PARADISE CREEK

Total Maximum Daily Load Implementation Project

The 2004 Final Project Report of the
Palouse-Clearwater Environmental Institute

Palouse-Clearwater Environmental Institute

Watersheds Program

The Paradise Creek TMDL Implementation Project
2004 Final Project Report of the
Palouse-Clearwater Environmental Institute

This report is available on the Palouse-Clearwater Environmental Institute website:
www.pcei.org

Table of Contents

Acknowledgements **7**
Summary **9**

Introduction **11**

Part I. Urban Riparian Restoration, Roadside Erosion Control, and Animal Waste Prevention, Contract #QC056200

Berman Creekside Park 24
Bridge Street Park 27
Carol Ryrie Brink Nature Park 30
Chipman Trail 33
East Mountain View 36
Fire Station 40
Fosberg 43
Garton 46
Good Samaritan Village 49
Guy Wicks Field 52
Lightfield 55
Lorfing 58
Meadow Street 61
Mountain View Park 64
Nichols 67
Renaissance Charter School 70
Roadside Erosion Control 73
Sixth Street 76
State Line 78
Styner 81
Sweet Avenue 84
Thorogold Stables 87
West Bridge Street 89
White Avenue 92
Willard 95

Part II. Rural Riparian Restoration and Wetlands Restoration, Contract #QC060500

Big Draw 100
Brockington 102
Forbes 105
Hall 108

Harden 111
Leffingwell-Reid 114
LeFors 117
Morton 120
Morton Extension 123
Moscow Wastewater Treatment Plant Wetlands 126
Orchard Street 129
Remington 132
Streets 134
Townsend 137
Willard 140

Works Cited 143
Appendix A. Plants Utilized in Paradise Creek Restoration..... 145

Acknowledgements

The Palouse-Clearwater Environmental Institute (PCEI) would like to thank the members of the Paradise Creek Watershed Advisory Group and the Clearwater Basin Advisory Group for their efforts to improve the water quality of Paradise Creek. The residents of the Paradise Creek watershed are fortunate to have many dedicated and knowledgeable individuals involved in the management of our natural resources. PCEI was especially fortunate to work with the Latah Soil and Water Conservation District as our partner in the Paradise Creek Total Maximum Daily Load Implementation Project.

Thank you to the Idaho Department of Environmental Quality (IDEQ) Non-Point Source Management Program and to the IDEQ Regional Office in Lewiston, ID. IDEQ provided funding for the project, technical support, and leadership to guide our region through the TMDL and Implementation Plan process for improved water quality.

We would like to thank our Paradise Creek watershed community, including our supporters in Moscow, ID, Pullman, WA, the University of Idaho and Washington State University.

We would like to thank all of the generous landowners, farmers, and land managers who collaborated on restoration projects and continue to be examples of responsible stewardship.

Thank you to the City of Moscow for providing funding and support throughout the process. We would especially like to thank the City of Moscow Parks and Recreation Department for collaborating on many stream restoration projects associated with City of Moscow property.

Thank you to the staff of PCEI past and present whose hard work, long hours, passion for community service and commitment to environmental conservation led to these results.

Special thanks go to the PCEI membership, community supporters, and dedicated volunteers. Their generosity, dedication, flexibility and enthusiasm are inspirational. The implementation of this project was truly a community effort. We learned about the little stream that winds through our forests, farmland, neighborhoods, and campus. We learned the meaning of watershed stewardship, we learned about our community, and we learned how much we could accomplish by working together.

Summary

Through the collaborative Paradise Creek Total Maximum Daily Load Implementation Project, the Palouse-Clearwater Environmental Institute (PCEI) completed watershed restoration projects on Paradise Creek and its tributaries from January 2000 to December 2004. The TMDL Implementation Project was a watershed effort led by the Paradise Creek Watershed Advisory Group, the Latah Soil and Water Conservation District and PCEI. This report covers restoration work by PCEI for the TMDL Implementation Project under two contracts, #QC060500 and #QC056200, with the Idaho Department of Environmental Quality (IDEQ) under Section 319 of the Clean Water Act.

Restoration efforts were designed to reduce nonpoint source pollution in Paradise Creek to reach the targets set by the Paradise Creek Total Maximum Daily Load (TMDL) and TMDL Implementation Plan. Through these efforts, restoration projects were implemented by PCEI on public and private lands throughout the watershed. PCEI completed 39 restoration projects on Paradise Creek and its tributaries. The major project categories were: urban riparian restoration, animal waste prevention, roadside erosion control, rural riparian restoration, and wetlands restoration. In total, the restoration projects implemented by PCEI treated 8.9 miles of streambank and restored 35 acres of vegetated stream buffer area. To restore wetland and riparian plant communities, more than 27,500 woody plants were installed along with 13,000 emergent herbaceous plants, and 12.4 acres of grass. The restoration work engaged community volunteers and supporters to provide materials and labor. More than 19,000 hours of volunteer time went into the project. Following the completion of project implementation, PCEI is focused monitoring and evaluation to determine success and improve future efforts.

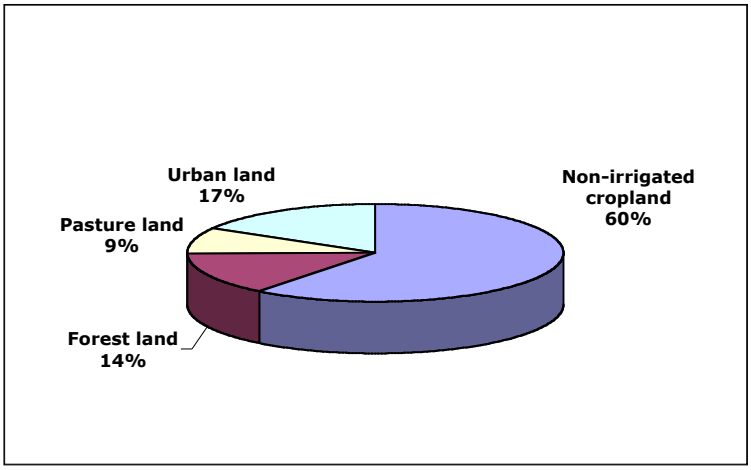
The Paradise Creek Total Maximum Daily Load Implementation Project

Paradise Creek

Paradise Creek is located in the Palouse Bioregion of northern Idaho and eastern Washington. The stream originates in forested headwaters of the Palouse Mountain range in Latah County, Idaho and flows through agricultural lands into the city limits of Moscow, Idaho. The stream flows through Moscow and the campus of the University of Idaho, then enters Whitman County, Washington just downstream from the Moscow wastewater treatment plant. Paradise Creek flows along Washington State Highway 270 approximately seven miles to Pullman, Washington where the stream joins the South Fork of the Palouse River. Paradise Creek is part of the Palouse River Subbasin, a tributary of the Snake River, which enters the Snake near Lyons Ferry, Washington.

The Paradise Creek Watershed covers 23,038 acres with 13,888 acres located in Idaho (Figure 2)(USDA 1995). Elevations in Idaho range from 2,520 ft (763 m) to 4,356 ft (1,320 m). Paradise Creek is characterized by low flows during the summer and fall and high peak flows in the winter and spring (IDEQ 1997). The stream is intermittent upstream of the Moscow city limits and perennial downstream. Land use in the watershed is primarily non-irrigated cropland (Figure 1).

Figure 1. Land use in the Paradise Creek watershed (USDA 1995).



Land use changes and management practices have significantly impacted wetlands, riparian areas, and water quality of Paradise Creek. Since mechanized farming was introduced to the watershed, agriculture has significantly impacted upland and riparian areas. Native riparian vegetation has been almost entirely removed throughout the agricultural land of the watershed. Invasive reed canarygrass (*Phalaris arundinacea*) dominates the riparian vegetation. The loss of woody species and altered stream

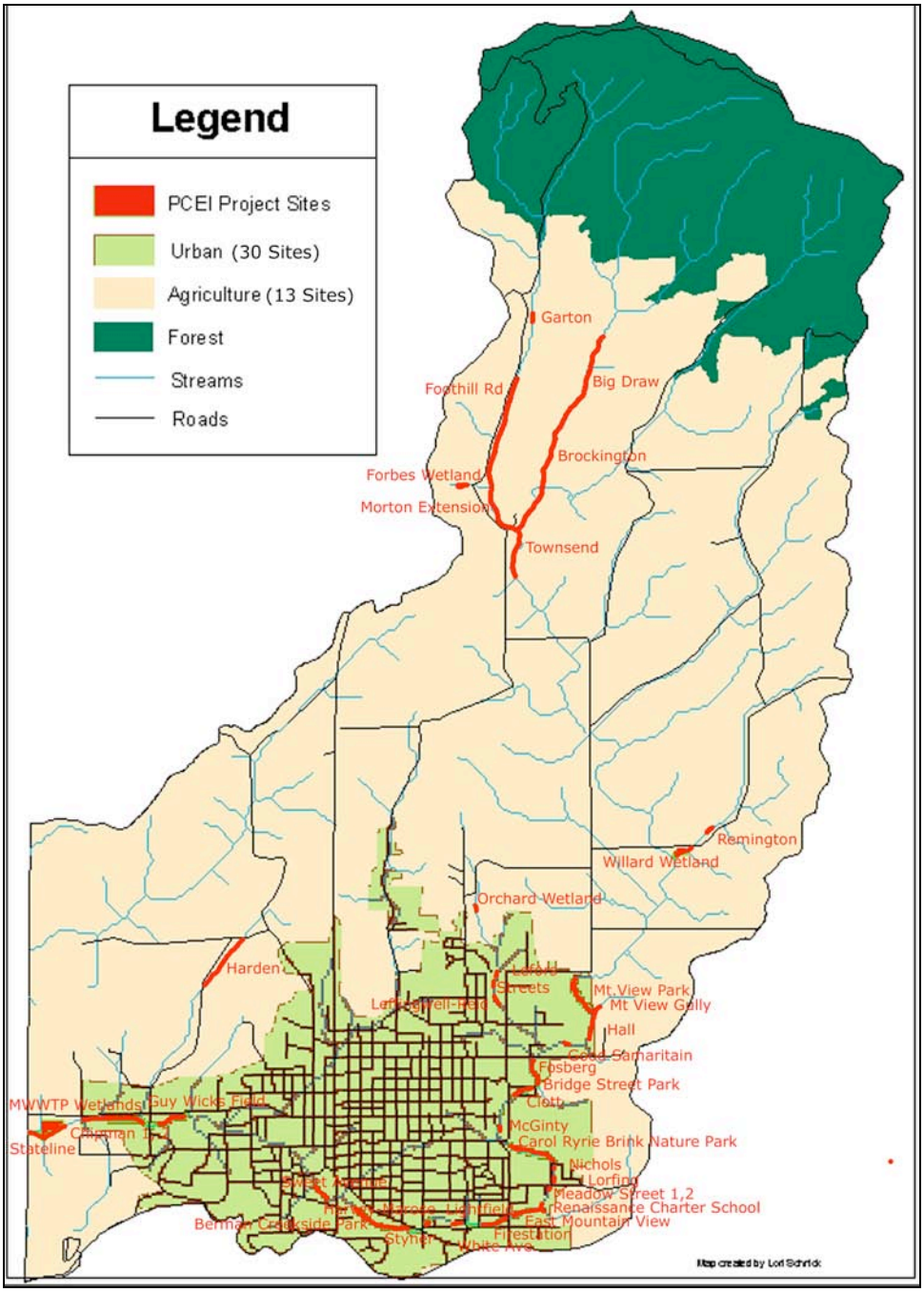
channels led to highly erosive instream conditions. The stream has been channelized and dredged, resulting in highly entrenched and steep eroding stream banks.

Forest practices involving timber harvest and road building have altered the forested headwaters. However, timber activities have become greatly reduced in the watershed (IDEQ 1997). Erosion along county roads is common where Paradise Creek tributaries have been confined to ditches, often dredged. Urban development has had large impacts on the floodplain and stream conditions within Moscow. Urban development has meant increased channelization and dredging of the stream. This decreases sinuosity and has entrenched channels, largely characterized by eroding and unstable banks. Riparian vegetation has been largely removed. Invasive plants like European golden willow (*Salix alba*) and reed canarygrass dominate the vegetative component of the riparian area. Floodplain development and a large increase in impermeable surfaces has changed the influence of stormwater on the stream system and increased water velocities. In addition, there are two point sources of pollution in the watershed, the Moscow wastewater treatment plant and the University of Idaho Aquaculture Research Institute.

Wetlands in the watershed are typically associated with riparian areas along Paradise Creek and its tributaries. The condition of these wetlands has been rated poor to fair due to past and present management activities (Doke and Hashmi 1994). Throughout the Palouse bioregion, wetlands have been lost or damaged since European settlement. Researchers estimate 97% of Palouse wetlands have been converted to other land uses (Black et al 1999). This trend is likely borne out in the Paradise Creek Watershed, however specific data on pre-settlement conditions is difficult to find.

There are reports that Paradise Creek once supported cold-water fisheries (Wertz 1993). Currently, fish species detected in Paradise Creek include redside shiner (*Richardsonius balteatus*), northern pikeminnow (*Ptychocheilus oregonensis*), speckled dace (R*hinichthys osculus*), large-scale sucker (*Catostomus macrocheilus),* longnose sucker (*C. catostomus*), and bridgelip sucker *(C. columbianus*). For a full discussion of fish and wildlife present in the watershed, refer to the draft Palouse Subbasin Management Plan (NWPCC 2004).

Figure 2. The Paradise Creek Watershed



Water Quality Protection Under the Clean Water Act

Under the federal Clean Water Act, Idaho surface waters are required to be assessed for uses, and water quality that supports those uses. The designated beneficial uses for Paradise Creek as identified by Idaho Water Quality Standards are: cold water aquatic life, secondary contact recreation, and agricultural water supply (IDAPA 16.01.02). The Idaho Department of Environmental Quality (IDEQ) conducts assessments to determine the support for those beneficial uses as determined by numerical and narrative water quality standards. If the water quality of a stream does not meet the criteria required to support its designated beneficial uses, the stream is identified as "water quality limited" and added to the 303(d) list under Section 303(d) of the Clean Water Act. In 1994, Paradise Creek was listed as water quality limited from its headwaters to the Idaho-Washington state line for the following pollutants: ammonia, nutrients, sediment, habitat modification, pathogens, flow alteration, and temperature (IDEQ 1997).

For interstate waters like Paradise Creek, Section 401 of the Clean Water Act further requires each state to meet the water quality standards of the receiving state at the state line. In Washington, Paradise Creek is classified as a Class A water to be protected for salmonid spawning, primary contact recreation, domestic water supply, wildlife and aesthetics (IDEQ 1997). Currently salmonid spawning, domestic water supply, and primary contact recreation are not supported by Paradise Creek in Washington (EPA 1993).

Total Maximum Daily Load (TMDL)

With the listing of Paradise Creek as water quality limited in Idaho and Washington, IDEQ had the responsibility under the Clean Water Act to develop a Total Maximum Daily Load (TMDL). A TMDL is a pollutant budget that sets targets for the maximum amount of a pollutant that a water body can receive from human-caused sources and still meet water quality standards (IDEQ 2004). Once IDEQ begins the TMDL development process, a Watershed Advisory Group (WAG) is convened. The WAG consists of watershed residents representing various interests. The Palouse-Clearwater Environmental Institute (PCEI) joined the WAG when it was formed in 1996 as a representative for the "environmental" interest of the watershed community.

The WAG worked with IDEQ to develop the Paradise Creek TMDL, which set pollutant load targets for sediment, temperature, nutrients, pathogens, and ammonia. In 1998, the TMDL became the first in the state of Idaho developed by IDEQ and approved by the US Environmental Protection Agency (EPA).

TMDL Implementation Plan

Development of a TMDL Implementation Plan was the next step in the watershed planning process toward water quality improvement on Paradise Creek. This plan was developed by the Paradise Creek WAG and IDEQ in 1999. The Implementation Plan was developed to provide guidance to improve water quality in Paradise Creek and lead

to full support of all designated beneficial uses (PCWAG 1999). The plan includes activities, structures, treatment facilities, and nonpoint source management practices. The plan also outlines potential funding sources, estimated completion schedules, effectiveness estimates, and lead agencies. Major categories of treatment include point source pollution control activities, and nonpoint source pollution control on agricultural and rural non-forested lands, rural roads, forest lands, and urban lands.

TMDL Implementation Project

The Paradise Creek TMDL Implementation Project was conceived during development of the TMDL Implementation Plan. The project was developed by PCEI, the Latah Soil and Water Conservation District and other Paradise Creek WAG members. Two contracts with the Idaho Department of Environmental Quality funded the project through the Nonpoint Source Management Program 319 Subgrant Program. The Latah Soil and Water Conservation District was the primary project sponsor for the contracts and PCEI was subcontracted to carry out portions of the project.

The FY99 (Contract #QC056200) encompassed agricultural BMPs, urban riparian restoration, roadside erosion control. The Latah Soil and Water Conservation District took the lead to implement agricultural best management practices. PCEI provided leadership to implement urban riparian restoration. PCEI also worked with other stakeholders to complete roadside erosion control projects and animal waste prevention projects. The FY00 Contract (#QC060500) addressed rural riparian and wetlands restoration. While the LSWCD focused on agricultural BMPs in upland areas, PCEI was subcontracted to focus on rural riparian and wetlands restoration throughout the Paradise Creek watershed.

The goal of the Paradise Creek TMDL Implementation Project was to use ecological restoration to improve water quality in Paradise Creek, which would lead to full support of all designated beneficial uses. The purpose of this report is to summarize and describe the activities of PCEI under the TMDL Implementation Project related to urban riparian restoration, animal waste prevention, roadside erosion control, rural riparian and wetlands restoration.

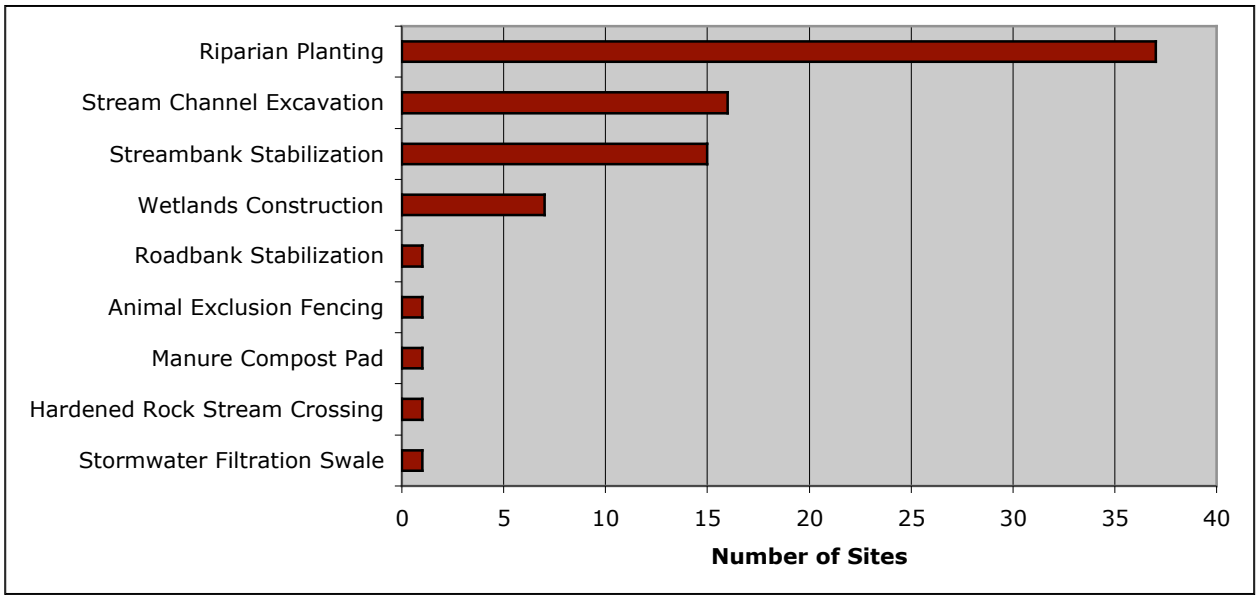
Watershed Restoration

Ecological restoration is a process to reestablish the structure and function of ecosystems. The primary goals of PCEI's wetlands and riparian restoration projects were to restore the community structure and function of the ecosystem, including the natural complement of species, as closely as possible to pre-disturbance conditions. The restoration philosophy of PCEI is based on local conditions, scientific research, and the definitions developed by the US Forest Service and the National Research Council (USFS 2004, NRC 2004). Aquatic ecosystems are inherently variable and dynamic. PCEI recognizes the dynamic nature of aquatic ecosystems and seeks to reestablish heterogeneous conditions and energy flows similar to predisturbance conditions.

Restoration of the riparian plant community is an important component of Paradise Creek watershed restoration. Strong evidence exists to support the effects of riparian vegetation on water quality. Riparian vegetation reduces both in-stream erosion and pollutant loading from overland runoff. For instance, major bank erosion can be 30 times more likely on non-vegetated river bends compared to vegetated bends (Beeson and Doyle 1995). On another site, tree planting, straw mulch and erosion netting reduced streambank erosion by 95% over three years (Megahan 1974). Additionally, a 15-ft wide vegetated buffer will remove 53-86% of incoming sediment from overland runoff and a 30-ft buffer will remove 70-98% (Gilmore 1995). Vegetated buffers have also been reported effective for filtering bacteria from overland runoff.

PCEI utilized riparian planting as the cornerstone of Paradise Creek riparian and wetland restoration efforts. Riparian planting was carried out on 37 of the 39 sites (Figure 3). Riparian plantings were carried out using native plants based on the best available information about pre-settlement conditions (Appendix A). Native grasses, herbaceous plants, and woody plants were used to re-establish riparian buffer areas and restore the plant communities of wetlands. Plant species selection was based on historical information, reference sites, and plant availability.

Figure 3. Restoration practices utilized in the Paradise Creek TMDL Implementation Project.



Stream channel excavation and streambank stabilization were important techniques utilized in the TMDL Implementation Project (Figure 3). Stream channel excavation, carried out on 16 sites, includes one or more of the following: resloping streambanks, reconnecting the stream to the floodplain, the construction of a narrow low-flow channel, and remeandering of the stream channel. Streambank stablilization, carried out on 15 sites, includes installation of one or more of the following: erosion control fabric, coir

logs, fascines, soil wrap revetments, log crib revetments, root wad revetments, and rip rap stabilization.

Wetlands construction occurred on seven sites in rural and urban portions of the watershed (Figure 3). Wetlands construction is expected to improve water quality through increased stormwater retention, filtration of pollutants from runoff, and increased deep percolation which increases base flow and lowers water temperatures.

Other restoration techniques utilized in the project included roadbank stabilization, animal exclusion fencing, manure compost pad, hardened rock stream crossing and stormwater filtration swale. These techniques will reduce nonpoint source loading of pollutants targeted by the TMDL.

TMDL Implementation Project Results

Under the Paradise Creek Total Maximum Daily Load (TMDL) Implementation Project, PCEI completed 39 restoration projects to improve water quality through reduction of nonpoint source pollution. The work was carried out under two contracts (QC#060500 and QC056200) funded primarily through the Idaho Department of Environmental Quality (IDEQ) (Table 1). Restoration efforts were carried out on rural and urban areas on public and private property, with the overall goal to achieve water quality targets set by the Paradise Creek TMDL. The restoration projects implemented by PCEI treated 8.9 miles of streambank and restored 35 acres of vegetated stream buffer area (Table 2). To restore wetland and riparian plant communities, more than 27,500 woody plants were installed along with 13,000 emergent herbaceous plants, and 12.4 acres of grass. The restoration work engaged community volunteers and supporters to provide materials and labor. More than 19,000 hours of volunteer time went into the project. Through non-federal matching funds, volunteer time, and in-kind donations, 42% of the project cost was raised by PCEI to match IDEQ's contributions.

Under the Paradise Creek Total Maximum Daily Load (TMDL) Implementation Project (Contract #QC060500), PCEI completed 15 restoration projects to restore rural riparian reaches of Paradise Creek and to restore wetlands areas throughout the watershed. One of these projects, Willard, is also listed under Contract #QC056200 for animal waste prevention. Rural riparian and wetlands restoration projects treated 4.6 miles of streambank and 35 acres. Fourteen wetlands were constructed and covered 3.6 acres, with a water storage capacity of 280,000 cubic feet. More than 17,000 woody trees and shrubs were planted on the restoration sites. Plantings also included approximately 9,000 emergent herbaceous plants and 1,300 forbs.

Under the Paradise Creek TMDL Implementation Project (Contract #QC056200), PCEI completed 24 restoration projects to restore urban riparian reaches (21 sites) of Paradise Creek, to reduce roadside erosion (one project) and to reduce the impacts of animals (four sites) on Paradise Creek water quality. Urban riparian restoration treated 4.4 miles of streambank and covered almost 16 acres. Two wetlands were constructed with a combined surface area of 7,056 square feet and a water storage capacity of 3,528 cubic

feet. Approximately 9,400 woody trees and shrubs were planted on the restoration sites. Plantings also included 3,620 emergent herbaceous plants and 1,660 forbs.

Three animal waste prevention projects were implemented on rural private property. One hardened-rock stream crossing was installed and one manure compost pad was constructed. In addition, the Willard Wetlands restoration site, listed primarily as a Wetlands Restoration Project (Contract #QC060500), had an Animal Waste Prevention component that included exclusion fencing. This project is described under both Part I and II of this report. One roadside erosion control project was conducted in partnership with the North Latah Highway District and private landowners.

Project	319 Funds	Non-Federal Match	% Non-Federal Match	Additional Match - AmeriCorps	Total
Contract #QC056200					
Urban Riparian Restoration	$321554	$373,447	53.7	$67,749	$762,750
Animal Waste Prevention	$3,999	$1,717	30.0	---	$5,716
Roadside Erosion Control	$17,349	$14,875	46.2	---	$32,224
SUBTOTAL	**$342902**	**$390,039**	**48.7**	**$67,749**	**$800690**
Contract #QC060500					
Rural Riparian Restoration	$301,904	$175,552	36.8	$23,997	$501,453
Wetlands Restoration	$33,225	$51,203	60.7	$4,778	$89206
SUBTOTAL	**$335,129**	**$226,755**	**40.4**	**$28,774**	**$590658**
TOTAL	**$678031**	**$616,794**	**41.6**	**$96,523**	**$1391348**

Table 1. The budget summary for the Paradise Creek TMDL Implementation Project, Contracts #QC056200 and #QC060500, includes urban riparian restoration, roadside erosion control, animal waste prevention, rural riparian restoration and wetlands restoration.

Project	Streambank Length Treated (ft)	Vegetated Buffer Area (ft^2)	Woody Plants (#)	Emergent Plants (#)
Contract #QC056200				
Urban Riparian Restoration	23,079 (4.4 mi)	677,339 (15.6 ac)	9,396	3,620
Animal Waste Prevention	32	0	10	0
Roadside Erosion Control	0	18,515 (0.43 ac)	780	350
SUBTOTAL	**23,111 (4.4 mi)**	**695,854 (16 ac)**	**10,186**	**3,970**
Contract #QC060500				
Rural Riparian Restoration	21,962 (4.2 mi)	690,099 (15.8 ac)	14,670	5,614
Wetlands Restoration	2,070 (0.4 mi)	135,429 (3.1 ac)	2,646	3,485
SUBTOTAL	**24,032 (4.6 mi)**	**825,528 (19 ac)**	**17,316**	**9,099**
TOTAL	**47,143 (8.9 mi)**	**1,502,867 (35 ac)**	**27,502**	**13,069**

Table 2. The Paradise Creek TMDL Implementation Project, Contracts #QC056200 and #QC060500, stabilized streambanks, restored riparian buffer area, and restored riparian plant communities using woody and herbaceous plants.

Project	Wetlands Constructed	Wetlands Area (ft^2)	Wetlands Area (acres)	Wetlands Storage Capacity (ft^3)
Urban Riparian Restoration	2	7,056	0.16	3,528
Animal Waste Prevention	0	0	0	0
Roadside Erosion Control	0	0	0	0
SUBTOTAL	**2**	**7,056**	**0.16**	**3,528**
Rural Riparian Restoration	5	102,181	2.35	182,722
Wetlands Restoration	9	49,020	1.13	95,381
SUBTOTAL	**14**	**151,201**	**3.47**	**278,103**
TOTAL	**16**	**158,257**	**3.63**	**281,631**

Table 3. Under the Paradise Creek TMDL Implementation Project, Contracts #QC056200 and #QC060500, PCEI constructed 16 wetlands for water quality improvement.

Adaptive Management: Monitoring and Evaluation

PCEI's approach to ecological restoration includes an adaptive management component. This approach is an iterative process which integrates project design, implementation, monitoring and evaluation in an experimental framework to test assumptions and take adaptive action (Salasfky, ifad.org). This means that each restoration project is experimental and that research is emphasized for constant learning and improved techniques.

Since the Paradise Creek TMDL Implementation Project construction phase has been completed, PCEI has entered a phase of monitoring an evaluation. This will be a collective effort between many watershed stakeholders including PCEI, the Latah Soil and Water Conservation District, the City of Moscow, the Idaho Association of Soil and Water Conservation Districts, Idaho Department of Environmental Quality, Idaho Department of Lands, Idaho Department of Agriculture, and researchers from the University of Idaho and Washington State University. A summary of monitoring

responsibilities is outlined in the Paradise Creek TMDL Implementation Plan. Professor Jan Boll of the University of Idaho was recently awarded a grant from the USDA Conservation Effects Assessment Project (CEAP) for a research project entitled "Evaluation of Conservation Practices in a Mixed Land Use Watershed Using Cumulative Effects Modeling and Interdisciplinary Analyses". This effort will yield useful information related to riparian and wetlands restoration efforts by PCEI.

The monitoring framework developed by PCEI is based on the monitoring plan described in the TMDL Implementation Plan and on the document, "Monitoring a Living Legacy: A Plan for Evaluating Paradise Creek Restoration", a plan developed by Tracy Brown to fulfill a Masters in Natural Resources at the University of Idaho (Brown 2004). The comprehensive plan will allow PCEI to determine how effective restoration projects have been toward meeting TMDL objectives and improving the ecological function of Paradise Creek riparian areas. Monitoring will incorporate macroinvertebrate sampling, water chemistry sampling, stream channel measurements, and visual habitat assessments.

Each restoration project will require time for the full establishment of vegetation before the significant effects of restoration will be measurable in the environment. PCEI will track effectiveness over both short-term and long-term bases. Vegetation establishment is expected to take approximately ten years. Morphological effects on channel morphology and substrate may also have short-term and long-term trends as well. These long-term trends and the extent of uncertainty inherent in ecological systems are accounted for in PCEI's plan for monitoring and evaluation.

PART I.

Urban Riparian Restoration, Animal Waste Prevention, and Roadside Erosion Control

Contract # QC056200

Berman Creekside Park: Urban Riparian Restoration

Contract	QC056200						
Project Name	Berman Creekside Park						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality						
Project Location (Figure 1)	**UTM**	500323 E			5174379 N		
	Lat	-116.9958 °W			**Long**		46.7230 °N
	Qtr Sec	NW	**Sec**	17	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	April 2001 to June 2002						
Project Dimensions	**Length (ft)**	1,066			**Width (ft)**	55	
Project Area	**Sq Ft**	58,630			**Acres**	1.35	
Streambank Length Treated	**Side 1 (ft)** North Bank	990			**Side 2 (ft)** South Bank	620	
Vegetated Buffer	**Side 1 (ft)** North Bank	990 x 15 14,850 ft^2			**Side 2 (ft)** South Bank	620 x 6 3,720 ft^2	
Woody Plants	519						
Emergent Plants	0						
Forb Plants	535						
Area Grass Seeded	3,720 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Log Revetment Reslope Streambanks Erosion Control Fabric						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 19,826.46
Non-federal Match	$ 11,510.36
Additional Match	$ 4,742.41
Project Total	$ 36,079.23

Project Description: Berman Creekside Park

The restoration site is located on urban public property owned by the City of Moscow in Moscow, ID. Prior to restoration, the property was a privately owned vacant lot. The landowner, Katrina Berman, placed a conservation easement on the property and donated the land to the City of Moscow. Planning for the riparian restoration project began at the same time that the City of Moscow began to develop the area as Berman Creekside Park. The streambanks were steep, eroding, and frequently undercut by high water events. Golden willows, an introduced species, lined the banks, and the understory was dominated by reed canarygrass.

A cedar/fir log revetment was constructed and installed by AmeriCorps*NCCC members during the summer of 2001. Logs were secured with cables and posts along the base of an outer meander bend. The revetment was used to stabilize 143 ft of eroding streambank. The upper streambank was resloped to a gradual slope. The banks were covered with erosion control fabric and planted with native woody species, bunchgrasses and herbaceous forbs. Donated wildflowers planted on the site included prairie smoke, smooth alumroot, little sunflowers, and grass widows.

Renaissance Charter School parents and students, local Girl Scouts, University of Idaho students, AmeriCorps*NCCC and other community volunteers participated in riparian planting events. Volunteers also installed wildlife habitat structures constructed from donated materials. The PCEI Education Program provided leadership and coordination on student planting events through the AmeriCorps Learn and Serve Program. Whitman College Alternative Spring Breaks volunteers collected willow and dogwood poles for planting. Donated plants were provided by the University of Idaho Forest Research Nursery and the USDA Plant Materials Center. The City of Moscow further developed the floodplain area into a City Park and focused their landscaping efforts to complement riparian restoration efforts.

Berman Creekside Park: Urban Riparian Restoration

Before, Winter 2001

After, Spring 2001

Bridge Street Park: Urban Riparian Restoration

Contract	QC056200						
Project Name	Bridge Street Park						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501793 E			5175717 N		
	Lat	-116.9765 W			**Long**		46.7350 N
	Qtr Sec	SW	**Sec**	9	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	April 2001 to June 2002						
Project Dimensions	**Length (ft)**	420			**Width (ft)**	30	
Project Area	**Sq Ft**	12,600			**Acres**	0.29	
Streambank Length Treated	**Side 1 (ft)** West Bank	420			**Side 2 (ft)** East Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** West Bank	370 x 16 5,920 ft^2			**Side 2 (ft)** East Bank	N/A	
Woody Plants	420						
Emergent Plants	280						
Forb Plants	0						
Area Grass Seeded (ft^2)	23,100						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reconnect Stream to Floodplain Reslope Streambanks Construct Narrow Low-Flow Channel Soil Wrap Revetments Erosion Control Fabric						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 31,010.05
Non-federal Match	$ 14,799.04
Additional Match	$ 6,097.39
Project Total	$ 51,906.48

Project Description: Bridge Street Park

The restoration site is located on Paradise Creek in Moscow, Idaho on urban property owned by the City of Moscow. The stream channel was channelized and historically dredged. The channel was wide and deep with steep, eroding streambanks. Reed canarygrass was the dominant vegetation and woody plants were largely absent. The site is directly upstream from the PCEI restoration site West Bridge Street.

PCEI worked with the City of Moscow, TerraGraphics Environmental Engineers Inc., and contractors to excavate a narrow low flow channel and terraced streambanks with a gentle slope. Soil wraps were installed to stabilize streambanks and seeded with native grasses. During fall 2001, woody shrubs and trees were planted on the streambanks. The terraced streambanks increased channel storage capacity. According to HEC-2 modeling and analysis by TerraGraphics Environmental Engineers, Inc., the local 10-year flood elevation was decreased by a maximum of 0.2 ft. The 100-year flood elevation was decreased by 0.1 ft upstream of the project.

Bridge Street Park: Urban Riparian Restoration

Before, Spring 2001

After, Summer 2001

Carol Ryrie Brink Nature Park: Urban Riparian Restoration

Contract	QC056200						
Project Name	Carol Ryrie Brink Nature Park						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Moscow School District						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501711 E			5175097 N		
	Lat	-116.9776 W			**Long**		46.7294 N
	Qtr Sec	NW	**Sec**	16	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	May 2001 to October 2002						
Project Dimensions	**Length (ft)**	1,081			**Width (ft)**		96
Project Area	**Sq Ft**	103,776			**Acres**		2.38
Streambank Length Treated	**Side 1 (ft)** North Bank	790			**Side 2 (ft)** South Bank		1081
Vegetated Buffer	**Side 1 (ft)** North Bank	790 x 15 11,850 ft^2			**Side 2 (ft)** South Bank		1,081 x 52 56,212 ft^2
Woody Plants	1,891						
Emergent Plants	0						
Forb Plants	616						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Fascines						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 15,391.91
Non-federal Match	$ 6,577.35
Additional Match	$ 2,709.95
Project Total	$ 24,679.21

Project Description: Carol Ryrie Brink Nature Park

The restoration site is located on urban property owned by the Moscow School District. Prior to restoration, the stream channel had been dredged and channelized. The streambanks were steep and eroding. Woody riparian vegetation was largely absent.

Work completed under previous contract # QC012700

PCEI worked with the City of Moscow, the Moscow School District, engineers, and contractors to develop and implement a substantial riparian restoration project. Approximately 1,200 ft of stream channel was excavated to restore the connection of the stream channel to the floodplain and reintroduce stream channel meanders. Three major streambank revetments were installed, each approximately 175 ft in length. More than 3,000 ft^2 of streambank and five acres of floodplain were seeded and mulched. More than 750 native riparian plants were planted by volunteers. Volunteers also built a bark chip path through the park. Moscow School District students, University of Idaho students, Washington State University students, and other community members participated in the project. Following restoration, the site was renamed the Carol Ryrie Brink Nature Park after a local writer.

Restoration practices implemented under the previous contract included:

- Reslope streambanks
- Reconnect stream to floodplain
- Erosion control fabric
- Stream channel remeander
- Log-crib revetment
- Coir logs
- Root wad revetment

Work completed under current contract # QC056200

Riparian planting, fascines, repairs and other site maintenance were performed. This work involved repairs following flood damage from 1997 flooding. Fascines made from Drummond willow, MacKenzie willow, and red-osier dogwood were installed on streambanks where initial vegetation had trouble establishing. Staff installed protective wire around plantings after beaver damaged plants. Volunteers performed maintenance on bark chip paths using donated wood chips and added a secondary path. Volunteers also planted a large number of donated forbs. PCEI's Education Program AmeriCorps Learn and Serve members created and installed interpretive signs funded by the City of Moscow and private donors.

Carol Ryrie Brink Nature Park: Urban Riparian Restoration

Before, 1994

After, Spring 2002 – Red-osier dogwood fascines installed

Chipman Trail: Urban Riparian Restoration

Contract	QC056200						
Project Name	Chipman Trail						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	497835 E			5175414 N		
	Lat	-117.0283 W			**Long**		46.7323 N
	Qtr Sec	SE	**Sec**	6	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	April 2002 to June 2002						
Project Dimensions	**Length (ft)**	2,391			**Width (ft)**	55	
Project Area	**Sq Ft**	101,500			**Acres**	2.33	
Streambank Length Treated	**Side 1 (ft)** North Bank	2,391			**Side 2 (ft)** South Bank	2,326	
Vegetated Buffer	**Side 1 (ft)** North Bank	2,391 x 15 35,865 ft^2			**Side 2 (ft)** South Bank	2,326 x 15 34,890 ft^2	
Woody Plants	400						
Emergent Plants	0						
Forb Plants	0						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 9,825.79
Non-federal Match	$ 6,577.35
Additional Match	$ 2,709.95
Project Total	$ 19,113.09

Project Description: Chipman Trail

The restoration site is located on urban property owned by the City of Moscow. The stream channel is confined between a railroad track and a major roadway (Hwy 270). The site is also adjacent to the Chipman Trail, a paved recreational pathway that connects Moscow to Pullman, WA. Prior to restoration the stream channel had been dredged and the streambanks were steep and eroding. Woody vegetation was largely absent from the riparian area.

Work completed under previous contract # QC044500

PCEI worked with community volunteers to plant more than 2,000 native trees and shrubs in a 40 ft riparian buffer on both sides of the stream. Additionally, willow poles were planted using a post-hole tool on an excavator. Plant protective tubes were installed to prevent plant damage. Watering and weed control activities were conducted during the first two years of plant establishment. The City of Moscow planted native trees along the Chipman Trail to extend the woody vegetation to 75 ft on the north side of the stream.

Work completed under current contract # QC056200

Maintenance of previous plantings was performed, including protective tube maintenance, weed control, and watering. Additional willow poles were planted to provide streambank stability. AmeriCorps*NCCC and the City of Moscow assisted with maintenance needs.

Chipman Trail: Urban Riparian Restoration

Before, Winter 1999

After, Spring 2002

East Mountain View: Urban Riparian Restoration

Contract	QC056200						
Project Name	East Mountain View						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501579 E			5174487 N		
	Lat	-116.9793 °W			**Long**		46.7239 °N
	Qtr Sec	NW	**Sec**	16	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	August 2002 to June 2003						
Project Dimensions	**Length (ft)**	874			**Width (ft)**	219	
Project Area	**Sq Ft**	191,406			**Acres**	4.39	
Streambank Length Treated	**Side 1 (ft)** North Bank	831			**Side 2 (ft)** South Bank	831	
Vegetated Buffer	**Side 1 (ft)** North Bank	783 x 80 62,640 ft^2			**Side 2 (ft)** South Bank	783 x 134 104,922 ft^2	
Woody Plants	2,340						
Emergent Plants	2,085						
Forb Plants	210						
Area Grass Seeded (ft^2)	161,690						
Wetlands Created: 2	**Area (ft^2)**	**Circum. (ft)**		**Avg. Depth (ft)**		**Capacity (ft^3)**	
Wetland 1	1,767	149		0.5		883.5	
Wetland 2	5,289	334		0.5		2644.5	
Total	7056	483		-		3,528	
TMDL Parameters of Concern Addressed	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flood Mitigation Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Remeander of Stream Channel Reconnection to the Floodplain Wetlands Construction Reslope Streambanks Narrow Low Flow Channel Log-Crib Revetments Soil Wrap Revetments Root Wad Revetments Erosion Control Fabric Coir Logs						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 93,784.93
Non-federal Match	$ 199,330.13
Additional Match	$ 20,324.63
Project Total	$ 313,439.69

Project Description: East Mountain View Park

The restoration site is located on Paradise Creek in Moscow, Idaho on property owned by the City of Moscow and planned to become a City Park. The channel had been straightened and dredged. The channel shape was wide with steep, eroding banks. Undercutting and slumping banks were evident. Woody riparian vegetation was largely absent and reed canary grass dominated vegetative cover.

Excavation was necessary to restore the connection between stream channel and floodplain. PCEI worked with the City of Moscow and TerraGraphics Environmental Engineers, Inc. to develop restoration plans for the site. Up to 2 ft of soil was removed from the surface of the project area to remove fill material and restore the stream system. Three meander bends were constructed, lengthening the reach from 643 ft to 874 ft, an increase of 36%. Streambanks were sloped at 3:1 to limit bank erosion and allow for the establishment of streambank vegetation. A narrow low-flow channel was constructed with a bottom width of 3 ft and a depth of 1.5 ft. Two shallow wetlands were constructed. Each wetland is approximately 1 to 2 ft at maximum depth, with a 5:1 slope.

Many bank stabilization techniques were utilized in this project. Bank revetments were installed in areas especially prone to erosion. The following revetment types were used in the project:

- Log crib
- Buried log crib
- Root wad
- Soil wrap
- Coir logs

The restoration area was seeded with native grasses and all streambanks were covered with geotextile erosion control fabric. Open weave straw matting was installed on lesser erosion prone streambank areas. Tighter weave coir matting was used on more erosion-prone areas. The entire area was planted with native forbs and woody species. Protective tubes were installed for all woody plants. Watering, weed control and maintenance tasks were shared by PCEI and the City of Moscow.

Many volunteers participated in this collaborative restoration project. A local Boy Scout earned his Eagle Scout Award by building an observation deck for the site. Bark chip trails cross the site and access the observation deck where visitors can overlook the new meanders and wetlands areas. The restoration site was the location of the 2002 Paradise Creek Watershed Festival, attended by local fourth grade students and local agencies and organizations.

TerraGraphics Environmental Engineers, Inc., Synthetic Industries, AmeriCorps*NCCC members, the City of Moscow, Washington State University students in Environmental Science, Moscow School District elementary school students, local Boy Scouts, and many community volunteers participated in the project to make it a very successful example of community-building and collaboration.

East Mountain View: Urban Riparian Restoration

Before, Spring 2000

After, Spring 2003

Fire Station: Urban Riparian Restoration

Contract	QC056200						
Project Name	Fire Station						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501427 E			5174421 N		
	Lat	-116.9813 °W			**Long**		46.7233 °N
	Qtr Sec	NE	**Sec**	17	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	September 2002						
Project Dimensions	**Length (ft)**	177			**Width (ft)**		8
Project Area	**Sq Ft**	1,416			**Acres**		0.03
Streambank Length Treated	**Side 1 (ft)** North Bank	177			**Side 2 (ft)** South Bank		N/A
Vegetated Buffer	**Side 1 (ft)** North Bank	69 x 8 = 552 ft^2			**Side 2 (ft)** South Bank		N/A
Woody Plants	50						
Emergent Plants	280						
Forb Plants	N/A						
Area Grass Seeded (ft^2)	880						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Riprap Bank Stabilization Erosion Control Fabric Coir Logs						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 14,714.21
Non-federal Match	$ 8,221.69
Additional Match	$ 3,387.44
Project Total	$ 26,323.34

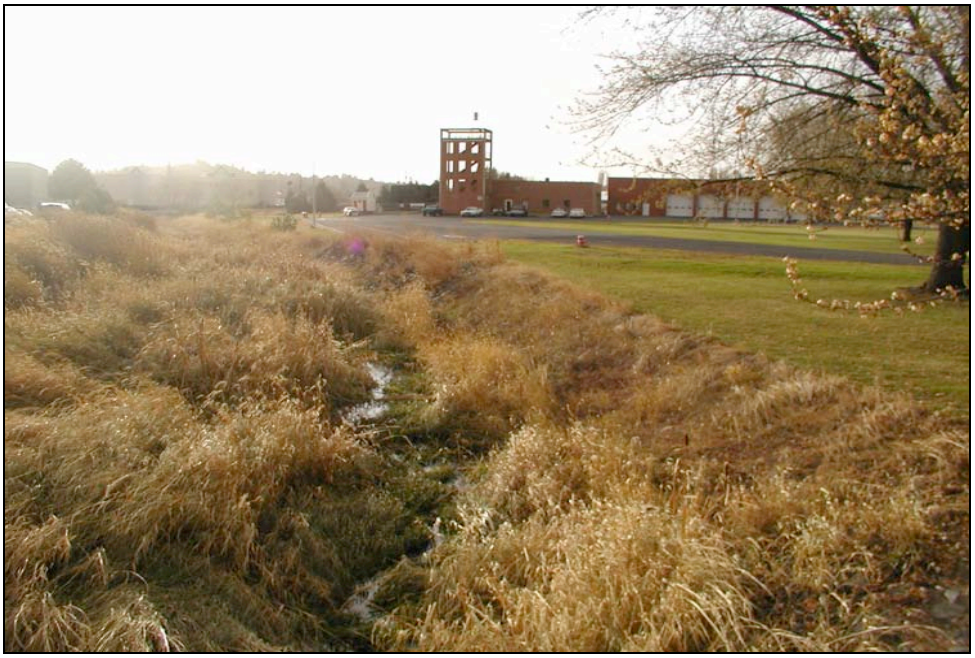
Project Description: Fire Station

The restoration site is located on Paradise Creek in Moscow, Idaho adjacent to a City of Moscow Fire Station. The stream reach was channelized and dredged. Woody vegetation was largely absent and streambanks were steep and eroding.

Streambanks were stabilized using erosion control fabric and coir logs. A small area was stabilized with riprap where other techniques could not be used. Streambanks were seeded with native grasses and then planted with native woody shrubs and trees. Herbaceous plugs were planted in the coir logs. Protective tubes were installed on all woody plants to ensure plant survival. Watering, weed control and maintenance were performed by PCEI, City of Moscow, and community volunteers. University of Idaho students, Latah County Youth Services, Washington State University students and AmeriCorps*NCCC members participated in the restoration project.

Fire Station: Urban Riparian Restoration

After, Spring 2002



After, Fall 2003

Fosberg: Urban Riparian Restoration and Animal Waste Prevention

Contract	QC056200						
Project Name	Fosberg						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration and Animal Waste Prevention						
Owners	Maynard and Margaret Fosberg						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501688 E		5175907 N			
	Lat	-116.9779 °W		**Long**		46.7367 °N	
	Qtr Sec	SW	**Sec** 9	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	2000						
Project Dimensions	**Length (ft)**	685		**Width (ft)**	205		
Project Area	**Sq Ft**	140,425		**Acres**	3.22		
Streambank Length Treated	**Side 1 (ft)** East Bank	685		**Side 2 (ft)** West Bank	685		
Vegetated Buffer	**Side 1 (ft)** East Bank	685 x 102.5 = 70,212 ft^2		**Side 2 (ft)** West Bank	685 x 102.5 = 70,212 ft^2		
Woody Plants	75						
Emergent Plants	N/A						
Forb Plants	20						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
Fencing Installed (ft)	1,370						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature Bacteria						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Animal Exclusion Fencing						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	Urban Riparian Restoration	$ 2,672.64
	Animal Waste Prevention	N/A
Non-federal Match	Urban Riparian Restoration	$ 1,315.47
	Animal Waste Prevention	$ 1,266.00
Additional Match		$ 541.99
Project Total		$ 5,796.1

Project Description: Fosberg

The restoration site is located on Paradise Creek in Moscow, Idaho on private property previously managed as pasture. Woody vegetation was largely absent and reed canarygrass dominated the streamside vegetative cover. The landowners decided to remove livestock from the riparian area and were interested riparian restoration.

Native trees and shrubs were planted to establish a woody riparian buffer on both sides of the stream. Protective tubes were installed on all plants to ensure survival. Watering, weed control and maintenance were performed by PCEI, the landowners, and community volunteers. Fencing was installed by the landowners to exclude horses from the riparian area. The property is now in a permanent conservation easement with the Palouse Land Trust. University of Idaho students, AmeriCorps*NCCC members, and community volunteers participated in the project.

Fosberg: Urban Riparian Restoration

Before, Fall 1999

After, Fall 2000

Garton: Animal Waste Prevention

Contract	QC056200						
Project Name	Garton						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Animal Waste Prevention						
Owners	E. Oz and Virginia Garton						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501719 E		5182971 N			
	Lat	-116.9775 °W		**Long**		46.8003 °N	
	Qtr Sec	NW	**Sec** 21	**Rng**	5W	**Twnshp**	40N
Project Installation Date(s)	August 2003						
Project Dimensions	**Length (ft)**	57		**Width (ft)**	17		
Project Area	**Sq Ft**	969		**Acres**	0.02		
Streambank Length Treated	**Side 1 (ft)** West Bank	15		**Side 2 (ft)** East Bank	17		
Wetlands Created	N/A						
Wetlands Area (sq ft)	N/A						
Wetlands Storage Capacity (ft^3)	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Hardened Rock Stream Crossing						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 1,030.29
Non-federal Match	$ 162.00
Additional Match	N/A
Project Total	$ 1,192.29

Project Description: Garton

The restoration site is located on Paradise Creek north of Moscow, Idaho on rural private property managed for horse pasture. The riparian area on this property is vegetated with quaking aspen, Douglas hawthorn, snowberry, serviceberry, cow parsnip and many other species composing a healthy riparian buffer of native species. There was a specific area where horses were allowed to cross the stream, causing disturbance to the streambanks and stream channel substrates.

PCEI worked with the landowners and contractors to install a hardened rock stream crossing. A shallow excavation was performed and rock fill, eight inches or less in diameter, was placed in the depression. A strip of gravel was placed on the larger diameter rock. Filter fabric was installed beneath the rock. Disturbed areas without rock were grass seeded and covered with erosion control fabric.

The site now serves as a source for transplants for PCEI's ongoing watershed restoration projects. Student groups help PCEI transplant aspen, snowberry, and rose and collect seeds for propagation. This donation from the Gartons amounts to a considerable cost savings for PCEI.

Garton: Animal Waste Prevention

Before, Summer 2003

After, Summer 2003

Good Samaritan: Urban Riparian Restoration

Contract	QC056200						
Project Name	Good Samaritan						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Good Samaritan Village						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	502094 E		5176156 N			
	Lat	-116.9726 °W		**Long**		46.7390 °N	
	Qtr Sec	NW	**Sec** 9	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2002 to October 2002						
Project Dimensions	**Length (ft)**	215		**Width (ft)**	60		
Project Area	**Sq Ft**	12,900		**Acres**	0.30		
Vegetated Buffer	5,724 ft^2						
Woody Plants	149						
Emergent Plants	0						
Forb Plants	0						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments						
Other Benefits	Fish and Wildlife Habitat Improvement Stormwater Treatment Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Stormwater Filtration Swale						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 5,739.43
Non-federal Match	$ 3,288.68
Additional Match	$ 1,354.98
Project Total	$ 10,383.08

Project Description: Good Samaritan

The restoration site is located near Paradise Creek in Moscow, Idaho on property owned by the Good Samaritan Village. Two drainage paths received runoff from an adjacent parking lot and the water discharges into Paradise Creek. Additional plantings were expected to help slow and filter stormwater runoff. Prior to planting, turf grass, several large conifers, and a manicured hedge were the primary vegetation on the site

PCEI, Good Samaritan Village staff, Moscow School District students, and community volunteers planted native shrubs and trees. Plant protective tubes were installed on all plants to ensure survival. Watering, weed control and maintenance activities were conducted. Good Samaritan Village staff continue to contribute to maintenance on the site and have helped with weed control on the Hall restoration site as well.

Good Samaritan: Urban Riparian Restoration

Before, Spring 2002

After, Fall 2003

Guy Wicks Field: Urban Riparian Restoration

Contract	QC056200						
Project Name	Guy Wicks Field						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	University of Idaho						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	498471 E			5175432 N		
	Lat	-117.0200 °W			**Long**		46.7324 °N
	Qtr Sec	SW	**Sec**	7	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	April 2002 to May 2002						
Project Dimensions	**Length (ft)**	1,688			**Width (ft)**	45	
Project Area	**Sq Ft**	38,824			**Acres**	0.89	
Streambank Length Treated	**Side 1 (ft)** North Bank	1,688			**Side 2 (ft)** South Bank	1,206	
Vegetated Buffer Area (ft^2)	38,824						
Woody Plants	600						
Emergent Plants	0						
Forb Plants	0						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 3,566.78
Non-federal Match	$ 1,973.21
Additional Match	$ 812.99
Project Total	$ 6,352.98

Project Description: Guy Wicks Field

The restoration site is located on Paradise Creek in Moscow, Idaho on the University of Idaho campus. The stream channel was channelized and dredged. The streambanks were steep and eroding with a wide channel bottom. Reed canarygrass was prevalent and woody riparian vegetation was absent.

Plants donated by the Natural Resources Conservation Service (NRCS) were planted along the stream. These included Austrian pine, Scotch pine, and lodgepole pine. AmeriCorps*NCCC members assisted PCEI and community volunteers with planting. Protective tubes were installed for all plants to ensure survival. Watering, weed control, and maintenance were performed. Further plantings with students and volunteers occurred in 2004 under a grant for Community Forestry funded by the National Tree Trust.

Guy Wicks Field: Urban Riparian Restoration

Elementary school students from Moscow School District helped plant trees along Paradise Creek at Guy Wicks Field.

Washington State University students participated planted riparian trees and shrubs at the Guy Wicks Field site.

Lightfield: Urban Riparian Restoration

Contract	QC056200						
Project Name	Lightfield						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Kirk Lightfield, Tenant: Victoria Shortt						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501019 E		5174389 N			
	Lat	-116.9867 W		**Long**		46.7231 N	
	Qtr Sec	NE	**Sec** 17	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2003 to October 2003						
Project Dimensions	**Length (ft)**	194		**Width (ft)**	30		
Project Area	**Sq Ft**	5,820		**Acres**	0.13		
Streambank Length Treated	**Side 1 (ft)** South Bank	137		**Side 2 (ft)** North Bank	N/A		
Vegetated Buffer	**Side 1 (ft)** South Bank	30 x 194 5,820 ft^2		**Side 2 (ft)** North Bank	N/A		
Woody Plants	134						
Emergent Plants	80						
Forb Plants	N/A						
Area Grass Seeded	1,960 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambank Erosion Control Fabric Coir Logs						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 20,020.33
Non-federal Match	$ 8,221.69
Additional Match	$ 3,387.44
Project Total	$ 31,629.46

Project Description: Lightfield

The restoration site is located on Paradise Creek in Moscow, Idaho on urban private property. The stream channel was dredged and highly simplified. The streambanks were steep and eroding with a wide channel bottom. Reed canarygrass was prevalent and woody riparian vegetation was absent.

PCEI worked with the landowner and contractor to reslope the streambank on the south side of the stream, the outer meander bend. Streambanks were resloped to a 2:1 slope. Coir logs were installed at the toe of the slope. The coir logs were stacked at the upstream end of the site where stream velocities were highest. The banks were seeded with native grasses and covered with erosion control fabric. Herbaceous plants and woody species were planted to form a riparian buffer approximately 30 ft in width. Plant protective tubes were installed and watering, weed control and maintenance activities were conducted. The landowner, tenant and community volunteers participated in planting and maintenance.

Lightfield: Urban Riparian Restoration

Before, Summer 2003

After, Summer 2003

Lorfing: Urban Riparian Restoration

Contract	QC056200						
Project Name	Lorfing						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Scott Lorfing						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501920 E			5774787 N		
	Lat	-116.9749 W			**Long**		46.7266 N
	Qtr Sec	NW	**Sec**	16	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	May 2000 to June 2000						
Project Dimensions	**Length (ft)**	65			**Width (ft)**	18	
Project Area	**Sq Ft**	1,170			**Acres**	0.03	
Streambank Length Treated	**Side 1 (ft)** West Bank	65			**Side 2 (ft)** East Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** West Bank	1,170			**Side 2 (ft)** East Bank	N/A	
Woody Plants	197						
Emergent Plants	120						
Forb Plants	N/A						
Area Grass Seeded	1,170 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambanks Fascines Coir Logs Erosion Control Fabric						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 12,245.52
Non-federal Match	$ 5,755.18
Additional Match	$ 2,371.21
Project Total	$ 20,371.91

Project Description: Lorfing

The restoration site is located on Paradise Creek in Moscow, Idaho on urban private property. The riparian area was highly degraded by urban development and channelization. Concrete walls, chunks of concrete and a steep roadside gravel embankment impacted the stream channel and caused erosion. Reed canarygrass was the dominant vegetation and woody plants were largely absent. Undercutting and bank failure was observed. The site is adjacent to PCEI's Meadow Street restoration site.

PCEI worked with the landowner and an AmeriCorps*NCCC team to manually reslope a segment of streambank. This area was stabilized by erosion control fabric. The area was seeded with native grasses and planted with native woody and herbaceous vegetation.

Lorfing: Urban Riparian Restoration

Before, Spring 2000

After, Summer 2000

Meadow Street: Urban Riparian Restoration

Contract	QC056200						
Project Name	Meadow Street						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Louis Vader						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure X)	**UTM**	501935 E			46.7270 N		
	Lat	-116.9747 W			**Long**		46.7270 N
	Qtr Sec	NW	**Sec**	16	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	May 2000 to July 2000						
Project Dimensions	**Length (ft)**	300			**Width (ft)**	20	
Project Area	**Sq Ft**	6,000			**Acres**	0.14	
Streambank Length Treated	**Side 1 (ft)** West Bank	300			**Side 2 (ft)** East Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** West Bank	6,000			**Side 2 (ft)** East Bank	N/A	
Woody Plants	150						
Emergent Plants	120						
Forb Plants	N/A						
Area Grass Seeded	4,200 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambanks Fascines Coir Logs Erosion Control Fabric						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	18,718.28
Non-federal Match	$	9,866.03
Additional Match	$	4,064.93
Project Total	$	32,649.23

Project Description: Meadow Street

The restoration site is located on Paradise Creek in Moscow, Idaho on urban private property. The riparian area was highly degraded by urban development and channelization. Concrete walls, chunks of concrete and a steep roadside gravel embankment impacted the stream channel and caused erosion. Reed canary grass was the dominant vegetation and woody plants were largely absent. Undercutting and bank failure was observed.

PCEI worked with the landowner and contractor to reslope a 65 ft segment of streambank. This area was stabilized by three bioengineering techniques: fascines, coir logs, and erosion control fabric. The area was seeded with native grasses and planted with native woody and herbaceous vegetation.

Meadow Street: Urban Riparian Restoration

Before, Spring 2001

After, Spring 2002

Mountain View Park: Urban Riparian Restoration

Contract	QC056200						
Project Name	Mountain View Park						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure X)	**UTM**	502124 E		5176684 N			
	Lat	-116.9722 °W		**Long**		46.7437 °N	
	Qtr Sec	NW	**Sec** 9	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	April 2001 to June 2001						
Project Dimensions	**Length (ft)**	2,114		**Width (ft)**	40		
Project Area	**Sq Ft**	84,560		**Acres**	1.94		
Streambank Length Treated	**Side 1 (ft)** West Bank	2,057 x 15 30,855 ft^2		**Side 2 (ft)** East Bank	1,543 x 15 23,145 ft^2		
Vegetated Buffer	**Side 1 (ft)** West Bank	2,057 x 15 30,855 ft^2		**Side 2 (ft)** East Bank	1,543 x 15 23,145 ft^2		
Woody Plants	435						
Emergent Plants	N/A						
Forb Plants	N/A						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	5,538.00
Non-federal Match	$	2,959.81
Additional Match	$	1,219.48
Project Total	$	9,717.29

Project Description: Mountain View Park

The restoration site is located on Paradise Creek at the north edge of Moscow, Idaho at Mountain View City Park. Streambanks had a moderate slope, but woody riparian vegetation was absent and major portions were eroding. Reed canary grass was prominent.

Work under previous contract # QC053000

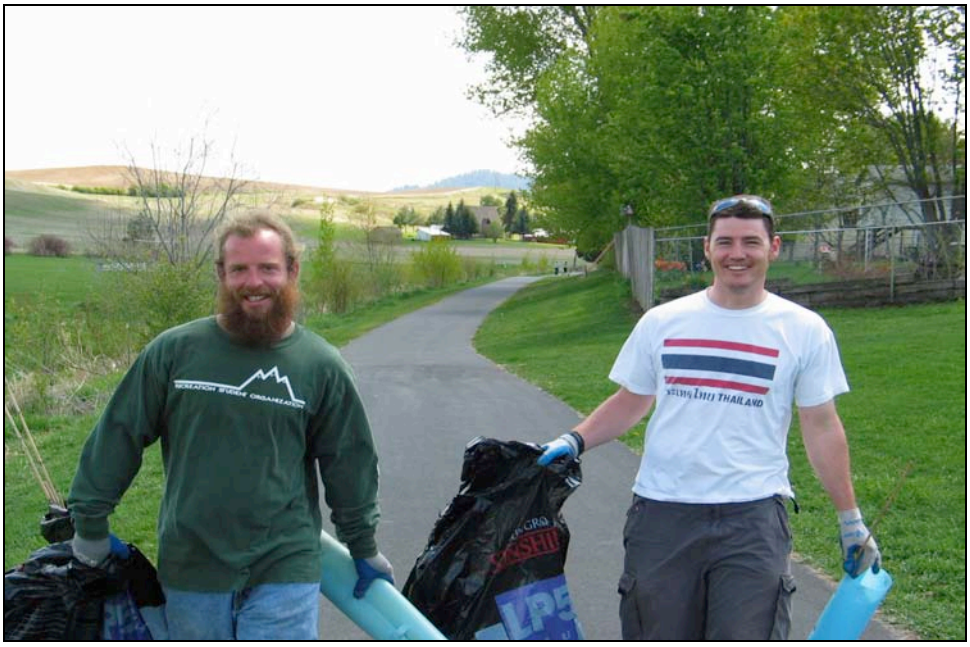
PCEI, subcontracted by the University of Idaho, worked with a variety of volunteer groups to plant trees and shrubs in a riparian buffer 15 to 30 ft wide. Protective tubes were installed to protect plants during establishment. PCEI and City of Moscow staff performed weed control and maintenance activities to ensure plant survival. In total, more than 1,100 trees and shrubs were planted.

Work completed under contract #QC056200

PCEI staff and volunteers replanted vegetation in areas of low survival and performed maintenance of previous plantings. This included watering, weeding, and removal of the protective tubes. Mountain View Park has been the headquarters of the Annual Paradise Creek Stream Clean-Up.

Mountain View Park: Urban Riparian Restoration

After, Spring 2002



Mountain View Park served as the starting location for the annual Paradise Creek Stream Clean-Up.

Nichols: Urban Riparian Restoration

Contract	QC056200						
Project Name	Nichols						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Dorothy Nichols						
Funding	Idaho Department of Environmental Quality (PCEI)						
Project Location (Figure X)	**UTM**	501940 E		5174884 N			
	Lat	-116.9746 W		**Long**		46.7275 N	
	Qtr Sec	NW	**Sec** 16	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	August 2000 to November 2000						
Project Dimensions	**Length (ft)**	60		**Width (ft)**	10		
Project Area	**Sq Ft**	600		**Acres**	0.01		
Streambank Length Treated	**Side 1 (ft)** West Bank	60		**Side 2 (ft)** East Bank	N/A		
Vegetated Buffer	**Side 1 (ft)** West Bank	60 x 10 600 ft^2		**Side 2 (ft)** East Bank	N/A		
Woody Plants	206						
Emergent Plants	120						
Forb Plants	N/A						
Area Grass Seeded	1920 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Coir Logs						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	4,912.89
Non-federal Match	$	3,288.68
Additional Match	$	1,354.98
Project Total	$	9,556.55

Project Description: Nichols

The restoration site is located on Paradise Creek in Moscow, Idaho on urban private property. The west streambank of this reach was severely eroded and slumping. Woody riparian vegetation was absent and reed canarygrass was the primary vegetative cover.

PCEI, the landowner and community volunteers stabilized the streambank with coir logs and riparian plantings. Coir logs were installed to secure the toe of the streambank. Woody riparian vegetation was planted in a 10 ft wide buffer. Willow poles planted at the toe of the slope will further stabilize the bank.

Bon Terra, University of Idaho students, AmeriCorps*NCCC members and community volunteers contributed to this restoration project.

Before, Summer 2000

After, Spring 2001

Renaissance Charter School: Urban Riparian Restoration

Contract	QC056200						
Project Name	Renaissance Charter School						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Linda Canary and Jim Gale						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501773 E			5174579 N		
	Lat	-116.9738 W			**Long**		46.7248 N
	Qtr Sec	NW	**Sec**	16	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	October 2002						
Project Dimensions	**Length (ft)**	446			**Width (ft)**	12	
Project Area	**Sq Ft**	5,352			**Acres**	0.12	
Streambank Length Treated	**Side 1 (ft)** North Bank	360			**Side 2 (ft)** South Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** North Bank	360 x 12 4,320 ft^2			**Side 2 (ft)** South Bank	N/A	
Woody Plants	324						
Emergent Plants	0						
Forb Plants	0						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	7,347.31
Non-federal Match	$	3,453.11
Additional Match	$	1,422.72
Project Total	$	12,223.15

Project Description: Renaissance Charter School

The restoration site is located on Paradise Creek in Moscow, Idaho on the grounds of the Renaissance Charter School. The streambanks steep, eroding, and frequently undercut by high water events. Reed canary grass and exotic golden willows were the primary vegetation.

PCEI worked with the Renaissance Charter School to plant a riparian buffer 15 ft wide on both sides of the stream. Native trees and shrubs were planted by PCEI, Charter School students and community volunteers. Protective tubes were installed to improve survival. Students helped with ongoing plant maintenance. Students installed log habitat structures to complement the riparian planting.

Renaissance Charter School: Urban Riparian Restoration

Students participated in riparian planting during Fall 2002.

After, Fall 2003

Paradise Creek Roadside Erosion Control

Contract	QC056200						
Project Name	Paradise Creek Roadside Erosion Control						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Roadside Erosion Control						
Owners	Multiple private landowners - Reisenaur						
Funding	Idaho Department of Environmental Quality						
Project Location (Figure 1)	**UTM** 502277E				5179835N		
	Lat	-116.9702°W			**Long**		46.7721°N
	Qtr Sec	NE	**Sec**	33	**Rng**	5W	**Twnshp** 40N
Project Installation Date(s)	Fall 2004						
Project Dimensions	**Length (ft)**	529			**Width (ft)**	35	
Project Area	**Sq Ft**	18,515			**Acres**	0.43	
Streambank Length Treated	**Side 1**	N/A			**Side 2**	N/A	
Woody Plants	780						
Emergent Plants	350						
Forb Plants	240						
Area Grass Seeded	18,515 ft^2						
Wetlands Created	N/A						
Wetlands Area (sq ft)	N/A						
Wetlands Storage Capacity (ft^3)	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments						
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education						
Restoration Practices	Roadside Planting With Native Plants Erosion Control Fabric Roadcut Stabilization						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 17,349.00
Non-federal Match	$ 14,875.00
Additional Match	N/A
Project Total	$ 32,224

Project Description: Roadside Erosion Control

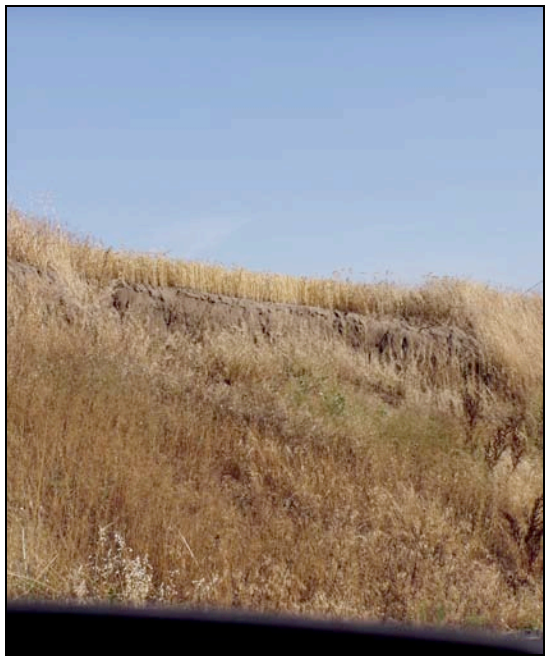
PCEI's roadside erosion control project is a small part of the overall roadside erosion control effort called for in the Paradise Creek TMDL Implementation Plan. PCEI is working closely with the North Latah County Highway District (Highway District) and private landowners in the rural Paradise Creek watershed to address the problem of roadside erosion.

PCEI worked with the Highway District to identify target areas and strategies for riparian restoration and roadside stabilization. Six sites were identified to receive treatment. These include one large roadcut on Mountain View Road and five small roadside sites. The large roadcut on Mountain View Road is located on the east side of Mountain View Road just south Idler's Rest Road. The slope of the unvegetated bank is very steep and sloughing is evident. The bank needs to be resloped to a more moderate angle and stabilized with erosion control fabric, grass seed, and woody plants. PCEI secured the cooperation of the landowner and farmer and created the design and planting plan. The Highway District will perform the excavation. The project was delayed until September 2004 to allow for harvest because the work will impact the adjacent fields.

Other small plantings will take place within the Highway District right of way and under consent of willing landowners. Bridge and culvert areas will be targeted at Darby Road and Moscow Mountain Road. In 2004, the Highway District replaced an undersized culvert on Moscow Mountain Rd just upstream from the Willard Wetlands Restoration Site and sediment catchment. The roadside section of Paradise Creek's tributary south of the Morton Extension project on Foothill Road will also be addressed by PCEI, the Highway District and the landowner. The Highway District is considering the possibility of moving either the stream or the road and PCEI will contribute by negotiating with landowners and providing plants for bank stabilization.

PCEI purchased plants and materials with 319 Funds. The Highway District will provide all excavation and associated labor. Volunteers will provide planting and maintenance. The full value of matching contributions won't be known until the project's completion in 2004. At that time, the final value will be reported.

Paradise Creek Roadside Erosion Control



Before, Fall 2004

After, Fall 2004 Pre-planting

Sixth Street: Urban Riparian Restoration

Contract	QC056200						
Project Name	Sixth Street						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality						
Project Location (Figure 1)	**UTM**						
	Lat	-117.0052 °W			**Long**		46.7299 °N
	Qtr Sec	NW	**Sec**	17	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	April 2001 to June 2002						
Project Dimensions	**Length (ft)**				**Width (ft)**		
Project Area	**Sq Ft**				**Acres**		
Streambank Length Treated	**Side 1 (ft)** North Bank		N/A		**Side 2 (ft)** South Bank		
Vegetated Buffer	**Side 1 (ft)** North Bank		N/A		**Side 2 (ft)** South Bank		
Woody Plants	18						
Emergent Plants	N/A						
Forb Plants	N/A						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Source	**Amount**
319 Funds	$ 0.00
Non-federal Match	$ 3,433.00
Additional Match	N/A
Project Total	$ 3,433.00

Project Description: Sixth Street

During the spring and summer of 2001, the campus Landscape Operation at the University of Idaho planted trees and shrubs along two sections of Paradise Creek that run adjacent to university property and Sixth Street in Moscow, Idaho. The trees and shrubs were planted to stabilize eroding streambanks and provide shade and beauty along the stream. The University of Idaho provided plants and labor to install and maintain the plantings. A total of 18 trees and shrubs were planted (Table 1).

Tree/shrub	Size	Quantity
Mockorange (*Philadelphus x virginalis*)	large	2
Redtwig Dogwood (*Cornus sericea*)	large	4
Lilac (*Syringa vulgaris*)	large	2
Swiss Stone Pine (*Pinus cembra*)	8 ft	2
Chokecherry (*Prunus virginiana*)	10 ft	1
Serviceberry (*Amelanchier spp.*)	15 ft	1
Paul's S. Hawthorn (*Crataegus laevigata*)	1 3/4"	3
Autumn Blaze Maple (*Acer x freemanii*)	1 3/4"	3

Table 1. The University of Idaho planted trees and shrubs along Paradise Creek for bank stabilization, shade and beautification

Sixth Street: Urban Riparian Restoration

After, Fall 2004

State Line: Urban Riparian Restoration

Contract	QC056200							
Project Name	State Line							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Urban Riparian Restoration							
Owners	University of Idaho							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	497073 E			5175262 N			
	Lat	-117.0383 W			**Long**		46.7309 N	
	Qtr Sec	SW	**Sec**	6	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	Fall 2000, Spring 2001, and Spring 2002							
Project Dimensions	**Length (ft)**	740			**Width (ft)**	12		
Project Area	**Sq Ft**	8,880			**Acres**	0.20		
Streambank Length Treated	**Side 1 (ft)** North Bank	740			**Side 2 (ft)** South Bank	740		
Vegetated Buffer	**Side 1 (ft)** North Bank	282 x 6 1,692 ft^2			**Side 2 (ft)** South Bank	458 x 6 2,748 ft^2		
Woody Plants	929							
Emergent Plants	220							
Forb Plants	0							
Area Grass Seeded	N/A							
Wetlands Created	N/A							
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature							
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education							
Restoration Practices	Riparian Planting Fascines							

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	16,602.32
Non-federal Match	$	8,221.69
Additional Match	$	3,387.44
Project Total	$	28,211.45

Project Description: State Line

The restoration site is located on Paradise Creek in Moscow, Idaho on the University of Idaho campus at the state line with Washington. Reed canarygrass was the dominant vegetation and woody plants were largely absent. Streambanks were steep and eroding.

Work completed under previous contract # QC045000

PCEI staff and volunteers stabilized and revegetated a 1,020 ft section of streambank. Earth-moving was completed by University of Idaho Farm Operations to reslope the streambanks. Banks were reconstructed with a 3:1 slope where possible and a 2:1 slope where space was limited. The resloped streambanks were seeded with native grasses and covered with erosion control fabric. Additionally, large chunks of concrete were removed from the channel during excavation. In especially erosion-prone sections, coir logs pre-planted with emergent plants were installed at the toe of slopes.

Work completed under contract #QC056200

Willow (*Salix exigua, S. drummondia, S. mackenziana*) and red-osier dogwood poles and dogwood fascines were planted on streambanks where initial plantings did not establish as well as desired. Weed control, watering, and maintenance tasks were performed. Invasive plants are a larger problem at the Washington state line than in the interior of the watershed because many plants are spreading from the west up the stream corridor. This increases maintenance and makes restoration plantings more difficult.

State Line: Urban Riparian Restoration

Before, Fall 2000

After, Spring 2002

Styner: Urban Riparian Restoration

Contract	QC056200						
Project Name	Styner						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	500567 E			5174364 N		
	Lat	-116.9926 W			**Long**		46.7228 N
	Qtr Sec	SW	**Sec**	17	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	April 2002 to June 2002						
Project Dimensions	**Length (ft)**	514			**Width (ft)**	35	
Project Area	**Sq Ft**	17,990			**Acres**	0.41	
Streambank Length Treated	**Side 1 (ft)** South Bank	429			**Side 2 (ft)** North Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** South Bank	514 x 33 16,962 ft^2			**Side 2 (ft)** North Bank	N/A	
Woody Plants	233						
Emergent Plants	0						
Forb Plants	0						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	19,135.98
Non-federal Match	$	8,221.69
Additional Match	$	3,387.44
Project Total	$	30,745.10

Project Description: Styner

The restoration site is located on Paradise Creek in Moscow, Idaho on urban public property owned by the City of Moscow. The stream had been dredged historically and dredge spoils dumped on the streambanks. The stream channel was highly simplified with steep and eroding streambanks. Reed canarygrass was the dominant vegetation and woody plants were largely absent.

Willow poles were planted along the streambank by PCEI staff and community volunteers. Native shrubs and trees were planted to form a riparian buffer of 13 ft on each side of the stream. Local Girl Scouts, Russell Elementary School students, and community volunteers participated in the planting. Protective tubes were installed to improve plant survival and watering, weeding, and maintenance tasks were performed.

Before, Winter 2002

After, Spring 2003

Sweet Avenue: Urban Riparian Restoration

Contract	QC056200						
Project Name	Sweet Avenue						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	University of Idaho						
Funding	Idaho Department of Environmental Quality						
Project Location (Figure 1)	**UTM**						
	Lat	-117.0052 °W			**Long**		46.7299 °N
	Qtr Sec	NW	**Sec**	17	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	June 2001						
Project Dimensions	**Length (ft)**	590			**Width (ft)**	80	
Project Area	**Sq Ft**	62,933			**Acres**	1.44	
Streambank Length Treated	**Side 1 (ft)** North Bank	645			**Side 2 (ft)** South Bank	645	
Vegetated Buffer	**Side 1 (ft^2)** North Bank	31,467			**Side 2 (ft^2)** South Bank	31,466	
Woody Plants	86						
Emergent Plants	N/A						
Forb Plants	N/A						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Source	**Amount**
319 Funds	$ 0.00
Non-federal Match	$ 5,580.00
Additional Match	N/A
Project Total	$ 5,580.00

Project Description: Sweet Avenue

The University of Idaho and the Palouse-Clearwater Environmental Institute (PCEI) partnered on the Sweet Avenue Urban Riparian Restoration Project. The riparian restoration project was part of a larger clean-up of hazardous wastes on the site and the reclamation of an industrial brownfield to a streamside path and university parking lot.

Work completed under previous contract

Work completed under previous contracts included excavation and installation of erosion control structures in 1998. Additional work consisted of installation of a bike path, plantings and other site improvements. During this phase in 1999, approximately 2,144 wetland emergents, 2,207 shrubs and 225 trees were planted.

Work completed under current contract

Work completed during the summer of 2001 included the replacement of 20 trees and 66 shrubs. This work was provided by the University of Idaho.

Sweet Avenue: Urban Riparian Restoration

After, Fall 2004

After, Fall 2004. Stormwater filtration swales receive and filter runoff from the large University of Idaho parking lot prior to stream discharge.

Thorogold Stables: Animal Waste Prevention

Contract	QC056200							
Project Name	Thorogold Stables							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Animal Waste Prevention							
Owners	Janice and Mic Hess							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**							
	Lat				**Long**			
	Qtr Sec		**Sec**		**Rng**		**Twnshp**	
Project Installation Date(s)	February 2001							
Project Dimensions	**Length (ft)**	N/A			**Width (ft)**	N/A		
Project Area	**Sq Ft**	N/A			**Acres**	N/A		
Streambank Length Treated	**Side 1**	N/A			**Side 2**	N/A		
Vegetated Buffer	N/A							
Wetlands Created	N/A							
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature Nutrients Bacteria							
Other Benefits	Fish and Wildlife Habitat Improvement							
Restoration Practices	Manure Compost Pad							

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	507.09
Non-federal Match	$	144.44
Additional Match		N/A
Project Total	$	651.53

Project Description: Thorogold Stables

The restoration site is located north of Moscow, Idaho on rural private property where the landowners operate a horse stable. Prior to restoration, manure was spread on fields in an amount great enough to cause runoff of nutrients from the field into Paradise Creek, 0.25 mile away.

PCEI contributed funds toward the construction of a concrete pad to compost manure. PCEI provided funds for the materials and the landowners performed the installation.

West Bridge Street: Urban Riparian Restoration

Contract	QC056200						
Project Name	West Bridge Street						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	Richard and Anna Fehrenbacker						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501738 E		5175673 N			
	Lat	-116.9772 W		**Long**		46.7345 N	
	Qtr Sec	SW	**Sec** 9	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	April 2001 to June 2002						
Project Dimensions	**Length (ft)**	100		**Width (ft)**	35		
Project Area	**Sq Ft**	350		**Acres**	0.01		
Streambank Length Treated	**Side 1 (ft)** North Bank	100		**Side 2 (ft)** South Bank	N/A		
Vegetated Buffer	**Side 1 (ft)** North Bank	75		**Side 2 (ft)** South Bank	N/A		
Woody Plants	140						
Emergent Plants	75						
Forb Plants	0						
Area Grass Seeded	2,500 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambanks Narrow Low-flow Stream Channel Coir Logs						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 5,797.25
Non-federal Match	$ 3,288.68
Additional Match	$ 1,354.98
Project Total	$ 10,440.90

Project Description: West Bridge Street

The restoration site is located on Paradise Creek in Moscow, Idaho on urban private property. The stream channel was channelized and historically dredged. The channel was wide and deep with steep, eroding streambanks. Reed canarygrass was the dominant vegetation and woody plants were largely absent. The site is directly downstream from PCEI restoration at Bridge Street Park.

The steep streambanks were resloped and stabilized with erosion control fabric and coir logs. We followed with plantings of woody and herbaceous native riparian plants. AmeriCorps*NCCC members greatly helped with installation of erosion control materials. The landowners collaborated in project design and post-restoration maintenance. Other community volunteers helped with planting and maintenance.

West Bridge Street: Urban Riparian Restoration

Before, Spring 2001

After, Summer 2001

White Avenue: Urban Riparian Restoration

Contract	QC056200						
Project Name	White Avenue						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Urban Riparian Restoration						
Owners	City of Moscow						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501161 E			46.7230 N		
	Lat	-116.9848 W			**Long**		46.7230 N
	Qtr Sec	NE	**Sec**	17	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	September 2002 to June 2003						
Project Dimensions	**Length (ft)**	380			**Width (ft)**	12	
Project Area	**Sq Ft**	4,560			**Acres**	0.10	
Streambank Length Treated	**Side 1 (ft)** South Bank	372			**Side 2 (ft)** North Bank	N/A	
Vegetated Buffer	**Side 1 (ft)** South Bank	372 x 8 2,976 ft^2			**Side 2 (ft)** North Bank	N/A	
Woody Plants	100						
Emergent Plants	240						
Forb Plants	0						
Area Grass Seeded	4,464 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambanks Erosion Control Fabric Coir Logs						

Summary of Project Expenditures		
Source		**Amount**
319 Funds	$	14,704.42
Non-federal Match	$	57,563.95
Additional Match	$	3,116.44
Project Total	$	75,384.81

Project Description: White Avenue

The restoration site is located on Paradise Creek in Moscow, Idaho on urban public property owned by the City of Moscow. The stream has been channelized and dredged and was highly impacted by floodplain development and the adjacent road, White Avenue. Large amounts of low-quality fill had been dumped in to the riparian area including asphalt, concrete chunks and gravel. The streambanks were steep and eroding and woody vegetation was absent.

PCEI and contractors resloped the streambanks from a nearly vertical condition to a 2:1 or 3:1 slope. Some debris was removed from the channel. Following construction, the streambanks were hydro-seeded with a native grass mix and covered with erosion control fabric. Snowberry and woods rose were planted on the site. Herbaceous plugs were planted at the toe of the slope. Protective tubes were installed on plantings. Watering, weed control and maintenance tasks were performed. AmeriCorps*NCCC members, University of Idaho students, and community volunteers participated in the project.

White Avenue: Urban Riparian Restoration

Volunteers installed coir logs at the toe of the slope for bank stability.

After, Fall 2003

Willard: Rural Riparian Restoration, Wetlands Restoration and Animal Waste Prevention

Contract	QC060500							
Project Name	Willard							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Wetlands Restoration, Rural Riparian Restoration, and Animal Waste Prevention							
Owners	Janice Willard and Eric Nilsson							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	503219 E			5177960 N			
	Lat	-116.9579°W			**Long**		46.7552°N	
	Qtr Sec	NW	**Sec**	3	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2001 to June 2002							
Project Dimensions	**Length (ft)**	1842			**Width (ft)**	40		
Project Area	**Sq Ft**	73,680			**Acres**	1.69		
Streambank Length Treated	**Side 1 (ft) North Bank**	288			**Side 2 (ft) South Bank**	288		
Vegetated Buffer	**Side 1 (ft) North Bank**	20 x 288 = 5760 ft^2			**Side 2 (ft) South Bank**	33 x 288 = 9504 ft^2		
Woody Species	96							
Emergent Species	30							
Forb Species	N/A							
Area Grass Seeded	N/A							
Fencing Installed (ft)	60							
Wetlands Created: 1	**Area (ft)**		**Avg. Depth (ft^2)**		**Capacity (ft^3)**			
Wetland 1	9,360		2.83		26,488			
Total	9,360		2.83		26,488			
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients Bacteria							
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education							
Restoration Practices	Wetlands Construction Riparian Planting Flood Mitigation Reconnection of Stream to Floodplain Installation of Coir Logs Installation of Soil Wraps Addition of Large Woody Debris							

Summary of Project Expenditures		
Source		**Amount**
319 Funds	Rural Riparian Restoration	$ 25,833.68
	Animal Waste Prevention	$ 2,461.62
	Wetlands Restoration	$ 3,096.63
Non-federal Match	Rural Riparian Restoration	$ 8,777.61
	Animal Waste Prevention	$ 144.44
	Wetlands Restoration	$ 5,120.27
Additional Match		$ 3,530.44
Project Total		$ 48,964.69

Project Description: Willard

The streambanks on the site were lacking woody riparian vegetation and the riparian area was managed as a pasture for livestock. Reed canary grass formed a dense monoculture in the stream channel and riparian area. These conditions led to highly erosive conditions for streambanks on the site. Bank slumping was evident. The channel was highly simplified, cut off from the floodplain by steep streambanks, and unshaded. Upstream from the restoration site, Paradise Creek was channelized into a roadside ditch. Channelization, dredging, undersized culverts, and removal of vegetation caused high inputs of sediment and increased water temperature.

The wetlands restoration project at the Willard site was primarily designed to function as a sediment catchment. During November 2001, PCEI's contractors excavated the 10,000 ft^2 wetland area adjacent to the stream channel. The wetland catchment receives sediment-laden water during high flows and allows the sediments to settle out. The catchment banks were sloped to a 3:1 slope and stabilized with geotextile erosion control fabric and riparian plantings. Riparian plantings occurred during Spring 2002. Coconut fiber-filled coir logs pre-planted with herbaceous riparian plants were installed at the toe of the streambanks in areas of high erosion potential. Large woody debris was added to the wetlands to further slow water velocities and increase channel complexity. Fencing was installed to exclude livestock from the wetlands area.

PCEI worked closely with the landowners to design, implement and maintain the wetlands project and riparian plantings. The North Latah County Highway District collaborated on the project by consulting and by replacing an undersized culvert directly upstream of the wetlands. AmeriCorps*NCCC members, Washington State University students, and community volunteers participated in the project by installing streambank stabilization materials, planting riparian vegetation, and performing weed control and maintenance activities. A private individual donated habitat structures.

Willard: Rural Riparian Restoration, Wetlands Restoration and Animal Waste Prevention

Before, Fall 2001

After, Winter 2001

Part II.

Rural Riparian Restoration
Wetlands Restoration

Contract # QC060500

Big Draw: Rural Riparian Restoration

Contract	QC056200						
Project Name	Big Draw						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Rural Riparian Restoration						
Owners	Ron and Nadine Morton						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	502142 E		5182190 N			
	Lat	-116.9719° W		**Long**		46.7933° N	
	Qtr Sec	SW	**Sec** 21	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	February 2002 to June 2003						
Project Dimensions	**Length (ft)**	3,970		**Width (ft)**	60		
Project Area	**Sq Ft**	204,585		**Acres**	4.7		
Streambank Length Treated	**Side 1 (ft) East Bank**	1,900		**Side 2 (ft) West Bank**	3,150		
Vegetated Buffer	**Side 1 (ft) East Bank**	2,725 x 27 = 73,575 ft^2		**Side 2 (ft) West Bank**	3,970 x 33 = 131,010 ft^2		
Woody Species	3,950						
Emergent Species	N/A						
Forb Species	N/A						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature Nutrients						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reconnection with Floodplain						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 14,799.50
Non-federal Match	$ 8,777.61
Additional Match	$ 1,499.80
Project Total	$ 25,076.90

Project Description: Big Draw

The restoration site is located on a tributary to Paradise Creek in a rural area north of Moscow, Idaho on private property. The stream channel had been straightened and was deeply incised in several stretches. Woody vegetation was largely absent and reed canarygrass was the dominant vegetative cover. The streambanks were bare, steep and eroding. Adjacent land was in agricultural use.

PCEI joined a multi-agency effort to restore the riparian area in this reach. In 2000 and 2001, several thousand seedlings of native riparian deciduous species were planted into a riparian forest buffer under the Continuous Conservation Reserve Program (CCRP). Due to circumstances beyond the landowner's control, the planting suffered high mortality and re-planting was needed to accomplish the wildlife and water quality goals of the project.

PCEI worked with community members and natural resource agencies to provide replacement and supplemental planting of plants in a riparian buffer area approximately 60 ft wide. The Idaho Department of Fish and Game (IDFG) provided materials and assistance coordinating the project. The plantings by PCEI included 3,950 woody plants in an area approximately 2700 ft by 60 ft. Plant maintenance tasks were carried out over the entire 5,725 ft site and included installation of protective tubes, watering, and weed control.

Brockington: Rural Riparian Restoration

Contract	QC060500						
Project Name	Brockington						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Rural Riparian Restoration						
Owners	Judy Brockington						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501667 E			5181121 N		
	Lat	-116.9782 °W			**Long**		46.7836 °N
	Qtr Sec	NW	**Sec**	21	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	March 2003 to October 2003						
Project Dimensions	**Length (ft)**	2,769			**Width (ft)**	35	
Project Area	**Sq Ft**	96,915			**Acres**	2.22	
Streambank Length Treated – East Tributary	**Side 1 (ft) West Bank**	2,083			**Side 2 (ft) East Bank**	N/A (Townsend)	
Streambank Length Treated – West Tributary	**Side 1 (ft) South Bank**	673			**Side 2 (ft) North Bank**	394	
Vegetated Buffer – East Tributary	**Side 1 (ft) West Bank**	1,969 x 8.5 to 25 =30,869 ft^2			**Side 2 (ft) East Bank**	N/A	
Woody Plants	2,317						
Emergent Plants	185						
Forb Plants	45						
Area Grass Seeded	25,400 ft^2						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediments Temperature Nutrients						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Construction of Narrow Low-Flow Stream Channel Reconnection of Stream to Floodplain						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 54,077.81
Non-federal Match	$ 35,110.43
Additional Match	$ 4,499.40
Project Total	$ 93,687.64

Project Description: Brockington

The restoration site is located on two tributaries to Paradise Creek in an agricultural area north of Moscow, Idaho. All woody riparian vegetation had been removed and reed canarygrass was the dominant vegetative cover. The stream was channelized, highly simplified and eroding banks were evident. There were multiple equipment crossings for agricultural machinery to cross the eastern channel.

The landowner, Judy Brockington, and the agricultural operator, Larry McMillan, collaborated with PCEI to design, implement, and maintain the restoration project. A variable-width riparian buffer was planted on both Paradise Creek tributaries. The buffer is 10 to 40 ft wide and is planted with native riparian shrubs and trees. On the eastern tributary, the buffer was seeded with native grass seed. PCEI and contractors excavated a narrow low-flow channel and resloped the streambanks. The banks were stabilized with erosion control fabric. One area was designated as the equipment crossing and was selected to minimize water quality effects. The agricultural operator, Larry McMillan, performed additional excavation on the western tributary to bring the channel down to the level of the culvert at the Brockington driveway. The Brockington site borders the Big Draw site to the north, the Morton site to the west and the Townsend site to the east and south. The restored complex of riparian area will provide increased water quality protection in the upper Paradise Creek watershed. Approximately 25,000 ft^2 (0.6 acre) of cropland was removed from production related to this restoration project.

The Brockington restoration site provided an exceptional opportunity for community involvement and education. Judy Brockington, Steve and Laura Nidlow, Larry McMillan, Clint Townsend, University of Idaho (UI) students, local Girl Scouts and Boy Scouts, UI Environmental Club, UI Community Service Learning Center, Washington State University students, Church of Latter Day Saints members, and Russell Elementary School students participated in excavation, streambank stabilization, planting, and maintenance. AmeriCorps*NCCC members participated in watering, maintenance and weed control. The National Tree Trust provided additional funds for trees and shrubs.

Brockington: Rural Riparian Restoration

Before, Spring 2003

After, Fall 2003

Forbes: Wetlands Restoration

Contract	QC060500						
Project Name	Forbes						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Wetlands Restoration						
Owners	Mike and Lahde Forbes						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501098 E			5181421 N		
	Lat	-116.9856 °W			**Long**		46.7863 °N
	Qtr Sec	NE	**Sec**	29	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	July 2003 to October 2003						
Project Dimensions	**Length (ft)**	934			**Width (ft)**	147	
Project Area	**Sq Ft**	137,298			**Acres**	3.15	
Streambank Length Treated	**Side 1**	N/A			**Side 2**	N/A	
Woody Plants	840						
Emergent Plants	120						
Forb Plants	165						
Area Grass Seeded	15,300 ft^2						

Wetlands: 3	**Area (ft^2)**	**Avg. Depth (ft)**	**Capacity (ft^3)**
Wetland 1	3,519	1.8	6,334
Wetland 2	4,641	1.8	8,354
Wetland 3	4,386	1.5	6,579
Total	12,546	N/A	21,267

TMDL Parameters of Concern Addressed by the Project	Sediments Temperature Nutrients Bacteria
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Flow and Habitat Alteration Improvement Community Involvement and Education
Restoration Practices	Wetlands Construction Riparian Planting

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 44,398.49
Non-federal Match	$ 26,332.82
Additional Match	$ 4,499.40
Project Total	$ 75,230.71

Project Description: Forbes

The wetlands restoration site is located on a tributary to Paradise Creek in a seasonally wet draw with intermittent springs. The draw had been utilized as a horse pasture. The Forbes family, who had recently purchased the property, was interested in enhancing the wildlife habitat value of the land and improving water quality in their watershed. Reed canarygrass, meadow foxtail, and field bindweed dominated ground cover. There was little woody vegetation.

PCEI and contractors excavated three wetlands in July 2003. All exposed soil was seeded with native grasses and mulched after construction. Planting native woody and herbaceous plants was accomplished in the fall. The fence surrounding the pasture was removed and all livestock were removed from the area.

The Forbes family, Washington State University students in Environmental Science, the University of Idaho Community Service Learning Center, and community volunteers participated in seeding and planting the restoration site. The Forbes family continues to perform weed control and maintenance of the project.

Elementary students from Lapwai Elementary School participated in a camas planting at the site. A member of the Nez Perce Tribe taught the students about the ecological and cultural significance of camas. Then students planted 150 camas bulbs as part of the native riparian plant community.

Forbes: Wetlands Restoration

Before, Spring 2003

After, Fall 2003

Hall: Rural Riparian Restoration

Contract	QC060500						
Project Name	Hall						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Rural Riparian Restoration						
Owners	Alice Hall						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	502287 E			5176308 N		
	Lat	-116.9701 °W			**Long**		46.7403 °N
	Qtr Sec	NW	**Sec**	9	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	September 2002 to October 2002						
Project Dimensions	**Length (ft)**	1,063			**Width (ft)**	28	
Project Area	**Sq Ft**	29,764			**Acres**	0.68	
Streambank Length Treated	**Side 1 (ft) East Bank**	1,063			**Side 2 (ft)**	N/A	
Vegetated Buffer	**Side 1 (ft) East Bank**	1,063 x 20 = 21,260 ft^2			**Side 2 (ft)**	N/A	
Woody Plants	935						
Emergent Plants	1,340						
Forb Plants	35						
Area Grass Seeded	N/A						
Wetlands Created	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Reslope Streambanks Construction of Narrow Low-Flow Stream Channel						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 44,398.49
Non-federal Match	$ 26,332.82
Additional Match	$ 4,499.40
Project Total	$ 75,230.71

Project Description: Hall

The restoration site is located on Paradise Creek at the urban/rural interface near Moscow, Idaho on private property. The stream was dredged and channelized with steep, eroding streambanks. Reed canarygrass was the dominant vegetative cover and woody riparian vegetation was largely absent. In addition, there were two gullies on the site.

One gully was located at the southeastern end of Mountain View Park, at the end of a drainage pipe. The gully was approximately 3 ft deep and ranged from 10 ft at the mouth to 2 ft wide at the source. The second gully was located approximately 200 ft downstream. The gully formation was primarily due to agricultural encroachment into the riparian area and a lack of riparian vegetation. The gully was 20 ft long and approximately 4 ft deep. The gully width ranged from 11 ft at the mouth to 2 ft at the source.

Before, Spring 2002

After, Spring 2003

Harden: Rural Riparian Planting

Contract	QC060500						
Project Name	Harden						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Rural Riparian Planting						
Owner(s)	Dick Harden						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	498931 E		5177049 N			
	Lat	-117.0140 °W		**Long**		46.7470 °N	
	Qtr Sec	SW	**Sec** 6	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	April 2002 to May 2002						
Project Dimensions	**Length (ft)**	889		**Width (ft)**	20		
Project Area	**Sq Ft**	17,780		**Acres**	0.41		
Streambank Length Treated	**Side 1 (ft) East Bank**	889		**Side 2 (ft) West Bank**	889		
Vegetated Buffer	**Side 1 (ft) East Bank**	859 x 9 = 7,731 ft^2		**Side 2 (ft) West Bank**	865 x 10 = 8,650 ft^2		
Woody Plants	563						
Emergent Plants	N/A						
Forb Plants	N/A						
Area Grass Seeded	N/A						
Wetlands Created (#)	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 14,799.50
Non-federal Match	$ 8,777.61
Additional Match	$ 1,499.80
Project Total	$ 25,076.90

Project Description: Harden

The site is located on a tributary to Paradise Creek. The channel had been straightened to allow for cultivation to the stream's edge. Reed canarygrass was the dominant streambank plant species and woody riparian vegetation was largely absent. There was no filter for agricultural runoff laden with sediments, nutrients and pesticides. The stream channel was extremely simplified, with no pools or shading to moderate stream temperatures. Eroding streambanks were evident.

A riparian buffer was planted along 860 feet of the Paradise Creek tributary. The buffer included 563 native trees and shrubs. Plastic plant protectors were installed on the plants. Weeding, watering and other maintenance activities occurred following planting.

The Harden family collaborated with PCEI to design, implement, and perform maintenance on the restoration project. AmeriCorps*NCCC members, Washington State University students of Environmental Science, and community volunteers participated in restoration plantings, watering and weed control on the site.

Harden: Rural Riparian Planting

Before, Spring 2002

After, Spring 2003

Leffingwell-Reid: Wetlands Restoration

Contract	QC056200						
Project Name	Leffingwell-Reid						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Wetlands Restoration						
Owners	Jeanne Leffingwell and James Reid, Shelly and Randy Gilmore						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501376 E			5176436 N		
	Lat	-116.9820 °W			**Long**		46.7415 °N
	Qtr Sec	NE	**Sec**	8	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	June 2003 to October 2003						
Project Dimensions	**Length (ft)**	257			**Width (ft)**	160	
Project Area	**Sq Ft**	41,120			**Acres**	0.94	
Streambank Length Treated	**Side 1 (ft) East Bank**	206			**Side 2 (ft) West Bank**	206	
Vegetated Buffer	**Side 1 (ft) East Bank**	243 x 60 = 14,580 ft^2			**Side 2 (ft) West Bank**	243 x 80 =19,440 ft^2	
Woody Plants	405						
Emergent Plants	220						
Forb Plants	N/A						
Area Grass Seeded	8,240 ft^2						
Wetlands Created: 3	**Area (ft^2)**	**Circum. (ft)**	**Avg. Depth (ft)**	**Capacity (ft^3)**			
Wetland 1	1,634	126	1.3	2,124			
Wetland 2	860	114	1.5	1,290			
Wetland 3	1,020	103	1.3	1,320			
Total	3,514	343	-	4,740			
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Wetlands Construction Riparian Planting						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 9,781.05
Non-federal Match	$ 17.920.95
Additional Match	$ 1,592.52
Project Total	$ 29,294.51

Project Description: Leffingwell-Reid

The wetlands restoration site is located on a tributary to Paradise Creek directly downstream from the Streets wetlands restoration site. Prior to restoration, the stream channel was channelized and incised, and banks were visibly eroding. Woody riparian vegetation was largely absent. Reed canarygrass was the dominant vegetative cover with a vigorous infestation of Canada thistle and field bindweed. The site was downstream from a horse pasture and was impacted by associated pollutants.

PCEI and contractors excavated a narrow meandering stream channel and three shallow wetlands on the site. The design allows a defined stream channel to carry water during low flow conditions. This narrow, low-flow channel is critical for reducing summer water temperatures. In high flow, the water spills into the wetlands area, where pollutants filter out. Geotextile erosion control fabric was installed on streambanks to stabilize the soil. Native grasses, shrubs and trees were planted in the wetland and riparian area.

The landowners and community volunteers helped seed the site with grasses, install erosion control fabric, and plant shrubs and trees. The landowners contribute to the success of the project by providing weed control and maintenance of plantings.

Leffingwell-Reid: Wetlands Restoration

Before, Spring 2003

After, Fall 2003

LeFors: Wetlands Restoration

Contract	QC056200						
Project Name	LeFors						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Wetlands Restoration						
Owners	Kathy and Gary LeFors						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501356 E		5176756 N			
	Lat	-116.9822 °W		**Long**		46.7444 °N	
	Qtr Sec	NE	**Sec** 8	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2002 to October 2002						
Project Dimensions	**Length (ft)**	494		**Width**	100		
Project Area	**Sq Ft**	49,400		**Acres**	1.13		
Streambank Length Treated	**Side 1 (ft) East Bank**	494		**Side 2 (ft) West Bank**	494		
Vegetated Buffer	**Side 1 (ft) East Bank**	494 x 8.5 = 4,199 ft^2		**Side 2 (ft) West Bank**	494 x 75 = 37,050 ft^2		
Woody Plants	837						
Emergent Plants	1,620						
Forb Plants	60						
Area Grass Seeded	7,209 ft^2						
Wetlands Created - 2	**Area (ft^2)**	**Circum. (ft)**	**Avg Depth (ft)**	**Capacity (ft^3)**			
Wetland 1	7,616	360	0.5	3,808			
Wetland 2	1,620	197	0.5	810			
Total	9,236	557	-	4,618			
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients Bacteria						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Increased Stormwater Storage Capacity Community Involvement and Education						
Restoration Practices	Wetlands Construction Riparian Planting						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 5,861.15
Non-federal Match	$ 11,264.59
Additional Match	$ 928.27
Project Total	$18,054.71

Project Description

The wetlands restoration site is located on a tributary to Paradise Creek directly upstream from the Streets and Leffingwell Reid wetland restoration sites. Prior to restoration, the stream channel was incised with little woody riparian vegetation. Reed canary grass was the dominant vegetative cover and banks were visibly eroding. The area was seasonally inundated with water and therefore a good candidate for wetlands restoration. The site was adjacent to a horse pasture and was impacted by associated pollutants.

PCEI and contractors excavated two shallow wetlands on the site. The design allows a defined stream channel to carry water during low flow conditions. This narrow, low-flow channel is critical for reducing summer water temperatures. In high flow, the water spills into the wetlands area, where pollutants filter out. Native grasses, shrubs and trees were planted in the wetland and riparian area.

The landowners, AmeriCorps*NCCC members, University of Idaho students, Washington State University students, and community volunteers participated in planting, weed control and site maintenance activities. The landowners have made significant contributions to site maintenance of restoration plantings. Since completion of the project, the National Tree Trust has funded further planting and site maintenance.

LeFors: Wetlands Restoration

Before, Winter 2002

After, Winter 2003

Morton Extension: Rural Riparian Restoration

Contract	QC060500						
Project Name	Morton Extension						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Riparian Restoration						
Owners	Ron and Nadine Morton						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501300 E			5181283 N		
	Lat	-116.9830 °W			**Long**		46.7851 °N
	Qtr Sec	NE	**Sec**	29	**Rng**	5W	**Twnshp** 40N
Project Installation Date(s)	September 2003 to October 2003						
Project Dimensions	**Length (ft)**	623			**Width (ft)**	80	
Project Area	**Sq Ft**	43,610			**Acres**	1.00	
Streambank Length Treated	**Side 1 (ft)** East Bank	623			**Side 2 (ft)** West Bank	623	
Vegetated Buffer	**Side 1 (ft)** East Bank	623 x 35 21,805 ft^2			**Side 2 (ft)** West Bank	623 x 35 21,805 ft^2	
Woody Plants	529						
Emergent Plants	10						
Forb Plants	30						
Area Grass Seeded	N/A						
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature						
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Riparian Planting Stream Channel Remeander Construction of Narrow Low-Flow Stream Channel						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 25,727.27
Non-federal Match	$ 14,044.17
Additional Match	$ 2,999.60
Project Total	$ 42,771.04

Project Description: Morton Extension

The restoration site is located on rural private property north of Moscow, ID on Foothill Rd. Prior to restoration, the stream channel was straightened and crossed by agricultural machinery. Reed canarygrass was the dominant vegetation and no woody species were present. The lack of vegetation and the impact of agricultural development led to degraded stream conditions and erosion.

A new, narrow stream channel was created with a trackhoe. Channel sinuosity was increased by the inclusion of meanders. The stream length was approximately doubled in this reach. Native riparian vegetation was planted following excavation. The landowners collaborated on the project design and implementation. Students from the University of Idaho and Washington State University participated in plantings and maintenance.

Morton Extension: Rural Riparian Restoration

Before, Fall 2001

After, Fall 2003

Morton: Rural Riparian Restoration and Wetlands Restoration

Contract	QC060500						
Project Name	Morton						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Rural Riparian Restoration and Wetlands Restoration						
Owners	Ron and Nadine Morton						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501336 E			5181695 N		
	Lat	-116.9825 °W			**Long**		46.7888 °N
	Qtr Sec	SE	**Sec**	20	**Rng**	5W	**Twnshp**	40N
Project Installation Date(s)	March 2002 to June 2003						
Project Dimensions	**Length (ft)**	3,523			**Width (ft)**	60	
Project Area	**Sq Ft**	211,380			**Acres**	4.85	
Streambank Length Treated	**Side 1 (ft) East Bank**	2,850			**Side 2 (ft) West Bank**	3,100	
Vegetated Buffer	**Side 1 (ft) East Bank**	2,850 x 30 85,500 ft^2			**Side 2 (ft) West Bank**	3100 x 40 124,000 ft^2	
Woody Plants	2,353						
Emergent Plants	650						
Forb Plants	185						
Area Grass Seeded	N/A						

Wetlands: 2	**Area (ft^2)**	**Circum. (ft)**	**Avg. Depth (ft)**	**Capacity (ft^3)**
Wetland 1	75,460	940	1.5	126,018
Wetland 2	14,175	500	2.5	35,437
Total	89,635	1,440	-	161,455

TMDL Parameters of Concern Addressed by the Project	Sediment Temperature
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Flow and Habitat Alteration Improvement Community Involvement and Education
Restoration Practices	Riparian Planting Stream Channel Remeander Wetlands Construction

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 24,478.82
Non-federal Match	$ 17,555.22
Additional Match	$ 1,499.80
Project Total	$ 43,533.83

Project Description: Morton

The restoration site is located on rural private property north of Moscow, ID on Foothill Rd. Prior to restoration, the stream channel was straightened and its function was reduced to a drainage ditch along Foothill Rd. Reed canarygrass was the dominant vegetation and a riparian buffer was absent. Active agricultural fields were located directly adjacent to the stream.

Work completed under previous contract # QC044500

During 1999, PCEI implemented a riparian restoration project that included restoring the stream's connection to its floodplain, re-meandering the stream channel, constructing wetlands, and revegetating the riparian corridor. TerraGraphics Environmental Engineers, Inc. designed the reconstructed stream channel and wetlands. An operator was hired to perform the excavation. PCEI staff and volunteers planted the area with native grasses, herbaceous emergent plants and woody species.

Work completed under contract # QC060500

The vegetation planted in 1999 and 2000 had difficulty establishing due to hard clay soils and animal damage. During Spring 2002, PCEI and volunteers planted quaking aspen and red-osier dogwood plugs provided by the National Tree Trust to supplement prior plantings. This was followed by further plantings in 2003 to stabilize streambanks. Willow and cottonwood poles and red-osier dogwood plugs were planted on streambanks lacking woody vegetation. Native emergent herbaceous plugs were also planted in the stream channel. These included small-fruited bulrush, Nebraska sedge, and baltic rush. Donated plants, including ponderosa pine provided by the National Tree Trust, were planted adjacent to the stream. AmeriCorps*NCCC teams provided assistance with labor. Watering, weed control, plant protectors maintenance, and other tasks were also performed by PCEI and the landowner during the project.

Riparian planting, maintenance, monitoring, and weed control took place during 2002 and 2003. Habitat structures were installed near the wetland to encourage raptors.

Cottonwood fascines were installed for streambank stabilization during summer 2003.

Moscow Wastewater Treatment Plant Wetlands: Wetlands Restoration

Contract	QC060500							
Project Name	Moscow Wastewater Treatment Plant Wetlands							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Wetlands Restoration							
Owners	University of Idaho							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	497106E			5175332N			
	Lat	-117.0379°W			**Long**		46.7315°N	
	Qtr Sec	SW	**Sec**	12	**Rng**	6W	**Twnshp**	39N
Project Installation Date(s)	Summer 2002 and 2003							
Project Dimensions	**Length (ft)**	1,300			**Width (ft)**	300		
Project Area	**Sq Ft**	390,000			**Acres**	8.95		
Streambank Length Treated	**Side 1**	N/A			**Side 2**	N/A		
Vegetated Buffer	**Side 1 (ft^2)**	19,500			**Side 2**	N/A		
Woody Plants	120							
Emergent Plants	N/A							
Forb Plants	N/A							
Area Grass Seeded	N/A							
Wetlands Created	Created in 1996 under previous contract							
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients							
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education							
Restoration Practices	Riparian Planting							

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 4,153.78
Non-federal Match	$ 5,120.27
Additional Match	$ 796.26
Project Total	$ 10,070.31

Project Description: Moscow Wastewater Treatment Plant Wetlands

The restoration site is located on urban property owned by the University of Idaho. The site is across Paradise Creek and downstream from the Moscow Wastewater Treatment Plant. Prior to restoration, the streambanks on Paradise Creek were largely lacking woody riparian vegetation. Streambanks were steep and eroding in sections. Reed canarygrass was common. Effluent from the treatment plant was discharged into Paradise Creek. The area where the wetlands would be constructed was dry and used as a cattle pasture.

Work completed under previous contract # QC012700

PCEI worked with the Idaho Water Resources Research Institute, the University of Idaho and the City of Moscow to implement the wetlands construction project. TerraGraphics Environmental Engineers, Inc and a group of technical advisors developed a plan to construct a series of wetlands that would receive and treat a portion of treatment plant effluent before discharge into Paradise Creek. One subsurface flow wetland, eight surface flow wetlands, and two organically shaped surface flow wetlands were constructed on the site. A series of pipes directs water flow. Emergent vegetation fills the cells and facilitates treatment of the water. This work was conducted in 1996 and 1997.

Work completed under contract # QC060500

PCEI and volunteers planted woody species near the wetlands cells and along the streambanks. Weed control and other site maintenance tasks were performed. The wetlands have become a source of wetlands plants for transplant to other restoration sites. This provides a cost savings for PCEI. Protective plant tubes installed during the initial planting were removed when plants outgrew the small tubes. Invasive plant species are a larger problem near the Idaho-Washington state line than farther upstream. The plants are spreading west up the stream corridor and make weed control and plant establishment difficult. Mowing and other physical weed control methods were employed by PCEI.

Moscow Wastewater Treatment Plant Wetlands: Wetlands Restoration

The Moscow Wastewater Treatment Plant Wetlands receives and treats five percent of effluent from the municipal wastewater treatment plant.

Volunteer monitoring of PCEI wetlands restoration projects has documented the presence of amphibians like the Columbia Spotted Frog (*Rana luteiventris*).

Orchard Street: Wetlands Restoration

Contract	QC060500						
Project Name	Orchard Street						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Wetlands Restoration						
Owners	Joanne Reese and Bill Voxman						
Funding	Idaho Department of Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501171 E			5177465 N		
	Lat	-116.9847°W			**Long**		46.7507°N
	Qtr Sec	NE	**Sec**	5	**Rng**	5W	**Twnshp** 39N
Project Installation Date(s)	June 2001 to June 2002						
Project Dimensions	**Length (ft)**	146			**Width (ft)**	77	
Project Area	**Sq Ft**	3,212			**Acres**	0.07	
Streambank Length Treated	**Side 1**	N/A			**Side 2**	N/A	
Woody Plants	424						
Emergent Plants	450						
Forb Plants	200						
Area Grass Seeded	11,242 ft^2						

Wetlands Created: 1	**Area (ft^2)**	**Avg. Depth (ft)**	**Capacity (ft^3)**
Wetland 1	14,019	3	42,057
Total	14,019	3	42,057

TMDL Parameters of Concern Addressed by the Project	Sediment Temperature
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Flow and Habitat Alteration Improvement Community Involvement and Education
Restoration Practices	Wetlands Construction Riparian Planting

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 4,864.18
Non-federal Match	$ 2,560.14
Additional Match	N/A
Project Total	$ 7,424.32

Project Description: Orchard Street

The wetlands restoration site is located on a tributary to Paradise Creek. Woody riparian vegetation was largely absent. Reed canarygrass was the dominant vegetative cover. The area was seasonally inundated with water and a good candidate for wetlands restoration. Flooding was frequent during storm events and contributed sediment load to Paradise Creek. The site was downstream from a horse pasture and, if restored, could filter associated pollutants from runoff.

PCEI and contractors excavated one large wetland on the site in 2001. The banks of the wetland area were covered with geotextile fabric and seeded with native grasses. Herbaceous and woody species were planted around the wetland. An island was constructed within the wetland to increase surface area for wetland vegetation.

The landowners collaborated with PCEI during design and implementation of the project and continue to contribute to maintenance of restoration plantings. The National Tree Trust provided trees and shrubs. University of Idaho students, Washington State University Students, AmeriCorps*NCCC members, and community volunteers participated in planting, installing geotextile fabric, weed control and maintenance. Donations of time and materials contributed to the successful and cost-effective implementation of the restoration project.

Orchard Street: Wetlands Restoration

After, Spring 2003

Remington: Rural Riparian Restoration

Contract	QC060500							
Project Name	Remington							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Rural Riparian Restoration							
Owners	Remington Family							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	502774 E			5177264 N			
	Lat	-116.9637°W			**Long**		46.7489°N	
	Qtr Sec	SE	**Sec**	4	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	June 2001							
Project Dimensions	**Length (ft)**	400			**Width (ft)**	30		
Project Area	**Sq Ft**	12,000			**Acres**	0.28		
Streambank Length Treated	**Side 1 (ft) West Bank**	400			**Side 2 (ft) East Bank**	N/A		
Vegetated Buffer	**Side 1 – West Bank**	30 x 400 = 12,000 ft^2			**Side 2 – East Bank**	N/A		
Woody Plants	730							
Emergent Plants	0							
Forb Plants	0							
Area Grass Seeded	N/A							
Wetlands Created	N/A							
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature							
Other Benefits	Fish and Wildlife Habitat Improvement Community Involvement and Education							
Restoration Practices	Riparian Planting							

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 5,919.80
Non-federal Match	$ 3,511.04
Additional Match	N/A
Project Total	$ 9,430.84

Project Description: Remington

The restoration site is on a tributary to Paradise Creek in a rural area northeast of Moscow, Idaho. All woody vegetation had been removed from the site and the area had been managed as a pasture and hay field. The channel was highly simplified and lacked shading and habitat complexity.

PCEI worked with the landowners and community volunteers to plant a riparian buffer along a 400 ft reach of the stream. The landowner mowed the area to prepare for planting. University of Idaho and Washington State University students planted shrubs and trees. The University of Idaho Forest Research Nursery and the Wildlife Habitat Institute donated plants for the project. Protective tubes were installed on all plants. The Remington family provided watering and maintenance for the plantings.

Streets: Wetlands Restoration

Contract	QC060500						
Project Name	Streets						
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)						
Project Category	Wetlands Restoration						
Owners	Steve and Heather Streets						
Funding	Idaho Department Environmental Quality (IDEQ)						
Project Location (Figure 1)	**UTM**	501351 E		5176558 N			
	Lat	-116.9823 °W		**Long**		46.7426 °N	
	Qtr Sec	NE	**Sec** 8	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2002 to May 2003						
Project Dimensions	**Length (ft)**	380		**Width (ft)**	137		
Project Area	**Sq Ft**	52,060		**Acres**	1.20		
Streambank Length Treated	**Side 1 (ft) East Bank**	335		**Side 2 (ft) West Bank**	335		
Vegetated Buffer	**Side 1 (ft) East Bank**	15 x 380 = 5700 ft^2		**Side 2 (ft) West Bank**	92 x 380 = 34,960 ft^2		
Woody Plants	844						
Emergent Plants	1,165						
Forb Plants	350						
Area Grass Seeded	9,360 ft^2						
Wetlands Created: 2	**Area (ft^2)**	**Circum. (ft)**	**Avg. Depth (ft)**	**Capacity (ft^3)**			
Wetland 1	9,291	366	1.3	12,078			
Wetland 2	3,600	226	1.5	5,400			
Total	12,891	592	-	17,478			
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients and Bacteria						
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Stormwater Filtration Treatment Flow and Habitat Alteration Improvement Community Involvement and Education						
Restoration Practices	Wetlands Construction Riparian Planting Reconnection to Floodplain						

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 5,468.22
Non-federal Match	$ 9,216.49
Additional Match	$ 928.97
Project Total	$ 15,613.67

Project Description: Streets

The wetlands restoration site is located on a tributary to Paradise Creek directly downstream from the LeFors wetlands restoration site and upstream from the Leffingwell-Reid wetlands restoration site. Prior to restoration, the stream channel was incised with little woody riparian vegetation. Reed canarygrass was the dominant vegetative cover and banks were visibly eroding. The area was seasonally inundated with water and therefore a good candidate for wetlands restoration. The site was directly downstream from a horse pasture and was impacted by associated pollutants.

PCEI and contractors excavated two shallow wetlands on the site. The design allows a defined stream channel to carry water during low flow conditions. In high flow, the water spills into the wetlands area, where pollutants filter out. A berm was removed from the east side of the stream channel, further reconnecting the stream to the floodplain. Native grasses, shrubs and trees were planted in the wetland and riparian area.

Elementary students from Moscow's Renaissance Charter School and Lapwai Elementary School participated in a special camas planting at the site. PCEI organized this activity to bring together students from Moscow and Lapwai to learn about their environment and the relationship of people to their environment. A member of the Nez Perce Tribe taught the students about the ecological and cultural significance of camas. Then students planted camas as part of the native riparian plant community.

The landowners, AmeriCorps*NCCC members and community volunteers participated in planting, weed control and site maintenance activities. Since completion of the project, further planting and site maintenance has been funded by the National Tree Trust.

Streets: Wetlands Restoration

Before, Winter 2001

After, Winter 2002

Townsend: Rural Riparian Restoration

Contract	QC060500							
Project Name	Townsend							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Rural Riparian Restoration							
Owners	Clint Townsend							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	501628 E			5180959 N			
	Lat	-116.9787 °W			**Long**		46.7822 °N	
	Qtr Sec	NW	**Sec**	21	**Rng**	5W	**Twnshp**	40N
Project Installation Date(s)	August 2003 to October 2003							
Project Dimensions	**Length (ft)**	3,037			**Width (ft)**	206		
Project Area	**Sq Ft**	278,650			**Acres**	6.4		
Streambank Length Treated	**Side 1 (ft) East Bank**	1,820			**Side 2 (ft) West Bank**	929		
Vegetated Buffer	**Side 1 (ft) East Bank**	894 x 63 +926 x 42 +380 x 29 = 106,234 ft^2			**Side 2 (ft) West Bank**	894 x 34 = 30,396 ft^2		
Woody Plants	2,383							
Emergent Plants	3,309							
Forb Plants	260							
Area Grass Seeded (ft^2)	241,250 ft^2							
Wetlands Created	N/A							
Wetlands Area (sq ft)	N/A							
Wetlands Storage Capacity (ft^3)	N/A							
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients							
Other Benefits	Fish and Wildlife Habitat Improvement Flow and Habitat Alteration Improvement Community Involvement and Education							
Restoration Practices	Riparian Planting Construction of Narrow Low-Flow Stream Channel Reconnection with Floodplain Reslope Streambanks Remeander Stream Channel Erosion Control Fabric Soil Wrap Revetments							

Summary of Project Expenditures	
Source	**Amount**
319 Funds	$ 47,470.60
Non-federal Match	$ 26,332.82
Additional Match	N/A
Project Total	$ 73,803.42

Project Description: Townsend

The restoration site is located on a tributary to Paradise Creek in agricultural land north of Moscow, Idaho. The stream was highly degraded by agricultural management practices. The site was cultivated to the streambank and all riparian vegetation was removed. The stream channel was braided with areas of steep, eroding banks. Reed canarygrass filled the 40 ft wide braided channel.

PCEI and contractors excavated the floodplain, reintroduced stream channel meanders, resloped steep streambanks, and defined a narrow, low-flow channel. Following the excavation work, streambanks were stabilized with erosion control fabric and planted with a buffer of native riparian vegetation. The excavation of the floodplain was designed to reconnect the stream to the floodplain, increase water storage capacity and provide stream channel conditions beneficial for water quality. Terraced streambanks were constructed. Meanders were constructed. Layered soil wrap revetments were installed in the streambank at the downstream end of the site at an area of high erosion potential. All exposed soil was seeded with native grasses and the streambanks were covered with erosion control material. During Fall 2003, a riparian buffer was planted on both sides of the stream. The buffer varied in width from 45 to 90 ft.

The Townsend restoration site provided an exceptional opportunity for community involvement and education. The landowner, Clint Townsend, and the agricultural operator, Larry McMillan, collaborated in project design, implementation, and maintenance of the site. Washington State University (WSU) students, University of Idaho (UI) students, local Girl Scouts and Boy Scouts, WSU Community Service Learning Center, UI Community Service Learning Center, CAMPOS Student Organization, UI Environmental Club, UI Bonner's Scholar Program, Lake City High School faculty, Alternative Breaks Association, and other community volunteers participated in planting, installing bank stabilization materials, weed control and maintenance. AmeriCorps*NCCC participated in weeding, watering and maintenance.

Townsend: Rural Riparian Restoration

Before, Spring 2003

After, Fall 2003

Willard: Rural Riparian Restoration, Wetlands Restoration and Animal Waste Prevention

Contract	QC060500							
Project Name	Willard							
Lead Agency	Palouse-Clearwater Environmental Institute (PCEI)							
Project Category	Wetlands Restoration, Rural Riparian Restoration, and Animal Waste Prevention							
Owners	Janice Willard and Eric Nilsson							
Funding	Idaho Department of Environmental Quality (IDEQ)							
Project Location (Figure 1)	**UTM**	503219 E			5177960 N			
	Lat	-116.9579°W			**Long**		46.7552°N	
	Qtr Sec	NW	**Sec**	3	**Rng**	5W	**Twnshp**	39N
Project Installation Date(s)	September 2001 to June 2002							
Project Dimensions	**Length (ft)**	1842			**Width (ft)**	40		
Project Area	**Sq Ft**	73,680			**Acres**	1.69		
Streambank Length Treated	**Side 1 (ft) North Bank**	288			**Side 2 (ft) South Bank**	288		
Vegetated Buffer	**Side 1 (ft) North Bank**	20 x 288 = 5760 ft^2			**Side 2 (ft) South Bank**	33 x 288 = 9504 ft^2		
Woody Plants	96							
Emergent Plants	30							
Forb Plants	N/A							
Area Grass Seeded	N/A							
Fencing Installed (ft)	60							
Wetlands Created: 1	**Area (ft)**		**Avg. Depth (ft^2)**		**Capacity (ft^3)**			
Wetland 1	9,360		2.83		26,488			
Total	9,360		2.83		26,488			
TMDL Parameters of Concern Addressed by the Project	Sediment Temperature Nutrients							
Other Benefits	Fish and Wildlife Habitat Improvement Increased Stormwater Storage Capacity Flow and Habitat Alteration Improvement Community Involvement and Education							
Restoration Practices	Wetlands Construction Riparian Planting Flood Mitigation Reconnection of Stream to Floodplain Installation of Coir Logs Installation of Soil Wraps Addition of Large Woody Debris							

Summary of Project Expenditures		
Source		**Amount**
319 Funds	Rural Riparian Restoration	$ 25,833.68
	Animal Waste Prevention	$ 2,461.62
	Wetlands Restoration	$ 3,096.63
Non-federal Match	Rural Riparian Restoration	$ 8,777.61
	Animal Waste Prevention	$ 144.44
	Wetlands Restoration	$ 5,120.27
Additional Match		$ 3,530.44
Project Total		$ 48,964.69

Project Description: Willard

The streambanks on the site were lacking woody riparian vegetation and the riparian area was managed as a pasture for livestock. Reed canary grass formed a dense monoculture in the stream channel and riparian area. These conditions led to highly erosive conditions for streambanks on the site. Bank slumping was evident. The channel was highly simplified, cut off from the floodplain by steep streambanks, and unshaded. Upstream from the restoration site, Paradise Creek was channelized into a roadside ditch. Channelization, dredging, undersized culverts, and removal of vegetation caused high inputs of sediment and increased water temperature.

The wetlands restoration project at the Willard site was primarily designed to function as a sediment catchment. During November 2001, PCEI's contractors excavated the 10,000 ft^2 wetland area adjacent to the stream channel. The wetland catchment receives sediment-laden water during high flows and allows the sediments to settle out. The catchment banks were sloped to a 3:1 slope and stabilized with geotextile erosion control fabric and riparian plantings. Riparian plantings occurred during Spring 2002. Coconut fiber-filled coir logs pre-planted with herbaceous riparian plants were installed at the toe of the streambanks in areas of high erosion potential. Large woody debris was added to the wetlands to further slow water velocities and increase channel complexity. Fencing was installed to exclude livestock from the wetlands area.

PCEI worked closely with the landowners to design, implement and maintain the wetlands project and riparian plantings. The North Latah County Highway District collaborated on the project by consulting and by replacing an undersized culvert directly upstream of the wetlands. AmeriCorps*NCCC members, Washington State University students, and community volunteers participated in the project by installing streambank stabilization materials, planting riparian vegetation, and performing weed control and maintenance activities. A private individual donated habitat structures.

Willard: Rural Riparian Restoration, Wetlands Restoration, and Animal Waste Prevention

Before, Fall 2001

After, Winter 2001

Works Cited

Beeson, C.E. and P.F. Doyle. 1995. Comparison of Bank Erosion at Vegetated and Non-Vegetated Channel Bends. Water Resources Bulletin. Vol. 31, No. 6.

Black, A., E. Strand, P. Morgan, M. Scott, R. Wright, and C. Watson. 1999. Biodiversity and Land-use History of the Palouse Bioregion: Pre-European to Present. In Perspectives in the Land Use History of North America: A Context for Understanding Our Changing Environment. http://biology.usgs.gov/luhna/chap10.html. Accessed 2003 December 10.

Doke, J. and G. Hashmi. 1994. Paradise Creek Watershed Characterization Study. Washington State University, Pullman, Washington.

Gilmore, S. 1995. BMP Effectiveness Review. Latah Soil and Water Conservation District, Moscow, Idaho.

Idaho Department of Environmental Quality. 2004. www.ideq.state.id.us Accessed 10 Oct 2004.

Idaho Department of Environmental Quality. 1997. Paradise Creek TMDL: Water Body Assessment and Total Maximum Daily Load. Lewiston Regional Office, Lewiston, Idaho.

Megahan, W.F. 1974. Deep rooted plants for erosion control on granitic road fills in the Idaho Batholith. USDA Forest Service Research Paper INT-161. Intermountain Forest and Range Experiment Station, Ogden, Utah. 18p.

National Research Council. 1992. Restoration of Aquatic Ecosystems: Science, Technology and Public Policy. National Academy Press, Washington, D.C.

Northwest Power and Conservation Council. 2004. Draft Palouse Subbasin Management Plan.

Paradise Creek Watershed Advisory Group. 1999. Paradise Creek TMDL Implementation Plan.

U.S. Forest Service. 2004. http://www.fs.fed.us/r6/fremont/sycan/text/APPENDIX_C.htm. Accessed 5 Oct 2004.

United States Department of Agriculture, Natural Resources Conservation Service. 1995. Preliminary Investigation Report for the Paradise Creek Watershed.

United States Environmental Protection Agency. 1993. “Paradise Creek Waterbody Assessment-Draft.” EPA, Boise, Idaho.

Wertz, L.B. 1993. “Beneficial Use Attainability Assessment Work Plan, Paradise Creek, Latah County, Idaho.” Idaho Department of Health and Welfare Division of Environmental Quality.

Appendix A.

Plant Species Utilized in Paradise Creek Restoration

Scientific Name	Common Name
Acer glabrun	Rocky Mountain Maple
Alnus incana	Thinleaf Alder
Amelanchier alnifolia	Serviceberry
Beckmannia syzigachne	American Sloughgrass
Betula glandulosa	Scrub/Bog Birch
Betula occidentalis	Water Birch
Camassia quamash	Common Camas
Carex amplifolia	Big-leaf Sedge
Carex aquatilis	Water Sedge
Carex microptera	Small-winged Sedge
Carex nebrascensis	Nebraska Sedge
Carex utriculata	Beaked Sedge
Carex vesicaria	Inflated Sedge/Blister Sedge
Cornus stolonifera	Red-osier Dogwood
Crataegus douglasii	Douglas Hawthorn
Deschampsia caespitosa	Tufted Hairgrass
Elocharis palustris	Creeping Spikerush
Glyceria occidental	Western Mannagrass
Heracleum lanatum	Cow Parsnip
Holodiscus discolor	Oceanspray
Iris missouriensis	Wild Iris/Blue Flag/Rocky Mountain Iris
Juncus articulatus	Jointed Rush
Juncus balticus	Baltic Rush
Juncus effusus	Common Rush/Soft Rush
Juncus ensifolius	Dagger-leaf Rush
Mahonia repens	Creeping Oregon Grape
Philadelphus lewisii	Mockorange/Syringa
Physocarpus malvaceous	Mallow Ninebark
Pinus ponderosa	Ponderosa Pine
Polygonum bistortoides	American Bistort
Populus tremuloides	Quaking Aspen
Populus trichocarpa	Black Cottonwood
Prunus emarginata	Bitter Cherry
Prunus virginiana	Common Chokecherry
Pseudotsuga menziesii	Douglas Fir
Ribes aureum	Golden Currant
Rosa gymnocarpa	Baldhip Rose

Rosa nutkana	Nootka Rose
Rosa woodsii	Woods/Pearhip Rose
Rubus parviflorus	Western Thimbleberry
Sagittaria latifolia	Wapato/Duck Potato/Arrowhead
Salix bebbiana	Bebb Willow
Salix drummondaii	Drummond Willow
Salix exigua	Coyote Willow
Salix lasiandra cuadata	Whiplash/Pacific Willow
Salix mackensieana	Mackenzie Willow
Salix scouleriana	Scouler Willow
Sambucus cerulea	Blue Elderberry
Scirpus acutus	Hardstem Bulrush
Scirpus cyperinus	Woolgrass
Scirpus microcarpus	Small-Fruited Bulrush
Scirpus pungens	Three-Square Bulrush/Olney's Three-Square
Scirpus validus	Softstem Bulrush
Spirea betulifolia	Shiny Leaf Spirea
Spirea douglasii	Douglas Spirea
Symphoricarpos albus	Common Snowberry
Symphoricarpos mollis	Creeping Snowberry