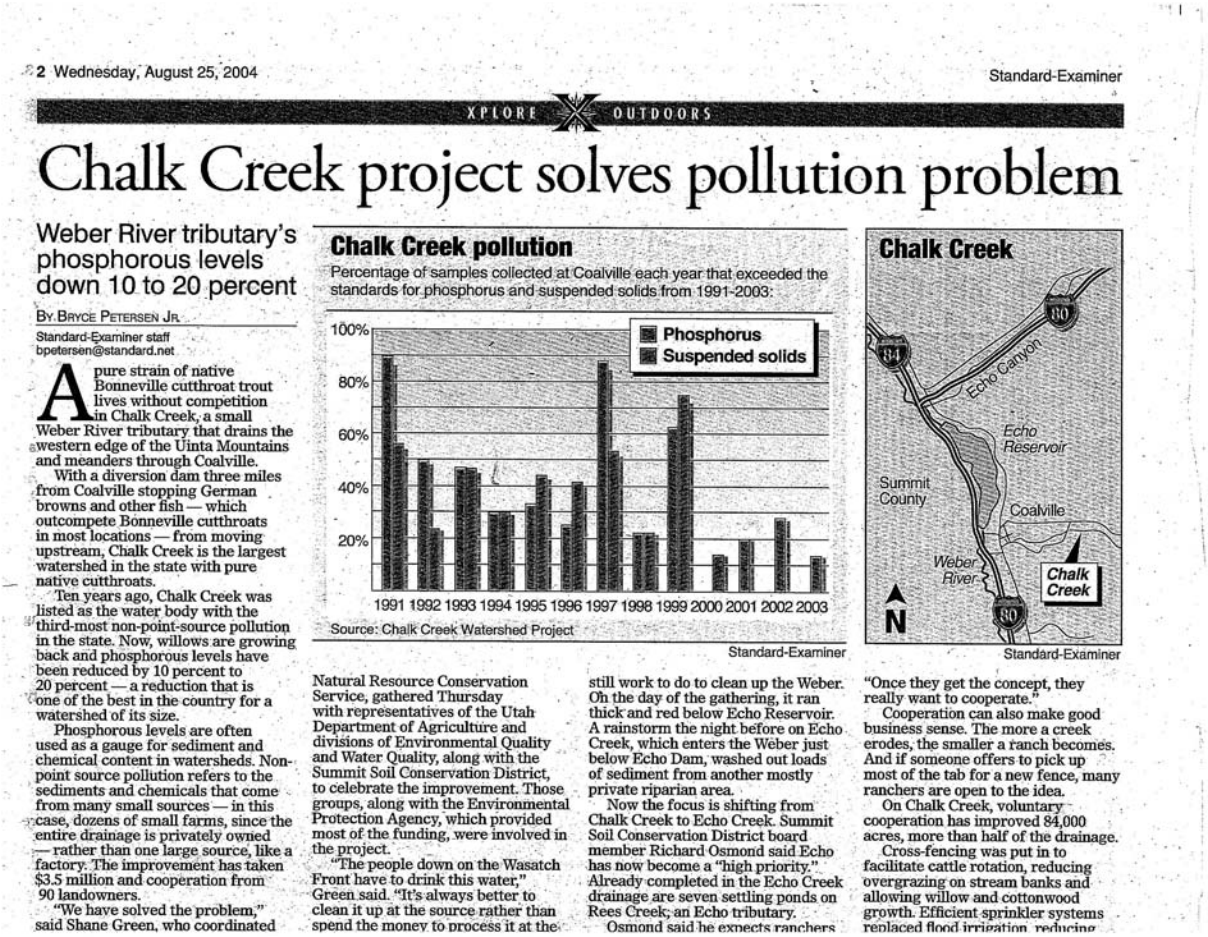
The population of the watershed is expanding rapidly and a shift from larger scale agricultural operations to recreational properties and urban sprawl is presenting additional and different water quality challenges. Education will be needed to inform stakeholders of the water quality problems that exist and keep these at the forefront of management decisions that may affect the resource. Additional technical assistance will be required to address these issues.

A continued cooperative effort between federal, state, county agencies, landowners and private entities will be required to restore beneficial use to listed waters and maintain or improve those not listed.

8.1 INFORMATION AND EDUCATION OUTPUTS

Figure 1

A sampling of articles that were published in various papers throughout the Weber River Watershed. The following article was published in the Ogden Standard Examiner.



2 Wednesday, August 25, 2004 Standard-Examiner

XPLORE OUTDOORS

# Chalk Creek project solves pollution problem

## Weber River tributary's phosphorous levels down 10 to 20 percent

By Bryce Petersen Jr.
Standard-Examiner staff
bpetersen@standard.net

A pure strain of native Bonneville cutthroat trout lives without competition in Chalk Creek, a small Weber River tributary that drains the western edge of the Uinta Mountains and meanders through Coalville.

With a diversion dam three miles from Coalville stopping German browns and other fish — which outcompete Bonneville cutthroats in most locations — from moving upstream, Chalk Creek is the largest watershed in the state with pure native cutthroats.

Ten years ago, Chalk Creek was listed as the water body with the third-most non-point-source pollution in the state. Now, willows are growing back and phosphorous levels have been reduced by 10 percent to 20 percent — a reduction that is one of the best in the country for a watershed of its size.

Phosphorous levels are often used as a gauge for sediment and chemical content in watersheds. Non-point source pollution refers to the sediments and chemicals that come from many small sources — in this case, dozens of small farms, since the entire drainage is privately owned — rather than one large source, like a factory. The improvement has taken $3.5 million and cooperation from 90 landowners.

"We have solved the problem," said Shane Green, who coordinated Natural Resource Conservation Service, gathered Thursday with representatives of the Utah Department of Agriculture and divisions of Environmental Quality and Water Quality, along with the Summit Soil Conservation District, to celebrate the improvement. Those groups, along with the Environmental Protection Agency, which provided most of the funding, were involved in the project.

"The people down on the Wasatch Front have to drink this water," Green said. "It's always better to clean it up at the source rather than spend the money to process it at the still work to do to clean up the Weber. On the day of the gathering, it ran thick and red below Echo Reservoir. A rainstorm the night before on Echo Creek, which enters the Weber just below Echo Dam, washed out loads of sediment from another mostly private riparian area.

Now the focus is shifting from Chalk Creek to Echo Creek. Summit Soil Conservation District board member Richard Osmond said Echo has now become a "high priority." Already completed in the Echo Creek drainage are seven settling ponds on Rees Creek, an Echo tributary.

Osmond said he expects ranchers "Once they get the concept, they really want to cooperate."

Cooperation can also make good business sense. The more a creek erodes, the smaller a ranch becomes. And if someone offers to pick up most of the tab for a new fence, many ranchers are open to the idea.

On Chalk Creek, voluntary cooperation has improved 84,000 acres, more than half of the drainage.

Cross-fencing was put in to facilitate cattle rotation, reducing overgrazing on stream banks and allowing willow and cottonwood growth. Efficient sprinkler systems replaced flood irrigation, reducing

**Chalk Creek pollution**

Percentage of samples collected at Coalville each year that exceeded the standards for phosphorus and suspended solids from 1991-2003:



Source: Chalk Creek Watershed Project

Standard-Examiner

**Chalk Creek**



Standard-Examiner

Figure 2. Articles published in the Morgan County and Summit County newspapers.

*Conservation Corner--* #2 2008

# Why are riparian areas so important?

The last time you were trying to escape the heat of the day in a cool shady spot next to your favorite stream, lake or spring you may have not realized you were enjoying a riparian area. So what is a riparian area and why are they so important to all of us.

The riparian area is the zone of lush vegetation adjacent to a water body such as a river, stream, lake or spring. It is typically vegetated by water tolerant plant species, such as trees, shrubs, sedges, and grasses. Here in the valleys of northern Utah these species consist of Cottonwood, River Birch, Willow, as well as various shrubs and grasses. In addition deadfall, driftwood and previous years flood deposits also cover the ground. The natural floodplain of rivers and streams usually extends well beyond the stream bank and encompasses this riparian zone.

A functional riparian zone provides numerous benefits to the land owner and agricultural producer. They are critical to maintaining water quality in adjacent waterways. They act as sponges absorbing water when abundant and slowly releasing water over dry periods. They provide high quality habitat for fish and wildlife which has become a valuable resource for landowners. Sound management of riparian protects habitat for both fish and wildlife and improves water quality. Properly maintained riparian zones can also provide limited grazing use at certain times of the year.

A properly functioning riparian zone will be fully vegetated with native or naturally occurring, non-invasive or noxious vegetation. Intact riparian zones have a natural and diverse mix of herbaceous and / or woody habitat for fish and other aquatic species. Riparian zones are key natural habitats for hundreds of species of plants and animals.

Water quality in our water ways can be degraded if riparian areas are not managed properly. If riparian areas are grazed too intensively or at the wrong time of year this can result in a loss of stream bank stabilizing vegetation. This causes stream bank erosion resulting in sediment entering the stream, sometimes in surprisingly large quantities which degrades water quality. Vegetation adjacent to the water body also acts as a filter to unwanted inputs into the waterway.

What types of management practices should be utilized to maintain high quality riparian areas? Riparian fencing is probably the single most effective tool that can be used to maintain the health and integrity of riparian zones. Riparian exclusion fencing controls grazing access so that plant cover is maintained adjacent to the water body. Fencing should be wildlife friendly as these areas will be heavily utilized. This may require specific wire spacing so fencing does not become a wildlife stock watering, water gaps and offsite water should be used as needed to ensure the riparian zone is not impacted due to grazing or trampling. If a riparian area is going to be used for grazing it should have limited access points and a grazing system to govern utilization. Livestock occupation periods in riparian areas should be managed so that utilization does not exceed 50% of the current year's growth. Grazing riparian areas should be confined to the early fall to allow the full summer growing period for riparian vegetation. Grazing of woody vegetation is discouraged as these provide the stabilizing root masses to hold stream banks in place. Pest management should also be utilized to prevent these areas from becoming havens for noxious weeds.

Healthy riparian areas benefit everyone because we all live downstream form someone. By maintaining healthy riparian zones, and improving degraded ones, water quality, wildlife and the landowner all reap the benefits.

If you have questions or need assistance with conservation work on your land contact the Natural Resource

*Conservation Corner--*

# Non point source pollution

#3 2008

*By Doug Garfield Summit CD*

Clean water is a critical resource to maintaining life here in the arid mountain west. Maintaining or improving water quality is critical as the demand for this finite resource expands.

Non point source pollution results from many different sources and sometimes may be difficult to identify, unlike one single source such as a pipe dumping into a river. NPS pollution is caused as rainfall, snowmelt or irrigation water moves over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, depositing them into lakes, rivers, streams, wetlands and underground sources of drinking water.

Examples of nonpoint source pollution include excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas. In addition, as energy production and urbanization expands in the west, caution must be taken so that oil, grease and toxic chemicals don't pollute waterways. Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks can also be sources of NPS pollution. Salt form irrigation practices as well as bacteria and nutrients from livestock, pet wastes, and faulty septic systems can easily enter water bodies and degrade water quality. States report that nonpoint source pollution is the leading remaining cause of water quality problems. The effects of nonpoint source pollution on each water body may vary. However, we know that all of these pollutants have harmful effects on drinking water supplies, fisherics, recreation and wildlife.

The United States has over 330 million acres of

cy. However, when improperly managed, agricultural activities can affect water quality. "The most recent National Water Quality Inventory reports that agricultural nonpoint source (NPS) pollution is the leading source of water quality impacts to surveyed rivers and lakes."

Agricultural activities that cause NPS pollution include confined animal facilities, grazing, plowing, pesticide spraying, irrigation, fertilizing, planting, and harvesting. The major agricultural NPS pollutants that result from these activities are sediment, nutrients, pathogens, pesticides, and salts. Agricultural activities if not properly managed can damage habitat and stream channels.

Numerous government programs are available to assist landowners in designing and paying for management practices that prevent and control NPS pollution. A large percentage of 319 Clean Water Act grants have been used to control agricultural runoff. Lets examine some of these resource concerns.

Sedimentation occurs when soil particles are carried by wind, or water runoff from a farm field into a water body. Excessive sedimentation clouds the water, reducing sunlight to aquatic plants. In addition sediment can cover spawning areas and clog fish gills. Other pollutants such as phosphorous, pathogens or heavy metals can be bound to sediments and carried into waterways with the soil. Proper management controlling flow rates and volume can reduce sedimentation loads from 20 to 90 percent on croplands.

Managing nutrients is critical to maintaining water quality. Fertilizers, manure, sludge, irrigation water, and

water. Stretches of streams or lakes can become devoid of fish as oxygen is used up in the water because of the decomposition of plant material. Producers can implement nutrient management plans which maintain high yields but reduce NPS pollution.

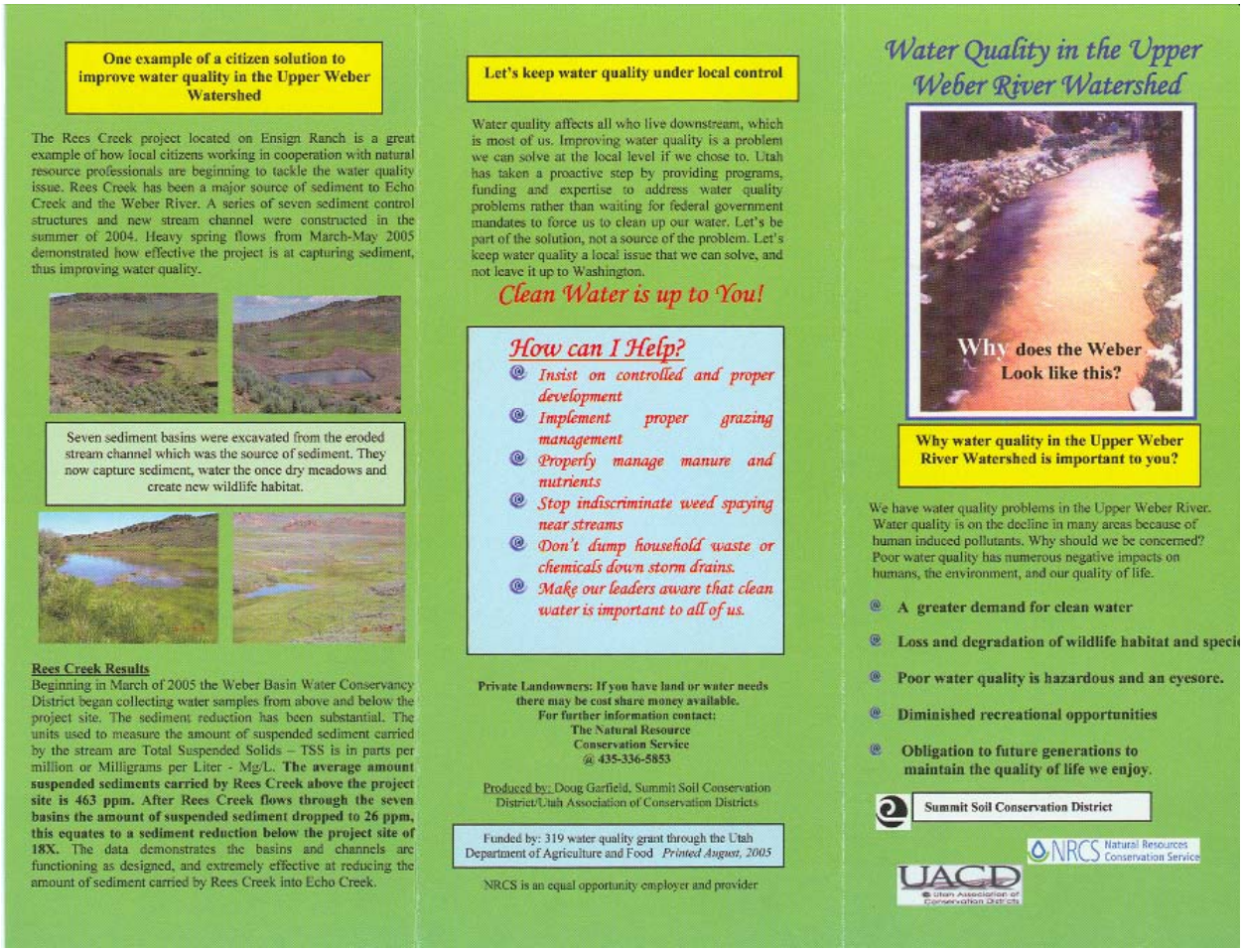
Managing confined animal operations is essential to maintaining water quality. Runoff from poorly managed facilities can carry pathogens and nutrients. Groundwater can be contaminated by seepage. Discharges can be limited by storing and managing facility runoff with a waste management system.

Managing irrigation is required to prevent concentrating pesticides, nutrients, salts and disease causing organisms. Producers can reduce NPS pollution by improving water use efficiency, reducing the transport of pollutants through the over application of irrigation water.

Overgrazing exposes soils, increases erosion, and encourages invasion of undesirable plants. In addition fish habitat may be destroyed while reducing the filtration of sediments necessary for building stream banks, wet meadows and floodplains. To address these concerns farmers can adjust grazing intensity, limit livestock access to sensitive areas and provide alternative sources of water and shade away from the stream corridor.

Recognizing and addressing these various resource concerns can go along way towards improving water quality. The Weber River Watershed is a prime example of where properly managing these practices could improve water quality and quantity in our area. If you have questions regarding any of these management

Figure 3. Outer cover of the upper Weber River water quality pamphlet



**One example of a citizen solution to improve water quality in the Upper Weber Watershed**

The Rees Creek project located on Ensign Ranch is a great example of how local citizens working in cooperation with natural resource professionals are beginning to tackle the water quality issue. Rees Creek has been a major source of sediment to Echo Creek and the Weber River. A series of seven sediment control structures and new stream channel were constructed in the summer of 2004. Heavy spring flows from March-May 2005 demonstrated how effective the project is at capturing sediment, thus improving water quality.

Seven sediment basins were excavated from the eroded stream channel which was the source of sediment. They now capture sediment, water the once dry meadows and create new wildlife habitat.

**Rees Creek Results**

Beginning in March of 2005 the Weber Basin Water Conservancy District began collecting water samples from above and below the project site. The sediment reduction has been substantial. The units used to measure the amount of suspended sediment carried by the stream are Total Suspended Solids – TSS is in parts per million or Milligrams per Liter - Mg/L. **The average amount suspended sediments carried by Rees Creek above the project site is 463 ppm. After Rees Creek flows through the seven basins the amount of suspended sediment dropped to 26 ppm, this equates to a sediment reduction below the project site of 18X.** The data demonstrates the basins and channels are functioning as designed, and extremely effective at reducing the amount of sediment carried by Rees Creek into Echo Creek.

**Let's keep water quality under local control**

Water quality affects all who live downstream, which is most of us. Improving water quality is a problem we can solve at the local level if we chose to. Utah has taken a proactive step by providing programs, funding and expertise to address water quality problems rather than waiting for federal government mandates to force us to clean up our water. Let's be part of the solution, not a source of the problem. Let's keep water quality a local issue that we can solve, and not leave it up to Washington.

*Clean Water is up to You!*

*How can I Help?*

- *Insist on controlled and proper development*
- *Implement proper grazing management*
- *Properly manage manure and nutrients*
- *Stop indiscriminate weed spaying near streams*
- *Don't dump household waste or chemicals down storm drains.*
- *Make our leaders aware that clean water is important to all of us.*

**Private Landowners: If you have land or water needs there may be cost share money available. For further information contact: The Natural Resource Conservation Service @ 435-336-5853**

Produced by: Doug Garfield, Summit Soil Conservation District/Utah Association of Conservation Districts

Funded by: 319 water quality grant through the Utah Department of Agriculture and Food *Printed August, 2005*

NRCS is an equal opportunity employer and provider

*Water Quality in the Upper Weber River Watershed*

Why does the Weber Look like this?

**Why water quality in the Upper Weber River Watershed is important to you?**

We have water quality problems in the Upper Weber River. Water quality is on the decline in many areas because of human induced pollutants. Why should we be concerned? Poor water quality has numerous negative impacts on humans, the environment, and our quality of life.

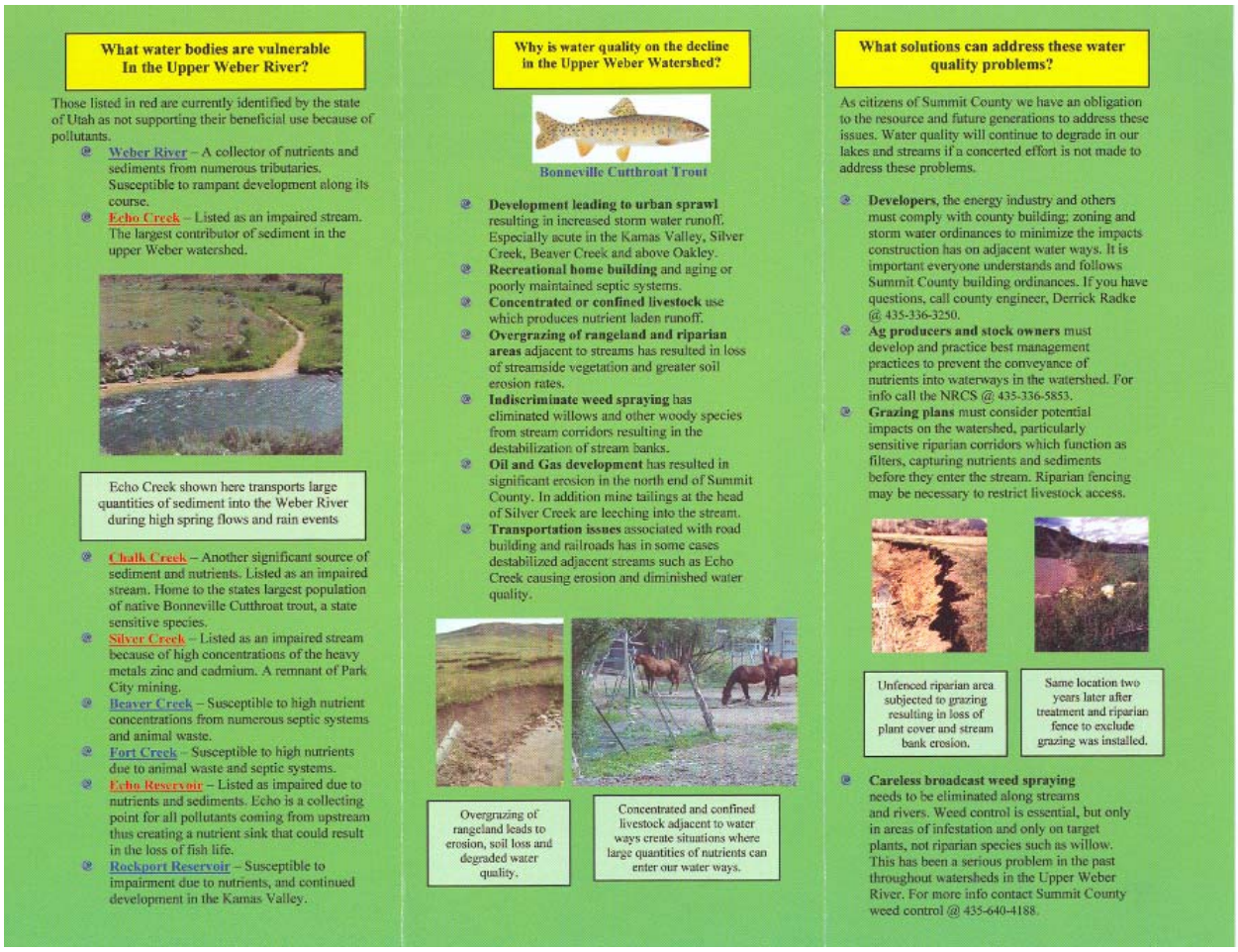
- **A greater demand for clean water**
- **Loss and degradation of wildlife habitat and speci**
- **Poor water quality is hazardous and an eyesore.**
- **Diminished recreational opportunities**
- **Obligation to future generations to maintain the quality of life we enjoy.**

**Summit Soil Conservation District**

NRCS Natural Resources Conservation Service

UACD Utah Association of Conservation Districts

Figure 4. Inside of the upper Weber River water quality pamphlet.



**What water bodies are vulnerable In the Upper Weber River?**

Those listed in red are currently identified by the state of Utah as not supporting their beneficial use because of pollutants.

- Weber River – A collector of nutrients and sediments from numerous tributaries. Susceptible to rampant development along its course.
- Echo Creek – Listed as an impaired stream. The largest contributor of sediment in the upper Weber watershed.

Echo Creek shown here transports large quantities of sediment into the Weber River during high spring flows and rain events

- Chalk Creek – Another significant source of sediment and nutrients. Listed as an impaired stream. Home to the states largest population of native Bonneville Cutthroat trout, a state sensitive species.
- Silver Creek – Listed as an impaired stream because of high concentrations of the heavy metals zinc and cadmium. A remnant of Park City mining.
- Beaver Creek – Susceptible to high nutrient concentrations from numerous septic systems and animal waste.
- Fort Creek – Susceptible to high nutrients due to animal waste and septic systems.
- Echo Reservoir – Listed as impaired due to nutrients and sediments. Echo is a collecting point for all pollutants coming from upstream thus creating a nutrient sink that could result in the loss of fish life.
- Rockport Reservoir – Susceptible to impairment due to nutrients, and continued development in the Kamas Valley.

**Why is water quality on the decline in the Upper Weber Watershed?**

Bonneville Cutthroat Trout

- **Development leading to urban sprawl** resulting in increased storm water runoff. Especially acute in the Kamas Valley, Silver Creek, Beaver Creek and above Oakley.
- **Recreational home building** and aging or poorly maintained septic systems.
- **Concentrated or confined livestock** use which produces nutrient laden runoff.
- **Overgrazing of rangeland and riparian areas** adjacent to streams has resulted in loss of streamside vegetation and greater soil erosion rates.
- **Indiscriminate weed spraying** has eliminated willows and other woody species from stream corridors resulting in the destabilization of stream banks.
- **Oil and Gas development** has resulted in significant erosion in the north end of Summit County. In addition mine tailings at the head of Silver Creek are leeching into the stream.
- **Transportation issues** associated with road building and railroads has in some cases destabilized adjacent streams such as Echo Creek causing erosion and diminished water quality.

Overgrazing of rangeland leads to erosion, soil loss and degraded water quality.

Concentrated and confined livestock adjacent to water ways create situations where large quantities of nutrients can enter our water ways.

**What solutions can address these water quality problems?**

As citizens of Summit County we have an obligation to the resource and future generations to address these issues. Water quality will continue to degrade in our lakes and streams if a concerted effort is not made to address these problems.

- **Developers**, the energy industry and others must comply with county building; zoning and storm water ordinances to minimize the impacts construction has on adjacent water ways. It is important everyone understands and follows Summit County building ordinances. If you have questions, call county engineer, Derrick Radke @ 435-336-3250.
- **Ag producers and stock owners** must develop and practice best management practices to prevent the conveyance of nutrients into waterways in the watershed. For info call the NRCS @ 435-336-5853.
- **Grazing plans** must consider potential impacts on the watershed, particularly sensitive riparian corridors which function as filters, capturing nutrients and sediments before they enter the stream. Riparian fencing may be necessary to restrict livestock access.

Unfenced riparian area subjected to grazing resulting in loss of plant cover and stream bank erosion.

Same location two years later after treatment and riparian fence to exclude grazing was installed.

- **Careless broadcast weed spraying** needs to be eliminated along streams and rivers. Weed control is essential, but only in areas of infestation and only on target plants, not riparian species such as willow. This has been a serious problem in the past throughout watersheds in the Upper Weber River. For more info contact Summit County weed control @ 435-640-4188.

Figure 5. Rees Creek tour sheet

6/08

# Rees Creek Water Quality Demonstration Project-Fact Sheet

*Cooperating Entity:* Castle Rock Land and Livestock
*Owner:* Chris Robinson
Ranch Manager: Jeff Young
*Primary Uses:* Livestock production, Big Game hunting, Oil and Gas production

## *Background:*

Castle Rock Land and Livestock obtained ownership of the ranch in the mid 1990's. Prior to Castle Rock obtaining ownership resources on the ranch were in a degraded state. Vegetative cover and water quality had been compromised due to over grazing and oil and gas development. Castle Rock has developed an innovative resource management program in cooperation with NRCS, UACD, WBWCD and the Utah Department of Agriculture that has sought to restore ecological integrity, increase productivity and improve water quality.

This photo shows Rees Creek in a degraded condition with a deeply incised channel in the mid 1980's. Location is just above present project site.

The Rees Creek project is centered on capturing sediment that has been a primary source of degraded water quality in Echo Creek and the Weber River.

## *Objectives:*

1. Capture/retain sediment in the Rees Creek sub watershed. Rees Creek identified as the single largest source of sediment to Echo Creek which is listed on 303D list for sediment.
2. Restore wet meadow conditions which historically existed on Rees Creek. Overgrazing impacts and channel incision resulted in the loss of the water table, drying up the meadows.
3. Implement offsite watering for livestock on uplands, minimizing impact to riparian area.
4. Improve water quality, increase water quantity and species diversity in newly created wetland/ riparian area.
5. Monitor and quantify water quality improvements on Rees Creek.

Rees Creek can produce high flows which transport significant quantities of sediment into the Weber River. This photo was taken @ the parshall flume just above the confluence with Echo Creek during the spring runoff 3/1/06.

### *Project Timeline*

- Project Implementation 2003
- Pond and Channel Construction Summer 2004
- Offsite stock water, Summer 2004-07
- Project completion phase 1 Summer 2007
- Phase 2 construction Summer 2007

### *Sediment Capture Results*

**Table 1-1 Data Results From Rees Creek Demonstration Project Spring 2005**

| Date | Rees Cr Abv Project (TSS in ppm) or Mg/L | Rees Cr Blw Project (TSS in ppm) or Mg/L | Parshall Flume Abv Confl w/Echo (TSS in ppm) or Mg/L |
|---|---|---|---|
| 3/25/05 | 270.4 | 12 | 32.8 |
| 4/1/05 | 398 | 7.5 | 35 |
| 4/8/05 | 596 | 78.5 | 95 |
| 4/21/05 | 120 | 8.7 | 71.5 |
| 5/2/05 low | 59 | 7.7 | 74 |
| 5/6/05 | 1274 | 72 | 228 |
| 5/13/05 high | 1196 | 18.9 | 169 |
| 5/20/05 | 167.5 | 22.4 | 57 |
| 5/27/05 | 87.2 | 8.4 | 11.5 |

**Table 1-2 Data Results From Rees Creek Demonstration Project Spring 2007- 2008**

| Date | Rees Cr Abv Project (TSS in ppm) or Mg/L | Rees Cr Blw Project (TSS in ppm) or Mg/L | Parshall Flume Abv Confl w/Echo (TSS in ppm) or Mg/L | Discharge CFS |
|---|---|---|---|---|
| 3/16/07 | 215 | 1.6 | 86 | 5.9 |
| 3/23/07 high | 413 | 0 | 73 | 7.8 |
| 3/30/07 | 154 | 2.8 | 71.6 | 7.2 |
| 4/6/07 | 101.6 | 1.6 | 170 | 8.4 |
| 4/13/07 | 79.4 | 0 | 123.6 | 6.8 |
| 4/27/07 | 72.6 | 0 | 104.8 | 6.8 |
| 5/11/07 | 38 | 0 | 64 | 4.8 |
| 5/18/07 | 13 | 0 | 12 | 2.8 |
| 5/25/07 | 10 | 0 | 25.6 | N/A |
| 6/4/07 | 9.6 | 0 | 4.4 | 1.2 |
| 6/8/07 | 10 | 0 | 25 | 2.6 |
| 6/15/07 | 16 | 18 | 0 | 1.3 |
| 6/22/07 low | 7.6 | 0 | 0 | .9 |
| 5/16/08 | 53.8 | 0 | 10** | 11.63 |

*Data provided by Weber Basin Water Conservancy District Lab Manager Scott Petersen

** Phase 2 ponds now removing sediment below demo project ponds

Sediment reduction as measured by the Weber Basin Water Conservancy District in Rees Creek has been substantial. Stream flows were measured between 3/25/05-5/27/05 and 3/16/07-6/22/07 and 5/16/08. No data was obtained for 2006 due to a malfunction in the monitoring equipment. The results are shown in Tables1-1 and 1-2. Units used to measure the amount of suspended sediment carried by the stream are *Total Suspended Solids - TSS in parts per million or Milligrams per Liter - Mg/L.* The data demonstrates the basins are functioning as designed. **The overall average of suspended sediments carried by Rees Creek during the monitoring periods combining 05, 07 & 08 data above the project site is 233 ppm. After Rees Creek flows through the seven basins the amount of suspended sediment drops to 11 ppm, this equates to a sediment reduction below the project site of 95%.**

The 7 sediment retention basins and meadows on Rees Creek are functioning as man made beaver pond filters. They capture sediment, and coupled with channel restoration are restoring the wet meadow conditions that once existed here. The new ponds have provided ideal wetland – wildlife habitat where little existed before. Combined with the ranches management practices the project will increase forage production, species diversity and dramatically improve water quality.

The stream channel directly above pond #1 has filled with approximately 3.5 feet of sediment. The sediment fills the incised channel and begins the process of building the channel back towards its historic floodplain.

## *Rees Creek Phase 2*

A second phase of the project was completed during the summer of 2007 approximately 3 miles downstream from the demonstration project site. The project consists of four water spreading dikes constructed across the valley floor to settle out sediment. This second phase was deemed necessary because large amounts of sediment were still entering the stream below the first project site. Data results from 2008 are summarized below, which equates to an 82% reduction in TSS.

Table 1-3 Data Results From Rees Creek Phase 2 Project Spring 2008

| Date | Rees Cr.-2 Abv Project (TSS in ppm) or Mg/L | Below Rees Cr.-2 @ Parshall Flume Abv Confl w/Echo (TSS in ppm) or Mg/L | Discharge CFS |
|---|---|---|---|
| 5/16/08 | **56.6** | **10** | 11.63 |

**The Future**

The Rees Creek model has demonstrated its effectiveness as a tool that can be used in specific areas to improve water quality by reducing sediment transport and restore hydrologic function where it has been compromised. Coupled with other treatments and BMP's significant sediment reduction can be achieved.

Figure 6. Article from Utah Watershed Review magazine

# Work Begins to Remove Sediment from Rees Creek

**By Doug Garfield**
**Summit Soil Conservation District**

Black thunderheads rolled across the upper Echo Creek watershed as a cloudburst of rain pelts down on the red clay soil. Within minutes the streambed swells with a red, roiling torrent as the sediment laden stream makes its way down Echo Canyon towards the Weber River.

This scenario has been played out for decades in the Echo Creek watershed. Sediments from the highly erosive landscape composed of clay, shale, and conglomerate based soils have been transported by Echo Creek into the Weber River for as long as anyone can remember. Activities within the watershed from road construction, overgrazing and indiscriminate weed spaying have accelerated rates of erosion and soil loss over the last few decades contributing to a downtrend in water quality not only in Echo Creek but also in the Weber River.

One example of a landowner seeking to improve water quality within the Echo Creek watershed is the Ensign Ranch Co. Ensign Ranch, in a cooperative effort with the Utah Department of Agriculture and Food (UDAF), Natural Resource Conservation Service (NRCS), Weber Basin Water Conservancy District (WBWCD), the Utah Department of Environmental Quality (UDEQ) and the Summit Soil Conservation District have embarked on an ambitious effort to reduce the amount of sediment flowing into Echo Creek. The project is being funded by Ensign Ranch, the (UDAF) with 319 water quality funding and the (WBWCD) with a clean drinking water grant. Technical assistance has been provided by (NRCS), (UDEQ)) and the Summit SCD. The Weber Basin Water Conservancy District has been a key player in the project providing funding and water quality monitoring assistance.

Rees creek, a major tributary of Echo creek, has been a constant source of sediment contributing over 50% of the sediment load transported by Echo creek into the Weber River. Rees Creek flows through lands owned by the Ensign Ranch Corporation. Ensign assumed ownership of the land in 1994. When Ensign acquired the ranch range conditions were poor and erosion had become a major problem on Rees creek. Since the acquisition Ensign has implemented numerous grazing and range management practices that have increased production, reduced erosion and drastically improved range condition. Ensign currently grazes around 5,000 head of cattle on the ranch along with abundant populations of big game and other wildlife.

The Rees creek project is a great example of a win/win project for the landowner, the resource as well as consumptive user's down stream. The construction phase of the project began in early July. The design consists of a series of excavated basins and dams each with a reinforced spillway. The basins are designed to slow water flow allowing sediments suspended in the stream to settle out in the basins. The excess water flows over the spillway of each pond into the next pond further downstream. There are seven different settling ponds as you move down the watershed. In addition portions of new stream channel will be excavated to replace an old deeply eroded stream channel which has functioned like a drain dropping the water table and drying up the once wet meadows. Through the ponds and the new channel, the once existing wet meadow conditions will be restored to the area. In addition a number of water developments will be developed on both sides of the stream in the uplands away from the meadows to shift livestock use and impact away from the riparian area along Rees creek. Willow plantings will be used to reestablish woody vegetation along the stream. The root mats created by willows help to hold and stabilize soils and armor the banks against the erosive energy of the moving water.

When Jeff Young the ranch manger for Ensign was asked why does the ranch implement projects of this type his reply was eloquently simple. Jeff said "it is the right thing to do". The ranch is in the business of managing its lands and resources for the long haul, not just for short term benefit. The ranch considers a healthy sustainable system necessary for its operation. This project will have both long and short term benefits. Upon completion sediment that otherwise would be transported downstream during spring runoff and during thunderstorm events will now be captured and retained in the ponds. It is estimated that as much as 33% of the sediment transported by Echo creek will be captured by this project. Woody vegetation will once again hold soil in place and new wetlands will be created which will provide additional productive wildlife habitat. Forage production will increase as the water table rises restoring the wet meadow conditions once again.

Near the confluence of Rees creek and Echo Creek a permanent water quality monitoring station and flow meter have been constructed to measure the success and impact the project will have on water quality in Rees creek. The station has the capability to measure all basic water quality data such as temperature, pH, and turbidity.

The benefits are numerous. The ranch sees an increase in overall production and is better able to distribute its cattle and improve range use. Wildlife is provided new wetland and riparian habitat that had been lost and water users downstream will see a reduction in the amount of sediment transported into the Weber River

*A series of small sediment retention ponds are being built on the Ensign Ranches on Rees Creek in Summit County to filter out sediments that has been choking Rees Creek and Echo Creek for years.*

*Mark Quilter, Utah Department of Agriculture and Food, teaches Morgan Elementary School students about ground water during the Morgan Soil Conservation District Farm Field Day at Fred Thurston's ranch in the foothills west of Morgan*

***Utah Watershed Review:***
is the official publication of the Utah Nonpoint Source Task and is produced by the Utah Department of Agriculture and Food.
http://ag.utah.gov/mktcons/uwr.html
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