BONNEVILLE POWER ADMINISTRATION

Walla Walla River Basin Fish Habitat Enhancement Project

Annual Report 2002 - 2003 December 2005 DOE/BP-00006414-3

This Document should be cited as follows:

Volkman, Jed, "Walla Walla River Basin Fish Habitat Enhancement Project", 2002-2003 Annual Report, Project No. 199604601, 42 electronic pages, (BPA Report DOE/BP-00006414-3)

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This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

Walla Walla River Basin
Fish Habitat Enhancement Project

Annual Report

February 2002- January 2004

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Project No. 1996-046-01
Contract Number 00006414

ABSTRACT

In 2002 and 2003, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Fisheries Habitat Program implemented stream habitat restoration and protection efforts on private properties in the Walla Walla River Basin with funding from Bonneville Power Administration (BPA). The objective of this effort is to protect and restore habitat critical to the recovery of weak or reintroduced populations of salmonid fish. The CTUIR has currently enrolled nine properties into this program: two on Couse Creek, two adjacent properties on Blue Creek, one on Patit Creek, and four properties on the mainstem Walla Walla River. Major accomplishments during the reporting period include the following:

- Secured approximately $229,000 in project cost share;
- Purchase of 46 acres on the mainstem Walla Walla River to be protected perpetually for native fish and wildlife;
- Developed three new 15 year conservation easements with private landowners,
- Installed 3000 feet of weed barrier tarp with new plantings within project area on the mainstem Walla Walla River;
- Expanded easement area on Couse Creek to include an additional 0.5 miles of stream corridor and 32 acres of upland habitat;
- Restored 12 acres on the mainstem Walla Walla River and 32 acres on Couse Creek to native perennial grasses;
- Installed 50,000+ new native plants/cuttings within project areas;

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BACKGROUND

This project is funded by the Bonneville Power Administration to restore and protect stream and upland habitat critical to the survival of salmonid fish in the Walla Walla River Basin. This document defines project activities for the period of February 1, 2001 through January 31 of 2003. The report begins with a historical summary of the rivers, riparian corridors, floodplains and uplands of the basin prior to the dramatic decline of summer steelhead and extinction of salmon. By doing so, we can better understand what things led to the loss of these species and what needs to be done to ensure their return.

The conditions we see today in the Walla Walla River Watershed reflect the land-use practices that have occurred in the basin throughout its history (United States Dept. of Agriculture, 1941). The earliest inhabitants of the Walla Walla River Basin included three Native American Tribes: the Cayuse, Walla Walla, and Umatilla. The Tribes ceded the land to the United States in an 1855 treaty (CTUIR, 2001). In 1805, the now infamous Corps of Discover led by Lewis and Clark came into the valley. On the Touchet River near it's mouth they wrote "The hills of this creek are generally abrupt and rocky, but the narrow bottom is very fertile, and both possess 20 times as much timber as the Columbia itself; indeed, we now find, for the first time since leaving Rock fort (the Dalles), an abundance of firewood. The growth consists of cottonwood, birch, crimson haw, red and sweet willow, choke-cherry, yellow currants, gooseberry, the sumac, together with some corn-grass and rushes. (Clark and Lewis, 1805-1806)"

The large influx of Euro-Americans to the basin began in the mid-1800's. At this time, timber and brush mixed with grass and forbs were found in the Blue Mountains, bunch grasses in the middle portions of the watershed, and wild rye and sagebrush in the valleys (U.S. Dept of Agriculture, 1941). In 1839, an early explorer near Whitman Mission on the Walla Walla River wrote "The plain about the waters of this river is about thirty miles square. A great part of this surface is more or less covered with bunch grass" (Farnham, 1839). In 1858, Charles Dickerson, the son of an early settler on Pine Creek (near the city of Milton Freewater, OR), remembered the raw farm land of his childhood as being fertile but covered thickly with clumps of tall rye grass (Caverhill,1971). Further downstream, Lewis and Clark in 1806, and David Douglas in 1826, noted the surrounding country as being predominated by sagebrush.

Horses were introduced into the Walla Walla Valley from New Mexico in the 1730's. Native American Indians began to make use of them soon afterward. In the mid-1800's, large numbers of domestic cattle, sheep, and draft horses were introduced to the area (United States Dept. of Agriculture, 1941). Ultimately the rangelands were overgrazed which, not surprisingly, led to native plant populations being replaced by more competitive introduced plant species and wide spread soil loss.

The earliest noted agriculture in the valley occurred in about 1825 at Fort Nez Perce, near the mouth of the Walla Walla River (Walt Gary, personal communication). In 1839, the area around Whitman Mission was primarily wheat, corn, onions, melons, and various other crops (Farnham, 1839). Prior to the establishment of Whitman Mission in 1836, the grass covered hills were thought to be only suited for grazing. But by 1850, small amounts of cropland were situated along the river bottoms including some irrigation. In the fall of 1863, a farmer sowed 50 acres of wheat on the upland near Weston and the following summer collected an average of 35 bushels to the acre. From this point forward, land was broken out at an accelerated rate and by the late 1870's, Walla Walla County was considered one of the leaders in cultivated grains (United

States Dept. of Agriculture, 1941).

As agriculture in the Walla Walla Valley continued to expand, so too did the availability of large machinery capable of manipulating the landscape. Harper et al. (1938) indicates that steam-powered tractors were available in Umatilla County (Oregon) in 1904 and 1905, caterpillar-type gasoline-powered tractors were introduced from 1907 to 1909, and diesel oil-burning caterpillar type tractors could be purchased in 1932. Heavy machinery allowed riparian areas to be cleared for farming and grazing, and extensive stream channel straightening to begin (Figure 1).

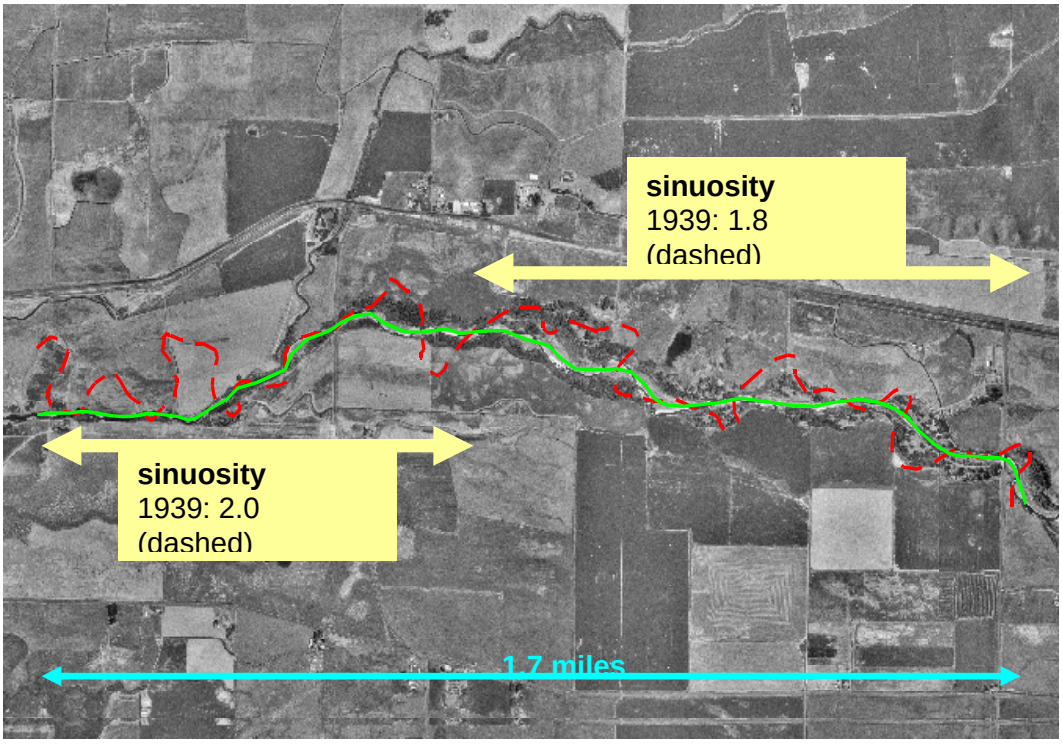

Figure 1: Aerial view of Walla Walla River near Lowden Washington depicting stream channel in 1939 (dashed line) and stream channel in 1996 (solid line) (TMDL Draft, 2001).

A scientist named Dice conducted vertebrate studies in the Touchet River Basin from 1904 to 1914 (Kuttel, 2001). He wrote: "The animal habitats of southeastern Washington have been greatly altered by the work of man. Farming is extensively carried on and in the prairie area a very large percentage of the land is under cultivation. Irrigation is also practiced in valleys of both prairie and sagebrush areas. All of the land not under direct cultivation has been heavily grazed by cattle and stock. Part of the timber along the streams has been cut down and much of the brush has been cleared away…These changes in the environment have caused great changes in the abundance of the different species of vertebrates" (Dice, 1916 cited in Mudd, 1975).

Historical accounts clearly validate the presence of several now extinct species of salmon in the Walla Walla River. Some species, particularly fall chinook and chum, were likely spillover from the Columbia River, essentially of Columbia River origin but occupying the lower portions of the

Walla Walla River for spawning. Nevertheless, runs of spring and fall chinook, chum, coho, and sockeye salmon are reported to have been present at some level (Swindell, 1942). Several historical journals remark that the Touchet, Mill Creek, mainstem Walla Walla, and various other tributaries contained healthy populations of spring chinook salmon at one time. The last spring chinook salmon run of any significance was reported in 1925 (Van Cleve and Ting, 1960). By 1955, only 18 spring Chinook salmon were reported to have been captured in the sport fishery (Oregon Game Commission, 1956 and 1957). Today, the remaining native fish populations include summer steelhead at severely depressed levels, bull trout, resident redband trout, reintroduced spring chinook salmon (adult out-plants have occurred in the basin since the fall of 2000) and various other non-game species. Summer steelhead and bull trout are presently listed as threatened under the Federal Endangered Species Act (ESA).

It's also important to recognize the impact that over-appropriation of water and inadequate passage conditions have had on the once abundant populations of salmon and steelhead. In 1950, Nielson reported a total of 130 points of irrigation diversion in the basin of which 123 had no protective fish device of any kind. Numerous historical journals report "sacks of smolts" being collected from the cropland fields in the spring out-migration months. Early accounts by local people note that annual returns of spring chinook salmon reduced dramatically following the construction of nine-mile dam at Reese Washington in 1905 (Nielsen, 1950; Van Cleve and Ting, 1960). And, Van Cleve and Ting (1960), while summarizing data for the period of 1935-36, wrote that it would be "practically impossible for spring chinook salmon to ascend the river under the present system of water use".

INTRODUCTION

Efforts to protect and reintroduce existing populations of native fish in the Walla Walla Basin have increased dramatically in recent years. This is partly a reaction to requirements under the Federal Clean Water Act and Endangered Species Act but also a reflection of increased funding and concern by agencies and landowners in the basin. Hatchery supplementation, instream flow augmentation, habitat protection and restoration, and adult and juvenile passage improvement projects are all part of the long-term plan. Projects are being implemented by a myriad of State, Federal, Tribal, and local interest groups. Much of the funding in the basin is being provided by the Bonneville Power Administration (BPA), but other sources such as the State of Washington Salmon Recovery Board, Pacific Coastal Salmon Board, Oregon Watershed Enhancement Board, and Department of Agriculture are also large contributors.

There are many examples of recently completed or ongoing projects in the basin. The US Army Corps of Engineers (COE) is currently working with the CTUIR in the development of long-term flow enhancement strategies. Enhancement efforts will likely include a combination of irrigation efficiency, reservoir storage and purchase of water rights from willing sellers. It's hoped that this project will result in minimum stream flows reaching the mouth of the river during all months of the year. The State of Washington has implemented Senate Bill 5595, which provides funding for habitat restoration efforts in the basin through its Salmon Recovery Funding Board (SRFB). Fish ladders and screens have been replaced at Burlingame Dam and the little Walla Walla Diversion. A new fish ladder has been constructed at Nursery Bridge Dam (mainstem Walla Walla River) providing video surveillance and enumeration of migrating adults. Surplus spring chinook adults from Ringold Hatchery on the Columbia River were released into the Walla Walla Basin in August of 2000 and will produce the first adult return in the spring of 2004. The first phase of a new fish hatchery on the South Fork of the Walla Walla was completed in 1997 and it's hoped that with continued funding spring chinook juvenile releases will begin soon.

Habitat restoration and protection activities accomplished under this project will compliment the ongoing efforts by the CTUIR and others mentioned above. *The goal of the project is to "protect and restore habitat critical to the recovery of weak or reintroduced populations of salmonid fish within the Walla Walla River Basin".* Habitat interventions will function at a watershed level, practice best scientific practices, and employ passive approaches whenever possible as these have proven to be the most effective. This approach is working, and over time we can expect that critical salmonid spawning and rearing areas will be improved, naturally spawning populations of salmonids elevated, and juvenile out-migration numbers increased.

The project objectives are as follows:

1. Identify, prioritize, select and implement habitat restoration and protection projects that provide long-term benefit to biological systems and the salmonid fish relying on them.

2. Improve benefit to salmonid species and biological life within habitat restoration areas by monitoring and evaluating physical and biological parameters over time. Results from this data will be used to adapt and improve project strategies.

PROJECT AREA

The Walla Walla River Basin originates in the Blue Mountains at an elevation of nearly 6,500 feet. The watershed encompasses 1,758 square miles in northeast Oregon and southeastern Washington (Figure 2). Of this area, 73 percent is located in Washington and 27 percent in Oregon. The basin is bordered by the Snake River Basin on the north, the Tucannon and Grande Ronde Basins to the east, and the Umatilla Basin to the south (US Army Corps of Engineers, 1997).

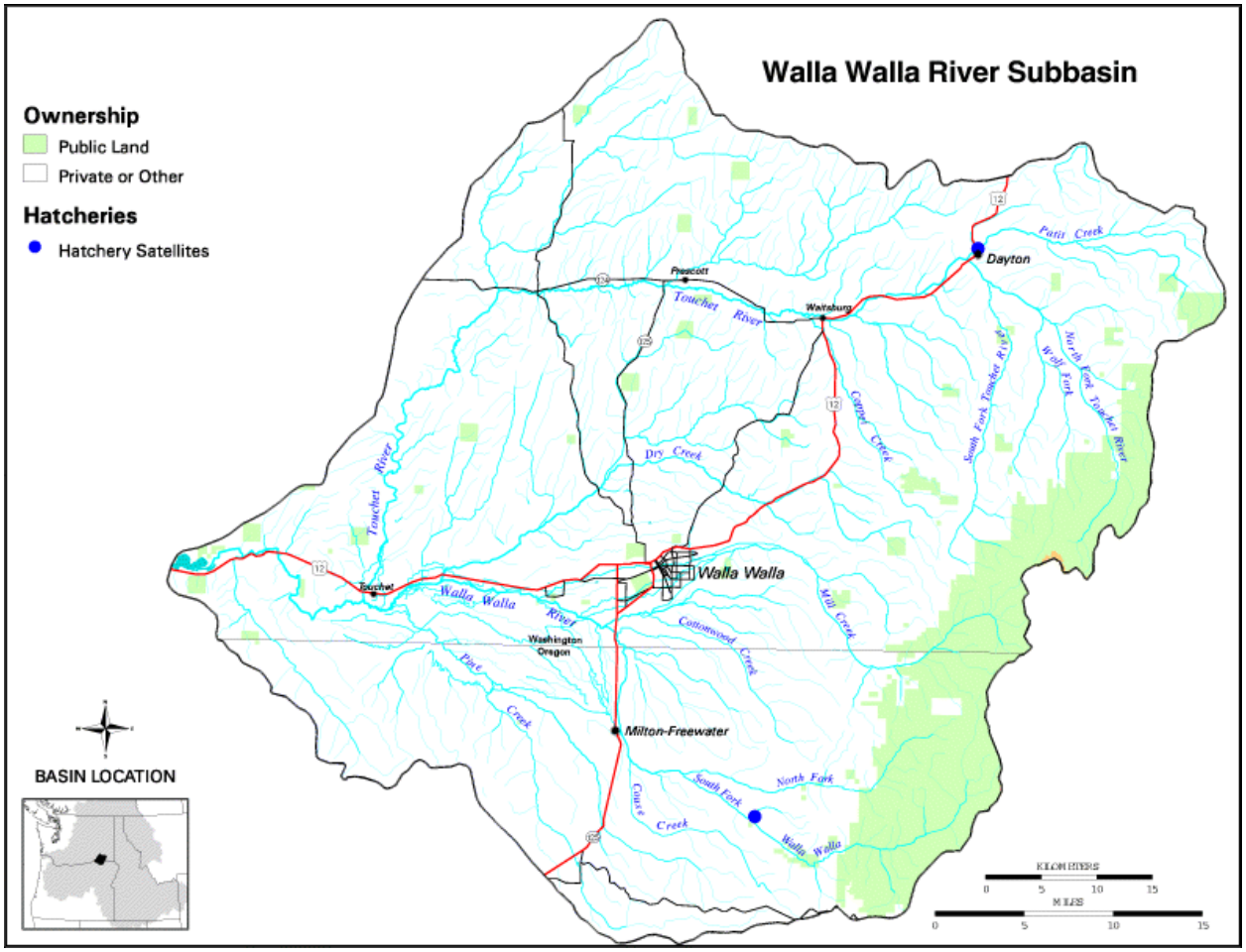

Figure 2: Map of the Walla Walla River Basin.

Annual precipitation in the middle and lower reaches of the basin averages 10-16 inches with more than 40 inches accumulating in higher elevations (Corps of Engineers, 1997).

Cultivation, domestic livestock grazing, and flood control activities have impacted riparian vegetation throughout much of the mid-lower elevation reaches. Loss of channel meander and length as a result of straightening is substantial throughout the basin (see Figure 1). Mudd (1975) estimated that only about 37 percent of the Touchet River riparian zone is currently vegetated. Along the Oregon portion of the Walla Walla River, 70 percent of the existing riparian zone is in poor condition (Water Resources Commission, 1988).
Irrigation is the principal water use in the basin. Stream flows characteristically peak in April, dropping sharply in May as high elevation runoff subsides and low elevation irrigation diversions

increase (CTUIR, et al.). These conditions annually lead to unacceptable habitat for salmonid fishes in the mid-lower portions of the basin.

This project currently has ten habitat restoration and protection sites with riparian conservation easements within the basin. Project areas are established within Blue Creek, Couse Creek, the mainstem Walla Walla, the South Fork of the Walla Walla, and Patit Creek as seen in Figure 3. There is approximately six miles of stream habitat being protected. The following descriptions are intended to familiarize the reader with the physical and biological characteristics of each of the individual restoration sites.

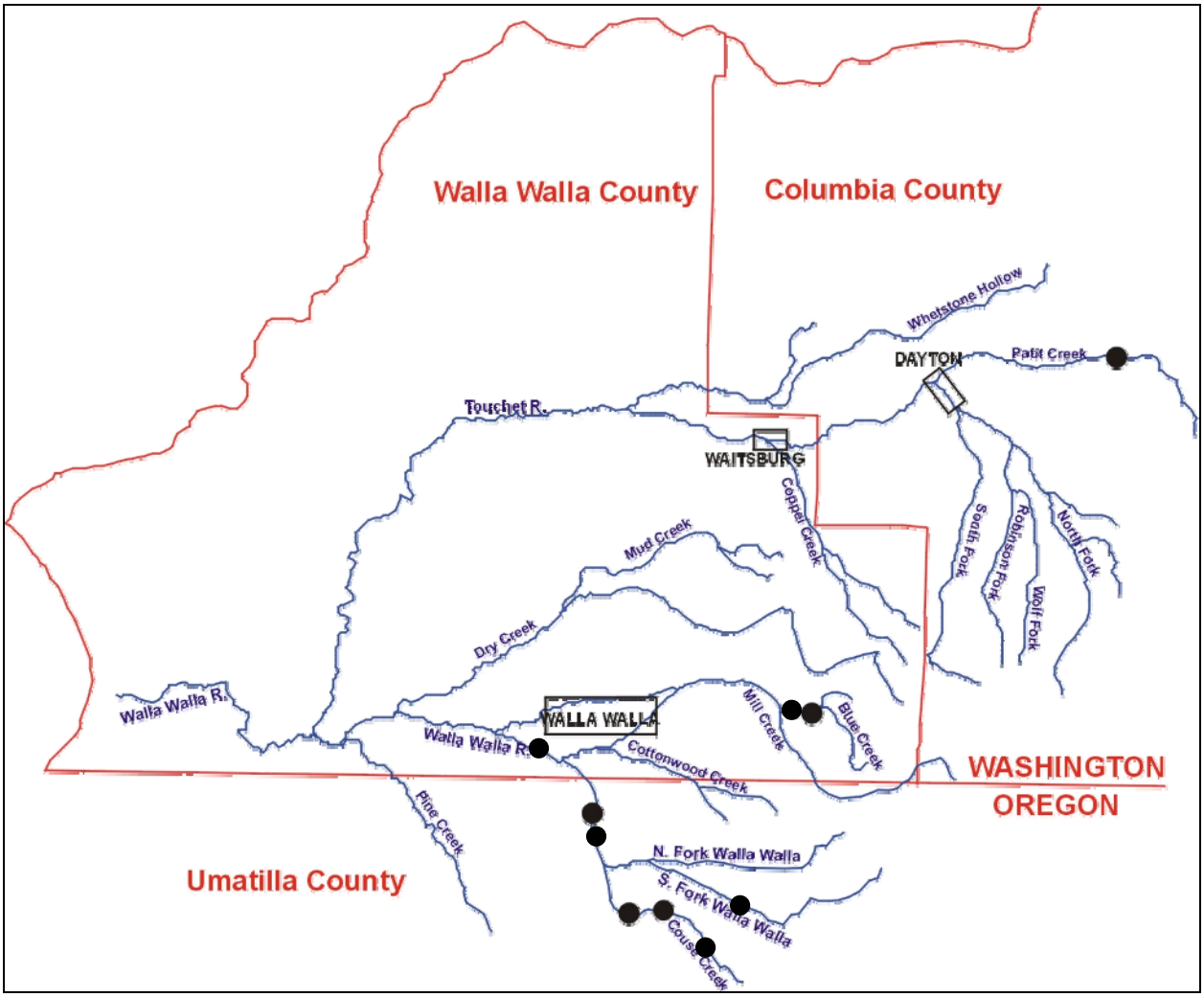

Figure 3: Project restoration and protection locations being managed by the project within the Walla Walla Basin.

Blue Creek (Gardner and Langert Landowners)

This project restoration area is located at approximately RM 2 on Blue Creek, a small tributary to Mill Creek east of the City of Walla Walla, Washington. The site consists of two adjacent properties with separate owners and Conservation Easements. The 15-year Conservation Easements were signed between the CTUIR and landowners in September of 1997. The site is at an elevation of approximately 1,800 feet. Residential encroachment in recent years is impacting much of the system both above and below the project area. The valley bottom within the project area is approximately 100 yards in width with timbered stringer draws on the south side of the stream and grasslands to the north. The stream length included within the project is approximately 0.25 miles. Stream flows are perennial although very low in late summer. Maximum daily stream temperatures have exceeded 75 degrees (F) in late July of each year. Native redband trout/summer steelhead can be found in the project area throughout the year. One bull trout was found while sampling in October of 1997. The stream and riparian corridor were severely impacted by high water in February of 1996 leaving virtually no riparian vegetation. Immediately after the flood event, the stream contained only riffle and riffle/boulder habitat; pool habitat was non-existent and large woody debris absent. Factors thought to be most limiting salmonid production include stream temperatures, bank and channel stability, pool frequency, large wood, and riparian cover.

Couse Creek (Banks Landowner)

This project area is located at approximately RM 3 on Couse Creek, a tributary to the Walla Walla River near Milton Freewater, Oregon. The 10-year Conservation Easement was signed in 1996 and is between the landowner, the Walla Walla Watershed Council, and the ODFW. The project is approximately 0.5 stream miles in length and at an elevation of 1,600 feet. The predominate land-use is farming and livestock pasture. Past agricultural practices and overgrazing have severely impacted this project site. These activities led to the disappearance of virtually all native riparian plant species and a resulting high incidence of bank failure. The surrounding slopes to the east and west of the stream are used for farming but are also comprised of various perennial grasses and shrub species. Throughout Couse Creek summer flows are ephemeral/subterranean leaving isolated pools and reaches with interrupted flow regimes. Native redband trout can be found in Couse Creek during any month of the year. One bull trout was found downstream of the project area when sampled by the CTUIR in August of 1999. Limited salmonid production within the project area is primarily a result of low or non-existent flows during the summer months but the system is also affected by high stream temperatures, channel incision, bank and channel instability, lack of channel diversity, low pool frequency, and inadequate riparian cover.

Mainstem Walla Walla River (Lampson Landowner)

This restoration area is located on the mainstem Walla Walla River approximately two miles east of Milton Freewater, Oregon at River Mile 49. The 15-year Conservation Easement was signed between the CTUIR and landowner in April of 1998. The landowners have graciously allowed the CTUIR to work within a very wide riparian corridor, as much as 300 meters from the stream in some areas and encompassing approximately 18 acres. The riparian corridor and adjacent floodplain have mostly recently been managed for agricultural purposes. A large rock dike constructed in the 1960's confines and straightens the stream along most of its length and nearly all riparian vegetation has been removed since the 1950's. Historical aerial photos taken in 1944 (obtained from the University of Oregon Library System) show a riparian corridor and

floodplain as wide as 300 meters in places dominated by cottonwood. By 1947, 30 percent of the trees had been removed, and by the 1950's, all riparian vegetation had been cleared for agricultural purposes. River flows here are perennial and stream temperatures are excellent (less than 60 degrees F) throughout the year. Native redband trout/summer steelhead, bull trout, and recently reintroduced spring chinook salmon are present in good numbers. Conditions limiting site potential include decreased pool frequency, channel straightening, lack of large wood and stream diversity, reduced riparian cover, and non-existent floodplain function.

Couse Creek (Hasso Landowner)

This project is located at approximately RM 7, on Couse Creek, a small tributary to the Walla Walla River near Milton Freewater, Oregon. The landowner, a resident of California, signed a fifteen-year Conservation Easement with the CTUIR in December of 1999. The landowner is financially compensated through the Conservation Reserve Enhancement Program (CREP) administrated through the United States Department of Agriculture. Throughout Couse Creek, flows are ephemeral/subterranean in the summer months leaving isolated pools and reaches with broken flow regimes. Where flow is available, redband trout/summer steelhead can be found during any month of the year.

The Conservation Easement encompasses the stream and entire floodplain on both shorelines for a distance of approximately 1.2 stream miles. The floodplain is more than a 100 meters in width in most places although it narrows to less than 50 meters just above the restoration area. This transition creates a high gravel deposition area during spring flow events leading to channel braiding and other restoration obstacles. Livestock grazing has also been done intensely on the property for decades which has resulted in the elimination of virtually all perennial riparian vegetation. Instead yellow starthistle (*Centaurea solstitialis*) and weak stands of various annual grasses predominate much of the riparian corridor and surrounding uplands. Within the project area, salmonids are most limited by low or non-existent flows during the summer months but also by elevated stream temperatures, bank and channel instability, lack of channel diversity, decreased pool frequency, and reduced riparian cover.

The long list of management challenges mentioned above combined with shallow soils and ephemeral flows make this project area the most challenging site we have in the Walla Walla Basin. Understanding this, the project has chosen to focus on “passive approaches” such as livestock exclusion and native plant reintroduction as we believe this provides us with the best opportunity for success.

Patit Creek (Brown Owner)

This project area is located at approximately RM 3, on West Patit Creek, a small tributary to the Touchet River near Dayton Washington. The landowner signed a fifteen-year Conservation Easement with the CTUIR in November of 1999 and is also participating in the CREP Program administrated through the United States Department of Agriculture. The area included within the Conservation Easement is approximately two miles in length and includes the stream and entire floodplain (exceeding 200 meters in some areas) on both shorelines. Timbered stringer draws, shrub species, and grasses are found on the valley slopes to the south while various perennial grasses and invasive yellow starthistle (*Centaurea solstitialis*) predominate slopes to the north.

A flood in February of 1996 severely changed the existing stream channel and removed much of the riparian vegetation in the top 0.5 miles of the project area. In most years, stream flows are ephemeral/subterranean during the summer months leaving isolated pools. Despite these conditions, summer steelhead, native red band trout, and various other fish species are present in good numbers throughout the year. Other limiting factors include bank and channel instability, low channel diversity, low pool frequency, and inadequate riparian cover.

Mainstem Walla Walla River (Lofthouse Landowner)

This project is located near RM 32 on the mainstem Walla Walla River, several miles east of the city of Lowden Washington. The landowner signed a fifteen-year Conservation Easement with the CTUIR in November of 2001. The conservation area includes approximately .25 miles of stream, the riparian corridor on both shorelines, and 12 acres of floodplain/upland corridor. The upland portion of the property has in the recent past been used to cultivate various crops. At the time the conservation easement was signed the field had been left fallow and contained primarily invasive weed species.

The existing riparian corridor on both shorelines is narrow (less than 30 meters) and includes a mix of native tree and shrub species, including cottonwood, wild rose, and willow. Former landowners discarded a number of vehicle parts, farm implements, and miscellaneous other items in an apparent attempt to provide stream-bank protection. The main stream channel flows along the north shoreline most of which has been reinforced with large rock. Like most of the Walla Walla River, the stream here has been confined and lacks meander, diversity, and pool habitat. There is a functioning stream floodplain although it is too narrow to allow proper stream meander, pool formation, and diversity.

Flows at the project site in past years have generally been at or near zero during the summer months. Recent legal agreements resulting from the Endangered Species Act between upstream irrigation districts and the federal government now allow a minimum amount of water to continue downstream. Although this has helped improve water conditions, flows and stream temperatures are still not meeting the needs of salmonid fishes within the project area during many months of the year.

Mainstem Walla Walla River (McCain Landowner)

The project area is located at approximately RM 50 on the mainstem Walla Walla River approximately five miles upstream of the city of Milton Freewater, Oregon. The project signed a 15 year riparian easement with the landowner in February of 2003. The stream length is approximately .25 miles long and the riparian/upland corridor width being protected varies from 150 feet to more than 300 feet. The upland area on the south side of the stream was most recently used as an apple orchard and includes the landowner's residence and several out-buildings. The apple orchard was removed during the last five years. To the North of the stream is a narrow riparian corridor with willow, alder, cottonwood trees, rose and blackberry. Immediately beyond this are steep slopes, basalt outcroppings, and shallow rocky soils providing at best marginal pasture.

Historical photos of the now pasture area south of the river show dense cottonwood galleries extending out several hundred meters from the river. Today the riparian corridor is 60 feet wide in most areas and occupies primarily native plant species including mature cottonwood, willow, and rose. Some non-natives such as blackberry, various thistle species, and grasses may also

be found. At the time the conservation easement was signed the riparian corridor also contained large amounts of discarded vehicle parts, cement blocks, household items, etc., presumably used for bank protection by previous landowners.

The stream channel is confined and channel straightening for the purpose of agricultural interests is evident throughout its length. The stream here has perennial flows, excellent water quality, and contains strong populations of summer steelhead, bull trout and recently reintroduced spring chinook salmon during all months of the year.

Mainstem Walla Walla River (CTUIR Owner)

With administrative assistance from the Trust for Public Lands the CTUIR purchased a 46 acre property on the South Fork of the Walla Walla in December of 2003. A combination of Pacific Coastal Salmon and Wildhorse Gaming Resort dollars were used to fund the acquisition. The property is included as part of this report because funding provided under this project will be used to implement restoration and protection activities.

The property includes a total of 46.5 acres in the foothills approximately 13 miles east of Milton Freewater Oregon on the mainstem Walla Walla River. Included in the property is 0.5 miles of the river, an older 900 square foot family dwelling in need of much repair (currently vacant) and several outbuildings. Also attached with the property is a water-right for approximately 13 acres of pasture. The CTUIR has yet to decide how the water-right will be managed. Water quality at this point of the river is excellent throughout the year and provides refuge for strong populations of summer steelhead, red-band trout, spring chinook salmon, and bull trout. The river channel is confined by a dike along the north shore and an abrupt hillside with conifer trees and basalt out-croppings to the south. Limiting factors are thought to include lack of pool habitat, riparian vegetation, stream length, floodplain function, and stream diversity.

Landowner Conservation Easements

All CTUIR habitat projects are protected under long-term (minimum 15 years) or perpetual Conservation Easements. Landowner easements are designed to protect the resource, the landowner, the investments of CTUIR, and the project's funding sources (primarily Bonneville Power Administration). Easements are very descriptive, clearly defining the project location, riparian corridor width, livestock exclusion fence placement if any, and the expectations and goals of all parties. Under these agreements, landowners are restricted from certain land use activities within the enhanced riparian corridor area, such as grazing, removal of vegetation and use of weed or insect control measures. The CTUIR works closely with the landowner to address their concerns management needs (such as livestock water gaps, stream crossing sites, weed control, etc.) into to final conservation easement. Once signed by both CTUIR and the landowner, easements are notarized and filed at the County Courthouse. Therefore, easements transfer to new landowners in the event that the property ownership changes.

Environmental Clearances

Habitat projects may require a variety of environmental clearances depending on the restoration action. Consultation with NOAA and USFWS as a requirement under the Endangered Species Act is coordinated with the BPA Environmental Program. The Columbia River population of bull trout (*Salvelinus confluentus*) and mid-Columbia Evolutionary Significant Unit of summer steelhead (*Oncorhynchus mykiss*) are listed as threatened species. Any proposed instream work activities in areas currently supporting these species or providing critical habitat for them require ESA consultation when federal funding is utilized. Upon completion of a biological assessment, BPA initiates consultation with two federal services. The US Fish and Wildlife Service (USFWS) is consulted with regarding potential impacts to wildlife and resident fish species (such as bull trout). The National Oceanic and Atmospheric Administration (formerly NMFS) is consulted with regarding potential impacts to anadromous fish species (such as summer steelhead). Biological assessments are reviewed by USFWS and NMFS, during consultation proceedings, and they determine whether an instream project will impact listed species, and how those impacts can be minimized. Other permits include State and Local regulatory permits prior to implementation of any instream activities and burning permits from Umatilla or Walla Walla County to control noxious weeds within existing project areas. Of course all of this administrative process greatly increases project delays and administrative cost.

The project also coordinates with CTUIR's Cultural Resource Protection Program (CRPP) at proposed habitat enhancement sites involving ground disturbance (fence construction, instream work, etc.) to obtain cultural and historical clearances. This is required under Section 106 of the National Historical Preservation Act (NHPA). CRPP staff conduct file and literature searches, pedestrian surveys and/or archeological excavations to determine if cultural resources potentially eligible for inclusion to the National Register of Historic Places are present at proposed enhancement sites. Final reports documenting their findings are prepared and submitted to the State Historic Preservation Office. CRPP Staff may also conduct on-site monitoring of projects during implementation at culturally sensitive locations.

Project Implementation

Restoration efforts are focused on passive techniques such as livestock exclusion and revegetation as these techniques have proven themselves the most successful and cost efficient. Projects requiring more aggressive approaches such as the manipulation of stream channels and shorelines are reserved for sites that fail to respond otherwise or areas lacking quality stream habitat. Heavy equipment rental is subcontracted to independent contractors through a competitive bidding process consistent with guidelines attached to the funding source. All facets of project design are handled by CTUIR staff.

Livestock exclusion fencing remains an important tool in the protection of sensitive riparian zones. Sensitive riparian areas are attractive to livestock as they provide a source of shade, water, and abundant feed. Over-grazing leads to loss of native vegetation, displacement of native fish and wildlife species, bank erosion, loss of shade, and bank failure among other things. Livestock fences are constructed with the maximum amount of riparian and floodplain corridor width made available to us by the landowner. Private fence contractors meeting all license, insurance, and experience requirements are hired to build livestock fences. Fence design generally follows specifications provided by the USDA in an effort to be consistent with other conservation programs and the migrational needs of wildlife. Small fence projects, routine maintenance, and livestock water-gaps are handled by CTUIR project technicians.

Native plant species are used for restoration of riparian and upland project areas. Potted plants and tublings are obtained through area plant nurseries or grown out by staff at the CTUIR Native Plant Nursery. Live cuttings (willow primarily) are collected at or near the project site and installed by trenching or stinging them into the soil with the use of an cat-track excavator. Willows placed in this manner require no maintenance and have proven very successful. When necessary newly planted trees and shrubs (rooted stock) are watered from July through September with a 300-gallon tank and sprayer mounted on a flat-bed pickup.

When appropriate we reestablish stands of native grasses to upland areas as part of our restoration process. Once established, grasses provide excellent cover for wildlife species and control of soil erosion and noxious weed species. Grass seed is obtained from area suppliers and includes a mix of species that represent historic composition.

The CTUIR hires licensed chemical applicators through a competitive bidding process to chemically treat noxious weeds in existing project areas; some spot-spraying is completed by project staff. All chemical applications are consistent with Oregon Revised Statute (ORS).570.505 and Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Regulations.

Project Monitoring

In response to an increased interest in detailed project monitoring data we developed a monitoring “plan” in 2000 (available upon request). This document is a compilation of monitoring approaches that include in part methods from ODFW’s “*Methods for stream habitat surveys in Oregon Department of Fish and Wildlife, Aquatic Inventory Project” (1993).* The Monitoring Plan is a working “draft” and is changing as we increase our knowledge and experience. The project monitoring methodology is provided below.

Monitoring methodology:

During the longitudinal survey, a survey team walks upstream along the thalweg of the channel and measures the stream length within the project area using a hip chain. While walking the stream, the team identifies individual channel habitat units. Channel habitat units are relatively homogeneous lengths of the stream that are classified by channel bed-form, water surface slope, and flow characteristics (e.g. riffle, glide, scour pools). The length of each habitat unit is measured and the depths of all pools are determined.

During the cross-sectional survey, 2-10 permanent transects are established within the project area (depending on project length), ensuring that transects are representative of the different vegetation coverages within the project area. At each cross section, the transect is marked with permanent stakes perpendicular to the stream's thalweg (see Figure 3). The transect will run the entire width of the project area (from fence line to fence line) unless it is more feasible to sample just the floodplain width. Cross sections will be numbered from "1" starting from the downstream end of the project site continuing upstream.

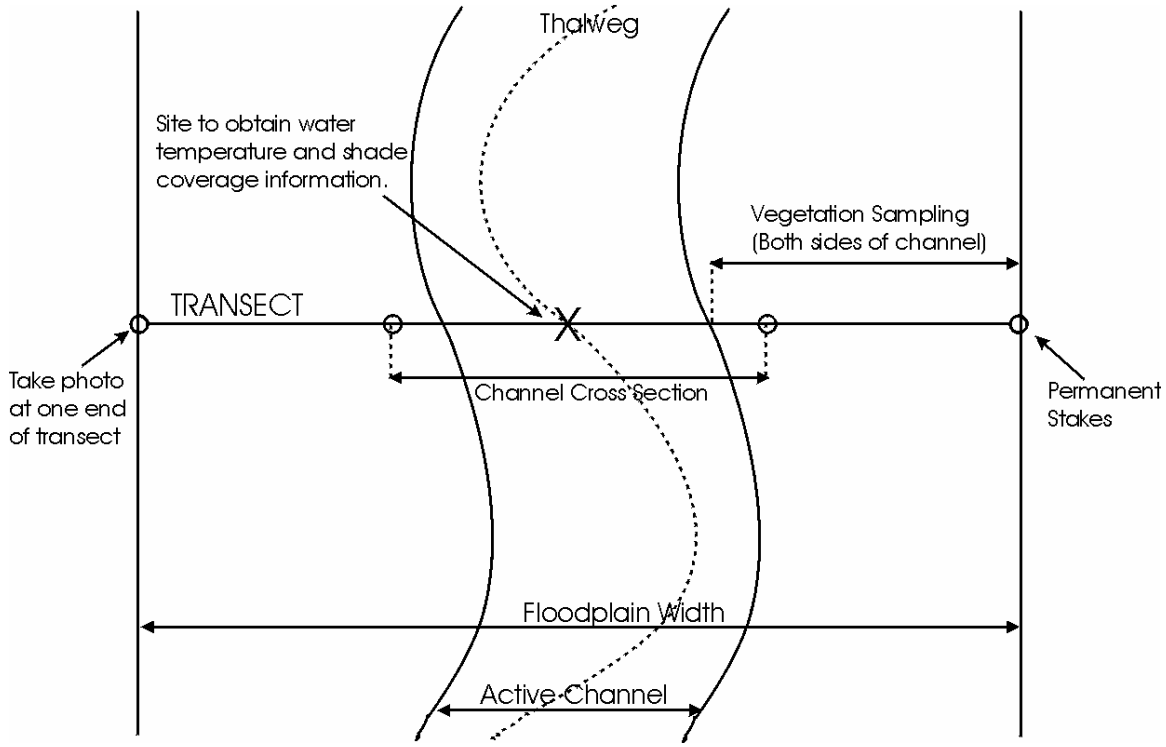

Figure3: Transect setup for monitoring surveys.

A measuring tape is staked across the width of the stream channel along the transect, and the cross-section is surveyed using a rod and hand level. The elevations are recorded at any major slope breaks within the active channel (see Figure 4). Elevations are also taken at the top of the bank, bankfull, water's edge, and maximum depth along the thalweg. Right and left banks (looking upstream) are clearly identified in the notes. While collecting cross-sectional information, the wetted width and bank-full width are also measured. Permanent transects are

clearly marked so that they can be repeated over time.

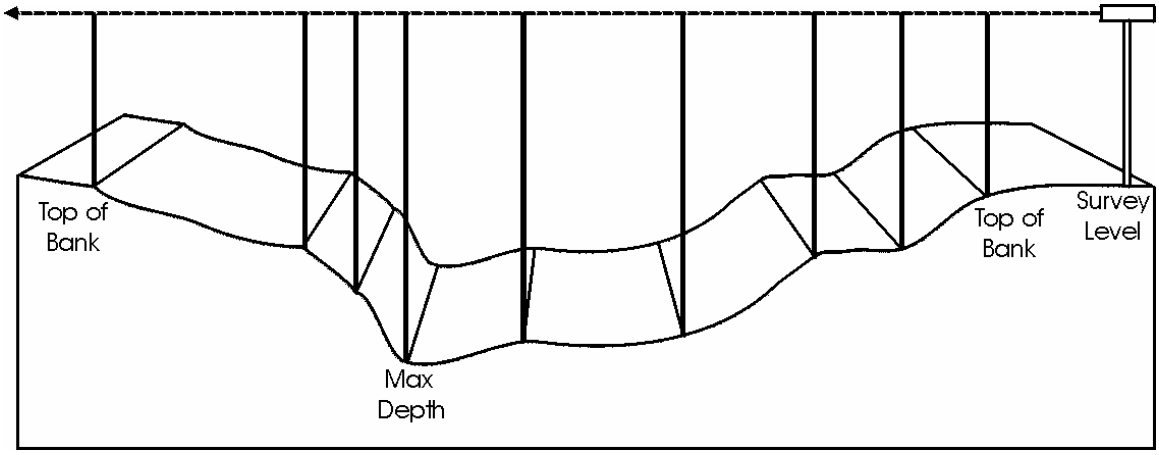

Figure 4: Survey all major slope changes across the active channel.

Vegetation surveys are also conducted along the cross-sectional transect as seen in Figure 3. A measuring tape is stretched from the top of the stream bank, away from the channel, to the end of the transect. At every meter interval, the predominate vegetation along that one-meter portion of the transect is categorized using the classifications developed by ODFW (1993). This procedure is repeated on both sides of the stream. Additional observations may be taken note of at this time (i.e.: large weed infestations, recent evidence of fire, etc.). This compiled information will be used to determine percent ground cover, and proportional vegetative composition indices.

Using a concave spherical densiometer, shade coverage is measured within the stream channel. Shade readings are taken while standing mid-channel along the transect, and four readings are recorded (facing upstream, downstream, to the right bank and to the left bank).

The percent distribution of substrate material are categorized into six size classes (ODFW, 1993). The distribution relative to the total area of the habitat unit (wetted area) is estimated and rounded off to nearest 5-percent.

Using simple field observation, the predominate land use is determined for adjacent terraces and hill slopes that are not part of the riparian zone. The amount of in-channel woody debris is categorized using a classification system that allows for five possible wood classes, each categorizing the complexity and amount of woody debris. A qualitative description is used for the observed stability of both the right and left bank. All of this is accomplished using the classifications devised by ODFW (1993).

Standardized photo points are taken in the summer and provide a visual record of changes in channel morphology and riparian recovery. A photo point notebook, containing 35 mm slides of annual changes, is maintained by the CTUIR Fisheries Habitat Enhancement Project.

Fish surveys are completed by the CTUIR Natural Production Program (BPA Project #200003900) using their methodology. Fish samples are collected with a backpack electro-fisher within project areas. A single pass with the electro-fisher is made to evaluate community

composition. All salmonids captured are enumerated, fork lengths measured and identified to species in the field. All non-salmonid fish species numbers are visually estimated during sampling. These surveys are not conducted annually in an attempt to reduce stress to fish, particularly ESA listed species.

RESULTS AND DISCUSSION

Blue Creek

During the summer of 1997 the CTUIR began discussing with the local NRCS various management options for two adjacent properties on Blue Creek. Both of the properties were damaged from high water in February of 1996. A project design was created that included several rock weirs, log weirs, channel sloping, and revegetation. The instream work portion of the plan was completed in late September of 1997. The NRCS provided all of the engineering design and implementation oversight for the instream structures.

The rock vortex weirs have been effective at reducing bank erosion, improving channel stability and increasing survival of riparian vegetation. The structures have proven less effective at providing instream habitat for fish. The vortices incorporated into the design effectively move flows toward the center of the channel as designed but limit the formation of pool habitat. One of the rock weirs has been entirely buried in gravel and at this point serves only as a channel grade control.

For several years the log V-weirs functioned as designed but during the reporting period two of the three failed as a result of channel grade changes (head-cut moving upstream). These changes eventually undermined the structures causing them to partially collapse. We removed the logs with a chainsaw on one of the structures and intend to remove the second with large machinery in 2004. Some minor grade control measures and channel form work will also be incorporated as part of this effort. A biological assement for this proposed work was completed during the 2003 FY and submitted to the BPA Environmental Compliance Group (please see Appendix A for project design developed by James Webster, CTUIR Hydrologist). We now realize that grade control measures should have been included as part of the original stream design. A considerable amount of science, education, and experience has been gained by the project and NRCS in recent years, however, which has eliminated these types of design errors.

Native plant restoration efforts have been very effective on Blue Creek which is interesting given that the riparian corridor is almost entirely river rock (please see 1998 photos below). Nearly all of the willow cuttings and rooted stock plants placed during excavation and subsequent planting efforts have survived. All rooted stock plants were hand-watered (in August and September) in the first two years following planting by project staff. All of the willow cuttings were placed below the “water line” and are thus “self watering”.

The following photo points portray the significant floodplain and channel form recovery that has occurred at this project site.

May 1998 **July 2001**






Monitoring data for the Blue Creek Project was provided in the 2001 report of progress and will be repeated in 2005.

Couse Creek (Banks landowner)

This property was first signed into ten-year conservation easement by the ODFW and local Watershed Council in 1996. The CTUIR became involved with the project in 1997, providing additional technical assistance and funding from the Bonneville Power Administration. A discussion of work completed by the project for the period of 1997-2001 may be found in the 2001 Annual Report of Progress.

A 15 year conservation easement was signed with the landowner in May of 2001 that included an additional 0.5 miles of Couse Creek and approximately 32 acres of upland habitat. The upland zone of the property had not been farmed for several years and was now predominated by invasive weed species. It was decided to control the weeds and provide future water quality improvements and wildlife habitat by reintroducing native grasses.

To prepare the field for seeding, the weeds were mowed twice followed by chemical treatment with a broad-spectrum herbicide. Once the weeds in the field had greened up in March of the 2002 the field was sprayed again. The soil was then prepared and seeded with a native grass seed mixture. By the fall of 2003 most of the field had an established stand of native grasses. There are some small sections of the field that still contain various annuals, particularly wild oats but we expect these will eventually be crowded out by the perennial grasses.

The reintroduction of native tree and shrub species will occur once all weed concerns in the upland portions of the property have been managed.

Mainstem Walla Walla River (Lampson Landowner)

This conservation project is located on the mainstem Walla Walla River about five miles east of the city of Milton Freewater, Oregon. The 15-year easement was signed with the landowner in 1998. Because the project area had not been farmed in a number of years we chose to first establish a stand of native perennial grasses to control weeds which proved more challenging than expected. Grasslands West of Clarkston Washington provided the project with a recommended seed date and mix of grass seed appropriate for the site. The field was was treated twice (1998 and 1999) with a broadleaf chemical for weeds, tilled, and seeded. In each case the grass would emerge but eventually be out-competed non-native weed species, particularly reed canary grass (*Phalaris arundinacea*) and cheatgrass (Bromus tectorum). In both 2002 and 2003 we continued with weed control measures that included hand-pulling, chemical application, and mowing. This has improved conditions considerably with approximately 60-70% of the field now occupied by desirable grass species.

In the spring of 2001 the project purchased and installed 36 large (41' x 100') black plastic tarps from Layfield Plastics Incorporated of Bellevue, Washington. The tarps are designed to eliminate competitive weeds and aid in the maintenance of soil moisture. The life of the tarps is said to be about five years although we suspect it may be much longer. Each tarp was secured in place by burying the perimeter with a small tractor. Small rocks were also arbitrarily positioned on the tarps as additional protection against high winds. We made every attempt to place the tarps in a random pattern across the field. It was thought that by doing so we would best mimic the natural succession of a shrub, tree, and grass ecosystem. Each tarp was planted with a compliment of approximately 200 native plants appropriate for the site. Plants were maintained throughout the year with summer watering (using a water truck) and hand

weeding. Thus far, survival of the plants in the tarps has varied from 60 to 90% and growth has been outstanding.

In March of 2003, Wild West Riparian of Walla Walla was hired to install an additional 3,000 (tarps are 15 feet wide) feet of weed barrier tarp. The tarps were installed in sections of the field lacking natural tree and shrub recruitment. Several thousand tubling plants were then placed into the tarps by CTUIR habitat staff. The new tubling plants were watered several times during the drought months of July through September.

August 1998 **July 2001**

Monitoring data for this project site was presented in the 2001 Annual Report of Progress and will be repeated in 2005.

Couse Creek (Hasso Landowner)

This project area has been severely impacted for more than 50 years by livestock. The upland slopes that were once dominated by perennial grasses are now predominately non-native annual grass species. The restoration area includes the entire floodplain for more than a mile of the stream. Within this section only a few shrubs were visible when the CTUIR began restoration efforts in 1999. Past grazing activities are combined with prodigious amounts of bed material following each high water event as a result of a dramatic change in valley width at the top of the project area. Stream braiding and ephemeral flows are found throughout the project

area. In recent years the stream channel has been dry from late June through October. The area does, however, contain a substantial population of resident red band trout and native summer steelhead during portions of the year. Several summer steelhead redds are observed within the project area each spring.

A 15 year riparian easement was signed with the landowner in December of 1999 and in February of the following year a livestock exclusion fence was constructed. It was decided to forego the use of any bare-root stock plants at this site because of the poor soil conditions, and the harsh summer environment. Instead the project chose to hasten recovery through the installation of willow cuttings which when placed below the water line are self-watering. Several thousand native willow cuttings were collected nearby on the North Fork of the Walla Walla River and placed with an excavator during the fall of the 2000 reporting period. Survival of the cuttings was higher than 80% the following spring but as summer progressed and stream flows eventually stopped many of the plants began to die. By the summer of 2003 approximately 40% of the willows were growing and dozens of young cottonwood trees, hawthorne, rose, and various other species are beginning to grow also. We expect that with continued livestock exclusion and time, perhaps decades, the entire riparian corridor will again support a healthy riparian plant community and proper functioning stream channel.

December 1999 **July 2001**

Patit Creek (Brown Landowner)

This project area is located in the foothills east of Dayton Washington on Patit Creek, a small

tributary of the Touchet River. The stream contains healthy populations of redband trout and summer steelhead. The area of protection is two miles in length and includes the entire floodplain on both shorelines. The stream is small and flow is reduced to very low levels in some years (please see photos below). A 15 year easement was signed with the landowner in November of 1999. Four miles of riparian fence was constructed along the entire perimeter of the project in March of of the following year. The CTUIR then applied for and received a grant totaling $55,000 from the Salmon Funding Recovery Board (State of Washington funding source). These dollars were combined with funds from the BPA to further implementation.

The uppermost one half mile of the project area was severely impacted by high water in February of 1996 leaving much of the channel braided and lacking meander, pool habitat, woody debris, and riparian cover. A restoration plan (available upon request) was developed by the CTUIR to reconstruct this section of the stream. The work included the construction of eight vortex weirs, two rootwad revetments, two keyed log-jams, meander bend enhancement and point-bar development. Several thousand willow cuttings were installed by both trenching and stinging at this same time.

Today the channel is functioning as we had designed and the willow cuttings placed during implementation are thriving. Some additional floodplain planting of ponderosa pine, willow, and cottonwood have provided mixed results. We will report on the success of these efforts and all other monitoring parameters in 2005.

July 2000 **July 2001**

Mainstem Walla Walla River-Lofthouse Landowner

This restoration project is located near RM 32 on the mainstem Walla Walla River. The landowner signed a 15 year conservation easement with the CTUIR in November of 2001. The area includes both shorelines for a distance of approximately .25 miles and consists of a mix of approximately 12 acres of upland and riparian habitat. Management plans developed for the property include the control of noxious weeds and reestablishment of native grasses in the upland areas and perennial tree and shrub species in the riparian zones.

In March of 2002 a contractor was hired to plow approximately 10 acres of upland habitat within the project area. Several weeks later when the weeds had emerged the entire field was treated with a broad spectrum weed control herbicide followed by seeding with a mixture of native grasses recommended by the Umatilla County Conservation District in Pendleton Oregon (a species list for the mix is available upon request). Once the new grass plants had developed several leaves the entire field was sprayed again with a broadleaf chemical. The landowner periodically irrigated the field during the rest of the first growing season.

By the spring of 2003 most of the newly seeded field had a substantial stand of native grasses. The field was mowed in July of 2003 and by the end of the reporting period native grass has successfully been established over the entire 10 acres of upland habitat.

In the summer of 2003 the project hired a contractor to remove a large amount of debris that that been dumped within the riparian corridor by previous owners. The items included old farm implements, cars, appliances, cements blocks, etc. Once these items were removed all exposed soil sections were seeded with native grass.

Project plans in 2004 and beyond will include close coordination with the landowner and control of noxious weeds as necessary. The currently narrow riparian corridor width will be expanded in the fall of 2005 by reintroducing several hundred native tree and shrub species appropriate for the site.

Mainstem Walla Walla River-McCain Landowner

The 15 year conservation easement for this property was signed in February of 2003. The project is located at approximately River Mile 50 on the mainstem Walla Walla River about 5 miles east of the city of Milton Freewater, Oregon.

A 660 foot livestock exclusion fence with 4 gates was constructed by the project in July of 2003. Noxious weeds were sprayed by project technicians several times during the period of April through October of the same year. A large number of native plant species are naturally establishing themselves throughout the riparian corridor and we are confident that several years of livestock exclusion will lead to a good mix of riparian tree and shrub species.

In the summer of 2003 a contractor was hired to remove a large amount of debris that had been dumped within the riparian corridor by previous owners. The items included a list very similar to those mentioned for the project above, farm implements, cars, appliances, cements blocks, etc. Debris within project areas is removed because of concerns related to shoreline erosion, toxic fluid leaks, and aesthetics. Large amounts of debris may also prevent the natural succession of native plant communities. The items were hauled to the landfill and all exposed soil sections

were seeded with native grass.
The landowner has recently chosen to include the property in a USDA program. The project will be working with the local conservation district and landowner to meet the USDA Conservation Plan requirements.

Mainstem Walla Walla River-CTUIR

This 46 acre property is located immediately upstream and adjacent to the CTUIR South Fork Hatchery Facility on the mainstem Walla Walla River. The CTUIR acquired the property in December of 2003 with funds obtained from the Pacific Coastal Salmon Funding, Wildhorse Gaming, BPA, and the Trust for Public Lands. The project will be using funding provided by the BPA under this project to conduct restoration and protection actions in the coming years. A restoration plan is being developed at this time and will be provided in the 2004 annual report of progress.

Additional accomplishments

Additional results and accomplishments made during the reporting period include:

- Coordinated with various local, State, and Federal agencies in the prioritization and selection of habitat restoration sites;
- Conducted on-site visits with landowners, evaluated areas potential for restoration and importance to target species;
- Developed grants and proposals for cost-share opportunities. Secured $219,588 in cost share from the Salmon Recovery Funding Board and $10,000 from Wildhorse Gaming for the acquisition of 146 acres of critical river habitat on the South Fork of the Walla Walla River. An additional estimated amount of $3,000 was provided in “in-kind” funding from the BPA through this project. The Trust for Public Lands also donated a unknown amount of “in-kind” funding for this project. The project could not have been done without the assistance of the TPL.
- Completed instream design for repair of a log structure on Blue Creek and some minor channel work and shoreline revegetation to be accomplished in 2004.
- Developed biological assessment for proposed instream work on Blue Creek in 2004. Submitted these documents to the BPA Environmental Compliance Group for consultation with the USFWS and NOAA.
- Provided written comments to ODFW/WDFW and others regarding various proposed instream/upland activities impacting salmonid habitat;
- Coordinated with participating landowners in meeting their concerns, project objectives, future tasks, etc.
- Prepared quarterly and annual reports of progress;
- Attended basin strategy, planning, and funding meetings;

- Provided educational habitat restoration and protection presentations to area schools and interested groups;

- Provided tours to the NWPPC, BPA, and others of habitat restoration project sites;

- Collected monitoring data during the months of July and August for project sites included within our long-term data group;

Discussion:

Habitat projects funded within the scope of this document are implemented on private lands within the Walla Walla River Basin. Consequently, project success hinges on volunteer participation of private landowners. As a result of improved education, awareness, funding, and imposing environmental laws, private landowners are increasingly willing to work for the benefit of fish and wildlife.

The project has encountered difficulties in integrating Tribal goals, expertise, and experience into programs recently being offered to landowners by the USDA. The USDA offers financial compensation to private landowners willing to set aside portions of land for the benefit of fish, wildlife, and water quality. The programs are implemented through the Farm Service Agency (FSA) and Natural Resource Conservation Service (NRCS) of counties throughout the State. The FSA and NRCS are closely connected with private landowners, a major benefit, but do not have staff trained in the area of fish and wildlife biology. We have noted a large portion of USDA program funded projects aimed and helping fish are implemented in areas of very low potential. Those driving the program appear more interested in serving the needs of private landowners and putting in miles of project rather than selecting sound biological approaches within priority areas of the basin that will truly make a difference for the resource. In the end millions of tax-payer dollars will be spent on projects that will likely take us no closer to the goal of enhancing native fish and wildlife populations. These dollars would have been far better spent in the hands of those trained in the field of fish and wildlife biology in cooperation with local farm agencies.

Large portions of the Walla Walla River Basin are privately owned and individual land-holdings are often small. This complicates the exercise of securing Conservation Easements along large reaches of river. These circumstances elevate the importance of focusing restoration dollars on proven long-term solutions and in areas of the basin expected to provide the greatest benefit to salmonid fish.

Riparian vegetation is frequently the principal element affecting water quality and floodplain function at project sites. Arid conditions prevailing in the region throughout much of the growing season inhibits natural riparian re-growth and species succession. It is with this understanding that we have focused much of our attention on the restoration of native plant communities.

Planting techniques implemented within the scope of this project have led to mixed results. Plant survival has been the highest with willow cuttings placed below the water line with the use of an excavator (stinger or trenching). This method has been successful in both the early spring (March) and late fall months (late October and November). However, fall months may provide a better opportunity for root growth prior to summer drought. It's worth noting that cottonwood cuttings placed the same way have survived poorly. Other planting approaches, including rooted stock and hand-placed cuttings, although helpful, have been far less successful and

economical.
If using rooted stock, the use of larger plants with more developed root systems may be beneficial. Native pioneer plant species seem more tolerant to prolonged periods of drought and exposure, such as wild rose and hawthorn, appear to survive better at arid sites. It's expected that once these are established and the micro-climate is changed the less resistant varieties will naturally succeed. Of course each restoration in the basin is unique. The restoration approach must consider historical species composition, soil type, exposure, flood interval, elevation, and various other factors. Some reaches will easily revegetate themselves if given several years of rest, particularly those bathed in shade and complimented by deep soils. Others will express slow recovery at best, requiring replanting, periodic maintenance and perhaps decades to eventually achieve a climax plant community.

The project has been experimenting with the use of tree shelters and tree mats. The shelters, manufactured by Treessentials Company, Minnesota, are plastic tubes (two feet in length, four-inch diameter) designed to enclose and protect the young plant from animal browsing and girdling, drought, wind, and competition. The shelters have proven beneficial but survival has not been high enough to merit their exclusive use. We have also been experimenting with tree mats designed to reduce weed competition and moisture loss. The mats, composed of a fibrous material, are staked at the base of the plant and designed to decompose over a period of five years. Limited success has resulted from the use of the mats, however, and there is a need for continued maintenance as a result of wind damage. We now feel that the mats were too small to provide the desired result (3'x3'). In 2001 we began using much larger mats (100'x40') at a site on the mainstem Walla Walla River. These tarps were secured in place by burying the edges with soil and then staking and weighting the center portions of the tarp. The tarps were then "clump" planted in the spring with site-appropriate native species. In the last three years, the plant survival in the tarps has ranged from 60-90% and plant growth has been phenomenal. The soil under the tarps seems to be maintaining moisture for longer periods, improving survival during drought periods and reducing maintenance.

Basin wide water quality conditions improve as a result of habitat restoration and protection activities but these changes are difficult to measure at a "project level". For this reason the project focuses on factors we expect to change over time at a "project level"; some examples include riparian vegetation, bank stability, channel form, and percent shade. There is a delicate balance between doing enough monitoring to know what works and so much that you are repeating the process at considerable expense. Currently we are monitoring about half of the project sites. Various parameter measurements for each site are reproduced every two or three years. We are constantly reevaluating this process and will continue to work closely with the CTUIR Natural Production Monitoring and Evaluation Staff and various other resource agencies to improve our approach.

CONCLUSION

A multitude of factors have led to the extinction of salmon and severe reduction of summer steelhead in the Walla Walla River Basin. Undoubtedly though, irrigation withdrawals and inadequate passage conditions have been the most damaging. Today, there are still migration barriers in the basin that partially or entirely prevent adult and juvenile migration. And, despite the fact that salmon are extinct and summer steelhead and bull trout are now listed under the Endangered Species Act, there are today, as there was a hundred years ago, irrigation withdrawals that leave streams with inadequate flow for months of the year.

In recent years, particularly since the listing of several species under the Endangered Species Act, we have begun to take the first steps toward protection of salmonid fish in the Northwest. The Endangered Species Act, Clean Water Act, and a myriad of state and federal funding programs aimed at salmon programs have kicked off a great start to fisheries restoration. With time, education, and continued funding, many of the obstacles now facing salmon can be eliminated. Eventually, however, those living in the Walla Walla River Basin and throughout the Northwest will be forced to decide what they are willing to sacrifice for the sake of these fish. These trade-offs are revealing themselves today in the form of electrical rate increases, reduced and altered timber harvest, changing farm practices, and water conservation measures.

Biologically, it's clear what needs to be done to save salmon. But at this time, it's also clear that our current efforts to protect them are not enough. Salmon in the Northwest are indeed swimming toward elimination. We must strive to protect and enhance all salmonid habitat and enforce existing laws structured to protect the salmon life cycle. Logging, grazing, and agriculture can coexist with the needs of salmon if managed appropriately. Working together, and in the interest of all, we can continue to live as we have in the last century, while protecting a species that has thrived in this region for thousands of years. We must continue to learn, always striving to improve our methods of restoration and protection while working on a system that is fair to all. Stream buffers and zoning laws that protect riparian areas from further development are desperately needed. . County plans must recognize the need to restrict development of critical riparian and wetland areas, this is not happening. Minimum stream flows must be maintained to protect critical spawning, rearing, and migration periods. And, with ever increasing amounts of dollars invested by state and federal agencies, particularly farm programs, its imperative that restoration projects focus in areas that provide the greatest benefit to salmonid fishes. Ultimately, and perhaps sadly, the future of the salmon depends only on our willingness to protect it.

ACKNOWLEDGEMENTS

This project was funded by the Bonneville Power Administration to mitigate, in part, for salmon and steelhead losses associated with the construction and operation of Columbia and Snake River Dams. The Confederated Tribes of the Umatilla Indian Reservation thank Peter Lofy, ben Zelinsky, and other BPA personnel for their contributions.

The authors would like to thank several CTUIR employees for their contributions to the project:

- Todd Shaw (Habitat Biologist) for technical assistance and support;
- Randy Bonifer and James Bill, (Habitat Technicians) for their field assistance;
- Gary James (Fisheries Program Manager), for project management, assistance, and manuscript review;
- Amy Sexton, for technical review, data collection and analysis, writing and virtually all other aspects of this project;
- Michelle Thompson for contract administration;
- Julie Burke for administrative support; and
- Celeste Reeves for secretarial assistance.
- James Webster-hydraulic design

We appreciate the help of Tim Bailey (ODFW), Mark Grandstaff (WDFW) and Brian Wolcott (Walla Walla Watershed Council), the Tri-State Steelheaders, and Rick Jones (WWCCD) for their devotion to fisheries restoration in the basin and working with this project and the CTUIR.

A sincere thank you to Kristin Newman of the Trust for Public Lands for her hard work through the process of purchasing the Kentch Property on the South Fork of the Walla Walla River. Kristin invested an enormous amount of professional and personal time into this project and it could not have been accomplished without her help, thank you Kristin.

Finally, I wish to thank the many landowners in the Walla Walla River Basin committed to doing all they can for future generations of Fish and Wildlife.

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Appendix A
Proposed Stream Channel maintenance design for Blue Creek Project in 2004

Blue Creek Stream Enhancement
Field Assessment of Existing Structures

James G. Webster, Hydrologist[1]
Umatilla Tribe

Introduction:

This document is intended to provide an assessment of channel condition and recommendations for Blue Creek within the Mill Creek Watershed. The emphasis of this assessment is to address concerns with channel morphology associated with fish habitat structures installed several years ago. Observations of the site under two separate discharge levels were made on May 7, 2003 and March 16, 2004.

Surface Water Resources:

USGS operated a stream discharge monitoring site on Blue Creek from October 1939 through September 1971 (site #14013500). Since the station was not operating during the 2003 and 2004 site visits and discharge measurements were not taken during these visits, actual discharge is not known. The station was located approximately 2 miles downstream of the project site and included a drainage area of 17.0 square miles. Annual peakflow records for the period of operation were downloaded and recurrence intervals were calculated. A simple log distribution of peakflow magnitude was graphed and is shown in Figure 1.

[1] Environmental Planning and Rights Protection Program, Dept. of Natural Resources, CTUIR

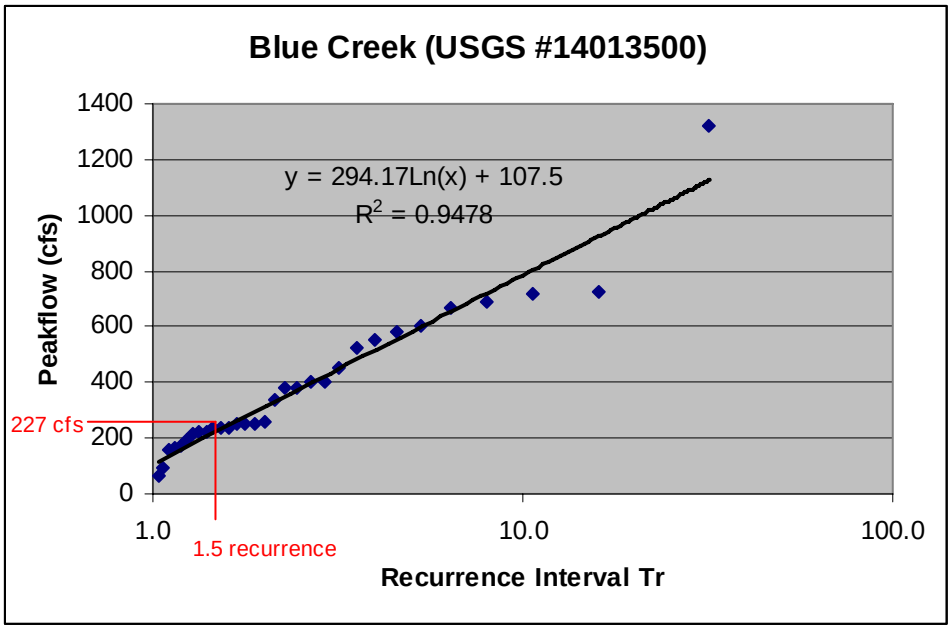

Figure 5 Peakflow recurrence distribution for Blue Creek.

With an estimated bankfull discharge recurrence interval of 1.5 years (based on generally accepted literature values as described by Dunne and Leopold, 1978) the calculated bankfull discharge is 227 cfs. This corresponds fairly well with the inflection point of the data shown in Figure 1, which has commonly been associated with the bankfull recurrence interval. Using regional hydraulic geometry relationships as developed by Castro and Jackson (2001) for the Blue Mountains area the expected bankfull width is 38 feet at the gage site. In order to get an expected range for the bankfull width, the width was calculated based on the drainage area of 17.0 square miles, again using equations by Castro and Jackson (2001). The calculated bankfull width is 31 feet with a calculated bankfull discharge is 188 cfs. The bankfull discharge and width is expected to be slightly less at the the project site since the gage is located downstream and includes discharge from a larger drainage area.

Assessment Reach Characteristics:

Based on indicators at the project site, the bankfull width was measured to be in the range of 25 to 30 feet. Some areas, such as the section near the downstream end of the project area, were much wider with the estimated bankfull width exceeding 40 feet. The indicators used for these estimations included the elevation of depositional features (pointbars and center gravel bars), elevation of the first major topographic break along the channel banks, and the lowest point of key vegetation species. Since the vertical stability of the channel is in question and has obviously changed within the past 10 years this field estimation is poor, although still useful for structure design.

The visually estimated Rosgen stream type is a B3 or B4 which would be an expected functional type for the valley characteristics (Rosgen 1996). This stream type should be moderately entrenched in the floodplain with moderate gradient (2-4%) moderate width to depth ratio (>12) and moderate sinuous (~1.2). The valley form through the reach is fairly wide and historically is thought to have allowed significantly high flows to access the entire floodplain. Dominant substrate materials in the channel bed and floodplain consisted of large gravels and cobble.

The channel configuration shows signs of both lateral and vertical instability, with excessive bank erosion observed. Due to the construction of levees (as discussed below) the channel is entrenched at higher flows. There is a limited, active floodplain currently available to Blue Creek above bankfull height, but its extent is limited by the existing levees at the extreme flood levels (>50 year events). Significant bedload movement and channel form changes usually take place at or above bankfull discharge.

Floodplain and Channel Conditions:

Blue Creek was subject to a large flood event during the 1997 water year. Based on recorded discharge measurements on other streams in the Blue Mountains, this flood event was estimated to be between a 50 and 100 year recurrence interval. As water filled the channel and valley bottom, a large amount of bedload material was scoured and transported downstream. The channel shifted both laterally and vertically in several locations as existing headcuts moved and new headcuts were created.

In an effort to reduce flood damage to private property located in the valley bottom, heavy equipment was used to create levees from the floodplain substrate material and constrain the channel to the left side of the valley (looking downstream). As discharge increased and water depth increased, shear stress and erosive force on the channel bed increased. This led to greater energy available for moving larger substrate material and eventual downcutting of the channel through the project area. The upper end of the project reach is vertically controlled by a bedrock base that was exposed prior to the 1997 event. The lower end of the project is determined by a property boundary and appears to be vertically controlled solely by substrate size and channel form.

An instream project was implemented in order to address poor channel and fish habitat conditions. The project included the installation of channel-spanning log structures designed to retain bedload and create a hydraulic constriction in the channel. A plunge pool was formed on the downstream side of each of these structures and a bedload substrate wedge was created in the channel on the upstream side. Rootwads and logs were also place and installed in the banks at various points along the project reach in order to address bank erosion problems. Vegetation was also planted along the channel and in the floodplain to try and provide long term stability.

Problem Identification:

During the past several years the installed instream structures have been monitored for effectiveness and function. For the most part, the channel has remained in the same lateral location in the valley bottom. Bedload has moved and shifted in several portions of the project and has created some depositional features that are both positive and negative. Deposition on pointbars and the developing floodplain within the levees is helping the expansion of riparian vegetation. Deposition behind the channel-spanning log structures has raised the channel grade at each point, but has also created a potential for headcut initiation and mass wasting of channel banks.

In 2002 it was noted that the top two and the most downstream full-spanning log structures in the project area were becoming unstable and were barriers to fish migration. All three structures were being undercut by expansion of the plunge pool on the downstream side. The 2 upper structures actually had significant flow through them and were modified in 2003 by

removing the center sections. The lowest structure had a large and deep plunge pool associated with it and significant undercutting and bank erosion. The jump height or head change above and below the structure was approximately 3 feet.

During the winter of 2003-2004 the lower structure failed as the gravel mat tore loose and bedload was moved downstream. The headcut that was created by the structure moved upstream by moving bedload and lowering the channel elevation. The upstream end of the headcut is currently located 140 feet upstream from the structure at the downstream end of the next meander bend. The channel downstream of the structure site has adjusted by the development of a pointbar/center bar along the left bank and undercutting and mass wasting along the right bank. The channel below the log structure appears to be moving toward the right side of the valley. Two large pieces of wood are now exposed in the right bank and may have slowed the erosion of that bank, but will not stop channel progression. The four large logs that formed the structure are still intact along with all the large boulder ballast material.

If left in the current condition, the headcut that initiated at the most downstream channel-spanning log structure will continue to migrate upstream. This will lower the channel elevation in relation to the newly developing floodplain and lower the local watertable. This will mean less water available for riparian vegetation and less water stored for late season flow. The channel will also be more entrenched and will require a higher discharge in order to access the floodplain. Water depth will be higher during discharges greater than bankfull which will equate to higher erosion potential. The right bank below the log structure will continue to be undercut and the channel will migrate to the right.

Proposed Solution:

Both vertical and lateral stability of Blue Creek at the downstream end of the project area needs to be addressed. The recommended methods will require the use of heavy equipment and the addition and rearrangement of large boulder material, channel substrate, and large woody debris. The recommendations are also meant to work with the assumed channel type of a Rosgen B3 or B4 and will attempt to restore a channel morphology that is stable and sustainable under natural conditions. It is recognized that there are developments and changes to the valley bottom that will never allow full restoration of the stream segment to historic conditions.

Channel-spanning Cross Vane (Appendix A):

Vertical stability of the channel will be addressed through channel grade control and current channel elevation maintenance. This control can be established through the construction of a channel-spanning boulder structure to arrest the migration of the headcut. The structure is proposed for the current location of the top of the headcut, approximately 140 feet upstream of the lowest log structure. This structure will be constructed as a boulder cross-vane and will act to maintain the existing channel elevation without creating a sediment wedge or retaining bedload above the existing floodplain level. Because of its low elevation in relation to the channel bed, this structure should not be expected to create a significant scour pool on the downstream side. The structure will be in the shape of an upstream “U” with the center being the lowest point and the keys reaching into the floodplain on both sides of the channel (Appendix A). Stream flow lines will cross over the structure perpendicular to it orientation and will be concentrated at the center of the channel.

The structure will consist of two layers of larger boulders (24-48 inches) with the lower layer providing a foundation below the existing channel bed and the upper layer set at the appropriate level for hydraulic control. The highest points of the structure will be at the keys will be approximately 2/3rd the bankfull height. Total structure width will be 80 feet with approximately 38 feet on the left side from the center of channel to the bedrock bluff and 42 feet on the right from center of channel across the floodplain and into the levee.

Meander bend stabilization and pointbar development:

Lateral stability of the channel should be addressed in the section of channel between the lowest log structure and the end of the project reach. The existing log structure consisted of 4 large logs approximately 40 feet in length and stacked 2 deep to form an upstream "V" shaped structure. As described above, the channel downcut through this structure and shifted toward the right bank. In order to stabilize this section, undercutting along the right bank must be stopped and conditions improved for establishment of riparian plant species. Deposition along the left side will continue to build a pointbar and extend floodplain space that is immediately available to overbank flow.

A series of 4 rootwad revetment structures along the right bank will be installed in order to stop the undercutting and mass wasting of the bank. Each structure will consist of a 16-foot long footer log buried parallel to the bank and below the existing channel bed elevation (Appendix B). A second log with attached rootwad and 15-18 foot bole is installed into the bank, perpendicular to stream flow with a slight angle (15-30^{o}) upstream. The logs and ballast rocks that were used in the existing log structure will first be removed and used in the construction of the revetments as footer logs. The bend radius of the right bank will be slightly increased as the revetment logs are installed. The top portion of the bank, above bankfull elevation, will be tapered back to a 4:1 slope for stability and to more easily support vegetation. The most upstream revetment structure will be installed 20 feet downstream from the existing log structure with each subsequent revetment installed 15 feet downstream. Approximately 4 yd^3 of ballast rock will be added on the footer and revetment log for stability.

Large woody debris will be added in the form of a key member log jam in order to promote deposition along the left bank. Recent channel changes will be promoted by the enhancement of the developing pointbar along the left bank. The channel through this section is expected to narrow significantly from the 40+ foot bankfull width as the pointbar develops and the erosion along the right bank is stabilized. The log jam on the left bank will be constructed with at least 3 pieces of large woody debris that is a minimum of 15" diameter by 30 feet long. It would also be preferable that one of the pieces of large wood have an attached rootwad for increased roughness. The log jam will be built by placing one piece, the key member, of large wood (with rootwad if available) perpendicular to stream flow at the upper end of the pointbar and at bankfull elevation. Two of the remaining pieces of wood will be laid over the key member with at least half their length buried in the gravelbar downstream of the key member. The key member is then braced against flow forces and will slow stream velocities over the pointbar. Large boulders will be placed on the downstream side of the key member and beside the buried pieces for additional stability.

Riparian Planting:

The establishment and growth of riparian plant species will ultimately provide the needed

stability for the channel and floodplain through this reach. The area around the proposed boulder weir consists of large substrate and bedrock and may limit the success of plantings. Cottonwood and willow cuttings will be installed in the excavated keys and damage to existing vegetation will be avoided.

The outside of the meander bend should be planted with willow, cottonwood, and conifers. Willow bundles will be installed at the time that revetment structures are installed. Additional bundles and cuttings will be installed during the fall with an excavator-mounted stinger in order to assure that the water table is reached. Conifers and available rooted stock will be planted along the upper portion and top of the right bank and will require additional maintenance, such as weed control and watering, to insure success. Cuttings will also be planted across the pointbar on the left bank using a trenching and stinging method.

Project Budget

Materials and Supplies	Quantity	Unit	Unit cost	Subtotal	Total Cost
Riparian plants					
Riparian plant protection					
Miscellaneous material expense				500.00	
TOTAL MATERIAL & SUPPLIES					**500.00**
Personnel					
Fish Habitat Biologist	50	hours	30.00	1500.00	
Hydrologist	50	hours	30.00	1500.00	
Technician	110	hours	15.00	1650.00	
TOTAL PERSONNEL					**4650.00**
Travel					
Vehicle cost	1	vehicles	300.00	300.00	
TOTAL TRAVEL COSTS					**300.00**
Subcontracts					
Tracked excavator (Cat 312 or equiv)	50	hours	120.00	6000.00	
Conifer log w/rootwad (15" x 20')	4	tree	300.00	1200.00	
Conifer whole tree (15" x 50')	3	tree	500.00	1500.00	
Large Boulders (30-42 inch)	125	yd^3	30.00	3750.00	
TOTAL SUBCONTRACTS					**12450.00**
TOTAL PROJECT COST					**17900.00**

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Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Co., San Francisco, CA. 818 pp.

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Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

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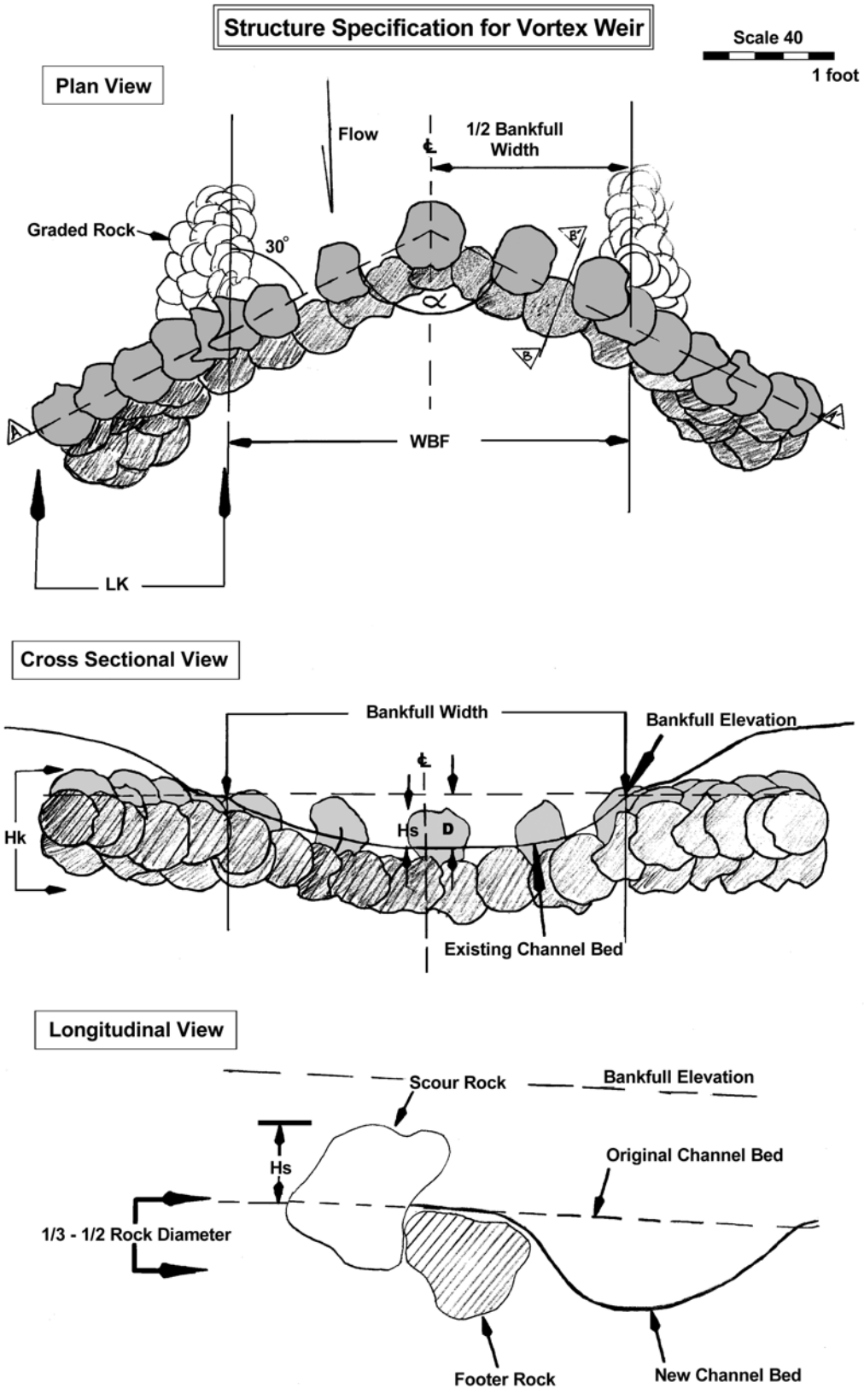
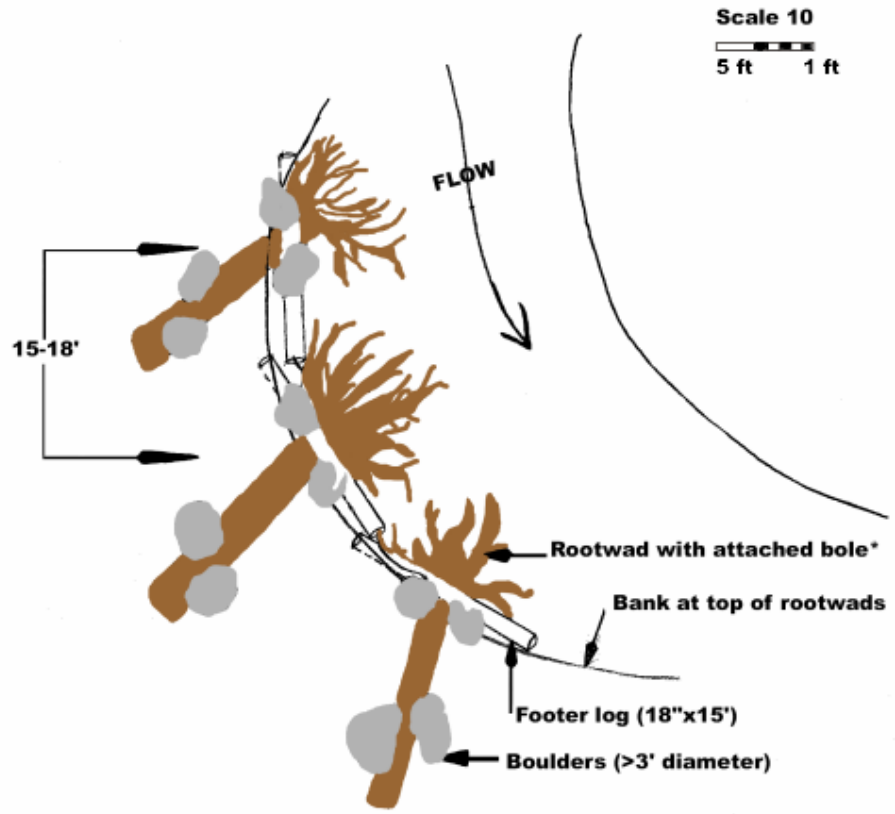
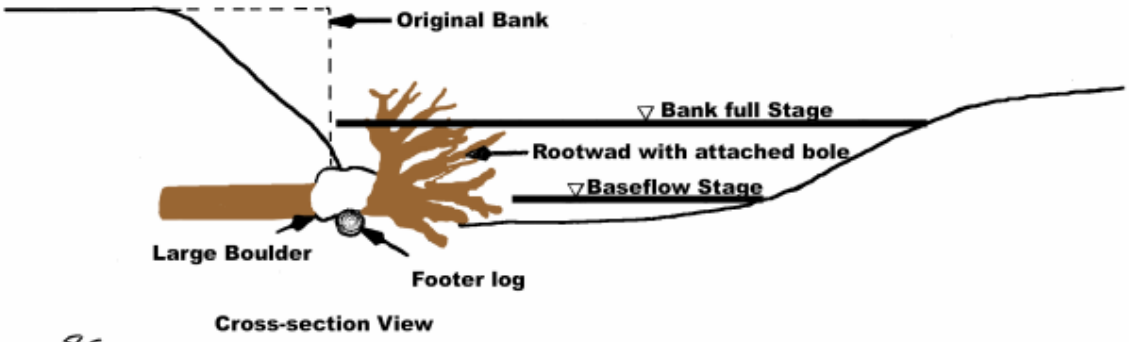

Structure Specification for Vortex Weir
Scale 40
1 foot
Plan View
Flow
1/2 Bankfull Width
Graded Rock
30°
WBF
LK
Cross Sectional View
Bankfull Width
Bankfull Elevation
Hk
Hs
D
Existing Channel Bed
Longitudinal View
Scour Rock
Bankfull Elevation
Hs
Original Channel Bed
1/3 - 1/2 Rock Diameter
Footer Rock
New Channel Bed

Structure Specification for Rootwad Revetment



Typical Plan View



Cross-section View

JW 8/25/04

***Rootwad pieces should be a conifer species for strength and longevity**
Rootwad diameter should exceed 6'.
Attached bole should exceed 18" DBH x 15'.