

**CLEAN WATER ACT
SECTION 319 NONPOINT SOURCE POLLUTION PROGRAM
DEMONSTRATION PROJECT
FINAL REPORT**

**THISTLE CREEK 319 DEMONSTRATION
UTAH COUNTY, UTAH**

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

State (UDAF) Contracts # 01-1062, 01-1907, 02-1684
Grant # C9998187-99, C9998187-00 and C9998187-01

EXECUTIVE SUMMARY

PROJECT TITLE: Thistle Creek Demonstration Project

PROJECT START DATE: May 1, 1999 PROJECT COMPLETION DATE: Sept. 30, 2009

FUNDING:	TOTAL BUDGET	\$435,723
FY99 \$68,300	TOTAL EPA GRANT	\$280,630
FY00 \$12,330		
<u>FY01 \$200,000</u>	TOTAL EXPENDITURE	
Total \$280,630	OF EPA FUNDS	\$248,630
	TOTAL SECTION 319	
	MATCH ACCRUED*	\$155,093
	BUDGET REVISIONS**	\$32,000
	TOTAL EXPENDITURES	\$403,723

*The match for this project came from two sources. Utah Department of Wildlife Resource (UDWR) prepared the planning documents with the landowner, using the Rosgen methodology for stream restoration. They also provided the equipment to install the project. The landowner provided the cost for materials. In addition, the UDWR used their habitat authorization funds to implement a project for Blaine Evans, which is included in the discussion of this report. The cost of that project is not included with the above stated match.

** This grant was amended by reducing the total contract by \$32,000. The money was transferred to another 319 project on the Upper Bear River.

SUMMARY ACCOMPLISHMENTS:

This project restored 9300 feet of Thistle Creek removing 178 tons of sediment on an annual basis. Practices include the installation of rock and log vanes, sloping of vertical banks, transplanting willow clumps, root wads and logs to protect stream banks, and fencing to exclude livestock. Three AFO owners implemented projects removing 1,078 lbs of Nitrogen, 517 lbs of phosphorus, and 4,135 lbs of BOD.

The project also improved adjacent rangeland thereby removing an additional 34.4 tons of sediment per year. The project removed approximately 215 acres of pinion juniper and decadent sage brush that was reseeded to native grasses.

The Utah Division of Wildlife Resources monitored the fishery, and reported that as a result of improved habitat and reduced sediment that the fishery density has increased from 594 trout per mile before the project, to 3,048 trout per mile after the project, which represents a 5-fold increase.

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1.0 INTRODUCTION

Demonstration projects were implemented on Thistle Creek to restore riparian habitat, stabilize eroding stream banks, improve upland vegetation, and inform and educate the public about water quality. Three Animal Feedlot Operations (AFO) were also implemented as part of the Utah Strategy for AFOs. Thistle Creek is tributary to the Spanish Fork River and is in the Utah Lake drainage. Thistle Creek is classified by the Utah Division of Water Quality and protected for the following designated uses: recreation (Class 2B), cold water fishery (Class 3A), and agriculture (Class 4). Thistle Creek is located within HUC 16020202.

Too much sediment and phosphorus in Thistle Creek negatively affects the designated beneficial uses. The primary sources of sediment were identified as upland soil erosion and unstable stream banks. Excessive amounts of sediment were greatly impacting the fishery by reducing oxygen supply, affecting spawning, and reducing the capacity of young fish rearing areas. The Thistle Creek Coordinated Resource Management Plan (CRMP) recommended a series of specific actions and management strategies to improve natural resource conditions in Thistle Creek.

The Spanish Fork watershed committee prepared the CRMP. Five local landowners stepped forward to allow the watershed committee to implement riparian projects on their land. In addition, three AFOs were approved for implementation. The Utah Division of Wildlife Resources provided the technical assistance and labor to construct the riparian projects. The Section 319 money reimbursed the cost of construction by Wildlife Resources. One project was completed entirely by the Utah Division of Wildlife Resources, with the entire funding provided by their agency. The projects restored 9,300 feet of habitat. Management practices included new meanders, rock and log vanes, sloping of vertical banks, root wads, willow clumps, and fencing to exclude livestock. Additionally, two landowners participated in irrigation improvement projects to reduce runoff from irrigation that was eroding the stream banks. One landowner also implemented an improved grazing project.

The Spanish Fork watershed committee members included the local Conservation District that chaired the committee, local landowners, NRCS, Utah Division of Water Quality, Bureau of Reclamation, Mountainland Association of Governments, US Forest Service, Central Utah Water Conservancy District, Strawberry Water Users Association, Spanish Fork City, Spanish Fork River Commissioner, Utah Department of Transportation, Utah Division of Wildlife Resources, Spanish Fork Grazing Association, Utah State University Cooperative Extension, and Utah County Government.

2.0 PROJECT GOALS, OBJECTIVES, AND ACTIVITIES

The project goal is to reduce nonpoint source pollution, improve water quality in the Thistle Creek watershed, and restore beneficial uses. The project restored riparian habitat, stabilized eroding stream banks, improved upland vegetation, and provided education to the public. In

addition to the cost of implementation were costs associated with education, technical assistance, and administrations.

Hubbs project:

Elevation:	5,180 feet
Rosgen Stream Type:	C4
Mean Stream Width:	27 feet
Project Length:	1,700 feet
Fish species:	Brown trout, cutthroat trout, mottled sculpin, mountain sucker, leatherside chub, longnose dace.
Project Funding:	\$17,870 Section 319, Utah Wildlife Resources \$17,000

In 1983, a landslide in Spanish Fork Canyon blocked off the main stem of the Spanish Fork River just below the confluence with Thistle Creek. This resulted in the formation of Thistle Lake that backed up water for several miles along Thistle Creek. The lake was eventually drained, but the riparian and upland vegetation, which existed prior to Thistle Lake, was destroyed. The Thistle Creek channel had filled with sediment, and as the lake drained, the stream cut through the sediment, resulting in significant down cutting. The stream on this property never fully recovered from that event. The physical complexity of the stream was lost, cover for trout was significantly reduced, and the natural function and stability of the stream was significantly altered.

In 1998 and 1999, stream restoration techniques were applied. The restoration focused on techniques to enhance the natural function of the stream. Several rock and log vanes were placed at critical locations to protect stream banks and allow riparian vegetation to re-establish. Vertical banks were sloped to allow vegetative cover to establish. Willow clumps were transplanted to positions along the newly sloped stream banks. Root wads and logs were also used to protect stream banks and provide cover for trout. In addition, livestock were excluded from the riparian area by fencing. The landowner agreed to allow public access to the property for fishing. Structures were built along the fence to allow easy access through and over the fence.

Upland restoration focused primarily on weed control. Treatment strategies were developed and implemented using the Dave Rosgen Natural Channel Design Methodology for Stream Restoration. The project included willow plantings, installing root wads, rock vanes, and rock barbs. The most extreme restoration practice was changing the stream dynamics to add meanders. Don Wiley, Fisheries Biologist with Utah Wildlife Resources, designed the projects.

Educational projects included a video production (10 Years on Thistle Creek (1983-2003), newspaper article (Deseret News, June 26, 2000), article in wildlife magazine (Wildlife Review, Spring 2000), and project tours.



Pretreatment photographs are shown on the left, and photographs taken after about 2.5 years are shown on the right.



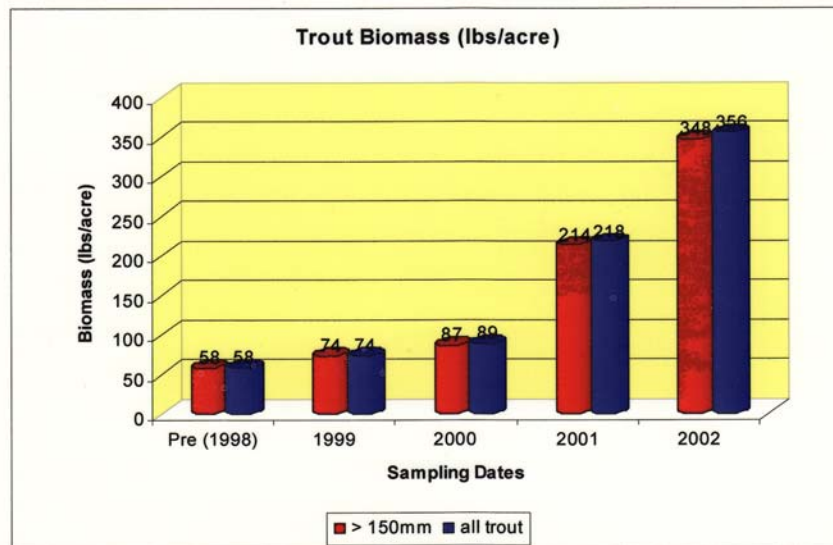
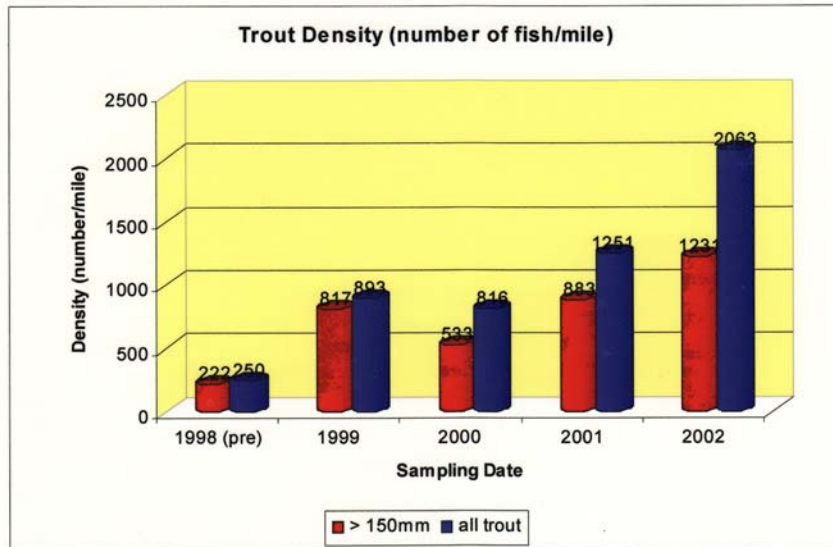


Photographs above are taken about 2.5 years after the project and illustrate rock vanes deflecting flow away from the toe of the bank, barbs that move the flow toward the center of the channel, and re-established vegetation.

Prior to implementation of the project, the NRCS Ventura Model was implemented to estimate the streambank erosion on Thistle Creek. Because of the condition of the stream through the Hubbs property, it was estimated that as much as 368 tons of sediment per mile per year was being contributed to the waters of Thistle Creek. The model also showed that the sediment load could be reduced to 57 tons per mile per year with implementation. The Hubbs project included 1,700 feet of restored stream, resulting in a reduction of 100 tons of sediment per year.

The Utah Division of Wildlife Resources monitored the fishery, and reported that as a result of improved habitat and reduced sediment that the fishery has significantly improved. Prior to 1997, catchable rainbow trout were stocked annually into Thistle Creek. Since 1997, Thistle Creek has been managed as a wild/self sustaining trout fishery and rainbow trout are no longer stocked. Wildlife Resource studies determined that trout abundance along the Hubbs project is about 402% greater after treatment and trout biomass is 217% greater. The charts below show the increased number of fish per mile and the increased pounds per acre on the Hubbs property.

Phase I - 1998 Restored Section



Hall Project:

Elevation:	5,480 feet
Rosgen Stream Type:	C4
Mean Stream Width:	18 feet
Project Length:	1,800 feet
Upland acres:	215
Fish species:	Brown trout, cutthroat trout, mottled sculpin, mountain sucker, leatherside chub.
Project Funding:	\$77,172 Section 319, Utah Wildlife Resources \$10,000

This section of stream is located about 7 miles upstream of the Thistle Creek and Spanish Fork River confluence and about 6 miles upstream of the Hubbs property. The stream in this reach has been straightened and riparian vegetation is poor.

The objectives of this project are to: 1) move the stream from its existing channel by reconstructing a channel with meanders, 2) reduce sediment load in Thistle Creek from stream bank erosion, 3) restore proper dimension, pattern and profile that mimics a natural stream, 4) enhance riparian vegetation quality and quantity, 5) enhance fish cover, 6) improve upland vegetation by removing pinion juniper and then seeding perennial grasses.

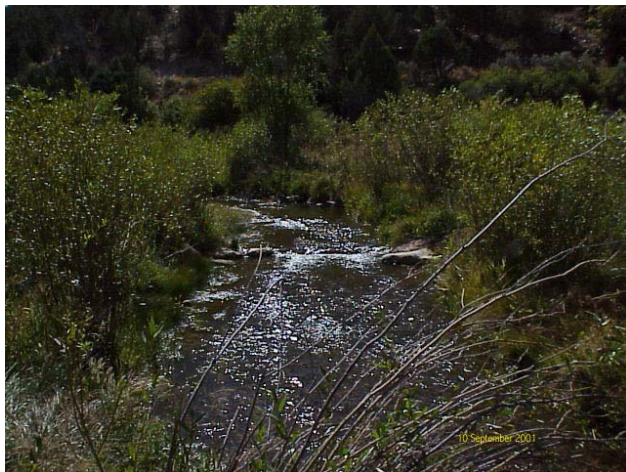
In 1999 and 2000, stream restoration techniques were applied. The restoration focused on techniques to enhance the natural function of the stream. Several rock and log vanes were placed at critical locations to protect stream banks and allow riparian vegetation to re-establish. Vertical banks were sloped to allow vegetative cover to establish. Willow clumps were transplanted to positions along the newly sloped stream banks. Root wads and logs were also used to protect stream banks and provide cover for trout. In addition, livestock were excluded from the riparian area by fencing. The landowner agreed to allow public access to the property for fishing. Structures were built along the fence to allow easy access through and over the fence.

Upland restoration focused primarily on weed control. Treatment strategies were developed and implemented using the Dave Rosgen Natural Channel Design Methodology for Stream Restoration. The project included willow plantings, installing root wads, rock cross vanes, and rock barbs. Fish habitat structures were constructed to allow fish to be able to get underneath the stream banks. The most extreme restoration practice was changing the stream dynamics to add meanders. Don Wiley, Fisheries Biologist with Utah Wildlife Resources, designed the projects.

Educational projects included a video production (10 Years on Thistle Creek (1983-2003)), newspaper article (Deseret News, June 26, 2000), article in wildlife magazine (Wildlife Review, Spring 2000), and project tours.



Pictures of the Hall project during construction are shown on the left (new channel reconstruction, and fish structure next to a rock barb), and photographs on the right show the same place after about 2.5 years.



Cross vanes on Thistle Creek at the Bruce Hall project.

Prior to implementation of the project, the NRCS Ventura Model was implemented to estimate the streambank erosion on Thistle Creek. Because of the condition of the stream through the Hall property, it was estimated that as much as 130 tons of sediment per mile per year was being contributed to the waters of Thistle Creek. The model also showed that the sediment load could be reduced to 49 tons per mile per year with implementation. The Hall project included 1,800 feet of restored stream, resulting in a reduction of 28 tons of sediment per year.

The Hall project also included upland restoration to control erosion. The project removed 84 acres of pinion juniper and 68 acres of decadent sagebrush, reseeding of perennial grasses, fencing, rotational grazing distribution, and installation of 3 water troughs to disperse livestock.

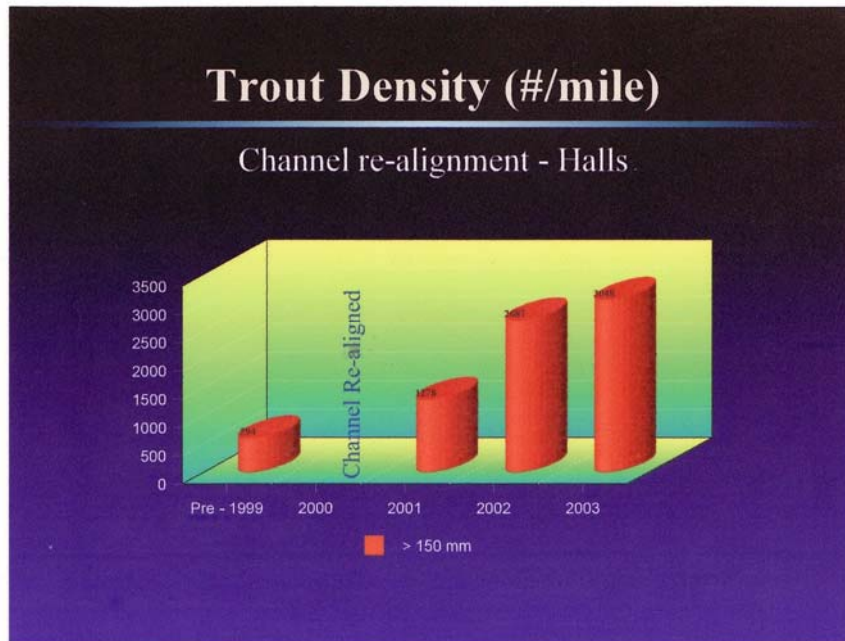
Pictures below show the removal of the pinion juniper, reseeded with native vegetation, and the installation of one of the dispersed water troughs. The project allows the landowner to move his cattle off of his riparian property, and use a rotational grazing system to reduce erosion. Upland pasture fencing was installed to implement rotational grazing and dispersal.



The PSIAC model was used to determine the erosion rates on uplands in the watershed. It was determined that prior to project implementation, that the erosion rate on the Hall upland project was 0.8 tons per acre per year. Of that amount, NRCS estimated that the soil to stream delivery rate is 20%. Based on those calculations, the Hall upland project eliminated 34.4 tons of sediment from Thistle Creek annually.

The Utah Division of Wildlife Resources monitored the fishery, and reported that as a

result of improved habitat and reduced sediment that the fishery has significantly improved. Prior to 1997, catchable rainbow trout were stocked annually into Thistle Creek. Since 1997, Thistle Creek has been managed as a wild/self sustaining trout fishery and rainbow trout are no longer stocked. Wildlife Resource studies determined that trout density along the Hall project improved from 594 trout per mile before the project, to 3,048 trout per mile three years after the project was completed, which represents a 5-fold increase.



Evans Project:

Elevation:	5,400 feet
Rosgen Stream Type:	C4
Mean Stream Width:	18 feet
Project Length:	2,300 feet
Fish species:	Brown trout, cutthroat trout, mottled sculpin, mountain sucker, leatherside chub.
Project Funding:	\$0 Section 319

This section of stream is located about 6 miles upstream of the Thistle Creek and Spanish Fork River confluence, and about 5 miles upstream from the Hubbs project, and 1 mile downstream from the Hall project. The stream in this section had been straightened and riparian vegetation eliminated to protect adjacent land from flooding and to maximize grazing. The Evans project was not funded by any of the Section 319 funds. However, it was considered to be part of the

overall Thistle Creek project, and was implemented at the same time as the Hubbs and Hall projects. Photographs of the Evans project are available, however are not included in this report.

The restoration effort focused on techniques to enhance the natural function of the stream. Meanders were created to mimic the natural stream pattern. Restoring meander decreased the channel slope, thereby decreasing the stream velocity. In addition, channel length increased by about 40%. Several rock and log vanes were placed at critical locations to protect stream banks and allow riparian to re establish. Vertical banks were sloped to allow vegetative cover to establish. Willow clumps were transplanted to positions along the newly sloped stream bank. Root wads and logs were also used to protect stream banks and provide cover for trout. In addition, livestock were excluded for the riparian area by fencing.

Prior to implementation of the project, the NRCS Ventura Model was implemented to estimate the streambank erosion on Thistle Creek. It was estimated that the Evans property contributed as much as 21 tons of sediment per mile per year to the waters of Thistle Creek. The model also showed that the sediment load could be reduced to 8 tons per mile per year with implementation. The Evans project included 2,300 feet of restored stream, resulting in a reduction of 6 tons of sediment per year.

The Utah Division of Wildlife Resources monitored the fishery, and reported that as a result of improved habitat and reduced sediment that the fishery has improved. The large number of young of the year brown trout indicates that spawning habitat is significantly improved over pre-treatment conditions. The mean density of all trout increased by about 65%, whereas the mean trout biomass decreased by about 11% when compared to pre-treatment conditions. Wildlife officials reported that carrying capacity in a newly constructed channel might take a couple of years as new recruits enter the population.

Thistle Creek Animal Feeding Operations

Type of Operation:	Beef Feedlot
Total Animal Units:	35
Days Confined:	90
Elevation:	5,400 feet
Project Funding:	\$8,672 Section 319, \$6,324 EQIP

This corral is located on a slope just above the confluence of Bennie Creek and Thistle Creek in Utah County. An inventory and assessment was conducted on this facility as required by the Utah Animal Feedlot Operation Strategy. It was determined that the facility met the requirements of a potential CAFO and that the owner would voluntarily cooperate to implement a project to keep manure from entering the Waters of the State.

The cows had direct access to the creek for drinking purposes. The corrals sloped directly toward the creek, and during a 25 year/24 hour storm event the runoff could reach the water. There were no barriers to stop the runoff. The corrals consisted of about 69,969 square feet. Manure was piled up adjacent to Bennie Creek for several years.

The objective of the project was to contain all manure on land owned and operated by the land owner, and to provide site specifications necessary to keep manure out of the creek and to properly utilize manure on the land owned or operated by the owner to prevent the degradation of soil and water.

Below are pictures depicting the animal feeding operation prior to implementation.



To meet the objectives of this project, the owner installed a gravity-flow pipe from the creek to newly installed water troughs that are located within the corrals from which the cattle can drink. He eliminated corrals that included the creek within the corral area. His corral area was reduced from 69,969 square feet to about 43,560 square feet. He installed a livestock fence a minimum of 35 feet away from the stream bank and constructed an earthen berm between the fence and the creek. He planted vegetative cover on the berm. He removed all of the piles of manure that had

accumulated within the corrals. Pictures below depict some of the practices that were implemented.



To determine the reduction of nutrients before and after project implementation, the Utah Animal Feedlot Runoff Risk Index (UAFRRI) was used.

LOADING CALCULATIONS			
	Before Project	After Project	Percent Reduction
Tons of manure produced	100	66	66.0%
Total N Available (lbs)	572	381	66.7%
Total P Available (lbs)	279	186	66.7%
Total BOD Available (lbs)	2,079	1,386	66.7%
Total N Loading (lbs)	317	26	82.0%
Total P Loading (lbs)	155	13	83.9%
Total BOD Loading (lbs)	1,153	96	83.3%

Webster Irrigation / Riparian Project:

Elevation:	5,700 feet
Rosgen Stream Type:	C4
Mean Stream Width:	12 feet
Project Length:	1.0 miles
Fish species:	Brown trout, cutthroat trout, mottled sculpin, mountain sucker, leatherside chub.
Project Funding:	\$59,030 Section 319

This section of stream is located about 10 miles upstream of the Thistle Creek and Spanish Fork River confluence. The stream in this reach had active stream bank slumping and head cutting that was the result of irrigation tail water from adjacent pasture. It was determined that some springs in the area also attributed to bank slipping from the subbing of the springs. It was noted that there were several species of nuisance weeds along the stream.

The objectives of this project are to: 1) improve irrigation water conveyance by providing a sprinkler irrigation system that would eliminate flood irrigation tail water. The purpose is to prevent erosion. 2) Provide critical area planting, 3) weed management to allow the better riparian species to establish, 4) prescribed grazing to reduce erosion and improve water quality, 5) and streambank protection to reduce erosion. The conservation plan was prepared by NRCS and the project was partially funded with an Environmental Quality Incentive Program (EQIP) grant.

In 2006 the irrigation system was constructed and weed management techniques were applied. The irrigation project consisted of 4,100 feet of underground mainline, 3,410 feet of sprinkler pipe hand line, a 350 gpm pump, and a water storage reservoir.

The pictures below depict the sprinkler irrigation system and the water storage reservoir:



The pictures below show the proximity of the pasture to Thistle Creek and the eroded banks adjacent to the previously flood irrigated pasture. Also shown is Thistle Creek on this landowner's property. With exclusion of livestock, the riparian vegetation is making a significant improvement.



Prior to implementation of the project, the NRCS Ventura Model was implemented to estimate streambank erosion on Thistle Creek. Before the project, it was estimated that as much as 74 tons of sediment per mile of stream per year was being contributed to the waters of Thistle Creek. The model also showed that the sediment load could be reduced to 22 tons per mile per year by implementing the prescribed BMPs. The Webster project included 4,500 feet of improved stream that resulted in a reduction of 44 tons of sediment per year.

Thistle Creek Animal Feeding Operations

Type of Operation:	Beef Feedlot
Total Animal Units:	35
Days Confined:	90
Elevation:	5,400 feet
Project Funding:	\$33,287 Section 319; \$34,559 EQIP

This corral is located 12 miles upstream of the confluence of Thistle Creek and Soldier Creek. The corrals are sloping toward Thistle Creek. An inventory and assessment was conducted on this facility as required by the Utah Animal Feedlot Operation Strategy. It was determined that the facility met the requirements of a “potential CAFO” and that the owner would voluntarily cooperate to implement a project to keep manure from entering the Waters of the State.

The cows had direct access to the creek for drinking purposes. The corrals slope toward the creek, and during a 25 year/24 hour storm event the runoff could reach the water. There were no barriers to stop the runoff.

The objective of the project was to contain all manure on land owned and operated by the land owner, and to provide site specifications necessary to keep manure out of the creek and to properly utilize manure on the land owned or operated by the owner to prevent the degradation of soil and water.

To meet the objectives of this project, the owner provided off stream livestock watering facilities by providing livestock watering troughs. The troughs are supplied with water from a 2,250 gallon storage tank with gravity pressure to each trough. Two waste storage ponds were installed to contain temporary storage of manure and runoff from the feedlot area to keep the manure out of the creek. Both ponds were lined with a flexible impervious membrane to prevent seepage. Also, to provide a location for the ponds, the corrals were reconfigured requiring fences to be built.

The photos below show the corrals and the trench that provided water to the off stream water troughs.



To determine the reduction of nutrients before and after project implementation, the Utah Animal Feedlot Runoff Risk Index (UAFRRI) was used.

LOADING CALCULATIONS			
	Before Project	After Project	% Reduction
Tons of manure produced	104	104	0
Total N Available (lbs)	624	624	0
Total P Available (lbs)	285	285	0
Total BOD Available (lbs)	2,703	2,703	0
Total N Loading (lbs)	349	44	87.3
Total P Loading (lbs)	160	20	87.5
Total BOD Loading (lbs)	1,514	189	87.5

Hullinger Irrigation Project:

Elevation:	5,700 feet
Rosgen Stream Type:	C4
Mean Stream Width:	12 feet
Project Length:	1.0 miles
Fish species:	Brown trout, cutthroat trout, mottled sculpin, mountain sucker, leatherside chub.
Project Funding:	\$2,355 Section 319, \$7,440 EQIP

This section of stream is located about 1 mile upstream of the Thistle Creek and Spanish Fork River confluence, and immediately downstream of the Gary Hubbs restoration project. It was determined that the stream in this reach would benefit if this landowner would convert from flood irrigation to sprinkler irrigation, thereby reducing the erosion from his farm into adjacent Thistle Creek. NRCS had determined the land to be highly erodible. This project was partially funded by a NRCS Environmental Quality Incentive Project (EQIP) contract.

The project included a water diversion structure in Thistle Creek for a subsurface pipeline (1,600 feet), an above ground sprinkler irrigation system on 7.3 acres of land, and pest management on 15 acres. The pest management was followed up with reseeding. To prevent erosion at the site of the diversion structure, a J-hook was constructed in the stream to move water away from the stream bank. The portion of this project funded by Section 319 was the reseeding and the streambank protection at the diversion.



No calculations are available on load reduction to Thistle Creek for this project.

Animal Feeding Operation South Fields Canal

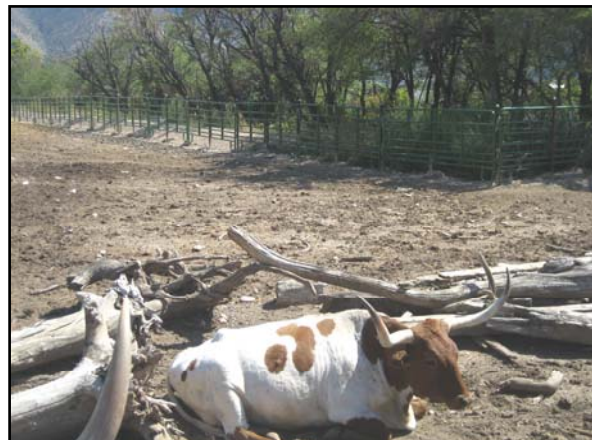
Type of Operation:	Beef Feedlot
Total Animal Units:	35
Days Confined:	365
Elevation:	5,400 feet
Project Funding:	\$1,215 Section 319, \$25,874 EQIP

This corral is not located on Thistle Creek, but is south of Spanish Fork, in the Spanish Fork River watershed on the South Fields canal. The corrals are sloping toward the canal. An inventory and assessment was conducted on this facility as required by the Utah Animal Feedlot Operation Strategy. It was determined that the facility met the requirements of a “potential CAFO” and that the owner would voluntarily cooperate to implement a project to keep manure from entering the Waters of the State.

The cows had direct access to the canal for drinking purposes. The corrals slope toward the canal, and during a 25 year/24 hour storm event the runoff could reach the water. There were no barriers to stop the runoff. The objective of the project was to contain all manure on land owned and operated by the land owner, and to provide site specifications necessary to keep manure out of the canal and to properly utilize manure on the land owned or operated by the owner to prevent the degradation of soil and water.

To meet the objectives of this project, the owner constructed an earthen berm between the corrals and the canal, a fence between the corral and the berm, and a limited access livestock watering facility. The berm was vegetated, and the canal bank was lined with rock rip rap to prevent erosion into the berm.

The photos below show the corrals before construction, and after construction. The fence, vegetated berm and limited livestock water access can be seen in the photos.





To determine the reduction of nutrients before and after project implementation, the Utah Animal Feedlot Runoff Risk Index (UAFRRI) was used.

LOADING CALCULATIONS			
	Before Project	After Project	% Reduction
Tons of manure produced	173	173	0
Total N Available (lbs)	994	994	0
Total P Available (lbs)	484	484	0
Total BOD Available (lbs)	3614	3614	0
Total N Loading (lbs)	551	69	87.5
Total P Loading (lbs)	269	34	87.4
Total BOD Loading (lbs)	2004	251	87.5

2.1 Planned and Actual Milestones, Products, and Completion

The tasks were the same for the Hubbs project and the Hall project.

Task	Planned Milestone	Actual Milestone	Products
Task 1	1999	2000	Fishery inventory
Task 2	1999	2000	PSIAC sediment yield
Task 3	1999	2000	Water quality monitoring
Task 4	1999	2000	Video, tours and photographs
Task 5	1999	2000	Detailed landowner plan
Task 6	1999	2000	Implement plan
Task 7	1999	2000	Monitor sediment reduction
Task 8	1999	2000	Noxious weed control
Task 9	1999	2000	Conduct tours
Task 10	1999	2000	News stories
Task 11	1999	2000	Photographs and video

Tasks for the Animal Feeding Operation

Task 1	2001	2001	Inventory and Assessment
Task 2	2001	2001	Nutrient Management Plan
Task 3	2001	2001	Maintenance Agreement
Task 4	2002	2007	Implemented Plan
Task 5	2002	2007	UAFRRI

Completion Date of Project

The projects on Thistle Creek covered three separate 319 contracts. The contract was amended one time to transfer money (\$32,000) to a 319 project on the Bear River. The completion date of all projects was completed on schedule.

2.2 Evaluation of Goal Achievement

Riparian Projects

Goal 1: Implement Best Management Practices to reduce sediment. Sediment was reduced by 212.4 tons per year resulting in improved water quality and improved fishery.

Goal 2: Implement a project to educate and inform landowners and other public groups about water quality. Video, newspaper articles, magazine articles, and tours were successfully used to complete this goal. Other landowners have implemented projects on their land as a result of these demonstration projects. Numerous personal inquiries from neighboring associates have been made to the owners/operators regarding the success of the project. The project has and continues to function as designed.

Animal Feeding Operations

Goal 1: Under the direction of the Natural Resources Conservation Service, prepare Nutrient Management Plans and implement Best Management Practices at Animal Feeding Operation facilities, to reduce sediment and nutrients in order to improve water quality and restore fishery. Nitrogen was reduced by 1,078 lbs per year (88.6%), phosphorus was reduced by 517 lbs per year (88.5%), and BOD was reduced by 4,135 lbs per year (88.5%).

Goal 2: Under the direction of the Spanish Fork River CRMP Education Committee, implement an Animal Feeding Operation in the Spanish Fork River Watershed to educate and inform landowners and other public groups about the value of participating in a water quality project to restore water quality and fishery benefits.

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

Water quality models indicate that as a result of the three riparian projects, the sediment reduction in Thistle Creek totaled 212.4 tons per year. Also, the fishery has responded and greater numbers of fish and biomass has been measured. The Hubbs project alone showed an increased in trout numbers of 402% and a biomass increase of 217%. Greater awareness of water quality conditions within the watershed has occurred as a result of this project. Owner/operators of similar operations have expressed greater interest and need to implement these BMPs.

Water quality data was insufficient to adequately determine implementation benefits. There were insufficient sites where data was collected.

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

The Utah Division of Wildlife Resources selected the Best Management Practices that were installed along the riparian corridor. Those practices include rock and log vanes, sloping of vertical banks, transplanting willow clumps, root wads and logs to protect stream banks, and fencing to exclude livestock.

The Natural Resources Conservation Service and UACD provided the technical assistance for removal of pinion juniper and the reseeding. Initially, the pinion juniper was going to be removed by chaining. That was changed to removing each tree individually by using a backhoe.

5.0 MONITORING RESULTS FOR DEMONSTRATION PROJECTS

Utah Wildlife Resources, NRCS, UACD and the local Conservation district monitored these projects during construction. Monitoring indicates that the projects were constructed as planned and BMPs were installed according to design.

5.1 BMP Effectiveness Evaluations

Owners have signed agreements, as part of their plans to maintain the projects as implemented. These maintenance agreements are detailed in their cooperative agreements.

5.2 Results of BMP Operation and Maintenance Reviews

Utah Wildlife Resources, UACD, and NRCS personnel have inspected the installed BMPs and have indicated that the BMPs are in a proper functioning condition, and are being maintained by the owner as agreed.

6.0 PUBLIC INVOLVEMENT AND COORDINATION

The Timp-Nebo Conservation District provided the leadership on this project. The District has been involved and supportive since the beginning of the project. They have approved funding requests, design criteria, design changes, and tour coordination. A video was prepared by the

Bureau of Reclamation entitled 20-years on Thistle Creek (1983-2003). An article was in the Utah Deseret News on Monday June 26, 2000 entitled Cooperation = improved streams + health fish. Spanish Fork River watershed is taking a turn for the better. Also, in the Utah Wildlife Review (Spring 2000) was an article entitled Habitat Funds Improve Angling on Thistle Creek.

6.1 State Agencies

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

Utah Division of Wildlife Resources (DWR) – Monitoring of fisheries in Thistle Creek, and construction of best management practices.

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

6.2 Federal Agencies

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

Environmental Protection Agency (EPA) – Financial assistance.

Bureau of Reclamation – Video Production

6.3 Local Governments and Others

Cooperative Extension Service (ES) – Information and education of BMP effectiveness to local cooperators through tours, brochures and meetings.

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

6.4 Other Sources of Funds

Match for this project was provided by landowners, Division of Wildlife Resources, and UACD.

7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

There is not an indication of any aspects of this project that did not work well. Currently, the project is functioning as designed and the owners/operators are satisfied. The amended contract included a task to provide planning for the lower Spanish Fork River watershed. That task was

not funded at a level that allowed our staff to complete that work. That task was changed to funding the AFO that was located on the South Fields Canal, that was included in the report.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

Work with other landowners on Thistle Creek to implement similar projects.

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Thistle Creek Nonpoint Source Projects

