

SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM
PROJECT/INFORMATION AND EDUCATION
FINAL REPORT

Scofield Reservoir Project Implementation Plan FY 2004, 2005 and 2006

By

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

HUC: 14060007-010

Contract Numbers: 05-1646, 06-1022, 07-1032

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EXECUTIVE SUMMARY

PROJECT TITLE: Scofield Reservoir Project Implementation Plan FY 2004, 2005 and 2006

CONTRACTS: 05-1646, 06-1022, 07-1032

GRANT SOURCE: Utah Dept. of Agriculture & Food

INITIATION DATE: July 1, 2004

EXPIRATION DATE: September 30, 2008

FUNDING:

Total EPA 319 Grant FY 2004:

TOTAL BUDGET: \$117,096.00

\$18,000.00

Total EPA 319 Grant FY 2005:

\$25,200.00

Total EPA 319 Grant FY 2006:

\$20,200.00

Total EPA 319 Funds:

\$63,400.00

Total Match Accrued:

\$53,696.00

Total Expenditures:

\$117,096.00

SUMMARY ACCOMPLISHMENTS:

On December 15, 2004 this contract was awarded to the sponsor of the Scofield Reservoir Improvement Project, the Price River Conservation District (PRCD). The watershed coordinator, in coordination of the PRCD, began working with the Scofield Watershed Council on July 1, 2005. The Watershed Council determined that the Solid Waste Transfer Station (dumpster facility) on the southeast shore of the lake and the Information Sign on the northeast shore of the lake would be the primary projects to complete. Carbon County provided the designs for both projects. Construction began in October 2005, concrete for the footings and walls on the dumpster site were poured. Cement ramps were later installed to allow users better access to the dumpster sites. Backfill was completed on the 29th of May 2006, signaling project completion.

Heavy grazing by cattle in the Spur Bay region of Scofield Reservoir was identified as a cause of nutrient loading and erosion. In cooperation with the local property owner, local rancher and the watershed coordinator in the Provo NRCS office, a grazing plan was developed. It was agreed that the cows will be in the area for 2 weeks in the early summer then moved out until another 2 week grazing period in October after the cows are rounded up to come off the mountain. The rancher was very willing to help make improvements at Spur Bay, but still wanted to graze in the area. With this set up, the grass will be able to maintain healthy growth and seed distribution. In just a few months the Spur Bay area had regained vigor.

Small credit card sized informational "refrigerator" magnets were distributed in lieu of brochures. Initially, 200 magnets were created for distribution around Scofield at the reservoir, local store, Carbon County Courthouse, and Scofield State Park Service. The Magnets were so popular and well received that an additional 500 were later ordered. Further distribution occurred at the annual Carbon County Fair.

The Scofield Watershed Council determined that an informational sign should be installed on the northeast shore of the reservoir. The sign was placed in a high traffic area close to the primary boat ramp. Gravel and back fill around the base of the sign was completed by the Carbon County Road Department. UDOT has gathered rocks and in the near future, rock pillars will be created on either side of the Scofield Reservoir sign.

In cooperation with the Utah Division of Wildlife Resources (UDWR) and the Carbon County Recreation and Transportation Special Service District, a 1.3 mile, 40 riparian acre section of the river was restored. Active cutbanks were treated by sloping to a 3:1 ratio and adding willow wads that were already present in various segments of the river.

INTRODUCTION

1.0 Project Water Quality Priority

As required by § 26-11-6 of the Utah Code Annotated 1953, the waters of the State of Utah are grouped into classes so as to protect against controllable pollution. Scofield Reservoir (HUC 14060007-010) has been identified as a High Priority watershed, 303d list Unified Assessment Category IC. The designated uses for Scofield Reservoir water are drinking water (1C), secondary recreation contact (2B), cold water fishery (3A), and irrigation (4).

Scofield Reservoir was placed on the State of Utah's 1998 303(d) impaired waterbodies list as partially supporting its designated beneficial use as a cold-water fishery because of low dissolved oxygen and high total phosphorous concentrations. Nutrients are delivered to the reservoir directly during summer draw down, during spring runoff, summer storm events and in tributary flows. High nutrient concentrations result in excessive algal growth and turbidity in Scofield Reservoir. Water with high biological productivity results in lower oxygen concentrations and stress to the aquatic community. Several winter fish kills have been reported to occur within the reservoir.

A TMDL was developed for the Scofield Reservoir with specific goals of shifting phytoplankton dominance away from blue-green algae, dissolved oxygen (DO) concentrations of no less than 4 mg/L in 50% of the water column and trophic state index values around 40-50 (mesotrophy). A load reduction of total phosphorus (TP) from 6,723 kg/yr to 4,842 kg/yr (1,881 or 28% reduction) was recommended to achieve these goals. Implementation strategies identified within the TMDL include stream restoration and elimination of grazing below the high water line. Other measurements discussed were recreational developments and solid waste disposal.

1.1 Water body Information

Scofield Reservoir is located in Carbon County, Utah within the Wasatch Montane Zone ecoregion at an elevation of 7,618 feet. Scofield Reservoir was constructed at the confluence of several perennial streams including Fish Creek, Mud Creek (locally referred to as Clear Creek), Pondtown Creek and other springs and small tributaries. The Reservoir's outlet feeds into the Price River, a tributary of the Green River 70 miles to the southwest.

The capacity of Scofield Reservoir is 73,600 acre feet and has a surface area of 2,815 acres. The average annual stream flows from major tributaries are: Fish creek 35,453 acre feet, Mud Creek 12,567 acre feet, and Pondtown Creek 5,382 acre feet. Scofield Reservoir is used for several purposes including flood control, recreation, and storage for irrigation and drinking water.

1.2 Maps

See Figure 1 map showing location and size of the watershed. See Figure 2 map that depicts the project sites around Scofield Reservoir.

1.3 General Watershed Information

The majority of the Scofield Reservoir watershed is located in Carbon County, with small portions in Utah County to the north and Sanpete County to the west. The watershed encompasses approximately 1,259,000 acres. Land within the watershed is used for livestock grazing, wildlife, coal mining, recreation and residential homes.

Average annual precipitation into the drainage ranges from 14 inches at Scofield Dam to over 30 inches at the headwaters on the top of the Wasatch Plateau, with the majority

falling as snow during the winter. Mean annual air temperature at Scofield Dam is 37° F with a frost free season of 74 days.

The geology and soils within the watershed have a significant effect on the water quality of Scofield Reservoir. The Wasatch Plateau is composed of Cretaceous and Tertiary sedimentary rocks with a few intrusive igneous rocks with metamorphosed coal and rock along the dike contacts. The topography of the watershed consists of relatively flat lying strata that have been deeply dissected by streams into larger canyons and smaller side canyons causing wide variations in local relief. The soils are mostly silt loam and silty clay loams which are moderately-well to poorly drained.

Consisting of over a dozen smaller tributaries, the Fish Creek drainage, to the west of the Reservoir, is the largest sub-watershed. The Mud Creek sub-watershed enters the reservoir from the south and includes several active coal-mining operations and the community of Scofield. Draining an area that is relatively lower in elevation, the Dry Valley Creek enters at the northern end of the reservoir. Piontown Creek enters at the northwest corner of the reservoir, draining a long, narrow and steep canyon. (See Figure 1 and 2)

Located within the Wasatch Plateau ecological sub-region, the principle vegetation types at Scofield Reservoir include; conifer, aspen, grasses, mountain shrub, and sagebrush-grass. Riparian areas within the watershed predominately include Narrowleaf cottonwood, willow species and sedges.

1.4 Water Quality Problems

The Utah Division of Water Quality (DWQ) has regularly monitored water quality within Scofield Reservoir and its tributaries. The USGS also maintains three gauging stations within the watershed on Gooseberry Creek, Fish Creek and Mud Creek.

Water quality concerns within the reservoir include nutrient enrichment (eutrophication) and associated low dissolved oxygen concentrations, fish kills, and blue green algae blooms. The causes and sources of water quality impairments have been well documented within Phase 1 and 2 Clean Lakes Reports published by the DWQ (Denton et al. 1983 and Judd 1990).

The primary sources of nutrients (partially phosphorus) identified within the Phase 1 Clean Lakes Report (1983) include erosion from unstable hill slopes and stream banks, animal waste, recreational use, sewage disposal, construction activities, and solid waste disposal. Since the Phase 2 Clean Lakes Report was published in 1992 significant progress has been made in addressing some of these sources, but needed work in several key areas remain.

PROJECT GOALS, OBJECTIVES, TASKS

Progress Narrative

2.0 Project Goals, Objectives and Tasks

The overall project goals are to reduce non-point source pollution into Scofield Reservoir

Goal 1: Assist landowners adjacent to Scofield Reservoir watershed in the development of grazing management plans and implementation of best management practices on pasturelands and rangelands including fencing, water development and reseeding improved varieties of forage grasses. Expected load reduction: 1,000 kg of Total Phosphorous (TP) per year.

Objective 1: Develop pasture and rangeland grazing management plans including implementation of best management practices (BMP's) to ensure proper utilization of forage and water resources and prevent animal waste from entering Scofield Reservoir.

Task 1: Identify and select project cooperators and develop grazing management plans using BMP's. **UPDATE:** Landowners have been identified and mapped. Heavy grazing by cattle in the Spur Bay region of Scofield Reservoir was identified as a cause of nutrient loading and erosion.

Task 2: Implement grazing management plans. **UPDATE:** In cooperation with the local property owner, local rancher and the Watershed Coordinator from the Provo NRCS office, a grazing plan was developed. It was agreed that the cows will be in the area for 2 weeks in the early summer then moved out until another 2 week grazing period in October after the cows are rounded up to come off the mountain. The rancher was very willing to help make improvements at Spur Bay, but still wanted to graze in the area. With this plan, the grass will be able to maintain healthy growth and seed distribution. In just a few months the Spur Bay area had regained vigor. (See Figures 3 and 4) The effects of erosion and nutrient loading had been reduced. Further results will be observed as time progresses. (See Figure 18 for UAFRR estimates of load reductions)

319: No funds were spent.

In-kind: \$0

Goal 2: Improve stability of tributary stream channels and enhance the riparian corridor through the establishment and protection of woody vegetation to reduce sediment and nutrient loading to the reservoir. Expected load reduction: 500 kg of TP per year.

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

Task 3: Identify and select project cooperators and develop stream bank and riparian improvement plan using BMP's and bioengineering principles. **UPDATE:** Two sites were identified that require riparian improvement, Mud Creek outside of Scofield town and Upper Fish Creek. Mud Creek is the priority site due to heavy grazing and high stream bank erosion. Carbon County Recreation and Transportation Special Service District purchased property on Mud Creek south of Scofield town. No grazing has been allowed for three years. Previous stream restoration work allowed regeneration of bank vegetation and riparian regrowth. Grazing Management is being considered with adjacent landowner to help control noxious weeds and keep vegetation productive. UDWR hired a consultant to evaluate additional work on the Mud Creek property and active cut banks were categorized in three tiers according to treatment need. Type 3 cut banks were treated to a 3:1 slope with willow clumps, sod mats and log vanes. 1.3 river miles were treated. Construction was completed September 2010. DWQ did UCASE sampling during the summer, pre-project, and plan to continue monitoring for the next 5 years post project. Results not yet received. (See Figures 10-15)

Task 4: Implement projects. **UPDATE:** Mud Creek Restoration project has been implemented.

319: \$21,969.48

In-kind: \$6,763.00

Goal 3: Prevent vehicular access below high water line of the reservoir through the strategic placement of a restroom and small parking area. Expected load reduction: 250 kg of TP per year.

Objective 1: Eliminate vehicular access from exposed lake bed and provide restroom and waste bins for proper recreational use.

Task 5: Construct parking area, vault toilet and two waste bins on area that provides access below high water line of reservoir. UPDATE: The Division of Wildlife Resources and Carbon County had the land appraised for this project; however, the landowner rejected the appraised value. Additional sites are being sought. UPDATE: Due to a court hearing, previously private property at Singletons boat ramp was determined to belong to the Bureau of Reclamation (BOR). Plans have been started to create a third Scofield State Park at the newly acquired property. A parking lot will be established which will eliminate vehicular access at the Singletons area. In addition, restroom facilities will be created along with recreational fishing areas. The BOR hopes to begin work in 2014.

319: No funds were spent.

In-kind: \$0

Goal 4: Improve the accessibility and capacity of the local solid waste transfer station (roll off dumpster) to eliminate windblown trash from entering the reservoir. Expected load reduction: 50 kg of TP per year.

Objective 1: Reduce windblown trash and litter from entering the reservoir through the construction of an improved solid waste transfer station.

Task 6: Construct solid waste transfer station, consisting of a drive through ramp with roll off dumpsters on either side surrounded by a perimeter fence to contain fugitive trash. UPDATE: In November 2005, excavation on the dumpster site began. Cement ramps were later installed to allow users better access to the dumpster sites. Backfill was completed on the 29th of May 2006, signaling task completion. A significant reduction in windblown trash and debris free to pollute the reservoir has been realized. (See Figures 5, 6, and 7) UPDATE: In October 2010 Carbon County began work on an additional solid waste holding facility on the north end of Scofield near Madsen Bay State Park. (See Figures 16 and 17) Two feet of slanted chain link fencing was placed along the top edge of the cement structure to decrease the amount of trash that can blow out of the holding facility. The Project was completed in December 2010 further decreasing the amount of windblown garbage that can enter the Reservoir.

319: \$25,717.00

In-kind: \$41,000.00

Goal 5: Inform and educate the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed. Expected load reduction: 50 kg of TP per year.

Objective 1: Establishment of informational signage at key locations around the reservoir.

Task 7: Place informational signage at key locations where visitors to the watershed can obtain information on the location of facilities, propitiated activities and participating partners in the water quality improvement effort. UPDATE: The Scofield Watershed Council determined that it would be best to add one large, informational sign at the northeast shore along Hwy 96. Hwy 96 is a high traffic area along the main road to the reservoir close to the primary boat ramp. The final sign design was approved by the Scofield Watershed Council, and installation was performed by the Carbon County Planning and Zone Coordinator, Dave Lavanger. Gravel around the base of the sign will be installed at a later date by the Carbon County Road Department. The sign states:

"Welcome to Scofield Reservoir & Pleasant Valley. Drinking Water Source. Please Keep it Clean!" (See Figure 8)

319: \$3,243.40

In-kind: \$5,843.00

Objective 2: Share general and technical information with local producers and other stake holders.

Task 8: Develop informational brochures. UPDATE: Small credit card sized informational refrigerator magnets were distributed in lieu of brochures. Initially, 200 magnets were created for distribution around Scofield at the reservoir, local store and Scofield State Park Service. The Magnets were so popular and well received that an additional 500 were later ordered. Further distribution occurred at the prelisted sites and a voluntarily run booth at the annual Carbon County Fair. The informational magnets have a background picture of Scofield Reservoir with the printed phrase "We fish in it. We play in it. We drink it. Scofield Reservoir Water. Please help us protect it!" (See Figure 9)

319: \$255.49

In-kind: \$90.00

Goal 6: Provide administrative assistance to project sponsors documenting matching contributions, tracking individual project progress, coordinating team efforts, and generating reports and data in a timely manner. Expected load reduction: 0 kg of TP per year.

Objective 1: Provide administrative service.

Task 9: Track match and prepare reports.

319: \$12,214.63 (Tracking: \$2,926.97 Technical Assistance: \$9,287.66)

2.1 Planned/Actual Milestones

Table 1: Planned/Actual Milestone Table

Note: X = Planned X = Actual

Task	Description	Groups	2006			2007			2008			2009			2010		
			J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D
	Goal 1: Objective 1																
1	Develop grazing management plans using BMPs.	2,3,5 & Ad							X	XX							
2	Implement grazing management plans.	2,3,5,7								XX	XX						
	Goal 2: Objective 1																
3	Develop riparian improvement plan.	2,3,4,5,6,7 & Ad				X	X					X	X	X	X		
4	Implement riparian plan.	2,3,5,7					X	X									X
	Goal 3: Objective 1																
5	Construct parking area, vault toilet and 2 waste bins.	1,9 & Ad		X			X			X							
	Goal 4: Objective 1																
6	Construct solid waste transfer station.	1,3,4,9		X	X	X	X										X
	Goal 5: Objective 1																
7	Placement of informational signs at key locations around reservoir.	1,3,4 & Ad		X			X			X	X						
8	Develop brochures and Annual Fact Sheets.	1,3,4,6,7			X		X	X		X	X		X				
	Goal 6: Objective 1																
9	Track match and prepare reports.	3	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Group 1: Carbon County
Group 2: Private Landowners
Group 3: Price River Soil C.D.

Group 4: UACD
Group 5: NRCS
Group 6: Utah State University Ext.

Group 7: Utah Division of Water Quality
Group 8: Utah Division of Wildlife Services
Group 9: Utah Dept. of Transportation

Goal 3 Task 5: The Division of Wildlife Resources and Carbon County had the land appraised for this project. Landowner rejected the land appraisal, additional sites are being sought. UPDATE: Due to a court hearing, previously private property at Singletons boat ramp was determined to belong to the BOR. Plans have been initiated to create a third Scofield State Park at the newly acquired property. A parking lot will be established which will eliminate vehicular access at the Singletons area. In addition, restroom facilities will be created along with recreational fishing areas. In cooperation with Carbon County, UDWR, and the Utah Park Service, the BOR will begin work around in the near future. Preliminary funding estimates by BOR suggest that the project will begin close to the year 2014.

2.2 Evaluation of Goal Achievement and relationship to the State NPS Management Plan.

The Scofield TMDL is focused on the reduction of phosphorus into the Reservoir. All goals and projects have been correlated and preformed on the basis of phosphorus reduction.

Goal 1: Grazing Management Plans.

One Grazing Management plan was created and carried out at the Spur bay region of the reservoir.

Goal 2: Riparian Improvement.

A Riparian improvement plan was developed for Mud Creek south of Scofield Reservoir; high risk areas with erosion potentials were noted. In September 2010 a 1.3 mile stretch of Mud Creek was restored and active cut banks were treated to a 3:1 slope with willow clumps, sod mats and log vanes.

Goal 3: Prevent vehicular access below high water line with the construction of a parking area and restroom.

Land could not be purchased to create the parking area or vault toilets. BOR was given land by order of the court near singletons boat ramp. A parking area and restrooms will be created at a later date.

Goal 4: Improve accessibility and capacity of local solid waste transfer station.

One waste transfer facility was created at the south end of the reservoir near Scofield town. A second waste facility was created by Carbon County at the north end near the entry for Madsen Bay State Park.

Goal 5: Place informational signs at key locations, develop brochures.

A large informational sign was placed at the north side of Scofield informing the public that Scofield Reservoir is a drinking water source and needs to be protected. Informational magnets were distributed throughout the area and even at the county fair. Scofield residents were made aware of the need to keep the drinking water source clean.

BEST MANAGEMENT PRACTICES DEVELOPED

3.0 Best Management Practices Developed

The following is a list of proposed BMPs that may be used along with the information and education efforts to improve water quality in the Scofield Reservoir watershed.

Pastureland practices including: Prescribed grazing irrigation water management, stock watering, fencing, pasture seeding, and filter strips.

Riparian practices including: Riparian area planting and fencing.

Surface disturbance activities including: A solid waste transfer station for improved waste disposal.

All projects will include BMPs and will be planned to the level of a total resource management system in accordance with NRCS standards and specifications.

1. Isolate water quality problem sources.
2. Select and implement projects for watershed non-point source problems.
3. Promote fair and cost effective non-point source pollution control.
4. Monitor progress and evaluate economic benefits of implementing water quality improvements.
5. Create awareness of water quality concerns and educate the public on how they can protect water quality for themselves and the community. Promote community involvement activities by use of volunteer groups.

MONITORING RESULTS

4.0 Monitoring

The monitoring goals of this project were to document progress in achieving improved water quality conditions as non-point source control programs were implemented, and to document and review the effectiveness of BMP's. The Quality Assurance Project Plan (QAPP) monitoring was conducted by the Utah Division of Water Quality. Water Quality samples were collected as subsurface grab samples. All samples were kept cold and dark, being delivered to laboratories and analyzed within the established holding times. For the Mud Creek Restoration Project DWQ performed Utah Comprehensive Assessment of Stream Ecosystem (UCASE) sampling the summer of 2010 as a pre-project analysis. UCASE results will include information on riparian conditions, water chemistry, and biological parameters such as fish population, macroinvertebrates, and periphyton. DWQ plans to continue monitoring and UCASE sampling each year during the summer for the next five years. Unfortunately, the data for Mud Creek will not be available for this report.

4.1 BMP Effectiveness Evaluation

In support of the TMDL phosphorus reduction plan the following BMP's were developed to control phosphorus levels in the Scofield Reservoir.

1. **Riparian improvement practices including planting and fencing.**
The TMDL for Scofield Reservoir listed riparian restoration as the primary BMP for the Scofield area. Mud Creek was targeted due to the property being owned by the Carbon County Recreation and Transportation Special Service District.

Fencing will be installed and livestock will be excluded from the riparian zone for three years and then will be used as an occasional management tool to improve riparian health and vigor.

2. Developing and implementing livestock grazing management plans.

The Grazing Management plan in the Spur Bay area significantly increased the lakeside grasses, reducing raw shorelines and undercutting. The potential for phosphorus reduction is still in the process of being realized.

3. Planning of recreational development, providing an improved sewer disposal system.

Although the effectiveness of this BMP is efficient at the reduction of phosphorus in the Scofield Reservoir, the high cost of parking facilities and sewer disposal systems is debilitating.

4. Controlling of surface disturbance activities and solid waste disposal.

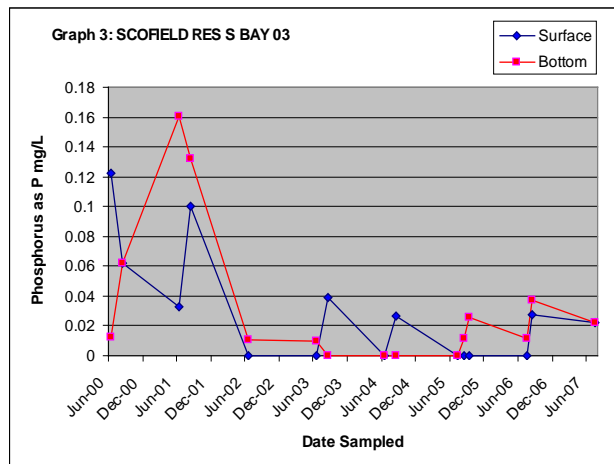
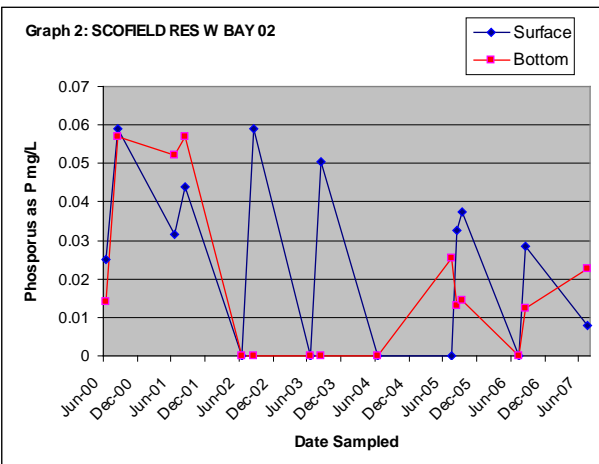
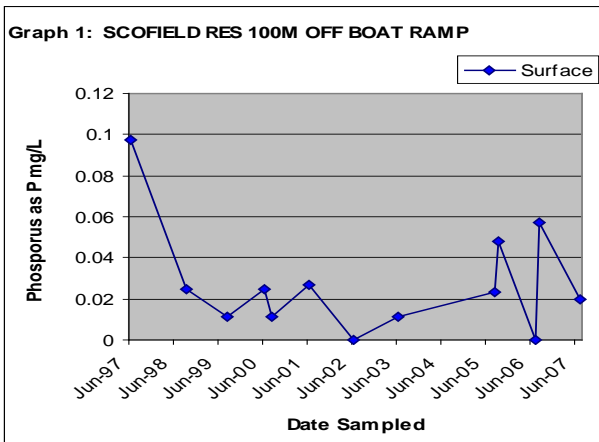
The Scofield Watershed Council met and determined that the primary action should be the Solid Waste Transfer Station, due to project visibility. The effectiveness of this BMP was in the increase of public awareness and participation, while allowing responsible trash elimination. The project was so successful that Carbon County installed a second Solid Waste Facility at the Northern end of the Reservoir.

4.2 Surface Water Improvements

4.2.1 Chemical Improvements

The following graphs (1, 2 and 3) were formulated from the Storet sampling sites included

in the QAPP (593097, 593098, and 593099 respectively). Water Quality samples were collected as subsurface grab samples. Data has been tallied and averaged according to site and date of sampling. In all graphs, recorded phosphorus loads that were lower than .02 mg/l were reported as non detected and for the purpose of these graphical displays have been listed as zero, although a null statistic is unlikely. Due to lower water levels the sample site for the information presented in graph 1 is a surface sample only and did not include a lake bottom sample.



The overall trends show a slight decline in phosphorus over the space of the project, with the highest reported phosphorus decrease in graph 3 of 0.14 mg/l from 2001 to 2007. Although graph 2 depicts a rise in phosphorus toward the end of 2007, the overall phosphorus trend at the sampling site is decreasing. The combined efforts of increasing public awareness and implementation of a grazing improvement plan along the Spur Bay region of the Reservoir may have been a part in the realization of lower phosphorous levels.

Scofield Reservoir inflow samples were taken twice during the summer months, once during spring runoff and once during base flow conditions. The inflows sampled include Mud Creek below Scofield Town, Fish Creek above Scofield Reservoir and Pondtown Creek above Scofield Reservoir (STORET sites 593149, 593165, and 593168 respectively.) The information for the following tables (2, 3 and 4) is taken from the State

Table 2: MUD CREEK BL SCOLFELD TOWN			
Before Implementation		After Implementation	
Sample date	Total Phosphorus	Sample date	Total Phosphorus
06/17/03	Non-detect	07/05/06	Non-detect
08/26/03	Non-detect	08/22/06	0.025 mg/l
Sample date	Dissolved Phosphorus	Sample date	Dissolved Phosphorus
06/17/03	Non-detect	07/05/06	Non-detect
08/26/03	0.027 mg/l	08/22/06	Non-detect

Table 3: FISH CK AB SCOFIELD RES			
Before Implementation		After Implementation	
Sample date	Total Phosphorus	Sample date	Total Phosphorus
01/21/03	Non-detect	07/05/06	Non-detect
05/06/03	Non-detect	08/22/06	0.024 mg/l
05/20/03	0.055 mg/l		
06/06/03	Non-detect		
06/17/03	Non-detect		
08/26/03	Non-detect		
Sample date	Dissolved Phosphorus	Sample date	Dissolved Phosphorus
01/21/03	Non-detect	07/05/06	0.031 mg/l
05/06/03	Non-detect	08/22/06	Non-detect
05/20/03	Non-detect		
06/06/03	Non-detect		
06/17/03	Non-detect		
08/26/03	0.021 mg/l		

Table 4: POND TOWN CK AB SCOFIELD RES			
Before Implementation		After Implementation	
Sample date	Total Phosphorus	Sample date	Total Phosphorus
06/17/03	0.02375 mg/l	07/05/06	0.021 mg/l
		08/22/06	0.039 mg/l
Sample date	Dissolved Phosphorus	Sample date	Dissolved Phosphorus
06/17/03	Non-detect	07/05/06	Non-detect
		08/22/06	Non-detect

sampling criteria. Fish Creek is the only site where a drop in total phosphorus was realized. With reference to the above tables the lake water sample sites becomes more relevant to an overall lake water decrease in phosphorus levels.

4.2.2 Visual Improvements

Visual surface water improvements came with the implementation of the solid waste transfer station. Before the project was implemented, due to inaccessibility, large quantities of windblown trash and debris would end up polluting the surface waters of the reservoir. The completion of the waste station enables user's better access to the dumpster site, significantly lowering the amounts of trash that ends up in Scofield Reservoir. Several local residents have commented on the surface water enhancements. The project gained momentum and Carbon County secured the funds necessary to install a second solid waste transfer station on the northern end of the reservoir.

Heavy grazing in the Spur bay region led to higher erosion rates along the banks of Scofield reservoir along with nutrient loading from animal waste. After the implementation of a grazing management plan, grasses have returned to Spur Bay enabling a decrease in erosion and nutrient loading. Although, the Utah Animal Feedlot Runoff Risk Index (See Figure 11) was created for animal feeding operations, a load reduction on a range project basis can be estimated. When Scofield water levels increase nearly 15% of the Spur bay region can be submerged. By limiting upwards of 350 animals that use the bay for grazing, down to 2 weeks in the spring and 2 weeks in the fall; there is an estimated reduction from 3,288 to 548 lbs of loading available nitrogen (2,750 lbs N/year), a reduction from 1,603 to 267 lbs of loading available phosphorus (1,336 lbs P/year) and a reduction from 11,955 to 1,993 lbs of loading available BOD₅ (9,962 lbs BOD₅/year). With the rancher using a grazing management plan, there is a calculated, 83% decrease, in all three nutrients.

The property purchased by Carbon County Recreation and Transportation Special Service District on Mud Creek south of Scofield Town has had significant stream bank recovery. The areas targeted for high erosion potential were treated. Banks were pulled to a 3:1 ratio and Willows are beginning to return to the riparian zone, with fewer exposed raw banks. Willow clumps, sod mats and log vanes, and rock J hooks were added to increase vitality and speed recovery. 1.3 river miles were treated. Compared to adjacent properties the visual impact is notable. Unfortunately, the UCASE data for the project will be accumulated over the next five years and is not available for inclusion into this report.

4.3 Monitoring Consistency with QAPP

The Quality Assurance Project Plan (QAPP) monitoring was conducted by the Utah Division of Water Quality. Water Quality samples were collected as subsurface grab samples. All samples were kept cold and dark, being delivered to laboratories and analyzed within the established holding times. Additional monitoring was simply through observable decreases in windblown trash and grassland improvement in grazing management areas. UCASE sampling will continue on Mud Creek for the next five years post project.

COORDINATION

5.0 Coordination Efforts

In the preliminary report, Price River Conservation District (PRCD) was determined to be the lead sponsor; however, after project implementation it was determined that the listed cooperator role should be Carbon County. This change was is due to the fact that Carbon County owns the property of both dumpster site and proposed sign areas. Carbon County will assume all responsibility of maintenance and liability, not the Price River Soil Conservation District

The successes of this project are the cooperation of the various groups involved. The Scofield Water Quality Committee (SWQC) has brought together citizens and partner agencies that are concerned about the future condition of Scofield Reservoir and its tributaries. They represent the primary stakeholders in the future value and future problems that affect this watershed. The Utah Association of Conservation Districts is a non-profit corporation that provided staffing for project coordination and financial administration.

The Scofield Watershed Council was the empowered committee that provided oversight of project conceptualization, cooperator selection and volunteer efforts during implementation, completion and sharing of information generated by this project with others.

5.1 Coordination from Local Agencies

Carbon County – Provided match in the form of labor and equipment to haul fill, compact fill and prepare solid waste transfer station site. Design and inspection work were also performed. A secondary solid waste transfer station at Madsen Bay was added. Agreed to be the sponsoring agent for the Scofield TMDL.

Carbon County Planning and Zoning Department – Provided the design and inspection of both dumpster sites as well as the sign project at the Scofield Reservoir. Two employees serve on the Scofield Water Quality Committee (SWQC).

Carbon County Road Department – Assisted with the finalization of the Scofield Informational Sign and serves on the (SWQC).

Castle Country Travel – Byway Coordination along Hwy 96.

Price River Conservation District – Project oversight and reporting.

Price River Water Improvement District – Hauled in gravel around the solid waste transfer station and serves on the (SWQC).

San Rafael Soil Conservation District – Handled all funds for the solid waste transfer station site improvement project.

Scofield City – Involved with the solid waste transfer station site location and design recommendations and serves on the (SWQC).

Scofield State Park Service – Distribution of water quality informational “refrigerator” magnets to the public and serves on the (SWQC).

Skyline Coordinated Weed Management Area Committee – Booth creation for the distribution of the informational magnet at the Carbon County Fair (8/10/2007). Set up booth each year at the Scofield Annual Celebration.

5.2 Coordination from State Agencies

Utah Association of Conservation Districts – Administration, contracting, staff and technical assistance.

Utah Department of Agriculture and Food – Technical, informational and educational assistance.

Utah Department of Transportation – Coordinated excavation and concrete work for the solid waste transfer station site and site location with design recommendations.

Utah Division of Water Quality – Standard monitoring and technical assistance.

Utah Division of Wildlife Resources – Advisory, monitoring assistance, and project lead for the Mud Creek restoration project.

Utah State Parks – Solid waste transfer station site location and design recommendations.

Utah State University Extension Service – Information and Education

5.3 Federal Coordination

Environmental Protection Agency – Financial assistance and 319 grant oversight.

Natural Resources Conservation Service – Technical planning design and oversight and serves on the (SWQC).

United States Army Corps Engineers – Technical planning and permitting

5.4 Accomplishment of Agency Coordination Meetings

Additional technical assistance and funding for stream bank restoration has been received by the Division of Water Quality and the Division of Wildlife Resources. Agency Coordination meetings have created greater awareness and higher rates of public and county support.

5.5 Other Sources of Funds

At the Carbon County fair (8/10/2007) one volunteer ran the Scofield water quality awareness booth for five hours, distributing the Scofield informational magnets as well as other information pertaining to water quality. The booth was a success as many magnets

were distributed and general water quality awareness among the population was increased. Using the rate of \$18.00 per hour, the total amount of in-kind match is \$90.00.

Carbon County assisted with the first solid waste transfer station, donating time and equipment at \$16,500. Carbon County then funded a second solid waste transfer station for \$24,000. Carbon County assisted with the informational sign, donating \$4,850 toward the custom metal work needed to create the sign.

Other in-kind match as reported from the Scofield Reservoir Project Group were for hours donated toward project discussion, oversight and all meetings totaling \$6,763.00.

6.0 Summary of Public Participation

The success of this project was in direct correlation with the cooperation of various local groups and entities. Private landowners were involved in the preliminary planning, development, commencement and completion of the various projects discussed within this report. Carbon County, Scofield City and various other entities were instrumental in the planning and accomplishments of all projects. Public awareness and concern has increased dramatically in Scofield and the surrounding areas due to the implementation of the informational sign and the distribution of the information magnets. The Scofield Water Quality Committee has brought together citizens and partner agencies that are concerned about the future condition of Scofield Reservoir and its tributaries. They are the primary stakeholders in the future value and future problems that affect this watershed. Increased involvement will invariably be one of the results of the projects performed in Scofield.

7.0 Aspects of the Project That Did Not Work Well

The reduction of Phosphorus as P has been minimal. Early land acquisition for the restroom and parking lot area stalled project work, and then failed. If not for the court ruling for BOR the restrooms and parking area would never have been realized. The cost of establishing a parking lot and restrooms to prevent vehicular access were too excessive for the amount of grant funds allotted. Monitoring results for the Mud Creek Restoration project will not be available until 2015.

8.0 Future Activity Recommendations

Continue stream restoration effort with a focus on Mud and Fish Creeks.
Contact livestock and wildlife managers and inform them through workshops on grazing improvement practices and impacts, for improved support in riparian and reservoir improvement.
Pursue restroom facilities property.
Pursue parking lot.
Continue to inform the public through pamphlets, sign, and informational practices.

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- Denton, R.L., Cox, M.I., Merritt, L.B. 1983. *State of Utah Scofield Reservoir Phase I Clean Lakes Study*. Department of Health, Division of Environmental Health, Bureau of Water Pollution Control. SLC, UT 84103.
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Scofield Reservoir

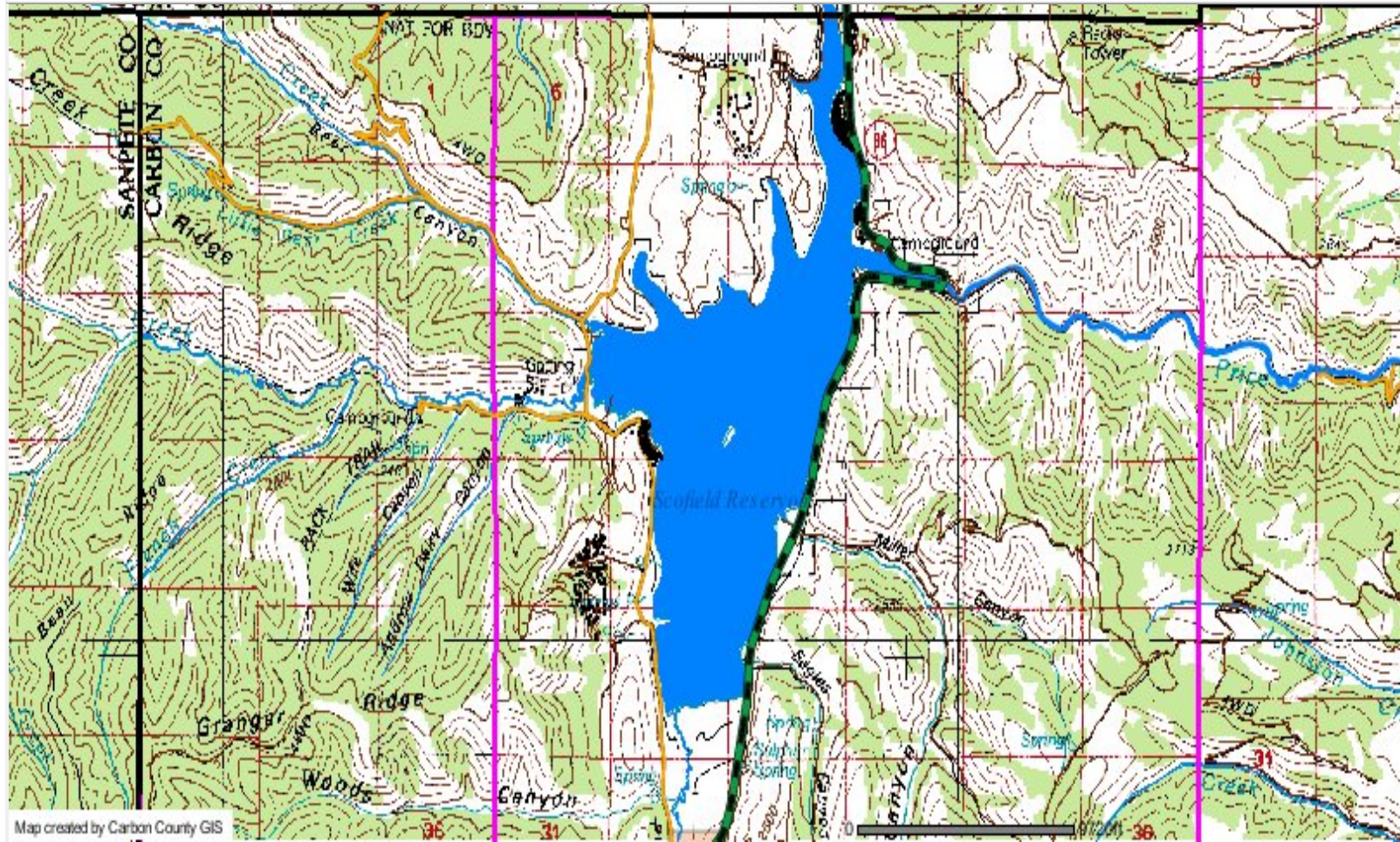


Figure 1: Map of Scofield Reservoir and the surrounding area.

Scofield Reservoir

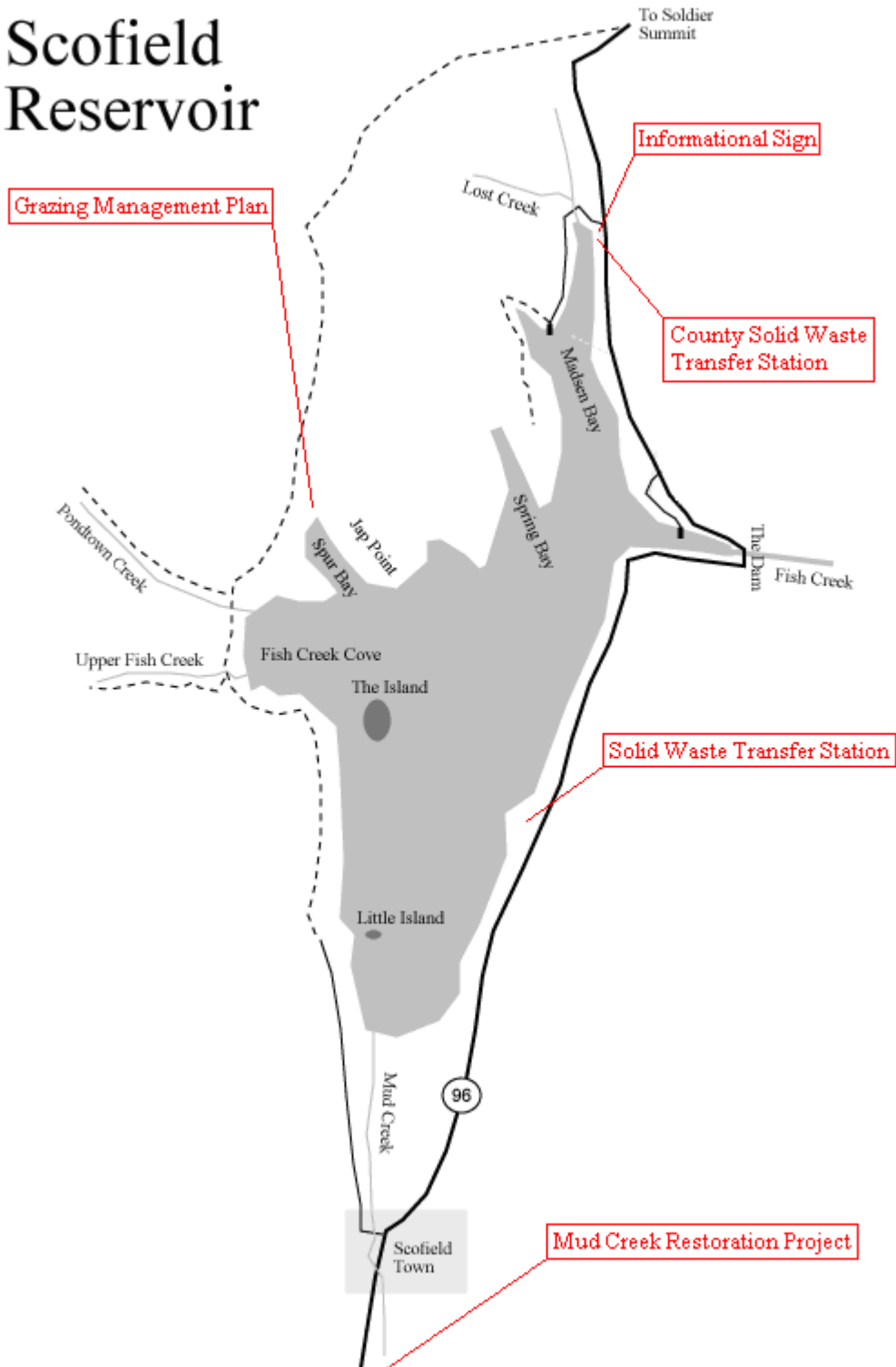


Figure 2: Map of project sites around Scofield Reservoir.



Figure 3: Scofield, Spur Bay before grazing management.



Figure 4: Scofield, Spur Bay after grazing management.



Figure 5: Scofield, dumpster site before project implementation.



Figure 6: Scofield, dumpster site during project implementation.



Figure 7: Scofield, solid waste transfer station complete.



Figure 8: Scofield Sign



Figure 9: Scofield, information and education refrigerator magnet.



Figure 10: Mud Creek, willow wads.



Figure 11: Mud Creek, 3:1 bank slope alteration.



Figure 12: Mud Creek, materials.



Figure 13: Mud Creek, rock erosion protection.



Figure 14: Mud Creek, log vane.



Figure 15: Mud Creek, project completion.



Figure 16: Scofield Madsen Bay, county waste transfer station during implementation.



Figure 17: Scofield Madsen Bay, county waste transfer station complete.

***Utah Animal Feedlot Runoff Risk Index Worksheet**

Landowner:	Mr. Brown
Location:	Spur Bay, Scofield
Planner:	Dnaiel Gunnell
Date:	April 21, 2010

Weather Station:	Fairview
HUC:	14060007
Precipitation:	13.5

Lot Description:	Open Rangeland, on Spur Bay			
Planning Scenario:	Before	After	Before	After
Lot Size (Sq. Ft.):	440000	440000		
Surface Type:	Dirt	Dirt		
Animal Type:	Beef (Cow)	Beef (Cow)		
No. of Animals:	350	350		
Avg. Weight:	1100	1100		
Days Confined:	84	28		
Sq.Ft./Animal:	1257.1	1257.1		
Feedlot Features				
Runoff Containment	40	20		
Distance to Water	16	16		
% Slope	1.5	1.5		
Vegetation	4	2		
Clean H ₂ O Diversion	0	0		
Index and Risk Level				
Index:	61.5	39.5		
Risk Level:	High	Medium		
Manure Management and Conservation Practices				
Haul/Scrape Frequency	Annually	Annually		
Practices to be implemented	The rancher has agreed to graze the animals 2 weeks in the spring and 2 weeks in the fall.			
Loading Calculations				
Fresh Manure (tons)	1,023	341		
Total N Available (lbs)	5,870	1,957		
Total P Available (lbs)	2,862	954		
Total BOD ₅ Available (lbs)	21,344	7,115		
Precipitation Factor	0.78	0.78		
Lot Surface Factor	0.90	0.90		
Risk Factor	0.80	0.40		
Total N Loading (lbs)	3,288	548		
Total P Loading (lbs)	1,603	267		
Total BOD ₅ Loading (lbs)	11,955	1,993		

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

Figure 18: Estimated load reductions in Nitrogen, Phosphorus and Total BOD₅. Although the UAFRRI is used primarily for animal feeding operations and the Spur Bay area is considered rangeland, an estimated load reduction on Spur Bay can be realized by using the index. As shown in Figure 3, the landscape was denuded severely before the introduction of a working Grazing Management Plan. In order to facilitate the use of the index, a conservative approach using values closely associated with documented conditions was used to obtain numerical values.