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**WALLA WALLA RIVER BASIN
FISH HABITAT ENHANCEMENT PROJECT
ANNUAL REPORT OF PROGRESS
2005 and 2006**



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ABSTRACT

This document reports stream habitat restoration activities completed by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Fisheries Habitat Program in the Walla Walla River Basin in 2005 and 2006.

Maintenance activities (noxious weed control, fence maintenance, etc.) were completed in all existing conservation areas. All federal clearances needed for project implementation were coordinated with the BPA environmental group. A new 15-year conservation easement was signed with a landowner on upper Cottonwood Creek and a livestock exclusion fence will be constructed on the property in 2007. Nearly \$500,000 was secured in coordination with the local conservation district as cost-share to design and build a new fish ladder at Gose Street on Mill Creek, which was completed in October of 2006. An 850-foot rock levee was removed on the mainstem Walla Walla River to promote stream meander and floodplain connection. Post treatment monitoring was conducted within the Blue Creek Project area in both 2005 and 2006. Monitoring data demonstrates that stream canopy cover (transect 1) improved from a pre-project value of 6 percent to more than 55 percent by 2005. The total number of salmonids captured within the project survey area on Blue Creek increased from 29 in 1997 (pre-project) to 62 in 2006. The average minimum and maximum lengths of captured fish increased during the monitoring period.

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BACKGROUND

This project is funded by the Bonneville Power Administration to restore native fish habitat in the Walla Walla River Basin. This report defines project activities for the period of February 1, 2005 through January 31 of 2006. Past reports for this project are available at BPA's web site under "publications". Do a search for "Walla Walla Basin Fish Habitat Enhancement".

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 all of the land within the Walla Walla Basin 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, and sumac together with some corn-grass and rushes (Lewis and Clark, 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 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). 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). Further downstream near the mouth of the river, Lewis and Clark in 1806, and David Douglas in 1826, noted the surrounding country as being predominated by sagebrush just as it is today.

Horses were introduced into the Walla Walla Valley from New Mexico in the 1730's and 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 widespread soil erosion.

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. However, 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, Oregon 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 nation's 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).

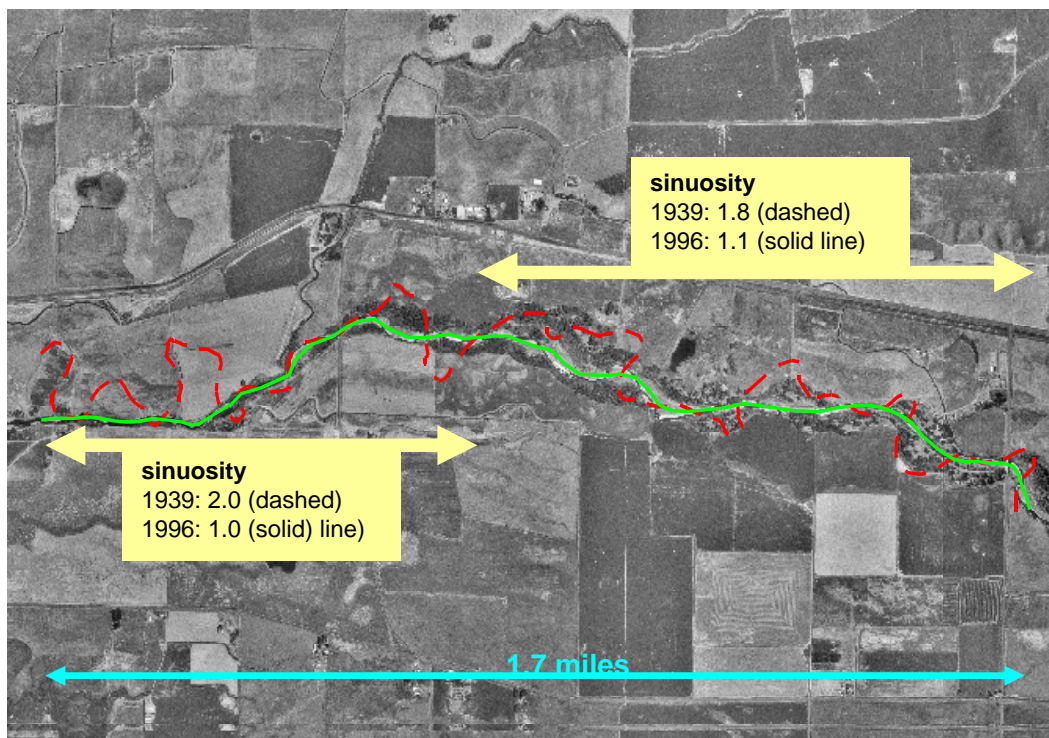


Figure 1: Aerial view of Walla Walla River near Lowden Washington depicting stream channel in 1939 (dashed line) and stream channel in 1996 (solid line) (Walla Walla Subbasin Temperature TMDL, 2005-page 58). .

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 during spawning periods. 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 include summer steelhead at severely depressed levels, bull trout, resident redband trout, reintroduced spring chinook salmon and various other non-game species. Summer steelhead and bull trout are presently listed as threatened under the Federal Endangered Species Act (ESA).

It is 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, Figure 2). In addition, 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".



Figure 2: A portion of Nine Mile Dam near Reese Washington can be seen in this undated photo on the mainstem Walla Walla River. This dam was reportedly built in 1905 and eventually removed.

INTRODUCTION

Efforts to protect and reintroduce native salmonid 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 result of increased state and federal funding and better-educated 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 restoration approach. 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 restoration 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 may include irrigation efficiency, reservoir storage, Columbia River pumping, and purchase of water rights from willing sellers. It is hoped that this project will result in minimum stream flows reaching the mouth of the river during all months of the year. Fish ladders and screens have been modified at Burlingame Dam, the little Walla Walla Diversion and at Gose Street on Mill Creek. A new fish ladder has been constructed at Nursery Bridge Dam (mainstem Walla Walla River) providing video surveillance and enumeration of migrating adults. Releases of hatchery reared juvenile spring chinook salmon were released for the first time in the Oregon portion of the basin in the spring of 2004 and the first adult return resulting from this effort is expected in 2007.

Habitat restoration and protection activities accomplished by this project compliment the ongoing efforts mentioned above. The project implements proven scientific restoration methods in areas of the basin expected to provide the greatest benefit to native fish.

The project goal and objectives are as follows:

Goal:

To protect, enhance and restore functional, healthy and sustainable floodplain, channel and watershed process for the purpose of protecting and restoring fisheries and aquatic species in the Walla Walla Basin.

Objectives:

1. Identify priority actions and geographic areas based on factors limiting anadromous salmonid and other important aquatic species populations.
2. Improve watershed function and fisheries habitat
3. Continue fisheries habitat protection and improvement through the maintenance of past project sites.
4. Measure the effectiveness of fisheries habitat projects through monitoring and apply learned

lessons to future planning efforts.

5. Develop coordinated partnerships with other key agencies and stakeholders in order to maximize project efficiency and success.

PROJECT AREA

The Walla Walla River Basin originates in the Blue Mountains at an elevation of nearly 6,500 feet. The Walla Walla River and its major tributaries the Touchet River and Mill Creek comprise a subbasin of 1,758 square miles and 2,454 stream miles (Mendel, et al, 2005) in northeast Oregon and southeastern Washington (Figure 3). 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). Approximately 15 percent of the subbasin is comprised of forestland, and 82 percent is used for cropland and grazing. Over 90 percent of the subbasin in Washington is privately owned.

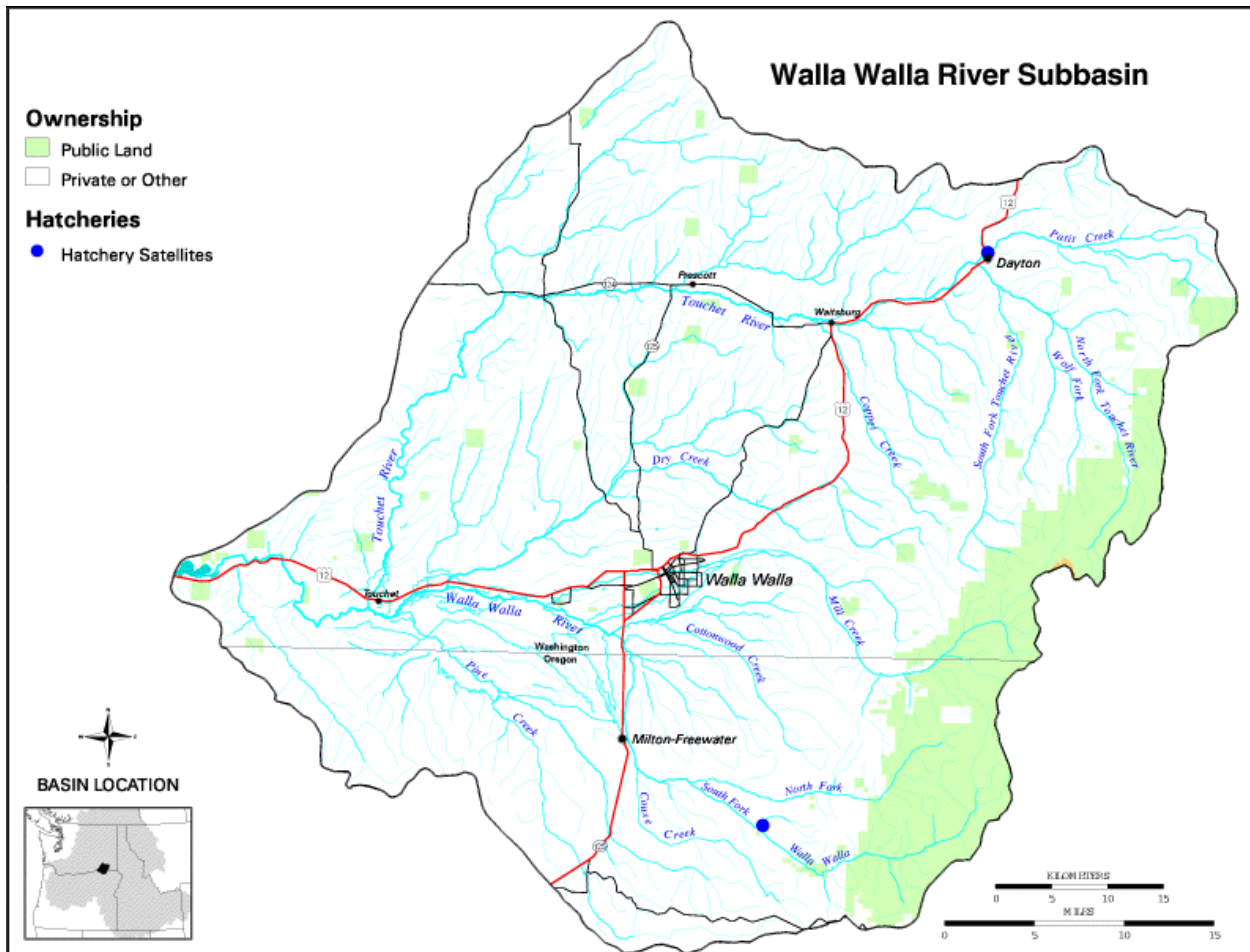


Figure 3: Map of the Walla Walla River Basin.

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 affected riparian vegetation throughout much of the mid-lower elevation reaches. The loss of channel meander and stream length, as a result of straightening is substantial throughout the basin

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.

Conservation easements in the basin:

Approximately seven miles of stream corridor habitat is currently protected in long-term conservation easements between private landowners and the CTUIR under this project. Project areas are located within Blue Creek, Couse Creek, the mainstem Walla Walla, the South Fork of the Walla Walla, and Patit Creek.

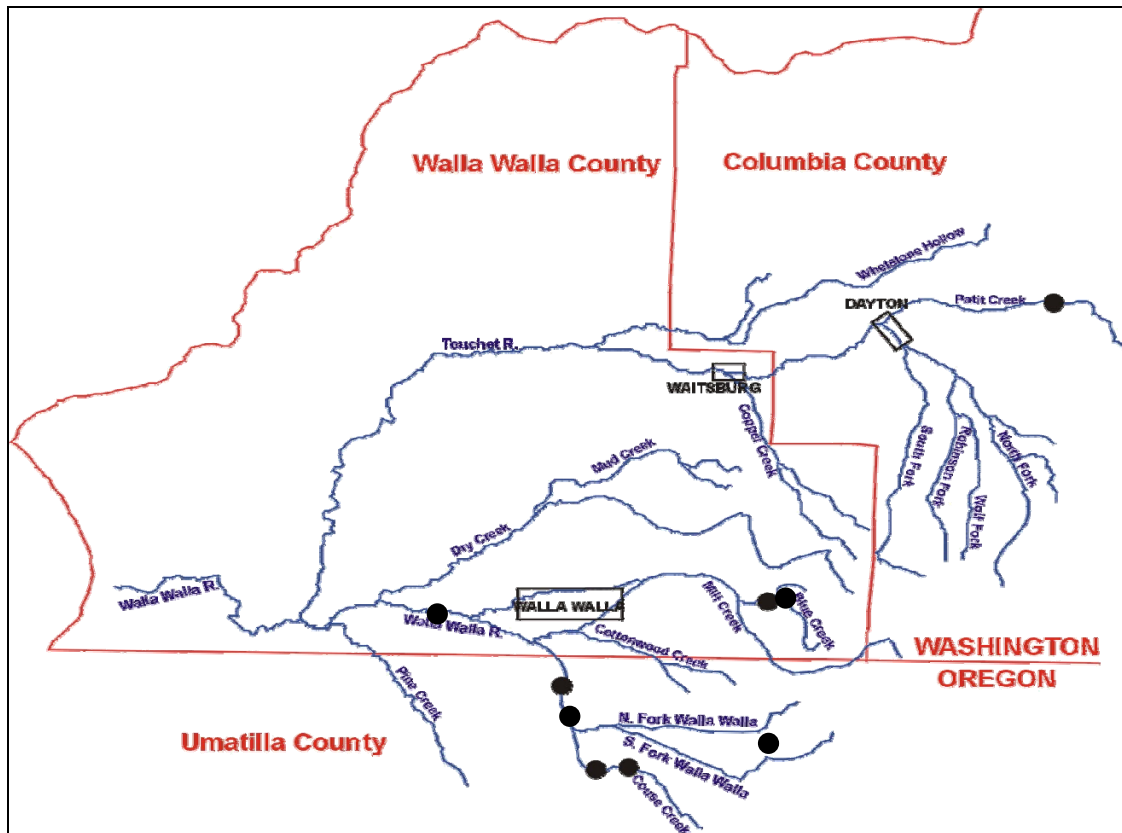


Figure 4: The black dots on the map indicate private property locations currently signed into 15-year habitat conservation easements with the project.

METHODS

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 Owner specifically reserves the right on behalf of himself, his agents, employees and guests, to hunt and fish in the Project Area. The CTUIR works closely with the landowner to address their individual ranching needs such as livestock water gaps, stream crossing sites, weed control, etc. into the 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. Ongoing coordination with the landowner is an essential part of the restoration process and flexibility on the part of both parties is an integral part of project success.

Environmental Clearances:

Habitat projects require a variety of environmental clearances depending on the restoration action. All actions requiring federal environmental clearances are coordinated with the BPA Environmental Program. Part of this process also includes coordination with the CTUIR's Cultural Resource Protection Program (CRPP) in obtaining Section 106 cultural and historical clearances. CRPP staff conducts 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 and BPA. All other state and local permits are developed and secured by the CTUIR habitat project leader.

Project Implementation:

Restoration efforts often focus on passive techniques such as livestock exclusion and revegetation. Projects requiring more aggressive approaches such as the manipulation of stream channels and shorelines are reserved for sites that would fail to meet objectives otherwise. Some examples include the removal of fish passage barriers, culvert replacements, and instream habitat improvements. Heavy equipment needed to complete this work is subcontracted to independent contractors through a competitive bidding process consistent with requirements of the funding source.

Livestock exclusion fencing remains an important tool in the protection of sensitive riparian zones. 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 stream 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. Typically, larger river systems require greater buffer width. Livestock fence construction is sub-contracted out to private contractors meeting all license, insurance, and experience requirements. The fence design typically follows specifications provided by the USDA in an effort to be consistent with other conservation programs and meet the migrational needs of wildlife. Small fence projects, routine maintenance, and livestock water gaps are managed by CTUIR project technicians.

Plants native to the region 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 a cat-track excavator. Willows placed in this manner require no maintenance and have proven very successful. Newly planted rooted trees and shrubs are watered from July through September with a 300-gallon tank and sprayer mounted on a flatbed pickup.

Reestablishment of native grasses is often the first management step taken within upland areas. Once established, grasses provide excellent cover for wildlife species and control of soil erosion and perhaps most important management of competitive noxious weeds. Grass seed is obtained from area suppliers and includes a mix of site appropriate species.

If left uncontrolled, noxious weeds will typically out-compete native trees and shrubs the project wishes to reestablish. The CTUIR hires licensed herbicide applicators through a competitive bidding process to treat noxious weeds in existing project areas. Maintenance spraying is done throughout the year as needed by project staff. All chemical applications are consistent with Oregon Revised Statute (ORS).570.505 and Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Regulations and NOAA.

Project effectiveness Monitoring:

Various monitoring strategies are used to measure physical and biological changes that occur in and along streams following various project restoration approaches (fencing, planting, instream enhancement, etc.). Most of the monitoring methods employed by the project are modified from protocol developed by Oregon Department of Fish and Wildlife in 1993 (Moore et al., 1993). Other sources include Monitoring Stream and Restoration by Roni 2005, Stream Channel Reference Sites, a USFS publication by Harrelson et al. 1994 (www.stream.fs.fed.us), and an AFS publication entitled Aquatic Habitat Assessment by Bain and Stevenson, 1999. A copy of the project effectiveness monitoring methods guide may be obtained from the CTUIR Fisheries Habitat Program upon request.

The specific physical and biological parameters monitored within each project area depend on the site-specific limiting factors and project objectives. How well the project is meeting objectives is determined through long-term physical and biological effectiveness monitoring. We monitor habitat features at the project level that we expect to be able to improve. For example, we would not expect a significant shift in water temperatures resulting from livestock exclusion over a short stream reach and would therefore not measure this parameter. However, we would expect to see positive changes to vegetation, shade, and eventually large woody debris and would therefore monitor these features over time.

The monitoring strategy of the project works under the assumption that “good habitat supports more fish than poor habitat”. This assumption is backed by decades of science and published

literature. With all things being equal, a system with complex stream habitat and a fully functioning riparian and upland corridor, will support and generate more fish than one with a poor habitat rating. In fact, the entire EDT modeling process used in the subbasin planning effort operates under the assumption that habitat improvements will enhance fish populations (NPPC, Walla Walla Subbasin Plan, 2004, page 129). It is understood, however, that measurable ecological benefits associated with habitat restoration often require years to come to fruition and biological outcomes, fish production in particular, is difficult to directly credit to project level restoration efforts.

RESULTS AND DISCUSSION

Blue Creek (Warriner and Gardner):

This conservation 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 stream length included within the project is approximately 0.25 miles.

The site is at an elevation of approximately 1,800 feet. Residential encroachment in recent years is affecting much of the system both above and below the project area. The valley-bottom within the project area is approximately 200 meters in width with timbered stringer draws on the south side of the stream and grasslands to the north. Stream flows are perennial although very low in late summer. Maximum daily stream temperatures typically exceed 75 degrees (F) for several days in late July of each year. Native redband trout/summer steelhead can be found in the project area throughout the year and one bull trout was found while sampling in October of 1997.

In February of 1996, the Blue Creek Project Area experienced a flood of such dimension that virtually all instream woody debris and riparian vegetation was removed. During and after this event a considerable amount of channel work was done with heavy equipment by private landowners. As a result, much of the stream channel was straightened and channelized which ultimately caused the streambed elevation to drop and a severe head-cut to move upstream through the project area. Two log weirs designed by the local NRCS and constructed in 1997 were undermined and failed because of these activities. In 2004, two grade control structures were constructed to prevent this from reoccurring.

Recovery of riparian vegetation at this site has been excellent. Riparian areas completely devoid of vegetation in 1996 now contain strong stands of various native trees and shrubs. Stream canopy shade has improved throughout the entire project corridor and active erosion has essentially been eliminated. The stream channel remains incised because of a push-up dike on the right bank and natural sloping topography along left side of the stream. This situation prevents access to the floodplain and formation of high-water channels and off-channel habitat. Further results and discussion regarding the Blue Creek Project Area is included in the monitoring section of this report.

1998

2001



2004



Figure 5: Project photo-points on Blue Creek within the project area collected at the same location in 1998, 2001, and 2004. All of the willows shown above the log structures along the left bank and right riparian corridor were placed with the aid of an excavator and stinger in 1998.

Couse Creek (Banks):

Couse Creek is a small tributary entering the mainstem Walla Walla River east of Milton Freewater, Oregon. Dry-land farming and livestock have severely influenced the stream and surrounding upland areas on this stream. Throughout Couse Creek, summer flows are ephemeral leaving isolated pools and reaches with interrupted flow regimes. Native redband trout can be found in Couse Creek during any month of the year and a small population of summer steelhead spawn in the upper reaches of the stream each spring. One bull trout was found downstream of the project area by the CTUIR in August of 1999 (Gene Shippentower, CTUIR Fish Biologist personal communication).

This project is split into two separate reaches on Couse Creek both owned by the same individual. Despite being separated by only two miles, the stream conditions at each site are much different.

The upstream reach of the stream is over-widened which has ultimately led to channel braiding and lack of pool habitat. Years of over-grazing removed all riparian vegetation although some

native willows, cottonwood, and rose are beginning to return to the site. In 1997, several rock barbs designed by the local NRCS were installed in an attempt to reduce bank erosion and allow for the reestablishment of riparian vegetation. The barbs have ultimately proven very effective at protecting the stream bank and vegetation but have left the stream braided, widened, and lacking meander, and pool formation. The project is considering measures to correct this problem in 2008 or 2009.

The downstream reach is extremely incised with the distance from the top of the bank to the water surface exceeding 20 feet in some areas. Stream access to the floodplain is impossible under typical flow regimes and virtually no large wood or off-channel habitat is available. Vertical banks prevent vegetation from growing adjacent to the stream although a considerable amount of trees and shrubs are present along the narrow riparian corridor at the top of the bank. In 2001, the project seeded approximately 32 acres of uplands adjacent to this stream reach with native grasses. The grasses have been very helpful in eliminating various noxious weeds and soil erosion.

Mainstem Walla Walla River (Lampson):

This conservation project 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 generously allowed the CTUIR to work within a wide riparian and upland corridor encompassing approximately 25 acres. River flows here are perennial and stream temperatures are typically 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 a large rock levee along the right bank, decreased pool frequency, channel straightening and thus stream meander, lack of large wood, excessive fast-water habitat, reduced riparian cover, and floodplain function.

In the spring of 2001, the project installed 36 large (41' x 100') black plastic weed barrier tarps purchased from Layfield Plastics Incorporated of Bellevue, Washington. The tarps are designed to eliminate competitive weeds and aid in the maintenance of soil moisture. Each tarp was secured in place by burying the perimeter with topsoil. Small rocks were also arbitrarily positioned on the tarps as additional protection against high winds. The tarps were placed in a random pattern throughout the 20-acre restoration area in an attempt to 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 first and second years with summer watering and hand weeding. Thus far, survival of the plants in the tarps has varied from 60 to 90 percent and growth has been outstanding.

In March of 2004, some maintenance planting was done on the tarps, which included 20 ponderosa pine, 1200 willows, 400 mock orange, 360 ninebark, and 680 snowberry. A contractor was hired to chemically treat cheat grass (*Bromus Tectorum*) in February of 2006. Project technicians periodically treated new infestations of noxious weeds with backpack sprayers throughout each growing season. Technicians also cleared the tarps of any weeds by hand pulling them and mowed around the perimeter of the tarps to help control weeds in June and December of each year.



1998



2001



2004



2006

Figure 6: Photo points taken from a ridge over-looking the mainstem Walla Walla River (Lampson) project area in 1998, 2001, 2004 and 2006.

Couse Creek (Hasso):

This site 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 15-year Conservation Easement with the CTUIR in December of 1999. The Conservation Easement encompasses the stream and entire floodplain on both shorelines for a distance of approximately 1.2 stream miles. The landowner is also enrolled in the Conservation Reserve Enhancement Program (CREP) administered through the United States Department of Agriculture.

This area of Couse Creek has been severely over-grazed by livestock for more than 75 years. The upland slopes that were once dominated by perennial grasses are now mostly comprised of non-native yellow-star thistle (*Centaurea solstitialis*). The riparian and floodplain areas are comprised of sparse stands of annual grasses and a few drought tolerant shrubs. Soils are typically shallow and most of the riparian corridor is comprised of river rock. In recent years, the

stream channel has been dry from late June through mid-November. The site is further complicated by prodigious amounts of streambed material following each high water event because of a dramatic change in valley width within the upper reaches of the project area. The floodplain contains a myriad of high flow and abandoned stream channels indicating that the stream has changed its course many times over the last several decades. Summer steelhead are known to spawn within reaches of the project area and juvenile redband trout/steelhead are found when water is present.

Restoring riparian vegetation to this site is particularly challenging because of the extended summer drought, ephemeral flows, and poor soils. As a result, the project has chosen to focus on “passive restoration approaches” including livestock exclusion and self-watering willow cuttings. Several thousand native willow cuttings were collected nearby on the North Fork of the Walla Walla River and trenched in adjacent to the stream with an excavator during the fall of 2000. Survival of the cuttings was higher than 80 percent the following spring but as summer progressed and stream flows eventually stopped many of the plants began to die. By the summer of 2005, approximately 40 percent of the willows are remaining and dozens of young cottonwood trees, hawthorn, rose, and various other species are beginning to reestablish themselves 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 properly functioning stream channel and floodplain.



1999



2006

Figure 7: Photo-points taken within the project area on Couse Creek (Hasso) in 1999 and 2006. A century of over-grazing, shallow soils, and summer drought make this restoration site particularly slow to recover. The stream is narrowing, however, and vegetative is slowly recovering.



1999



2006

Figure 8: Photo-points taken in 1999 and again in 2006 over-looking the project area on Couse Creek (Hasso).

Patit Creek (Brown Landowner):

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 15-year Conservation Easement with the CTUIR in November of 1999 and is participating in the CREP Program administrated through the United States Department of Agriculture. Timbered stringer draws, shrub species, and grasses are found on the valley slopes to the south while various perennial grasses and invasive yellow star thistle are predominately found on slopes facing to the south. In most years, stream flows are ephemeral during the summer months leaving isolated pools. Despite these conditions, summer steelhead, native red band trout, and various other native fish species are present in good numbers throughout the year.

The area included within the Conservation Easement is approximately two stream miles in length and includes the stream and entire floodplain (exceeding 200 meters in width in some areas) on both shorelines. A livestock exclusion fence was constructed by the project around the entire perimeter (four miles) in 2000.

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, actively eroding and lacking pool habitat and riparian cover. An instream enhancement plan was developed by the CTUIR to address these concerns in 1999 and construction occurred in 2000. The work included eight vortex weirs, two root wad revetments, two keyed logjams, meander bend and point-bar enhancement. Several thousand willow cuttings were also installed at this time by trenching them in adjacent to the stream.

The stream form has remained stable since the instream work occurred in 2000. Large wood placed on point-bars is catching sediment and allowing riparian vegetation to be reestablished. The survival of native willow cuttings trenched in during enhancement activities has been near 100 percent (please see the photo-points below).

A total of 220 pine, 400 willow, 300 mock orange, and 140 ninebark were planted as tublings in the project area in the reporting period. Survival of these plants has not been as successful as hoped because of drought conditions and competition by non-native plant species. Noxious

weed infestations, particularly yellow star thistle continue to be a management challenge that the project is attempting to control with the reintroduction of native grasses and herbicides. Noxious weeds were spot-sprayed by project staff in March and June of each reporting year.

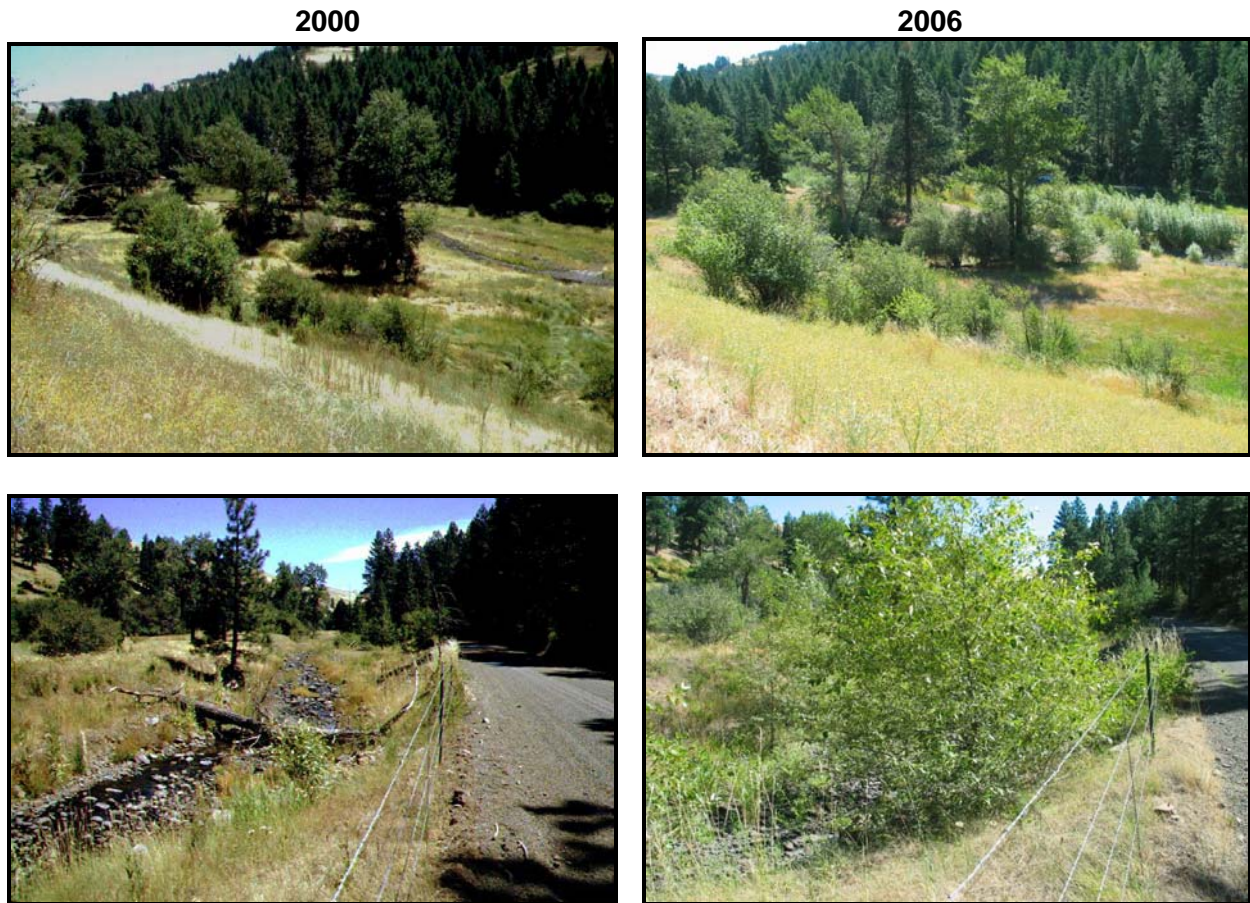


Figure 9: Patit Creek photo points taken in 2000 and repeated in 2006. The willows along the shoreline in the top right photo were planted by the project during instream enhancement activities conducted in 2000.

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 15-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 non-native 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. The stream channel flows along the right bank most of which has been reinforced with large rock. The

stream here is moderately incised, confined by large rock along both shorelines, and is overly straightened.

An early traveler at Whitman Mission very near this site wrote, "The Walla Walla is a pretty stream. It's channel is paved with gravel and sand, and about three rods in width; water two feet deep, running five or six miles the hour, and limpid and cool through the year" (Early Western Travels, Farnham's Travels, 1839). Today flows at the project site are at or very near zero during the summer months. Recent legal agreements resulting from the Endangered Species Act between upstream irrigation districts and the federal government have allowed a minimum amount of water (less than 15cfs) of water to continue downstream. Although this has helped improve stream conditions, flows and stream temperatures are still not meeting the needs of salmonid fishes during many months of the year.

In March of 2002 approximately 10 acres of upland habitat within the project area was seeded to native grasses. The field was irrigated during the first summer and two applications of broadleaf herbicide were applied. In an attempt to strengthen the grass stand the field was no-till seeded again in the spring of 2004. Broadleaf weeds were treated with herbicides twice in 2005 and again in 2006. Some patches of cheat grass remain in the field but these are expected to eventually be crowded out by perennial grasses. The project will continue to apply periodic weed control measures for at least two more years at which time a mixture of native trees and shrubs will be reintroduced.

Main stem Walla Walla River-McCain Landowner:

The project area is located at RM 50 on the mainstem Walla Walla River approximately five miles southeast of the city of Milton Freewater, Oregon. The project signed a 15-year riparian easement with the landowner in February of 2003. The conservation area takes in approximately .25 miles of the stream and includes a riparian buffer of 150-300 feet on both shorelines. The upland area on the south side of the stream (left bank) was most recently used as an apple orchard and includes the landowner's residence and several outbuildings. The apple orchard was removed during the last five years and is now a horse pasture. Historical photos of this area from the early 1900's show dense cottonwood galleries extending several hundred yards out across most of the floodplain. Today the riparian corridor is 60 feet wide at most along both the left and right stream banks. Riparian plants include alder, cottonwood trees, rose and invasive blackberry. 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. These items have since been removed by the project.

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.

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. The stream channel is confined and channel straightening for the purpose of agricultural interests is evident throughout its length. The stream contains virtually no pool habitat or slow-water habitat areas of any kind. The project intends to address limiting in-water habitat conditions in 2007.

Several hundred native plants were planted into the riparian/upland area along the south shore by the project in 2004. The planting procedures followed a planting plan designed by the Oregon Farm Service Agency and included the use of small (one square meter) weed barrier tarps. Despite watering the plants in the summer months, the survival has remained less than 40 percent. The tarps are too small to provide much water conservation or weed control and should not be used for habitat restoration projects. The tarps are replanted each spring as necessary but plant mortality remains high.

Mainstem Walla Walla River-CTUIR:

With 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 Funding and Wildhorse Gaming Resort dollars were used to fund the acquisition. The 46-acre property is located 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. 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 right bank and an abrupt hillside with conifer trees and basalt out-cropping to the south. Limiting factors the project will address include riparian and upland vegetation, floodplain function, and instream habitat quality. No restoration work was done on this property during the reporting period.



Figure 10: Photo looking upstream on the mainstem Walla Walla River within the property owned by the CTUIR.

Project effectiveness Monitoring:

Blue Creek:

Instream habitat enhancement actions provide the project with an opportunity to quickly improve in-water conditions critical to native fishes. Long-term monitoring of parameters such as pool frequency, pool quality, width to depth ratios, large woody debris, and salmonid densities can

help determine the effectiveness of these efforts and guide out-year restoration approaches.

By 2000, the amount of pool habitat had increased to 20 percent of the total surface area (Table 1). This value changed to 25 percent in 2001 and 18 percent in 2006, which is slightly below the management recommendation of the subbasin plan of 20 percent (Walla Walla Subbasin Plan, page 143, Table 7-3). The loss of pool habitat between 2001 and 2006 is the result of a head-cut moving through the project area.

Pool cover is generally lacking within the project area on Blue Creek. Pool rating data collected in 2006 showed that both overhead and instream cover is needed to improve pool quality (Table 2). It is expected that as the riparian vegetation continues to recover and mature in the Blue Creek Subbasin some additional large wood will be come available.

Table 1: The percent of the total wetted area occupied by various habitat unit types. Data was collected on the same project reach of Blue Creek in 2000, 2001, and 2006.

Habitat Unit Type	2000	2001	2006
dry unit	0%	0%	0%
cascade over boulders	0%	0%	1%
cascade over bedrock	2%	2%	3%
glide	15%	9%	15%
lateral scour pool	7%	8%	6%
plunge pool	12%	12%	7%
trench pool	1%	0%	2%
straight scour pool	0%	5%	3%
rapid over boulders	0%	0%	0%
rapid over bedrock	0%	0%	19%
riffle	6%	64%	1%
riffle with pockets	57%	0%	44%

Table 2: Summary of habitat monitoring data collected within the project area (stream survey length of approximately 1,100 feet) on Blue Creek in September and October of 2006.

Monitoring Parameter	2006
Wetted Width	13.6
Bank Full Width (ft) at Cross Section 1	18.8
Mean Bank Full Depth (ft) at Cross Section 1	1.0
Width to Depth Ratio (BFW/Mean of BFD) at X-Section 1	18.8
Number of pools	15.0
Mean Pool Depth (ft)	1.8
Mean Pool Area (sq. ft.)	115.0
Mean pool rating*	2.7
Percent no veg/stable/no erosion	4.0
Percent no veg/unstable/actively eroding	9.0
Percent veg/stable/no erosion	87.0
Percent veg/unstable/actively eroding	1.0
Percent no vegetation	0.0

*Pool ratings:

1. Cover is abundant, pool has excellent instream cover and most of the perimeter of the pool has overhead cover.
2. Cover is intermediate, pool has moderate instream cover and half of the pool perimeter has overhead cover.
3. Cover is lacking, pool has poor instream cover and less than one-fourth of the pool has overhead cover.

Vegetation surveys conducted on Blue Creek characterize the predominant vegetation type beginning at the water's edge and moving up the bank perpendicular to the stream flow to a distance of 65 feet. In 2000, monitoring surveys showed that 45 percent of the riparian areas surveyed contained no vegetation of any kind. In 2005, the percent of these same areas without vegetation had been reduced to just 3 percent (Table 3). The recovery of riparian plants is also improving stream shade. The percent of the stream covered by overhead canopy was on average 6 percent in 1997 but had improved to 55 percent by 2005 (Table 4).

Table 3: Riparian vegetation data summary for Blue Creek Project Area in 2000 and 2005.

Vegetation Cover	2000	2005
% no vegetation	45	3
% annual grasses/herbs	45	45
% perennial grass	0	10
% shrubs	10	12
% deciduous dominated	0	27
% mixed conifer/deciduous	0	3

Table 4: Summary of the percent stream canopy (shade) at three permanent cross sections on Blue Creek in 1997 (pre-project implementation), 2001, and 2005.

Shade Measurement/ Location	1997(pre-pjct)	2001	2005
% stream canopy at covered at X-Section 1	6	34	61
% stream canopy at covered at X-Section 2	8	35	61
% stream canopy at covered at X-Section 3	6	41	43

Electro fishing surveys were conducted within the project area on Blue Creek in 1997, 1998, 1999, and 2006. Within the same survey reach, 29 salmonids were captured (pre-project) in 1997, 66 in 1998, 69 in 1999, and 62 salmonids in 2006 (Table 5). The average minimum and maximum lengths of captured fish increased during this same period. This may be a result of improved habitat conditions for adult fish, particularly large pools. Stream cross-section data for three permanent monitoring points is provided in Figures 11 and 12.

Table 5: Electro-fishing data collected in the same project reach of Blue Creek during the years of 1997, 1998, 1999, and 2006.

Category	1997(pre-pjct)	1998	1999	2006
Total Captured	29	66	69	62
Minimum length	69	65	48	97
Maximum length	259	235	230	277
Average Length	121	147	117	154

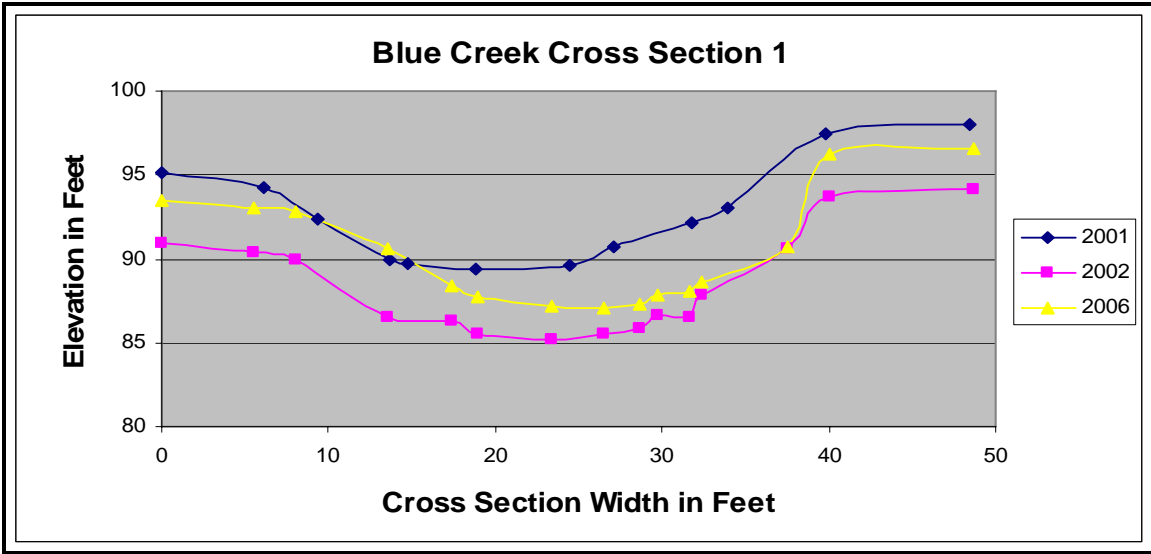


Figure 11: Stream Cross-section data for Blue Creek RM 2.4 collected at cross-section “1” for the period of 1997, 2002, and 2006.

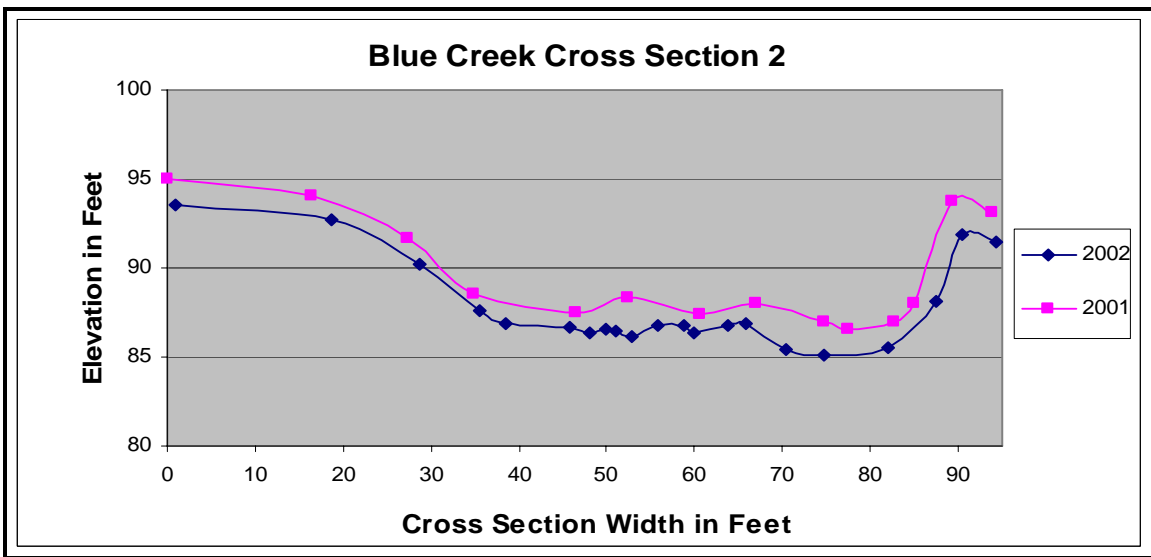


Figure 12: Stream Cross-section data for Blue Creek RM 2.4 collected at cross-section “2” for the period of 1997 and 2002.

Summary of monitoring findings on Blue Creek:

Physical and biological monitoring data collected over the last decade on Blue Creek is documenting a dramatic improvement in habitat conditions. The channel is narrowing and deepening as a result of a now recovering riparian corridor. Shoreline erosion has virtually been eliminated which indicates that riparian vegetation is improving and that sediment transfer and channel form is closer to a proper functioning condition.

The formation and maintenance of pools in Blue Creek continues to be limited by the lack of

stream meander and large woody debris. The stream is unable to laterally migrate because of a push-up levee along the entire right bank and naturally steep topography along the left shoreline. In this confined situation, the stream velocities and riffle habitat have increased over the pre-project condition. The lack of stream meander also prevents the formation of lateral pools critical to both juvenile and adult fish.

Large woody debris is generally lacking throughout the project area. Large woody debris found in streams is primarily the result of a mature riparian forest and unfortunately, most of this material was removed by high water in 1996. Large wood also provides roughness, which encourages the formation of pools, slows the river current during high flow events allowing sediment to drop out and provides needed cover for both juvenile and adult salmonid fish. With time, the amount of large wood in Blue Creek will increase although it may take several decades to see substantial improvements.

The project area is also highly influenced by landowners that have straightened the channel below the project area and removed virtually all riparian and instream cover. This caused a head-cut to move through the project area in recent years, which ultimately destroyed several large pools and increased channel incision.

Finally, Blue Creek like many streams in this region is being heavily impacted by continued development along its banks. Homeowners typically remove riparian vegetation in an attempt to enhance the esthetic value of the property, which leads to bank erosion. Concerned landowners will then armor the shoreline with large rock, which effectively locks the channel in place and begins the process of channel straightening, incision, and loss of pools and lack of floodplain function. County ordinances are desperately needed to protect what little riparian habitat is remaining on private properties in the Walla Walla Basin.

Gose Street Passage Improvement Project:

In 2005, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) in coordination with the Walla Walla Conservation District began the process of securing funding to repair a series of passage barriers at Gose Street on Mill Creek. By the summer of 2006, grants totaling approximately 450,000 dollars were secured through a combination of sources that include the Snake River Salmon Recovery Board, the Walla Walla Watershed Alliance, the Pacific Coastal Salmon Recovery Board, the US Fish and Wildlife Service, and Bonneville Power Administration.

An oversight group comprised of participants from the WDFW, NOAA, the USFWS, the WWCCD, the CTUIR, and Walla Walla County was formed to see that the project design met all of the necessary biological and structural elements. Ultimately, two "pool and chute" type fish ladders were designed to safely allow migration of both juvenile and adult salmonid fish over the series of passage barriers.

All federal permit requirements were coordinated through the Bonneville Power Environmental Group. The CTUIR project leader secured the local and state permits and the WWCCD managed all of the construction contracting. Royse Hydro Seeding and Excavating of Walla Walla was contracted to do all of the construction work and Narum Concrete Construction of Walla Walla completed all of the concrete work

Construction of the new fish ladder began in mid-September and was completed by October 30, 2006. The fish ladder is operating as designed and no juvenile or adult passage concerns have been identified since its completion. There are some minor concerns with stranding in the cement box near the top of the first fish ladder on the left bank and various options for correcting this problem are being discussed. Two additional cement weirs designed to improve passage at the first sheet-pile weir above the bridge are scheduled for construction in 2007. Out monitoring and evaluation for the project site will be conducted by the CTUIR Monitoring and Evaluation Project.



Figure 13: This pre-project photo was taken in 2004. In this condition, migrating salmonid fish were unable to negotiate the series of structures under most flow conditions.



Figure 14: The photo was taken in late October of 2006 shortly after both new fish ladders were

completed. The new ladder meets state and federal passage criteria for both juvenile and adult migrating fish in Mill Creek.



Figure 15: Photo of completed fish ladder at Gose Street during high flows.

ADDITIONAL ACCOMPLISHMENTS

- Coordinated with various local, state, and federal agencies in the prioritization and selection of habitat restoration sites;
- Conducted on-site visits with landowners;
- Developed and met with project design team for Gose Street Passage Project.
- Began development of Gose St. Passage Improvement Project design; completed contract with Cooper and Associates (design engineering);
- Secured \$50,000 in cost share from the Walla Walla Watershed Alliance (NRCS funding) to be used for the Gose Street Passage Improvement Project;
- Secured \$127,000 from the Snake River Funding Board for the Gose Street Passage Improvement Project.
- Secured approximately \$250,000 dollars in cost-share from the BPA for the Gose Street Passage Improvement Project.
- Met with Priority Projects group (WWCCD, TSS), developed project strategy for 2005, and 2006;

- Provided written comments on habitat related projects for Pacific Coastal Salmon Dollars;
- Completed all state, federal, and local, environmental clearances for the Gose Street Passage Improvement Project. This included clearances with NOAA, USFWS, NEPA, cultural clearances, the WDFW, and Walla Walla County.
- Completed RPA Metrics and herbicide reporting as per BPA requirements;
- Developed annual statement of work and budget as per BPA requirements. This exercise also required a budget by month, annual budget, spending plan, work schedule and metric reporting.
- Completed all quarterly and annual Pisces and written reports;
- Provided written/verbal comments to ODFW, WDFW, and Walla Walla County regarding various proposed instream/upland activities impacting salmonid habitat;
- Coordinated with participating landowners in meeting their concerns, project objectives, future tasks, etc.
- Completed all Pacific Coastal Salmon Reports;
- Attended basin strategy, planning, and funding meetings;
- Provided tours of project restoration areas to the NWPPC, BPA, and others as needed;
- Collected project effectiveness monitoring data during the months of July and August of each reporting year;
- Secured more than \$57,000 in Pacific Coastal Salmon Funding for the removal of a rock levee within the floodplain near McDonald Road on the mainstem Walla Walla River.
- Developed project design and secured all state and federal clearances for the removal of the levee at McDonald Road.
- Developed and mailed out contract bid request, selected contractor, and implemented removal of the McDonald Levee in November of 2006. More than 2000 cubic yards of rock in the levee was moved out of the floodplain as part of this effort. The Tri-State Steelheaders provided cost-share in the form of post-project planting at this site.

CONCLUSION

A multitude of factors have led to the extinction of salmon and severe reduction of summer steelhead in the Walla Walla River Basin. Nevertheless, irrigation withdrawals and inadequate passage conditions have been the most damaging. There is 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. With time, education, and continued funding, many of the obstacles now facing salmon can be eliminated. 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 conducted appropriately. 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 participants including native fish and wildlife. Stream buffers and zoning laws that protect riparian areas from further development are desperately needed. County land management plans must recognize the need to restrict development of critical riparian and wetland areas, this is currently not happening. Minimum stream flows should be maintained to protect critical spawning, rearing, and migration periods. Moreover, with ever-increasing amounts of dollars invested by state and federal agencies, particularly farm programs; it is imperative that funding aimed at helping native fish be directed toward projects that will provide the greatest benefit.

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