2003 REPORT TO CONGRESS

Activity at a 25-acre constructed wetland completed as part of a section 319 project with participation of three landowners in the Jim Ford Creek of the Clearwater River system. Learn more about this project on pages 9-12 of this report.

Taking Plans to Action

STATE OF IDAHO NONPOINT SOURCE MANAGEMENT PROGRAM

Department of
Environmental Quality
1410 North Hilton
Boise, ID 83706

2003 REPORT TO CONGRESS

Taking Plans to Action

STATE OF IDAHO NONPOINT SOURCE MANAGEMENT PROGRAM

Department of
Environmental Quality
1410 North Hilton
Boise, ID 83706

2003 REPORT TO CONGRESS

IDAHO NONPOINT SOURCE MANAGEMENT PROGRAM

OVERVIEW

Each year the Program is obligated to submit a Report to Congress. The Report is intended for a general audience and highlights activities conducted during that calendar year. Highlights include primarily focus on project outcomes, assessing progress made in the field, and project close out summaries. The *Taking Plans-to-Action: 2003 Program Annual Report* describes overall activities conducted by the program and can be accessed at http://www.deq.state.id.us/water/nps/Annual_Report_2003_Full.pdf

The *2003 Report to Congress* is divided into three sections. The first section provides an introduction and overview of the project field evaluation season. The full report *2003 Field Evaluation Progress Report* can be accessed at http://www.deq.state.id.us/water/nps/FieldEvalReport_2003.pdf

The second section of report summarizes work conducted in four "placed-based" areas around the state. The four areas focused on this year that really provide the best example of project accomplishments were: Jim Ford Creek of the Clearwater River, Medicine Lodge Creek, Paradise Creek of the Columbia River System, and Thomas Fork Creek.

The third section provides twelve summaries of sixteen completed projects. These projects represent five of the seven sectors represented by the state's 1999 Nonpoint Source Management Plan. Many of these projects took between two and three years to complete. Each summary provides a brief discussion about the benefits and outcome of the project. Additional information can be obtained for these projects by contacting the manager of the program.

Todd Maguire, Manager
The State of Idaho
Nonpoint Source Management Program
Department of Environmental Quality

SECTION 1

Results of the 2003 Project Field Evaluation Season

DEQ currently oversees approximately 50 NPS regional projects in Idaho. Each project is assigned a contract number. If projects are extended to several years with additional tasks and funding, additional contract numbers may be assigned to a project area (see Table 1). All projects are subject to field inspections by DEQ. DEQ's Nonpoint Source Program manager set a goal to evaluate the progress of at least half of all current projects annually, to assure the projects are completed in a timely manner and achieve their overarching goal of cleaning up and preventing NPS water pollution. During the summer and fall of 2003 staff from the DEQ Technical Services Division exceeded that goal by inspecting 32 of 50 on-going NPS contracted projects.

DEQ used its list of NPS field project requirements to generate a detailed form for staff to use for field evaluations. For all evaluations DEQ staff carefully reviewed the project's subgrant agreement and made notes prior to going to the field. The DEQ project evaluator routinely contacted the project manager and arranged to accompany the project manager, DEQ regional staff, and any other stakeholders to the field. In all cases the detailed evaluation form was used as a guide to assure that all NPS requirements were being met in the field.

DEQ staff traveled to 25 geographical areas of Idaho and evaluated 32 contracted projects during the summer and fall of 2003. Of the 32 contracts evaluated, 28 appear to be fully meeting their contractual obligations by demonstrating substantial progress toward completion of their designated tasks to reduce, eliminate, or prevent NPS water pollution. Three contracts appear to be proceeding unsatisfactorily, and work on one contract has been delayed until next year.

Two of the projects where unsatisfactory work is occurring include storm water BMPs at the City of Blackfoot and storm water BMPs at the City of Pocatello.

During our evaluation of the Blackfoot projects (Contract Number S020) DEQ learned that the Blackfoot Tribe, which owns adjacent land, has elected to not let the City of Blackfoot use their land at the outflow end of both retention ponds involved in this project. This denial of land use will cause the storm water capacity of one pond to be reduced considerably and will cause the other pond to not function as a flow-through facility as originally designed. No further 319 funds should be spent on either pond until this problem can be solved.

During our evaluation of the City of Pocatello's North City Park Wetland project DEQ discovered that there seems to be a problem with the proposed location of the bioinfiltration/wetland facility. It appears that the area selected for the wetland and bioinfiltration basin will not be maintainable without the installation of a costly irrigation system. An irrigation system would be required because the bottom of the proposed wetland would be situated too far above the water table for the wetland to be self-sustainable. It is also unclear whether the conveyance pipeline and outlet that has already been installed will work properly in a storm event. After discussing the project with DEQ engineers and the city engineer it is suggested that no additional 319 funds be spent on this project until these issues have been resolved.

The great majority of the projects evaluated in 2003 are proceeding satisfactorily. The project evaluations covered a variety of best management practices (BMPs) related to recognized NPS categories including agriculture, hydrologic habitat modification, transportation, mining, and urban storm water runoff.

Projects evaluated include irrigation water cleanup, wetland creation, and settling ponds in south-central and southeast Idaho; Animal Feeding Operation (AFO) relocations, stream bank restoration, livestock exclusion,; and restoration of an abandoned mine dump near Yellow Pine, in north-central Idaho. Finally, in the watershed above Winchester Reservoir, DEQ evaluated pollution prevention measures including low-till and no-till farming techniques, and lake water cleanup techniques in Winchester Reservoir including lake water aeration.

In section 1, Table 1 lists details of all 32 of the NPS contracted projects that were evaluated in the field during the summer and fall of 2003. These 32 contracts occurred at 28 project sites around Idaho. In Section 2, four project areas?the Jim Ford Creek Watershed Enhancement Project, the Thomas Fork Stream Bank Protection Project, the Medicine Lodge Creek Total Maximum Daily Load (TMDL) Implementation Project, and the Paradise Creek TMDL Implementation Project are high-lighted because they exemplify outstanding coordination, design, and implementation. Reports of all 28-project evaluations are contained as an appendix to this report or can be accessed electronically through links from Table 1.

FIGURE 1
Active Nonpoint Source Projects that Were Field Evaluated during Summer/Fall 2003

TABLE 1

Active Nonpoint Source Projects That Were Field Evaluated during Summer/Fall 2003

Grant Year	Contract Number*	Project Name	Hydrologic Unit No.	Tasks or BMPs Evaluated	DEQ Region
2000	Q609	Bear River Fencing and Riparian Enhancement	16010202	Stream bank stabilization, fencing, grazing plans, weed control	Pocatello
2000, 2001	Q607 and S020	Blackfoot, City of, Engineered Wetland and Urban Runoff	Two storm water retention	ponds	Pocatello
1998,1999	Q529 and Q366	Coeur d' Alene Tribe Wetland Creation and Restoration/Lake Creek – Plummer	1701030423	Sediment control BMPs for dirt roads	Coeur d' Alene
2003		Cedar Draw Coulee Wetland		A series of three serpentine shaped ponds that will be interconnected with riparian wetland areas	Twin Falls
2003	S093	Edson Fichter Nature Area		Revetments, seeding along stream bank, restoration of 700 feet of meandering stream channel, installation of 300 feet of pipe to convey water to a settling pond, installation of a small settling pond	Pocatello
1999	S029	H 17 Drain TMDL Implementation Plan		200 feet long and 50 feet wide sediment basin installed at the bottom end of a six-mile long irrigation canal; captures sediment from return irrigation water prior to discharge to Goose Creek and Snake River.	Twin Falls
2002	S055	Hailey Big Wood River Improvement	17040219	Stream bank stabilization – 1300 feet, Rock drop structures – 4 Removed highway maintenance material that was adjacent to river, Planted woody and grass vegetation along bank and filter strip Removed illegal land fill including asbestos, Installed ? acre settling pond/wetland used for normal river flow and for storm water runoff	Twin Falls
2001	S015	Jim Ford Creek Watershed Enhancement	17060306	Road rocking and culvert installation, 6 miles of exclusion fencing, 9200 willow cuttings planted, 3300 lodgepole pine seedlings planted, 1100 dogwood seedlings planted, 2500 hawthorne seedlings planted, 100 alders, 100 cottonwoods, 200 spirea planted One quarter mile of stream rehabilitation and re-alignment completed	Lewiston
2001	S041	Kinsey Corral relocation Note: This project has been delayed and will be completed next year.		We visited the current location of Kinsey corral and discussed the relocation and reclamation of the old site. We observed where 3,500 feet of exclusionary fencing will go to keep livestock out of McMullen Creek. We visited the site where the new corral will be built	Twin Falls
2002	S054	Lemhi Watershed TMDL Implementation		Fencing, diversion berms, pipe line, water troughs, well	Twin Falls
2003	S079	Maine Purrine Coulee Wetland		Future site for a concrete diversion structure, a large (8 acre) settling pond and several wetlands These features will treat 80 to 90% of all the water coming through Main Perrine Coulee	Twin Falls
2002	S051	Medicine Lodge Creek TMDL Implementation	1704021505 0100	Willow Clumps, Willow pole plantings Toe rock rip rap, Vertical bundles of willows, V-Notch weirs used for drop structures, Grass, Fencing	Idaho Falls

Grant Year	Contract Number*	Project Name	Hydrologic Unit No.	Tasks or BMPs Evaluated	DEQ Region
2001	S039	North-central AFO Relocation		Relocation of numerous AFOs belonging to 27 operators over five conservation districts BMPs include corral relocations, hardened crossings, fencing, culverts and water troughs	Lewiston
1999	Q562	Paradise Creek (Urban) TMDL Implementation	17060108	Wetlands, stream channel restoration, extensive plantings, fencing, woody plant riparian buffers, wildlife habitat structures stream bank stabilization, noxious weed control, flood plain restoration	Lewiston
2000	Q605	Paradise Creek (Rural) TMDL Implementation	17060108	Wetlands – 5 projects totaling 522,700 square feet within 11 wetlands, gully plugs, fencing – 16,000 feet, woody vegetation – 10,547 plants, herbaceous vegetation – 168,680 plants stream bank restoration – 18,750 feet, noxious weed control, storm water bioinfiltration ponds, vegetated buffer – 685,364 square feet (Note: all figures are proposed amounts upon project completion)	Lewiston
1997	Completed	Pocatello First Street Wetland	17040208	3 acre combined wetland and retention/evaporation basin	Pocatello
2001	S022	Pocatello North City Park Wetland	17040208	One small catchment basin has been constructed, conveyance pipeline and infiltration sump have been installed, a large bioinfiltration wetland basin could be constructed in an oxbow to the Portneuf River	Pocatello
1999	Q508	Raft River Riparian and Watershed Demonstration		Rock crossings, rock drop structures-20, stream bank stabilization revetments, 12 diversion structures, 12 weirs, 12 concrete irrigation return flow structures, plantings including willows and grass, grazing management	Twin Falls
2001	S023	Rapid Creek Riparian Project		Water well and pump, corral modification, pipeline, water troughs, 1,500 feet of fencing, stream bank restoration, grass and woody plantings	Pocatello
2001	S026	Rock Creek Restoration	17010304	Two storm water detention ponds, stream bank sloping and stabilization geo-matting, seeding, trees, shrubs, sprinkler system, installation of 5000 yards of topsoil, removal of old concrete from a two acre area, installation of two pedestrian bridges across Rock Creek	Twin Falls
2001	S024	Santa Creek Stream Bank Restoration	17010304	Electric fencing, hard crossings , re-vegetation along stream bank including wild rose, willow, aspen, thin leaf alder, syringa, wild apple, white pine, ponderosa pine, Douglas fir, and larch	Coeur d' Alene
1999, 2000	Q564 and S009	Scriver Creek Watershed Roads and Forested Lands	17050112	Sediment control BMPs for dirt roads including culverts, gravel road base, road sloping, ditches, two sediment collection/measuring boxes	Boise
1996	Q444	Sheridan Creek Restoration	17040202	Nine large diversions completed, (one remaining to be completed), 14 miles of fencing, 10 rock check dams, six culverts numerous rock drop structures, 0.5 mile of riparian plantings along stream banks, one water well	Idaho Falls

Grant Year	Contract Number*	Project Name	Hydrologic Unit No.	Tasks or BMPs Evaluated	DEQ Region
2003	Internal	Stibnite Mine Meadow Creek Restoration		Two sub-project areas include the Glory Hole project and Meadow Creek area. Glory Hole BMPs include relocation and stabilization of mine tailings, adjacent to Meadow Creek. Meadow Creek BMPs include construction of a large composting operation, application of compost to reclaimed mine waste piles, additional reclamation of mine waste piles, installation of stream bank plantings	Boise
2001, 2002	S016, and S053	Thomas Fork Stream Bank Protection	16010102	Numerous rock barbs, 13,267 feet of stream bank sloping and riprapping, 13,267 feet of stream bank plantings including grass and woody vegetation, 10,000 of fencing, drop fencing for variable flows, one 18 foot wide and 66 foot long bridge across Thomas Fork River, one manure separator, one wetland complex.	Pocatello
2000	Q606	Willow /Boulder Creeks BMP Implementation	17050123	Fencing, hardened crossings, trees and scrubs, stream bank restoration and stabilization, cattle exclusion, pest management	Boise
2002	S043	Winchester Lake In-Lake Phosphorous Reduction	17060306	Five electric powered aerators installed on Winchester Lake, one fish cleaning station	Lewiston
1999	S011	Winchester Lake Upper Lapwai Creek Watersheds	17060306	Nine fish friendly culverts, filter strips between cultivated fields and dirt roads, no-till farming techniques applied to 30% of all cultivated fields, reduced till farming techniques applied to 60% of all cultivated fields, grass planted in intermittent waterways	Lewiston

*More than one contract number for a project indicates that additional funding was later granted for additional tasks.

SECTION 2

Outstanding Projects of 2003

Jim Ford Creek Water Quality Management Report

Jim Ford Creek in the Clearwater Basin (see Figure 1) flows through forested uplands to the city of Weippe then passes through a narrow steep basalt canyon to its confluence with the Clearwater River.

The Jim Ford Creek watershed is managed to reduce pollutants (including sediment, excess temperature, and bacteria) and nutrients (including total inorganic nitrogen and total phosphorus). Nonpoint sources causing impaired water quality include timber harvest activities, rural land use, grazing, non-irrigated croplands, urban runoff, and land development activities. Point sources of pollution include the Weippe wastewater treatment plant, the Timberline High School wastewater treatment plant, and Hutchins Lumber, Inc.

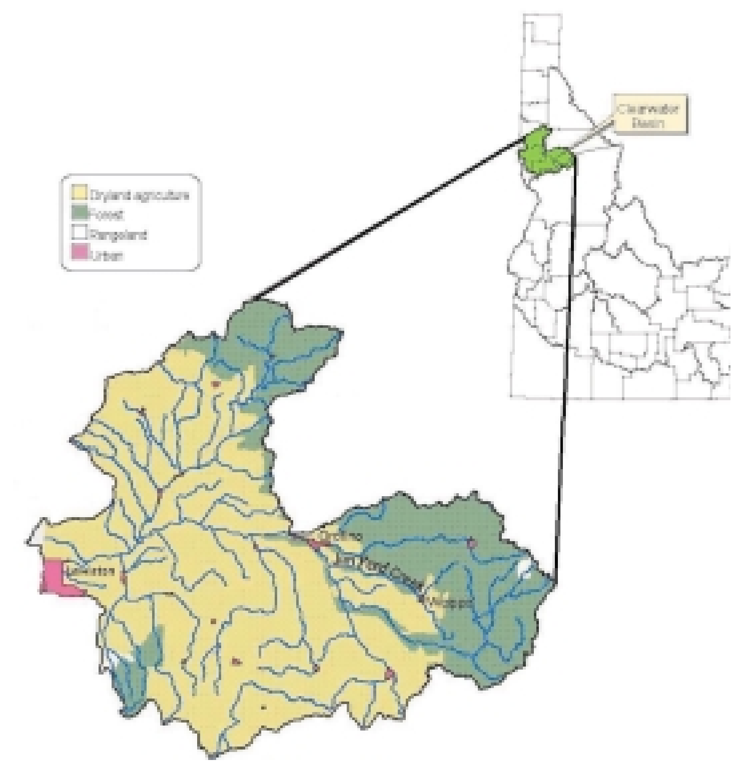


FIGURE 1
Jim Ford Creek in the Clearwater Basin

KEYS FOR SUCCESS

Three keys for success in the watershed management of nonpoint sources fueled the tremendous cooperative efforts of the Clearwater Soil and Water Conservation District, the Nez Perce Tribe, the Idaho Department of Lands, Potlatch Corporation, and private landowners. First, every agency made an effort toward public outreach, increasing the camaraderie between the agencies and the private landowners. Second, landowners have been and continue to be very proactive in seeking assistance and technical advice from the conservation district. Finally, Clearwater County recognized the assets of all of the watershed improvements and increased funding to the conservation district.

PHASED IMPLEMENTATION PLAN

Due to the complexity of riparian systems, restoration efforts take many years to become fully effective. The Clearwater Basin Advisory Group formed the Jim Ford Creek Watershed Advisory Group to develop an implementation plan to reduce the pollutants affecting water quality and the result is a phased plan with a schedule of activities to reduce pollutant loading to the stream. Refer inside for Table 1 provides a summary of the watershed management projects that have already been accomplished, along with descriptions of the resultant benefits to Jim Ford Creek water quality. Many of the watershed improvement projects are being installed on streams that are tributaries to the mainstem of Jim Ford Creek.

FIGURE 2
One of nine rural land use projects

TABLE 1 **Summary of Watershed Management Projects for Jim Ford Creek**

Management Issues	Collaborative Partners in Watershed Management	Watershed Management Projects Accomplished	Resultant Benefits to Jim Ford Creek Water Quality
Forestry Land Use	Idaho Department of Lands Clearwater Soil and Water Conservation District (Clearwater SWCD)	2 miles of fence built, 5 culverts installed, stream rehabilitation, and riparian plantings completed in Miles Creek	Fencing and culvert installation restores natural drainage pattern and eliminates historic spring flooding that had transported nutrients, bacteria, and sediment to the stream Stabilized streambanks and restored riparian vegetation, which filters pollutants, reduces erosion, and cools the water
		1.5 miles of riparian plantings on Wilson Creek	Restored riparian vegetation, which filters pollutants, reduces erosion, and lowers water temperature
		Riparian plantings of trees and shrubs on Space Creek	Restored riparian vegetation, which filters pollutants, reduces erosion, and lowers water temperature
	Potlatch Corporation Clearwater SWCD	Constructed 6 miles of fence, two new corrals, two cattle guards, and two new stockwater ponds outside of the riparian area, and planted trees and shrubs in the disturbed stream sites on Winter Creek	Eliminated grazing on 80% of the Winter Creek subwatershed, thereby reducing nutrient, bacteria, and sediment load to the receiving waters Riparian habitat restoration produced cooler instream temperatures
		Stabilized and repaired mass failure 100 feet wide by 800 feet long on Green Road, installing culvert ahead of the slump to keep excess water from saturating the fill	Eliminated further sedimentation and channel movement of a lower reach of Jim Ford Creek that had been previously impacted by the bank failure
Rural Land Use	Clearwater Highway District Clearwater SWCD	Nine projects in the Jim Ford Creek drainage to line ditches with rock; grade, slope, and rock roads; mat and hydroseed bare slopes; replace ineffective culverts; and build additional culverts (Figure 2)	Ditch armoring has reduced high flows that used to cause gully washing, bank erosion, and increased turbidity, allowing more spring runoff water to infiltrate instead of contributing to overland flow. Properly functioning culverts and vegetated banks reduce sediment contribution to streams
	Clearwater SWCD Idaho Department of Fish and Game Private landowners	Built 25-acre wetland in the Weippe Prairie with the participation of three landowners (Figure 3)	Livestock exclusion from streambanks reduces nutrient, sediment, and bacteria input to the surface water Restored wetland vegetation filters pollutants, reduces erosion, and cools the water temperature
	Clearwater SWCD Private landowners	Improved animal feeding operation facilities for two private landowners with covered manure stacking pads, covered feed bunk mangers, and new corral systems with watering facilities.	Practically eliminated any animal waste from entering surface or groundwater, thereby decreasing nutrient, solids, and bacteria loading to the receiving waters
Grazing	Clearwater SWCD Bennett Creek Grazing Association	Built new livestock corrals and holding pens outside of the riparian area of the Winter Creek drainage	Improved livestock containment prevents riparian degradation
Point Sources	City of Weippe wastewater treatment plant	Removed underdrain from Jim Ford Creek and monitored effluent with a grant from the US Environmental Protection Agency	Phosphorus and bacteria were below the load allocation
Point Sources *continued*	Timberline High School	Monitoring and effluent disinfection	No bacteria detected in effluent
	Hutchins Lumber, Inc.	Storm water plan implemented	Reduces potential storm water nutrient and sediment load from entering the watershed

The Water Quality Program for Agriculture has accomplished 16 contracts with private landowners since May 2000, with Best Management Practices including the following:

- 10 miles of riparian fencing
- 9 livestock access ramps for heavy-use area protection
- 3 grade stabilization structures
- 2 wildlife and stockwater ponds
- 100 acres of new pasture and hayland plantings
- 1 natural spring development
- 2 feedlot restoration contracts

The Continuous Conservation Reserve Program has enlisted 235.5 acres of marginal pastureland for riparian improvements including the following:

- 16,700 tree and shrub plantings
- 9,300 linear feet of riparian fence
- 1 natural spring development
- 3 ramps built for heavy-use area protection

FUTURE WORK

Work remains to be done in the Jim Ford Creek watershed: the Lower Ford Creek Road on tribal land of the Nez Perce Indian Reservation will be repaired and improved, the hillside within a road cut will be graded to a gentler slope and stabilized with vegetation, and the road will be realigned, graded, and rocked. All of the repair work will eliminate potential sediment transport to Jim Ford Creek.

Work also continues on the Weippe Prairie wetland restoration. Through landowner participation, the Clearwater Soil and Water Conservation District is working on purchasing 100 more acres of potential wetland to restore the area to a functional wetland.

FIGURE 3
25-acre wetland built with participation of three landowners

Medicine Lodge Creek

Medicine Lodge Creek TMDL Implementation

Work funded through the 319 NPS Program is treating 35 miles of streams within the Medicine Lodge Subbasin (Figure 1), including Medicine Lodge Creek, Irving Creek, Fritz Creek and Edie Creek. Work on all of these 303d-listed stream segments will take four to five years with a grant amount of $783,326. This project requires cooperation between the Clark Soil Conservation District, the Natural Resources Conservation Service, the Idaho Association of Soil Conservation Districts, the Soil Conservation Commission, the Idaho Department of Agriculture, the Idaho Department of Environmental Quality, and local landowners.

FIGURE 1
Location Map for Medicine Lodge Creek TMDL Implementation Project

FIGURE 2 *The success of this program depended heavily on convincing local ranchers and landowners that State and federal agencies would work with them to improve water quality without negatively impacting ranching operations.*

FIGURE 3 *Problems that are routinely found along Medicine Lodge Creek include unstable, steep stream banks caused by improper grazing techniques. This problem has been exacerbated by unusual weather patterns over recent years.*

FIGURE 4 *One solution to bank erosion is to carefully place rip-rap and woody vegetation at the toe of the bank. With time, this bank will become completely vegetated and stabilized.*

Another common problem along Medicine Lodge Creek is that confined animal feeding operations (CAFOs) have historically been placed in and adjacent to streams in order to provide water for livestock. The CAFO seen in Photo 4 used to be located in Irving Creek. This facility was recently relocated away from Irving Creek and now has water piped into it.

FIGURE 5 *Confined Animal Feeding Operation relocated away from Irving Creek*

Adjacent to the 35 miles of stream length being treated, there are more than 1,527 acres of riparian area to be treated. The Best Management Practices (BMPs) being implemented in these areas include prescribed grazing systems, corral systems, water gaps, hardened crossings, exclusionary fencing, vegetation revetments, clump plantings, rock V-weirs, and stable concrete irrigation diversions.

FIGURE 6 *Vertical slopes from overgrazing were knocked down. Rip-rap and willows were added to stabilize the bank. This looks unsightly now but will appear quite natural after one or two growing seasons. The biodegradable silt fencing will break down.*

FIGURE 7 *The stream bank in the foreground has been re-sloped, stabilized with rip-rap, and replanted. The vertical stream bank in the background has not yet been rehabilitated.*

FIGURE 8 *Willows were planted as horizontal bundles and as transplanted rooted clumps. All woody plants are locally derived. Many of the vertical banks were stabilized at their toe with large rocks and woody plants. The upper bank will slough back until stabilization is naturally achieved. Vegetation will then continue to establish itself naturally.*

FIGURE 9 *One very effective method for planting willows involves the use of a water jet. This high-pressure water injection technique allows the willow cuttings to be quickly and easily planted several feet deep along the bank and within the water table.*

FIGURE 10 A

These willow cuttings were planted with the assistance of water jet injection. Each vegetative revetment consists of several large trees, carefully embedded along the stream banks, to create a slower moving stream velocity where previously faster moving water was causing erosion. By cutting select trees on nearby forest service land, an additional benefit is gained: thinning the trees and reducing the fire danger in the adjacent forest.

FIGURE 10 B

Willow cuttings from a broader perspective.

All of these BMPs are being applied with the ultimate goal of restoring coldwater aquatic life and beneficial uses on 35 miles of stream bank along Medicine Lodge Creek. This goal is achieved by reducing stream bank and stream channel erosion; improving grazing management with planned grazing, pasture or exclusion fencing; decreasing sediment, nutrient and bacteria concentrations; reducing livestock concentration with off stream water developments; buffering streams with grass, shrubs and trees; and stabilizing eroding streambanks and channels using stream re-naturalization techniques.

FIGURE 11 *Within several years, all of the areas shown in the previous photographs will look as good and function as well as this section that was completed just two years ago.*

FIGURE 12 *These are some of the members of the Basin Area Group (BAG) that supported the Medicine Lodge Creek project. Lloyd Bradshaw (second from right) is the project manager.*

Paradise Creek

Paradise Creek Riparian Restoration

A PROGRAM OF THE PALOUSE-CLEARWATER ENVIRONMENTAL INSTITUTE

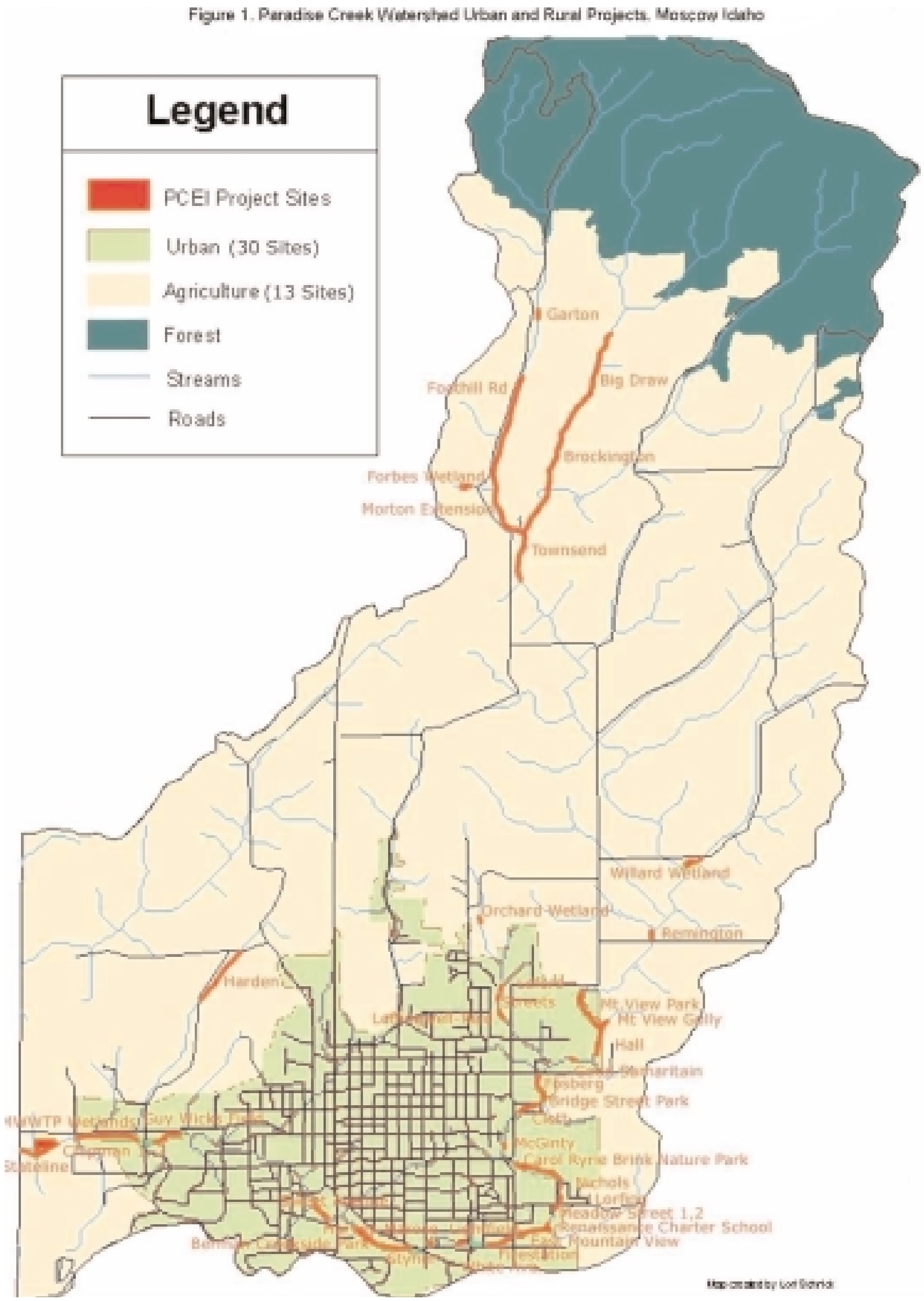
There are thirty-four sub-projects funded through NPS 319 subgrants that have been completed under the Paradise Creek Riparian Restoration Program by the Palouse-Clearwater Environmental Institute since 1999. All of the sub-projects are located in the Paradise Creek watershed upstream of the City of Moscow (Figure 1). Partners and local matching funds came from a wide variety of sources. The *Urban Riparian Restoration Project* began in 1999 and continues to date. This summary contains pertinent information, including photographs for four of the twenty- three urban sub-projects for 2003:

- Leffingwell-Reid Wetland Construction and Revegetation
- Lefors Wetland: Wetland Construction and Riparian Planting
- Streets Wetland Construction and Riparian Planting
- White Avenue: Stream bank Stabilization and Revegetation

The *Rural Riparian Restoration Project* began in 1999 and continues to date. This summary contains pertinent information including photographs for ten of the eleven rural sub-projects for 2003:

- Brockington Riparian Planting
- Forbes Wetland Construction and Riparian Planting
- Garton Hardened Rock Stream Crossing
- Harden Riparian Planting
- Morton Meander, Floodplain, Wetland Construction, and Riparian Planting
- Morton Extension Channel Remeander and Riparian Planting
- Remington Riparian Planting
- Townsend Re-meander, Floodplain Excavation, and Riparian Planting
- Willard Sediment Catchment, Wetland and Riparian Planting
- Big Draw Riparian planting

FIGURE 1
Paradise Creek Watershed Urban and Rural Projects, Moscow, Idaho



LEFFINGWELL-REID WETLAND CONSTRUCTION AND REVEGETATION

Partners and local matching funds came from Jeanne Leffingwell, James Reid, the City of Moscow, and community volunteers. The project took place during Summer 2003 and included 650 feet of stream bank restoration and construction of 8,420 square feet of wetlands in three areas.

PREVIOUS CONDITIONS: Prior to restoration, this Paradise Creek tributary was a straight, incised channel. Reed canary grass was the predominant species, with a vigorous infestation of Canada thistle and morning glory. The site had few native trees and shrubs, grasses and forbs. The stream reach was exposed to direct solar radiation as well as storm water runoff containing sediments, nutrients, and pesticides.

DESCRIPTION OF COMPLETED ACTIVITY: This urban riparian restoration project is a demonstration of the effectiveness of creating and maintaining a riparian wetland area in the Paradise Creek watershed. The long-term goals of the project include establishment of native riparian vegetation, improved water quality, and increased habitat for wildlife.

To accomplish these goals, a narrow meandering stream channel and three associated wetlands were constructed. Wetlands vary in depth from 1 to 2.5 feet. Professional Operators Company excavated the site with a track hoe, using an 18-inch toothed bucket. The construction phase took approximately three days to complete. The wetlands are adjacent to the new channel to receive and filter runoff before entering the stream and to increase flood storage capacity (Figure 2).

Community volunteers helped seed the site with native grasses and install geotextile fabric on newly constructed banks. Wetland transplants and herbaceous plugs were planted along the stream channel, as well as in and around the three wetlands. Stream banks and wetland edges

FIGURE 2 *Leffingwell-Reid property after work was complete in Fall 2003*

were seeded with native grasses, including tufted hairgrass, ticklegrass, fowl bluegrass, western managrass, prairie junegrass, and Idaho fescue. The riparian area was also planted with herbaceous species (small-fruited bulrush, common rush, creeping spikerush) and native woody species (red osier dogwood, sandbar and Mackenzie willow [plugs], quaking aspen, Douglas hawthorn, Nootka rose, serviceberry, shiny leaf spirea, and syringa).

LIGHTFIELD STREAM BANK STABILIZATION AND RIPARIAN PLANTING

Partners and local matching funds came from Kirk Lightfield, the City of Moscow, and community volunteers. The project was constructed during Summer 2003, along a stretch of Paradise Creek located between Blaine Street and Lynn Street, 918 White Avenue, Moscow, and consists of 200 feet of stream bank restoration.

PREVIOUS CONDITIONS: The stream segment had nearly vertical, slumping, eroding stream banks that contribute to the sediment load in the creek. Reed canary grass was the predominant species on this stream reach. There was a lack of existing native woody vegetation close to the creek to help shade out weeds and decrease water temperature. In the past, this reach of Paradise Creek was dredged, which exacerbated the steep banks and promoted incising (Figure 3).

DESCRIPTION OF COMPLETED ACTIVITY: The construction phase of the project was completed September 23, 2003. Moscow contractor, Dale Stubbs, excavated the existing bank to create a 2:1 slope. Slope construction took approximately six hours using a 48-inch toothed bucket. Bio-logs were installed at the toe of slope to provide a shelf for plant material and bank stabilization. The coir logs were terraced two high on the upstream section of the project, this technique used to minimize undercutting in an area of high velocity. The re-sloped bank was promptly seeded with native grasses (tufted hairgrass, ticklegrass, fowl bluegrass, western managrass, prairie junegrass, and Idaho fescue), herbaceous plants (small-fruited bulrush, common rush, creeping spikerush) and native woody species (red-osier dogwood, sandbar and Mackenzie willow [plugs], quaking aspen, Douglas hawthorn, Nootka rose, serviceberry, shiny leaf spirea, and syringa) (Figure 4).

FIGURE 3 *Lightfield Stream bank before work*

FIGURE 4 *Lightfield Stream bank after work*

STREETS: WETLAND CONSTRUCTION AND RIPARIAN PLANTING

Partners and local matching funds came from AmeriCorps*NCCC, TerraGraphics Environmental Engineers, Renaissance Charter School, Lapwai Elementary School, and community volunteers. During Fall 2002 and Spring 2003, restoration of two wetlands, covering 14,019 square feet and 732 feet of stream bank, was completed in a draw between Mountain View Road and Cleveland Street. This location is behind a residence in Moscow.

PREVIOUS CONDITIONS: The site is on a tributary to Paradise Creek in a draw. The stream segment was bordered by a steep bank on the east side and a wide, flat wet area to the west. The site was inundated for a significant portion of the year, which made it a suitable location for a wetland. Reed canary grass was the dominant vegetation along the stream segment, and few trees or other woody species were present. The site was directly downstream from a horse pasture and was impacted by associated pollutants entering the water from upstream.

DESCRIPTION OF COMPLETED ACTIVITY: Two shallow, excavated wetlands were constructed at the site. The wetlands range from 40 to 80 feet wide, are approximately 275 ft long, and have an organic shape. The depth of the wetlands ranges from 1 to 2.5 ft. The wetland area is fed by runoff and a spring located in the northern portion of the project. In addition to the spring, the wetland design allows the waters of the adjacent stream to spill out, over into the wetland area while providing a defined channel for water movement in low flow situations. A berm, located on the east side of the stream, was removed to allow for the extension of the floodplain. Approximately 895 cubic yards of soil was excavated from this site. The excavated soil was relocated onsite.

Wetlands were constructed on the tributary to Paradise Creek to improve flood control, provide native habitat for wildlife, and filter pollutants. The constructed wetland also provides recreational and educational opportunities for the community. Native species of woody shrubs, trees and grasses were planted along the bank to provide shade to the stream and wetlands and wildlife habitat. Herbaceous wetland plants were planted in the wetland to help improve water quality by reducing nutrient loading through filtering. All plantings are protected from animal damage with plastic tubes.

Native willow and cottonwood cuttings were planted along the banks of the stream to secure the banks and introduce shade to the system, creating a woody riparian buffer. Woody riparian buffers offer many benefits, including filtration of runoff, wildlife habitat and flood water retention. PCEI also organized a day of camas planting with students from Renaissance Charter School and Lapwai Elementary School. The students learned about the ecological and cultural significance of the camas from a member of the Nez Perce Tribe and helped restore the plant to its native Palouse Prairie (Figure 5 and Figure 6).

FIGURE 5 *Streets site before planting*

FIGURE 6 *Streets site after planting*

WHITE AVENUE: STREAM BANK STABILIZATION AND REVEGETATION

Project Partners and local matching funds came from the City of Moscow, AmeriCorps*NCCC, University of Idaho students, and community volunteers. The project, completed along a stretch of Paradise Creek between the Latah County Fairgrounds and Blaine Street in Moscow, took place during September 2002 and Spring 2003 and includes 358 feet of stream bank restoration.

PREVIOUS CONDITIONS: The stream segment had near vertical, slumping, eroding stream banks with little vegetation that contributed to the sediment load in the creek. Paradise Creek had been dredged in this reach many different times, which added to its degraded state. In the past, the City of Moscow dumped asphalt onto the sides of the bank in an effort to stabilize the side.

DESCRIPTION OF COMPLETED ACTIVITY: The purpose of this project was to reslope the stream bank to a 2:1 or 3:1 slope from its near-vertical state reduce erosion, and allow for the establishment of woody vegetation. The project site is 358 linear feet of a heavily damaged, ditch-like creek. The stream bank is composed almost entirely of fill, especially gravel and concrete chunks. After removal of the debris, the site was hydroseeded with a native seed mix and then covered with erosion control fabric. Snowberry and Wood's rose were planted on the site. A few sedges and rushes were planted at the toe of the slope (Figure 7).

FIGURE 7 *Moscow wastewater treatment wetlands planting*

BROCKINGTON RIPARIAN PLANTING

Partners and local matching funds for this project came from Judy Brockington, Steve and Laura Nidlow, Larry McMillan, Clint Townsend, University of Idaho students, Girl Scout troops, AmeriCorps *NCCC, Washington State University students, the University of Idaho Community Service Learning Center, University of Idaho Environmental Club, Church of Latter Day Saints, National Tree Trust, Russell Elementary School, and Boy Scout troops. Project installation, located approximately 3.5 miles north of Moscow, Idaho, occurred from April 2003 through October 2003.

PREVIOUS CONDITIONS: Reed canary grass lined the banks of the two Paradise Creek tributaries flowing through the Brockington property. Active wheat fields were directly adjacent to the stream. A riparian buffer was absent in this section of the creek, which exposed the creek to direct solar radiation as well as runoff containing sediments, nutrients, and pesticides. There were multiple equipment crossings through the eastern tributary.

DESCRIPTION OF COMPLETED ACTIVITY: The scope of this project was to plant a variable width buffer along the two tributaries on this property, including a total length of 2,500 feet. The riparian buffer ranges from 10 to 40 feet in width and consists of native shrubs and trees. The buffer area of the eastern tributary was also seeded with native grass seed. PCEI completed minimal excavation along the eastern tributary to create a narrow, low flow channel with associated floodplain, in conjunction with the adjacent Townsend project. In addition to the excavation coordinated by PCEI (the current agricultural operator), Larry McMillan contributed by excavating the sediment-laden channels of both tributaries. McMillan's work included excavating to the level of the culvert below the Brockington driveway. The Brockington project borders the Big Draw project to the north and the Townsend project to the east and south, therefore it is expected to have significant benefit as a wildlife corridor as vegetation matures (Figure 8 and Figure 9).

FIGURE 8 *Brockington Riparian Area prior to planting woody vegetation*

FIGURE 9 *Brockington Riparian Area immediately after woody vegetation was planted. Farm equipment will be restricted to designated waterway crossings. Plastic collars protect young plants from deer and elk until plants become established.*

FORBES WETLAND CONSTRUCTION AND RIPARIAN PLANTING

Partners and local matching funds for this project came from Washington State University environmental science students, the University of Idaho Community Service Learning Center, Lapwai Elementary School Students, Nez Perce Tribe, and community volunteers. The project, located north of Moscow, Idaho near Moscow Mountain, included work along 820 feet of stream channel and installation of three wetlands for a total of 12,800 square feet. Wetland excavation occurred on July 25, 2003. Plantings were completed in September and October of 2003.

PREVIOUS CONDITIONS: This seasonally wet draw with intermittent springs collects a significant amount of water from the surrounding hills and is a tributary to Paradise Creek in the spring. In the past, this draw has been utilized as horse pasture. The Forbes family recently purchased the property and decided to enhance its value as native habitat and improve its water quality. Prior to restoration, reed canary grass, meadow foxtail, morning glory, and other invasive weeds dominated ground cover. There was little vegetative diversity at this site.

DESCRIPTION OF COMPLETED WORK: The scope of work for this site was to construct several wetland benches. The goals of the project were to increase the flood storage capacity of the draw, provide a place for sediment to settle, increase biological diversity with native species, improve water quality of this small tributary, and establish a shallow channel to allow wetlands overflow to flow into Paradise Creek.

All exposed soil was seeded and mulched after construction. Species used were fowl bluegrass, tufted hairgrass, ticklegrass, prairie junegrass, and yarrow. Native woody and herbaceous vegetation was planted in the fall of 2003. Herbaceous plants will continue to be planted over the next few years as the storage capacity and other characteristics of the wetlands become more apparent. PCEI organized a planting of 150 camas bulbs in October of 2003 with students from Lapwai Elementary School. The students learned about the cultural and ecological significance of camas in addition to helping restore the species (Figure 10 and Figure 11).

FIGURE 10 *Forbes area in Spring 2003, prior to wetland construction and riparian planting*

FIGURE 11 *Photo 4. Forbes area after Fall 2003, including wetlands and woody riparian plants*

GARTON HARDENED ROCK STREAM CROSSING

Partners and local matching funds for this project came from Oz and Virginia Garton, Latah County Youth Services, and community volunteers. Project installation occurred on August 21, 2003.

PREVIOUS CONDITIONS: This section of Paradise Creek, located three miles north of Moscow, has populations of quaking aspen, Douglas hawthorn, snowberry, serviceberry, cow parsnip, and many other species that compose a healthy riparian buffer. Restoration effort targeted a specific problem area disturbed by an established horse crossing that provided access to pasture on both sides of the creek. Prior to restoration, continuous use of the stream section for animal passage contributed to nutrient and sediment inputs. The presence of large stands of Canada thistle in proximity to the creek was also of concern.

DESCRIPTION OF COMPLETED ACTIVITY: The project was designed to minimize disturbance to the riparian area and to improve water quality along this reach of Paradise Creek. The long-term goals of this project include the following:

Improved water quality though construction of a hardened rock crossing that limits creek disturbance while still providing access to pasture.

FIGURE 12 *Garton Stream before the work*

Minimized erosion from animal impact by concentrating the animal traffic to an area properly constructed to withstand animal use.

Mark Hawley of Moscow was hired to do shallow excavation and to place the rock fill. Rock, eight inches or less in diameter, was used to fill the depression, and a two foot strip of gravel dressing was placed down the middle of the crossing to lessen the possibility of injury to the animals. Filter fabric was installed beneath the rock. Project construction lasted about five hours. Figure 12 and Error! Reference source not found. show the crossing before and after the work was accomplished.

FIGURE 14 *Garton Stream After the work*

HARDEN RIPARIAN PLANTING

Partners and local matching funds came from a Washington State University environmental science class, AmeriCorps*NCCC, and community volunteers.

This project, installed on March 29, 2003, includes 1,720 feet of stream bank restoration.

PREVIOUS CONDITIONS: Prior to restoration, the channel of this tributary to Paradise Creek had been straightened to allow for cultivation to the stream's edge. Reed canary grass lined the banks of the creek, and active wheat fields were directly adjacent to the stream on the east side (Figure 15). A riparian buffer was absent in this section of the creek, which exposed the creek to direct solar radiation as well as agricultural runoff containing sediments, nutrients, and pesticides.

DESCRIPTION OF COMPLETED ACTIVITY: The purpose of this project was to create a riparian buffer along an 860-foot reach of a tributary to Paradise Creek, so 563 trees and shrubs were installed along the stream channel. Woody riparian buffers offer many benefits, including filtration of runoff, soil stabilization, wildlife habitat, and floodwater retention. These plantings will be protected from vole damage with plastic tubes. The plants in Figure 16 were watered and weeded on multiple occasions in 2003.

FIGURE 15 *Harden Riparian Area prior to work*

FIGURE 16 *Harden Riparian Area after work completed*

MORTON MEANDER, FLOODPLAIN, WETLAND CONSTRUCTION, AND RIPARIAN PLANTING

Partners and local matching funds came from the Latah Soil & Water Conservation District, Natural Resource Conservation Service, Idaho Soil and Water Conservation Commission, BonTerra, Wildlife Habitat Institute, Church of Latter Day Saints members, AmeriCorps*NCCC, National Tree Trust, University of Idaho and Washington State University classes and students, Ron Morton, Moscow High School students, and community volunteers.

This project located near Moscow Mountain, on Foothill Road north of Moscow, includes 7,200 feet of stream bank restoration and two wetlands covering 115,650 square feet.

PREVIOUS CONDITIONS: Prior to restoration, the stream channel was straightened and acted as a drainage ditch along Foothill Road. Reed canary grass lined the banks of the creek, and active wheat fields were directly adjacent to the stream. A riparian buffer was absent in this section of the creek, which exposed the creek to direct solar radiation as well as storm water runoff containing sediments, nutrients, and pesticides.

DESCRIPTION OF COMPLETED ACTIVITY: This rural riparian restoration project will demonstrate the effectiveness of maintaining a riparian buffer strip along agricultural stream channels. The primary long-term benefits from this project will include the following:

- Establishing native riparian vegetation along the creek to provide habitat for fish and aquatic invertebrates, a corridor for migratory wildlife, and habitat for resident wildlife
- Improving water quality due to riparian vegetation shading and filtration and trapping of sediments, nutrients, and organic matter from runoff before it reaches the creek
- Restoring hydrological diversity within the creek through installation of meanders that resemble the creek's historical path

To accomplish these ends, riparian floodplain, meandering stream channel, and associated wetlands were constructed and vegetated with native woody vegetation, grasses, and emergent herbaceous wetland plants.

TerraGraphics Environmental Engineering, Inc designed the re-constructed stream channel and wetlands. The main channel cross section was designed to accommodate the calculated 2-year, 24-hour flow of 25 cubic feet per second (cfs). The floodway of the new channel was designed to accommodate up to 147 cfs, the elevation of a localized 100-year flood event. Two wetlands approximately 12 inches deep were excavated adjacent to the newly meandered stream to receive runoff before it enters the stream, to act as a flood storage and groundwater recharge area, and to provide habitat for wildlife.

Stream channel meanders were constructed during low stream flows (mid July – early August) to minimize erosion resulting from construction. The stream was relocated to follow its estimated historical path approximately 200 feet east of its prior location, and the meanders were installed to follow the natural contours of the land, determined by a survey of topographical features, old aerial photographs, and clues from the current natural runoff flow.

Volunteers from the Church of Latter Day Saints and other community volunteers helped stabilize the newly constructed stream banks with geotextile fabric and coir logs. The entire stream channel was lined with coconut fiber BioLogs® and pre-planted with wetland vegetation. These activities stabilize the toe of the stream banks, maintain the newly constructed meanders, catch sediments from runoff to the creek, and help filter nutrients from the water as it travels downstream.

In the fall of 1999, the stream channel, floodplain and adjacent land were seeded, by hand and with farm equipment, with a riparian grass mix. The following spring, PCEI volunteers and the Mortons planted a 150 foot wide buffer strip with a mix of native woody plant species. The first 30 feet on either side of the creek was planted by PCEI; the remaining 120 feet was planted by a private company contracted by the landowners, with assistance from the continuous riparian buffer strip Conservation Reserve Program, to form a 150 foot buffer strip on each side. The two wetlands were seeded with locally collected wetland plant seeds.

The stream banks were planted with red-osier dogwood (*Cornus sericea*) and willow spp. (eg. *Salix exigua*). Adjacent to the stream channel, and up to 30 feet from the channel, the following species were planted: water birch (*Betula occidentalis*), aspen (*Populus tremuloides*), rocky mountain maple (*Acer glabrum*), black cottonwood (*Populus trichocarpa*), mountain ash (*Sorbus scopulina*), Douglas hawthorn (*Crataegus douglasii*), chokecherry (*Prunus virginiana*), serviceberry (*Amelanchier alnifolia*), and blue elderberry (*Sambucus cerulea*). Herbaceous cover was established by fall to provide ground cover and maintain stream channel integrity during the upcoming winter and spring thaw.

A riparian functioning assessment team organized by the Latah County Soil and Water Conservation District will monitor this site annually to determine the effectiveness of the stream restoration efforts towards improving biological diversity and viability and water quality. Furthermore, the site was marked with a sign and will be accessible to the public, providing a demonstration site to show the benefits of riparian habitat along waterways, demonstrating that such methods can be used to complement current farming practices.

Subsequent work was completed during Spring 2002 and Spring 2003 including 1,790 feet of stream bank restoration. Due to difficult growing conditions, including hard clay soils and vole damage, vegetation failed to establish along some sections of the stream. In the spring of 2002, quaking aspen and red osier dogwood plugs from the National Tree Trust were planted around the wetlands and in other unvegetated areas.

In the spring of 2003, willow and cottonwood poles, and red osier dogwood plugs were planted on the stream banks in spots lacking woody vegetation. Fascines were constructed from live cottonwood and willow cuttings and were placed where banks were bare and sloughing into the creek during high flows. Native wetland plugs, including small-fruited bulrush, Nebraska sedge, and Baltic rush were planted along bare sections of the streams. These deep-rooted plants will hold the stream bank in place and filter sediment and nutrients from the stream. Ponderosa pines from the National Tree Trust were also planted adjacent to the stream to provide long-term shade, contribute woody material to the stream system, and provide wildlife habitat. All work was done with the help of AmeriCorps*NCCC teams (Figure 17 and Figure 18).

FIGURE 17 *Predator bird habitat structure Summer 2003*

FIGURE 18 *Stream bank stabilization being installed Summer 2003*

MORTON EXTENSION CHANNEL RE-MEANDER AND RIPARIAN PLANTING

Project partners and local matching funds came from Ron Morton, University of Idaho (UI) students, UI Circle K, Washington State University (WSU) students, WSU service learning, and community volunteers. During Fall 2003 2,700 feet of stream bank restoration was conducted East of Foothill Road, north of Moscow.

PREVIOUS CONDITIONS: Prior to restoration, the stream channel was nearly straight and was largely overgrown by reed canary grass. There was no native vegetation present other than a few native wetland plants. The reed canary grass monoculture provided little shade to the stream and little wildlife habitat. The lack of woody vegetation and prevalence of fine silt in this section of stream encouraged the development of an excessively wide, shallow channel. In addition, downstream landowners were concerned about flooding resulting from the channel silting in.

DESCRIPTION OF COMPLETED ACTIVITY: A new "E" type stream channel approximately 1' wide and 10" deep was dug with a trackhoe. Channel sinuosity was increased by the inclusion of numerous meanders in the newly constructed channel, doubling the channel length within this reach. An increase in sinuosity will encourage more natural sediment deposition, develop stream-associated wetlands, and reduce stream velocity and thus erosive force.

Native riparian shrubs were planted after channel construction. A riparian buffer of woody vegetation will shade the stream, reduce water temperatures, stabilize soil, filter runoff from adjacent roads and farm fields, and contribute woody material to the stream system (Figure 19 and Figure 20).

FIGURE 19 *Morton extension area prior to work*

FIGURE 20 *Morton extension. Area after work completed*

TOWNSEND REMEANDER, FLOODPLAIN EXCAVATION, AND RIPARIAN PLANTING

Partners and local matching funds came from Clint Townsend, Larry McMillan, a Washington State University science class, University of Idaho students, Cub Scout troops, Girl Scout troops, Washington State University Community Service Learning Center, CAMPOS Student Organization, University of Idaho Community Service Learning Center, University of Idaho Environmental Club, Alternative Breaks Association, University of Idaho Bonner's Scholar Program, Lake City High School faculty, and community volunteers.

Project installation including 3,775 feet of stream bank restoration occurred during Fall 2003.

PREVIOUS CONDITIONS: Due to agricultural development, the stream was braided into several small channels with steep, eroding banks in many places. The site was cultivated to the edge of the stream channel and no riparian vegetation existed. Reed canary grass lined the 40 foot wide braided channel. Our goals were to improve the water quality of the two tributaries that flow through the Townsend property, to increase diversity of native riparian vegetation, and to create habitat for wildlife. Water quality improvements focus on non-point source pollutants like temperature, sediment, nutrients and bacteria. Improvements at this site will contribute to improving water quality in the mainstem of Paradise Creek.

DESCRIPTION OF COMPLETED ACTIVITY: The scope of work included excavating the floodplain, defining a narrow, low flow channel and planting a riparian buffer of woody and herbaceous species. Excavation occurred in September 2003. Excavation was done in two phases. The downstream end, below the confluence of two tributaries was completed first and excavation of the eastern-most tributary was second. The channel was constructed using an excavator and excess soil was spread outside the floodplain on the Townsend property using a bulldozer. A multi-level floodplain was constructed to accommodate varying flow levels. Meanders were


FIGURE 21 *Townsend Waterway prior to reclamation*


FIGURE 22 *Within one year Townsend waterway will have stable banks and support sustainable, healthy riparian vegetation.*

constructed in the new stream channel. A two layered soil wrap revetment was constructed on the downstream end of the project to protect against further erosion of a previously existing scour pool. After construction, all exposed soil was seeded with native grasses and banks were covered with erosion control fabric. In October and November of 2003, a riparian buffer of native trees and shrub, varying in width from 45 to 90 feet, was planted on either side of the stream (Figure 21 and Figure 22).

WILLARD SEDIMENT CATCHMENT, WETLAND AND RIPARIAN PLANTING

Partners and local matching funds came from North Latah Highway District, AmeriCorps*NCCC, community volunteers, Janice Willard, Bill Styer, and Washington State University students. The project was installed on November 7, 2001, with additional planting completed in spring 2003. The project, including 618 feet of stream bank restoration and one wetland covering 10,197 square feet, is located 0.5 mile east of Mountain View Road, between Darby Rd. and Moscow Mountain Rd north of Moscow.

PREVIOUS CONDITIONS: Stream banks along this tributary to Paradise Creek were eroding due to a lack of woody vegetation and steep banks. Reed canary grass formed a dense monoculture, whose shallow root mats did not prevent slumping of the stream bank. Thus, stream banks were frequently undercut during heavy storm events. The lack of trees or woody vegetation along this stream segment allowed direct solar radiation to heat the stream water. There were also high levels of sediments in this tributary that added to the sediment loads of Paradise Creek.

DESCRIPTION OF COMPLETED ACTIVITY: The main purpose of this project was to create a sediment catchment system to trap sediment-filled high water. Another goal was to stabilize and revegetate a 300-foot section of the tributary to provide habitat for wildlife, provide shade to reduce stream temperatures, provide a vegetated buffer from agricultural runoff, and reduce the amounts of sediments entering the stream. Earth moving was completed by Professional Operators Company. PCEI staff and volunteers completed the bank stabilization activities. The catchment banks were sloped to a 3:1 slope. This moderate slope reduces erosion, reconnects the stream to its floodplain, and creates a prime area for native vegetation. The resloped banks were seeded with a riparian grass mixture and covered with geotextile fabric. Native woody vegetation was planted in the spring of 2002. All excavated material was removed off-site. In selected areas (Figure 23), coconut fiber-filled BioLogs®, pre-planted with wetland plants, were installed along the toe of the stream bank for stabilization and to improve water quality through the water-filtering qualities of wetland plants. Woody debris of cedar and pine were installed in the catchment to act as a filter and, in turn, to slow the velocity of the water so sediment could settle out. Planting of native woody and herbaceous vegetation was completed in the spring of 2002 by PCEI staff and volunteers.

FIGURE 23

BIG DRAW RIPARIAN PLANTING

Partners and local matching funds came from the Natural Resource Conservation Service, Idaho Fish and Game, Whitman College Alternative Spring Break, Latah County Youth Services, Delta Chi Fraternity, AmeriCorps*NCCC, National Tree Trust, Church of Latter Day Saints, Latah Trail Foundation, Oz and Virginia Garton, and community volunteers. The project was installed over the spring and fall of 2002 and spring of 2003.

The project, located at Big Draw near Moscow Mountain north of Moscow, includes 5,725 feet of stream bank restoration.

PREVIOUS CONDITIONS: The stream channel had been straightened for agricultural development. The channel was deeply incised in some stretches, and the vegetation was a monoculture of reed canary grass. The steep, bare banks eroded during high water events. The lack of woody native vegetation along the stream channel contributed to bank erosion and high water temperatures for this stretch of the stream.

DESCRIPTION OF COMPLETED ACTIVITY: Thousands of native trees and shrubs, mostly Douglas hawthorn, ponderosa pine, and Nootka rose, were planted along the stream channel to establish a woody riparian buffer. As the vegetation matures, it will shade the stream channel, stabilize eroding banks, and contribute woody material to the stream channel. Woody debris in the channel will increase channel diversity, provide habitat, and help reduce channel incision.

Thomas Fork Creek

Thomas Fork Creek Implementation to Rehabilitation

The Thomas Fork Watershed encompasses 150,100 acres of Idaho and Wyoming. This watershed is located in the southeastern corner of Idaho within townships 10, 11, 12, 13, and 14 South, Ranges 45 and 46, east of Bear Lake County, and in western Wyoming, within townships 26,27,28,29, and 30 North, Ranges 118,119, and 120 West, within Lincoln County (Figure 1). The Sublette and Pruess mountain ranges bound Thomas Fork Valley on the east and west, respectfully. Mountain elevations in the area range from 6,000 feet to 9,600 feet above sea level. The headwaters reside in Lincoln County, in the State of Wyoming, as Salt Creek and continue into Idaho as Thomas Fork Creek. As the Thomas Fork Creek enters the State of Idaho, it meanders twenty-seven river miles through Bear Lake County to the confluence of the Bear River. Bear River flows into Bear Lake, which has been designated a "special resource" water by the Idaho Legislature.

LAND USE PRACTICES

Agricultural practices represent the greatest use of the valley, with recreation playing a lesser role. Over 90% of the land is planted in harvest crops, such as alfalfa and grain, while the rest is used for dairies and grazing.

FIGURE 1 *Location map for Thomas Fork Stream Bank Protection Project*

It has been suggested that no one single practice is responsible for the deteriorated condition of the stream banks along Thomas Fork. Irrigation canals traverse the valley floor, providing necessary water to agricultural operations. This same principle was applied to Thomas Fork to expedite water delivery to downstream users. Meander bends were removed in certain segments in an effort to provide increased efficiency in water conveyance. Straightening the channel increases the head gradient in the stream, which compounded water quality problems from the stream channel to the stream banks.

An additional source of water quality degradation is the lack of riparian vegetation along many parts of Thomas Fork. Riparian vegetation acts as a buffer strip to remove nutrients from the water, stabilize the soil, and shade the stream. Without this buffer strip, overland erosion is accelerated, nutrient uptake at the root zone is decreased, and the lack of shade increases the temperature of the water. With no root zone to retain the soil in place, the angle of the bank is increased to near vertical. Survival of vegetation is directly correlated to the slope of a stream bank: as the angle of a bank is increased, vegetation establishment is decreased.

EXPLANATION OF BEST MANAGEMENT PRACTICES (BMPS)

To achieve the purpose of the Clean Water Act that all national waterways be "fishable and swimmable," a plan was set forth. The Bear Lake Soil and Water Conservation District (BLSWCD) set Thomas Fork as a priority region within the county to address agricultural issues related to water quality. The State Agricultural Water Quality Plan (SAWQP) produced by the BLSWCD outlined priority areas of Thomas Fork that where the greatest contributors of pollutants. In addition, the SAWQP plan suggested mitigation techniques to remedy water quality problems on Thomas Fork Creek. Eroding stream banks were outlined as the largest single contributor of nutrients and sediment to Thomas Fork. Nutrients of concern included nitrogen and phosphorus. A number of proven techniques suggest by the SAWQP plan have now been implemented on degraded segments of Thomas Fork by the Bear Lake Regional Commission. To date, 11,262 linear feet of stream bank have been treated with BMPs. This section describes these treatments and their benefits in the order they are constructed.

Stream banks that have been denuded of riparian vegetation are quickly eroded and have a slope face of near 90 degrees. Heavy construction equipment is used to reduce the angle of these banks to a more stable slope. Often a 2:1 or 3:1 slope is suggested by the NRCS as suitable for revegetation of riparian species. Reducing the slope further enhances the probability of revegetation but reduces the number of farmable acreage. Photo 1 illustrates the effect of bank shaping. Left of the trackhoe is a vertical face nearly 10 feet above the Thomas Fork Creek (at normal flow). The reduced angle of the bank provides more floodplain for high flows and dissipates energy associated with those flow events. Once the angle of the banks has been reduced to a less critical slope other techniques are applied which help to keep the stream bank from reverting to a 90-degree angle.

Soil disturbed on stream banks is covered to prevent erosion during rain events or spring runoff. Native rock is placed by tractor bucket over the exposed soil. Local quarries provide the rock, which is hard, angular and dense. This composition is resistant to weathering and high flows. Typically, rock used for this purpose is 8-12" in diameter (Photo 2). This technique does not provide a desired end result but rather a temporary protection from wind and rain until grasses and other vegetation can take root and further stabilize soil and uptake nutrients. The toe of the slope also benefits from the same technique as the upland slope. Rock quarried from the same location is laid end to end along the toe of the slope at the water's edge. This rock, like that used for rip-wrap is hard, angular, and dense but of greater diameter. These rocks are typically 2-3 feet in diameter and placed by trackhoe, one at a time rather than by the bucket load. (Photo 2).

FIGURE 2 *Photo 1. Heavy equipment used to move soil and place large rocks for stream bank stability.*

FIGURE 3 *Photo 2. Toe armoring and rip-rap bank protection techniques*

Flow is diverted away from sensitive banks with the use of flow deflection structures (Photo 3). Often referred to as "bank barbs" or "points", these structures are composed of the same material that covers the exposed banks only larger and placed specifically according to engineered plans. Large rock is laid end-to-end, pointing upstream at a 45 degree angle from the bank. Smaller rock is then placed over the large rock to fill interstitial spaces and reduce flow velocity between larger rocks. A key trench is dug into the bank to anchor these boulders in place.

The purpose of bank barbs is to absorb energy and deflect the flow away from sensitive areas prone to erosion. Energy from the water is dissipated within the rocks rather than diverted to erosion prone areas along the stream bank. The flow of the water is naturally diverted over the structure and away from sensitive areas downstream. Bank barbs are sized depending upon the flow in the channel and bankfull width.

Use of bank barbs to deflect flow away from sensitive areas enhances other river processes immediately downstream of the bank barb. As flow is diverted away from sensitive downstream areas, an "eddy" is formed. An "eddy" is a region of low velocity flow induced by an obstruction. There are several benefits that are produced by this region of low flow. Particles entrained in the water column during high flow are deposited in low velocity areas downstream of the barbs. Cumulative deposition in low velocity areas accumulates over time producing a gravel bar. As a result of the gravel bar the width to depth ratio of the stream channel is reduced.

This reduction is only present during low flow but improves water quality of the stream for much of the year. By reducing the width to depth ratio of the stream the surface area of the stream exposed to the sun is reduced. Cooler water temperatures help to achieve the beneficial uses of Thomas Fork Creek.

Revegetation provides long-term sediment and nutrient reduction in addition to other benefits. Revegetation consists of planting willows (Photo 4) and other on-site vegetation and broadcasting a native seed mix on affected areas. Native seed mix is blended at a local seed mill and consists of Sheep Fescue, Crested Wheatgrass, and Stream bank Wheatgrass. This mix was selected based on site conditions such as soil type and drought resistance of the seed. Willow plantings are cut from healthy on-site communities and pressed into the soil at the toe of all affected slopes. Care is taken to ensure contact is made with the water table at the base of the willow cutting. Cuttings are planted 4 to 6 inches apart during the late fall or early spring. When possible, entire willow stands (willow plantings) and other existing riparian vegetation are transplanted into the toe of the slope along the bank. Planting during dormancy greatly improves chances of survival. Once the soil has been disturbed, the seedbed is prepared by using a harrowing device (Photo 5). The harrow in Photo 5 is a homemade piece of equipment. A six by ten foot piece of nine gauge chain link is cabled to a tractor or other four wheel drive piece of equipment. Chain link has shown to be optimal in these circumstances due to the fluid nature of the linkage. Larger harrows get snagged on rocks and are less maneuverable in confined spaces. The chain link disturbs only soil as it "snakes" along over the rocks and other protrusions. The seed is broadcast by hand as a final application just prior to snowfall. Seed is broadcast over disturbed soil at the recommended density of 30 pounds per acre then treated by dragging the harrow over the soil (Photo5).

Fencing is a technique used once the projects are completed to prevent sensitive areas from being grazed or trampled yet still proving water for animals. Commonly used in many locations to separate landowner parcels it has been applied and adapted to the riparian area. Common fencing can be used to separate animals in the pasture from the riparian area. However, there has been difficulty in the past keeping animals on adjacent properties from using the streambed as a conduit to other pastures. Gap fencing is a strategy devised to prevent use of the streambed as a conduit. Gap fencing is constructed using a combination of 3/8" steel cable, welded wire panels panels, railroad ties and a tensioner. Posts are pounded into the ground on opposing sides of the stream. The panels are set out perpendicular across the streambed from one bank to the bank on the opposing side. The cable is threaded through the panels and secured to one of the newly set posts. On the opposite post a tensioner is secured and fastened to the thread of panels. This configuration allows the panels to be raised and lowered depending upon stream discharge. Raising and lowering the panels according to discharge excludes the channel from being used as a conduit. This technique has proven to be 99% effective.

Water gaps are a method of fencing that allows animals access to the water in limited areas along the creek with minimal damage to the riparian area. Numerous methods of construction and materials exist for this purpose. Ultimately, a water gap is a deviation in the linearity of a fence that runs to the stream and allows one or two animals at a time to drink. With no room to spread out (caused by the fence) or grass to graze, they drink and move on. This method limits the amount of riparian area trampled to a minimum and still provides water for animals.

FIGURE 4 *Photo 3. Flow deflector or 'bank barb' diverting flow away from sensitive areas*

FIGURE 5 *Photo 4. Willow cuttings pressed into toe of bank slope*

FIGURE 6 *Photo 5. Harrowing soil after broadcasting seed*

History of 319 projects on Thomas Fork

The purpose of this section is to present the progress made on the Thomas Fork over a period of seven years of BMP implementation using photo documentation. Numerous before and after photographs are used to document the improvements to treated areas over a period of time. Other pictures illustrate the current condition of projects that have been completed. Photographs are arranged in reverse chronological order starting with the most recently completed project and ending with older projects. Additional photographs can be found in Appendix A while a table of BMPs applied to Thomas Fork at all projects can be found in Appendix B of the complete report on file at the DEQ State Office and through Mr. Mitch Poulsen of the Bear Lake Regional Commission.

PROJECT #7 (GARTH BOEHME)

This is the third bank stabilization project that Garth Boehme has participated in. Photos 6 and 7 were taken in the fall of 2002 and spring of 2003 after construction. Of particular interest is the width of the channel in these photos. Prior to construction, the creek spanned the width of the channel. After reducing the angle of the bank and constructing a bank barb, the channel width was reduced. Also of interest is the amount of sediment deposited next to the bank. This occurred during a two-month period over the spring runoff. As a result of the recently aggraded gravel bar, new emergent vegetation is starting to take root on the newly established gravel bed. The location of this project has been an asset based on the amount of vegetation present at the site. We have been able to experiment with different methods of revegetation and have seen some encouraging results. Prolific stands of willow and sedge have been available for transplant. We have found that by excavating a hole in the bank next to the water's edge that entire willow communities can be transplanted. This has also held true for sedge and reed grasses. A plug can be transplanted from one location on the project to another without disturbing their life cycle. The benefit of transplanting whole willow plantings can be seen from Photos 8 and 9. Specifically, this corner was treated using a mix of willow plantings and cuttings, which resulted in vibrant growth within six months. The difference in planting and cutting is the number and method used for transplant. A planting involves removal of the entire plant while a cutting is the selective removal of branches. Planting requires heavy equipment to transplant it from one location to another. Cuttings are cut and pressed into the soil at the water's edge. The light colored willow in the middle of the picture on the left-hand side of Photo 9 was the only standing vegetation on this cutbank prior to revegetation. All of the rest were willow plantings and cuttings. Willow cuttings are present in this picture although less visible. This project required treatment of 2163 linear feet of stream bank and construction of 12 bank barbs. Ecological enhancements include three new pool-riffle complexes and re-defined thalweg (deepest point of the channel). Other occurrences of interest at this location include reduction in stream width to depth ratio at three locations as a result of gravel beds forming.

FIGURE 7 *Photo 6. Prior to implementation of BMPs (Fall, 2002)*

FIGURE 8 *Photo 7. Post-BMP implementation (Spring 2003)*

Often banks are found to be eroding at transitional areas between cutbanks on corners. Photos 8 and 9 illustrate how little time is required for riparian vegetation to re-establish on the banks once the soil is stabilized in place using BMPs (Photo 9). Time lapse between Photos 8 and 9 is roughly six months. Treatments along 4275 linear feet of stream bank and 15 bank barbs were required at this project. Roughly, 2100 linear feet of log revetments were used as additional retention devices at strategic locations.

FIGURE 9 *Photo 8. Cutbanks prior to reclamation*

FIGURE 10 *Photo 9. Cutbanks six months after reclamation*

PROJECT #4 (HEBER BOEHME)

This project was one of the first along Thomas Fork to address bank stability. Now, five years old, riparian vegetation is abundant along treated and untreated banks. Photo 10 shows the ability of vegetation to stabilize the bank when treated and protected. This picture also represents a dichotomy in rehabilitation. The vegetation in the picture along the banks is Canary Reed Grass, which is a non-native species. In some locations this species out competes the native grass seed mix applied. Rock provides a temporary solution until a more permanent vegetative cover can be established. This bank was rip-wrapped from top to bottom to keep soil in place until vegetation could establish. Despite the fact that in purist terms it should not be used as a remedy for erosion, rock rip-wrap accomplishes the objective of bank stabilization and nutrient uptake and is particularly useful in areas where aesthetics are not as important as functionality. Conversation with landowners along Thomas Fork has indicated they lose about three feet of valuable farm ground each year as a result of erosion. After BMPs are implemented that number is drastically reduced. Further illustration of the benefit of BMP implementation can be seen in Photo 11. The left side of the picture is Heber Boehme's property after treatment with BMPs and allowing re-establishment of riparian vegetation. The right side of the picture lacks BMPs and an alternative to grazing management. Prior to treatment both sides of the fence looked like that on the right side. Clearly, implementation of BMPs and landowner cooperation results in a distinct improvement over the converse. Bank shaping and other treatments on this project totaled 1743 linear feet with placement of 13 bank barbs.

FIGURE 11 *Photo 10. Results of vegetation after five years*

FIGURE 12 *Photo 11. Illustration of the benefits of treated versus untreated land*

PROJECT #3 (GARTH BOEHME)

Garth's first bank stabilization project was completed in conjunction with several other projects that seek to keep sediment and nutrients out of the Thomas Fork. Photo 12 was taken six years after treatment. The photo was taken at the downstream terminus of the project from the bridge installed during previous projects. This photograph illustrates the benefit of implementing BMPs on eroding banks and the resulting effect on the channel. Like many other locations along Thomas Fork Creek, this stretch was much wider during low flow before BMP implementation. Prior to construction of upstream bank barbs and bank shaping at this site the channel possessed a much greater width to depth ratio. Post-BMP implementation has found the streambed in a more confined channel with an aggraded gravel bed only submerged during higher flows. Monitoring indicates that prior to construction the streambed was over twice the current width. The right edge of the photo was the edge of the creek prior to rehabilitation. Rip-wrap placed as temporary treatment has been secondary in benefit to riparian vegetation. This location has a strong community of willows on the opposing bank where previously only vertical bank was present. The bank on the left-hand side was shaped, then rip-wrapped. After several years the rip-wrap is no longer visible and has been completely overgrown with willow communities. The other benefit in this area is the gravel bed, which has aggraded vertically and horizontally and reduced the channel width. Treatments at this location include: bank shaping along 1500 linear feet, 900 feet of log revetments and 15 bank barbs constructed at strategic locations. In addition, 2000 linear feet of fence were erected for livestock exclusion.

FIGURE 13 *Photo 12. Vegetation and stream channel after six years*

PROJECT #2 (GARTH BOEHME)

In addition to bank stabilization and BMP implementation on Thomas Fork, other upland projects have been completed as well. A manure management facility consisting of a manure bunker, separator and constructed wetland have been completed to reduce nutrients entering Thomas Fork (Photo 13). The constructed wetland helps to take up much of the nutrients that previously entered Thomas Fork.

FIGURE 14 *Photo 13. Manure bunker with wetland in the background*

A bridge was also constructed at this location. Prior to construction, a dairy operation was located on a bluff overlooking the Thomas Fork Valley. Previously, all waste products from the dairy operation were pushed over the bluff adjacent to the stream channel where they accumulated until such time as they were needed to fertilize cropland. The material was scooped up and deposited in a manure spreader, which was hauled through Thomas Fork to adjacent cropland. To remedy this water pollution problem a nutrient management facility was constructed. Any waste products produced by the dairy are now deposited in the separator where the solids and liquids are directed to different locations. The solids remain in a concrete bunker until they are spread on cropland. The liquids are piped to a constructed wetland where the nutrients can be utilized by plant material. The bridge allows passage over Thomas Fork without contamination from the manure spreader.

SUMMARY AND CONCLUSION

Non-Point Source § 319 grants have been awarded to the Bear Lake Regional Commission to assist landowners along Thomas Fork Creek implement Best Management Practices over seven years. These practices have resulted in over 11,000 linear feet of stream bank held in place by applying treatments such as: bank shaping, revetments, rip-wrap, bank barbs and vegetation. These projects have proven successful on a number of levels. Treatments applied have retained soil in place for seven years. Photo monitoring of strategic locations has verified this. Cross

FIGURE 15 *Photo 14. Bridge crossing made from an old railroad flatbed car. Since this photo was taken, vegetation has taken over the flood plain where the photographer stood.*

sectional surveys of the stream have shown the benefit of stabilizing the banks with BMPs. Results from monitoring indicate for each foot of treated stream bank as compared to an untreated site, 50 cubic feet of stream bank material was retained on the banks over a three-year period. This retained material per foot when expanded to the entire treated area equals over 500,000 cubic feet of material retained in place. Further success has been noted in landowner perceptions to treatments. Many landowners were skeptical of BMPs implemented on neighboring lands. However, those perceptions have slowly dissolved, as projects implemented are successful at stabilizing land and enhancing values. Landowners and other sources help provide the labor and materials necessary for a successful project. This cooperative spirit is crucial to the success of these projects.

The success of bank stabilization work on the Thomas Fork comes from a combination of factors, none of which are very successful alone. The cooperation between the State of Idaho Department of Environmental Quality and local landowners provides a strong foundation for successful implementation. Money provided by the state allows construction to proceed while the landowner ensures its success by proper management. Both entities benefit through improved water quality and stabilized soil. The Bear Lake Regional Commission has been pleased to sponsor these projects and act on behalf of the landowners in carrying out implementation of Best Management Practices. It would be the hope of the regional commission board members that this relationship will continue for years to come until Thomas Fork Creek is once again classified as "fishable and swimmable."

(This is an edited, reduced version of a detailed report, titled *Thomas Fork Creek Implementation to Rehabilitation*, recently submitted to DEQ from project manager, Mr. Mitch Poulsen of the Bear Lake Regional Commission. Mr. Poulsen's entire photo essay report, covering seven years of stream bank stabilization progress is available on file with the DEQ State Office.)

Summary of Projects Completed During Federal Fiscal Year 2003

Agriculture Sector – Agricultural Best Management Practice (BMP) Effectiveness Field Guide

CONTRACT #S067

Location and Background

The intent of this statewide project is to develop an agricultural BMP effectiveness guidance document for in-field monitoring and evaluation. The document will be available for use by field staff from numerous local, state, and federal agencies.

Over twenty years ago, in December of 1981, a memorandum was developed to initiate the implementation of a standard process for evaluating the impact of Best Management Practices on water quality. Signed by the administrator of the Department of Environmental Quality (DEQ), administrative officer of the Idaho Soil Conservation Commission (ISCC), and the State Conservationist of the Soil Conservation Service (SCS), this document was the first attempt to officially implement BMP effectiveness monitoring and evaluation within Idaho's state Agricultural Water Quality Program.

However, little attention was paid to BMP effectiveness until 1990, when DEQ published *The Coordinated Nonpoint Source Water Quality Monitoring Program for Idaho*. This document outlined monitoring and evaluation responsibilities for designated agencies, naming ISCC as the lead state agency for development, implementation, and evaluation of agricultural BMPs. The publication recommended objectives for BMP effectiveness evaluations, emphasized the need for interdisciplinary teams, discussed potential timing, and recommended frequency of evaluations, operation, and maintenance. Only the grazing/riparian recommendations outlined specific evaluation parameters.

In the years since 1981, BMP effectiveness evaluation efforts have faltered due to limited resources, lack of staffing, and a focus on promotion of BMP implementation, program expansion, and other agency priorities.

More recently, changes in Idaho's Water Quality Law, Idaho Code § 39-3621, state that the ISCC (the designated state agency for agricultural and grazing activities), in cooperation with appropriate land management agencies, is responsible for ensuring agricultural BMPs are monitored for their effect on water quality. In addition, BMP effectiveness evaluation has been recognized as imperative for validation of successful TMDL implementation within the agricultural sector.

Results

In order to fulfill these responsibilities, the ISCC identified a need for a user-friendly BMP effectiveness evaluation field guide, which would present a flexible process with a wide variety of practice-specific protocols and tools. This project produced the following:

- *Idaho Agricultural Best Management Practices: A Field Guide for Evaluating BMP Effectiveness.* This field guide has been disseminated amongst ISCC field staff, Idaho Association of Soil Conservation Districts (IASCD) field staff, state and federal partners, and the University of Idaho. The document has also been made available electronically via the ISCC website: http://www.scc.state.id.us/PDF/BMP Effectiveness Guidance Document.pdf. Copies are also available in hardcopy.
- Training modules have been developed for classroom presentation and hands-on field application.
- Beginning in 2004, TMDL implementation annual progress reports based on BMP effectiveness field evaluations will be submitted to the ISCC Commissioners, IASCD Division Directors, and DEQ Regional Offices.

Agricultural Sector – Bear River Fencing Project

CONTRACT Q609

Location and Uses

This agriculturally related project is located in the community of Thatcher, Franklin County, in southeastern Idaho. The legal description is: Thatcher 7 ? minute quadrangle, Township 12 South, Range 40 East, NE ?, SW ?, Section 1.

Impairments

Idaho's §303 (d) list identifies the pollutants on this segment of the Bear River as flow alteration, nutrients, and sediments. The project addressed the following concerns of nutrients and excess sediments:

- Declining fisheries population due to the degradation of spawning and rearing habitat
- Reduced population densities and diversity of aquatic biota
- Declining primary and secondary contact recreation use
- Increased operation and maintenance costs due to sediment deposit on roads, in canals, under bridges, and in culverts
- Crop yield losses due to erosion
- Reductions in wildlife population and species diversity due to degradation and loss of riparian and wetland habitat
- Reduction in the downstream reservoir capacity

Funded Projects

The purpose of this project was to exclude livestock from the streambanks, creating a riparian corridor that allows the native vegetation to stabilize the streambanks. The resultant riparian community improves the project's wildlife habitat and the water quality in the Bear River downstream of the project area. Goals for this project included the following:

- Reducing stream bank erosion and nutrient loading
- Improving the riparian habitat and creating a wildlife corridor
- A livestock-grazing plan was planned and implemented by the ranch foreman at the direction of the landowners. The plan uses alternate watering sites located away from the river. Proper utilization of this plan will entail that the livestock will be rotated through the range, leaving the grass healthy and able to hold the sediment and nutrients upland. The plan will continue to be monitored and updated as needed.
- Working with the National Resources Conservation Service (NRCS), a fence design was compiled. This design was based on the NRCS standards and specifications for barb fencing. In the spring of 2000, the landowner began installing 16,900 linear feet of fence.
- Through matching funding, an off-stream livestock watering facility was installed, consisting of a well, trough, and pipeline. To further enhance the water quality in the Bear River, 319 funds were used to install 450 linear feet of rock riprap. During construction, willow bundles were interspersed with the rock. When mature these willows will provide shade and improve the wildlife habitat.

Results

A monitoring team visited the site on November 6, 2000 and observed the completed project. The fence is a 5-wire barb with post spacing 12 feet apart and wire stay between posts. The posts are 6-foot steel or 5-foot wood/railroad ties, and three gates are installed in the fence. One water gap, fenced on three sides, is included on the upper section.

Natural riparian revegetation was documented by comparison of the existing plant communities. The stubble height was noted and a percentage of the cover, including the type, was documented.

Silviculture Sector – Cascade Reservoir Watershed Road and Forested Land Final Report

CONTRACTS #Q374, Q443, AND Q558

Location and Uses

Located in central Idaho, near the town of Donnelly, Cascade Reservoir supplies agricultural irrigation water and is a popular recreational area. Some twenty miles long, the lake offers more than eighty miles of shoreline.

Impairments

Cascade Reservoir, Valley County, has been adversely impacted by sediments and nutrients associated with agriculture and residential development for many years. Investigations have determined that much of this contamination initiated from cattle grazing and from roads constructed adjacent to riparian areas. This Forestry Source Plan report discusses results of fieldwork conducted from 1997 through 2002.

Funded Projects

The work funded by three 319 grants, including contracts Q374, Q443, and Q558, was designed to reduce contamination in Cascade Reservoir resulting from grazing and road construction southwest and northeast of the reservoir.

- Sediment and phosphorus reduction was achieved through the following actions:
- Graveling sediment-producing roads and segments
- Graveling road approaches to stream crossings
- Installing cross drainages and permanent rolling dips in existing roads
- Closing roads in riparian areas
- Graveling recreational roads on state park lands adjacent to the reservoir
- Rocking the approach to stream fords
- Rehabilitating a riparian area
- Reviewing and revising the grazing management plans and applying BMPs

Results

The Forestry Source Plan goal for *The Cascade Reservoir Watershed Management Plan Total Maximum Daily Load (TMDL)* is a 45% reduction in sediment/phosphorus inputs from grazing and roads. The work performed under this project accomplished a 62% reduction from forestry management sources and a 52% reduction from grazing sources.

Included in this report is a description of SEDMODL, a computer model designed to predict delivery from roads and streams. The report recommends that DEQ adopt the use of SEDMODL as the method to develop TMDL's on forested lands.

Additional information, including quarterly reports submitted by the project manager and DEQ field inspections conducted by DEQ staff in 2002 and 2003, is available through the DEQ State Office.

Agricultural Sector – Coeur d' Alene Tribal lands Final Report

CONTRACTS QC036600, QC052900, AND S065

Location and Uses

This report summarizes § 319-funded work accomplished near Plummer, Idaho, on Coeur d' Alene Tribal lands, under DEQ grant contract numbers Q0529, Q0366 and S065. The predominantly agricultural land in the Plummer Creek watershed drains to Coeur d'Alene Lake and covers approximately 2,500 acres.

Impairments

Improper grazing and other agricultural techniques have resulted in denuding of stream banks and creation of near vertical cut banks along the main channel of Hangman Creek, Lake Fork Creek, North Fork Creek and Rock Creek. These streams have become a substantial source of sediment and nutrients to the southern portion of Coeur d' Alene Lake.

Funded Projects

This project consists of six subprojects, including the Lake Creek/Mitchell property, Lake Creek/Akers and Synder property, North Fork Rock Creek Watson property, Plummer Creek wetland, Benewah Creek Johnson property BMPs, and the Hangman Creek/Kitt property. Monitoring on each project varies, but includes annual photographs at select photo points, surveyed stream bank profiles that are resurveyed annually to detect erosion or profile changes, and annual plant survival surveys.

Results

The Plummer Wetland Restoration effort is the most visible and most notable accomplishment of this 319 project. It is located on a decommissioned portion of a lumber mill and log yard owned by the tribe and a nearby electric co-generation plant. The wetland project includes the main wetland pond, inflow and outflow channels, and an observation bridge for public field trips. This project has a very positive impact on the Plummer community as an indicator of the tribe's natural resources restoration program. This site is used for educational programs and is closely watched and maintained, as needed, to ensure its function as a water quality and wildlife improvement project.

Other work included wetland creation, the re-sloping of vertical cut banks along the main channel of Hangman Creek, the placement of erosion control matting and rock barbs to protect the re-sloped banks, and the planting of native grasses, trees, and shrubs to provide further stabilization. Woody vegetation restoration along the Hangman Creek/Kitt property mainstem is considered a key restoration effort. A very important watershed in both Idaho and Washington, Hangman Creek received considerable attention because of widespread degradation.

Other BMPs applied include sediment basins and pond systems that were constructed in the Lake and North Fork Rock Creek watersheds. This work, in conjunction with vegetative plantings, is considered vital in protecting and improving the quality of these drainages. While the use of native plant species does carry a high cost, it is seen to be the only real way of returning these drainages to stable conditions that support the full range of human, fish, and wildlife beneficial uses.

Sediment budget modeling conducted for the North Fork of Rock Creek is considered a very important step in understanding sediment generation and movement across the entire region. The process that was developed will have wide applicability to other drainages through its use of accepted erosion process equations and its basis in Geographic Information System (GIS) mapping techniques.

This 319 project had a very positive impact on the people of the Coeur d'Alene Reservation—both tribal members and non-tribal residents. The newsletter *Watershed Wrap* is distributed widely throughout this area and is widely read. This 319 project, and other water quality and non-point source issues, were featured in each publication during project construction. There is no doubt that public awareness of the reasons for, and solutions to, water quality and habitat degradation is the only way to achieve a lasting change in the present situation.

Groundwater Sector – Final Summary, Statewide Program, Pesticide Testing

CONTRACT #S050

This project was designed to provide a statewide perspective on the distribution and level of pesticides in ground water. Pesticide analyses, using gas chromatography (GC) analysis methods, were to be conducted on ground water samples collected from 300 of the approximately 400 statewide program wells sampled during the summer of 2002. (The pesticide information from the wells would have augmented the 597 statewide program samples analyzed for pesticides from 1994 through 2000.) The GC pesticide analyses funded by the §319 grant were to be used in conjunction with immunoassay pesticide tests and other analyses to: 1) identify areas with ground water quality problems, 2) help characterize water quality of Idaho's principal aquifers, and 3) direct future regional ground water quality monitoring and ground water quality management activities.

However, due to a fire at the State Health Lab, only samples from 172 sites were analyzed for pesticides using GC techniques (EPA Method 515.2 or 515.3 - chlorinated herbicides and EPA Method 525.2 – organic compounds). The sites analyzed using GC methods are predominantly located in southern Idaho. The lower number of laboratory tests resulted in unspent funds totaling $28,712 out of an original grant of $60,000.

Results of the pesticide analyses include the following:

- Ground water samples from eight of the 172 sites tested contain pesticides, as determined by GC tests.
- Ground water samples from seven sites contained one pesticide (Dacthal) and ground water samples from one site contained two pesticides (Dacthal and 2,4-D). Drinking water standards are not established for these compounds, so the levels were compared to EPA drinking water health advisories.
- No compounds were detected in concentrations above their drinking water health advisories.
- All results are contained in the IDWR Statewide Ambient Ground Water Quality Monitoring Program database and are readily accessible via the IDWR website: http://www.idwr.state.id.us/hydrologic/info/statewide/.

Ground water samples from the 172 GC sites and an additional 220 sites (392 sites total) were analyzed for pesticides using immunoassay tests, in accordance with existing statewide program procedures. Immunoassay testing results indicate ground water samples from 30 sites contained detectable concentrations of pesticides. Samples were tested for *Atrazine, Alachlor, Acetochlor,* and *Metolachlor*, the following results were obtained:

- Atrazine was detected in samples from 18 sites.
- Alachlor was detected in samples from 4 sites.

- Acetochlor was detected in samples from 1 site.
- Metolachlor was detected in samples from 9 sites.
- All concentrations are below drinking water standards or health advisory levels. Atrazine detections are distributed throughout Idaho.
- Overall, low levels of pesticides were detected in slightly less than nine percent of the samples tested for pesticides. Gem County and Franklin Counties had the highest percentage of sites with pesticides: two of the five wells sampled in each county contained a pesticide. Ada County had the next highest percentage of sites with pesticides, with six of 30 sites containing pesticides. In general, the highest frequency of detections was observed in ground water samples collected from southwestern Idaho.

The attached figures and tables summarize the results of the GC and immunoassay pesticide analyses conducted on samples collected from statewide program sites in 2002.

TABLE 1 **Sites where pesticides were detected in 2002**

Station	LatDeca	LongDecb	2,4-D	Acetochlor	Alachlor	Atrazine	Dacthal (DCPA)	Metolachlor
02N 03E 28CAC1	43.47805556	-116.1077778					1.14	
02N 04W 04ADA1	43.54055556	-116.8116667					35.2	
03N 01E 13BDB1	43.59944444	-116.2880556				0.3	0.94	
03N 01E 17ACA1	43.60027778	-116.3602778				0.1		
03N 02E 07ADCB2	43.61319444	-116.2571111				0.11		
03N 02W 04DDAA2	43.62263889	-116.5730278				0.12		
03N 03W 14CDA1	43.59194444	-116.6627778			0.11		1.3	
04N 01E 31DCCD1	43.63397222	-116.3822222				0.28	0.4	
04N 01W 25DCDD2	43.64844444	-116.3996944				0.34	1.5	
04N 02W 22DCD1	43.66333333	-116.5588889						0.07
04N 04W 21CAA2	43.66888889	-116.8222222			0.13			
04N 05W 02CBB1	43.71266667	-116.9093056	1.0				8.19	
04S 07E 20CAA1	43.06027778	-115.6488889						0.19
05N 04W 24ABA1	43.76194444	-116.7591667						0.08
05S 03E 36CAC1	42.94333333	-116.0494444				0.12		
05S 08E 34DBA1	42.94583333	-115.4872222						0.13
05S 17E 25CBCA1	42.95805556	-114.3930556						0.11
06N 03W 10BAA1	43.87916667	-116.6816667				0.2		
07N 02W 30CCC1	43.90888889	-116.6291667			0.1	0.8		
08S 14E 03DBB1	42.761	-114.7991667		0.07				
08S 30E 14ABB2	42.733	-112.9131667				0.8		
08S 39E 06DCB1	42.75388889	-111.9452778				0.06		
09N 05W 26CBB1	44.08916667	-116.9102778				0.07		
10N 44E 10CBA1S	44.20527778	-111.2491667						0.26
10S 13E 25DDC1	42.52138889	-114.8713889			0.16	0.14		
10S 22E 35BCB1	42.515	-113.8513889				0.16		
10S 23E 14CCB1	42.55	-113.7425				0.15		
10S 40E 24BAD1	42.54472222	-111.7302778				0.18		
11N 05W 29CBB1	44.25944444	-116.9725					0.57	
11S 23E 05BDC1	42.4985	-113.7955				0.14		
12S 40E 12CCB2	42.38972222	-111.7377778						0.08
14S 32E 25BDA1	42.17833333	-112.6647222						0.08
15S 40E 20DCB1S	42.10222222	-111.8055556						0.84
55N 02E 03CCB1	48.13944444	-116.2002778				0.06		

LatDec = latitude in decimal format.   LongDec = longitude in decimal format.

Agricultural Sector—H17/Snipe Drain TMDL Implementation 319 Project Final Report

CONTRACT S029

Location and Uses

The H17/Snipe Drain, located in south-central Idaho, near the town of Burley (Cassia County), drains into the Goose Creek channel, which discharges agricultural wastewater into the Snake River. The drain, originating approximately six miles south of Burley, meanders through the Burley golf course just prior to emptying into the river. This stretch of the Snake River is referred to as the Milner Pool, a water body included on the State of Idaho's 1998 §303(d) list and addressed in "Lake Walcott Subbasin Assessment and Total Maximum Daily Load" (IDEQ, 1999).

Impairments

The major pollutant of concern in the Milner Pool is phosphorus. The H17 Drain has been assigned a loading of 7.29 pounds per day of phosphorus. The goal of the H17 Drain project is to reduce the phosphorus flowing into the Milner Pool, thereby aiding the agricultural community in meeting the objectives of the Lake Walcott TMDL in reducing nuisance aquatic vegetation. The ultimate goal of this and other similar projects is to keep all water coming off agricultural fields from entering the Snake River.

Funded Projects

Because of its highly visible location (in the golf course), this project is functioning well as a demonstration project, representing one of the many Best Management Practices (BMPs) that can be used to improve water quality, and increase public awareness of the agricultural community's efforts to help clean impaired water bodies.

The project consisted of constructing an earthen berm, or dam, across an existing channel, along with enlargement of the channel, creating a water and sediment control basin on the lower end of the golf course approximately 80 feet upstream of the Snake River.

The Burley Irrigation District and the City of Burley completed the work for the project, with technical assistance provided by the Idaho Soil Conservation Commission, the Idaho Association of Soil Conservation Districts, and the Natural Resources Conservation Service. The project was sponsored by the West Cassia Soil and Water Conservation District.

Behind the new dam, water drains through a vertical pipe when the basin reaches a depth of four feet. The dam halts direct flow into the river, allowing sediment and the attached phosphorus to settle. Reeds, cattails, and water grasses absorb the soluble phosphorous.

Golf course personnel clean the basin on a regular basis. An emergency concrete overflow and valve were installed on the dirt berm, and the disturbed area was seeded to grass.

Urban Runoff Sector – Paradise Creek Urban and Rural Riparian Restoration Projects Final Report

URBAN CONTRACT Q562, RURAL CONTRACT Q605

Location and Uses

The Paradise Creek urban (Contract Q562) and rural (Contract Q605) riparian restoration projects began in 1999 and were completed in 2003. This single closeout report covers both projects, which are contiguous and jointly administered by the Palouse-Clearwater Environmental Institute of Moscow, Idaho. The urban project concentrates on an approximately one-mile stretch of Paradise Creek plus its tributaries within the City of Moscow. The rural project concentrates on over six miles of Paradise Creek and its tributaries north and east of Moscow.

Paradise Creek drains to the Palouse River and ultimately to the Snake River and Columbia River.

Impairments

The entire Paradise Creek watershed north of Moscow drains Palouse geomorphology, consisting of wind-derived, very-fine-grained, volcanic material. Due to this fine-grained, unconsolidated, nutrient-rich, nature, the Palouse is both extremely desirable for farming yet extremely vulnerable to erosion, characteristics that have led to mass erosion of millions of tons of sediment and nutrients from the urban highlands north of Moscow and deposition of that material into Paradise Creek. Subsequent human-caused channeling of Paradise Creek within the City of Moscow has resulted in near vertical head cutting and further mass erosion of sediment.

Funded Projects

All of the sub-projects under the rural and the urban contracts were funded through the NPS 319 grant. Partners and local matching funds came from a wide variety of sources. A partial list of contributors includes the City of Moscow, the Moscow School District, Boy and Girl Scout Troops, Washington State University (WSU) students, University of Idaho students, AmeriCorps National Civilian Community Corps (AmeriCorps*NCCC), and scores of community volunteers.

The urban portion of this multi-faceted operation involves 25 urban subprojects, covering 14,584 feet of stream bank restoration and installation of 11 constructed wetlands, covering 45,152 square feet along Paradise Creek and its tributaries, within the City of Moscow. The work also includes the planting of 5,404 herbaceous plugs and 12,592 woody plants. All of these projects are located on urban public or private land.

Under the rural restoration project, the Palouse-Clearwater Environmental Institute completed 12 urban restoration sub-projects along Paradise Creek and its tributaries, up to six miles north (upstream) of Moscow. The rural work includes 21,637 feet of stream bank restoration, and installation of four wetlands covering 22,997 square feet. The work also includes the planting of 5,150 herbaceous plugs and 14,103 woody plants and the installation of 2,541 feet of fencing for livestock exclusion. Results

The reader is referred to the Paradise Creek summary that appears in the 2003 annual report for more information about each of the 25 sub-projects under the urban contract and the 12 sub-projects under the rural contract. The summary contains pertinent information, including photographs of all 37 riparian restoration projects.

Hydrologic-Habitat—Rock Creek 319 Grant Closure Final Report

CONTRACT S026

Location and Uses

This project is located in Rock Creek Canyon, a site that was previously the abandoned Coates Colonial Concrete Facility in Twin Falls, Idaho, and, before that, it was a dumpsite for abandoned vehicles, garbage, and construction debris. The site now includes a city-owned recreational vehicle park that caters to travelers visiting patients in the nearby Twin Falls Hospital. Sixteen of twenty-six acres in the two parcels of land have been reclaimed. This work includes 3,300 feet of stream restoration and stabilization.

Impairments

The surface conditions were primarily broken slabs of concrete littered with cast concrete anchors and other concrete debris. This debris was covered over with a variety of weed species—mostly invasive with a few noxious species—and, when precipitation was heavy enough, the water would come off the upper slope and channel through, picking up a considerable amount of sediment and invasive weed seed. The runoff was then carried over the edge of the slope into Dead Mans Creek and Rock Creek proper, adding to the non-point pollution that empties into Rock Creek from Highway 30.

In addition, the Rock Creek stream bank had been manipulated and degraded from many years of human activity. The continuous soil disturbance had encouraged the rapid replacement of native species with invasive and noxious weeds.

Funded Projects and Results

Most of the concrete debris was removed, except for those pieces too large and deeply buried to extract. One 120′ x 80′ concrete slab remains, which is part of a man made embankment of Dead Man's Creek; it will be used as a parking lot.

Most invasive species were removed from the interior. The area of impact for improvements is the south and southwesterly boundary of Rock Creek and all of Dead Man's Creek. Conditions have been met to eliminate the majority of runoff coming through the property designated in the grant proposal.

Two settling ponds have been built to capture runoff from the four lanes of Highway 30 West. The primary settling pond is connected to the secondary one via multiple layers of porous rock and some man-made materials, mostly concrete. The secondary settling pond drains via an 8″ PVC drainpipe at the apex of the water column into a gravel filter and ultimately into Dead Man's Creek and Rock Creek. About 35% of the recovered area consists of asphalt and concrete for road access, parking, and picnic shelter areas.

Outside the initial buffer area around the settling ponds, ground cover includes bluegrass and perennial ryegrass turf. This vegetation will act as large absorptive filter throughout the park. This turf area is roughly 5.6 acres, and more than 140 trees were planted in there as well. Most of the project area also functions as an inner-canyon flood plain for Rock Creek.

Manual labor was supplied via the county of Twin Falls' Juvenile Offender Program (JOP). An extensive irrigation system, minimal fertilization, and an integrated pest management program, along with the commitment of trained city staff and volunteers, maintain the health and vigor of the new recreational facility. The city plans to continue using the JOP for care and maintenance of this site.

Silviculture and Transportation Sectors – Scriver Creek Watershed Roads and Forested Lands Final Report

CONTRACTS S009/ Q564

Location and Uses

The Scriver Creek road has been a major contributor of sediment to Scriver Creek, which joins the South Fork of the Payette River at a point about four miles north of Crouch, in Boise County, for many years.

Impairments

The TMDL pollutant of concern for the South Fork of the Payette River is sediment.

Funded Projects

In 1999 and 2000, a group of stakeholders, led by Boise County, applied for and received 319 funding in two grants to reshape and apply gravel to 20 miles of Scriver Creek road, stabilize five miles of stream bank, stabilize 26 acres of hill slopes, and monitor the results of the work. Global positioning satellite survey data was collected for the entire watershed and numerous meetings between the partners, including Boise National Forest, Boise Cascade Corporation, Idaho Department of Lands, and Boise County were held. All existing roadway, culverts, and potential areas of sediment delivery to Scriver Creek were identified. Priorities were established and work began in 2000.

Results

Four stream cross-sectional transects were monitored from 2001 through 2003.The cross-sections were measured annually and photographs were taken at each transect site. WINXSPRO hydrology software was used to calculate cross sectional area and width:depth ratios.

The surveys show variable trends from each transect. Transect #1 indicates the channel is becoming narrower and deeper, transect #2 remains unchanged, and transects #3 and #4 indicate a wider and shallower stream channel. The consultant overseeing this project concludes that the three years of monitoring data is not enough time to determine if the stream channel will benefit from the work already accomplished.

Although the stream cross-sectional transects show inconclusive results, the most important result of this project is a drastic reduction of sediment erosion from Scriver Creek road and delivery to the South Fork of the Payette River. This conclusion was made after monitoring two sediment collection boxes that were installed at culverts along Scriver Road. Prior to the road and stream bank stabilization work, the collection boxes were filled with sediment after a single rain event. After the work was accomplished, only trace amounts of sediment were recorded during the entire spring runoff of 2002.

Photographs documenting sediment runoff before and after this project, along with stream cross-section monitoring data, are on file at the DEQ State Office.

Agricultural Sector – Succor Creek/Homedale School District Water Quality Project Final Report

CONTRACT #S019

Location and Uses

The Succor Creek/Homedale School District project is located in extreme northern Owyhee County, southwest of Homedale, Idaho. In the spring of 1999, the Owyhee Soil Conservation District (SCD) and the Homedale School District asked the Southwest Resource Conservation and Development (RC&D) Council for assistance in developing an agricultural wetland. The functional goal of the wetland project was to treat runoff, reducing non-point pollution from approximately 100 acres of gravity-irrigated row crop farmland. The educational goals of the project were to provide an example for local agricultural producers as well as an educational center for local area schools (there are more than 2,300 students within a ten-mile radius) to study wetland natural resources.

Impairments

The primary nutrient that impairs beneficial uses of Succor Creek is phosphorus, but sediment loading, attributable to past land management practices that have resulted in unstable banks, also contributes to the impairment of this water body.

Funded Projects

The Owyhee SCD sponsored this project to the Southwest Idaho RC&D, which coordinated the project with the Homedale School District and set up an advisory committee. Local partners included Owyhee SCD, Homedale School District, teachers, the agricultural producer, City of Homedale, CH2M Hill consultants, Campbell Tractor of Homedale, and the irrigation district. State-level partners were the Idaho Department of Agriculture, Soil Conservation Commission, Department of Environmental Quality, Department of Water Resources, Idaho Fish and Game, University of Idaho, and Boise State University. Federal-level partners were the U.S. Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service and the Natural Resources Conservation Service.

Planning and design was done throughout 1999 and into 2000. In 2000, the RC&D began investigating funding sources based on the preliminary information. The major funding was secured in the winter of 2000 through a DEQ 319 water quality grant; however, the actual money did not become available until late in the spring of 2001, which delayed construction until the spring of 2002. The four-acre wetland system includes two sediment basins, primary filter, shallow wetland, deep-water wetland, and a final polishing filter. This wetland was designed by the NRCS engineers to have a detention time of three days when all of the vegetation is in place and has matured. Currently, the detention time would be about one day if there were enough tailwater to pass through.

Approximately 400 feet of stream bank was stabilized on one side of Succor Creek, with nearly 1,500 cubic yards of material placed along this section of the creek. Trees, shrubs, and grasses were planted to stabilize the bank, and this stabilization has eliminated the open active sloughing of this bank of Succor Creek.

The students' role in the development was to plant all of the wetland plants in the spring of 2002 and assist in the maintenance of the site. There were approximately 50 students involved in the two days of planting and several others assisting in weed control in the fall.

Nearly all the aforementioned partners also had volunteers for the planting event. During this time, 2,200 Baltic rush, 2,200 Nebraska sedge, and 1,600 creeping spike rush were planted in the primary filter and around the wetland. In addition, two truck loads of bulrush roots—harvested locally by Fish and Game—were planted in the wetland ponds. These plants have reproduced at phenomenal levels the last two years, and these levels are expected to continue for several years until a maximum density is reached, providing highly efficient filtering of the water.

Results

The Idaho Department of Agriculture has completed the first phase of water quality monitoring for base data. (Because the wetland had virtually no discharge in 2003, it was decided to discontinue phase two this year to evaluate any impacts the wetland is having on Succor Creek.) All the sediment and nutrients from the 90-acre farm were prevented from entering Succor Creek. On water-short years, or when irrigation sets are short due to the crop, there will be little water discharge into Succor Creek.

The Idaho Department of Agriculture will also be helping the Homedale School biology and chemistry teachers establish and conduct a long-range water-quality monitoring program.

The University of Idaho held the first of two Project WET (Water Education for Teachers) seminars. Several teachers from surrounding schools participated in this learning session, during which students collect and study water samples from each cell of the wetland, along with vegetation, macro-invertebrates, and wildlife. Students are using this outdoor classroom now and are planning further improvements for study, including goose-nesting platforms, bat boxes, and an area to hold outdoor classrooms. Surrounding schools are planning to start using this center in the spring of 2004.

Hydrologic-Habitat Modification Sector – Thomas Fork Watershed Streambank Stabilization Project Final Report

CONTRACT #S016

Location and Uses

The Thomas Fork Watershed encompasses 150,100 acres of Idaho and Wyoming, straddling the southeastern corner of Bear Lake County, Idaho, and western Lincoln County, Wyoming. The Sublette bounds Thomas Fork Valley on the east and the Pruess range bounds it on the west. The headwaters reside in Wyoming, as Salt Creek, which changes into Thomas Fork Creek once over the Idaho border. From there, Thomas Fork Creek meanders twenty-seven river miles through Bear Lake County to the confluence of the Bear River, emptying into Bear Lake, which has been designated a "special resource" water by the Idaho Legislature.

Agricultural practices represent the greatest use of the valley, with recreation playing a lesser role. Over 90% of the land is planted in harvest crops, such as alfalfa and grain, while the rest is used for dairies and grazing. Irrigation canals traverse the valley floor, providing necessary water to agricultural operations.

Impairments

This same principle used with the irrigation canals was applied to Thomas Fork to expedite water delivery to downstream users: meander bends were removed in certain segments in an effort to provide increased efficiency in water conveyance. Straightening the channel, however, increased the head gradient in the stream, which compounded water quality problems from the stream channel to the streambanks.

An additional source of water quality degradation is the lack of riparian vegetation due to improper grazing techniques along many parts of Thomas Fork. Riparian vegetation acts as a buffer strip to remove nutrients from the water, stabilize the soil, and shade the stream. Without this buffer strip, overland erosion is accelerated, nutrient uptake at the root zone is decreased, and the lack of shade increases the temperature of the water.

With no root zone to retain the soil in place, the angle of the bank is increased to near vertical. Because survival of vegetation is directly correlated to the slope of a stream bank, as the angle of a bank is increased vegetation establishment is decreased.

Funded Projects

Nonpoint source § 319 grants have been awarded to the Bear Lake Regional Commission to assist landowners along Thomas Fork Creek implement Best Management Practices over seven years. These practices have resulted in over 11,000 linear feet of stream bank held in place by applying treatments, including bank shaping, revetments, rip-rap, bank barbs and vegetation.

Results

These projects have proven successful on a number of levels. Treatments applied have retained soil in place for seven years, and photo monitoring of strategic locations has verified this.

Cross sectional surveys of the stream have shown the benefit of stabilizing the banks with BMPs. Results from monitoring indicate that for each foot of treated stream bank, 50 cubic feet of stream bank material was retained on the banks over a three-year period. This retained material, when expanded to the entire treated area, equals over 500,000 cubic feet of material retained in place.

Further success has been noted in landowner perceptions of treatments. Many landowners were skeptical of BMPs implemented on neighboring lands, but those perceptions have changed as projects stabilize land and enhance values. Because landowners and other sources help provide the labor and materials necessary for a successful project, this cooperative spirit is crucial to the success of these projects.

The success of bank stabilization work on the Thomas Fork comes from a combination of factors, none of which can succeed alone. The cooperation between the Department of Environmental Quality and local landowners provides a strong foundation for successful implementation: money provided by the state allows construction to proceed, while the landowner ensures success by proper management. Both entities benefit through improved water quality and stabilized soil.

The Bear Lake Regional Commission has been pleased to sponsor these projects and act on behalf of the landowners in carrying out implementation of Best Management Practices. It would be the hope of the regional commission board members that this relationship will continue for years to come, until Thomas Fork Creek is once again classified as "fishable and swimmable."

Agricultural Sector – Winchester Lake Watershed 319 Nonpoint Source Project Final Report

CONTRACT #Q610

Location and Uses

Winchester Lake, located 30 miles southeast of Lewiston, Idaho, is prized for its visual beauty and recreational value. The 75-acre lake, the focal point for Winchester Lake State Park, is used extensively by boaters, fishermen, and waders, receiving up to 37,000 visitors per year.

Impairments

Poor water quality has recently become a significant problem in Winchester Lake, the result of high phosphorus levels, which cause algae blooms, poor water clarity, and low dissolved oxygen for fish. The source of this phosphorous contamination includes fertilizers, land development, improper grazing techniques, dirt roads, and other agricultural activities adjacent to the lake and throughout the Upper Lapwai Creek watershed.

The effects of phosphorus are exacerbated by the natural warming/cooling cycles experienced by lakes. During spring and summer months, sunlight and warm air temperature heat the surface water of a lake. Cold water, due to its higher density, is heavier and sinks to the bottom, creating a condition called *thermal stratification*, in which the warm and cool layers of water don't mix. In the warm surface water, sunlight allows tiny plants to grow. As these plants die and sink, their decomposition uses up the oxygen in the deeper cool water (called the hypolimnion). Throughout the summer, oxygen levels in the hypolimnion continue to decline until no oxygen is present (anoxic conditions). This oxygen depletion, combined with warm water in the lake's upper layers, reduces the volume of the water in the lake that supports cold-water fishery to less than 16 percent of the total lake volume. Additionally, these periods of oxygen depletion allow the release of phosphorus from lake sediments into the waters of the hypolimnion.

During the fall, colder air temperatures cool the lake's surface waters. When surface water becomes cooler than deep water, the surface water sinks and the lake "turns over." This turnover allows the high concentrations of phosphorus in the hypolimnion to mix throughout the lake. The lake is thus fertilized for abundant plankton growth to occur the next summer, and cycle is repeated.

Funded Projects

As it became clear that cleaning up the Winchester Lake would require cooperation from farmers, Idaho Fish and Game, homeowners, the Nez Perce Indian Tribe, and Lewis County, several projects were designed and funded:

The Nez Perce Tribe (NPT) Water Resources and Forestry staff conducted a site visit with the contractor in September 2000 and formulated restoration options for two stream segments along Lapwai Creek. The work included installation of a gate to restrict livestock access and realignment of a new fish-friendly culvert. Rolling dips and buffer strips of grass were added to a portion of the road leading to Winchester Lake shoreline.

Along road Segment 2 (the section between Mud Springs Reservoir and Talmaks Reservoir), out-sloped roads with new rolling dips, one culvert, two gates, graveled surface, and mulched and seeded shoulders were completed. All of this work was done in 2000.

In 2001, NPT Water Resources staff, volunteers, participating landowners, and the Salmon Corps planted 2,500 trees and shrubs, including Douglas spirea, redozier dogwood, Douglas hawthorn, coyote willow, Drummond willow, Mackenzie willow, quaking aspen, serviceberry, paper birch, and Sitka alder. The area where plants were placed was cleared with hodags prior to planting, and compost was placed in holes. Tree protectors were staked around plantings. Plants were placed, according to species requirements for moisture and sunlight, within approximately 30 feet of the creek.

Work in a low-meadow campground adjacent to Upper Lapwai Creek included installation of contained steel campfire units to reduce nutrient loading during spring runoff. Six campfire grills were purchased for the Mud Springs Association Campground. The grills were designed and manufactured locally for a reduced price.

Stabilization of the Wolf Center access road included road surface hardening with coarse foundation rock and reshaping the inside ditch. Four rolling dips and five water bars were installed for water conveyance. Finally, a base rock application was installed in spring of 2002.

Beginning in the summer of 2003, the Idaho Department of Fish and Game teamed with the Department of Environmental Quality and implemented a project to directly attack the algae buildup in the lake. Many options were carefully considered for reducing the amount of phosphorous in the lake, including aeration, chemical treatment, dredging, and hypolimnetic water withdrawals. After considering factors, such as cost, public input, and environmental impacts, hypolimnetic aeration was determined to be the best option.

The Idaho Department of Fish and Game matched 319 grant funds to install eight aeration units in the deeper areas of Winchester Lake during the summer/fall of 2002. These units take water from the bottom of the lake, bringing it to the surface where it is oxygenated by contact with air, then returned to the bottom of the lake. By increasing the level of oxygen in the hypolimnion, the amount of phosphorous that can be released into the water is reduced, thereby reducing the amount of "fertilizer" available for algae. This in turn reduces the loss of oxygen in the hypolimnion due to decomposition, breaking the cycle. (Less algae buildup also means clearer water.)

Water is brought up from the bottom of the lake through the action of a compressor, which releases air at the bottom of a vertical pipe. As the air rises, it forces water up the pipe into an attached trough. As the level of the water increases in the trough, gravity forces water back down a second pipe to the bottom of the lake.

Each unit is approximately 10' x 10' and covered with a low A-frame roof. The air compressors are housed in sheds on the opposite side of the lake from the park and campground to reduce noise pollution in those areas. The units were turned on in early Summer 2003, and the summer and fall were then spent troubleshooting and fine-tuning the aeration system, which is currently running at full capacity and scheduled to operate for five years.

Results

Monitoring in Winchester Lake and Upper Lapwai Creek is ongoing to document improved conditions for salmonids and beneficial use support due to implementation of BMPs in the watershed. It is hoped that, over time, aquatic habitat and water quality will improve because of projects such as those described above, which promote meeting the loading targets of the TMDL established in 1999 for Upper Lapwai Creek.

Department of Environmental Quality
1410 North Hilton
Boise, ID 83706